



ENVIRONMENTAL MANAGEMENT PLAN

Amazonia Rice Investment Inc. (Johanna)



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Environmental Consultant

For: Amazonia Rice Investment Inc.

Date: December 29, 2022

SUSTINERI Technology

Acknowledgements

Sincere gratitude is extended to the following individuals and agencies listed below for their assistance and support in enabling the timely completion of the Environmental Management Plan for submission to EPA as per requirement process in obtaining a Variance for an Environmental Authorisation (Permit) for an existing or registered operation. These individuals and agencies include:

- Ms. Kulina Laljeit (Quality Manager, Nand Persaud & Company Ltd.)
- Mr. Pooran Shivdyal (Project Development & Automation, Nand Persaud & Company Ltd.)
- Mr. Seseupaul Jhagroo (Chief Security Officer/ Investigator, Nand Persaud & Company Ltd.)
- Mr. Irving Michael Ramalho (Production Manager, Amazonia Rice Investment Inc.)
- Kaizen Environmental Services (Guyana) Inc. (Water Quality Laboratory Analysis)
- Ministry of Agriculture Hydrometeorological Service (Provision of Climate Data)
- Ms. Quinita Friesco (GIS Specialist)
- Ms. Anne Bascom (Administrative Assistant/ Proof Reader)
- Mr. Shawn Manfield (Field Assistant/ Transportation)
- Mr. Seion Layne (Transportation)

Cover Photo compliments of Nand Persaud & Company Ltd (2022)

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Acronyms

\$	Dollar	GRDB:	Guyana Rice Development Board
°C	Degree Celsius	GYD:	Guyana Dollars
µg/m³:	Microgram per cubic metre	Hrs:	Hours
BOD:	Biological Oxygen Demand	ISO:	International Organisation for Standardization
Cap:	Chapter	ID:	Identification
CEMP:	Construction Environmental Management Plan	kg:	Kilogram
CPR:	Cardiopulmonary Resuscitation	km:	Kilometers
CRB:	Carlene Roscina Bascom	kW:	Kilowatt (the real Power)
dB:	Decibels	L:	Litres
EHS	Environmental Health & Safety	LCDS:	Low Carbon Development Strategy
EIA:	Environmental Impact Assessment	Mm	Millimeters
EMP:	Environmental Management Plan	mg/L:	Milligram per litre
EPA:	Environmental Protection Agency	MoA:	Ministry of Agriculture
ERP:	Emergency Response Plan	MT/h:	Metric Ton per hour
ES:	Environmental Statement	NA	Noise Level & Air Quality
ESIA:	Environmental Social Impact Assessment	NDC:	Neighbourhood Democratic Council
FAO:	Food and Agricultural Organisation	NDS:	National Development Strategy
ft:	Feet (unit of measurement)	NEAP:	National Environmental Action Plan
GFS:	Guyana Fire Service	No.	Number
GHG:	Green House Gases	NIS:	National Insurance Scheme
GL&SC:	Guyana Lands & Survey Commission	O&G:	Oil and Grease
GNBS:	Guyana National Bureau of Standards	OEMP:	Operational Environmental Management Plan
GPL:	Guyana Power & Light	OS&H:	Occupational Safety & Health



pH:	Potential of Hydrogen
PM:	Particulate Matter
PPE:	Personal Protection Equipment
TSS:	Total Suspended Solids
UNCCD:	United Nations Convention on Combating Desertification and Land Degradation.
UNDEP:	United Nations Environment Programme
UNFCCC:	United Nations Framework Convention on Climate Change
USDA:	United States Department of Agriculture
WHO:	World Health Organisation
WMP:	Waste Management Plan
WQ:	Water Quality

Document Quality Control

Amazonia Rice Investment Inc.

Document Title	Prepared by:	Version	Dated	Status
Environmental Management Plan	CRB	1	December 29, 2022	Submitted

Please take note that Document Quality Control is the cornerstone of quality, compliance, environmental health & safety (EHS) and process Excellence. (Fraser, 2020) The methodology of Document Control plays an important role in tracking the creation, revisions and distribution of the said Document with Consistency and efficiency.

1 Introduction

1.1 Overview

Name of Business:	Amazonia Rice Investment Inc.
Business Address:	70-71 Johanna, Black Bush Polder, Corentyne Berbice
Developers' Names:	Mr. Mohindra Persaud & Mr. Ragindra Persaud
Sector of Operation:	Rice Milling
Region 6:	East Berbice - Corentyne
GRDB Licence to Manufacture Rice:	<u>Licence No.:</u> 9, <u>Mill No.:</u> 278
Certificate of Incorporation No.:	7371
Transport:	Number 655/2013 <u>Dated:</u> July 8 th 2013
Date of Operations Commencement:	February 26 th 2013
Office Telephone No.	(592) 337-2402
Email:	quality@karibeerice.com

This Operation Environmental Management Plan (OEMP) is provided by Amazonia Rice Investment Inc. in compliance with the condition of:

- a) The EPA Correspondence Letter to the Amazonia Rice Investment Inc. dated May 27th, 2022 (as part of the review process for **Variance of Environmental Authorisation (Permit) Reference Number 20150331-MPRMD** submitted December 1st 2021) which requires the submission of an Environmental Management Plan (EMP) for the operation of the Rice Mill and Parboil Plant.

1.2 Background

In Accordance with the requirements and stipulation of the Environmental Protection Act Cap 20:05, 1996 (Amended 2005) Amazonia Rice Investment Inc. (Johanna, Black Bush Polder) applied to the Environmental Protection Agency (EPA) for a **Variance of Environmental**

Authorisation (Permit) Reference Number 20150331-MPRMD. The said Application accompanied with a Project Summary and other requirements was submitted to the EPA on December 1st 2021 for approval and the issuance of the new Permit.

During the processing of the Variance application, the Guyana EPA governed by the Environmental Protection Act Cap 20:05, 1996 (Amended 2005) reserves the right for further processing requirements based on the possible environmental impacts that can result from a given operation. Therefore, in light of this, the possible documentations required for further processing to ensure environmental protection safeguards are namely an:

- Environmental Statement (ES)
- Environmental Management Plan (EMP) or
- Environmental Impact Assessment (EIA)

The EPA upon review of the Amazonia Rice Investment Inc. variance application, informed the Company by way of correspondence dated May 27th, 2022 (*Please refer to **Appendix 1** for EPA Correspondence Letter*) determined that preparation of an Environmental Management Plan (EMP) was required for the approval and issuance of a new Environmental Authorisation Permit for Amazonia Rice Investment Inc.

In compliance with the Guyana EPA, an Operational Environmental Management Plan (OEMP) has been prepared, for submission to the EPA for approval and issuance of a new Environmental Authorisation Permit to Amazonia Rice Investment Inc., Johanna, Black Bush Polder; East Berbice - Corentyne

1.3 Definition of an EMP

An Environmental Management Plan (EMP) is a working dynamic written document which basically outlines mitigation measures and principles for the management of various operations in order to reduce potential negative impacts to the environment. The environmental measures implemented should also take into consideration feasible options in order to **factor in** viable sustainable and economic elements.

According to the EPA Guyana, an Environmental Management Plan (EMP) can be defined as “An environmental management tool used to ensure that undue or reasonably avoidable adverse

impacts of the construction, operation and decommissioning of a project are prevented, and that the positive benefits of the projects are enhanced” (EPA Guyana, 2013) (Lochner, 2005) or otherwise defined according to (World Bank, 1999) as “An outline of the mitigation, monitoring, and institutional measures to be taken during project implementation and operation to avoid or control adverse environmental impacts, and the actions needed to implement these measures.”

1.3.1 Types of EMP

An EMP document can be utilised throughout the life cycle of a given project to achieve practical environmental management measures to minimise environmental impacts during all phases of the life cycle of a project. (Baby, 2011)

Therefore, the three types of EMP prepared for the life cycle of a project are as follow:

- Construction Environmental Management Plan (CEMP) - for the Construction Phase
- Operations Environmental Management Plan (OEMP) - for the Operation Phase
- Decommissioning Environmental Management Plan - for the Decommissioning Phase

(Baby, 2011) (DEAT, 2004)

According to (DEAT, 2004), the difference between the three types of EMPs for a project is related to the difference in the mitigation measures required for the different phases of the life cycle of the project. In this context of the report therefore, it is understood that the operational phase of the EMP provides specific guidance as it relates to the operational activities associated with a particular development. The OEMP specifics the roles and responsibilities for mitigation, monitoring and performance assessment for the operational life of the development. (DEAT, 2004)

1.4 Purpose of the EMP

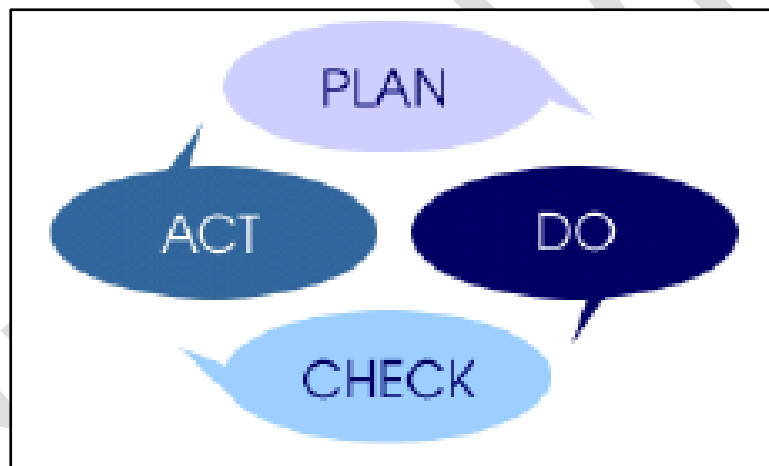
An Environmental Management Plan is recognised as a tool that can be used to provide assurance to the Regulating Agency, that Developers make suitable provisions for counteracting negative impacts that may occur through the project implementation and operation phase (EPA Guyana, 2013). Furthermore, an EMP executed with proper implementation mechanisms such as monitoring, record keeping and pollution abatement measures, will result in improved environmental performance of an operation.

According to the USA EPA (New England), The EMP features the "Plan, Do, Check, Act" model (Please refer to **Figure 1**) for any ongoing development which consist of:

- Planning (**Plan**) - identifying environmental impacts and establishing environmental goals.
- Implementing (**Do**) - training and establishing operational controls.
- Checking (**Check**) - auditing, monitoring and corrective actions.
- Reviewing (**Act**) - progress reviews and taking actions.

(Baby, 2011)

Figure 1: EMP Cycle Model



Source: (Baby, 2011)

Therefore, in terms of the purpose, this OEMP has been prepared primarily to:

- ❖ Comply with the conditions for the Issuance of a new Environmental Authorisation (Permit) by the Guyana EPA based on the variance application.
- ❖ Provide an Overview of potential environmental impacts of Amazonia Rice Investment Inc. Operation.
- ❖ Describe the Mitigation measures to protect and minimise any adverse impacts to the Environment.

Thus, the key overriding principles when preparing an EMP document are as follow:

- The EMP document should provide a description of the methods and procedures for mitigating and monitoring impacts.

- The EMP should be balanced, objective and concise, and be easily understood by other parties.
- The EMP provides a framework to assist with compliance, improvement and knowledge sharing (training).
- The EMP should consider the Sustainable Development concept in preparation and implementation.
- The EMP document should be guided by ethics and quality, catering for record keeping, and professional integrity during preparation and implementation.
- The EMP document should also:
 - Ensure responsibility for the content and commitments contained in the plan.
 - Set out environmental objectives and targets which the developer needs to achieve in order to reduce negative impacts.
 - Include adaptive management strategies and a description of the methods and procedures for mitigating and monitoring impacts and,
 - State any limitations that apply.
 - Be dynamic, flexible, responsive and integrate across the operation

(DEAT, 2004) (Environmental Management Plan Guidelines, 2014) (Baby, 2011) (Lochner, 2005)

Consequently, once properly prepared and implemented, a well-developed EMP can provide development with a number of benefits which consist of the following:

- Minimise environmental liabilities (including monetary fines for non-compliance);
- Maximize the efficient use of resources;
- Demonstrate a good corporate image;
- Build awareness of environmental concern among employees;
- Gain a better understanding of the environmental impacts of operation activities; and
- Increase profit, improving environmental performance, through more efficient operations.

(Jandakot Airport, 2011)

1.5 Scope and Objectives of the EMP

The Environmental Management Plan was developed to cover the Operation activities of Amazonia Rice Investment Inc. Johanna, Black Bush Polder to:

- Be in compliance with the requirements and conditions for approval for the issuance of an Environmental Authorisation Permit for an Existing Operation from the EPA.
- Develop a working Environmental management tool to implement at Amazonia Rice Investment Inc. during operation.
- Provide an overview of Amazonia Rice Investment Inc. operations to determine permit conditions by the EPA.
- Outline the relevant Legislation's, Policies, Permits governing the Environmental and Operation Compliance of the Mill
- Identify the environmental issues/risks associated with the operation
- Provide the context of the local and regional environment
- Provide a means to implement appropriate and feasible mitigation measures to avert environmental pollution from the Rice Mill and prevent long term environmental degradation.
- Estimate the Cost of proposed measures
- Establish an Emergency Response Plan in the event of an emergency
- Establish an Environmental Monitoring Programme (Documentation and Reporting)
- Contribute to the environmental awareness of the workforce.
- Assign roles and responsibility for the implementation of the EMP, and ensure commitment to the implementation of mitigation measures.
- Facilitates progress towards environmental targets and acts as a tool for continual improvement of environmental performance.

(Veolia, 2017) (DEAT, 2004) (EPA Guyana, 2013)

The EMP document therefore, as a guideline tool will assist the Developer to maintain adequate control over the project operation in order to minimise the potential environmental impact of the Rice Mill operation activities. As a consequence Amazonia Rice Investment Inc. operation activities will be maintained at an environmentally acceptable level.

1.6 Components of the EMP

According to the (World Bank, 1999) there is no standard format for EMPs. Therefore, any format used would need to accommodate the circumstances in which the EMP is being developed and the requirements for which it is designed. Furthermore, the EMP should be formulated in such a way that it can be easy to use. (World Bank, 1999).

EMPs should typically contain and address the following components/ aspects:

- ❖ Summary of Impacts
- ❖ Description of Mitigation measures
- ❖ Description of Monitoring programme
- ❖ Institutional Arrangements
- ❖ Implementation schedule and reporting procedures
- ❖ Cost estimates and sources of funds

(World Bank, 1999)

Consequently, the OEMP developed for the Amazonia Rice Investment Inc, has taken into consideration during preparation the components outlined above by the World Bank. The additional components listed below, have also been covered:

- Brief description of project Operation
- Waste Management Plan (WMP)
- Emergency Response Plan (ERP)
- Additional Environmental Programme
- Closing Statement/ Recommendations

1.7 Development of EMP

Monitoring, implementation, and supervision are fundamental aspects to the successful execution of this OEMP. It is important therefore, that the implementation and monitoring of this OEMP are adhered to by Amazonia Rice Investment Inc. (the Developer). Consequently, all potential impacts, mitigation measures and procedures to be implemented, which are outlined and described within this OEMP document, will be the responsibility of the Amazonia Rice Investment Inc. The

Rice Mill will take every step to adhere to the OEMP and appoint oversight personnel for the implementation, monitoring and dealing with Environmental related matters.

This Operation Environmental Management Plan (OEMP) has been prepared by Ms. **Carlene Roscina Bascom, Environmental Consultant** for the Rice Mill operations on behalf of the Amazonia Rice Investment Inc., Johanna Black Bush Polder. The OEMP has been developed in accordance with EPA Guyana guidelines to establish specific safeguards and controls to be employed at the design, development and operations phase. It provides environmental management guidance to the Rice Mill operation and assigns oversight responsibilities to specific personnel.

This Environmental Management Plan is provided by Amazonia Rice Investment Inc. in compliance with the condition process for a **Variance of Environmental Authorisation (Permit) Reference Number 20150331-MPRMD** (in accordance with EPA's Guidelines for the Preparation of Environmental Management Plan). The EMP document for the Operation will assist in the decision making process of the Agency to determine the conditions under which the new Permit will be approved and granted in accordance with the Environmental Protection Act 1996.

1.8 Company Profile

Amazonia Rice Investment Inc. is located at Johanna, Black Bush Polder Region 6 (East Berbice – Corentyne). The Rice Mill is approximately **150 km (93.21 miles) from Georgetown** and **approximately 51.7 km (32.125 miles) from New Amsterdam** (Google Maps) The milling capacity of the Rice Mill is approximately **10.0 MT/h (Metric Ton per hour)**, *Please refer to Appendix 2 for GRDB Licence to Manufacture Rice.*

Historically Amazonia Rice Investment Inc. was launched on February 26th 2013 by Nand Persaud & Company Ltd and has since 2013 been operating as a commercial business venture in the Rice Milling Sector, processing harvested rice paddy. Producing Rice Products for retail both for the local and international consumer markets. It's vision as a subsidiary of the by Nand Persaud & Company Ltd is *to improve the quality of Karibee Rice on a daily basis and to spread ...it to every corner of the globe* (Nand Persaud & Company Ltd., 2019).

Amazonia Rice Investment Inc. (Johanna)

Environmental Management Plan

The estimate annual turnover for the Rice Mill is \$215,876,788 Million GYD. Comprising 60,000 bags at 65 kg Parboil, 90,000 bags at 65 kg White Rice, 6,000 bags at 32 kg White Bran, 1,500 bags at 32 kg Parboil Bran, 750 bags at 45 kg Broken Parboil and 4,500 at 45 kg Broken White Rice. This is partly possible due the Capital investment of estimated \$198,000,000 GYD for the Parboil Plant. Resulting in the construction of the Parboil Plant being completed in July 24th 2021.

Therefore, in keeping with our contribution to Guyana's economy and responsibility to the environment, Amazonia Rice Investment Inc. prides itself in producing quality products at reasonable competitive prices while ensuring compliance with Environmental standards and practices.

2 Legal Framework and Policy

Amazonia Rice Investment Inc. operations fall under the jurisdiction of the laws of the Co-operate Republic of Guyana. The relevant legal requirements, national policies, guidelines, regulatory bodies governing the implementation, operation and efficient management of the Rice Mill are outlined and explained in this chapter.

2.1 Policies, Strategies and Plans

A number of key policies, strategies & plans established to guide development activities in Guyana in an effort to ensure that natural resources and agricultural lands are sustainably utilized, and environmental impacts minimized are as follow:

2.1.1 Low Carbon Development Strategy (LCDS) 2030

Guyana's Low Carbon Development Strategy **2030** (Draft Consultation October 2021 – July 2022) is the current revision of the Low Carbon Development Strategy (LCDS). Initially, the LCDS was launched June 2009. After a series of consultations, revised versions of the document were published in 2010 and 2013. The LCDS 2030 document sets out Guyana's effort to build a low carbon economy in Guyana through low-carbon energy; employment and development opportunities; a transformation of digital, marine and transportation infrastructure; and massive investment in adapting to the impacts of climate change.

Additionally, LCDS 2030 will focus as mentioned to create new low-carbon economy, built on the platform provided by the Monitoring, Reporting & Verification System (MRVS) and other areas of enhanced capacity in Guyana. The LCDS 2030 Draft will establish incentives, which value the world's ecosystem services, and promotes these as an essential component of Guyana's new model of global development with sustainability at its core.

The LCDS 2030 addresses four (4) objectives as follow: forest climate services and other Ecosystem Services, stimulate future growth through clean energy and sustainable economic activities, protect against climate change and align with global climate goals. In order to achieve the afore mention objectives the LCDS 2030 will promote same through Human Capital, Financial Capital, Physical Capital, and Natural Capital. It should be noted that all the areas above will be explored and advanced during the LCDS national consultation period ongoing. (LCDS, 2022)

2.1.2 National Development Strategy (NDS) 2001-2010

The National Development Strategy, 2001 – 2010 was developed to achieve Guyana’s national economic development, social harmony and well-being. Therefore, taking this into consideration, the strategy sets out a number of objectives and strategies to meet the goal of socio-economic development across different sectors, inclusive of the agricultural sector. These objectives are to attain high rates of economic growth in order to eliminate poverty in the country; achieve geographical unity; attain equitable geographical distribution of economic activity; and to diversify the economy. (Laws of Guyana)

2.1.3 National Environmental Action Plan (NEAP) 1994

The National Environmental Action Plan (NEAP), was developed in 1994, to identify the major environmental problems in the country and to formulate appropriate policies to address those problems. The plan further outlined the main environmental policy objectives for the sound management of the environment and natural resources. Twelve stated policy objectives were outlined, one of which called for the conduct of environmental assessments for proposed development activities that may significantly affect the environment. In keeping with this environmental policy objective, the Environmental Protection Act was enacted in June 1996 and includes the legal framework for undertaking an environmental impact assessment. (Laws of Guyana)

2.2 Legislation

The main legislation’s governing the operation of Amazonia Rice Investment Inc. are discussed as follows:

- Environmental Protection Act (1996)
- Environmental Protection (Authorisations) Regulations (2000)
- Environmental Protection (Water Quality) Regulation 2000
- Environmental Protection (Air Quality) Regulation 2000
- Environmental Protection (Hazardous Waste Management) Regulation 2000
- Environmental Protection (Noise Management) Regulation 2000
- Environmental Protection (Litter Enforcement) Regulations 2000
- Pesticides and Toxic Chemicals Control Act (2000)

- Occupational Safety & Health Act (1997)
- Labour Act (1942)
- National Insurance and Social Security (1969)

2.2.1 Environmental Protection Act (1996)

The Environmental Protection Act Cap 20:05 act no. 11 of 1996 (**amended by act no. 17 of 2005**), which established the Environmental Protection Agency and its functions, is the principle act which governs the environmental regulatory framework of Guyana.

The Act provides for the management, conservation, protection and improvement of the environment and governs the prevention and control of pollution; the assessment of potential impacts from economic development on the environment through the development of an Environmental Impact Assessment (if required). These methods, procedures, and criteria are mandated by law to cater for the need for the preservation and stability of the eco-systems, diversity of species and to protect and improve human welfare, and the environment.

To assist in the effective management of the environment, the Environmental Protection Act has accompanying **regulations** which aids in governing environmental protection in Guyana. These regulations are as follows:

- Environmental Protection (Authorisations) Regulations 2000
- Environmental Protection (Water Quality) Regulations 2000
- Environmental Protection (Air Quality) Regulations 2000
- Environmental Protection (Hazardous Wastes Management) Regulations 2000
- Environmental Protection (Noise Management) Regulations 2000
- Environmental Protection (Litter Enforcement) Regulations 2013

(Laws of Guyana)

2.2.2 Environmental Protection (Authorisation) Regulations 2000

These Regulations outline the procedure and requirements for the issuing of Environmental Authorisations (Permit) for any developmental activity which may possibly have adverse impacts on the environment, and the renewal of such permits. The Environmental Authorisation issued would stipulate permitted conditions for ensuring and maintaining the environmental integrity of

the area throughout the life of the operation. After issuance of the permit, the operation is hereafter monitored by the EPA to ensure compliance. It should be noted that this EMP Report Document is a direct result of the Environmental Authorisation decision making process governed under the laws of Guyana. (Laws of Guyana)

2.2.3 Environmental Protection (Water Quality) Regulation 2000

The water quality regulation was established to protect Guyana's inland/ coastal waters by controlling effluent discharge. This regulation requires that any developer involved in any operation, construction, modification/ extension of facilities discharging effluents must apply for an **Environmental Authorisation**. The regulation states that effluents discharged in inland/ coastal water or land shall not exceed established discharge parameter limits set by Guyana National Bureau of Standards (GNBS) (Laws of Guyana). The GNBS Effluent discharge parameter limits are indicated in *Table 1* below:

Table 1: General Environmental Guideline Values for Effluent Discharge

Categories	GNBS Limits
pH	5.0 – 9.0
Temperature	< 40°C
BOD for 5 days	< 50 mg/L
COD	< 250 mg/L
DO	--
TSS	< 50 as TSS
N as NH₃	< 10 mg/L
Total N	--
Phosphorous (P)	< 2 mg/L
CN Total (Cyanide)	< 1 free: 0.1
Phosphate (PO₄⁻)	--
Chlorine (Cl)	< CL: 0.2
Surfactant	--
Phenols	< 0.5 mg/L
Coliforms	< 400 MPN per 100 mls

Oil and Grease (O&G)	< 10 mg/L
---------------------------------	-----------

Source: (GNBS, 2002)

The provisions reiterate the establishment of sampling points; effective keeping of records; reports on effluent discharges, water quality and biological integrity; management of spills/ accidental discharge and encouragement of proper disposal/ treatment of effluents discharge. Amazonia Rice Investment Inc. will ensure adherence to **the water quality regulations** through the implementation of appropriate measures to keep possible discharge within the prescribed limits set by the GNBS. This will not only help to protect the environment, but will also ensure that the activities are conducted in keeping with the legal requirements of Guyana.

2.2.4 Environmental Protection (Air Quality) Regulation 2000

The air quality regulation outlines the requirement to limit and control the amount of air pollutants emitted into the atmosphere. The regulation requires that any Developer involved in any construction, installation, operation, modification/ extension of any facility that emits air contaminant must apply for an **Environmental Authorisation**. The regulation also states the air contaminant for which parameter limits are to be established. (Laws of Guyana)

There are no air quality parameter limits established to date in Guyana. However, Amazonia Rice Investment Inc. will ensure that their operations are controlled and restricted to a minimum emission value, through the implementation of appropriate measures to protect the health of workers and the environment. The Company will be guided by the International ambient air quality standards recommended and used by the EPA to show its commitment to a healthy work environment.

2.2.5 Environmental Protection (Hazardous Waste Management) Regulation 2000

The hazardous waste management regulation was developed with the primary aim of protecting the environment by controlling hazardous waste discharges. The regulation requires that any Developer involved in any operation that generates, transports, treats, stores or disposes of hazardous waste, must submit an application for an **Environmental Authorisation**. The regulation also stipulates and outlines the provisions for reporting; record keeping; emergency

preparedness planning; and transportation of hazardous waste, while at the same time encouraging Developers to utilise appropriate disposal/ treatment mechanisms of hazardous waste identified in the regulation. (Laws of Guyana)

Amazonia Rice Investment Inc. will take all precautionary measures required to ensure the safe handling and disposal of hazardous material/ substances utilised in the different stages of the operations. This will be done in an effort to ensure that the integrity of the environment is protected, and that all workers and nearby residents are also protected from negative health-related implications.

2.2.6 Environmental Protection (Noise Management) Regulation 2000

The environmental protection (noise management) regulation manages and controls noise emissions within Guyana. This regulation requires that any Developer involved in any operation, construction, installation, modification/ extension of a facility that emits noise must apply for an **Environmental Authorisation** from the Agency (EPA). The regulation also stipulates that noise decibel levels must be in accordance with the established permissible noise level/ limits set by the Guyana National Bureau of Standards (GNBS), and which have been adopted by EPA (Laws of Guyana). The permissible Noise levels are indicated in **Table 2** below:

Table 2: GNBS Guideline Values for Noise in Specific Environment

Categories	Daytime Limits in dB (06:00 – 18:00hr)	Night time Limits in dB (18:00 – 06:00hr)	
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 – 01:00hr	100
		01:00 – 08:00hr	70

Source: (GNBS, 2010)

Amazonia Rice Investment Inc. will take all necessary action to ensure adherence to the stipulated noise regulation, by the implementation of measures, to maintain minimal noise levels to protect the environment and to safeguard the health of workers.

2.2.7 Environmental Protection (Litter Enforcement) Regulations 2013

The Litter Enforcement regulations address among other aspects, litter offences, penalties and the power of the Local Authority to enter premises and to remove derelict vehicles. The Regulations are enforced by the EPA through its recently established Enforcement and Compliance Division.

Under the Litter Regulations, it is an offence to litter in a public place, and persons found guilty of littering shall be liable to a fine of between fifty to one hundred thousand dollars (\$50,000 - \$100,000) or three months' imprisonment (Laws of Guyana). Amazonia Rice Investment Inc. will ensure adherence to the stipulated litter enforcement regulations by implementation of measures, where necessary, to protect the environment from solid waste pollution at the facility.

2.2.8 Pesticides and Toxic Chemicals Control Act (2000)

The Pesticides and Toxic Chemicals Control Act no. 13 of 2000, resulted in the establishment of the Pesticides and Toxic Chemicals Control Board, which is intended to regulate the manufacture, importation, transportation, storage, sale, use and disposal of pesticides and other toxic chemicals. In this Act, toxic chemicals refer to "any disinfectant or any other substance known to be poisonous, corrosive, irritating, capable of causing a sensitive reaction, or sensitive to man or animal which is used in agriculture, the arts, commerce or industry or for any domestic or other purposes" (Laws of Guyana). As a consequence, Amazonia Rice Investment Inc. will take every precaution in the proper use and storage of any chemicals used in the day to day operation at the facility.

2.2.9 National Insurance and Social Security Act (1969)

The National Insurance and Social Security Act Cap 36:01 establishes the national insurance and social security system, which covers and protects workers. The persons/ individuals to be insured under this act by payment of contributions must be sixteen (16) years and older, under sixty (60) years of age, self-employed, and gainfully employed. The national insurance and social security system provides benefits for old age, invalidity, survivors' benefits, sickness, maternity, funeral

and industrial benefits (Laws of Guyana). Amazonia Rice Investment Inc. intends to comply with Guyana's social security laws to ensure the welfare of all the staff employed by the Company.

2.2.10 Labour Act (1942)

The Labour Act Cap 98:01 provides for the establishment of the Department of Labour, for the regulation of the relationship between the employer and the employees. The Act stipulates and establishes procedures regulating wages paid; minimum rate wages payable; hours of work; the rights and obligation of the employees; and provides for settlement of differences between employees and employers (Laws of Guyana). Amazonia Rice Investment Inc. intends to comply with Guyana labour laws and policies to protect and safeguard the welfare of all the staff employed by the Company.

2.2.11 Occupational Safety and Health Act (1997)

This OSH Act Cap 99:06 provides for the registration and regulation of industrial establishments/operation to ensure the occupational safety and health of workers, and inevitably prevent, as far as possible, avoidable injuries due to negligence and/or oversights in safety. The Act stipulates that companies and employers must ensure that measures are implemented to ensure the safety of all operating facilities and machinery, the provision of adequate ventilation, lighting, sanitary facilities and access to potable water; the identification of hazardous chemicals, physical and biological agents to be used during operations of the facility, and regulation of both the usage and storage of these (Laws of Guyana). Amazonia Rice Investment Inc. fully intends to comply with the OSH Act to protect and safeguard the welfare of all the staff employed by the Company.

2.3 Permits/Licences

The permits/licenses/certificates issued by the Guyana Rice Development Board and the Environmental Protection Agency as required for the operation of a Rice Mill in Guyana are:

2.3.1 Environmental Permit

The Environmental Protection Act 1996 under *Part 4 Environmental Impact Assessment Section (11)* and the Environmental Protection (authorization) Regulation 2000 under *Part 2 General Section (12) and Part 3 Power to Grant Environmental Authorization Section (17)*; requires that an environmental permit must be issued by the Agency (EPA) to any project which may

significantly affect the environment. The Permit is issued by the Agency upon review and analysis of the application for an Environmental Authorization and other relevant documentations requested by the EPA. Such documents include the Environmental Management Plan (EMP) or Environmental Social Impact Assessment (ESIA); which is submitted by the Developer. The holder of the permit is required to take all the necessary steps to minimize, prevent and/ mitigate adverse environmental impacts from the operation. (Laws of Guyana)

2.3.2 GRDB Licence

Any Developer desirous of engaging in Rice production activities and/ export of rice products will first need to apply to the GRDB for the issuance of the particular licence. The application submitted to the GRDB must be accompanied with the necessary requirements for processing by the Board. It should be noted that any Miller conducting activities without the relevant licence would be in contravention with the Laws of Guyana and subject to penalties. The Issuance of a GRDB license is governed by the Laws of the Co-operative Republic of Guyana as follow:

- ❖ Guyana Rice Development Board Act 1994 Cap. 72:01 - Part V (Regulation of Rice Factories and Manufacturing of rice), Part VI (Regulation of Marketing and Export of Padi, Rice etc.) and Part VII (Offences, Penalties and Procedure).
- ❖ Rice Factories Act 1998 Cap 95:05 revised 2002 - which governs the establishment of rice factories, the regulation and control of rice factories, and the manufacture of rice.

The License issued by the GRDB are as follow:

- Manufacturing Permit Licence (to process and manufacture rice products)
- Grading Padi and Rice Licence (for a licence grader)
- Export Licence (for padi, rice or any other product)

(Laws of Guyana)

2.4 Institutions

The central institutions which govern the operation of Amazonia Rice Investment Inc. are discussed as follows:

2.4.1 Environmental Protection Agency (EPA)

The Environmental Protection Agency established under the EPA Act Cap 20:05 act no. 11 of 1996 is the principal authority for *environmental management* in Guyana. The EPA falls under the umbrella of the Department of Environment, Ministry of Presidency with responsibility to oversee the effective management, conservation, protection, and improvement of the environment. Whereby in Sec. 4 (1) (a), the EPA is given the mandate to *“take such steps as are necessary for the effective management of the natural environment so as to ensure conservation, protection and sustainable use of its natural resources”*

In addition, the Agency is given the overall responsibility to *“co-ordinate the environmental activities of all persons, organizations and agencies”* [Sec. 4(1) (c)]; and is mandated *“to play a coordinating role in the preparation and implementation of cross-sectored programmes of environmental contents”* [Sec. 4(1) (1)]. The mandate to serve as the highest authority for granting Environmental Authorisations, where they are required, is supported by Sec. 5 which states that *“any person or authority under any other written law, vested with power in relation to the environment shall defer to the authority of the Agency and shall request an Environmental Authorisation from the agency before approving or determining any matter...”*. (Laws of Guyana) The EPA therefore is the body in charge of granting environmental permits for projects, including that for Amazonia Rice Investment Inc.

2.4.2 Ministry of Agriculture

The Ministry of Agriculture has direct oversight over the Agricultural sector in Guyana. The Ministry's main function is to *“ensure the formulation and implementation of policies and programmes which facilitate the development of agriculture and fisheries in Guyana”* This is in order to contribute to the enhancement of rural life; sustainable improvement in agricultural production and market chain; the maintenance of a sound physical and institutional environment for present and future productive activities. This function is addressed through Administration; Crops and Livestock Support Services; Fisheries Department; and Hydrometeorological Services. (Ministry of Agriculture, 2018)

2.4.3 Guyana Rice Development Board (GRDB)

Guyana Rice Development Board (GRDB) [an amalgamation of the Guyana Rice Export Board (GREB), Guyana Rice Milling & Marketing Authority (GRMMA) and the National Padi & Rice Grading Centre (NPRGC)] was established in in 1995 under the purview of the Guyana Rice Development Board Act No. 15 1994. GRDB falls under the supervision of the Ministry of Agriculture with the objectives of the Board being to develop the rice industry, conduct rice related research and engage in rice development and promotion activities. The main departments under the purview of GRDB's General Manager are Administrative, Research, Seed Production, Extension, Quality Control, Post Harvest/Value Added, Marketing, Finance and Internal Audit (GRDB, 2016).

2.4.4 Ministry of Human Services and Social Security

The Ministry of Social Protection functions to regulate the relationship between the employers and employees, and ensure OSH standards in the workplace. The Ministry also provide public support programmes for suicide prevention, childcare protection, and human trafficking prevention, special cases such as disabilities, domestic violence, and rape. Additionally, the Ministry caters for the provision of old age pension for the elderly.

2.4.5 National Insurance Scheme (NIS)

The National Insurance Scheme (NIS) is a social security organisation, which maintains a system of social security by securing contributions from both employees and employers to generate benefits during sickness and accidents. NIS also provides other benefits for example old age, invalidity, industrial etc.

2.5 Multilateral Environmental Agreements

Multilateral Environmental Agreements are International agreements signed between three or more Nations. In which various signatory countries signal their commitment to work together in an effort to meet numerous obligations, goals and targets in order to maintain the environment, minimise impacts and ensure mankind's well-being. The key Multilateral Environmental Agreements Guyana has assented to or ratified, which relates to the Amazonia Rice Investment Inc. operation are as follows:

- Occupational Safety and Health Convention
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
- Protocol Concerning Pollution from Land Based Sources and Activities. (Cartagena Convention)
- Stockholm Convention on Persistent Organic Pollutants
- Vienna Convention for the Protection of the Ozone Layer
- Montreal Protocol on Substances that Deplete the Ozone Layer
- United Nations Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol to the UNFCCC
- Paris Agreement
- United Nations Convention on Combating Desertification and Land Degradation (UNCCD)

Source: Ministry of Foreign Affairs (2018)

3 Operations Description

The following chapter outlines a synopsis of Amazonia Rice Investment Inc. Operations and resource allocations utilised for the production of Rice products by the Mill for retail trade and marketing.

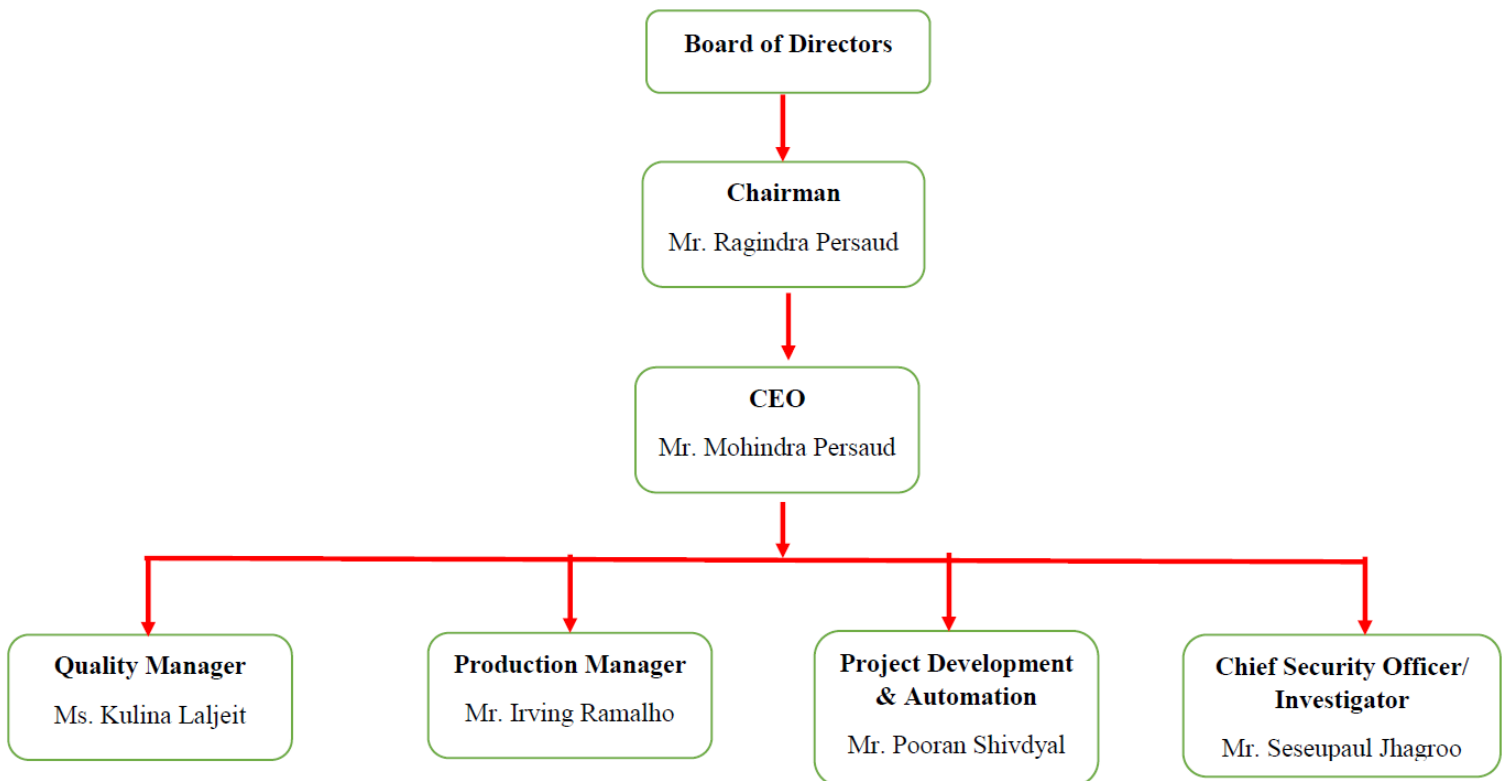
3.1 Overview

The Company was established in the year 2013 as a commercial business venture to process harvested rice paddy and provide edible rice products for retail to consumers. The operational activities and services provided by Amazonia Rice Investment Inc. occurs seven (7) days a week Monday to Sunday for 24hrs (during in crop period). While, operation occurs six (6) days a week Monday to Saturday between the hours of 7:00 hrs. to 17:00 hrs. / 18:00 hrs. (during out of crop period). Please take note that there are basically two crops per year.

The Company's operations are guided by a core management team consisting of a Board of Directors, Chairman, CEO and Key Management staff for operation, please refer to **Figure 2** on the following page 29. The core Management team oversee the day to day operations of Amazonia Rice Investment Inc.

The Management Team has a wealth of knowledge and experience in managing a Rice Mill Operation, and is dedicated to ensuring that Amazonia Rice Investment Inc. provides its customers with quality products and services. The Company is thereby contributing to the Guyana economy, by providing employment opportunities while upholding responsibility in the protection of the environment and also safeguard the health and safety of employees and the surrounding community. All in keeping with the laws of the Co-operative Republic of Guyana.

Figure 2: Amazonia Rice Investment Inc. Key Management Team



Illustrated by: Ms. Carlene R. Bascom (2022)

3.2 Site Location

Amazonia Rice Investment Inc. is located at 70-71 Johanna, Black Bush Polder, Region 6 (East Berbice - Corentyne) *Please refer to **Figure 3** for the location map on the following page 30.* Amazonia Rice Investment Inc. is approximately **150 km (93.21 miles)** from **Georgetown** and **approximately 51.7 km (32.125 miles)** from **New Amsterdam** (Google Maps)

Figure 3: Amazonia Rice Investment Inc. Location Map



Source: Bing Map view (2022) **Illustrated by:** Carlene R. Bascom (2022)

3.3 Resources

Access Road

The established access road to Amazonia Rice Investment Inc. operation originates from the East Berbice Corentyne Highway then proceed to turn into Black Bush Polder Road and then to Johanna Main Access Road (*please refer to **Figure 4** on the following page 31*). Upon entering the premises, the compound has well maintained and established internal tarmac for the traversing of vehicles with stocks (loading and off-loading).

Figure 4: Johanna Main Access Road to Amazonia Rice Investment Inc.



Photos taken by: Ms. Carlene R. Bascom (2022)

Land Resource

Amazonia Rice Investment Inc. Rice Milling operations complex is situated on 3 acres of land which constitutes the Rice mill. Please refer to **Figure 5: Amazonia Rice Investment Inc. Land Use Map**, Johanna, Black Bush Polder on the following page 32.

Figure 5: Amazonia Rice Investment Inc. Land Use Map



Infrastructure

The general established infrastructure of Amazonia Rice Investment Inc. operations complex site location (used in the day to day management and operational activities of Rice production) includes the following:

- Rice Mill Facility
- Generator Room
- Storage area
- Maintenance workshop
- Offices
- Housing Quarters

Equipment

The main equipment utilised by the Amazonia Rice Investment Inc. consist of the following:

- Moisture Meter
- Lab Equipment
- Paddy Cleaners
- Cyclones
- Packing Machines
- Silos
- Tower Dryers
- Paddy Huskers
- Paddy Separator
- Aspirators
- Destoner
- Sifter
- Generators (3)
- Solar Panels
- Colour Sorter
- Elevators

Employment Details

Amazonia Rice Investment Inc. currently has a total of Forty (40) employees, covering the span of the operation, working in administration, maintenance, transportation, quality control, and processing etc. Personal Protection Equipment (PPE) aka Safety gears are provided for staff at all levels which consists of goggles, ear plugs, dust mask, safety boots etc.

Bio-Security

Amazonia Rice Investment Inc. is highly committed to quality control and as such mandates quality assurance of the products produced after processing. To upkeep this mandate Amazonian Rice Investment Inc. has a laboratory situated within the compound to monitor and ensure product quality control according the GRDB National Standards for Paddy. The quality assurance test conducted by the laboratory (Quality Control) GRDB Licence Grading Officer Ms. Persaud and Ms. Tilku with assistance of the Rice Mill are as follow:

- **Dockage:** Cleaning for impurities
- **Moisture Content:** test for moisture
- **Shelling:** To see quality of paddy
- **Grading:** determine the Dominant factor of the sample



Amazonia Rice Investment Inc. (Johanna)

Environmental Management Plan

Upon completion of all test, the quality of the product for retail is ascertained and the same information can also determine the quantity of Rice.

Amazonia Rice Investment Inc. also adheres to **ISO 22000:2018** Food Safety Management System. Additionally, in an effort to ensure quality control, the prevention and pest control management is also taken seriously by the spraying of food grade chemical. The Amazonia Rice Investment Inc. also has a surveillance system with a series of cameras around the Rice Mill to monitor operations on a day to day basis to ensure quality control and food safety.

Sanitation and other facilities

There are on-site septic tanks, made of concrete and erected in accordance with the GNBS Code of Practice for the Design and Construction of Septic Tanks and Associated Secondary Treatment and Disposal Systems. These septic tanks are easily accessible for cleaning and de-sludging, and they are not located near any of the rice milling production area. Additionally, Amazonia Rice Investment Inc. has four (4) toilets and one (1) urinal.

The Amazonia Rice Investment Inc. rice milling complex, maintain a clean and healthy environment suitable for food production. Cleaning is done every day, including wet and dry cleaning. There is also a lunchroom facility with lockers for workers, as well as handwashing stations, and drinking water stations.

Water Consumption

The water utilised in the Rice Mill Production operations at Amazonia Rice Investment Inc. is approximately 61,200 gallons of water consumed every 24 hours from the well in the Rice Mill compound.

Energy Consumption

The energy consumed by Amazonia Rice Investment Inc. is supplied by, and obtained from the Guyana Power and Light Corporation (GPL). The Rice Milling operation consumes approximately 133,992 kW of power during off Peak periods and 261,438 kW peak period Energy demand from the Guyana Power and Light Corporation (GPL). In the event of a GPL power failure, the Milling Complex has two (2) generators housed on site with a generating capacity of 500 kW and 700 kW which allows for the assurance of constant power flow and continued processing operation production.

The diesel fuel consumed by the Rice Mill is approximately 12,900 Litres per month. The fuel consumed is utilised mainly by equipment such as the trucks, generator etc. Additionally, Amazonia Rice Investment Inc. utilise Solar Energy with a capacity of 531 kilowatt solar power. Solar Energy is used for 7 to 8 hours daily from 8:00 hrs to 16:00 hrs. The Solar energy generated is mainly used by for the entire operation as it connects together with the GPL consumption.

3.4 Operation Process

Amazonia Rice Investment Inc. operation activities at the Johanna, Berbice site location includes buying Rice Paddy from Farmers (Intake) and processing to produce a variety of **Karibee Rice brand products** for retail. The production operation activities entail the following components:

3.4.1 Rice Farmers (Supplier Perspective)

Rice Farming

Rice one of the staple food in Guyana is grown by local Rice Farmers in Berbice by undergoing a number of steps to yield greater production. The steps conducted are as follow:

- ❖ Land Preparation (Dry)
- ❖ Land Preparation (Wet) - for two weeks
- ❖ Application of fertilisers
- ❖ Sow Seedlings
- ❖ Irrigation
- ❖ Crop Growth (maintenance)

Harvesting

Once fully grown, the mature rice crop is collected from rice fields through harvesting method activities which include reaping (cutting the mature paddy), hauling (movement), threshing (separating paddy grain from rest of crop), cleaning (remove immature ones) etc. and then taken to the Rice Mill for further processing.

3.4.2 Amazonia Rice Investment Inc. (Processing Perspective)

The operational activities conducted at Amazonia Rice Investment Inc. entails the processing of rice paddy in a two separated milling process (please refer to *Appendix 3 for White Rice Flow Diagram and Appendix 4 for Parboil Rice Flow Diagram*) to produce edible Karibee rice products for commercial retail. The production operation activities entail the following components:

White Rice Mill Production

- a) **Sampling:** Conducting inspection of paddy before receiving and grading
- b) **Grading:** Determine the quality of the paddy which can determine the price

- c) **Weighing:** Harvested paddy brought to the rice mill in trucks are weighed on the truck scale to determine the quantity of paddy tonnage to be processed by the mill.
- d) **Discharge:** After weighing the harvested paddy, the paddy is then off-loaded into the Hopper to await processing.
- e) **Cleaning:** The paddy intake then goes through a cleaning process, using the paddy cleaner to remove all foreign impurities such as straws, sand, stone etc.
- f) **Drying:** The wet paddy is then put through a drying process to remove the moisture content from the paddy. The drying process consist of four different dryers, fuelled by paddy shell (husk).
- g) **Dry Storage:** After the drying process is completed, the dried paddy is stored in silos where fans are used to keep the paddy dry. The Paddy goes through the process of Aeration. This stage is also known as the **cooling stage**
- h) **Milling Stage:** In the milling stage after the paddy drying and cooling, the rice goes through the following process: 1) Paddy Cleaning 2) Husking to remove the shell, 3) Separation to remove paddy from the Cargo Rice, 4) Polishing to remove Bran from the Cargo Rice grain to produce **White Rice**. 5.) Aspiration to remove dust, 6) Destoning to remove stones, 7) Sifting to separate chip grain from rice, 8) Grading to separate broken grain from rice and grade to customer requirements, 9) Colour Sorting to remove impurities and odd grains
- i) **Packaging:** After Milling, the finished products are packaged in various sizes, stored on pallets and prepared for retail (sales & marketing).

Please Take Note: That Husking is removal of shell from the paddy followed by Separation. In husking 10 to 15% of paddy still remain with the shell and 85% of grain don't have the shell. Therefore, Separation is done to remove the 15% of paddy from the grain that remains. Therefore Husking removes shell and Separation remove paddy. Cargo Rice aka Health Rice is the rice with the bran Layer on the grain.

Parboil Rice Mill Production

- a) **Sampling:** Conducting inspection of paddy before receiving and grading
- b) **Grading:** Determine the quality of the paddy which can determine the price

- c) **Weighing:** Harvested paddy brought to the rice mill in trucks are weighed on the truck scale to determine the quantity of paddy tonnage to be processed by the mill.
- d) **Discharge:** After weighing the harvested paddy, the paddy is then off-loaded into the Hopper to await processing.
- e) **Cleaning:** The paddy intake then goes through a cleaning process, using the paddy cleaner to remove all foreign impurities such as straws, sand, stone etc.
- f) **Soaking:** Paddy is soaked in tanks with hot water at a specific temperature i.e. 72°C to 78°C
- g) **Steaming:** is a continuous process where the paddy enters at the top and exist steaming chamber at the bottom, where steam is applied to the paddy for 15 minutes.
- h) **Drying:** The wet paddy is then put through a drying process to remove the moisture content from the paddy. The drying process consist of four different dryers, fuelled by paddy shell (husk).
- i) **Dry Storage:** After the drying process is completed, the dried paddy is stored in silos where fans are used to keep the paddy dry. The Paddy goes through the process of Aeration. This stage is also known as the **cooling stage**
- j) **Milling Stage:** In the milling stage after the paddy drying and cooling the rice goes through the following process: 1) Paddy Cleaning 2) Husking to remove the shell, 3) Separation to remove paddy from the Cargo Rice, 4) Aspiration to remove dust, 5) Destoning to remove stones, 6) Sifting to separate chip grain from rice, 7) Grading to separate broken grain from rice and grade to customer requirements, 8) Colour Sorting to remove impurities and odd grains
- k) **Packaging:** After Milling, the finished products are packaged in various sizes, stored on pallets and prepared for retail (sales & marketing).

Retail Market

Sales & Marketing: The products produced by Amazonia Rice Investment Inc. are **White Rice, White Broken Rice, White Rice Bran, Parboil Rice, Parboil Broken Rice, and Parboil Bran.** Approximately 75% of the products produced are exported for commercial retail mainly to CARICOM, Europe, and the Lesser Antilles etc. The remaining 25% of products is sold within the

local market. It should also be noted that Nand Persaud and Company Ltd. the parent company of Amazonia Rice Investment Inc. achieved the rights to use the GNBS approved Made in Guyana Standard mark on November 22nd 2022.

Figure 6: GNBS Made in Guyana Certification Ceremony



Source: Nand Persaud & Company Ltd (2022)

Decommissioning Phase

There is currently no immediate future plans by Amazonia Rice Investment Inc., Johanna Corentyne Berbice to dissolve operations. The Company plans to be in full operation for approximately the next Thirty (30) years.

Figure 7: Scenes of Amazonia Rice Investment Inc.





















Carlene R. Bascom
Nov 19th 2022
Amazonia



Carlene R. Bascom
Nov 19th 2022
Amazonia



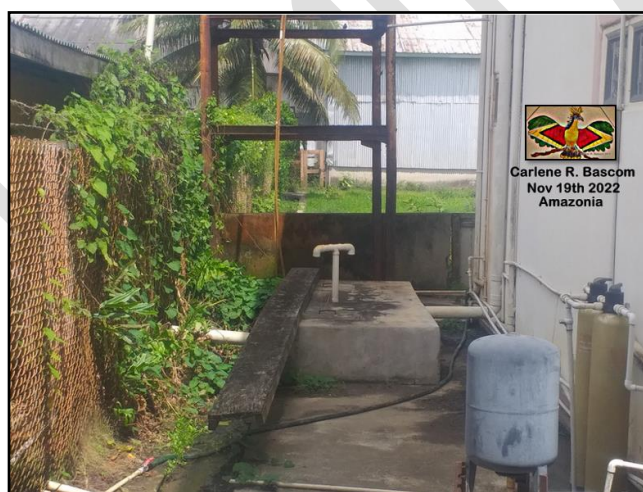
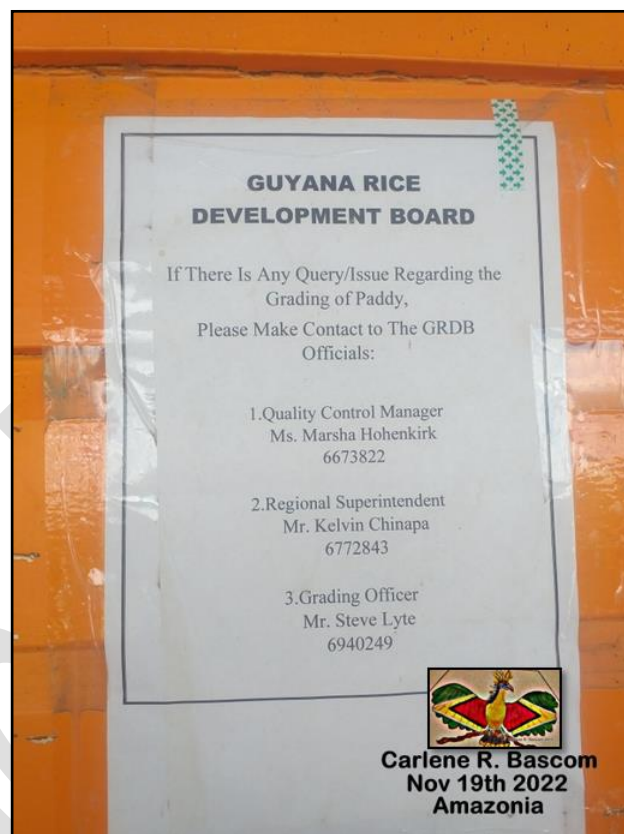
Carlene R. Bascom
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Carlene R. Bascom
Nov 19th 2022
Amazonia











Photos taken by: Ms. Carlene R. Bascom (2022)

4 Description of the Environment

This chapter presents and discusses information on the existing environmental and socioeconomic condition of the immediate surrounding environment of Amazonia Rice Investment Inc., Johanna, Black Bush Polder, East Berbice Corentyne.

4.1 Physical Environment

4.1.1 Climate

Guyana enjoys a Tropical Humid Climate, whereby the high rainfall, humidity and temperatures are characteristics of our climate. The rainfall pattern in Guyana is influenced by the movement of the ITCZ (Inter-Tropical Convergence Zone). The tropical heat and humidity is influenced by the north easterly winds blowing from the Atlantic Ocean. Notably, Guyana's climate is also influenced by the effects of the El-Niño (higher temperatures) and la Niña (higher precipitation) phenomenon.

Temperatures in Guyana vary geographically, with high altitude regions experiencing cooler temperatures than the coastal, lowland and savannah zones. Mean air temperatures in the upland regions and the interior (west) side of the country are between 20°C to 23°C. Mean air temperatures across the rest of the country range from 25°C to 27.5°C, reaching as high as 31°C, due to the stabilizing effect of the sea and the north-easterly trade winds (Ministry of the Presidency, 2015).

Precipitation patterns are generally associated with two distinct wet seasons (April to July) and (November to January) and two dry seasons where the mean annual precipitation is greater than 2000mm/year. On the contrary Guyana's savannah only experience one wet season and a longer dry season with a mean annual precipitation of 1400-1800mm/year (Ministry of the Presidency, 2015).

In Johanna, Black Bush Polder, East Berbice Corentyne area where Amazonia Rice Investment Inc. operation is situated, the climate is monitored by a number of Ministry of Agriculture Hydromet weather stations within Region 6. The closest weather station to Harlem is located in Johanna South (Rainfall) and New Amsterdam (Temperature). Therefore, to have a general assessment of the climate in that area the average mean temperature, and average precipitation

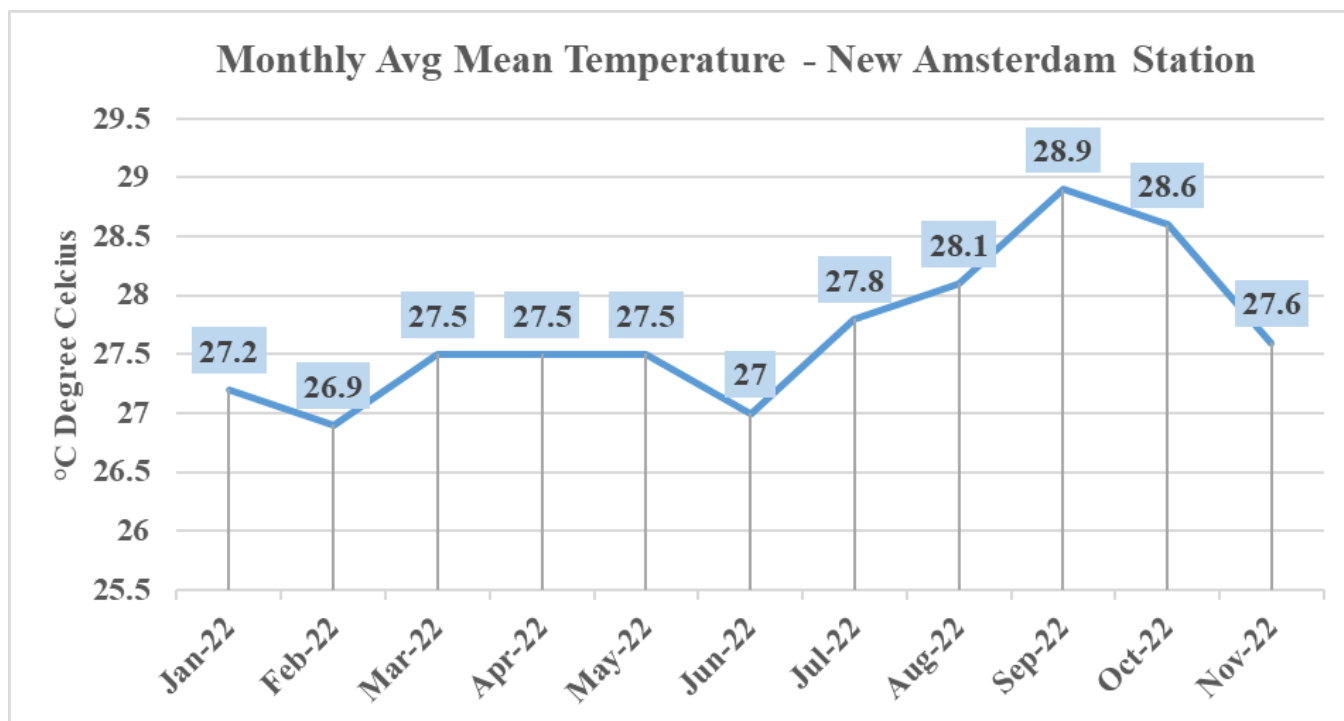
climate elements were analysed. Please refer to Table 3 & 4 and Figures 9 & 10 respectively. Additionally, please see **Appendix 5** for Dataset Correspondence with Hydromet

Table 3: Monthly Average Mean Temperature

New Amsterdam Station Field Data	
Month	Mean Temperature (°C)
January 2022	27.2
February 2022	26.9
March 2022	27.5
April 2022	27.5
May 2022	27.5
June 2022	27
July 2022	27.8
August 2022	28.1
September 2022	28.9
October 2022	28.6
November 2022	27.6

Source: MoA, Hydrometeorological Service, 2022

Figure 8: Monthly Average Mean Temperature



Illustrated by: Ms. Carlene R. Bascom (2022)

The average mean temperatures for the Berbice area New Amsterdam Station ranged from 27°C to 28.9 °C over the eleven (11) month period indicating a steady temperature reading with slight fluctuations. The highest temperature recorded during the month of Sept 2022 measuring 28.9 °C and the lowest temperature was recorded during the month of June 2022 measuring 27 °C. Additionally, based on calculation had overall estimated Monthly Average temperature of 27.7 °C.

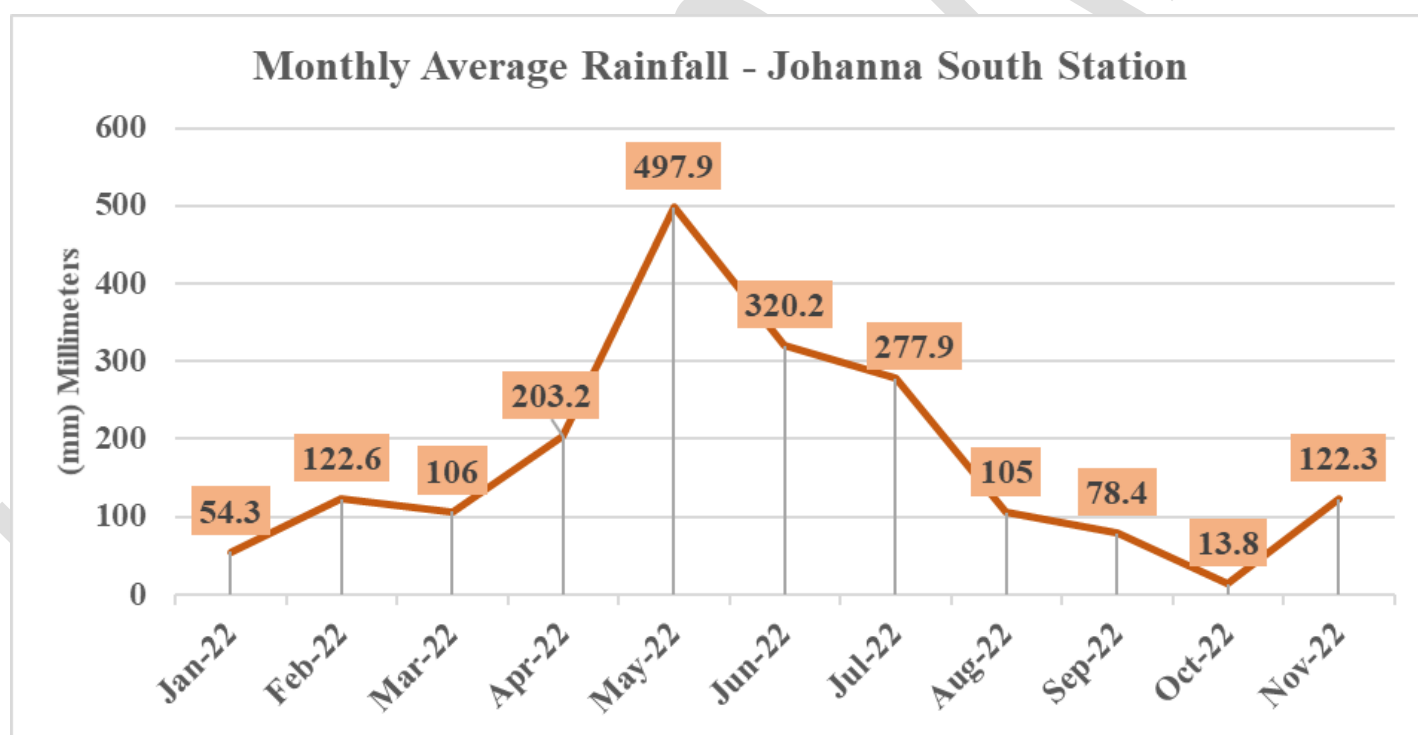
Table 4: Monthly Average Precipitation (Rainfall)

Johanna South Station Field Data	
Month	Rainfall (mm)
January 2022	54.3
February 2022	122.6
March 2022	106
April 2022	203.2

May 2022	497.9
June 2022	320.2
July 2022	277.9
August 2022	105
September 2022	78.4
October 2022	13.8
November 2022	122.3

Source: MoA, Hydrometeorological Service, 2022

Figure 9: Monthly Average Rainfall



Illustrated by: Ms. Carlene R. Bascom (2022)

The Johanna South Area area for the period Jan 2022 to Nov 2022 received approximately 1,901.6 mm of rain over the eleven (11) month period. Rainfall levels fluctuated over the eleven (11) month period, with the average rainfall increasing from the month Jan 2022. Rainfall levels reached its

highest peak occurring during the month of May 2022 measuring 497.9 mm. The lowest rainfall recorded was during the month of October 2022 measuring 13.8 mm.

4.1.2 Topography, Geomorphology and Soils

Johanna, Black Bush Polder, East-Berbice Corentyne, Region 6, is situated on the Coastal Plain of Guyana. The Coastal Plain of Guyana is the narrow strip of land lying parallel to the sea coast with a length of 459 km and 26 to 77 km wide (Daniel, 2001) (Guyana Chronicle, 2015).

From a **Geomorphological** vantage point, the Coastal Plain is underlain by the **Corentyne group of Rocks** (i.e. Corentyne Assemblage) which is subdivided into two categories:

- the **young Coastal Plain** underlain by the **Demerara Formation** of the Holocene epoch
 - The **old Coastal Plain** underlain by the **Coropina Formation** of the Pleistocene epoch
- (Daniel, 2001),

Both the Demerara Formation (*Holocene epoch*) and Coropina Formation (*Pleistocene epoch*) are of the **Quaternary Period** within the **Cenozoic Era** of the Formation of the Earth (Geological Timescale) as depicted in *Figure 11* below

Figure 10: Cenozoic Era (Earth's Geological Timescale)

Eon	Era	Period		Epoch	Start Date (mya)
Phanerozoic	Cenozoic	Quaternary		Holocene	0.01
				Pleistocene	1.64
		Tertiary	Neogene	Pliocene	5.2
				Miocene	23.3
			Paleogene	Oligocene	35.4
				Eocene	56.5
				Paleocene	65

Source: www.sutori.com

Therefore, based on location and the geomorphology of the area, Amazonia Rice Investment Inc. is situated on the **Demerara Formation**.

In terms of a **Topographically** standpoint, the village of Johanna, Black Bush Polder is characterized as low lying undulating terrain with lower elevations above sea level closer to the Atlantic Ocean.

Regarding from the viewpoint of **Soils**, the soil in Johann Black Bush Polder is classified by the FAO mapping unit as follow **1a: Fertile Low Humic Gleys** of high base status, marine phase "**frontland clays**" or the USDA Classification referred as **Hydraquents** (GL&SC, 2013)

Therefore, the soils in Johanna Black Bush Polder area and farmlands have a land capability classification of I & II which is good to moderate agricultural land for cultivation with medium to high soil fertility (GL&SC, 2013).

Amazonia Rice Investment Inc. is situated specifically on the **Fertile Low Humic Gleys** - "Frontland Clay" (Hydraquents) within the Joanna Black Bush Polder area. These soils are clay soils which are relatively fertile and poorly drained, but deep. This soil type developed on unconsolidated sediments with associated sandy 'reefs' that are old beach ridges. In addition to poor drainage, other limitations of the soil are in terms of its salinity and toxicity levels (GL&SC, 2013).

4.1.3 Environmental Monitoring Equipment

The monitoring equipment utilised for the Environmental field assessment for Amazonia Rice Investment Inc. Environmental Management Plan are as follow:

- **eTrex 30x GPS**

The eTrex 30x GPS is manufactured by GARMIN. The eTrex 30x GPS functions include the measurement or use of the following: a) Compass, b) GPS Location, c) Navigation, d) Distance and Speed, e) Elevation. f) Barometric Pressure, and g) Depth. The eTrex 30x GPS is in **compliance** with the **Directive 2014/53/EU** and **Part 15 of the FCC rules**. The function utilized in the field by the Consultant (Ms. Carlene R. Bascom) using the eTrex 30x GPS for the Amazonia Rice Investment Inc. EMP was the **GPS Location**.

- **Digital Sound Level Meter**

The Digital Sound Level Meter is manufactured by SNDWAY. The Digital Sound Level Meter functions includes the frequency weighting measurements 1) A-weighting and/ or 2) C-weighting. The main features of the Digital Sound Level Meter comprises the a) Min/Max. Reading Selection, b) Fast/Slow Time Weighting, c) an Accuracy of +/- 1.5 dB. among others. The Digital Sound Level Meter is in accordance with the **Standard IEC 651 Type 2 of National Committee** and the **American National Standard ANSI S1.4 Type 2**. The function measured in the field by the Consultant (Ms. Carlene R. Bascom) using the Digital Sound Level Meter for the Amazonia Rice Investment Inc. EMP was **A-weighting Slow Time Weighting**.

- **Professional Air Tester**

The Professional Air Tester, HD Intelligent type Multifunctional Air Detector model AX-8016 functions includes the measurement of the following: a) PM 2.5 particles, b) PM 10 particles, c) Formaldehyde concentration (HCHO), and d) Total Volatile Organic (TVOC) matter concentrations. The main features of the Air Tester are a) Real-time monitoring, b) Intelligent Calibration, c) Automatic alarm etc. The Air Tester is **CE Certified** and **ROHS Compliant**. The function utilized in the field by the Consultant (Ms. Carlene R. Bascom) using the Air Tester for the Amazonia Rice Investment Inc. EMP was **PM 2.5**, and **PM 10**.

- **TRI-Meter pH-117**

The TRI-Meter pH-117 Multi-Parameter Water Quality Monitor functions includes the measurement of the following: a) pH, b) Electrical Conductivity (EC), c) Conductivity Factor (CF), d) Total Dissolved Solids (TDS) and e) Temperature. The main features of the Water Quality Monitor is that it conducts infield measuring. The Water Quality Monitor is **CE Certified** and **ROHS Compliant**. The function utilized in-field by the Consultant (Ms. Carlene R. Bascom) using the Water Quality Monitor for the Amazonia Rice Investment Inc. was **pH**, and **temperature**.

4.1.4 Methodology

The sampling methodology employed for the Environmental field assessment for Amazonia Rice Investment Inc. Environmental Management Plan are as follow:

- **Surface Water Quality** (*Domestic Waste water*)

Lab Analysis: The Three (3) Surface Water Quality samples Collected from One (1) Sample Point at Amazonia Rice Investment Inc. were:

1. Labelled (Date and Time Taken)
2. Preserved using **Ice** as the preservative.
3. Delivered to Kaizen Labs on November 21st 2022 to conduct Surface Water Quality Analysis for the BOD, TSS and O&G parameters
4. Lab Test Methodology used by Kaizen was **SMEWW 2540 D** for TSS, **SMEWW 5210 B** for BOD and **USEPA 1664** for O&G (*Please refer to **Appendix 6** for Kaizen Lab Analysis Data Report*)
5. **Note:** Samples were taken from one sample point WQ1 because the other three potential sample point locations were dry. That is there was a lack water available.

In-field Analysis: The One (1) Surface Water Quality Sample Point measured at Amazonia Rice Investment Inc. was as follow:

1. Remove electrode protecting cover, connect pH and temperature electrode into respective socket.
2. Wash electrodes in distilled water and dry with filter paper.
3. Place electrodes (pH and temperature) into liquid testing and stir lightly.
4. Record the final value (pH and temperature).
5. After using, wash electrodes and put on protective cover
6. *Please refer to **Appendix 7** for Water Quality Sampling Data Sheet*

- **Noise Level Condition**

In-field Analysis: The Six (6) Noise Level Condition samples measured at Amazonia Rice Investment Inc. were as follow:

1. Set up meter at sample point.
2. Select A-weighting Slow Time Weighting
3. Monitor Noise Condition for 30 minute duration at each sample point
4. Record the final value
5. *Please refer to **Appendix 8** for Noise Level Sampling Data Sheet*

- **Air Quality**

In-field Analysis: The Six (6) Air Quality samples measured at Amazonia Rice Investment Inc. were as follow:

1. Set up meter at sample point.
2. Monitor Air Quality parameters for 30 minute duration at each sample point
3. Record the final value (PM 2.5 and PM 10)
4. Please refer to **Appendix 9** for Air Quality Sampling Data Sheet

4.1.5 Surface Water Quality

The term Water Quality basically refers to the biological, chemical and physical characteristic interactions of the water ecosystem (UofA). Therefore, the environmental quality of the water has a direct influence on aquatic life and human health if point and non-point source pollution are left unchecked. Water quality testing was done to provide information on effluent discharge from the operation as well as from the source of activity downstream to assess the quality of the water. The assessment was to establish baseline conditions of the surrounding environment, and to determine what extent if any, discharge from the operations can affect the aquatic environment.

Water samples were collected and analysed to determine the quality of surface water within, and around Amazonia Rice Investment Inc. The Three (3) water samples for One (1) Sample Point was collected on November 21st 2022 during the **Out of Crop season** within and around the Rice Mill.

The samples collected were analysed at a certified laboratory. The sample location was selected at strategic points within the area in order to provide an indication of the baseline surface water quality. The locations where the samples were collected are visually identified *on the map (Figure 12: Surface Water Quality Sample Point Location Map)* as the WQ points as portrayed on **page 69**. Tables 5, 6, & 7 outline and describe the data collected. No graphs were generated due to only one WQ point sampled. Please refer to the following discussion about sampled readings analysed in comparison with the threshold limits for water quality parameters.

The samples collected were analysed for several parameters which are key indicators generally used to determine the quality of water. The parameters measured are mainly that of Temperature, pH, Total Suspended Solids (TSS), Oil & Grease and Biological Oxygen Demand (BOD). High occurrences and changes in these parameters will aid in providing a good indication assessment of possible water pollution that can affect aquatic life and human health.

Consequently, the data set sample point measurement taken were then assessed for comparison with the threshold water quality standards set by the Guyana National Bureau of Standards (GNBS) General Environmental Guideline Values for Effluent Discharge (*Table 6*), the Guyana Geology and Mines Commission (GGMC) water quality criteria, as well as acceptable water quality limits set by the EPA Guyana for TSS from the Operations Permit (*Table 7*).

Table 5: Description of Surface Water Quality Sample Point

Client: Amazonia Rice Investment Inc.					
Surface Water Quality Location Description					
Location Description	Sample ID	Coordinates		for Lab	In-Field
		21N	UTM	Nov 21st 2022	Time Taken
Internal Settling Pond North of Parboil Plant	WQ1	469604	672498	9:04 hrs	9:09 hrs

Reference #: CRB-ARI-01

Sampled by: Ms. Carlene R. Bascom 2022

Table 6: General Environmental Guideline Values for Effluent Discharge

Categories	GNBS Limits
pH	5.0 – 9.0
Temperature	< 40°C
BOD for 5 days	< 50 mg/L
COD	< 250 mg/L
DO	--
TSS	< 50 as TSS
N as NH ₃	< 10 mg/L
Total N	--
Phosphorous (P)	< 2 mg/L

CN Total (Cyanide)	< 1 free: 0.1
Phosphate (PO₄)	--
Chlorine (Cl)	< CL: 0.2
Surfactant	--
Phenols	< 0.5 mg/L
Coliforms	< 400 MPN per 100 mls
Oil and Grease (O&G)	< 10 mg/L

Source: (GNBS, 2002)

Table 7: Operation Permit Threshold

Categories	EPA Limits
TSS	< 100 mg/L
TDS	< 40 mg/L
Nitrate	< 5 ml/L
Phosphate	< 1 mg/L

Source: (EPA Guyana, 2019)

Figure 11: Surface Water Quality Sample Point Location Map
Map Showing Surface Water Quality Sample point Location Map



Name of Client : Amazonia Rice investment Inc.

Location : Johanna Black Bush Polder, Region 6,
(East Berbice - Corentyne)

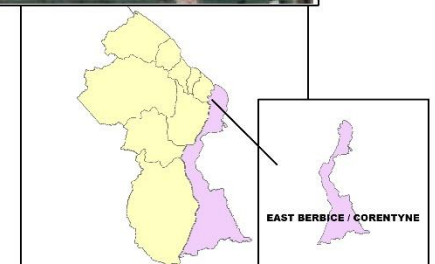
Commissioned by ; Sustineri Technology

Drawn by : Quinita Friesco

Date : 28th November 2022

Note ; Map Provided For Information Purpose only

Map Not drawn to Scale



4.1.5.1 Results and Discussion

As part of conducting the environmental baseline assessment, the following water quality parameter data below was recorded, demonstrated and analysed. *No graphs were generated due to only one WQ point sampled.*

Table 8: Surface Water Quality Sampling Results

Surface Water Quality RAW DATA								
Client: Amazonia Rice Investment Inc.								
Location Description	In Field:	pH, Temperature		Lab Analysis: TSS, O&G, BOD				
	Sample ID	Coordinates		Temp. °C	pH	TSS mg/L	O&G mg/L	BOD mg/L
		21N	UTM					
Internal Settling Pond North of Parboil Plant	WQ1	469604	672498	29.4	6.4	202	144	<5.06

Reference #: CRB-ARI-01

Sampled by: Ms. Carlene R. Bascom 2022

Lab Report: Kaizen Nov 29th 2022

Temperature - The surface water temperature sample reading was 29.4 °C during the time of collection in the field. Based on In-Field Analysis the data collected was within the GNBS accepted Guidelines for Industrial effluent, general environment limit range of <40 °C (as can be seen clearly in *Table 8*), which is considered healthy for aquatic living organisms to thrive in.

pH - The pH analysis of the surface sample reading collected was 6.4 pH, indicating that water in the area is slightly acidic. The pH measurement collected was within the 5.0 - 9.0 pH GNBS accepted Guidelines for Industrial effluent, general environment range (as can be clearly seen in *Table 8*). This indicates that the water samples measured are from a healthy environment for aquatic organisms to live and thrive.

Total Suspended Solids - The TSS level of the water sample readings was 202 mg/L. Based on the results, WQ1 (202 mg/L) was well above the EPA Operation Permit Threshold limit for the Amazonia < 100 mg/L and the GNBS accepted Guidelines for Industrial effluent, general environment limit range of <50 mg/L (as can be seen clearly in *Table 8*). Sample point WQ1 which is the Internal Settling Pond which follows the filtration process. The high TSS level is possibly due to 1. The filtration system being exhausted (or not cleaned) 2. Flow of the water and / or 3. Runoff from the surrounding environment. *Please refer to 8.1 Recommendations for a possible solution.* The results of the analyses of surface water quality indicate high levels of suspended particles.

Oil and Grease (OG) – The oil and grease levels recorded was 144 mg/L. Based on Lab Analysis, sample reading result was well above the GNBS accepted Guidelines for Industrial effluent, general environment range of <10 mg/L. This is clearly depicted in *Table 8*. The results of the analyses of surface water quality indicate high levels of Oil and Grease. The high O&G level is possibly due to 1. Runoff from the surrounding environment during maintenance and cleaning. *Please refer to 8.1 Recommendations for a possible solution.*

BOD (Biochemical Oxygen Demand) - BOD levels of the water sample reading was <5.06 mg/L. Based on Lab Analysis, sample reading result was well within the GNBS accepted Guidelines for Industrial effluent, general environment range of <50 mg/L. This can be clearly seen on the BOD in *Table 8*, indicating a healthy aquatic environment for organisms to live and thrive.

NOTE: Amazonia Rice Investment Inc. reiterates its commitment to the maintenance of the environment and is committed to the continual improvement of its environmental system to ensure that the operations have minimal impact on the aquatic environment. Consequently, Amazonia Rice Investment Inc. has plans to address the situation of TSS and O&G levels in the waters (*please refer to recommendations for further details*).

4.1.6 Noise Level Condition

Noise pollution by definition is the regular exposure to elevated sound levels that can possibly lead to adverse effects in humans or other living organisms (Environmental Pollution Centers, 2017). As such, the intensity of the sound generated by various activities is of key concern to health. Prolonged exposure to sounds louder than 80dB is considered hazardous to hearing (EPA Guyana, 2017). Therefore, as human hearing is only receptive to certain sound levels, an A-weighting noise assessment would provide data on existing noise levels. This assessment establishes baseline conditions of the surrounding environment and determine to what extent if any, noise from the operations can affect the general environment and the health of staff and community.

Noise measurements were taken at various strategic locations within, and around Amazonia Rice Investment Inc. The existing sound environment in, and around the Rice Mill is characterized as an Industrial Zone because of operational activities (EPA Guyana, 2019). Noise level measurements were recorded at Six (6) sample point locations for a duration of 30 minutes at each

sample site on November 26th 2022 during the Out of Crop Season within and around the Rice Mill. The sample locations were selected at strategic points within the area in order to provide an indication of the baseline noise level. The locations where the samples were collected are visually identified on the map (**Figure 13: Noise Level Condition and Air Quality Sample Point Location Map**) as portrayed on **Page 73** as the NA points. Table 10 outlines the data collected, while the graph (Figure 14) depicts sampled readings analysed in comparison with the Guyana National Bureau of Standards (GNBS) Guideline values for Noise in specific environment (Table 9).

Table 9: GNBS Guideline Values for Noise in Specific Environment

Categories	Daytime Limits in dB (06:00 – 18:00hr)	Night time Limits in dB (18:00 – 06:00hr)	
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 – 01:00hr	100
		01:00 – 08:00hr	70

Source: (GNBS, 2010)

Figure 12: Noise Level Condition and Air Quality Sample Point Location Map

Map Showing Noise Condition & Air Quality Sample Point Location



Name of Client : Amazonia Rice investment Inc.

Location : Johanna Black Bush Polder, Region 6,
(East Berbice - Corentyne)

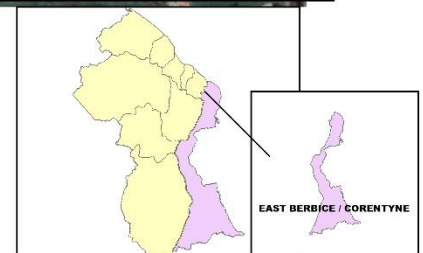
Commissioned by ; Sustineri Technology

Drawn by : Quinita Friesco

Date : 28th November 2022

Note ; Map Provided For Information Purpose only

Map Not drawn to Scale



4.1.6.1 Results and Discussion

As part of conducting the environmental baseline assessment, the following noise level data below was recorded, demonstrated and analysed.

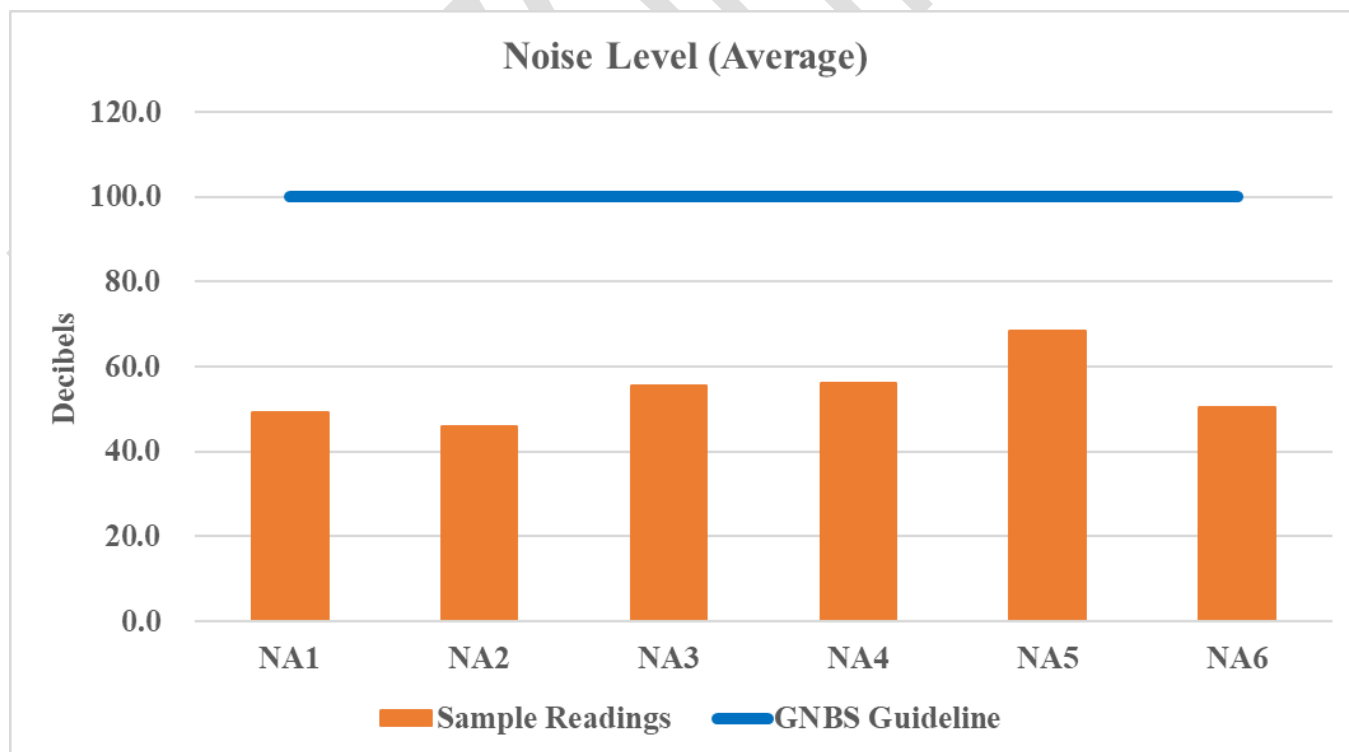
Table 10: Noise Level Sampling Results

Noise Level RAW DATA				
Client: Amazonia Rice Investment Inc.				
Location Description	Sample ID	Coordinates		Noise (dB Slow)
		21N	UTM	Average
Southern Section of Property by the Entrance, Road and near a Resident	NA1	469682	672377	49.3
Storage Area	NA2	469607	672392	46.0
White Rice Milling Section	NA3	469613	672387	55.4
Landfill Area	NA4	469431	672415	56.1
Parboil Plant	NA5	469592	672392	68.3
Generator Room	NA6	469591	672459	50.4

Reference #: CRB-ARI-02

Sampled by: Ms. Carlene R. Bascom 2022

Figure 13: Noise Level Readings



Illustrated by: Ms. Carlene R. Bascom (2022)

During the time of monitoring over an estimated 4 hours and 37 minutes duration, the noise level readings recorded in the area ranged from 46.0 dB to 68.3 dB. Based on results obtained, the highest noise level recorded was at NA5 (68.3 dB) over the monitoring duration.

The highest Noise Level highlighted above (based on observations) was due to Routine Maintenance at the Parboil Plant at sample point NA5 at the time of monitoring. Based on results taken all data recorded over the monitoring period was below the Guyana National Bureau of Standards (GNBS) Guideline Values for Noise in Specific Environment daytime limit (06:00 – 18:00h) for Industrial Zone (100 dB). This can be clearly seen in the noise graph *Figure 14* and *Table 10* indicating **acceptable noise level**.

The recorded noise level results obtained clearly indicates a healthy conducive surrounding environment for the sustenance of life. The results also highlight that any noise activities generated from the Rice Mill operation at Amazonia Rice Investment has no noticeable impact on the surrounding environment of the community. This is in keeping with the maintenance of a healthy environment and staff welfare.

4.1.7 Air Quality

Air pollution is contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere (WHO, 2012). This is becoming an increasingly significant problem to growth and development of cities and communities. The air pollutants of major public health concern include: particulate matter, carbon monoxide, ozone, nitrogen dioxide, sulphur dioxide and metals, such as lead (Hedges, 2004), (WHO, 2012). Therefore, air quality assessment was done to establish baseline conditions of the surrounding environment and to determine to what extent if any, emissions from the operations can affect the atmosphere.

Air Quality measurements were taken at various strategic locations within, and around Amazonia Rice Investment Inc. The measurements were recorded at Six (6) sample point locations for a duration of 30 minutes at each sample site on November 26th 2022 during the Pout of Crop Season. The sample locations were selected at strategic points within the area in order to provide an indication of the baseline air quality. The locations where the samples were collected are visually

identified on the map (**Figure 13: Noise Level Condition and Air Quality Sample Point Location Map**) as portrayed on **page 73** as the NA points. **Tables 12** outlines the data collected, while the graphs (**Figure 15, & 16**) depicts sampled readings analysed in comparison with the threshold limits for air quality parameters.

The measured parameters recorded are some of the key indicators generally used to determine air quality. The parameters of primary focus for this assessment are mainly that of Particulate Matter (PM_{2.5} and PM₁₀). High occurrences and changes in these parameters will aid in providing a good indication assessment of possible air pollution that can affect the atmosphere and human health. As a consequence, the parameter measurements recorded were assessed in comparison with the EPA Guyana Operations Permit Threshold (**Table 11**).

Table 11: Operation Permit Threshold

Categories		EPA Limits
PM_{2.5}	Annual mean	10 µg/m ³
	24-hour mean	25 µg/m ³
PM₁₀	Annual Mean	20 µg/m ³
	24-hour Mean	50 µg/m ³

Source: (EPA Guyana, 2019)

4.1.7.1 Results and Discussion

As part of conducting the environmental baseline assessment, the following air quality parameter data on the following page 76 was recorded, demonstrated and analysed.

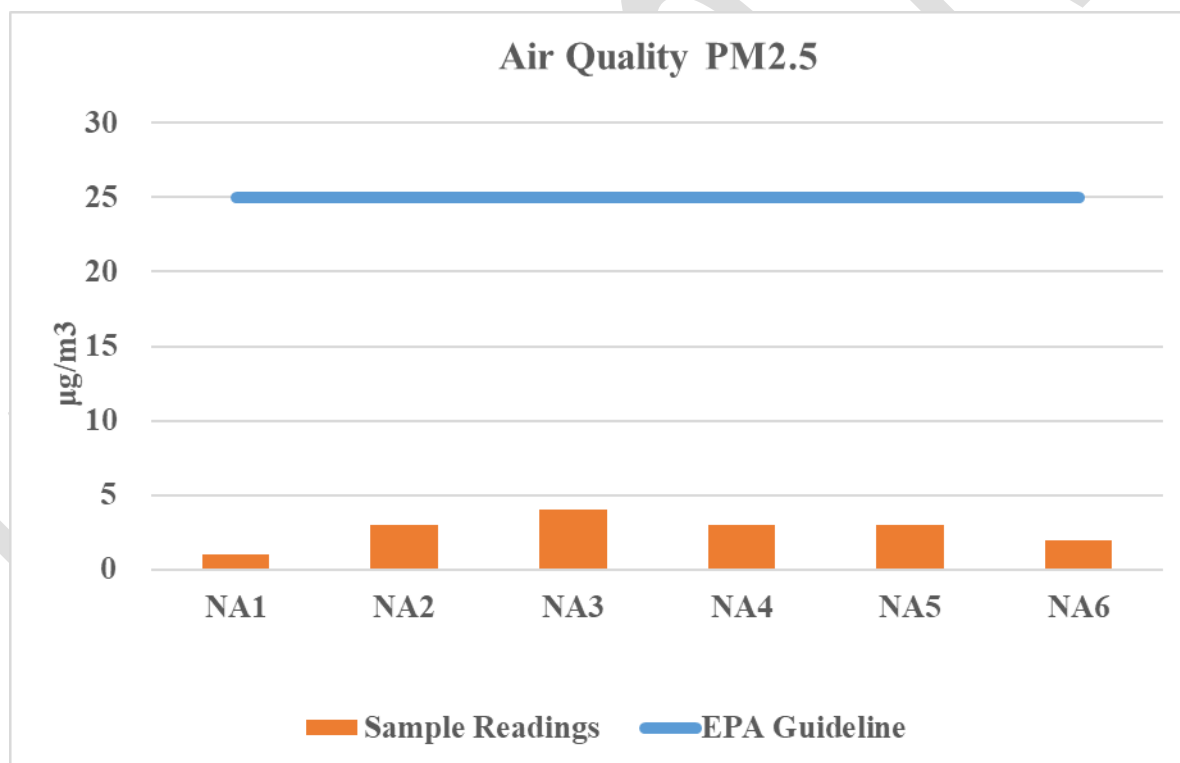
Table 12: Air Quality Sampling Results

Air Quality RAW DATA					
Client: Amazonia Rice Investment Inc.					
Location Description	Sample ID	Coordinates		PM2.5 µg/m ³	PM10 µg/m ³
		21N	UTM		
Southern Section of Property by the Entrance, Road and near a Resident	NA1	469682	672377	1	1
Storage Area	NA2	469607	672392	3	3
White Rice Milling Section	NA3	469613	672387	4	4
Landfill Area	NA4	469431	672415	3	3
Parboil Plant	NA5	469592	672392	3	3
Generator Room	NA6	469591	672459	2	2

Reference #: CRB-ARI-03

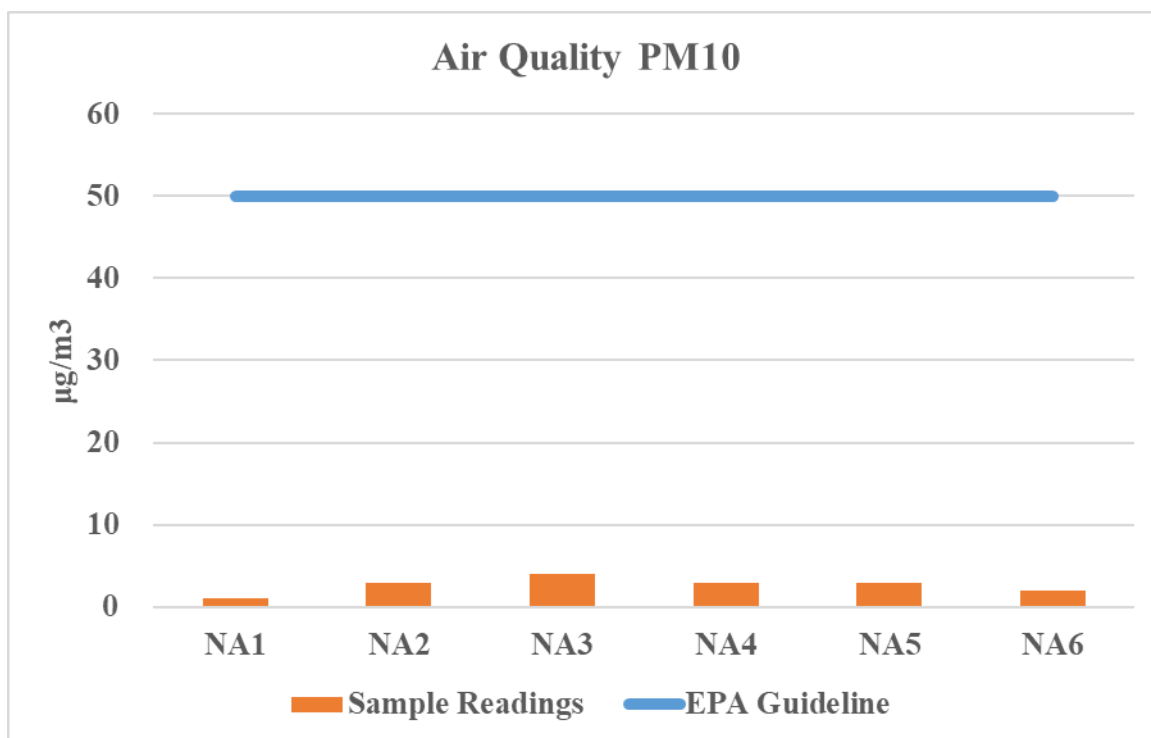
Sampled by: Ms. Carlene R. Bascom 2022

Figure 14: Air Quality Parameter (PM 2.5)



Illustrated by: Ms. Carlene R. Bascom (2022)

Figure 15: Air Quality Parameter (PM 10)



Illustrated by: Ms. Carlene R. Bascom (2022)

Particulate Matter: Inhalable Particulate matter is harmful to health, therefore analysis of PM2.5 and PM10 provides a better assessment of the quality of the air for the well-being of staff, the surrounding Community and the integrity of the Environment.

The Particulate Matter **PM2.5** sample readings recorded at 30 minute duration at each sample point during time of monitoring, ranged from 1 µg/m³ to 4 µg/m³. Based on the results obtained, the PM2.5 measurements were all well within the Guyana EPA Operations Permit Guidelines for Amazonia Rice Investment Inc. PM2.5 of 25 µg/m³ 24-hour mean. This is clearly depicted on the PM 2.5 graphs *Figure 15* and *Table 12*, indicating good quality of air.

Regarding Particulate Matter **PM10** sample readings recorded at 30 minute duration at each sample point during time of monitoring, ranged from 1 µg/m³ to 4 µg/m³. Based on the results obtained, the PM10 measurements were all well within the Guyana EPA Operations Permit Guidelines for Amazonia Rice Investment Inc. PM10 of 50 µg/m³ 24-hour mean. This is clearly depicted on the PM 10 graphs *Figure 16* and *Table 12*, indicating good quality of air.

The recorded air quality measurements obtained clearly indicates a healthy conducive surrounding atmosphere for the sustenance of life. The results obtained also clearly highlights that Amazonia Rice Investment Inc. operation has no noticeable impact on the surrounding environment of the community. This is in keeping with the maintenance of a healthy environment and staff welfare.

4.2 Biological Environment

Guyana's floral diversity is estimated to include over 8,000 species (inclusive of Ferns, Mosses etc.) with approximately 6,500 of those species identified, and 50% endemic. There are approximately 1,815 known species of fishes, amphibians, birds, reptiles and mammals. Fishes are very diverse, with 352 species of freshwater bony fishes and 501 species of marine fishes (EPA Guyana, 2010) (CBD, 2018).

The Johanna, Black Bush Polder biological environment has been influenced and modified due to development activities for housing, agriculture, road infrastructure, livestock production and service utility supply, to name a few. These development activities have thus resulted in a reduction of the natural flora diversity of the area. Additionally, the Fauna in the area consist of animals which are domesticated and have adapted to a built-up environment of human settlement.

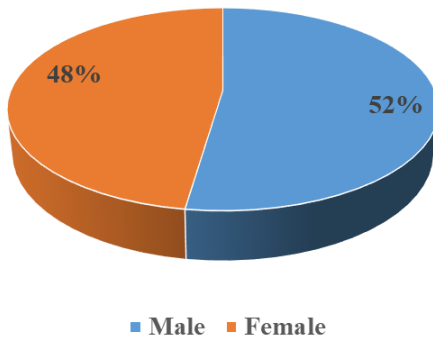
4.3 Socio-Economic Environment

Johanna, Black Bush Polder is a residential farming community located in Region Six (6) East Berbice Corentyne. The village falls under the jurisdiction of the Black Bush Polder NDC, located at Mibikuri, Black Bush Polder. While Johanna Village is the home of Amazonia Rice Investment Inc. with Rice Farming being the main economic activity.

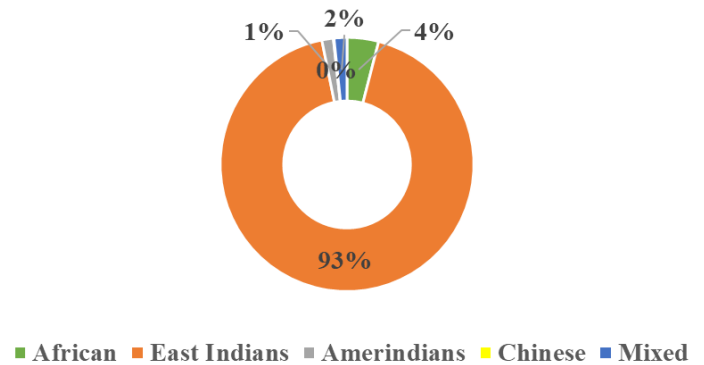
The village of Johanna has a total population of 1,095 persons of which 52% are males and 48% females. The number of households in the village total 290 (BOS, 2012). Johanna is predominately comprised of persons of East Indian decent (93%) with the remaining 7% of population consisting of Amerindians, Africans, Chinese and Mixed (BOS, 2012).

Figure 16: Demographics (Johanna, Black Bush Polder)

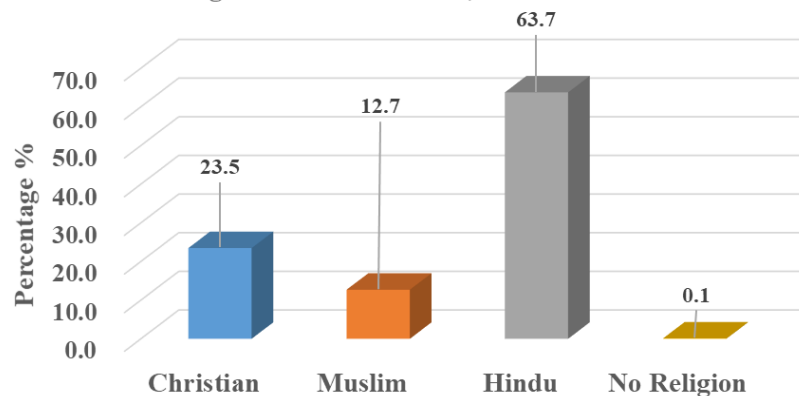
Population by Gender - Johanna, Black Bush Polder



Ethnic Composition- Johanna, Black Bush Polder



Religious Belief - Johanna, Black Bush Polder



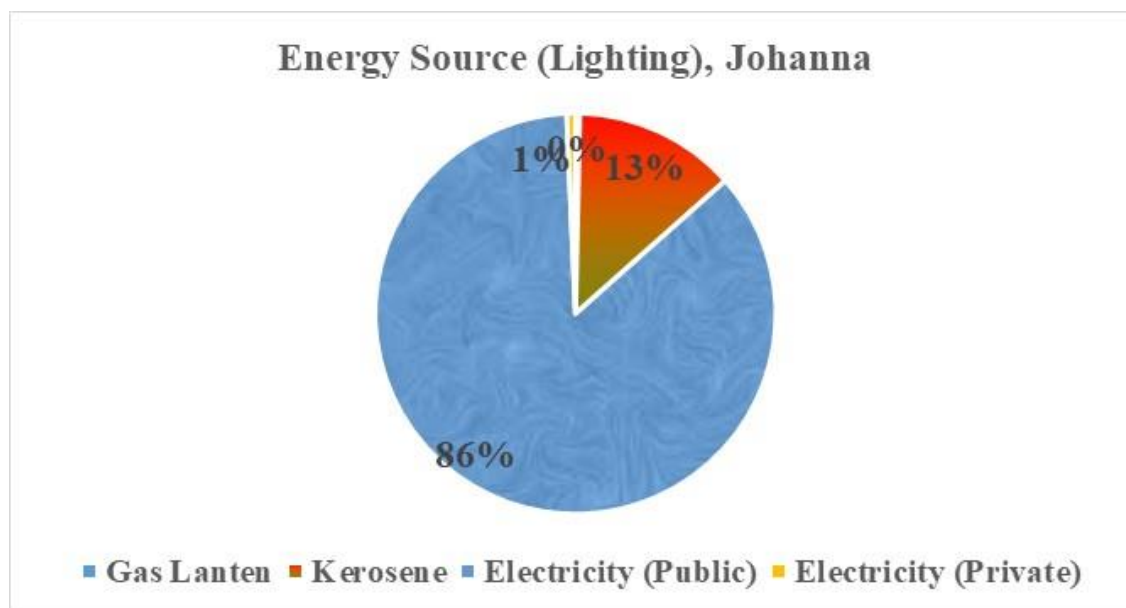
Illustrated by: Ms. Carlene R. Bascom (2022)

A majority (63.7%) of the residents attribute their beliefs to the Hindu Faith, followed by 23.5% Christian, 12.7% Muslim and 0.1% having no religious beliefs (BOS, 2012). The employment of residents spans a variety of Occupations inclusive of the Managers, Professionals, Technicians, Clerical Support, Service and Sales; Skilled Agricultural, Forestry and Fishery; Craft, Plant & Machine Operators & Assemblers and Elementary Occupation as a source of livelihood. Other means of livelihood consist of Remittance, Pensions, Parental/Spousal Support, Investment & Public Assistance (BOS, 2012).

The Johanna Village is a progressively developing area comprising stable electricity, potable water, tar pitch roads with a majority of households having electricity (86%) as their source of lighting (*Figure 18*). A large portion of the households used Kerosene (50%) as their source of

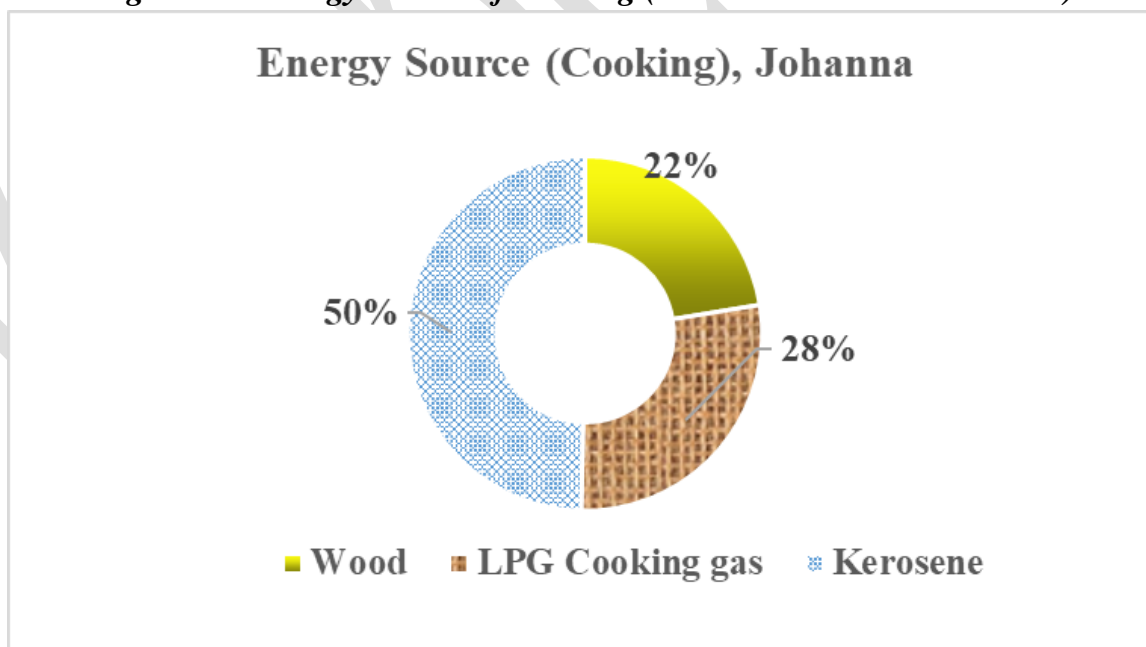
energy for cooking (Figure 19) and a majority of households have Traditional Pit Latrine with Slab (64%) as their toilet facility. (BOS, 2012)

Figure 17: Energy Source of Lighting (Johanna Black Bush Polder)



Illustrated by: Ms. Carlene R. Bascom (2022)

Figure 18: Energy Source of Cooking (Johanna Black Bush Polder)



Illustrated by: Ms. Carlene R. Bascom (2022)

Amazonia Rice Investment Inc. (Johanna)

Environmental Management Plan

In the event that there is a fire, villagers of Johanna can call on the Fire Station at Rosehall Corentyne Berbice. In the case of an incident villagers can call the Mibikuri Police Station. With regard medical service, the villagers are able to visit the Mibikuri Hospital located in Black Bush Polder. Pertaining to education, the highest level of education attained by most of the residents who completed studies was secondary (47.2%), followed by primary (41.0%) and, None/Nursery (5.9%). University and Post-Secondary were negligible (BOS, 2012).

With regard to environmental matters in the village of Johanna, an absolute majority of the households dispose of garbage by burning (97.2%) (BOS, 2012). Additionally, the main environmental concerns (Table 13) faced by the households in Johanna Village is Drainage followed by Flooding (BOS, 2012). Key indicators to note are the air, noise and water categories, where the general ambient environment of the village does not suffer from environmental issues that can affect human health and well-being.

Table 13: Environmental Concerns (Johanna, Black Bush Polder)

Concerns	Yes	No	Total HH
Air Pollution	5	285	290
Asbestos	0	290	290
Cell Phone Tower	0	290	290
Deforestation	0	290	290
Drainage	236	54	290
Flooding	165	125	290
Mangrove Destruction	0	290	290
Noise	3	287	290
Pesticides	1	289	290
Soil Erosion	15	275	290
Squatting	0	290	290
Waste Disposal	3	287	290
Water Contamination	2	288	290

Illustrated by: Ms. Carlene R. Bascom (2022)

Figure 19: Scenes from Water Quality Sampling Exercise









Photos taken by: Ms. Carlene R. Bascom & Mr. Shawn Manfield (2022)

Figure 20: Scenes from Field Monitoring Exercise









Photos taken by: Ms. Carlene R. Bascom (2022)

5 Potential Environmental Impacts and Mitigation

The very nature of the Rice Mill operation in one way or another has possible impacts on the Environment, if proper care is not taken during the process. Therefore, Amazonia Rice Investment Inc. values its responsibility to the community, to the staff, and to the entire surrounding environment to reduce as much as possible any environmental impacts from the operation. This ensures that the Company properly maintains all equipment and implements measures where necessary to mitigate and contain any possible pollution.

5.1 Operation Phase

The operation phase of the Amazonia Rice Investment Inc. aims to undertake the activities associated with the operation of the Rice Mill. It is the goal of the Amazonia Rice Investment Inc. to have all operational activities well managed, to ensure that the surrounding environmental integrity is protected and maintained, and to comply with the Environmental Protection Act 1996. Additionally, Amazonia Rice Investment Inc. will ensure that regular inspections and reporting on Environmental, and OS&H is done. The potential environmental impacts generated from the Rice Mill operation, and the mitigation measures the Mill has implemented to reduce adverse impact to workers health, the environment and the surrounding Johanna community during the operation phase are outlined as follows:

Table 14: Operation Phase Environmental Impacts & Mitigation Measures

Aspect	Potential Environmental Impact	Mitigation Measures Implemented
Air Quality	Dust/ Particulate Emissions	Provision of Dust Masks (PPE) to all staff and visitors to the Milling complex.
		EPA Designed cyclone furnace that the Mill burns waste (Paddy shell husk) to generate heat Energy.
		Boiler is fitted with two (2) Ash Trap system that prevent ash from entering the atmosphere
		Boiler uses Condense Water – After extract heat from the steam Condense Water is produced which has a temperature of 60°C to 70°C. The Boiler use

		this preheated water and thus burns less fuel in the Boiler.
		Installed Cyclones are used to facilitate the collection and transferal of rice husk and ash. Three (3) at the Parboil plant, three (3) at the White Rice drying and two (2) at the Mill.
		Regular and proper housekeeping is done to manage the build-up of dust/ particulates.
	Exhaust (VOC, GHG etc.)	All vehicles have emission control devices (exhaust Mufflers) installed.
		All vehicles and equipment undergo regular checks and maintenance.
		All vehicles & equipment are turned off when not in use.
Energy	Fuel Source	Installed Solar Panels (531 kW) to offset GPL Electricity and generator use
		Generated Waste husk is utilised as a fuel source for Rice Mill complex.
Noise Conditions	Noise Levels	Generators are equipped with Noise Mufflers
		All equipment and vehicles undergo regular checks and maintenance.
		Ensure the Mill and machinery is in proper working conditions.
		All vehicles have emission control devices (exhaust Mufflers) installed which also aid in noise control
		Idle vehicles & equipment are turned off when not in use.
		Provision of PPE for hearing protection to staff.

Water Quality	Well Water	Installed Filtration System to remove Iron
	Drainage Discharge	Constructed Filtration System – Length 75 feet, Width 8 feet, and Depth 66 inches. The filtration has four compartments/ stages for the removal of sediments from the water.
Hazardous Waste	Diesel Fuel	Fuel purchased for use is stored on site in Fuel Tanks . Only necessary quantity of fuel is purchased thereby minimising the amount of fuel stored on-site which reduces the likelihood for spillage.
	Waste Oil	Waste Oil is used to Lubricate equipment sprocket and chain. Waste Oil Quantity is minimal because it is only generated from the Generators during maintenance.
Solid Waste	Rice Husk/ Ash	Landfilling is done for excess waste husk (which is minimal) and ash at the Back of the Rice Mill. Heaps are kept low to as part of EPA requirements.
		The Rice Mill distributes free of cost some of the generated waste husk to local farmers for their Poultry fowl pen.
		Ninety- five (95%) of husk used as fuel source in the complex.
	Office Waste/ Domestic Waste	Excess domestic waste generated is normally burned. Plans are in place to construct a furnace for Office/ Domestic Waste,
Sewage	Effluent Discharge	A Septic Tank are located on site to facilitate the collection and storage of sewage.
		A Disposal Service is contracted by the Mill to clear the Septic tank and dispose of sewage appropriately.

Tabulated by: Ms. Carlene R. Bascom (2022)

The mitigation measures implemented by Amazonia Rice Investment Inc. outlined in *Table 14* have greatly contributed to the efforts made by the Rice Mill to minimize and reduce potential environmental impacts. Therefore, Amazonia Rice Investment Inc. will continue to take all necessary precautions to ensure the environmental integrity and the well-being of the workers.

5.2 Decommissioning Phase

In the event of a decommissioning phase for Amazonia Rice Investment Inc. operation, the Company will aim to undertake the activities associated with the decommissioning of the Rice Mill in a safe manner. Therefore, it will be the goal of Amazonia Rice Investment Inc. that all decommissioning activities are well managed to ensure that the surrounding environmental integrity is protected and maintained and complies with the Environmental Protection Act 1996.

Amazonia Rice Investment Inc. does **NOT** have any plans in the near future or over the next 30 years and beyond to decommission the Rice Mill operations at Johanna, Black Bush Polder. Amazonia Rice Investment Inc. intends to continue its operations fully and to be a striving Business, contributing to the Economy of the Co-operative Republic of Guyana.

5.3 Compliance

In the Co-operate Republic of Guyana, pollution emissions (negative externalities) must comply with the EPA Act 1996 cap 20:05 and accompanying Environmental Regulations and GNBS emission standards. Amazonia Rice Investment Inc. will ensure compliance with all the relevant Acts, Regulations, policy and standards. The Company will also comply with all the specific conditions outlined in the Environmental Permit to be issued for the Rice Mill operations. Amazonia Rice Investment Inc. will adhere to the Mitigation measures, Strategies and Protocols outlined in the EMP for the Rice Mill Operation. The Company's environmental policy reiterates and outline Amazonia Rice Investment Inc. Commitment to Environmental Compliance and will take all necessary precautions to ensure minimum impacts to the environment and human health, ensuring environmental integrity and workers wellbeing. Please refer to **Appendix 10** for *Amazonia Rice Investment Inc. Environmental Policy*

6 Monitoring Plan

This chapter outlines the Environmental parameters that will be monitored during production at Amazonia Rice Investment Inc. The plan also takes into consideration the documentation of information and the roles and responsibilities of key organisations/institutions/ personnel during the operation of the Amazonia Rice Investment Inc. Johanna, Black Bush Polder.

6.1 Responsibility

Amazonia Rice Investment Inc. has appointed designated personnel (*Table 15*) who will have direct oversight, and responsibility to implement the EMP mitigation measures, monitoring programme and recommendations for the Rice Mill operation with guidance from the Environmental Consultant. The designated personnel will coordinate with management and staff of the Rice Mill operation production to ensure environmental integrity and workers health and safety. The designated personnel will also work in coordination with the EPA, and external contacted environmental services to ensure compliance with the details of the EMP and the laws of Guyana.

Table 15: Appointed Environmental Liaison

Name	Designation	Role	Contact No.
Ms. Kulina Laljeit	Quality Manager	Oversight	(592) 648-2798
Mr. Pooran Shivdyal	Project Development & Automation	Oversight	(592) 600-5102
Ms. Carlene R. Bascom	Environmental Consultant	Guidance	(592) 609-5045

6.2 Training

The staff at Amazonia Rice Investment Inc. currently undergo Development training yearly which is facilitated by **Nand Persaud & Company Ltd.** However, over the years workers from Amazonia Rice Investment Inc. does not attend the training though invited. Please see **Appendix 11** for the Annual Training Plan 2022 and Recommendations.

6.3 Monitoring Programme

The Monitoring Programme below (*Table 16*) outlines the environmental parameters to be monitored during the operation of Amazonia Rice Investment Inc., Johanna, Black Bush Polder the estimated cost to implement the monitoring programme.

Table 16: Monitoring Programme

Parameters	Responsibility	Frequency	Sample Points	Cost Estimate
<u>Air Quality</u>				
Particulate Matter (PM2.5) Particulate Matter (PM10)	Carlene R. Bascom	Bi-annually Crop Season	Within the Boundaries of Amazonia Rice Investment Inc.	Invoice will be provided when Required
<u>Noise Condition</u>				
Decibels (dB)	Carlene R. Bascom	Bi-annually Crop Season	Within the Boundaries of Amazonia Rice Investment Inc.	Invoice will be provided when Required
<u>Surface Water Quality</u>				
pH Temperature Total Suspended Solids (TSS) Oil & Grease Total Dissolved Solids (TDS) Biological Oxygen Demand Nitrate Phosphate	Carlene R. Bascom	Bi-annually Crop Season	Settling Pond and Discharge Points	Invoice will be provided when Required
Site Inspection	Carlene R. Bascom	Bi-annually	Property of Amazonia Rice Investment Inc.	Invoice will be provided when Required
Environmental Auditing	Carlene R. Bascom	Every two years	Data Analysis and Records	Invoice will be provided when

				Required
Consolidated Annual Report	Carlene R. Bascom	End of Permit	For Permit Renewal Process	Invoice will be provided when Required
Waste Management	Amazonia Rice Investment Inc.	Seasonal/ Weekly	Property of Amazonia Rice Investment Inc.	Internal Cost
Routine Maintenance	Amazonia Rice Investment Inc.	Seasonal crop cycle end	All equipment and vehicles of the Rice Mill	Internal Cost
Quality Control	Amazonia Rice Investment Inc.	Daily	All products and Mill production	Internal Cost
Training	Amazonia Rice Investment Inc.	Annually	Rice Mill staff	Internal Cost
Mitigation Measures	Amazonia Rice Investment Inc.	As required	Planned measures to be implemented.	Internal Cost

Tabulated by: Ms. Carlene R. Bascom (2022)

6.4 Documentation

Amazonia Rice Investment Inc. will establish and maintain relevant documentation record of reports that are necessary to facilitate an effective and efficient Rice Mill operation with guidance from the Environmental Consultant. The reports established will comprise:

- ❖ Incident Reports
- ❖ Complaint Reports
- ❖ Equipment Fault & Maintenance Reports
- ❖ OS&H and Environmental Inspection Reports
- ❖ Monitoring Sampling Reports

These reports will be used to maintain and determine the effectiveness of environmental measures and procedures implemented by monitoring/ inspecting and reporting of key aspects to minimise environmental and OS&H effects of the Rice Mill.

6.4.1 Report Management

Incident/ Accident Reports

An incident report is a report where all the details of specific incident are recorded. This report is submitted to the Supervisor for further actions and investigations on the specific incident. The report will also define steps for solutions and improvement. Amazonia Rice Investment Inc. will make all efforts to safeguard the health and safety of workers with the provision of personnel protective gears, and employee training in environmental and OS&H awareness.

Hence, to maintain a safe and healthy work environment at the operation, a thorough accident investigation will be undertaken, immediately after an incident or accident in order to ascertain the cause, and the risk, and to recommend and implement corrective actions and/ preventative measures. The persons discovering an incident/accident or fault must report the matter to the Supervisor immediately. The officer will gather and record the details about the matter/ occurrence. This report will be submitted to the Manager for review and the necessary corrective action implemented.

Complaint Reports

A complaint is an expression of dissatisfaction, however it is made, about the standard of service, lack of action, or a matter of concern affecting an individual or group. The approach to be taken by Amazonia Rice Investment Inc. to address complaints from groups or individuals, which can comprise staff/ communities/ customers/ or other stakeholders, will be objective and to conduct relevant investigations to address the matter of concern documented/ recorded.

Any complaint made against the service/ actions of the Rice Mill will be comprehensively documented by the Supervisor on the ground and reported to the Manager within 8 hours. All complaints received must then be acknowledged within five (5) working days. An investigation of the complaint will be undertaken by the appropriate officers to analyse and recommend actions to resolve the complaint. The appropriate action required will then be executed. A response must be

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provided to the complainant within 30 working days on the outcome of their complaint and the action taken. If the complaint is still pending after 30 working days, feedback must be provided to the complainant at 15-day intervals until resolved. If the complaint cannot be resolved internally it must be referred to an external agency.

Maintenance

Maintenance is critical for Amazonia Rice Investment Inc. in order to be competitive and successful in the rice industry, both at the national and international levels. The Company's production systems and equipment performance must be efficient to enhance operating effectiveness, increase production quality, and maintain customer satisfaction, while reducing overhead costs.

For this to be effective, regular scheduled maintenance will need to be aligned with the production logistic operation. The principal responsibility of maintenance is to ensure that assets and equipment are kept good, safe, and in configured working condition to perform their intended functions. Also, to ensure the health and safety of workers; to perform all maintenance activities in an efficient and effective manner; to conserve and control the use of spare parts and material; to operate utilities and conserve energy.

The regular scheduled or emergency maintenance at the Rice Mill will be performed by the maintenance technicians. Maintenance and fault reports will be submitted to the Maintenance Supervisor for review. After maintenance, the conformation of the effectiveness shall be verified by the Manager.

Monitoring

Environmental monitoring will be an important feature of Amazonia Rice Investment Inc. environmental programme. Monitoring is key to knowing whether the quality of our environment is maintained within the set parameter threshold or has worsen and needs to be addressed. Environmental Monitoring will provide the basis for making informed decisions about the quality of the environment; measure and evaluate the Company's environmental performance, analyse root cause of problems, assess compliance with legal requirements and ensure the health, well-being of workers/ visitors in the facility.

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Ms. Carlene R. Bascom, Environmental Consultant will conduct regular scheduled monitoring within, and around the Amazonia Rice Investment Inc. Data measured and recorded will be analysed and evaluated by Ms. Bascom, and a report will be submitted to the Quality Manager for review and the implementation of appropriate recommendations. After the implementation of the appropriate corrective/ preventative measure, confirmation of their effectiveness shall be verified by the Project Development & Automation Manager of Amazonia Rice Investment.

Inspections (Audits)

Effective environmental, safety and health inspections would be one of the most important incident prevention tools in the Amazonia Rice Investment Inc. environmental, safety and health programme. The main purpose of the audit is to reveal potential dangers, confirm smooth working operation and ensure compliance of the Company's environmental, occupational safety and health:

- ❖ Guidelines,
- ❖ Measures implemented,
- ❖ Policies,
- ❖ Monitoring,
- ❖ Effective documentation/record keeping,

The environmental/ OS&H inspection will be conducted by Ms. Carlene R. Bascom based on scheduled inspections times. Upon the completion of the scheduled environmental, occupational safety and health inspections, non-conformity issues discovered will be recorded and submitted to the Quality Manager of Amazonia Rice Investment Inc. The non-conformities represent potential breaches or a need for improvement. The root cause of the non-conformity will be investigated by Ms. Bascom in association with the Rice Mill Supervisor/ Manager and will result in a recommended appropriate corrective and/ preventative measure to be adopted for mitigation by the Manager. After the implementation of the appropriate corrective/ preventative measure, confirmation of their effectiveness shall be verified by the Manager of the Rice Mill.



Annual Reporting

Based on environmental audits and activities of Amazonia Rice Investment Inc., Ms. Carlene R. Bascom, Environmental Consultant will prepare an Environmental Annual report, which will provide a record of all the complaints, incidents, enhancements and inspections documented on a monthly basis within the accounting year for the Rice Mill operation. This annual data will be made available to the relevant external governing bodies such as the Environmental Protection Agency upon request on compliance related matters, or during the renewal process for an environmental permit.

7 Emergency Response Plan

The chapter outlines the Emergency Response Plan for Amazonia Rice Investment Inc. Johanna, Black Bush Polder as follows:

7.1 Overview

According to the UNEP's Governing Council, an environmental emergency is defined as, "sudden-onset disasters or accidents resulting from natural, technological or human-induced factors, or a combination of these, which causes or threatens to cause severe environmental damage as well as loss of human lives and property" (UNEP, 2002). In addition, an emergency is defined as a serious, unexpected, and potentially dangerous situation requiring immediate action (Concise Oxford English Dictionary 11th Edition). Therefore, in light of the operation activities that will be undertaken by Amazonia Rice Investment Inc., possible emergencies can arise. As such, the Rice Mill has taken a precautionary approach to establish an Emergency Response Plan in the event of the occurrence of an emergency. The developed plan is intended to provide an overview of the Company's emergency procedures and contact details in the event of an emergency.

7.2 Purpose of the ERP

The purpose of this Emergency Response Plan is to provide clear planned procedures, coordinated strategy and information that will enable Amazonia Rice Investment Inc. to effectively respond to emergency situations. The primary objective of this ERP is to plan and prepare for potential impacts that could result from the operation, and maintenance of the Rice Mill. The overall goals of the plan will be, by all means necessary, to:

- Ensure the preservation of life
- Identify and assess potential hazards and emergencies,
- Prevent potential adverse impacts to human health, safety, property, and the environment,
- Prevent the occurrence of incidents and accidents,
- Assure preparedness in the event of an emergency,
- Provide an early organised response to emergencies,

- Ensure effective communication of emergency procedures, and
- Restore essential operations as soon as possible,

7.3 Responsibility

The protection of the environment and the health and safety of all employees, and the public are integral aspects of the operation activities of Amazonia Rice Investment Inc. As such the Rice Mill Management team is responsible for the emergency planning and the effective management and response to any emergency situation related to the operation, and maintenance of the Rice Mill. The Company is therefore highly committed to the process to safeguard health and well-being of staff by ensuring timely and appropriate responses to emergency, as Amazonia Rice Investment Inc. values highly the contribution of their staff.

7.4 Identification of an Emergency

The operation, and general maintenance of Amazonia Rice Investment Inc. may pose a number of potential hazards to both the operation and the life of personnel. As such, the most effective response to any given situation would result from prior awareness of the hazards, the potential effects and the consequences. Additionally, there must be a good understanding of the resources and actions necessary for a response. The possible types of Emergencies that can be encountered at the Rice Mill are as follow:

- ❖ Medical emergencies such as injuries and heart attack,
- ❖ Hazardous Material spills (release) from chemicals and fuels.
- ❖ Security such as crime and threats to personnel and plant.
- ❖ Fires such as electrical and fuel

7.5 Emergency Procedure

Emergency response procedures manage events that are not anticipated, almost totally unlikely to occur, or reasonably anticipated. It is therefore imperative to plan for worst case scenarios or adopt general procedures. It is also important to recognize that although highly unlikely, an emergency can have serious impacts well beyond the individual or the operation involved. Therefore, every

precautionary measure will be taken and put in place to ensure the safety of all staff and visitors to the plant.

All staff have a role to play in the event of an emergency, and will constantly be made aware of emergency procedures. These roles may include rescue, sounding of the alarm, extinguishing of fires, first aid attendance, or simply staying out of the way of designated emergency response personnel. Possible emergencies include, but are not limited to the following:

- ❖ Fires/ explosions
- ❖ Accidents/ medical situations
- ❖ Oil/ Fuel/chemical Spills (Hazardous)
- ❖ Criminal activity/ violence (Security)

The reactions of workers in the event of an emergency depends on how well the workers are prepared for the emergency. Therefore, Amazonia Rice Investment Inc. will ensure that all employees are familiar with, and have knowledge of the following:

- Layout of the Plant identifying all emergency exits,
- Location of alarm points,
- Location of fire extinguisher,
- Location of spill kits with instructions,
- A place of safe refuge in the event of an emergency.
- Excavation procedure,
- The internal and external emergency contact list.

7.5.1 Emergency Events

Fires

In the event of a fire anywhere in the compound:

- Activate the building fire alarm system closest to you. Notify security, emergency contacts and the Fire Station.

- Place a towel over your nose and mouth, if smoke is present.
- Rescue/ remove individuals in immediate danger/ harm by assisting them from the area. If possible when leaving, close all doors behind you.
- If possible
 - ❖ Confine/ contain the fire/ smoke/ toxic combustion to the area where the fire started as much as possible. Close all doors and windows, cutting flow of oxygen to the fire and preventing smoke from spreading.
 - ❖ Extinguish fires; staff should only attempt to extinguish small, contained fires where their safety is assured, have an escape route behind them and other staff members are available to assist.
 - ❖ Turn off all equipment.
- Evacuate the building immediately via the nearest exit and move to the closest area furthest away from the event. Points to remember when evacuating are:
 - ◆ Do not delay on hearing the alarm- evacuate immediately.
 - ◆ Walk don't run
 - ◆ When evacuating, do not return for personal belongings
 - ◆ Keep calm and assist others to exit.
 - ◆ If on fire, stop drop and roll.
 - ◆ Before opening any door check knobs, if hot use alternate, exit. If the knob is cool, open slightly and if there is hot draft or smoke visible use alternate exit.
 - ◆ If you are not near your work area/ station when the alarm sounds, DO NOT RETURN to the work area/ station until further instructed.
- If unable to evacuate
 - ❖ Close any doors and seal all cracks to reduce fire and smoke spread.

- ❖ Call security/ and contact from emergency list and inform where you are located. If possible, signal to emergency team by waving out of any window or by any means possible.
- ❖ Turn off and unplug all electrical equipment.
- ❖ Move to the most protected area in the room for refuge.
- ❖ Crouch low to the floor, if smoke enters the room/ area.
- ❖ Cover nose and mouth with towel.
- ❖ If on fire, stop drop and roll.
- ❖ Remain calm, do not panic and listen for any instructions given by rescuers.

Considerations in the event of a Fire

1. Workers are to follow the directions of emergency personnel.
2. Emergency evacuation drills will be done periodically.
3. Unauthorised workers are not to tamper with the fire extinguishers or alarms.
4. Workers are asked to report any malfunction of fire equipment.
5. Audits should be conducted routinely to ensure path to exits are lit, cleared and never blocked.

Medical Situation

In the event of a medical situation or accident:

- Assess the situation to the best of your ability.
- Call for the trained first aid attendant, providing as much information as possible.
- The first aid attendant provides the necessary first aid care.
- If seriously ill/ injured, alert the nearest hospital and transfer the patient to the hospital

- ❖ Do not attempt to move seriously injured persons without instructions from the trained medical first aid attendants'/ hospital paramedics.

If Burnt

- Cool the burn under cold running water until pain is relieved.
 - ◆ Do not use ice, since this can freeze skin and cause more damage.
 - ◆ Do not pop the burn blisters
- Alert/ call the first aid attendant, providing as much information as possible.
- The first-aid attendant provides the necessary first aid care.
- If required, seek further medical attention.

If Chemical Exposure

- Immediately remove contaminated clothing.
- Flush the affected area (skin/ eyes) with running water for 15 minutes.
- Alert/ call the first-aid attendant, providing as much information as possible and the chemical involved.
- Alert the hospital and seek medical attention from the Doctor.

Spill

In the event of spillage, the following steps must be taken:

- In case of spillage, the staff must inform the Supervisor immediately,
- The Supervisor isolate the spillage by the creation of a secured perimeter of 10 feet around the incident,
- A worker can be appointed to secure the perimeter and ensure that no activities continue, and that nobody walk within the perimeter (risk of spreading and contamination),
- The Supervisor identifies and removes the source of spillage with protective equipment,

- The Supervisor designates two (2) workers to keep the area safe,
- The Supervisor uplifts the spillage kit from storage location,
- With the spillage kit, the two (2) designated workers commence the spillage cleaning operation under the control of the Supervisor. If products are affected, they must be discarded,
- At the end of the spillage cleaning operation, the Supervisor inspects the area to ensure that cross contamination has been avoided, and gives the authorization to resume activities in the area,
- Supervisors must fill up an incident report.

Intrusion and Theft (Criminal Activity)

- The Security Guard must do a thorough security checks every two (2) hours to secure the site and to prevent unauthorized entry and theft.
- In case of an intrusion by unauthorized person,
 - ❖ the Security Guard must escort him to the entrance of the Rice Mill.
 - ❖ He must report the incident to the Mill Office and the Manager.
- In case of termination of job of an Employee, the Manager will advise Security Guard to deny entrance to the concerned staff.
- If the person is authorized, protocol for visitors to the Rice Mill will be in effect. Visitor must first proceed to the Rice Mill Office.
- Any intrusion or theft must be reported and investigated by the Chief Security Officer/Investigator, the Manager and Rice Mill Supervisor.
- If the situation by severity requires the support of the relevant authorities (Such as the Police,), the Manager is required to call and to involve the relevant authorities.

7.6 Emergency Equipment

Amazonia Rice Investment Inc. have in place several key equipment on site that will be utilised in the event of an emergency. The equipment are as follows:

- ◆ Fire extinguishers,
- ◆ First aid kits,

First-Aid Kits

By definition First-Aid is the immediate and temporary care/help given to the victim of an accident or sudden illness until professional medical treatment and help can be obtained. First-aid response is important in an emergency because, quick first-aid response:

- ❖ Could mean the difference between life and death.
- ❖ Can reduce the severity of a particular injury obtained,/or illness.

Due to carelessness and/or negligence on the part of employees around equipment, injuries can occur. As such, Amazonia Rice Investment Inc. have well-stocked First-Aid Kits on site within the Rice Mill. The company will ensure that each kit is clearly labelled and easily identifiable. There would also be instruction guidelines on the utilisation of the kit's contents. Amazonia Rice Investment Inc. will be responsible for the establishment, maintenance, and to make visible information regarding adequate first-aid supplies, providers, equipment and location in the event of an onsite injury.

The Company will take all necessary precautions to designate first-aid Attendants or Medics. The names and contact number of the trained first-aid Attendants will be posted alongside the first-aid kits, and in relation to the number of employees within the operation. The first-aid kits will be regularly inspected and replenished as needed by Office Managers and Mill Supervisors. Records will be kept by Managers and Supervisors on items used from the first-aid kit at each point location, by whom, and the reason for use. This will be done in order to maintain an inventory of the first-aid supplies.

It is the responsibility of all managers, supervisors and staff to be familiar with the contents of the first-aid kits, and have basic first-aid knowledge in order to assess an injured person and provide any immediate medical assistance; such as CPR (if qualified), maintain open airways if breathing is an issue, and prevent heavy blood loss; while awaiting a trained first-aid Attendant. Therefore, in the event of an accident or emergency, staff must immediately alert and summon the first-aid

Attendant or Medic and provide as much information as possible. The injured party must not be moved unless it is necessary to protect their lives or to prevent further injury occurring.

First-aid attendants or Medics will be qualified health care professionals trained in first-aid for:

- ◆ Respiratory arrest, cardiac arrest (CPR), haemorrhage, lacerations/abrasions,
- ◆ Amputations, musculoskeletal injuries, shock, eye injuries, burns,
- ◆ Loss of consciousness, extreme temperature exposure (hypothermia/hyperthermia),
- ◆ Paralysis, poisoning, loss of mental functioning, and drug overdose.
- ◆ Application of dressings and slings.
- ◆ Treatment of strains, sprains, fractures, bites, stings, contact with poisonous plants/animals/material.
- ◆ Immobilization, handling and transporting injured persons.

First-Aid Kit Content

The acceptable quantity of first-aid kits/materials to number of workers will be determined by Management. The Rice Mill Office will also be responsible through the first-aid Attendants/Supervisors to maintain the contents of each first-aid kit/materials. The first-aid kit and materials should be stored in a dust/water proof appropriate container. Each first-aid kit shall contain, but not limited to the following items *Table 17*:

Table 17: First-Aid Kit Contents

➤ Gauze pads	➤ Latex Gloves
➤ Large gauze pads (at least 8" x 10")	➤ Resuscitation equipment
➤ Box adhesive bandages (Band-Aids)	➤ Elastic wraps
➤ Package gauze roller bandage at least 2" wide	➤ Cold packs
➤ Triangular bandages	➤ Splint
➤ Rubbing alcohol/ alcohol wipes	➤ Emergency Assistance directions (Contact List)
➤ Scissors	➤ Burn Cream
➤ Adhesive tapes	➤ Snake bite kit
➤ Tweezers	➤ Ammonia inhalants

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- | | |
|-------------------------------------|-------------------------------------|
| ➤ Butterfly Closures | ➤ Anti-diarrhoea Mediation |
| ➤ Eye wash kit | ➤ Ibuprofen, Panadol (Pain tablets) |
| ➤ Hand mirror | ➤ Hand Sanitizer |
| ➤ Cotton balls | ➤ Antiseptic Cream |
| ➤ Limacol | ➤ Antibiotic Ointment |
| ➤ Two (2) Clean acceptable Blankets | ➤ Rigid Stretcher |

Tabulated by: Carlene R. Bascom (2022)

Fire Extinguishers

A fire extinguisher basically is a portable device which is used to control and quench manageable fires in the event of an emergency. Therefore, fire extinguisher is an important equipment to have in fire defence and preventing loss of life and property and shouldn't be overlooked or ignored. The reason being that a small fire in a few minutes can spread and destroy an entire structure. However, while proper procedure and training can minimize the chances of an accidental fire occurring in the plant, one must still be prepared to deal with a fire in the event it occurs. Amazonia Rice Investment Inc. will ensure that the Rice Mill is equipped with functional fire extinguishers. These extinguishers will be located at strategic points within the compound. The strategic points will be clearly marked and accessible to employees who will have knowledge of their position.

Fire extinguishers will be inspected on a monthly basis by the Supervisors of the site. Moreover, the extinguishers will undergo an official inspection by an officer of the Guyana Fire Service (GFS), on a biannual (six months) basis to ensure that they are functioning effectively and are in accordance with recommendations of the GFS with regards to the maintenance of fire extinguishers. Additionally, all employees of the Amazonia Rice Investment Inc. are required to undergo basic training in the utilisation of a fire extinguisher. It is of vital importance that staff have a general understanding of the proper use of a fire extinguisher, so as to avoid damage to property and safeguard life in the event of a fire. It should be noted that personnel must never try to use the fire extinguisher on an out of control fire, as this action can endanger the personnel. Therefore, in the event that a fire becomes out of control, Managers/ Supervisors must ensure that the trained professionals are called i.e. the fire service to prevent loss of life.

7.7 Training and Drill Exercises

Amazonia Rice Investment Inc. will be required to do training in environmental matters, and OS&H and conduct drill exercises such as fires, spills, and medical emergency scenario situations. Such training and drill exercise scenarios are to educate staff and develop their understanding of the elements, and the actions necessary to respond to an emergency, so that no life is loss and no one left behind.

The training and drill exercises to be undertaken will also be used by the Company to test and evaluate compliance and implementation of the Emergency Response Plan. Such training and exercises conducted will also aid in the improvement and update of the plan as needed. Amazonia Rice Investment Inc. will conduct staff orientation training for all new employees and will conduct regular training and drill exercises on a biannual basis. The training and drill exercises will include, but not be limited to:

- ◆ Emergency contact list,
- ◆ Emergency identification,
- ◆ Evacuations and assembly point,
- ◆ Emergency scenarios,
- ◆ Emergency equipment use,
- ◆ Personal Protective Equipment use,
- ◆ Waste management and Housekeeping.

7.8 Emergency Contact Details

In the event of an emergency the personnel and institutions that should be contacted are listed in *Table 18*. Both the internal and external contact list will be posted in the Mill at a strategic location to be seen by staff. Contacts on the Internal list will be called as appropriate in the event of an emergency. The primary duties of the emergency Internal contacts are to ensure the safety of the staff and visitors to the Rice Mill during an emergency.

Table 18: Internal Emergency Contact

Name	Designation	Contact No.
Ms. Kulina Laljeit	Quality Manager	(593) 648-2798
Mr. Pooran Shivdyal	Project Development & Automation	(592) 600-5102
Mr. Seseupaul Jhagroo	Chief Security Officer/ Investigation	(592) 608-8278
Mr. Irving M. Romalho	Production Manager	(592) 600-5113
Mr. Ishwardat Lawnand	First Aid Attendant	(592) 608-8276

The External contact list consists of a list of numbers for the relevant external agencies. In the event that an emergency has gone beyond the control of the internal company's emergency response actions, or requires further attention, the Director/Supervisor will therefore be able to contact the following relevant key agencies and institutions listed in Table 19 below:

Table 19: External Emergency Contact

Agency	Details	Contact No.
Mibikuri Police Station	New Amsterdam Switchboard	(592) 333-2152
Mibikuri NDC	Mr. Thakur Persaud, Chairman	(592) 687-3315
Mibikuri General Hospital	Dr. Ramdass, District Doctor	(592) 650-1054
Rose Hall Fire Station	Corentyne Berbice	(592) 322-5707 or 322-5708
Environmental Protection Agency (EPA)	Georgetown Switchboard	(592) 225-5472

Tabulated by Ms. Carlene R. Bascom (2022)

7.9 Review

The emergency response plan established by the Amazonia Rice Investment Inc., Johanna, Black Bush Polder, East Berbice Corentyne will be reviewed on an annual basis to determine relevancy and effectiveness of training, drill exercises, response process and emergency equipment. Where it is deemed necessary, improvements and updates to the plan will be made and instituted. The plan will also be reviewed, in the event an emergency was to occur at Amazonia Rice Investment Inc. to ensure a smooth process and effectiveness. Any amendments to the plan will be further communicated to all staff.

8 Closing Statement

The preceding chapters of this Operational Environmental Management Plan describe an overview of an EMP, an outline of the relevant legal framework, the process of production operation activities for Amazonia Rice Investment Inc., and the potential negative environmental impacts of the operations. The EMP document for Amazonia Rice Investment Inc. also identified a range of mitigation measures, a monitoring programme, emergency response plan and a waste management plan for effective implementation.

Consequently, the Environmental Management Plan document provides a clear understanding of the environmental and social impacts resulting from the Amazonia Rice Investment Inc. operations. The Environmental aspects of this operation have been closely analysed to minimise adverse social, environmental, safety and health impacts. Therefore, with careful management, monitoring and implementation, there should be minimal adverse impacts on workers' safety, health and well-being; and also maintain the integrity of the environment.

8.1 Recommendations

Based on the reporting and assessment of this OEMP it is recommended that for Amazonia Rice Investment Inc. implement the following measures listed below:

Issue 1: (Water Quality) Sample point WQ1 which is an internal Settling Pond north of the Parboil Plant indicates high total suspended solids levels.

Solution 1: Planned improvement efforts undertaken by Amazonia Rice Investment Inc. will include **adding approximately 15m in length** to the discharge filtration process to facilitate the removal of more sediments from the water before reaching settling pond prior to drainage discharge.

Issue 2: (Water Quality) Sample point WQ1 which is an internal Settling Pond north of the Parboil Plant indicates high oil and grease levels.

Solution 2: Planned improvement efforts undertaken by Amazonia Rice Investment Inc. will include adding a **grease trap** to remove and minimise Oil and Grease reaching the settling pond.

Issue 3: (Hazardous Waste) No Spill Kit on Site

Solution 3: In addition to the bund wall around fuel tanks, Amazonia Rice Investment Inc. should have in its supply Spill Kits in the event of spill. Please note Sand can also be utilised.

Issue 4: (Staff Awareness) Awareness of Staff to ensure their safety and health while conducting work at the Rice Mill is paramount.

Solution 4: In addition to the planned Environmental and OS&H training exercise programmes to be implemented by the Rice Mill, Amazonia Rice Investment Inc. plans to install visible reminders to staff about environmental, OS&H and internal matters through a number **signage and notice board** around the Milling Complex.

- Dissemination/ posting of material safety data sheets, instructions, and emergency procedures.
- Appropriate signage and notifications
- Include Environmental and OS&H Awareness Training

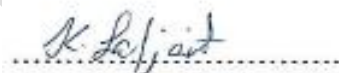
Issue 5: (Alarm System) only in Parboil Plant

Solution 5: Planned installation of additional alarm system extensions by Mid-January 2023

Issue 6: Lack of Participation in training at Nand Persaud & Company Ltd.

Solution 6: There should be more enforcement regarding ensuring participation in training done by Nand Persaud & Company Ltd.

Signed and Dated: December 29, 2022



Ms. Kulina Laljeit
Quality Manager
Amazonia Rice Investment Inc.



Ms. Carlene R. Bascom
Environmental Consultant
SUSTINERI Technology
BSc. Environmental Studies (SEES, UG)



Carlene R. Bascom
ENVIRONMENTAL CONSULTANT
(CONSULTANT)
Dec 29 2022

9 References

- Baby, S. (2011). *Approach in Developing Environmental Management Plan (EMP)*. IPCEBEE Vol.17: 2nd International Conference on Environmental Engineering and Applications.
- BOS. (2012). *Population Housing Census - 2012*. Georgetown: Bureau of Statistics.
- CBD. (2018). *Guyana-Country Profile Biodiversity Facts*. Retrieved from <https://www.cbd.int/countries/profile/default.shtml?country=gy>
- (n.d.). *Concise Oxford English Dictionary 11th Edition*. Oxford University Press.
- Daniel, J. R. (2001). *Geomorphology of Guyana: An Integrated Study of the Natural Environment 2nd Edition*. Georgetown: Department of Geography, University of Guyana.
- DEAT. (2004). *Environmental Management Plans, Integrated Environmental Management, Information Series 12*. Pretoria: Department of Environmental Affairs and Tourism (DEAT).
- (2014). *Environmental Management Plan Guidelines*. Commonwealth of Australia.
- Environmental Pollution Centers. (2017). *What is Noise Pollution?* Retrieved from <https://www.environmentalpollutioncenters.org/noise-pollution/>
- EPA Guyana. (2010). *Guyana Fourth National Report to the Convention on Biological Diversity*. Georgetown: Environmental Protection Agency.
- EPA Guyana. (2013). *Environmental Guidelines for Preparation of an Environmental Management Plan*. Georgetown: Environmental Management Division, EPA.
- EPA Guyana. (2017). *Noise Nuisance is an Offence*. Georgetown: Environmental Protection Agency.
- EPA Guyana. (2019). *Operations Permit Ref: 20150331-MPRMD*. Georgetown: Environmental Protection Agency.
- Fraser, G. (2020, January 1). *Ten Elements of Effective Document Control*. Retrieved from Quality Magazine: <https://www.qualitymag.com/articles/95868-ten-elements-of-effective-document-control>
- GL&SC. (2013). *Guyana National Land Use Plan*. Georgetown: Ministry of Natural Resources and Environment.
- GNBS. (2002). *GNBS Standards for Industrial Effluent Discharge*.
- GNBS. (2010). *GNBS Guideline Values for Noise in Specific Environment*.
- Google Maps. (n.d.). *Directions*. Google Maps.
- GRDB. (2016). *About Us*. Retrieved from <https://grdb.gy/about-us/>



Amazonia Rice Investment Inc. (Johanna)

Environmental Management Plan

Guyana Chronicle. (2015). *Integrated Coastal Zone Management*. Retrieved from www.guyanachronicle.com

Hedges, S. R. (2004). *Screening-Level Air Quality Survey for Conakry, Guinea*. United States Department of State Embassy.

Jandakot Airport. (2011). *Environmental Management Plans, Policy and Guidelines*.

Laws of Guyana. (n.d.). *Laws of the Co-operative Republic of Guyana*.

LCDS. (2022). *Guyana Low Carbon Development Strategy 2030*. Government of Guyana.

Lochner, P. (2005). *Guideline for Environmental Management Plans*. CSIR Report No. ENV-S-C 2005-053H. Cape Town: Department of Environmental Affairs & Development Planning.

Ministry of Agriculture. (2018). *About Us*. Retrieved from <http://agriculture.gov.gy/about-us/>

Ministry of the Presidency. (2015). *Draft for Consultation: Climate Resilience Strategy and Action Plan for Guyana*. Georgetown.

Nand Persaud & Company Ltd. (2019). Retrieved from Karibee Rice: <https://www.karibeerice.com/>

UNEP. (2002). *Further Improvement of Environmental Emergency Prevention, Preparedness, Assessment, Response and Mitigation*. UNEP/GC.22/INF/5. November 15. Governing Council of the United Nations National Environmental Programme.

UofA. (n.d.). *What is Water Quality*. University of Arkansas.

Veolia. (2017). *Operational Environmental Management Plan for Woodlawn Mechanical Biological Treatment Facility*. Australia.

WHO. (2012). *Air Pollution*. Retrieved from http://www.who.int/topics/air_pollution/en/

World Bank. (1999). *Environmental Assessment Source Book Update, No. 25*. Washington DC: Environment Department, the World Bank.

10 Appendices

Appendix 1: EPA Correspondence Letter

Appendix 2: GRDB Licence to Manufacture Rice

Appendix 3: White Rice Flow Diagram

Appendix 4: Parboil Rice Flow Diagram

Appendix 5: Dataset Correspondence with Hydromet

Appendix 6: Kaizen Lab Analysis Data Report

Appendix 7: Water Quality Sampling Data Sheet

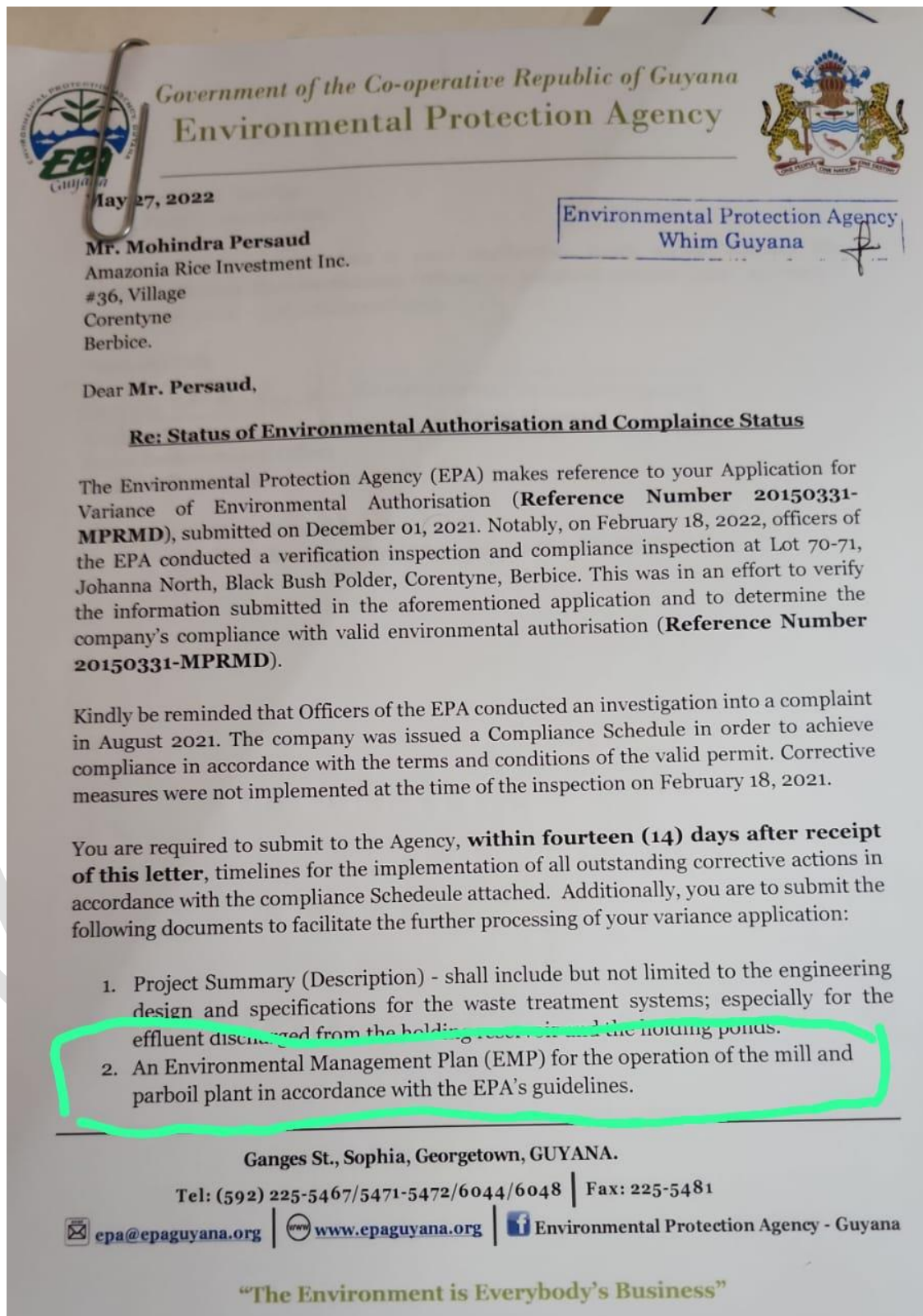
Appendix 8: Noise Level Sampling Data Sheet

Appendix 9: Air Quality Sampling Data Sheet

Appendix 10: Environmental Policy Statement

Appendix 11: Annual Training Plan 2022

10.1 Appendix 1: EPA Correspondence Letter



10.2 Appendix 2: GRDB Licence to Manufacture Rice

GUYANA RICE DEVELOPMENT BOARD
Ministry of Agriculture Complex, Guysuco Compound,
LBI East Coast Demerara,
Email: info@grdb.gy
Tel: 220-4732 Fax: 225-6486



LICENCE TO MANUFACTURE RICE

LICENCE No: **9** MILL No: **278**

REGION: **6**

NAME AND ADDRESS OF HOLDER: **AMAZONIA RICE INVESTMENT INC**
JOHANNA BLACK BUSH POLDER BERBICE

SITUATION OF RICE FACTORY: **AS ABOVE**

TOTAL MILLING CAPACITY: **10.0 mt/hr**

This Licence is issued to the above named person to manufacture rice at the
rice factory stated in this licence.

This Licence expires on the 31st day of December 20 **22**

LICENCE FEE: **\$160,000**


DATED THIS **1st** DAY OF **March 20 22**

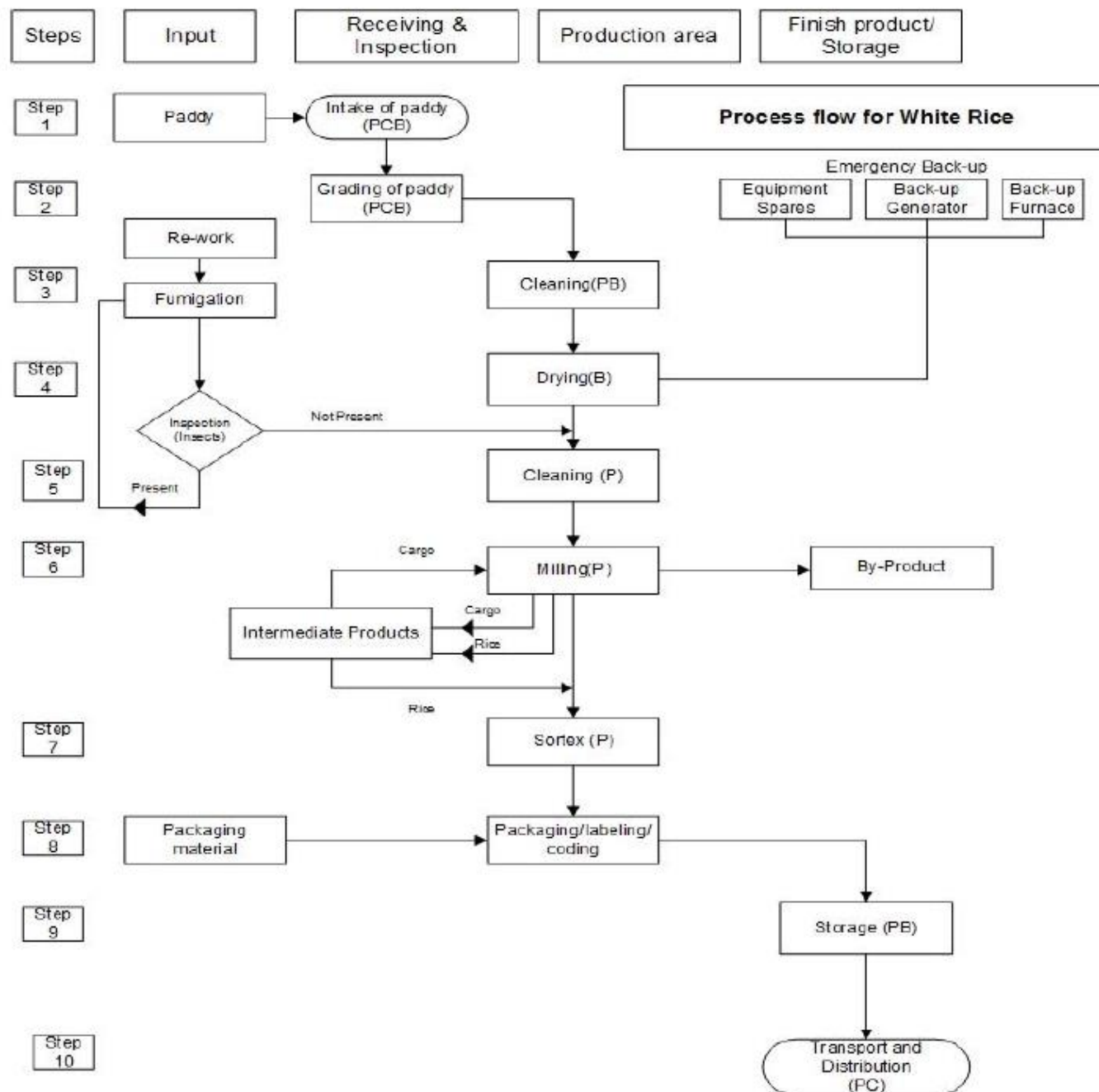

.....
GUYANA RICE DEVELOPMENT BOARD

Receipt No: 8659




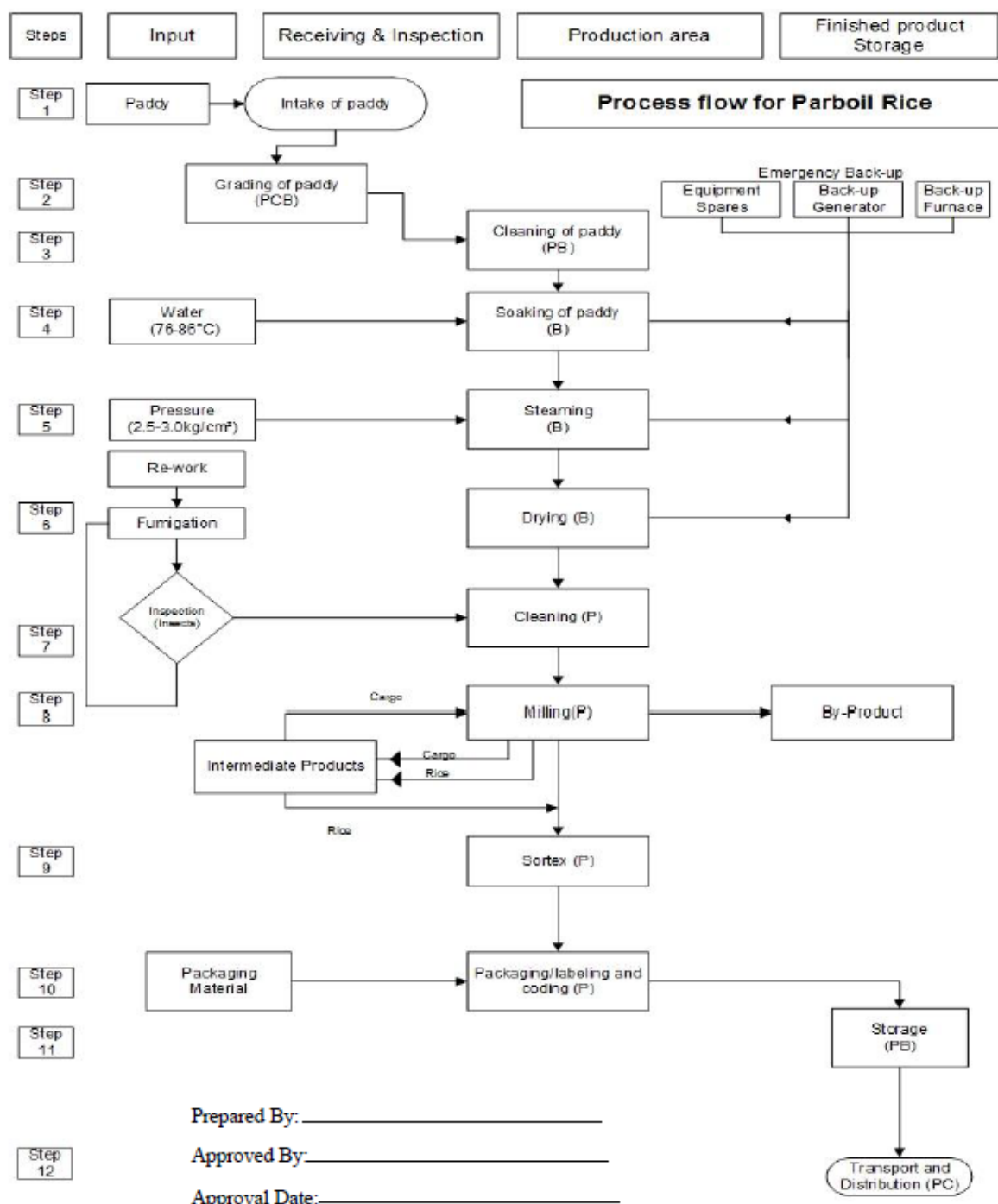
10.3 Appendix 3: White Rice Flow Diagram

	SUBJECT	PRODUCT	Page
	Flow Diagram	White Rice	1 of 1
DOCUMENT NO.	ADDRESS	PLANT NAME	ISSUE DATE
ARIH106R0	70-71 Johanna, Black Bush Polder, Corentyne, Berbice	Amazonia Rice Investment Inc.	



10.4 Appendix 4: Parboil Rice Flow Diagram

	SUBJECT	PRODUCT	Page
	Flow Diagram	Parboil Rice	1 of 1
DOCUMENT NO.	ADDRESS	PLANT NAME	ISSUE DATE
ARIH107R0	70-71 Johanna, Black Bush Polder, Corentyne, Berbice	Amazonia Rice Investment Inc.	



10.5 Appendix 5: Dataset Correspondence with Hydromet



MINISTRY OF AGRICULTURE

Cable Address: "MINFLAM"

Fax No: 592-226-1460

Phone No: 592-225-4247, 227-2463, 225-9303, 226-0341,

Website: www.hydromet.gov.gy

Ref: HYM 18/1

**HYDROMETEOROLOGICAL
SERVICE
18 Brickdam
Stabroek,
Georgetown,
Guyana.**

6th December, 2022.

Mr. Carlene R. Bascom
Sustiner Technology
N½ 66 Remus Street
Agricola
Georgetown
Guyana.

Dear Mr. Bascom,

Re: Request for Monthly Rainfall & Mean Temperature Data.

Kindly refer to your data request dated 5th December, 2022 for Monthly Rainfall Data for Johanna South & Mean Temperature Data for New Amsterdam from January to November, 2022.

Please find attached rainfall for Johanna South & temperature data for New Amsterdam which are the closest stations available. The rainfall is measured in Millimeters (mm) and temperature is measured in Celsius (°C).

This data is provided with the understanding that there would be no third party distribution and that it should not be used for commercial purposes.

Yours sincerely,



Hymawattie Danny

GIS Manager

For Chief Hydrometeorological Officer

Monthly Average Mean Temperature for New Amsterdam from January to November 2022.

Elements	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Mean Temperature	27.2	26.9	27.5	27.5	27.5	27	27.8	28.1	28.9	28.6	27.6

Monthly Rainfall Data for Johanna South from January to November 2022.

Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Rainfall	54.3	122.6	106	203.2	497.9	320.2	277.9	105	78.4	13.8	122.3


Checked By: Ratna

Date: 2022 12.06

10.6 Appendix 6: Kaizen Lab Analysis Data Report



26 Walkerd Avenue,
Thomas Lands,
Georgetown, Guyana.
Tel: (592) 231-0346 / (592) 231-0348
Email: inquiries@kaizen-guy.com

ANALYSIS DATA REPORT		
Customer:	Carlene R. Bascom	Lab File #: 001267-1
Customer's Address:	N 1/2 66 Remus Street Agricola	
Customer Contact:	Carlene R. Bascom	
Client Job #:	22-022	
Item(s) Analyzed:	Water Sample	
Date of Sampling:	21-Nov-22	
Sampled By:	Client	
Date of Receipt:	21-Nov-22	
Report Date:	29-Nov-22	
ANALYSIS RESULTS		
Parameter	Units	Results
		001267-1 WQ#1
Biological Oxygen Demand*	mg.L ⁻¹	<5.08
Total Oil and Grease	mg.L ⁻¹	144
Total Suspended Solids	mg.L ⁻¹	202
Test Methodologies:	Biological Oxygen Demand: SMEWW 5210 B Total Suspended Solids: SMEWW 2540 D Total Oil and Grease: USEPA 1654	
Comments:	Kaizen Environmental Services (Guyana) Inc. is Certified by the Guyana National Bureau of Standards (GNBS), conforming to GYS 170:2009, General Requirements for the operation of a Laboratory. Certificate No. 019. *Parameter is accredited under the GNBS requirements to the GYS 170:2009	
Report Authorized By:		 Shantel Charles Division Manager(IT)
This test report relates only to the items tested and shall not be reproduced except in full, without written approval of the laboratory.		

10.7 Appendix 7: Water Quality Sampling Data Sheet



SUSTINERI Technology
Carlene R. Bascom
Environmentalist

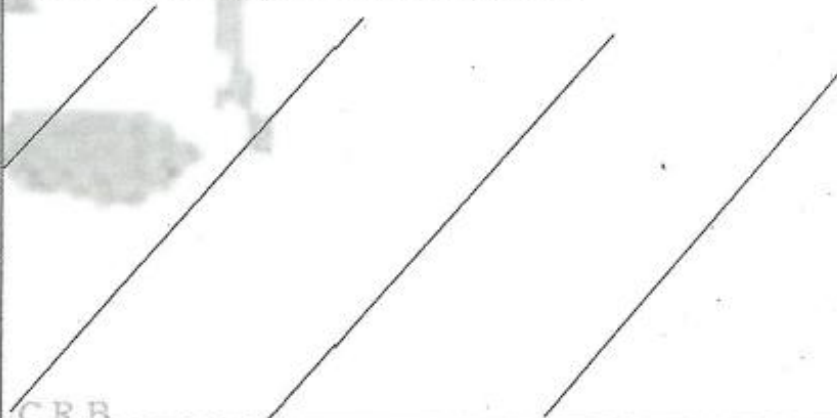
N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

Water Quality Sampling Data Sheet

Client: Amazonia Rice Investment Inc.

CRB

Sheet No. CRB-ARI-01

1. General	
Location (Site): 70-71 Johanna, Black Bush Polder, Region 6	Sampler: Ms. Carlene R. Bascom
Sample Date: November 21 st 2022	Assistant: Mr. Shawn Mansfield
Measurement Duration: Approximately 5 minutes	Sample Type: Domestic Waste Water
2. Field Observations	
Current weather:	Sunshine with Slight Cloud Cover
Site Activity:	Rice Milling
Sample Taken:	Three (3) samples TSS, O&G and BOD from One (1) Sample Point
Sample Point Description:	<p>Sample Point #1: Internal Settling Pond North of Parboil Plant WQ1,</p> 

Sheet No. CRB-ARI-01

Water Quality Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 1 of 3



SUSTINERI Technology
Carlene R. Bascom
Environmental

N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

4. Comments

Laboratory

- Samples collected were sealed, labelled and time stamped.
- Samples were preserved using ICE
- Samples on ICE were taken to Kaizen Labs on November 21st 2022 to conduct Water Quality Analysis Test for Total Suspended Solids, Oil and Grease and Biological Oxygen Demand.

In-Field

- Water Quality Analysis Test were done for pH and Temperature on samples collected.

5. Declaration

The above data sheet provides a true, accurate and complete account of sample readings

Signature:


Ms. Carlene R. Bascom
Environmental Consultant

Dated:

NOV 21st 2022

CC: EPA and Amazonia Rice Investment Inc.

Designed by Carlene R. Bascom (2014), Revised (2019) Updated Dec 2021



"The Environment is Everything that isn't me" – Albert Einstein

"We must remember that intelligence is not enough. Intelligence plus character – that is the goal of true education." – Martin Luther King Jr.

10.8 Appendix 8: Noise Level Sampling Data Sheet



SUSTINERI Technology
Carlene R. Bascom
Environmentalist

N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

Noise Level Sampling Data Sheet

Client: Amazonia Rice Investment Inc.

CRB

Sheet No. CRB-ARI-02

1. General	
Location (Site): 70-71 Johanna, Black Bush Polder, Region 6	Sampler: Ms. Carlene R. Bascom
Sample Date: November 26 th 2022	Assistant: _____
Measurement Duration: Approximately 4 hours 37 minutes	Sample Type: Outdoor/ Indoor
2. Field Observations	
Current weather:	Sunny
Site Activity:	Rice Milling
Sample Taken:	Six (6) Noise Level Condition Samples
Sample Point Description:	<u>Sample Point #1:</u> Southern Section of Property by the Entrance, Road and near a Resident
	<u>Sample Point #2:</u> Storage Area
	<u>Sample Point #3:</u> White Rice Milling Section

Sheet No. CRB-ARI-02

Noise Level Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 1 of 4



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Carlene R. Bascom
Environmentalism

N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

Sample Point Description:	<u>Sample Point #4:</u> Landfill Area
	<u>Sample Point #5:</u> Parboil Plant
	<u>Sample Point #6:</u> Generator Room

Sheet No. CRB-ARI-02

Noise Level Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 2 of 4



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Environmentalist

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Greater Georgetown
(592) 609-5045

3. Measurements (Raw Data)

Sample ID	Coordinates		Time		Noise (dB Slow) A-weighting		
	21N	UTM	Start (hr./min)	End (hr./min)	Average	Max.	Min.
NA1	469682	672377	8:30 hrs.	9:00 hrs.	49.3	NA	NA
NA2	469607	672392	9:04 hrs.	9:35 hrs.	46.0	NA	NA
NA3	469613	672387	9:39 hrs.	10:10 hrs.	55.4	NA	NA
NA4	469431	672415	10:14 hrs.	10:45 hrs.	56.1	NA	NA
NA5	469592	672392	12:10 hrs.	12:41 hrs.	68.3	NA	NA
NA6	469591	672459	12:46 hrs.	13:17 hrs.	50.4	NA	NA
CRB							
CRB							
CRB							
CRB							
CRB							

Sheet No. CRB-ARI-02

Noise Level Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 3 of 4



SUSTINERI Technology
Carlene R. Bascom
Environmentalist

N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

4. Comments

- Noise Level Readings were taken during the Out of Crop Season
- The main Source of Noise was from Routine Maintenance in the Mill, Road side noise came from Cars passing/ when there was noise from animals out of the compound or the resident Neighbour
- Readings for NA1 to NA6 was taken after a 30 minute duration.

5. Declaration

The above data sheet provides a true, accurate and complete account of sample readings

Signature:

Carlene R. Bascom
Ms. Carlene R. Bascom
Environmental Consultant
Carlene R. Bascom
ENVIRONMENTALIST
(CONSULTANT)
11/26/22

Dated:

Nov 26th 2022

CC: EPA and Amazonia Rice Investment Inc.

Designed by Carlene R. Bascom (2014), Revised (2019), Updated Dec 2021

"The Environment is Everything that isn't me" – Albert Einstein

"We must remember that intelligence is not enough. Intelligence plus character – that is the goal

Sheet No. CRB-ARI-02

Noise Level Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 4 of 4

10.9 Appendix 9: Air Quality Sampling Data Sheet



SUSTINERI Technology
Carlene R. Bascom
Environmentalist

N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

Air Quality Sampling Data Sheet

Client: Amazonia Rice Investment Inc.

CRB

Sheet No. CRB-ARI-03

1. General	
Location (Site): 70-71 Johanna, Black Bush Polder, Region 6	Sampler: Ms. Carlene R. Bascom
Sample Date: November 26 th 2022	Assistant: _____
Measurement Duration: Approximately 4 hours 37 minutes	Sample Type: Outdoor/ Indoor
2. Field Observations	
Current weather:	Sunny
Site Activity:	Rice Milling
Sample Taken:	Six (6) Noise Level Condition Samples
Sample Point Description:	<p><u>Sample Point #1:</u> Southern Section of Property by the Entrance, Road and near a Resident</p> <p><u>Sample Point #2:</u> Storage Area</p> <p><u>Sample Point #3:</u> White Rice Milling Section</p>

Sheet No. CRB-ARI-03

Air Quality Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 1 of 4



SUSTINERI Technology
Carlene R. Bascom
Environmental Scientist

N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

Sample Point Description:	<u>Sample Point #4:</u> Landfill Area
	<u>Sample Point #5:</u> Parboil Plant
	<u>Sample Point #6:</u> Generator Room

Sheet No. CRB-ARI-03

Air Quality Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 2 of 4



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Carlene R. Bascom
Environmentalist

N ½ 66 Remus Street
Greater Georgetown
(592) 609-5045

4. Comments

- Air Quality Readings were taken during the Out of Crop Season
- Routine Maintenance was ongoing in the Rice Mill.
- At NA3 there were occasions during the 30 minute duration that readings reached 20 µg/m³ before it stabilized. This spike was due to the movement of the Fork Lift.
- Readings for NA1 to NA6 was taken after a 30 minute duration.

5. Declaration

The above data sheet provides a true, accurate and complete account of sample readings

Signature: _____

Ms. Carlene R. Bascom
Environmental Consultant

Dated: _____

CC: EPA and Amazonia Rice Investment Inc.

CRB
Carlene R. Bascom
ENVIRONMENTALIST
(CONSULTANT)
NOV 26 2022

Designed by Carlene R. Bascom (2014), Revised (2019) Updated Dec 2021

"The Environment is Everything that isn't me" – Albert Einstein

"We must remember that intelligence is not enough. Intelligence plus character – that is the goal

Sheet No. CRB-ARI-03

Air Quality Sampling Data Sheet designed by Carlene R. Bascom (2014), R (2019), Updated (2021) Page 4 of 4



10.10 Appendix 10: Environmental Policy Statement



Environmental Policy Statement

Amazonia Rice Investment Inc. is a Company working in the Rice Milling Industry producing a variety of Rice products for the Karibee Brand. Our Company believes that protecting and maintaining the environment is an integral part of the Rice Milling Sector to ensure overall Environmental Integrity. Amazonia Rice Investment Inc. acknowledges that our operational activities will generate waste and emissions which will have possible impacts on the environment. Therefore, our Company will seek to prevent / reduce environmental impacts as far as possible in a sound practical manner.

As such, Amazonia Rice Investment Inc. is committed to

1. Full compliance with all environmental legislation, regulations and policies regarding the Rice Milling Sector.
2. Establishing pollution prevention controls at the Rice Mill and Parboil Plant.
3. Ensuring efficient use of resources and materials throughout the operation.
4. Maintaining good housekeeping and management of generated waste.
5. Continual improvement in environmental performance by initiating activities/ projects to reduce environmental impacts
6. Promoting regular environmental training to ensure a well-informed staff.

Amazonia Rice Investment Inc. will review this policy periodically, taking into account any changes within the National Legislations, and the Company. Furthermore updated Environmental Policy Statements will be communicated to our employees, interested parties and the public at large as we strive to maintain environmental integrity.

10.11 Appendix 11: Annual Training Plan 2022

Annual Training Plan (Year: 2022)																	NPCLPR38F1R4	
No.	Title of Training/Contents	Target Group	Duration	Venue	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Conducted By	
1	Workshop Safety & Company Policies	Fabrication, Electrical, Machine and Maintenance	2Hr	Conference Center							✓						Security Department	
2	Refresher on GMP + HACCP, Allergen, Company Policies & Procedures, Food Fraud & Food Defense	Mills & Plant Operators	2Hr	Conference Center							✓						Food Safety Department	
3	Refresher on GMP (Policies & Procedures) + HACCP, Allergen, Company, Food Fraud & Food Defense	Packaging & Bagging	2Hr	Conference Center							✓						Food Safety Department	
4	GMP (Policies & Procedures, Importance of Cleaning & Sanitation) + HACCP, Food Fraud & Food Defense	Bond Clerks	2Hr	Conference Center							✓						Food Safety Team Leader	
5	Importance of Cleaning & Sanitation, Food Fraud & Food Defense, Company Policies	Cleaners & Labourers	1Hr	Conference Center							✓							
6	Food Fraud & Food Defense, HACCP, Company Procedures & Policies	Lab Staff	2Hr	Conference Center							✓						Production Manager / Food Safety Team Leader	
7	Company Policies, Importance of Cleaning & Sanitation	Truck Owners & Porters	30-45mins	Conference Center		✓							✓				Food Safety Team Leader	
8	Refresher on FSSC 22000, ISO 22000, 2018, HACCP, Allergen	Food Safety Team	1Hr	Conference center							✓						Food Safety Team Leader	
9	Company Induction Training	New Employee	1Hr	Conference Center		✓					✓						HR & Food Safety Department	
10	Fire Drill Exercise	All Employees		Factory										✓			Security Department	
11	Forklift Training	Forklift Operators	1Hr	Conference Centre							Undefined						Security Department & Production Manager 2	
12	Food Handlers Training	New Packaging/ Bagging Staff & other Interested Staff	3Hrs	Conference Center							Undefined						Government Health Department	
13	First Aid Training	Selected Individuals	1Hr	Conference Center							Undefined						Outsourced	
Note: All training will be done during the out of crop period, training will be done during December January period and June July																		
Prepared By: Food Safety Team Leader		Approved By: C.E.O		Approval Date														