R L SUKHRAM AND SONS

REPORT ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

FOR

STATE FOREST EXPLORATORY PERMIT 2/2017

Godfrey Marshall

FORESTRY TRAINING CENTRE INCORPORATED

JULY 4, 2021

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ACKNOWLEDGEMENTS

RLSS records here its deep appreciation for the support of numerous boat captains plying the Cuyuni River and the Puruni River respectively, who provided information and facilitated access to various riverine locations on the concession area. Likewise, RLSS expresses its gratitude to those miners and business persons working in the Puruni and Cuyuni Districts respectively who also provided useful information or supported field crews.

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RLSS particularly wishes to record its appreciation for the valuable feedback provided by stakeholders during formal and informal consultations. Special thanks are due to representatives of the RDC, Region 7, representatives of MOH, NIS and GPS/MoHA based in Bartica, and community leaders at Iteballi 'Village', Kartabu Village and Batavia Amerindian Village respectively who supported social surveys in the Kartabu District.

GFC's mapping unit went beyond their normal duties to prepare many of the maps used in this report and for this project.

ACRONYMS

ACTO	Amazon Cooperation Treaty Organization
AOP	Annual Operations Plan
BCL	Barama Company Limited
CDC	Community Development Council
CI	Conservation International (Guyana)
COP	Code of Practice for Forest Operations, 2018
Dbh	Diameter at breast height
DFID	Department for International Development, UK
DOE	Department of Environment, Office of the President
EAB	Environmental Assistance Bureau
EPA	Environmental Protection Agency
EPPA	Environmental Protection and Protected Areas (Policy)
ESIA	Environmental and Social Impact Assessment
EU	European Union
FLEGT	Forest Law Enforcement, Governance & Trade
FMP	Forest Management Plan
FPA	Forest Products Association of Guyana
FTCI	Forestry Training Centre Incorporated
GDF	Guyana Defence Force
GEF	Global Environmental Facility, United Nations
GFC	Guyana Forestry Commission
GFFO	Guidelines for Forest Operations, 2018 (Large concessions)
GGDMA	Guyana Gold and Diamond Miners Association
GGI	Guyana Goldfields Inc.
GGMC	Guyana Geology and Mines Commission
GL&SC	Guyana Lands & Surveys Commission
GMSTC	Guyana Mining School and Training Centre
GOG	Government of Guyana
GPF	Guyana Police Force
GRA	Guyana Revenue Authority
ICT	Information and Communications Technology
IIC	Iwokrama International Centre
IPCC	Inter-Governmental Panel on Climate Change
ITTO	International Tropical Timber Organization
KPR	Kartabu-Puruni Road
LCDS	Low Carbon Development Strategy
MNR	Ministry of Natural Resources
MOAA	Ministry of Amerindian Affairs
MOH	Ministry of Health
MOHA	Ministry of Home Affairs
MOPW	Ministry of Public Works
NBSAP	National Biodiversity Strategy and Action Plan 2012-2020
NDC	Neighbourhood Democratic Council
NDS	National Development Strategy 2001-2010
NFP	National Forest Plan, 2018
NFPS	National Forest Policy Statement, 2018
NGO	Non-Governmental Organization
NIS	National Insurance Scheme (Guyana)
NLUP	National Land Use Plan

NPAS	National Protected Area System
OCC	Office of Climate Change
OOTP	Office of the President
OSH	Occupational Safety & Health
PAC	Protected Areas Commission
PMS	Permanent Monitoring Stations
RLSS	Rong-An Inc.
RLSS	RL Sukhram & Sons
SDG	Sustainable Development Goals
SFA	State Forest Organization
SFEP	State Forest Exploratory Permit
SFM	Sustainable Forest Management
TEEB	The Economics of Ecosystems and Biodiversity
TFF	Tropical Forest Foundation (based at Virginia, USA)
TOR	Terms of Reference for the ESIA study
TPTTI	Toolsie Persaud Timber Traders Inc.
UAV	Unmanned Aerial Vehicle
VPA	Voluntary Partnership Agreement
WCED	World Commission on Environment and Development
WTTCL	Willems Timber & Trading Company Ltd.
WWF	World Wildlife Fund

GLOSSARY

Base camp: A field based administrative operations centre, over an area of about 600km^2 set up by forest concessionaires for managing field operations. The base camp is organized to accommodate field operatives and carry out simple preventive maintenance of machines.

Business Community: All persons engaged in the transport, trade or sale of fuel, oil, mining gear, rations, and beverages, or providing services in the areas of mechanical, vulcanizing, or entertainment) services in the Kartabu Triangle.

Code of Practice (2018) -A set of rules on ethical, environmental, technical and social practices and protocols that the GFC published in 2018 and that embody mandatory standards for sustainable timber harvesting and ancillary practices in Guyana.

Forward camp: Simple, temporary tarpaulin covered camps set to accommodate forest operatives conducting forest inventory, road and skid trail construction and logging crews.

Gold Shout: Any news or rumours about a gold rush at a particular location.

Guidelines for Forest Operators (GFFO) (small concessions/large concessions): a document developed by GFC to provide forest concessionaires with guidance on timber harvesting and allied environmental and social practices in Guyana.

Depot: A site, generally on a riverbank, normally used for the temporary storage of containerized fuel or logs (see Landing).

Draaga: A floating, self-contained and self-propelled barge that dredges and processes earths from riverbeds and sometimes from river banks for the purpose of retrieving gold.

Landing: A clearing on an interior riverbank used as *transit points* for people, rations, equipment, and fuel transported by boat to access land based operations.

Logging community: all concession holders, their employees and contractors, and any other field operatives associated with harvesting timber on forest concessions in a given region or district.

Mining community: the entire array of large scale and small scale miners, their employees and contractors, and gold traders and other persons engaged with the retrieval, sale or purchase of gold from areas under mineral licences.

Rapids: A hydrological feature characterised by a river section where the riverbed has a steep gradient, causing a marked increase in water velocity and turbulence.

Sailor: An itinerant unskilled labourer who has no mineral license and who drifts from one mining operation to another doing odd jobs, including loading goods.

Sustainable Development: Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (WECD 1987).

Sustainable mining: According Strongman (2002[1]) to Sustainable mining involves projects that are financially viable, environmentally sound, and socially responsible implemented with sound

[1] http://siteresources.worldbank.org/INTOGMC/Resources/Madang-StrongmanPresentationCD-ROM.pdf

governance and it must bring lasting benefits especially for communities. https://www.ombudsman.gov.ph/UNDP4/wp-content/uploads/2013/01/PrimerPolicy-Brief-on-sustainable-mining.pdf

Timber depot: an area, generally within a forest concession or a riverbank designated for the sorting and temporary storage of logs.

Timber path: A road or path approved by the GFC within State forests for the purpose of allowing any logger to transit areas held by another forest concessionaire.

Timber harvesting: The aggregation of all operations, including pre-harvest planning and post-harvest assessment, related to the felling of trees and the extraction of their stems or other usable parts from the forest, for subsequent processing into industrial products (ILO 1998).

NON-TECHNICAL SUMMARY

ESIA REPORT-SFEP 2/2017-RLSS
NON TECHNICAL SUMMARY

1.0 INTRODUCTION-THE DEVELOPER, RL SUKHRAM & SONS (RLSS)

Mr. Ragunauth Lall Sukhram launched RL Sukhram & Sons (RLSS) in 2006. The enterprise constructed an office, sawmill and a lumber yard at Lots 6 & 7, St. Lawrence, East Bank Essequibo and later, a lumber yard at Versailles, West Coast Demerara (see Figure A). RLSS' current operations contribute significantly to home building projects at Tuschen and Parfaite Harmony respectively.

Figure A: Photograph of RLSS sawmill (left) and its lumber yard at Versailles right)

RLSS sources timber from its several small forest concessions in the Kartabu Triangle and through purchases from other forest concessionaires. However, the total volume of logs available for processing is insufficient for RLSS strategic business goals.

In July 2017, RLSS acquired a State Forest Exploratory Permit (SFEP) 2/2017 for an area of 432,262.59 ha, situated between the upper Cuyuni River and the Upper Puruni River, in Region 7 (see Figure B).

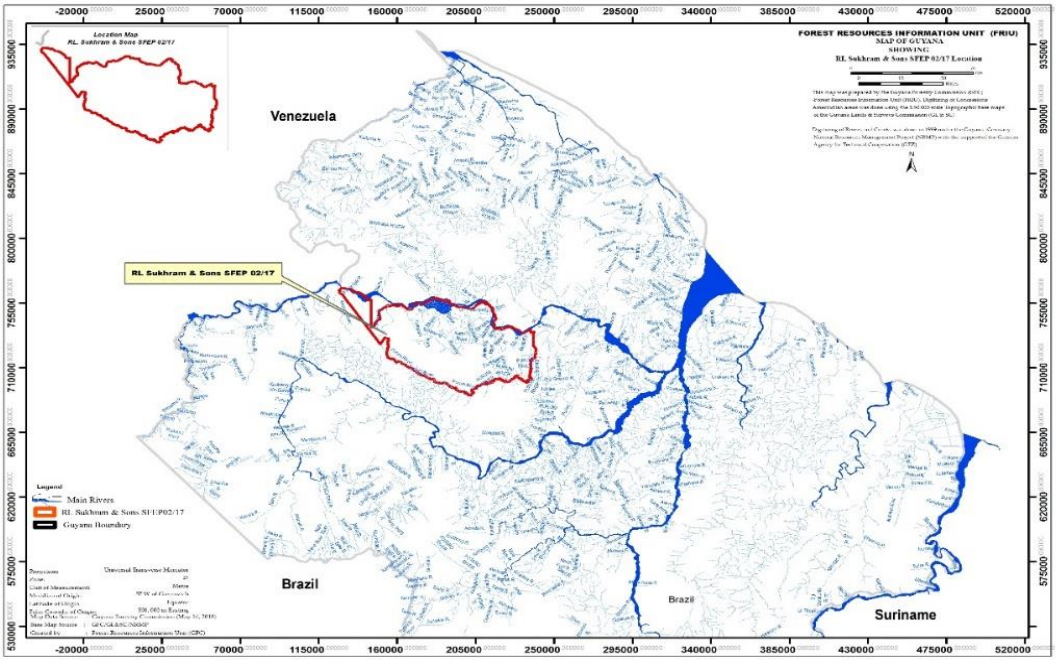


Figure B: Map showing the geographic location of SFEP 2/2017

RLSS duly applied to the Environmental Protection Agency (EPA) for an *Environmental Authorization and* recruited Forestry Training Centre Inc. (FTCI) to support the development of the requisite *Environmental and Social Impact Assessment* (ESIA).

RLSS has in its employment or at its disposal several persons with expertise in accounting, forest technology, wood processing, mechanical engineering, marketing and human resources management. RLSS projections are that it would employ and train a total of least 150 persons for the forest concession based operations by December 2021.

In addition, RLSS has at hand a formidable array of equipment (see Figure C) for deployment at its forest concession.

Figure C: Photograph showing some items of RLSS assets

RLSS will harvest logs at the concession area, transfer the logs via the Kartabu Puruni Road to Pine Tree Landing, right bank Cuyuni River**,** then transfer the logs to the enterprises' primary wood processing facility at St. Lawrence, East Bank Essequibo. RLSS will also maintain a small portable sawmill at its Ekabago Base Camp to salvage merchantable timber from defective logs or logs or portion of logs retrieved from mining sites: the merchantable lumber produced will either be utilized on the concession area or be transferred to St. Lawrence.

RLSS will collaborate with public agencies as well as the mining community to, *inter alia*, share responsibility for the preventive maintenance of the Kartabu-Puruni Road and for environmental management of the road corridor.

RLSS expects its operations to bolster the forestry sector's national timber output of by an 18% and generate an 8% increase in timber exports.

RLSS will enhance economic activity in the Kartabo Triangle through purchases of goods and employees' remuneration packages.

RLSS will add value to the livelihoods of residents there by extend its ongoing corporate social responsibility practices in Region 3, to include youth development programmes at Iteballi, Kartabu and Batavia (Region 7).

2.0 CONSULTANCY SERVICES-FTCI

FTCI has been conducting ESIAs in the Kartabu Triangle since 2006. In line with the multidisciplinary approach to ESIAs, FTCI recruited two external consultants, utilized four of its professional staffs as well as two of its forest technicians, and obtained additional support from two resource persons with expertise in ESIAs (see Table 1).

Table 1: List of experts that conducted the ESIA

No.	Consultant	Area(s) of expertise
	External Consultants	
1	Environmental Engineering Solutions (EES) (3 Persons)	• The collection and the analysis of environmental data such water quality and air quality respectively
2	Phillip Odwin Wildlife Expert	• Extensive experience in the capture and identification of fauna
	FTCI Staffs (6 persons)	
1	Robert Skeete	• Forestry, Introductory Anthropology
2	Robert Kissoon	• Forestry, Wood processing
3	Luann Nero (Ms.)	• Environmental Management, Social Science, Community Development
4	Mariea Suegrim (Ms.)	• Business Administration
5	Delyon Roberts	• Forest surveys, forest inventory
6	Bevin Dundas	• Forest Botany
•	**Resource Persons (2 Persons)**	
1	Jagdesh Singh	• Sustainable Forest Management; Forest Law, Policy and Governance; Environmental Law and Policy; Sustainable Development and Climate Change.
2	Godfrey Marshall	• Forester, Team Coordinator

In the preparation of the ESIA, FTCI carried out a number of tasks, including:

a) extensive consultations with stakeholders, including miners and boat captains traversing the upper Cuyuni River and the Upper Puruni River, respectively;

b) developed sampling plans for the collection of baseline data;

c) traversed a total of about 1,200 km: on foot, by road (ATV and 4 x 4 vehicle), and by river;

d) evaluated negative environmental impacts and developed applicable mitigation measures; and

e) prepared an environmental management plan.

Based on the remoteness of the concession area, the identification of access options for data collection took a considerable amount of time while the emergence of the COVID-Pandemic stymied consultations with stakeholders as well as the collection of baseline data.

3.0 BASELINE CONDITIONS FOR SFEP 2/2017

3.1 Location and access

The concession area is bounded by the upper right bank Cuyuni River to the north and by the upper left bank Puruni River to the south. Neither river is suitable for commercial scale transport of timber due to numerous rapids, rock outcrops and sand bars (see Figure D) as well as marked changes in depth between the rainy season and the dry season.

Figure D: Photo showing a natural barrier: part of Paiyuka Falls, Puruni River

Initial access efforts were focused on the Arimu Road (see Figure E); eventually however, RLSS *constructed* a 23km access road, extending from Tiger Creek Junction, northern side Kartabu-Puruni Road to the Ekabago River, the eastern boundary of the concession. (The access road traverses two forest concessions, a situation that required extended consultations).

3.2 Neighbouring forest concessions, properties

There are no indigenous communities *within* the concession area, however there are several miners' camps on left bank upper Puruni River and *Aranka Landing* on right bank Cuyuni River.

The boundary of SFEP 2/2017 has a total length of about 452km, including cut lines totaling 76.78km. At the eastern boundary, there is a 39 km shared boundary –including 10km of cut lines -with SFEP 2/2013 held by TPTTL. RLSS shares a 26km boundary-including two cut lines with Kurutuku Amerindian Village at the north western edge of the concession. (The linear distance between the Kurutuku Village and RLSS' base camp is about 88km).

On right bank Cuyuni River, SFEP 2/2017 shares a 25.75km boundary-all cut lines-with Guyana Goldfields Inc., Aurora (GGI). GGI occupies about 1.2% of the concession area and for management purposes, the area has been designated as 'non-productive' forest. (The linear distance between the south easternmost point of GGI's property at Aurora and RLSS' Ekabago Base Camp is 49km). RLSS' planned infrastructure will not overlap with that of Guyana Goldfields Inc.

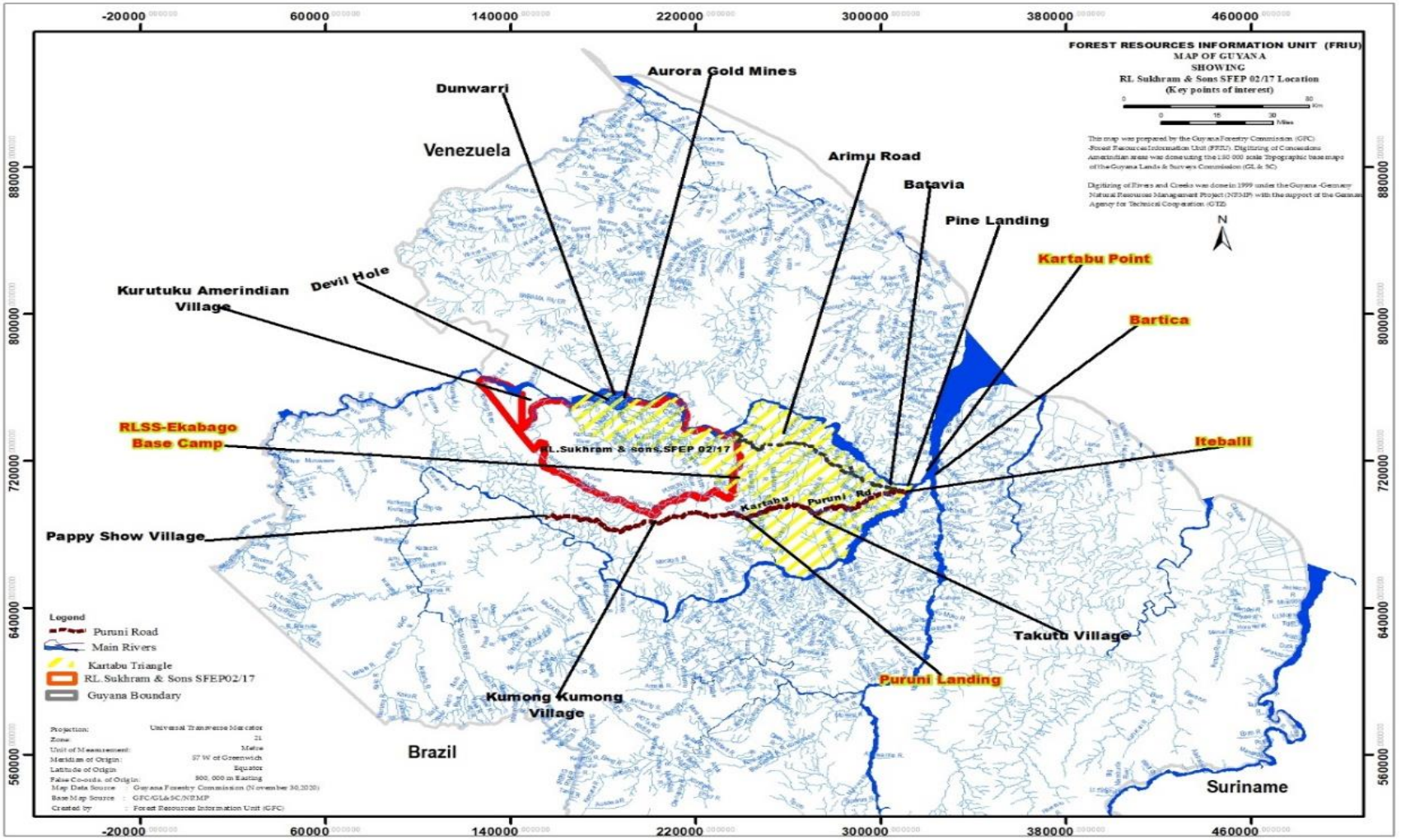


Figure E: Map of SFEP 2/2017 and surrounding communities

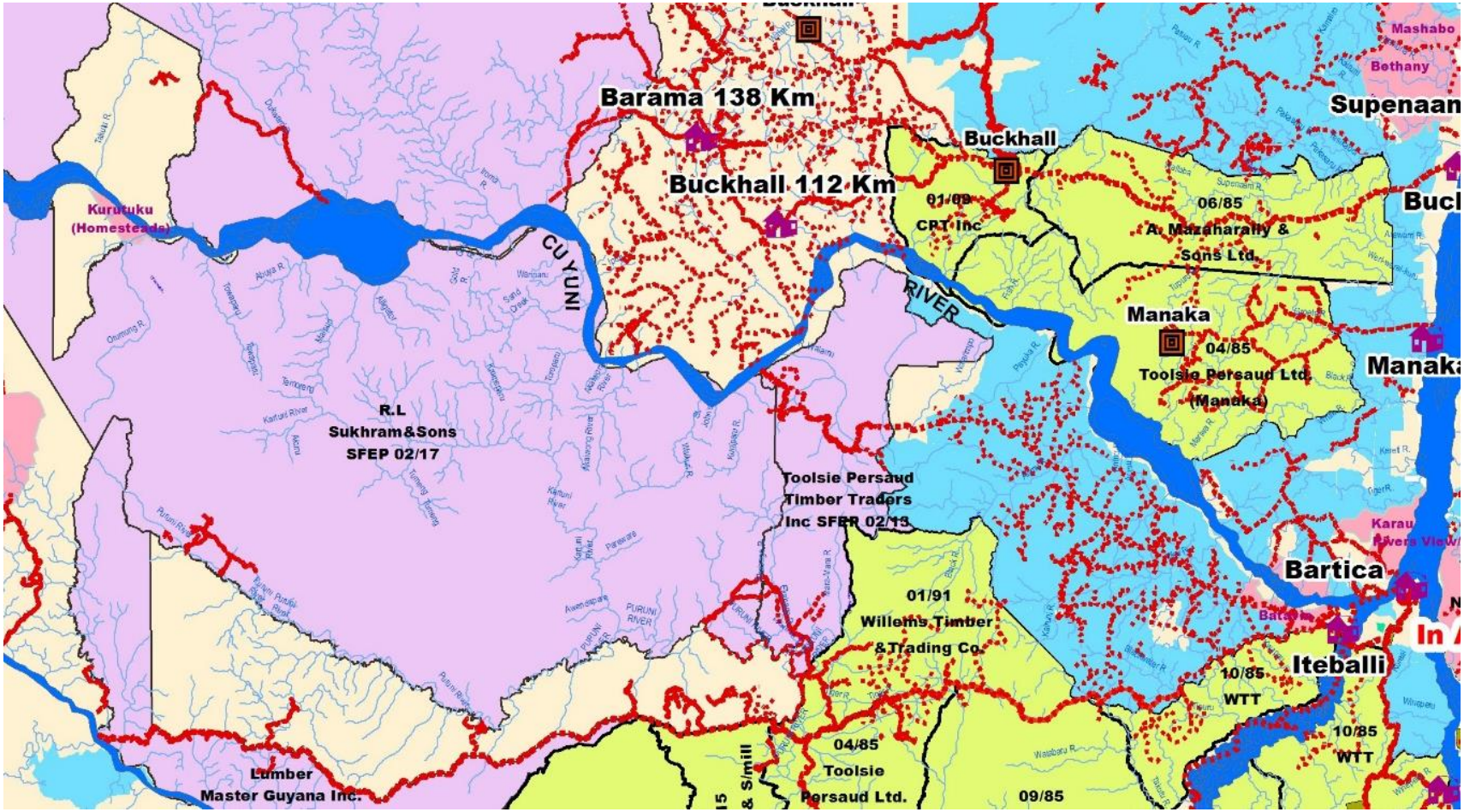


Figure F: Diagram showing SFEP 02/2017 and surrounding forest concessions, communities

3.3 The physical environment

3.3.1 Landform and hydrology

3.3.1.1 Landform

The concession area is generally hilly: the elevation ranges from 500 feet (152.4m) to 900 feet (274.32m). The hilly terrain is spread evenly across the concession area (see Figure G). This has implications for the alignment of RSS primary road network.

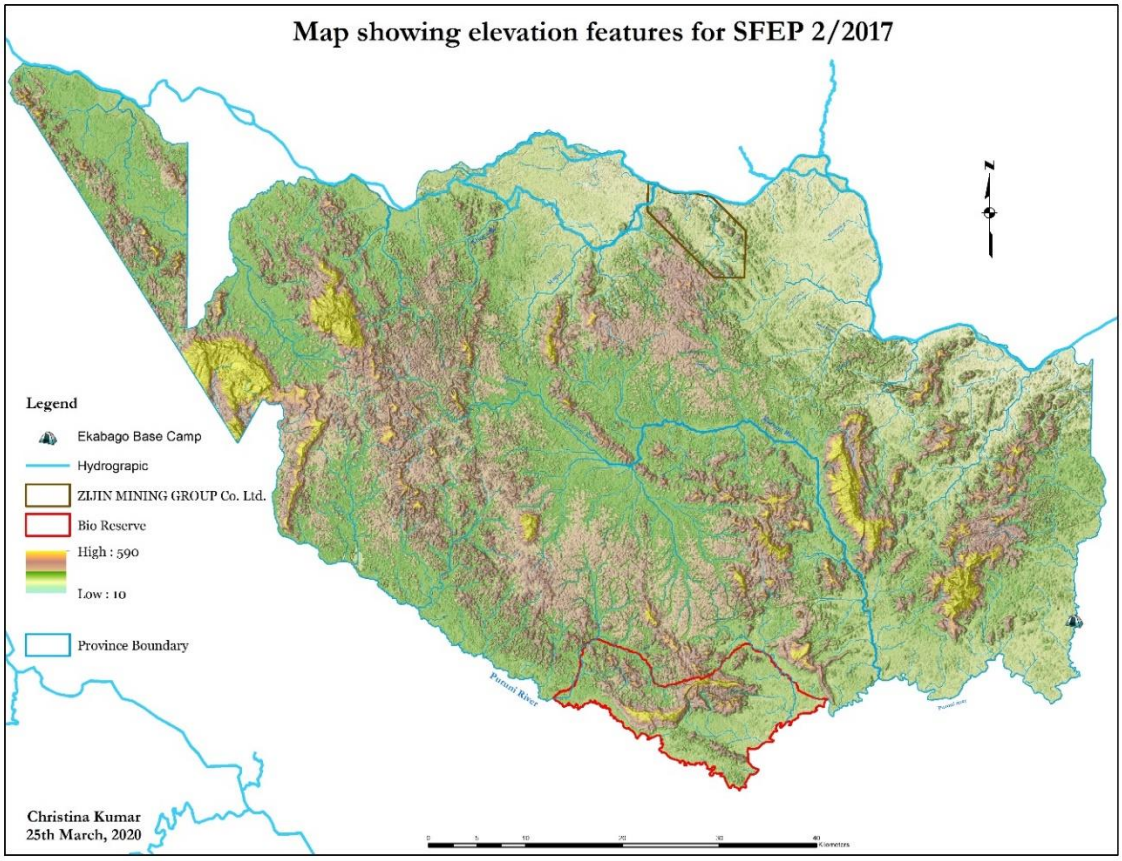


Figure G: Map showing elevation features for SFEP 2/2017

3.3.1.2 Hydrology

The area is drained by a large number of right bank tributaries of the Cuyuni River and left bank tributaries of the Puruni River. The largest river within the concession area is the Kartuni River, left bank Puruni River: this river (and its tributaries) drains the whole central area of the concession area.

None of the rivers within the concession area are suitable for commercial scale log or lumber transport: only bateau-type riverine craft traverse the rivers carrying personnel and goods for miners; the movement of even these bateau type boats is severely restricted in the dry season. (The consultants were able to assess water quality through the collection and analysis of a *modest* sample set).

3.2.2 Geology & Soils

3.3.2.1 Geology

The concession area is situated within Guyana's Northern Province where the dominant lithology is the Greenstone Belt. The greenstone belt comprise predominantly metamorphic rocks and are reputed to be common in the Earth's oldest rocks, including the Guiana Shield.

3.3.2.2 Soils

The GFC has at hand detailed soil maps for the concession area. The dominant soil type, Kanhapludults, occupy some 84.45% of the concession area. Kanhapludults are very deep well drained soils, with slight to high erosion hazard. The other major soil type present is Ustchrepts, occupying 9.89% of the concession area: Ustchrepts are deep alluvial soils, mottled in the subsurface, poorly drained, and not suitable for road works.

The consultants were able to validate the soil types through the collection and analysis of soil samples.

3.2.3 Climate

Rainfall data available for Iteballi, left bank Mazaruni River indicate that the Rainfall pattern for the Kartabu Triangle follows the broad national pattern: Rainfall during the long wet season extends from May to July, peaking at about 195mm in June; also, the short wet season extends from December through January peaking at about 152mm in January (Figure H).

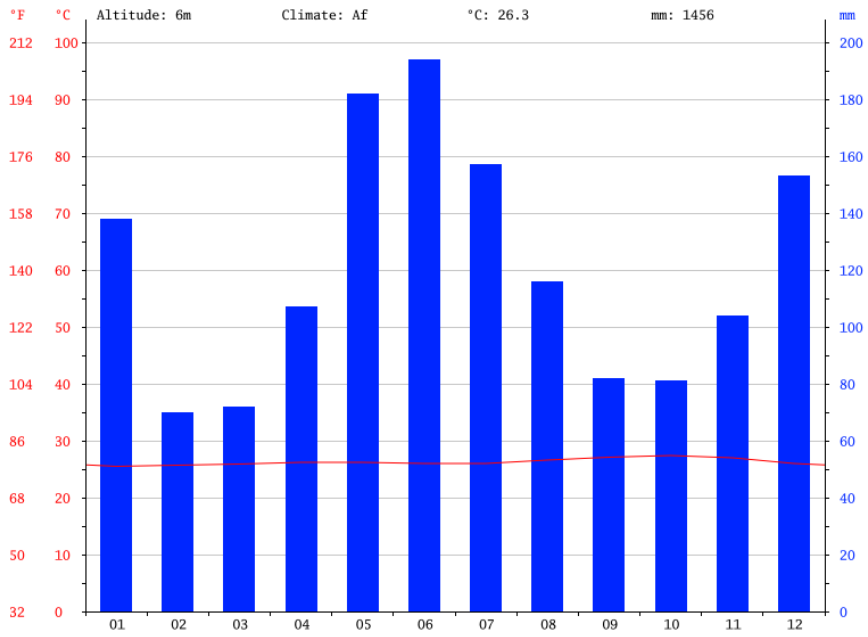


Figure H: Climatograph for Iteballi, left bank Mazaruni River

Mean air temperature ranges between 25 to 27.5°C throughout the year in most regions except the upland regions in the interior/west of the country, where mean temperatures are cooler and range between 20 to 23°C. At Iteballi, left bank Mazaruni River, average temperature is 25.5°C (`78.0°F). The consultants were able to assess parameters for air quality.

3.3 The Biological Environment

3.3.1 Vegetative and forest types

The forests within the concession area are relatively intact. Miners have removed vegetation from small patches of forests, mainly along the left bank of the Puruni River and there are many *exploratory pits* scattered across the concession area.

The concession area embraces the transition between two national forest types: ***Northwest Wet Forests*** and ***Central Guyana Wet Forests*** (ter Steege H. , 2000). 75.8% of the forest area contain productive forests, while 54.9 % of forests occur on hilly terrain.

An analysis of data from 10 blocks in Compartment 1, enumerated at 100% revealed that just 9% of the species are responsible for 71.5% of the stems with Dbh≥35cm (see Figure I).

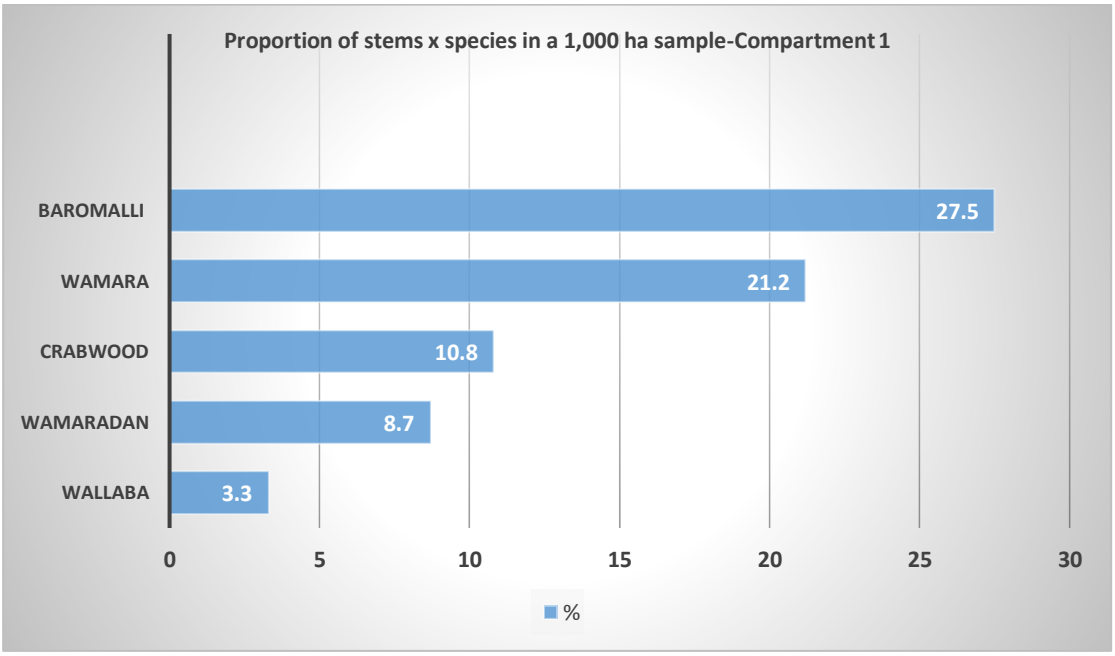


Figure I: Relative abundance of five species based on 100% inventory of trees ≥35cm over 1,000ha

RLSS is not unduly concerned about the species composition at this time and the enterprise determined that it will be able to harvest 13.33m^3/ha.

3.3.2 Fauna

The consultants relied mainly on trail cameras for discerning the fauna on the concession area (see Figure J), but the actual sightings of the diversity of fauna was impressive. Seines and fishing rods were used to identify fish specimens while nets were used to target and bats and nets and electronic devices were used to identify birds. No evidence of any commercial scale hunting or vending of wild meat or fish was observed in the Puruni area.

Figure J: Photographs showing wild hogs captured by a trail camera.

3.4 The socio-economic environment

3.4.1 Communities

RLSS estimates that there about 400 persons-miners and businesspersons- spread across the concession area, mostly in mining camps on left bank Puruni River.

There are no communities within the concession area, save for Guyana Goldfields Inc. (GGI). GGI's mineral concession on right bank Cuyuni River occupies 1.2% of the concession area and is situated 49km from RLSS' Ekabago Base. The area occupied by GGI does not form part of the 'productive forests' for SFE 2/2017; further no overlap or shared use of any infrastructure between RLSS' logging operations and GGI's mining operation is contemplated. RLSS will observe a 500m buffer zone outside the boundaries of GGI.

Kurutuku Village shares common boundaries with the concession area, but the village is located some 88km from RLSS base camp, and RLSS' operations will not approximate the vicinity of Kurutuku before 2040. A 500m radius buffer zone will be observed on the external boundaries of the extended village. The consultants did not visit Kurutuku; however they were able capture the core issues there from a recent detailed report prepared in 2019 by the Amerindian Peoples' Association et al.

RLSS consulted with residents of Puruni Landing, Tiger Creek Junction, Takutu Village, Iteballi Village and Kartabu Village and Batavia Village. All those communities **are well outside the boundaries of the concession area**; however, when hauling logs along the Kartabu-Puruni Road, RLSS will share a segment of the Kartabu Puruni Road and will therefore likely come into contact with residents. RLSS trucks will traverse *Takutu Village*, where there are about 15 buildings along the Kartabu Puruni Road. A few residents along the road sell foodstuffs, fuel and tools for sale, while others offer mechanical/ vulcanizing services. Residents there believe that they will benefit from a higher volume of traffic in the area

Batavia is adjacent to RLSS' Pine Tree Landing where RLSS will maintain a log depot and ship logs to its sawmill at St. Lawrence, East Bank Essequibo. RLSS has a good business relationship with Batavia based in part from RLSS' ongoing purchases of logs from Batavia's Logging Association. Apart from Kurutuku on the north-western boundary of the concession area, the nearest Village is Puruni Landing, about 33 km by road from RLSS base camp. At Puruni Landing it is possible to secure a variety of goods, source medical attention and consult with the Police and with GGMC staffers.

The major concern for all communities in the Kartabo Triangle is the seasonal degrade of the Kartabu-Puruni Road in the rainy season, and the absence of any planned, predictable schedule for road maintenance. Malaria is the major illness prevalent in the area; however it is possible nowadays to conduct tests for malaria at Iteballi and at Puruni Landing. Security is a major concern for residents at Puruni Landing, but crime has reduced considerably since the recent posting of policemen to the location. (There is a GDF unit as well at Puruni Landing).

3.4.2 Land-use

3.4.2.1 Mining

Mining is the dominant land use within the concession area and has been occurring since the early 1900s. Mining concessions, including Guyana Goldfields, occupy some 389,193.93 ha (90%) of the concession area (see Figure J); however ***active mining*** **occurs on just 970.38ha (0.2%) of the concession area[2].**

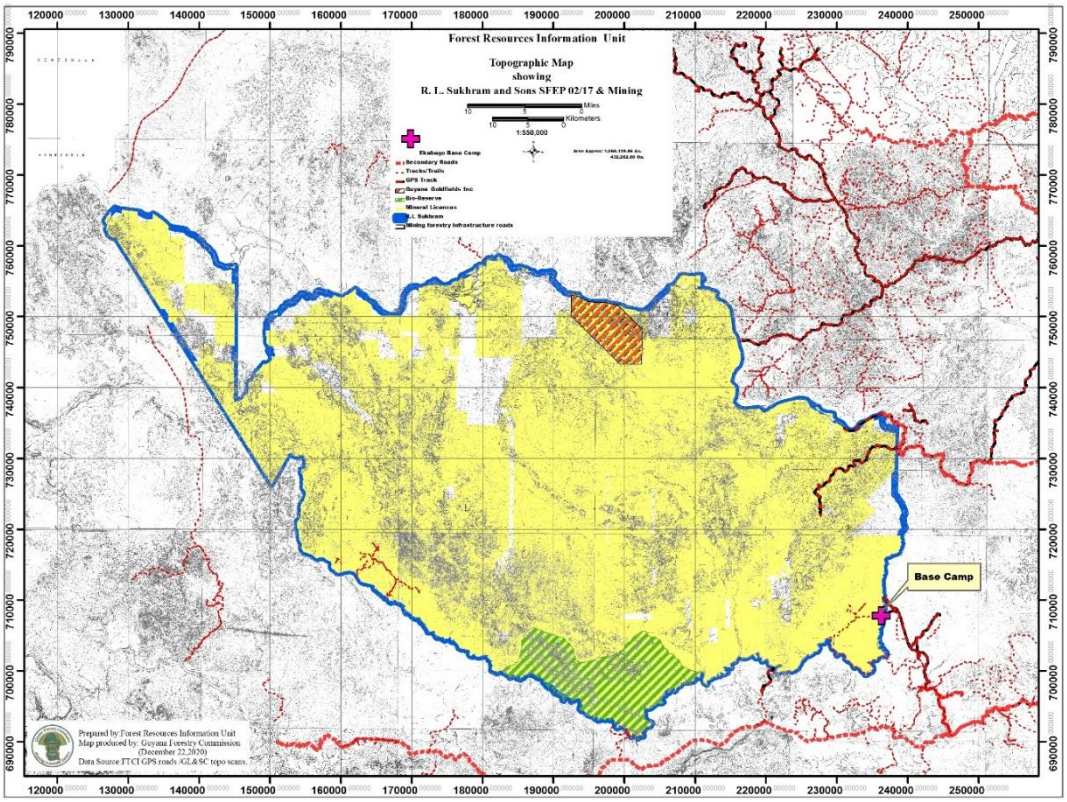


Figure J: Map showing the extent of mineral licences on the concession area.

RLSS estimates that, save and except Guyana Gold Fields, there are about 30 itinerant mining teams (±320 persons) active within the concession area-these are supported by about eighty

[2] Source: GFC, January 2018.

businessmen engaged in the commercial transport of personnel and the trade in goods (especially fuel).

Generally the miners would like to see logging in the area because they themselves hate to see timber wasted during mining operations. However, miners expressed strong interest in RLSS proposed road network. (The supply of large volumes of fuel is a major issue for miners in remote areas and roads do facilitate the timely transfer of equipment and fuel to mining sites).

3.4.2.2 Logging

The entire Kartabu-Triangle is occupied by large concessions, small concessions and State Forest Exploratory Permits (see Figure K). RLSS' access road traverses two forest concessions before 'joining' the Kartabu Puruni Road, and the requisite consultations with the respective holders of those concessions have occurred.

Figure K: Map showing SFEP 2/2017 and neighbouring forest concessions.

3.4.2.3 Other Land Use

There is no evidence of any other kind of land use of significance in the concession area: specifically there are no commercial scale agricultural cultivations and no ecotourism resorts. The consultants have never seen any fishing crew or hunting crew respectively; in addition, the consultants have never seen wild meat on sale.

4.0 RLSS' LOGGING PROJECT

4.1 RLSS' forest management objectives

RLSS nurtures the vision of entering the top quintile of timber producers in Guyana, producing and exporting tropical timber products worldwide that meet and exceed customers' requirements.

RLSS forest management objectives include the following:

a) Optimizing value from the forest concession through the sustainable harvesting, utilization and marketing of not less than twenty 20 species of timber;

b) Developing and implementing exemplary forest monitoring and environmental management practices respectively based on a suite of technologies that include the use unmanned aerial vehicles (drones);

4.2 Forest Organization

4.2.1 Legal Classification-Productive and Non-productive forests

From RLSS' perspective, non-productive areas include the four forest types with a total area of 104, 850.88ha and the mineral license of 5802ha license held by GGI at Aurora; therefore the total non-productive area is 110, 652.88ha and the productive area is 321,609.71ha.

Based on the productive area, and, as per GFC guidelines RLSS has computed that it requires a Biodiversity Reserve of 14,472.44ha. In fact, RLSS has in fact designated an area of 19,799.48ha, situated on left bank Puruni River as a biodiversity reserve (see Figure L). The biodiversity reserve includes both productive forest as well as some non-productive forests; in addition, the topographic conditions ensure a diversity of habitats.

4.2.2 Administrative Classification

Once the reconnaissance work was completed, RLSS moved to organize the concession area into compartments (see Figure M). In addition, a site for RLSS' first base camp was identified, and the compartments were divided into rectangular blocks 1000m x 1000m. This ensures that the development of the concession is done in an orderly manner: blocks are inventoried and harvested in a specific sequence.

4.2.3 Primary road network.

RLSS has been able to plan the primary road network in compartment 1, using the areas of productive forest as well as the nature of the terrain.

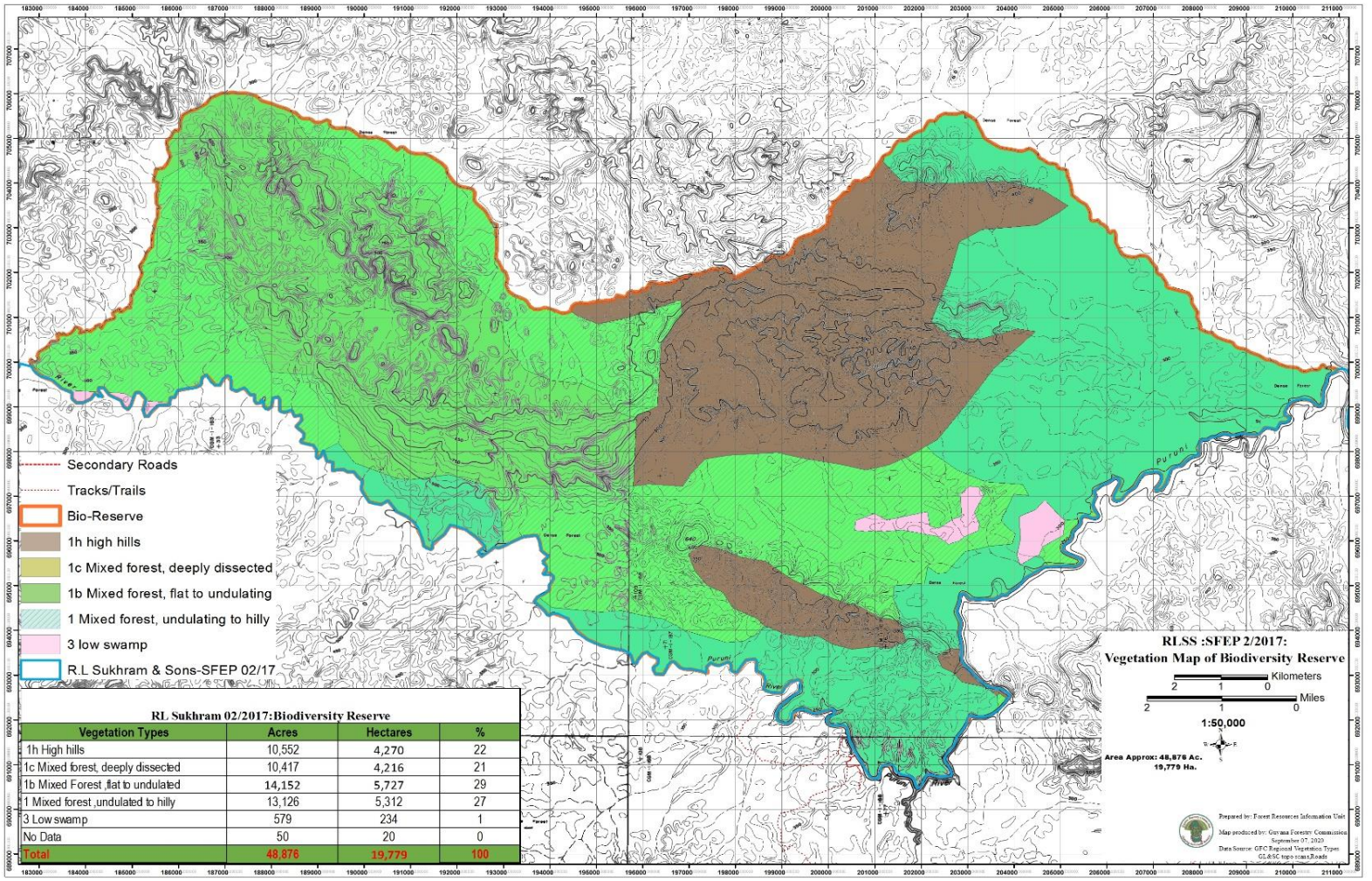


Figure K: Vegetation map of the biodiversity Reserve

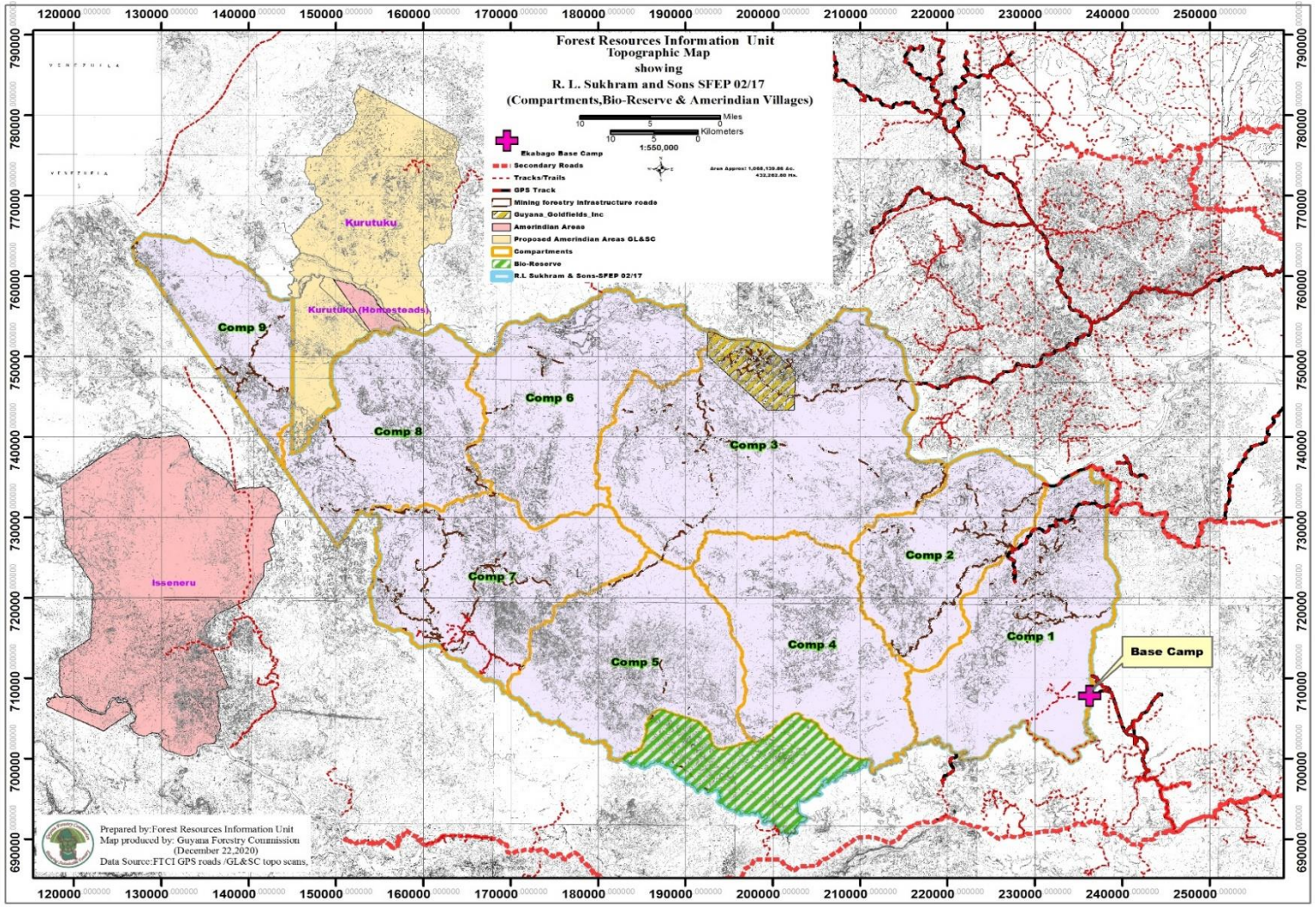


Figure M: Organization of the concession area into compartments and a biodiversity reserve

4.3 Production Parameters

4.3.1 Yield Regulation

Generally, yield regulation is determined by the following:

a) available volume/ha or per block for merchantable species based on preharvest inventories;

b) restrictions at the level of species-for example minimum diameter limits or protection status;

c) site restrictions- based on degree of slope, the occurrence of buffer zones, proximity trees protected trees, and in some cases whether there are nests of certain species of fauna on a tree targeted for felling; and

d) agreed cutting cycles and annual allowable cut.

4.3.2 Cutting cycle and annual allowable cut

Based on initial discussions and reconnaissance level data garnered to date, RLSS and GFC have agreed on the following parameters to guide the development of timber harvesting operations:

General parameters

A.	Concession size (ha)	432, 269.59
B.	Felling Cycle (yrs.).	40
C.	Sustained yield re 40yr. cycle (m^3/ha)	13.33

Operational parameters:

D.	Total sustained yield (m^3): (viii)*(iii)	3, 275, 311.88
E.	Annual Allowable area (AAA) (ha): (viii)/(ii)	6142.75~(61 blocks)
F.	Annual allowable cut (AAC) (m^3): (ix)/(ii)	81,882.80

4.3.3 Schedule of inventory and production

On the basis of the agreed annual allowable area and annual allowable cut, RLSS will submit the blocks in which it plans to conduct forest inventory and those which it plans to harvest respectively for the approval of the GFC. This is normally done via a Forest Management Plan for a five year period and an Annual Operations Plan for each calendar year.

4.3.4 Logging practices

Logging activity will proceed in a specific cyclic sequence: *RLSS will only conduct timber harvesting operations on 6,142.75ha or 1.4% of the concession area per annum.* The goal is that any unit area harvested will, theoretically at least, not be logged again by RLSS until after a 40-years.

RLSS' core operations *may be summarized as follows:*

a) Training of all field operatives to ensure proper standards and regular briefing sessions to reinforce the need for due attention to matters of occupational safety and health;

b) *Earthworks for road construction*: roads may be a major environmental hazard unless designed and constructed properly.

c) *100% forest inventory* to identify the number and volume of *merchantable* species, their respective spatial distribution, and pertinent site conditions.

d) Tree marking: to validate the condition of the merchantable stock, to establish felling direction and to plan skidding trail routes, and to address restrictions, linked to buffer zones or other criteria;

4.3.5 Operational Challenges

4.3.5.1 The mining community

The mining community's has displayed keen interest in RLSS road network; it is likely that there will be a significant increase in mining once timber harvesting starts; more mining activity could result in more opportunities for conflict. The challenge for RLSS is how to engage the mining community in a meaningful way.

RLSS' concerns are based on the following:

a) It is onerous to identify the bona-fide miners; frequently, the miners on the ground are not the actual owners of the mineral concessions; many 'miners' encountered in the field do not provide their (true names and addresses).

b) There is no overarching plan for the development of the mining district that RLSS can tap into.

4.3.5.2 The Kartabu-Puruni Road

The state of the Kartabu-Puruni Road is critical to RLSS log flows between its Ekabago Base Camp and Pine Tree Landing facility on right bank Cuyuni River. RLSS will be faced with maintenance costs for its concession based road networks as well as its 23km access road and will not be able to afford maintenance costs for extensive segments of the Kartabu-Puruni Road.

4.3.5.3 Labour issues

Currently, most logging companies are finding it challenging to get young people to do extended field time in the forest, even though the companies pay competitive wages, provides reasonable field accommodation and invests in an internet service.

4.3.5.4 Emergencies

The concession area is rather remote. RLSS is constantly engaged on measures to evacuate sick persons to Bartica (or Georgetown) as rapidly as possible from the concession area.

5.0 PROJECTED ENVIRONMENTAL IMPACTS

5.1 General Positive impacts

Generally, all stakeholders expressed the hope that the proposed development will materialize because:

a) More employment opportunities and job options or will become available within the Kartabu Triangle.

b) RLSS' road network will (eventually) afford the mining community more reliable and faster access to areas in the upper Puruni District and facilitate the expansion of gold mining operations.

c) Expanded economic performance in the area will lead to a corresponding growth in revenues for public agencies.

5.2 Negative environmental Impacts

5.2.1 Environmental impacts

Road construction and related earthworks will be a major sources of environmental impacts in the area particularly given the soil type and the hilly nature of the terrain. Elevated sediment levels in streams are anticipated if rainfall occurs within a few days after earth works due to erosion. Felling trees will alter the aesthetic qualities of the various landscapes. Any leaching or spillage of petroleum products will alter soil chemistry, and the quality of waterways.

5.2.2 Biological impacts

The selective felling of merchantable trees will cause both commercial degradation of residual forests. In the main, timber harvesting will contribute to short term forest degradation, altering species composition and the normal distribution of diameter classes. Harvesting trees that form the main canopy layer will alter the forest environment by modifying conditions in the understory in terms of light, temperature, and humidity; in turn the changes in the understorey environment may affect seed germination and seedling establishment for merchantable species.

Timber harvesting at any level will alter the habitats of many species of fauna. The use of heavy machines in the forest may scare or even kill some fauna or may force some species to migrate from the area. Timber harvesting may alter animal-animal, and animal-plant relationships, respectively.

5.2.3 Socio-economic impacts

Direct negative impacts relate to conflict between different stakeholders sharing the use RLSS's concession-based logging roads because non-RLSS users may resent restrictions or protocols that RLSS could introduce for the use of its roads. For example, RLSS may restrict the use of its roads during and perhaps up to four hours after heavy rainfall; other road users may resist this kind of restriction.

The construction of roads and skid trails *elsewhere in State forests* have set the pace for an influx of miners (and allied support businesses) who promptly use such roads and skid trails at a higher intensity than the loggers themselves). In fact, in many cases, loggers become *minor users* of their own logging roads. Where miners or any other stakeholder deprive loggers of the opportunity to harvest merchantable timber there is opportunity for conflict.

6.0 MITIGATION MEASURES TO BE IMPLEMENTED BY RLSS

On the basis of the projected environmental impacts in Section 5.0, RLSS has developed a mitigation plan (see Table 2) to address the impacts projected.

7.0 PROJECT RISKS

The outlay of mining properties within the concession area could be a major risk for RLSS's logging operations if **all** the properties hold extensive commercial deposits of gold ore. Indeed, no one can say for sure if similar gold resources that generated GGI's operations at Aurora is simply waiting to be discovered.

Small itinerant mining operations could have a nuisance value when RLSS were to convince customers overseas that it is not responsible for forest degradation produced by mining activities. In its management of small scale concessions, RLSS has maintained a respectful distance from mining operations and deliberately avoided any confrontation with them, to the extent that RLSS has never had any major confrontation with miners. It is a fact though, that the proximity of miners to areas being logged add to RLSS's administrative burden, especially from a security perspective, because RLSS will not know who the ***bona-fide*** miners are. Further RLSS anticipates major problems in engaging miners for meaningful discussions.

It is critical that RLSS develops and retains a cadre of highly trained field operatives to take forward the quality of forest management that RLSS envisages. (The Kartabu Triangle offers many competing job opportunities, for example experienced heavy-duty operators are always in demand.

Finally, for RLSS, it is vital that Kartabu Puruni Road remains open for use throughout the year so that RLSS can maintain is log flows between the concession area and Pine Tree Landing.

Table 2: Predicted impacts and corresponding mitigation measures

Predicted impact.	Proposed mitigation measures	Lead agency	Time frame for implementation
1. Physical Environment			
1.1 Earthworks will lead to , scarification of soil surface, sub-soil exposure , erosion, soil compaction, and water logging	• Plan roads, bridges and culverts paying attention to topography and the use of stock maps. • Use appropriate machines for all earth works to reduce the time taken to complete each activity. • Consider the weather pattern before initiating major earthworks. • Follow the recommendations of the CoP (Sections 4.5-4.7, Section 5)	RLSS	During the entire time frame for the project.
1.2 Air quality: Dust and smoke (especially along roads) minor changes in micro-climate	• Vehicles will travel slowly <25 km/hr. whenever they pass Takutu village. • All machines must be fully functional to maintain emissions within manufacturers' parameters.	RLSS	During the entire time frame for the project.
1.3 Water resources: negligible increases in turbidity, temperature, ph.; oil spills	• Strict adherence to RIL principles and prescriptions of the CoP, especially regarding buffer zones along waterways. • Maximum care to be taken to ensure all vehicles and machinery are in a proper state. Dispense or change lube oil only in designated areas. • EPA's Brochure on Water conservation to be placed at all public points around the concession. • Regular briefing sessions for field staff would be formalized. • Care taken to avoid excessive spillage of borax solutions whenever used to treat (some species of) timber.	RLSS, GFC	During the entire time frame for the project.
2. Biological/ecological environment			
2.1 Timber harvesting: destruction of juvenile trees, genetic erosion of species, decline in soil fertility, spillage of oil, increased potential for blow downs	• Implement a system for conducting pre-harvest inventories and preparing stock maps. • Use directional felling techniques for felling trees. • Plan skid trails based on stock maps. • Use winching techniques. • Use heavy duty machines that are fully functional. • Training all field operatives in RIL practices	RLSS	During the entire time frame for the project.
2.2 Wildlife: modification, destruction of habitats, population changes	• Ensure a systematic manner of timber harvesting so that once a block is harvested, the operation moves on, so that no further disturbances occur. • Prohibit employees from hunting and fishing. • Unique ecosystems, habitats and species will be conserved, by restricting logging in areas where they occur.	RLSS	During the entire time frame for the project.

Predicted impact.	Proposed mitigation measures	Lead agency	Time frame for implementation
2.3 Ecological relationships; Modifications of ecological relationships.	• Implement proper RIL practices and prescriptions of the CoP (Sections 8, 9 & 10) • Prohibit the use of fires on the forest floor.	RLSS, GFC	During the entire time frame for the project.
3. Socio-economic environment			
3.1 Conflicts: restrictions of access, alienation of rights	• Engage residents in discussion and consultations to address mutual concerns: ensure the company is positioned to receive and address complaints.	RLSS	As required
3.2 Social problems: crime, use of alcohol, other disagreeable behaviour; increase in life threatening behaviour through exposure to various illnesses.	• Work with public agencies (Police, staff of the Ministry of Health, and staff of the Ministry of Regional Development) in Regions 2, 3 to address emerging issues. • Keep proper records of emerging problems and pass these on to the appropriate agencies.	RLSS	As required
3.3 Road safety: high probability of road accidents.	• Work with MOPW, the GPF, the mining community and other stakeholders to ensure adherence to proper road use practices and to identify road locations requiring special attention. • Make sure that each vehicle is in a full functional state prior to its use on the roadways, within and outside of the concession area. • Place appropriate cautionary signs at sharp turns, steep grades, and bridges and near populated areas. • Promote proper skills set among drivers through training.	RLSS	During the entire time frame for the project.
3.4 Waste management: illnesses resulting from a polluted environment	• Observe prescriptions of the Code of Practice for forest operators. 3rd Ed. Sections 8.0, 9.1, 9.2. • Hold frequent briefing sessions with staff to ensure a shared understanding of the consequences of poor control over waste management. • Distribute and put-up EPA's brochure on waste management at all camps.	RLSS	Monthly
3.5 Indigenous, archaeological assets: loss , destruction modification of habitats, landscapes	• Identify and isolate any assets encountered and post appropriate advisory signs and notices; ensure such sites are recorded on all stock maps. • Consult with the Amerindian Affairs Ministry and the Walter Roth Museum on collaborative efforts to protect any assets discovered. • Collaborate with communities to address the conservation of existing and emerging assets. • Offer training & incentives where appropriate	RLSS	As required

8.0 PROJECT VIABILITY

RLSS has prepared a SWOT Analysis prior to the start-up of operations for its own guidance (see Table 3).

Table 3: RLSS's SWOT Analysis prior to the start-up of operations

STRENGHTS	WEAKNESSES
• **Location: RLSS's concession boundaries are well defined, virtually no problems with neighbours, and there are no (Amerindian) Communities within the concession area.** • **Large stocks of merchantable timber are available.** • **Wide ranging experience: RLSS has a strong and experienced, management team.** • **Markets: RLSS has access to markets based on current operations.**	• **Itinerant nature of mining: this refers to miners starting operations in blocks targeted for harvesting, extensive use of RLSS' logging roads and skid trails, etc.: these situation can complicate RLSS's strategic planning.** • **Unfamiliarity with the mining community *in situ:* it will take considerable time and effort for RLSS to get to know the owners of mining concessions so that the enterprise can begin positive collaboration with them.**
OPPORTUNITIES	**THREATS**
• **New technologies: RLSS can capitalise on new emerging technologies for wood processing.** • **New product lines: RLSS can capitalise on the large number of merchantable species to generate new wood products, including outdoor furniture.** • **New market opportunities: RLSS is in a position to adapt to new market conditions and customer behaviour.**	• **Competing land use-need to share road use: RLSS will share its concession road network with many people who use a wide assortment of vehicles: conformity with RLSS's road use protocols can lead to time consuming conflicts.** • **Strong national policy support for miners, whose activity drive economic activity in Region 7.** • Inability to compete with the mining sector re remuneration packages for heavy-duty operators.

All RLSS's financial analysis indicates that logging on the SFEP area will be profitable. A major cost centre will be the long-haul distance for conveying logs from the concession area to St Lawrence, a minimum distance of 200km, reaching more than 250km by 2025. (These haul distances have become the norm for the industry in the Upper Berbice, Upper demerara and Mazaruni-Cuyuni Districts. **RLSS's experience gives it a competitive edge**. To date, RLSS has been very skillful in navigating the variables and costs associated with the local logging and sawmilling activities, respectively. RLSS also understands the vagaries of timber sales on the local market.

9.0 MANAGEMENT OF STAKEHOLDER ISSUES

For RLSS, it is vital that any conflict with stakeholders sharing the use of the Kartabu-Puruni Road be addressed as quickly as possible. RLSS will set up **a checkpoint at Takutu Village**. The outpost will be staffed by two persons: a checker (clerk) monitoring the passage of RLSS's vehicles and a monitoring officer who will deliberately engage stakeholders to learn of any emerging issues that may lead to conflict or stymie log flows.

10.0 CONSULTANTS CONCLUSION/STATEMENT

Stakeholders' expect that RLSS' operations will be a major driver of economic development within the Kartabu Triangle, with many positive outcomes for the forestry sector and the mining sector respectively. RLSS expects to inject millions of dollars into the economy of the Kartabu Triangle through remuneration packages and purchases of fresh vegetables, meat and fuel.

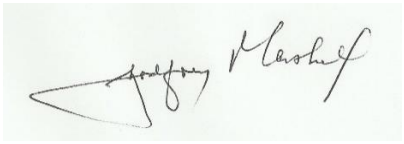
With about 150 persons to be employed, the revenue base for the GRA and NIS will expand markedly

RLSS anticipates an 18% increase in national timber output once its operations get fully on stream by January, 2022. RLSS will expand its network of timber yards to include the Canje-New Amsterdam lumber market (Region 6) and the Bartica lumber market (Region 7). RLSS will pay attention to the local market for tropical hardwoods used by the furniture sub-sector.

Less than 1.5 % of the concession area will be logged over per annum. The consultants believe that RLSS's logging operations will not lead to forest fragmentation nor degrade forest resilience nor lead to major incremental change in environmental parameters such as water quality and air quality. Note that RLSS will continue to monitor environmental data at permanent monitoring points within the concession area.

Research elsewhere has demonstrated that well run forest concessions are major drivers of forest conservation. The consultants believe that RLSS will abide by all local laws and forest management and environmental management standards, in line with its environmental authorization. The consultants also believe that the company is sincere in its commitment to regular engagements with stakeholders.

The consultants recommend that an ***environmental authorization*** be granted to RLSS.



G. Marshall
Coordinator/Team Leader
FTCI Team.

MAIN REPORT

1.0 INTRODUCTION AND BACKGROUND

1.1 The Developer-RL Sukhram & Sons

1.1.1 Introduction

Mr. Ragunauth Lall Sukhram has been engaged in logging and sawmilling in Guyana since 2000. In 2006, he registered RL Sukhram & Sons (RLSS) vide certificate # 8281 under the Business Names Registration Act, Chapter 90:05 (see copy of Certificate of Registration at Annex III). The contact details for RLSS are set out in Table 1.

Table 1: Contact details for RL Sukhram & Sons

Category	*Detail*
Registered address	Lots 6 & 7, St. Lawrence, East bank Essequibo, Region #3, Guyana
Telephones	592-262-0330 (Office); 592-698-5265 (Cell)
Facsimile	592-262-0299
Email	r.l_sukhram@yahoo.com

RLSS' proposed operations will occur at three discrete locations as follows:

a) ***St. Lawrence HQ, East Bank Essequibo, Region 3*:** The enterprise's headquarters, its primary wood processing complex, and a lumber yard are situated at St. Lawrence.

b) ***Ekabago Base Camp, right bank Ekabago River***: The base camp is situated on right bank Ekabago River: all concession based timber harvesting and ancillary field operations will be managed from this location; in addition, all timber products generated at the forest concession will be graded and sorted near Ekabago Base Camp before being dispatched via the Kartabu Puruni road to Pine Tree Landing, for further transfer by barge to St. Lawrence. (*The distance from Ekabago Base Camp to Pine Tree Landing is about 121 km and a loaded logging truck would do the trip in about 4.5 hours).*

c) ***Pine Tree Landing, right bank, lower Cuyuni River****:* RLSS will manage a 4ha timber depot on right bank Cuyuni River, where logs coming from the concession area will be transferred to barges for conveyance *via the Cuyuni, Mazaruni and Essequibo Rivers* to St. Lawrence, East Bank Essequibo River. *(The distance by barge between Pine Tree Landing and St. Lawrence is about 70km and takes 8hrs. Barges carry about ±500 pieces of logs or 800m^3 of logs).*

1.1.2 Business Objectives

RLSS' business objectives include:

a) Full compliance with all applicable policies, laws, and standards

b) The generation of a volume of high grade timber that will position RLSS within the top quintile of forest producers in Guyana.

c) Conservation of the natural environment to the maximum extent possible: this includes conservation of biodiversity, fauna, fresh water resources, soil and landscapes.

d) Respect for indigenous peoples and a commitment to preserve any assets of indigenous or archaeological value.

1.1.3 Staffing

Currently, RLSS employs 23 persons for operations within the concession area. The current management team is set out in Table 2 while Table 3 lists projected staff complement by December 2021. The full organization chart for the enterprise is set out in Annex VII.

Table 2: List of core management staffs-RLSS

#	Name	Designation	Remarks
1	**SUKHRAM**, Ragunauth Lall	Manager	30+ years' experience in logging & sawmilling. He has overall responsibility for strategic business planning, financial matters, business partnerships, procurement of assets and marketing.
2	**SUKHRAM**, Devendra	Operations Manager	Based at Ekabago Base Camp. Overall responsibility for concession based operations as well as log inventory management at Pine Tree Landing.
3	**SUKHRAM**, Khemraj	Manager-sawmilling Operations	Overall responsibility for sawmilling operations & lumber inventory at St. Lawrence.
4	**FARLEY,** Kwame	Chief Mechanic	Direct responsibility for the preventive maintenance for all mechanical assets and marine equipment.
5	**SIOKO**, Santiago	Forest Manager	Direct responsibility for coordinating forest planning and implementing forest operations in line with AOPs, FMPs, and applicable forest standards and guidelines
6	**SINGH**, Yogeata	Administrative Manager	Day to day administrative measures, including remuneration packages, goods inventory, purchases and record keeping

Table 3: Projected staff complement -RLSS -at December 31, 2021

#	Description	Core area of activity	Number
1	Community Liaison Officer	Regular engagements with stakeholders	1
2	Forest Technicians	Timber harvest planning, timber harvest operations	20
3	HD Machine Operators	Road , skid trail and log market construction, timber transport	16
4	Chainsaw Operators	Directional felling of trees, bucking logs	6
5	Choker-men/Assistants	Road , skid trail and log market construction, timber transport	12
6	Auto-Mechanics & auto-electricians	Preventive maintenance of all vehicular and stationary machinery assets	4
7	Administrative staffs	Staff recruitment & staff welfare, coordination of record keeping & MEDEX facility.	4
8	Security officers	Security matters	8
9	Sawmill Technicians	Log conversions, timber salvaging operations	6
10	Timber Graders	Grading logs and lumber	2
Total			79

1.1.4 RLSS' Corporate Discipline

In the course of its business, RLSS ensures full compliance with all applicable statutory obligations, forest management standards and all applicable guidelines. RLSS **is currently** fully compliant with **all applicable conditions** set down by the following agencies:

a) Environmental Protection Agency

b) Guyana Forestry Commission

c) Guyana Revenue Authority

d) National Insurance Scheme

e) Ministry of Home Affairs/Guyana Fire Service)

f) Ministry of Public Works/MARAD

g) Guyana National Energy Authority

h) Regional Development Council Region #3

1.1.5 Corporate Social Responsibility

RLSS routinely provides both solicited and voluntary material support for educational, religious and youth development projects promoted by a diverse grouping of public, civic, and private agencies.

Recipients of material support within the last five (5) years, include:

a) ***Religious bodies***: Leguan Mandir; Hydronie Mandir; Shari Surya Narayan Mandir; Guyana Hindi Dharmic Sabha; and Chris Community Church.

b) ***Educational institutions***: Blake Primary School, St, Lawrence Primary School

c) ***Local Authorities***: Parika-Mora NDC (East Bank Essequibo); Batavia Village Council-Batavia Amerindian Village, Lower Cuyuni River.

d) **Public Agencies**: Guyana Fire Service (Leonora).

1.1.6 Investments

In pursuit of its investments in SFEP 2/2017, RLSS has pursued the following developments:

a) The acquisition of vehicular assets, and marine assets, respectively (see Figure 1), to ensure year round conveyance of timber between the concession area and its St. Lawrence facility.

b) The construction of 23 km of access road, linking Tiger Creek Junction, KPR to Ekabago Base Camp, right bank Ekabago River, left bank Puruni River -the eastern boundary of the forest concession area. Further investments are projected in 2021 as RLSS moves to improve the access road.

c) The acquisition of a ten-acre (4.04ha) plot of land at **Pine Tree Landing**, right bank Cuyuni River, about one mile above Kartabu Point, where the enterprise will construct a timber depot and a pier to accommodate loading barges with volumes of 800-1000m^3.

Figure 1: Photographs showing some RLSS' assets

For 2021, RLSS will undertake major investments for base camp development, staff recruitment, staff training, the provision of personal safety gear, forest inventory and forest road development.

1.2 The Consultant-FTCI

1.2.1 Profile of FTCI

RLSS engaged FTCI to conduct its ESIA development process. FTCI was incorporated on May 1, 2003 as a result of a partnership between GFC, FPA and TFF (Virginia, USA) with financial support from ITTO and from DFID.

FTCI is situated at 17 Access Road, Kinston Georgetown and its main training facility is situated on right bank Mariwa river, left bank Cuyuni River. At the time of its establishment, FTCI became part of an international network of vocational training institutions offering practical hands-on training in skills necessary for planning and implementing reduced impact logging.

FTCI offers vocational training in the areas of forest surveys, forest inventory, planning of forest roads, skid trails and log markets, stock map preparation, tree marking, chainsaw use and maintenance, directional tree felling, skidding, and the use and maintenance of heavy-duty machines, such as skidders, front-end loaders. For its training programmes, FTCI targets field operatives attached to forest enterprises, forestry students (UG, GSA), representatives of environmental NGOs and communities respectively, public officers –*including GFC staffs.*

FTCI's training fees do not cover its costs and it relies on consultancies within the forestry sector to sustain itself. FTCI has been doing ESIAs since 2007.

1.2.2 The ESIA for RLSS

1.2.2.1 Overview

FTCI agreed to provide consultancy services for RLSS. On the signing of the contract with RLSS, FTCI engaged in four main activities: hiring of consultants, forest reconnaissance, development of a stakeholder plan, the development of a sampling plan, and the collection of baseline information.

1.2.2.2 Recruitment of consultants

The TOR agreed with the EPA requires a multi-disciplinary approach to generate an ESIA Report acceptable to the EPA. FTCI has staffs with a diversity of skills that it assigns for consultancies:

these persons are skilled in social surveys, introductory anthropology, aspects of forest surveys and forest inventories, forest technology and reduced impact logging, social surveys at the community level. FTCI recruited Environmental Engineering Solutions (EES) which has expertise in the collection and analysis of environmental data, using its own assets as well as the services of Kaizen Environmental Services' Laboratory. In addition, FTCI recruited Mr. Philip Odwin to support faunal studies.

The list of consultants used for this exercise is set out in Table 4 (see more details in Annex II):

Table 4: List of persons engaged in the preparation of the ESIA.

#	Name	Area of core expertise
I.	**FTCI Staffs**	
1	Mariea Suegrim	Socio-economic studies
2	Luann Nero	Social studies and environmental
3	Robert Skeete	Forestry technology, Anthropology
4	Delyon Roberts	Forest technician
II.	**External Consultants**	
5	Environmental Engineering Solutions(EES)	Environmental data collection and data analysis
6	Philip Odwin	Wildlife expert
III.	**Resource persons**	
7	Jagdesh Singh	Forestry, Environmental Science, and Forest Law
8	Godfrey Marshall	Coordinator

1.2.2.3 Forest reconnaissance activities

FTCI sourced topographic maps of the concession area with a view to determining

a) The boundaries of the concession area and matters relating to the number and length of (shared) cut lines with neighbouring concessions or communities, and access options for the concession area

b) The nature of land use within, and in proximity to the concession area.

It took FTCI more than 18 months of reconnaissance effort to determine the most feasible access route accessing the concession area. The selected option included the construction of a 23km access road across two ***existing*** forest concessions and a few active mining operations.

1.2.2.4 Development of a stakeholder plan

FTCI's second step was the identification and categorization of stakeholders and the development of a plan to consult (with) them. (Please see Chapter 3.0).

1.2.2.5 Development of a sampling plan for core baseline environmental parameters

Based on the configuration of the concession area and its access options, FTCI developed a sampling plan (see Figure 2). This plan required FTCI to collect water samples from perennial creeks, at points with unidirectional flows. The consultants believe that taking water samples

near the mouth of perennial water courses was a good way to capture any significant change in environmental parameters on the concession area. The consultants also worked with the view that 96 hours is the maximum time between collection of the water sample and its delivery to a laboratory in Georgetown. For this reason the water sample collection activity was divided initially into two phases, with sites targeted in Phase 1 being relatively more accessible than sites in Phase II. Other samples for soil and air quality were taken at the same sites.

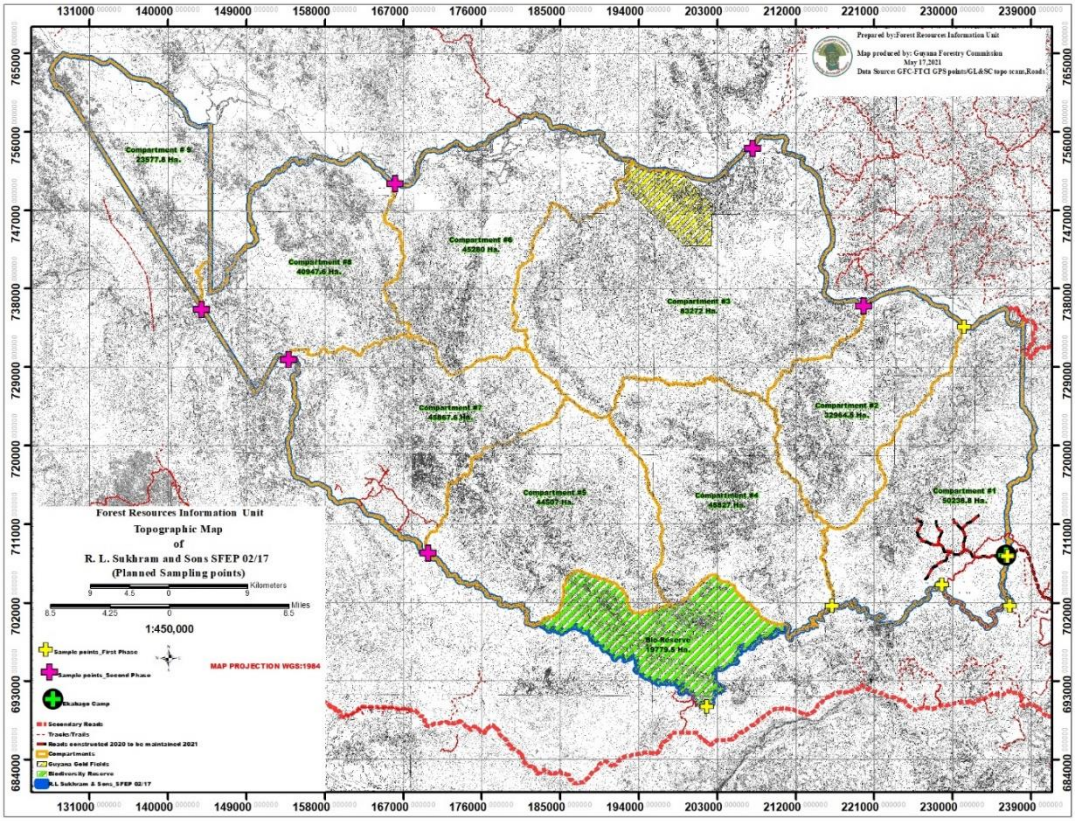


Figure 2: Map showing sampling stations targeted within SFEP 2/2017

1.2.2.6 Collection of other baseline information (see also Section 1.2.2.7).

FTCI made many field trips to the Kartabu Triangle to continually seek out access options for the concession area. Initial efforts targeted the Arimu-Quartzstone District, by traversing the Arimu Road and by boat trips for reconnaissance work along the Cuyuni River.

The second set of efforts targeted reconnaissance work along the Puruni River between Puruni Landing and Paiyuka Falls, and an ATV trail from Tiger Creek Junction (KPR) to several areas in the vicinity of Ekabago River -part of the eastern boundary of the concession area (see Figure 3).

Figure 3: ATV trails traversed in the search for access to SFEP 2/2017.

For areas that were *accessible*, FTCI initiated the collection of baseline information in 2017 itself, but more data was collected in 2020 after RLSS constructed an access road to the concession area.

1.2.2.7 Challenges

Access to the concession area was a major challenge. FTCI staffs and consultants traversed the Cuyuni River as far as Dukwarri. It is the case that above Devil Hole, Cuyuni River, and for a distance of about 27km upstream, the Cuyuni River has a *braid pattern*: and the navigable channel runs immediately along *left bank* Cuyuni River. At Dukwarri, for example, the river has a width of about four (4) km. The consultants were not able to find a boat captain willing to explore 'off channel' pathways to access areas on right bank Cuyuni River.

FTCI staffs traversed the Puruni River between Puruni Landing and Paiyuka Falls-the farthest point at which it is safe to traverse the Puruni River from Puruni Landing (see Figure). However, by travelling overland along the Puruni Road west of Puruni Landing, to Kumong-Kumong, on right bank Puruni River, the team was able to traverse a segment of the Puruni river bordering the biodiversity reserve, starting at the mouth of Kumong- Kumong River and proceeding upstream for about 10km to another 'barrier', Tumble Down Falls.

Figure 4: Photograph of a natural barrier to riverine craft-Paiyuka Falls, Puruni River

Gold mining is the major land use in the area; however there is no overarching mining development plan or 'care and maintenance plan' for the concession area or any part thereof, or indeed for mining district # 3; therefore, RLSS cannot predict the development and location of major new mining operations (and any planned road ways for accessing such operations).

This is particularly important for RLSS because its primary roads are planned with great care and any attempts to reroute the road to avoid 'lucrative' mining areas is very expensive and time consuming.

(Aurora Gold Mines has an access road on right bank Cuyuni River which is not suitable for RLSS' use at this time (see Annex XVIII): AGM's vehicles crosses the Cuyuni River by barge at Tapir then proceed via the Buckhall Road to their facility at Buckhall, lower left bank Essequibo River).

The Arimu Road approximates the northeastern boundary of SFEP 2/2017, but the condition was so bad at the time the consultants visited that they desisted (see Section 1.3.2).

The COVID 19 pandemic restricted social surveys: given that Batavia[3] was a major hotspot for COVID-19, the consultants were only able to conduct consultations safely in the Kartabu-Batavia District in March 2021.

1.3 Context-The Kartabu Triangle

1.3.1 Overview

The Kartabu Triangle, for the purpose of this report, embodies an area at the confluence of the Cuyuni and Mazaruni Rivers with left bank Puruni River as the western boundary (see Figure 5).

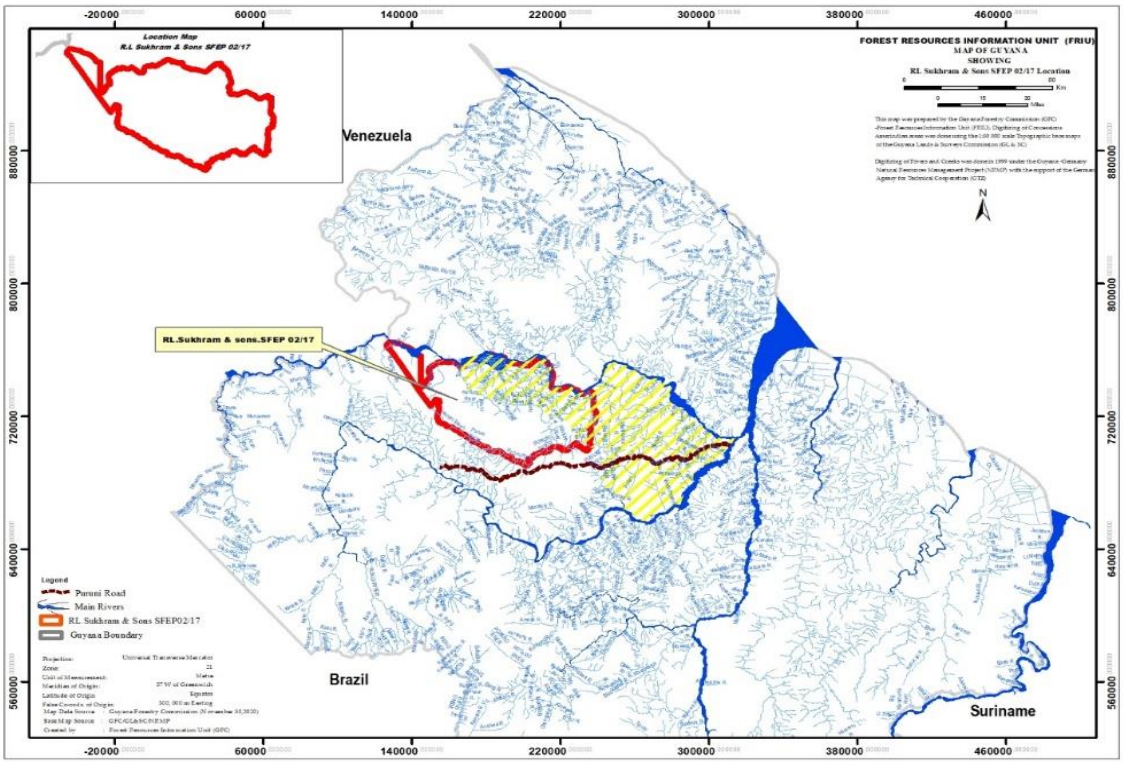


Figure 5: Map of Northern Guyana showing the location of the Kartabu Triangle.

The ease with which (jet) boats traverse the Mazaruni River between Kartabu Point, Left Bank Mazaruni River and locations such as Puruni Landing, Issano or Pappy Show in the upper Mazaruni, must be a source of envy for boat captains who travelled the same routes from the

[3] https://guyanachronicle.com/2020/08/02/batavia-covid-19-case-tally-climbs-to-14/

1920s through 1970s[4]. Indeed, the time taken on those routes were less of a concern than the frequent accidents that caused the loss of many lives and millions of dollars in cargo over the same period. It is for this reason that the construction of the Bartica-Issano Road or the Kartabu-Puruni Road were constructed. Vehicles can drive right up to mining camps or mining sites, whereas goods conveyed by river may need to be deposited at landings and then transported again by tractor, truck or even manual labour to mining sites.

1.3.2 Major road networks

1.3.2.1 The Kartabu-Puruni Road (KPR),

The construction of the Kartabu-Puruni Road started in the late 1920s and provided an alternative route to Peter's Mine, right bank Puruni River and surrounding areas. The maintenance of the Kartabu-Puruni Road proved exorbitant and after suspension of mining activity at Peter's Mine, the road deteriorated to the extent where many miners reverted to river transportation between Bartica and Puruni Landing. In the 1950s, WTTCL started logging in the area and used Iteballi to beach their logs, before taking the logs to Kaow Island (at the mouth of the Mazaruni River).

In the early 1970s , the Kartabu-Puruni road took on new importance, after GOG, set out to establish a hydropower scheme in the upper Mazaruni (Kurupung River Basin) and constructed an all-weather road between Iteballi, Left bank Mazaruni River and Pappy Show, left bank Mazaruni River. At the same time barge services were introduced at Kumaka Sherima-Suribanna Crossing, Essequibo River at Teperu-Iteballi Crossing, Mazaruni River and at Puruni River. The overall goal and result of all that work is that the mining community could drive all the way from Georgetown, transporting personnel, equipment and consumable goods much faster and safer to the upper Puruni River and beyond. In many cases, heavy-duty trucks carried goods to Puruni Landing where it was off-loaded into boats plying the Puruni River and its tributaries. Currently, more than 90% of the personnel and cargo going towards the upper Mazaruni, use the roadway.

The prevailing weather condition determines access options. In the rainy season, the roads deteriorate rapidly creating very challenging conditions for vehicles, and it used to be quite common for vehicles to remain bogged down in mud for several days (see Figure 6).

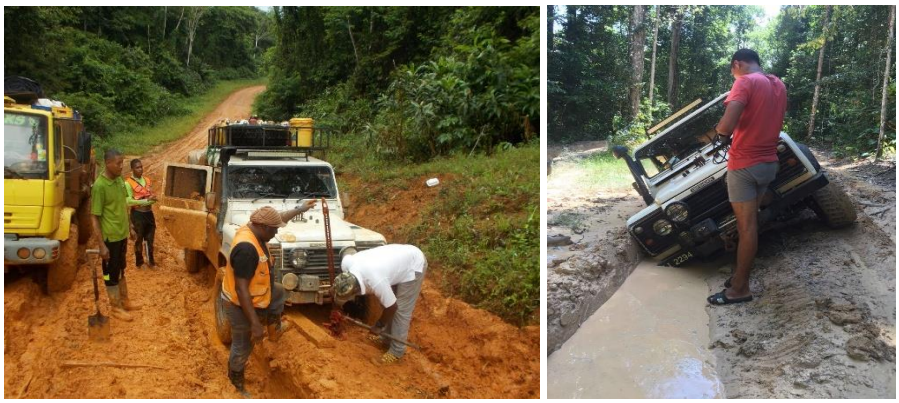


Figure 6: Examples of bad segments of the Kartabu-Puruni Road (left) and the Arimu Road (right).

In the rainy season water levels in the Cuyuni and Mazaruni rises by 3-4 meters and it is relatively easy to traverse the river with laden boats. The opposite scenario occurs in the dry

[4] A similar feeling would occur when those old captains look at the ease with which similar boats traverse the Cuyuni River

season: traversing roads is easier while traversing the 'dry' rivers by boat is extremely hazardous. The mining community thus balances road and water transport in line with the prevailing weather pattern.

For the KPR, there have been regular interventions by MOPW, MNR and GGMC to maintain the road in a usable state to the extent that there is a hire car service between Iteballi and Puruni Landing. No such interventions occur on the Arimu Road and its maintenance is entirely at the discretion of miners.

1.3.2.2 The Arimu Road.

A major branch of the KPR is the Arimu Road, initiated by Guyana Sawmills Limited in the 1950s-then subsequently extended in various directions by the mining community to link up with Waiamu Landing and Quartzstone Landing[5] respectively, on right bank Cuyuni River.

RLSS discarded the use of the Arimu Road as an option to access its forest concession. RLSS believes that on the basis of its alignment, the proximity of mining operations to the margin of the road and potential challenges with road maintenance, the Arimu Road represents a poor option for the scale of operations envisaged by the enterprise.

(Several miners and a few loggers have undertaken the maintenance of various segments or branch roads of the Arimu Road; a few miners have even instituted a toll system for the use of the segments they 'control').

1.3.3 Socio-economic issues

1.3.3.1 Overview

RLSS estimates that about 7,000 persons currently reside within the Kartabu Triangle and about 700 (10%) of these are women. There are children at Iteballi, Kartabu Village and Batavia. RLSS also estimates that 10% of the residents work in in the logging industry (see Figure 7).

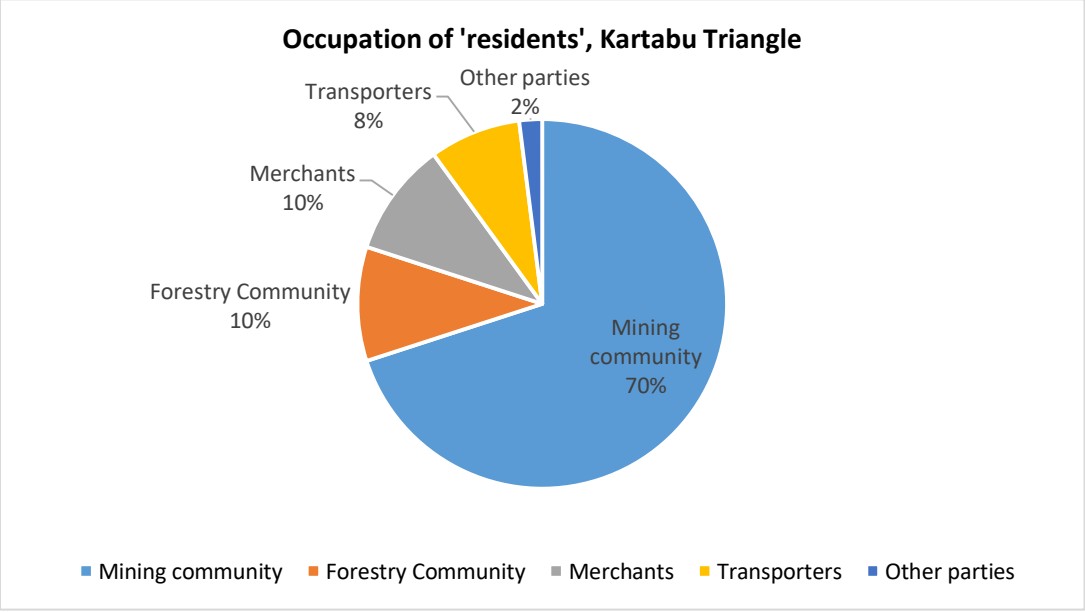


Figure 7: Chart showing the relative occupational status of residents of the Kartabu Triangle.

[5] Similar landings do not exist on right bank Cuyuni River, within SFEP 2/2017.

The most populous community in the Kartabu Triangle is Puruni Landing with 11% of the population (see Figure 8), however, collectively mining camps scattered across the Kartabu Triangle contain about 63% of the people living and working in the area.

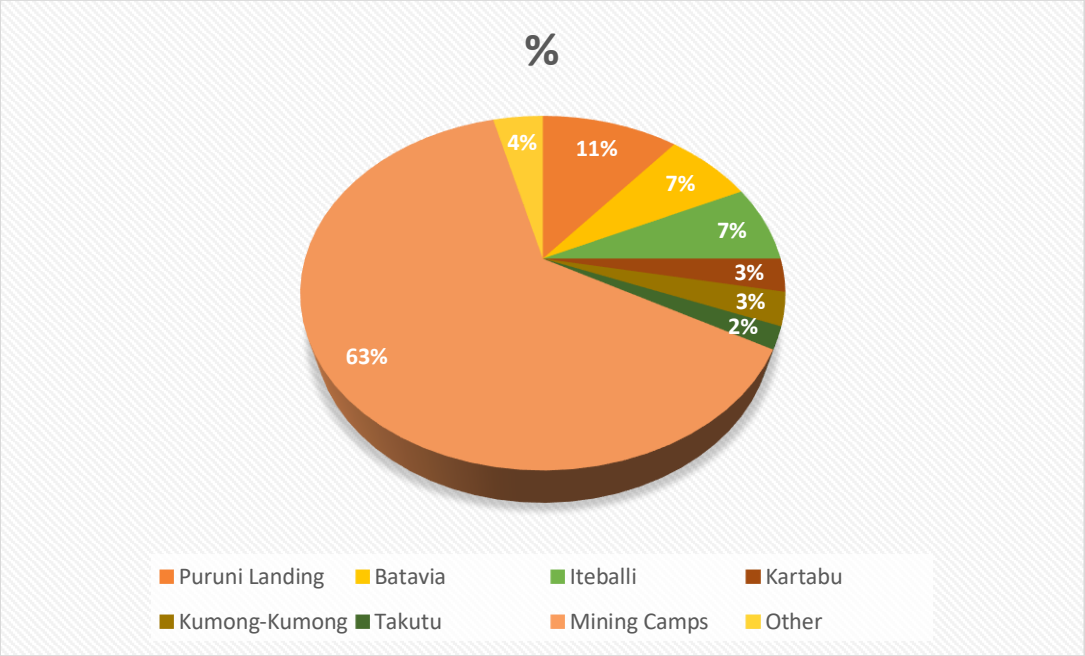


Figure 8: Chart showing the distribution of residents of the Kartabu Triangle.

Kartabu-Point, Iteballi, Batavia are full-fledged villages with a community based institutional arrangements to address their welfare. Other communities are simply 'clusters of people', though in the case of Puruni Landing, the layout of homesteads/businesses is more organized than the 'true' villages. There are children at Kartabu Village, Batavia and Iteballi. Likewise those communities have primary schools, health centers and community centers. Children attending secondary school do so at Bartica.

1.3.3.2 Main Communities

(a) Batavia Amerindian Village

Batavia lies in the lower Cuyuni River, about 2km above Kartabu Village (see Figure 9). Batavia first received title to their lands in 2014 but there is dissatisfaction with the area actually awarded: the proposed extended Batavia Village occupies both banks of the Cuyuni River and include many islands. Batavia is situated in proximity to Pine Tree Landing where RLSS will set up a large log depot and transshipment facility, where logs brought to Pine Tree Landing from the concession area 121km away will be transferred to barges for the 70km trip to St. Lawrence, East Bank Essequibo.

Batavia was founded in 1970 by the families of Lawrence Lawlist, Paymon Boodhoo and Patrick Henry but residents have reported finding artifacts such as clay pots, ancient arrows and stone axes on the riverbed that indicate earlier peoples in the area (APA et al 2019). Batavia has a population of about 500 persons comprising six indigenous peoples-Carib, Akawaio, Arawak, Warrau, Wapichan and Patamona as well as people of mixed race. Land titling issues are still pending (APA et al 2019).

Figure 9: Photograph of Batavia Landing

Earlier residents reportedly migrated from the Northwest district in the 20th century to seek employment on timber concessions in the area. Nowadays, the men particularly work on goldmining and several are employed as boat captains plying the Cuyuni River. Other residents are engaged in farming and hunting.

The village has a cellular network, a primary school (with a nursery class) and a health post.

Batavia was declared a hotspot for COVID-19 and it was only on March 4, 2021 that the FTCI team and the Toshao agreed for an interview. Earlier FTCI culled a considerable amount of detail on the community from a study by APA et al (APA et al 2019). 24 persons were interviewed separately in keeping with safeguards related to the COVID-19 pandemic.

(b) Kartabu Village

The establishment of Kartabo Village (see Figure 10) was initiated by the Morgan Williams family around 1900 (APA et al 2019), however there are other reports that residents based at the overcrowded Fort Kyk-Over-Al Kartabo moved to Kartabu. The village assumed prominence by its proximity to Kyk-Over-Al and on W. Beebe's work at Kartabu published in 1945 and 1946, he conducted studies on fauna, particularly lizards and snakes from 1909 thru 1926 (Cole, et al. 2013).

Kartabu Village has 327 persons via 69 households (APA et al 2019)[6]. It is run by a six-member CDC and has a community run poultry farm and community run shop. There is MEDEX facility, a nursery school and a primary school. Most community members work on forest concessions or mining operations.

It appears that the Kartabu-Puruni Road was started in the late 1920s to facilitate the transport of goods and personnel to Peter's Mine and surrounding gold mines. Fortunately, or unfortunately, the road engineers chose the Iteballi Landing for the hydropower access road, thereby bypassing Kartabu Village. As a consequence, Kartabu Village has maintained its basic environmental profile.

[6] FTCI reported the current population at March 2021 as 200 persons.

Figure 10: Photograph of Kartabu 'Waterfront'.

RLSS currently operates from Batavia and neither the enterprise nor the GFC has had any complaints on record about current RLSS' operations, although it must be mentioned that RLSS' proposed operations at Pine Tree Landing will be of a much larger scale.

On the contrary, residents opined that the beaching of logs at Iteballi affects the quality of the water reaching the beaches of Kartabu.

(c) Iteballi Village

WTTCL set up a camp and timber depot at Iteballi around 1954. In the mid-1970s, GOG established the Teperu-Iteballi barge crossing (see Figure 11) as part of the construction of the UMRP Road that extended from Iteballi to Pappy Show, with a barge crossing at Puruni Landing.

Figure 11: Photograph showing the barge plying the Teperu-Iteballi Crossing

Subsequently several large scale loggers within the Kartabo Triangle – GTL, WTTCL, TPL, AMS and GSM – taking advantage of the improved roads, established timber depots and camps there. As more and more persons started to traverse Iteballi, and business persons began to offer various services to the large number of people traversing Iteballi, a number of farmers and a few business persons occupied the area and applied for agricultural leases. GTL, WTTCL,

GSM moved from the area, however WTTCL, TPL and AMS still maintain facilities in the area. With expansion of logging in the lower Cuyuni, northern side KPR as well as new logging operations from logging concessions west of Puruni Landing, there has been a quiet rush for available 'waterfront' landings at Iteballi for lease or rental. One relatively newcomer to the area, Jettoo Sawmill and Lumber Yard (JSLY).

Over the past ten years, there has been a marked expansion in commercial activity at Iteballi, all spurred by the number of people and goods transiting the community. For example, within the past ten years, a gas station a few hotels and restaurants and a large number of new homesteads have been constructed there. One of the more innovative developments at Iteballi was the introduction of a taxi service between Iteballi and Puruni Landing (see Figure 12): currently it costs about US$70.00 per person for the 2 hour trip.

Figure 12: Taxis at Iteballi 'Waterfront': these go as far as Puruni Landing.

It is apparent that many public agencies such as the EPA and the MOH conduct extension services there. The GFC maintains a station there, while GGMC and the GPS have a monitoring station about 5km west of Iteballi along the KPR.

Over the years, as the population increased, residents voiced disquiet with the frequent transit of logging trucks 'through' the community, routes that they have always taken since the 1970s. Specifically, residents allege a regular dust nuisance, excessive noise and vibration as loaded trucks traverse the community. Ironically, the total logging trucks and utility vehicles associated with logging enterprises constitute less than 10% of the heavy-duty vehicles traversing the Iteballi waterfront 'public' road. In, fact there are thirteen barge trips per day between Teperu and Iteballi every day.

RLSS' log flows will not pass through Iteballi at any stage of its operations, since RLSS' vehicles will veer north about 8km west of Iteballi and head north to Pine Tree Landing. However a vibrant Iteballi Community is key to garnering material regional support for a well maintained KPR and RLSS will pay attention to what happens at Iteballi.

(d) Takutu Village

Takutu Village comprise a population of about 80 persons that occupy an ad-hoc cluster of buildings and tarpaulin covered camps spread over a valley about 4km^2 immediately south east of Takutu Mountains, and immediately south of the KPR. There is no CDC, and no *community based* assets there.

100% of the people at Takutu Village depend directly or indirectly on gold mining. There were *gold 'shouts'* or '*gold rushes'* within the Takutu 'basin' in the early 1980s and a large number of mining camps were set up. As is customary, a large number of business persons set up an array of businesses to cater for the needs of miners. Takutu Village is also sustained by the fact that it is an intermediary location between Iteballi and Puruni Landing, and business persons there provide mechanical and vulcanizing services.

As is the case with most areas in the mining belt in the Kartabu Triangle, people treat those locations as worksites, and their presence there is aligned to the scale of mining operations.

(e) Puruni Landing

Puruni Landing (see Figure 13) is testimony to the resilience of the mining community. The GGMC set up a station there since the early 2000 and endeavours to control some aspects of the infrastructure.

Figure 13: Photograph showing a section of Puruni Landing.

The community developed rapidly after a barge service (see Figure 14) was established there in the late 1970s. It is strictly a mining community, comprising miners and businesses catering for the need of miners.

Figure 14: Photographs of Puruni Landing 'Waterfront'.

The GGMC is the only public agency in the natural resources area with an office at Puruni Landing. However there is a MEDEX, a GDF Outpost, and a Police Outpost at Puruni Landing. Agencies such as the MNR, MOH and the RDC Reg. #7 visit Puruni Landing from time to time on extension exercises.

Loggers operating on right bank Puruni River transport logs via the barge at Puruni Landing. A sub-committee of MNR, MOPW, GGMC and GFC are reportedly reviewing options for a bridge across the Puruni Landing.

During social surveys at these points, the overall response is that all stakeholders' welcome development. There are many people seeking economic niches every day, as evidenced, for example, from the diversity of businesses in Puruni Landing. The businessmen trading in food, fuel and other goods welcome the opportunity to expand their sales. Stakeholders at Takutu and at Iteballi want to see more community development and employment opportunities. And everyone wants to know where the new road networks are.

1.3.3.3 Other settlements

Tiger Creek Junction (see Figure 15) was constructed by the mining community during period 2007-2015 to provide support to miners in the Rock Creek, Tiger Creek, Mara-Mara and Old Granny Districts.

Figure 15: Photograph of a section of Tiger Creek Junction, KPR

It is situate at 90km, KPR at the junction of the KPR and a trail linking KPR with Mara-Mara River and Old Granny River. In the **dry** season, ATVs can drive across the Mara-Mara River and a number of ATV trails on right bank Mara-Mara River lead on to mining areas near left bank Ekabago River[7]. The trail is an alternative route for some miners going up the Puruni River in the dry season

Tiger Creek Junction comprise about eight business establishments and households straddling the KPR and offering goods, fuel, mechanical services and vulcanizing services for miners operating in the Tiger Creek Basin.

In the late 1960s, loggers established base camps at **Kwapau (WTTCL)** and at **Batavia (GSM):** both companies also established bases at Iteballi. In the 1980s, loggers established base camps at Black Water (GTL) and at **Puriari (WTTCL)** and **Takutu River (AMS**), while in the 1990s, WTTCL established a base camp at the intersection of Puriari River and the KPR. (The base camps at Batavia, Kwapau and Black Water do not exist anymore).

[7] This is the trail eventually used by RLSS to access the concession area.

Today Kartabu and Iteballi are full-fledged communities with schools, community centers, MEDEX facilities and NDCs. Puruni Landing is also emerging as a full-fledged community: there is now GGMC Station, a MEDEX facility, a Police Outpost, and a GDF outpost, however there are neither children there nor a local authority.

1.3.3.4 Riverine homesteads/camps

There are small homesteads and camps at landings on right bank Cuyuni River: some serve as assembly points for persons seeking transportation up or down river, others are simply 'private mining camps (see Figure 16).

Figure 16: examples of homesteads along lower right bank, Cuyuni River.

Many of these carry from 1-15 persons depending on time of year and generally serves as temporary passenger depots or depots for fuel. Occasionally some are abandoned during the dry seasons. The western most clusters of homesteads occur at Aranka Landing[8].

1.3.4. Land-use

1.3.4.1 Gold Mining

Gold mining is by far the main driver of economic activity in the Kartabo Triangle and it occurs throughout the Kartabu Triangle (see Figure 17).

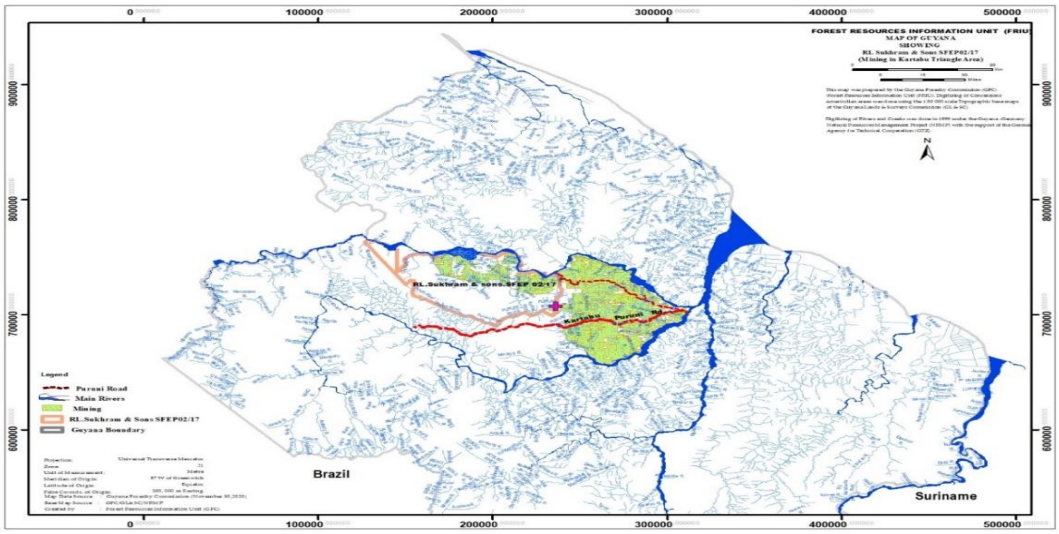


Figure 17: Indicative map showing the extent of mining in the Kartabu Triangle.

Mining communities set the tone for the development of the Kartabu Triangle. Peter's Mine on right bank Puruni River, about 110.5km from Kartabu Point was established around 1890 (Kretschner 2012). In fact it appeared that it was Peter's Mine Operation that was the catalyst

[8] Although situate on right bank Cuyuni River, residents there are associated with Aranka Village, Aranka River, left bank Cuyuni River.

for the construction of the KPR in the late 1920s. The importance of mining lies in its multiplier effects (Bulkan and Palmer 2016).

Apart from actual extractive mining activity, an array of job opportunities are associated with mining (see Figures 18, xxx and xxx). In addition, *mining supports a variety of industries in sectors such as metal fabrication, machine construction and repair, transportation, carpentry, plumbing, welding, pipe fitting and blasting '* (GOG 1997).

Figure 18: Photographs illustrating the diversity of activities associated with goldmining

The major mining operation in the area occurs at Aurora, right bank Cuyuni River. However, large scale mining operations on the right bank Puruni River at Million Dollar Mountain are equally significant.

1.3.4.2 The Forestry Sector

The forest industry employs about 10% of the persons currently residing in the Kartabo Triangle. Loggers started operating in the lower Kartabu Triangle In the early 1950s, but their road network was confined to a 50km radius from Kartabu Point. It was only in the 1980's that the GFC categorized the forests in the Puruni District as "accessible" and started granting forest concessions as far west as the Puruni River; later, from around 2005, GFC started issuing concessions west of Puruni River. Currently the *entire* Kartabu Triangle has been allocated as forest concessions: about 15% of the area are taken up by small concessions, the smaller concessions lying in the north eastern area of the 'Triangle', in the Arimu District (see Figure 19).

RLSS' enterprise currently operates on small forest concessions within the Kartabu Triangle and therefore RLSS is fully familiar with the people, the terrain and the social conditions there. RLSS

has acquired major experience collaborating with small miners. More importantly, RLSS developed a close working relationship with the Batavia community.

Most loggers in the Kartabu Triangle ship logs through Iteballi Landing. However, over the past year, as Iteballi becomes more congested, many loggers have been approaching RLSS with the objective of sharing share his waterfront facilities at Pine Tree Landing.

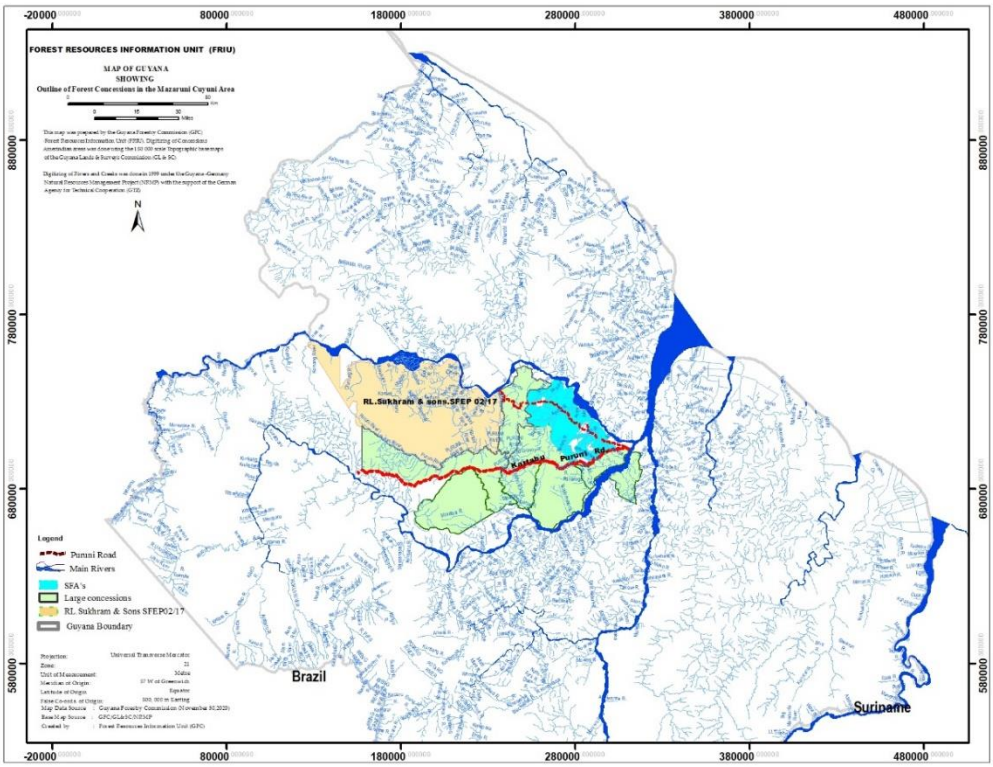


Figure 19: Map showing forest concessions in the Kartabu Triangle

The GFC currently maintains a station at Iteballi; however staffs from GFC HQ runs several patrols per month throughout the area and there are plans to set up more stations in 2021.

Forest production in the upper Kartabo Triangle has been stymied by the state of the Kartabu-Puruni Road which deteriorates in the Rainy season and where protocols for regular maintenance are uncertain. For areas west of Puruni River, production, which started relatively recently (2016) is severely limited by the existing barge service across the Puruni River. A committee comprising MNR, MOPW, GGMC and GFC is currently reviewing proposals for constructing a bridge across the Puruni River.

The logging community was particularly noteworthy for constructing airstrips at Kwapau and Takutu[9]: both these strips are not functional anymore. The only functional airstrip at this time is at Olive Creek, left bank Mazaruni River, opposite the mouth of Kurupung River, right bank Mazaruni River.

A developer with a SFEP on left bank Puruni River is contemplating constructing an airstrip within 'his' SFEP/large concession.

[9] AMS which built the airstrip currently uses a helicopter pad.

1.4 SFEP 2/2017

1.4.1 Overview

In 2017, RLSS acquired SFEP 2017, comprising 432,262.59ha situated within the Kartabu Triangle generally between the right bank Cuyuni River and left bank Upper Puruni River (see Figure 20, Annex VI). The concession area is situated in the Cuyuni-Mazaruni District, Administrative Region 7.

The perimeter of SFEP 2/2017 has a total length 452 km, including cut lines totaling 76.78km. In the north eastern part of the SFEP, RLSS shares a km boundary with the extended Kurutuku Amerindian Village, including two cut lines of totaling 20.4km. (This line will eventually be demarcated by GL&SC). To the east of the concession, RLSS shares a 39 km boundary, including 10 km of cut lines, with SFEP 2/2013 held by TPTTL.

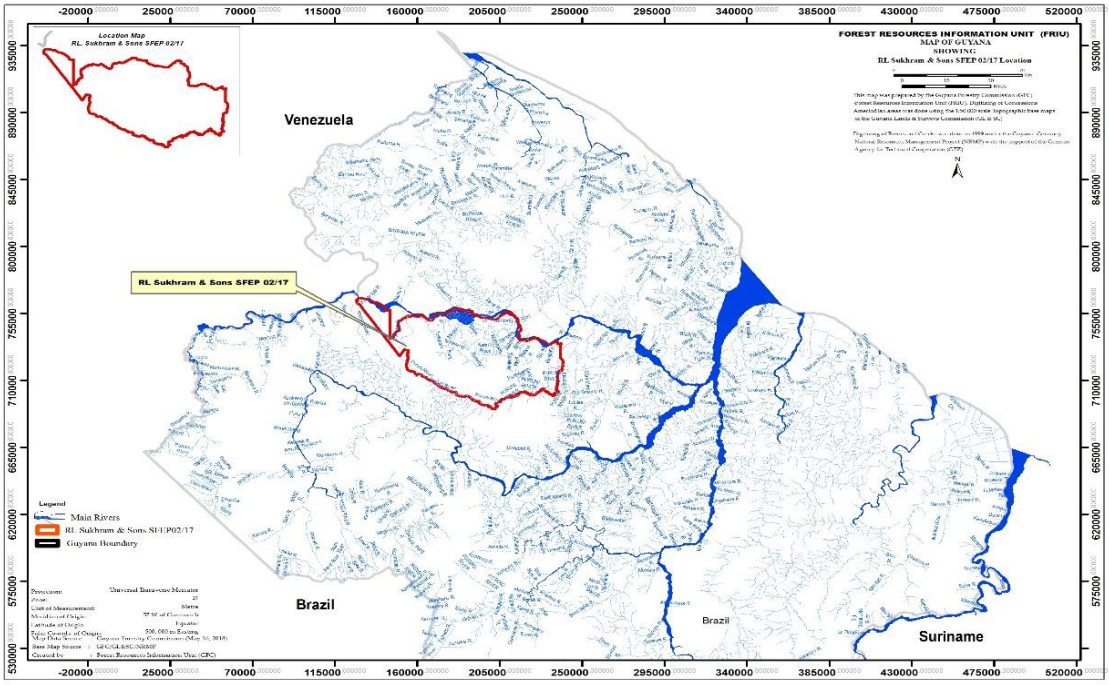


Figure 20: Map showing the geographic location of SFEP 2/2017

The following may be noted:

a) the *north-eastern most point of the boundary* on right bank Cuyuni River has UTM coordinates of 21N 0127999, 0761145, about 30km upstream of Kartabu Point;

b) the *south-eastern extremity* of the concession area lies at the mouth of (right bank) Ekabago River, left bank Puruni River, having UTM coordinates of 21N 0236740, 0702169, approximately 26 km, upstream of Puruni Landing.

c) the *north western extremity* of the concession lies on right bank Cuyuni River and has UTM Coordinates 21N 128117, 765384.

d) the *south western extremity* of the boundary lies near the source of the Puruni River and has UTM Coordinates of 21N 150150, 726041.

The northern part of the concession may be accessed via the Cuyuni River while the southern part of the concession may be accessed via the upper Puruni River; however neither River is suitable for conveying logs due to the large amounts of rock bars (see Figure 21) and sand bars respectively that characterize both rivers.

Figure 21: Rock bar just below Tumble Down' Fall, Puruni River.

The area embodied within SFEP 2/2017 appears not to have been subjected to the major interventions that characterize the general Puruni District. There have been no major gold shouts such as those that led to the development of Peter's Mine and *Million Dollar Mountain* mine , on *right bank* Puruni River. The Puruni Landing-Pappy Show Road which form part of the Kartabu-Pappy Show Road occurs on *right bank* Puruni River. There is no evidence of the concession area being occupied by any indigenous community; and there are no aged mining communities similar to Puruni Landing on left bank Puruni River, Kumong-Kumong on right bank Puruni River or Dukwarri on left bank Cuyuni River. In fact the only relatively *recent* intervention of note was the establishment of Aurora Gold Mines and ancillary infrastructure on right bank Cuyuni River in 2015 (see Annex XVIII).

The absence of any major intervention also implies that access to the concession area is very challenging. Currently, boat captains operating from Bartica do not go beyond Devil Hole (Island), Cuyuni River. Similarly, boat captains operating from Puruni Landing do not go beyond Paiyuka Fall. To travel in upstream Puruni River above Paiyuka Fall, one must approach the river from a landing upstream, using a branch road in a northerly direction between KPR and the River, such as is the case with Kumong-Kumong.

Prior to 2015, there was **no** existing road access to the concession area. AGM constructed a 26km road on right bank Cuyuni River to access its mining operations, however the use of that road is not convenient for RLSS. The current option to access the concession is a 23 km road that RLSS developed itself: the road extends from Tiger Creek Junction, KPR[10] to a point on right bank Ekabago River-on the eastern boundary of the concession, and traverses two forest concessions (see Figure 22).

[10] Recently, RLSS shifted to Long Boots road, about 4km east of Tiger Creek Junction to avoid steep terrain.

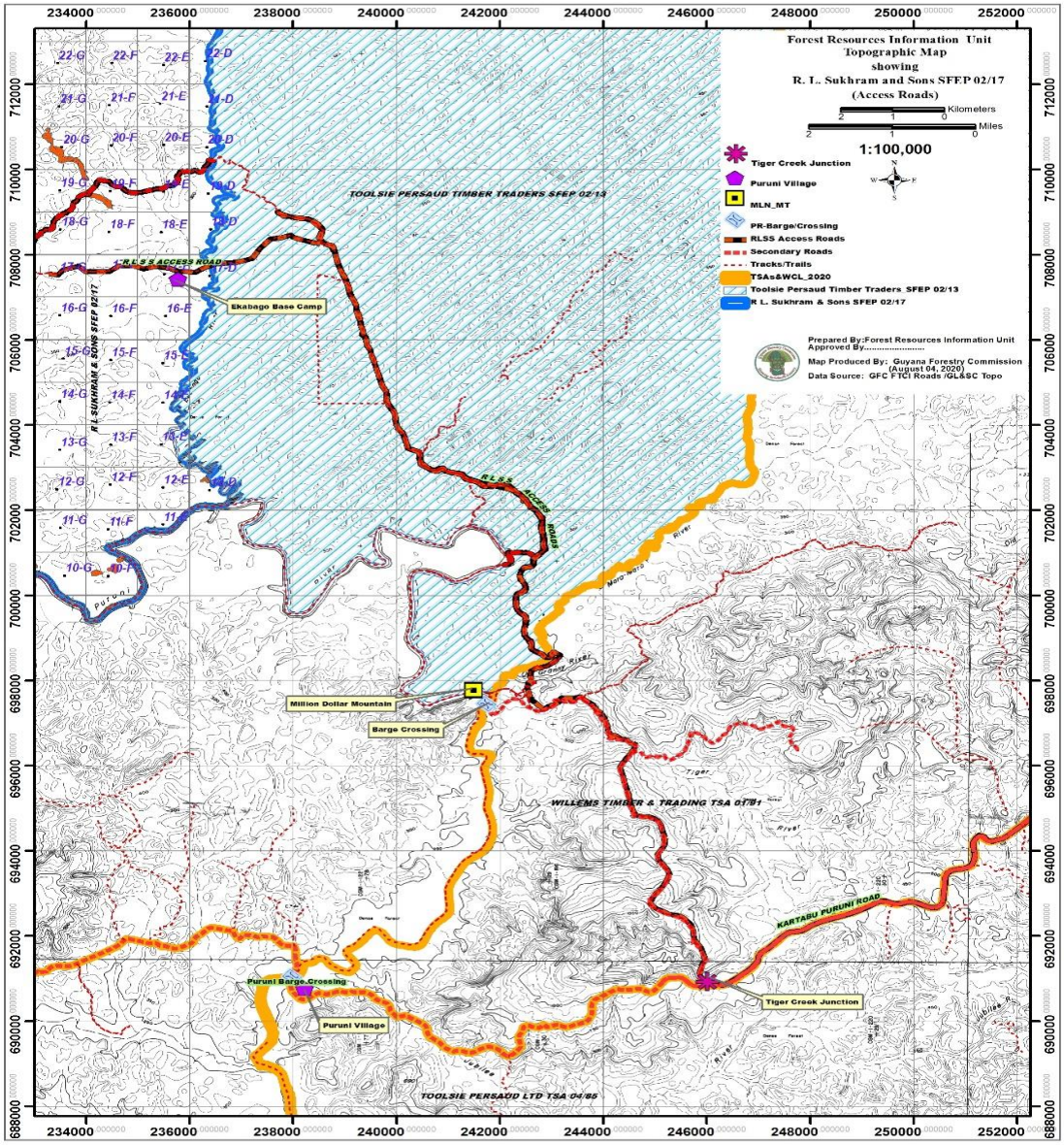


Figure 22: Map showing RLSS' access road.

1.4.2 Historical context

In 1991, the concession area formed part of TSA 4/91 that GFC issued to BCL; however no logging operations occurred there. BCL ceded the concession area to the GFC in 2016 and the entire area of the original concession, south of the Cuyuni River was re-advertised as SFEP 2/2017. (In July 2017, on the basis of RLSS' application, the GFC awarded SFEP 2/2017 to RLSS).

Itinerant gold mining has been the primary land use activity in the area since the 1940s. In 2015, AGM established a huge mine on right bank Cuyuni River (see Annex XVIII).

1.4.3 Natural Environment

1.4.3.1 Landform and hydrology

(a) Landform

The concession area is generally hilly: the elevation ranges from 500 feet (152.4m) to 900 feet (274.32m). The hilly terrain is spread evenly across the concession area (see Map 1). (In section 5.2.4, it appears that forests on high hills and forests on undulating to hilly terrain together occupy about 59% of the concession area). There are several escarpments within the concession area.

(b) Hydrology

GL&SC has classified the concession area under Map Unit 2, characterized by the following: *'Enormous quantities of fresh water is available from April through August and November through January form perennial rivers and streams draining the western highlands; in quantitative terms, water flow will vary between 4,000 l/min and 400,000 l/min'* ((GL&SC, 2013).

The area is drained by a large number of right bank tributaries of the Cuyuni River and left bank tributaries of the Puruni River. The largest river within the concession area is the Kartuni River, left bank Puruni River: this river drains the whole central area of the concession area. Other major left bank tributaries of the Puruni River include the Toraparu River, the Orariparu River, the Homeparu, River, the Akwaparu River and the Ekabago River. Major right bank tributaries of the Cuyuni River include, from west to east, Otomung River, Towaparu River, Maipuri River, Toroparu River, Akaiwong River and Waikuri River

None of the rivers within the concession area are suitable for commercial scale log or lumber transport due to significant fluctuations of water levels between the dry and wet seasons and the presence of rocks and sand bars. Only bateau-type riverine craft traverse the rivers carrying personnel and goods for miners; the movement of even these bateau type boats is severely restricted in the dry season.

1.4.3.2 Geology & Soils

(a) Geology

Guyana is subdivided geologically into three provinces: the *Northern* Province, the *Southern* Province and the *Takutu Graben* between them (GL&SC, 2013). The concession area is situated within the Northern Province where the dominant lithology is the Greenstone Belt. The greenstone belt are predominantly metamorphic rocks and are reputed to be common in the Earth's oldest rocks, including the Guiana Shield.

(b) Soils

The GFC has at hand detailed soil maps (see Annex X) that sets out details of the soil types (see Table 5).

Table 5: Summary of soil types within SFEP 2/2017.

#	DESCRIPTION	AREA (HA)	%	REMARKS
1	**Endoaquepts**	**116.19**	**0.03**	**Soils with restricted drainage , waterlogged, or alluvial soils**
2	**Kanhapludults**	**365,032.11**	**84.45**	**Very deep, well drained soils, slight to high erosion hazard**
3	**Quartzpsamments**	**5,229.28**	**1.21**	**Deep , white sandy soils; excessively drained, low fertility, slight erosion hazard**
4	**Ustochrepts**	**8,578.55**	**1.98**	**Very deep, well drained soils, slight erosion hazard**
5	**Ustchrepts**	**42,759.51**	**9.89**	**Deep, alluvial soils, mottled in the subsurface, poorly drained; not suitable for road works.**
6	**Water bodies**	**1,503.71**	**0.35**	
7	**No data**	**9,043.26**	**2.09**	
TOTAL		**432,262.6**	**100**	

1.4.3.3 Climate

Guyana has a tropical climate characterized by a high but variable Rainfall, high humidity, and a relatively small temperature range with two wet and two dry seasons. Along the coastal plain rain falls an average of 200 days a year, with 50% of the average Rainfall occurring from mid-April to mid-August (USACE 1998). The second wet season is in December through January. The wet seasons begin in the west of the country and move to the east, ending with their retreat to the west giving longer wet seasons in the west of the country. Annual Rainfall varies from about 2,200mm on the coast to 2,800mm inland, although it rises to over 4,000mm in the **Upper Mazaruni**/Pakaraima Mountains area (GL&SC, 2013). In the drier savannas, where there is only one wet season from April to August the average annual Rainfall ranges from about 1,400mm to 1,800mm and most Rainfall occurs from April to May.

Rainfall data available for Iteballi, left bank Mazaruni River indicate that the Rainfall pattern for the Kartabu Triangle follows the broad national pattern: Rainfall during the long wet season extends from May to July, peaking at about 195mm in June; also, the short wet season extends from December through January peaking at about 152mm in January (Figure 10).

Mean air temperature ranges between 25 to 27.5°C throughout the year in most regions except the upland regions in the interior/west of the country, where mean temperatures are cooler and range between 20 to 23°C. At Iteballi, left bank Mazaruni River, average temperature 25.5°C (`78.0°F).

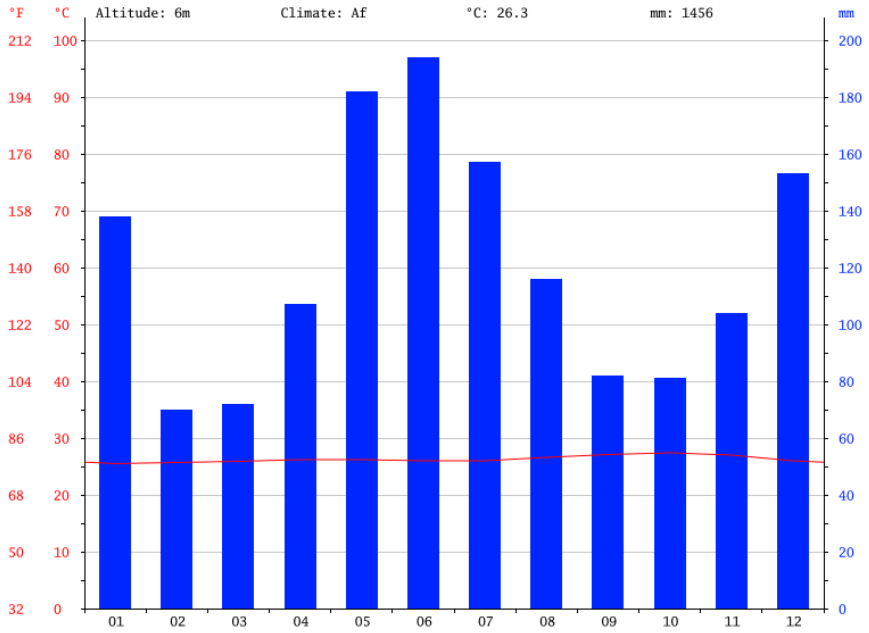


Figure 23: Climatograph for Iteballi, LB Mazaruni River.

1.4.3.4 Vegetative and forest types

Based on a general report by Hans ter Steege (ter Steege, 2000) on species densities -number of trees per 100ha) for the Cuyuni -Mazaruni District, the most abundant species per 100 ha in the concession area are:

a) Wallaba (*Eperua spp)* 545 trees/100ha

b) Mora (*Mora excelsa):* 593 trees/100ha

c) Greenheart (*Chlorocardium rodiei)* 380 trees/100ha

d) Wamara (*Swartzia spp)* 272 trees/100ha

e) Black Kakaralli (*Eschweilera spp*) 392 trees/ha

f) Kautaballi (*Licania spp*.) 147 trees/ha

g) Baromalli (*Catostemma commune)* 121trees/ha

The concession area embraces the transition between two forest types: ***Northwest Wet Forests*** and ***Central Guyana Wet Forests***. For this reason, RLSS will rely on more detailed forest type information available at the GFC (see Table 4, Annex IX).

Table 6: Summary of vegetation types within SFEP 2/2017.

#	Description	Area (ha)	%	Remarks
1	Mixed forest on undulating to hilly terrain	159,171.29	36.8	Productive forests
1b	Mixed forest on flat to undulating terrain	78,124.32	18.1	Productive forests
1c	Mixed forest on deeply dissected terrain	89,869.14	20.8	Productive forests
1h	Mixed forest on high hills	96,652.48	22.4	Designated non-productive pending ground assessment
1p	Los stemmed forests on steep high hills	2,436.58	0.6	Designated non-productive
3	Low swamp	235.12	0.1	Designated non-productive
3b	Mora	246.98	0.1	Productive forests
	No data	5526.70	1.3	Designated non-productive pending ground assessment
		432,262.83		

An analysis of data from 10 blocks in Compartment 1, enumerated at 100% revealed that just 9% of the species are responsible for 71.5% of the stems with Dbh≥35cm (see Figure 24)

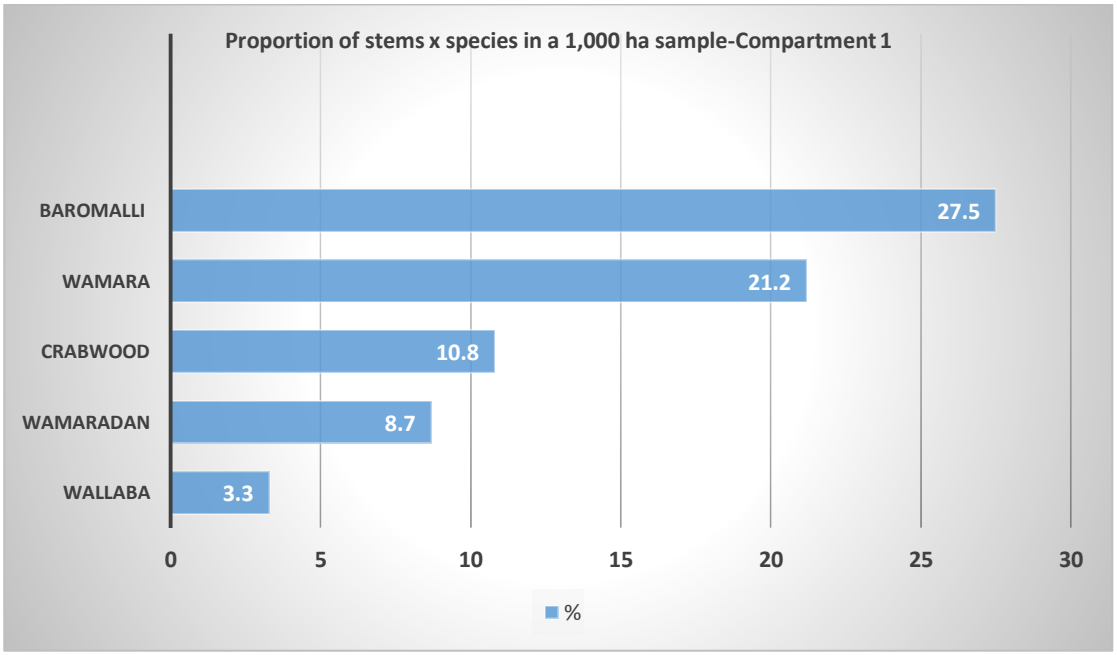


Figure 24: Relative abundance of five species based on 100% inventory of trees ≥35cm over 1,000ha

1.4.4. Social environments

Miners and business persons providing goods and services to miners-including transporters of fuel have occupied the concession area since the 1940s. RLSS estimates that about 2, 000

persons occupy the concession area, 15% of whom are females. Most of the women run restaurants at Landings or cook at mining camps. There are no children in the area.

The indigenous village, Kurutuku Amerindian Village, shares common boundaries with the concession area, at its western extremity.

The nearest Village is Puruni Landing, about 33 km by road from RLSS base camp. At Puruni Landing it is possible to secure a variety of goods from businesses there. A Health Centre and a GGMC[11] office are the only public facilities at that location. There are plans in train to set up a Police Station[12], a GDF outpost[13] and a GFC Forest Station. Iteballi and Kartabo Point are about 100km by road from the eastern end of the concession area. The nearest town is Bartica, where the regional headquarters for Region 7 is situated.

Vehicles traverse the Bartica-Puruni Landing route via Iteballi on a daily basis. There is also a taxi service between Iteballi and Puruni Landing. (It is anticipated that entrepreneurs are already planning a taxi service to Ekabago Base Camp). Although not widely popular, there is a boat service between Puruni Landing and Bartica.

Malaria is the major illness prevalent in the area. 3,405 persons tested positive for malaria in 2018[14], while for 2,017, the figure was 2774[15]. The current COVID 19 pandemics are a major concern in the Puruni District. The MOH conducts regular extension work in the area targeting awareness of the debilitating effects of malaria and the distribution of LLINS. Recently, a MEDEX facility with the capability for conducting testing for malaria was established at Puruni Landing.

1.4.5. Economic environment

1.4.5.1 Existing physical infrastructure

There is a high density of trails within the concession area developed by the mining community to transport fuel to workplaces in the dry seasons. There is no coordination to this network as each miner constructed only that segment of road that fit his or her needs. Most of the trails are only suitable for use by ATVs. (The road network contemplated by RLSS will be the first road network designed to open all areas within the concession area). Miners take full advantage of the Puruni River and the Cuyuni River respectively to goods, fuel, and personnel to mining locations within the concession area. However, during the dry season, the use of riverine transport is severely limited.

Several aged mining trails appear on satellite images of the concession area and many of these roads have been captured via GFC's MRV process. To date, RLSS has not been able to map the entire existing road or trail network used by miners in the concession area.

1.4.5.2 Mining Activity

The concession area is spread across Cuyuni Mining District No. 4 to the north and Mazaruni Mining District No. 3 to the south.

Mining is the dominant land-use activity on the concession area (see Figure . 39 minerals and ores recorded in Guyana that have economic importance, however gold mining and diamond mining respectively have been the main activity within the Cuyuni-Puruni District where the

[11] There is also a GGMC office at Aranka Landing, Right Bank Cuyuni River
[12] A small police unit already operates there
[13] GDF ranks are already encamped at Puruni Landing
[14] This represented about 25% of the persons tested for that year
[15] http://guyanachronicle.com/2019/04/29/paruni-to-get-health-centre-by-year-end

concession is located. Auriferous quartz has been exploited in the Puruni District. The largest mining operation currently occurs at Guyana Goldfields Inc., right bank Cuyuni River).

Figure 25: Evidence of mining activity, SFEP 2/2017

Mining concessions, including Guyana Goldfields (see Figure 26), occupy some 389,193.93 ha (90%) of the concession area; however *active mining* occurs on just 970.38ha (0.2%) of the concession area[16]. RLSS estimates that, save and except Guyana Gold Fields, there are about 30 itinerant mining teams active within the concession area-these are supported by operators of chartered transport services and merchants trading in goods and fuel.

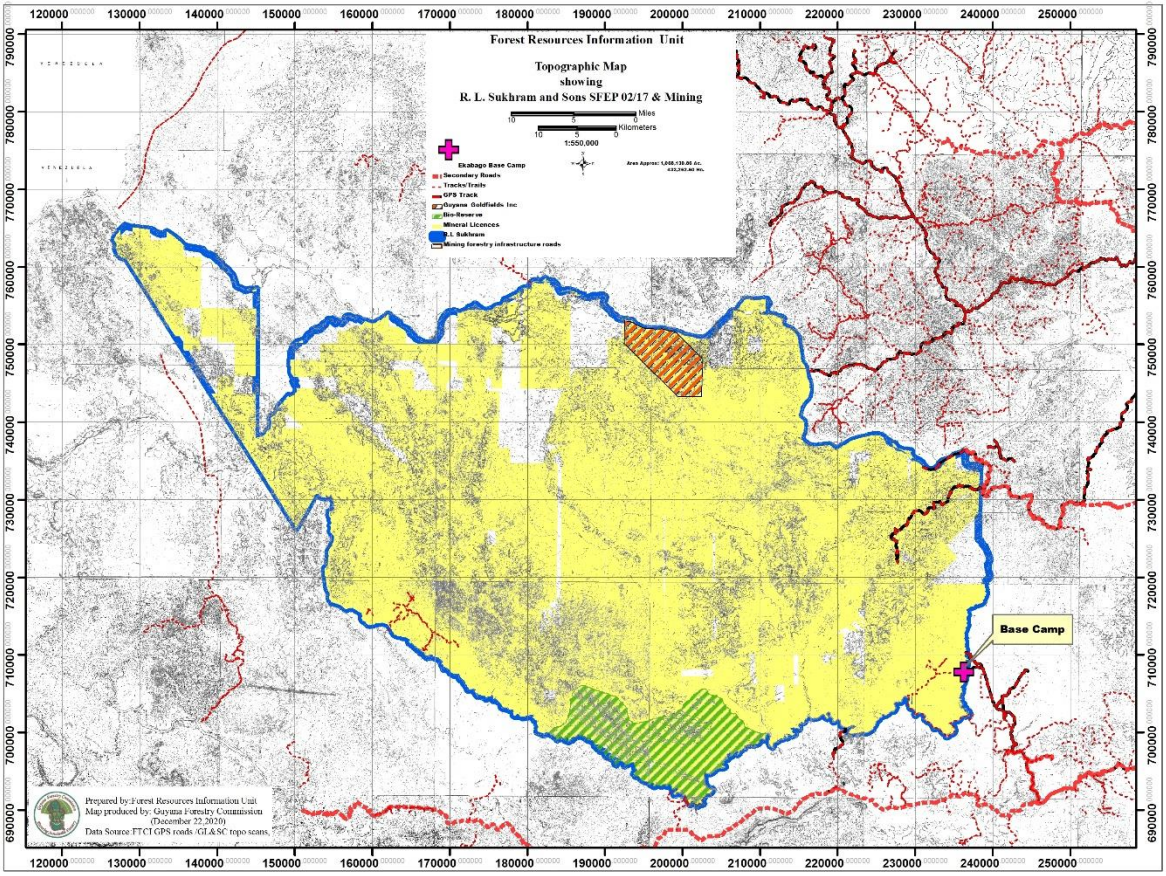


Figure 26: Map of SFEP 2/2017 illustrating the extent of mineral licenses.

[16] Source: GFC, January 2018.

1.4.5.4 Other Land use

No evidence of eco-tourism or commercial scale agricultural activity has been observed in the area. Also, no hunters or fishermen have been observed in the area; in fact the consultants have never seen locally sourced meat or fish for sale at Puruni Landing or the other interior locations.

1.4.5.5. Airstrip

No airstrip exists within the concession area itself. There is an airstrip on right bank Cuyuni River, used exclusively by Guyana Goldfields Inc. at Aurora. There is also an airstrip at Olive Creek, right bank Mazaruni River. There are reportedly many private helicopter pads in the area, including one at Million Dollar Mountain, near the mouth of Mara-Mara River, about 18km from RLSS' Ekabago Base Camp.

(RLSS will seek the appropriate approvals to set up a helicopter pad near its base camp at Ekabago. Alternatively, RLSS will consult with the Alphonso Group at 'Million Mountain Camp' –for the use of their helicopter pad for emergencies).

1.4.5.6 Communications

There is a DIGICEL mast on the eastern outskirts of Puruni Landing and RLSS currently enjoys cell phone communication at its Ekabago base camp. (RLSS will develop its own communications system when it acquires its forest concession).

2.0 APPROACH AND METHODOLOGY, SIGNIFICANCE CRITERIA, AREA OF INFLUENCE

2.1 Overview

This section relates the manner in which the consultants approached their task, the significance criteria associated with the project and the projected area of influence.

2.2 Approach and methodology

2.2.1 Organization of activities

The concession area is the largest block of intact forest in the Kartabu Triangle. Although, the area was formerly a part of TSA 1/94 held by BCL, that company did not undertake any interventions in the area. (In fact it was only relatively recently, in 2015, that there was any major intervention in the area when GGI developed AGM on right bank Cuyuni River).

The specific activities undertaken by the consultants and the developer may be summarized as follows:

a) Consultations

b) Desk reviews

c) The development of a stakeholder plan

d) The collection and analysis of baseline data

e) Discussion with the developer on its proposed project

f) Scoping meetings

g) Identification of and review of predictable direct, indirect, and cumulative impacts linked to the project

h) Drafting of the ESIA Report

2.2.2 Consultations (see also Section 3.0)

FTCI has been working on ESIAs for developers in the Kartabu Triangle since 2007 and representatives of the organization have made numerous trips to the area. For this work however there were new informal consultations along the Cuyuni River and in the Upper Puruni River.

Consultations within the riverine communities or homesteads were informal due to two reasons. Firstly many of the few operatives or businesses encountered in the concession area were reluctant to engage in conversation, either because of mistrust of the consultants or disinterest in environmental matters. (It is apparent that persons carrying large amounts of cash or gold are naturally reticent in confrontations with strangers, eschewing any conversation or even physical contact, wherever possible). Secondly, many of the persons encountered near the concession area are self-employed, small scale, itinerant miners or business persons who do not live or own property or mineral licenses in the area; they live in Bartica or Linden or coastal communities but travel across all mining districts plying their trade.

There were recent consultations[17] with residents of Puruni Landing, Tiger Creek Junction, Takutu, Iteballi, Kartabu Point and Batavia during period March 1-8, 2021. Those villages will be on the *periphery* of RLSS' logging operations. Public officials and boat captains proved to be the primary sources of the information garnered from consultations. Of course, feedback from the scoping meeting conducted on May 8, 2018 in Georgetown was also a major source of information.

2.2.3 Desk reviews

There are virtually no concession specific reports available since virtually no developments occurred in the area until 2015. Thematic maps covering topography, soils, vegetation types and mineral licenses were sourced from the GFC.

The more important documents reviewed included the following:

a) Ter Steege (2000) offered major indicative information about forest stocking;
b) Cole, et al (2013) provided data on previous faunal research in the Kartabu Triangle;
c) GL&SC (2013) was a major source of information for the concession area;
d) Pasha, Wenner & Clarke (2017) provided very useful information and perspectives on the mining sector in Guyana; and
e) APA et al (2019) provided recent and detailed information on Kurutuku Amerindian Village, Kartabu Village and Batavia Amerindian Village.
f) Reports published by Aurora Gold Mines (see example at Annex XVIII).

Websites for all agencies in the natural resources were scanned on a weekly basis.

2.2.4 Development of a stakeholder plan

FTCI developed a stakeholder plan to guide its consultations (see Chapter 3.0). Unfortunately, the advent of the COVID-19 pandemic stymied the intensity and range of engagement with stakeholders and the consultants relied on previous work in the area.

2.2.5 The collection and analysis of baseline data

More than 50% of the consultants' time was spent on procuring access to the locations identified in the sampling plan. This proved very challenging as it required that the consultants traverse up to 40km on foot. However, RLSS believes that sufficient initial information has been garnered to give a credible account of site conditions and prospects to stakeholders.

2.2.6 Discussion with the developer

The consultants engaged the developer about the structure of the proposed logging operations and associated log flow and also reviewed with the developer the *pros and cons* of traversing areas with a well-entrenched mining community. The consultants also worked with the developer to develop a suite of activities to mitigate the adverse impacts of the logging operation and on methods to develop partnerships with stakeholders.

2.2.7 Scoping meetings

The consultants participated in a scoping meeting conducted on May 8, 2018, where critical stakeholders' concerns were raised. Of course, the consultants drew upon other scoping meetings conducted for other developers within the Kartabu Triangle, and particularly how the issues raised affected the more permanent communities such as Iteballi and Kartabu Point, Iteballi and Batavia.

[17] These consultations were delayed due to the Covid-19 pandemic generally, and the fact that Batavia was declared a hotspot for Covid-19 infections.

2.2.8 Identification of and review of predictable direct, indirect, and cumulative impacts linked to the project'

Please see Section 16.0.

2.2.9 Drafting of the ESIA Report

The major problem with the drafting of the report was to develop ways of presenting information on maps for an area exceeding 432,262.59ha. Traditional methods of appending maps to the report would be onerous for stakeholders because large scale maps would be too bulky and small scale maps could make it difficult to discern the information presented.

2.3 Significance criteria

2.3.1 Overview

This section describes the transformative nature of the project in terms of its socio-economic impacts and the potential impacts on key ecological elements in the area.

2.3.2 Impacts on mining, the current driver of economic activity

Loggers, such as RLSS, use heavy-duty trucks carrying about $40m^3$ and using pole trailers to carry full length logs 10-18M. Loggers must maintain their roads in a satisfactory state in order to ensure unobstructed log flows, conserve their vehicle, reduce operational costs, and to reduce driver fatigue. As such roads built by loggers are ideal for miners who wish to access their mining permits but do not have the resources to construct their own roads.

Experiences elsewhere (Mabura, Buckhall, Bissaruni) indicate how miners populate areas along new roads as soon as these are constructed. In fact, in many areas, miners and other parties use roads built by forest concessionaires at a higher rate than the forest concessionaires, themselves.

Many loggers experience difficulty in getting the mining community to adhere to the same protocols that the loggers themselves follow for the proper or safe use of logging roads. For example, loggers impose restrictions on road use during heavy rainfall. Of course loggers must take care not to fell trees anywhere without posting signs or otherwise communicating to third parties that tree felling is in progress.

2.3.3 Impacts on livelihoods

Logging offers employment opportunities and varied skills sets for young and old men and women. Women take up clerical jobs on forest enterprises but these can also extend to forest surveying, tree identification, and timber grading. Young people at Kartabu Point, Iteballi and Batavia can therefore garner a skill from RLSS that make them employable elsewhere.

A major concern for parents in the district is secondary school education for their children. Once the children at primary school at Iteballi and at Kartabu Village transition to secondary schools in Bartica, parents must find extra regular cash to sustain them at Bartica (or any coastal location). Employment with mining enterprises attract higher enumeration but payment dates are not necessarily predictable. Employment with mining enterprises also require the extended absence of fathers from their homes. It follows then that nowadays, many fathers prefer jobs nearer to their homes and jobs with a predictable pay date, and therefore many residents of the villages in the area prefer to work with logging enterprises.

2.3.5 Impacts on the environment

The first major impact on the environment are the interventions associated with the establishment of a network of roads. These works are unavoidable, however the proposed network of roads in a hitherto inaccessible area will bring major economic benefits through expanded logging and mining projects respectively. Road networks help the mining sector in

two major ways: firstly roads allow miners to access hitherto inaccessible claims; and secondly, road networks allow miners more options for transporting fuel and other goods to riverine areas (along the Puruni River) in the dry season.

No hunting has been observed in the area to date; firearms carried by field operatives are more for their personal protection. However there has been numerous and frequent sightings of fauna: mammalian fauna such as agouti, deer and tapir, are always encountered along road ways and they seem to relish the new growth primary vegetation at road sides.

2.4 Area of Influence

2.4.1 Overview

The scale of activities required to operationalize logging activities at SFEP 2/2017 will transform economic activity in the entire Kartabu Triangle.

RLSS' timber harvesting activities will not impact directly on the main communities in the Kartabu Triangle: specifically, the activities will all be far away from Puruni Landing, Iteballi and Kartabu Point. Logs harvested on the concession area will be extracted via the KPR to Pine Tree Landing, and it is only in the use of the KPR that RLSS' operations will coincide or overlap with the activities of other developers. RLSS will use six to eight heavy-duty logging trucks with pole trailers per day, each capable of conveying 40-45m^3 of logs at speeds of 40-40km/hr. To main that output, RLSS cannot rely on ad-hoc road maintenance programmes currently in place for the KPR. RLSS will assist with road maintenance.

2.4.2 The KPR

All businesses or developers in the Kartabu Triangle, including those at Pappy Show and Kumong-Kumong Village (see Figure 27), use the KPR. And therefore these would all be impacted in some way by RLSS' use of the KPR. RLSS estimates that, once it gets into production, the logging community will only be responsible for less than 8% of the vehicular traffic along the KPR.

RLSS will have its own internal controls for maintaining its vehicular fleet; however, since mechanical breakdowns and punctures are unpredictable, there will be opportunities to utilize mechanical and vulcanizing services at places such as Takutu 'village'. There will be occasional purchases of lube-oil, hydraulic fluids and brake fluids from vendors along the KPR.

2.4.3 Communities

In the hey-day of its operations in 2022, RLSS will recruit a total of up to 180 persons for its operations at Ekabago and at Pine Tree Landing. The company will prioritize the recruitment of forest surveyors, tree spotters, timber graders, chainsaw operators and heavy-duty machine operators. RLSS will also prioritize the recruitment of field operatives from Batavia, Kartabu and Iteballi. (RLSS is almost in a position to recruit all the unemployed persons at Batavia).

RLSS also expects to purchase fresh meat, fruits and vegetables from villages in the Kartabu Triangle.

Altogether, on the basis of local purchases and remuneration packages, RLSS anticipates injecting G$200million per year into the economy of the Kartabu Triangle.

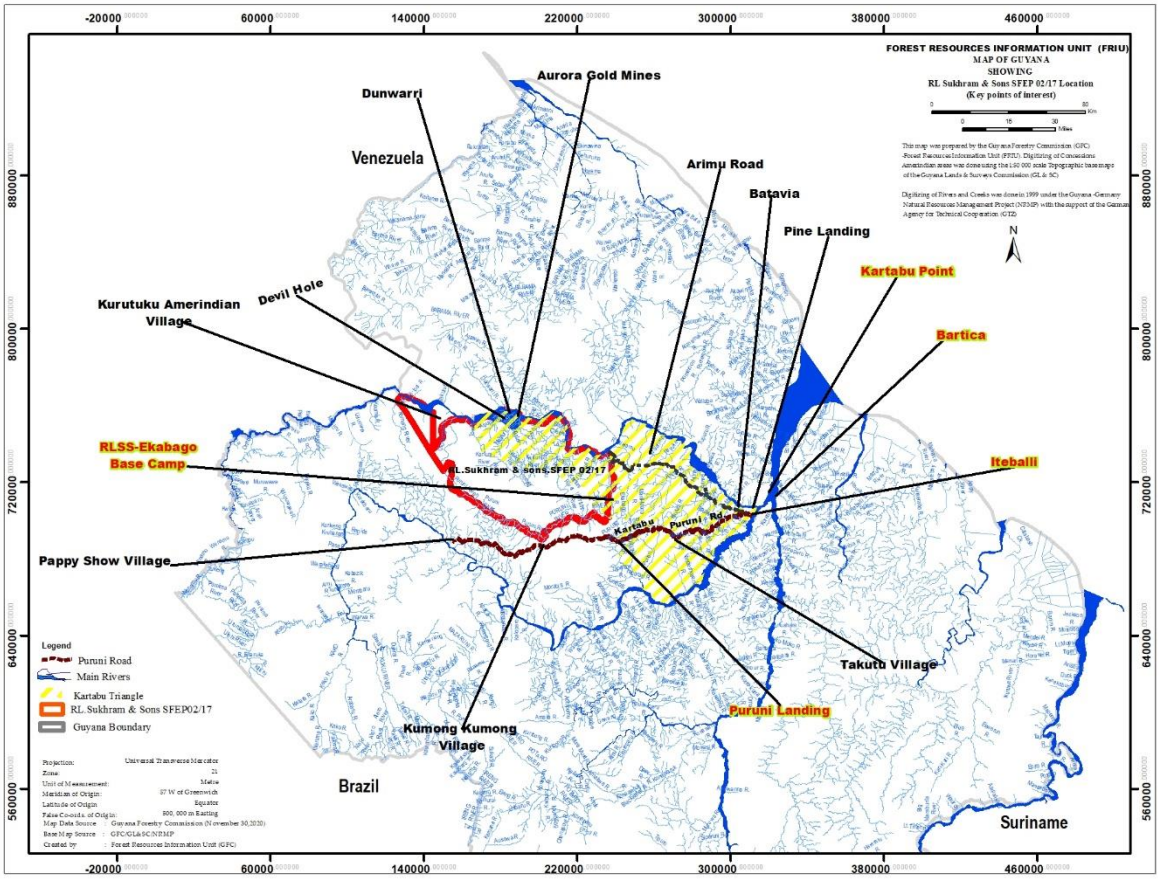


Figure 27: Map showing key areas/communities/features of interest around SFEP 2/2017.

2.4.4 Public agencies

More prosperous expanded villages will attract more public services and the GOG is likely to allocate more resources for the development of those communities. For example, Puruni Landing, in just the past three years have acquired a MEDEX facility, a Police Outpost and a GDF Outpost. GGMC has a large station at Puruni Landing and the GFC is expected to set up three outstations in the Puruni District.

RLSS estimates that its operations will lead to a 20% increment in the volume of business in the Kartabo Triangle. That should be enough to persuade the MOPW to expend more sums annually on KPR road works. The construction of a bridge across the Puruni River, in the vicinity of Puruni Landing is still under consideration.

3.0: PROJECT ALTERNATIVES

3.1 Overview

The area embodied within SFEP 2/2017, is in a relatively remote geographic area of Guyana. The area is devoid of communities and road infrastructure. The upper Cuyuni River and the upper Cuyuni River are not suitable for large scale commercial movement of goods due to rapids, rock bars and sand bars. There has been itinerant mining in the area for many years but it was only in 2015 that a large scale mine was developed at Aurora. The Cuyuni-Puruni watershed is not part of any major development such as the Amaila Falls Project. The only protected areas in the area are those associated with large scale forest concessions.

In considering regional development options, GL&SC has classified the area under 'North Western Guyana' that includes Region 1 and part of Region 7 (GL&SC 2013). GL&SC went on to report that the area is classed *generally* as poor agricultural land on rolling to hilly terrain, save for valleys…in the Cuyuni, Puruni and Mazaruni valleys.

Currently the area is classified as 'a major mining area with almost the whole area covered by prospecting leases' (GL&SC 2013).

3.2 The case for no action-that is no forest concession issued

If no forest concession were issued over the target area of 432, 262.59 ha, mining would continue based on mineral licenses already issued. Mining operations would contribute to forest degradation with loss of potential revenue for Government and massive waste of merchantable timber. RLSS believes that it is only a matter of time before a mining enterprise initiates heavy investment in the area.

3.3 The case for forest concessions

*"Governments can use their **forest capital** to meet socio-economic and environmental objectives, such as generating foreign exchange, creating employment, maintaining ecosystem services and earning government revenue"* (FAO, 2018).

The GFC collects revenue from concessionaires through a combination of area based charges and volume of timber extracted.

"In many tropical countries, the large size of timber production forests represents an opportunity to complement existing protected areas systems, providing critical habitat for wildlife (vertebrate and invertebrate fauna) and native plant species. Although production forests are not a substitute for nature preserves, they provide a complementary role when sustainably managed for both timber and non-timber resources" (Fimbel, Grajal, & Robinson, 2001).

Loggers must set aside biodiversity reserves which eventually become national assets, and an integral part of the national system of protected areas. In the case of the Cuyuni-Puruni District, the proposed biodiversity reserve (see Annex XIX) is the only protected area in the district.

Loggers create micro-villages, following which the Government adds social services. For example, DTL set up a village at Mabura, then the Government subsequently moved to set up a school, medical centre and police station there.

3.4 Peculiarities of local forest resources

Local forest resources are characterised by many species of trees of various ages and sizes distributed randomly, and not all of which are currently *merchantable*. In addition, there are standards for the minimum size (diameter) of trees to be felled, the maximum volume of timber that can be felled per hectare, and restrictions on sites where trees could be felled. This implies

that local loggers follow the *selection system* (not a *clear-felling system*) for harvesting trees and therefore there will always be (residual) trees in logged over forests.

3.5 Peculiarities of logging activity

Merchantable tree selection is based on stem condition, dbh, species, and site conditions. Further, looking elsewhere in the local sector, loggers retrieve on average about 8m^3/ha, or less than six trees/ha. Where there is full application of RIL principles, to the extent that the timber harvest is informed by pre-harvest inventory data, directional felling is practiced and skid trails are planned, the intervention in the forest environment is minimal. Based on the residual post-harvest conditions, selective logging is generally compatible with other major stakeholders' interest such as watershed management, wildlife conservation and the conservation of biodiversity.

Road construction, road maintenance and related earthworks such as the establishment of borrow pits are the main sources of environmental impacts.

3.6 RLSS' project

RLSS's timber harvesting practices will be in line with national standards and in full compliance with GFC's COP and GFFO. More importantly, RAI's practices represent *best practices*, used across the forest sector in Guyana.

The concession area will be organized in compartments and blocks in line with local standards: logging will be cyclic, where a particular area will be subject to logging for about 20 days, then left alone….then only areas near to primary roads will continue to be impacted. ***Each year, RLSS will harvest less than 1.5% of the concession area***.

The consultants concluded that technically, RAI's operations are technologically sound and in line with what would constitute *sustainable forest management* in a natural tropical forest.

The consultants believe that the award of a forest concession to RLSS would lead to a more structured development of the upper Cuyuni-Puruni District in Region 7. A forest concession would harness considerable economic value for the Guyanese society increased timber production and subsequently increased gold production.

4.0 STAKEHOLDER IDENTIFICATION AND CONSULTATION

4.1 Overview:

Logging operations within the area embodied under SFEP 2/2017 will add to the economic, social and environmental profile of the Kartabu Triangle. Specifically, the extractive route for timber overlaps with infrastructure already used by the mining community and logging community respectively in the Kartabu Triangle. From environmental and forest conservation perspectives, a relatively intact forest concession comprising 432,262.59 hectares, will attract stakeholders' interests. RLSS' estimates that less than 400 persons[18] occupy or traverse the concession area. Indeed, a few miners and shop owners occupy lands along the left bank Puruni River and the right bank Cuyuni River respectively.

The closest Amerindian Community is Kurutuku Amerindian Village at the north-western boundary of the RLSS' forest concession. The community shares common boundaries with RLSS: however, both GL&SC and GFC have made provision for *an extended community area* and that extended area **does not** form part of SFEP 2/2017. RLSS projections are that it would take more than 20 years for its operations to approximate the boundaries of Kurutuku Village.

The area occupied by GGI at Aurora (see Figure 28, Annex XVIII) is not included in any further discussion, especially as there is **no overlap**[19] in any operational aspect and RLSS projects that it would take about 10-15 years for its operations to approximate the boundaries of GGI.

RLSS has identified the stakeholders with whom it must collaborate in the development of the concession area (see Table 7). The access road constructed by RLSS has attracted the attention of the mining community and already a few have visited RLSS' base camp on right bank Ekabago River. Staffs of GGMC and GFC respectively as well as an EPA team have visited the base camp at Ekabago River.

4.2 Consultations

4.2.1 Overview

FTCI has conducted three sets of consultations across the Kartabu Triangle in line with work done in the area for other concessionaires between 2007 and 2021: the last set of surveys, linked specifically to the proposed development of SFEP 2/2017, was conducted from March 1-10, 2021. Consultations were delayed considerably due to precautions linked to the COVID-19 pandemic.

There were formal and informal consultations. *Formal consultations* included the culling of stakeholders' concerns at scoping meetings as well as structured interviews based on a questionnaire at the more populous communities of Iteballi, Kartabu Village and Batavia Amerindian Village. Informal consultations were done at Puruni Landing, Tiger Creek Junction and Takutu: these were ad hoc meetings with individuals or small groups-already in place at landings, business establishments or at worksites. During informal surveys, the consultation was limited to sharing information on the imminent timber harvesting operations in the area and seeking feedback from the interviewee(s) on their take on logging operations in mining areas. Names were requested but interviewees decided whether they would offer their names or the names of the mining enterprises with which they were associated.

[18] This number does not include the employees of GGI's AGM.

[19] GGI has an air strip on its' property' and it has a private road on right bank Cuyuni River, a barge crossing at Tapir, left bank Cuyuni River, and then the company uses the *Buckhall Road to its Administrative Base at Buckhall, left bank Essequibo River*

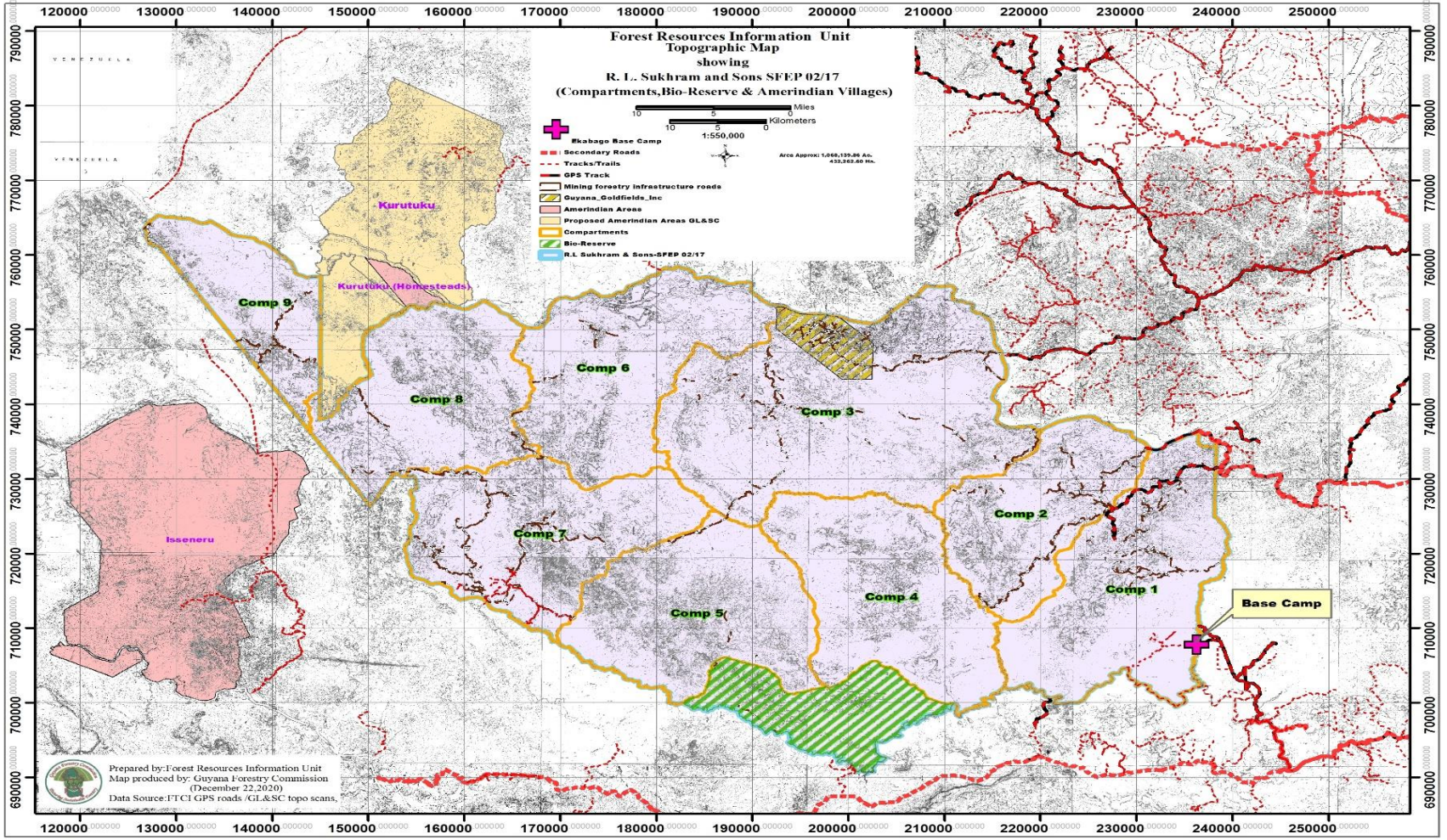


Figure 28: Map showing properties held Aurora Goldmines Inc. and Kurutuku Village respectively.

Table 7: Core stakeholder communities for RLSS' Operations.

#	STAKEHOLDER	INTEREST
A	**Public agencies**	
	• EPA	Environmental protection
	• GFC	Forest resources conservation
	• GGMC	Sustainable mining
	• GLSC	Land management
	• MOAA	Amerindian Issues
	• MOPW	Maintenance of the Kartabu-Puruni Road
	• GPF	Public security
	• PAC	Conservation of biodiversity, wetlands
B	**Environmental NGOs**	
	• WWF	Mining practices; conservation of fauna
	• CI	Mining practices, forest conservation, wildlife conservation
	• GGDMA	Sustainable mining development
	• APA	Land titling issues at Batavia, Kartabo Point
C	**Logging community**	Shared approach to the management of the KPR corridor; collaboration on environmental management.
D	**Mining community (general)**	Shared approach to the use of RLSS' access road and concession based roads.
E	**Mining community**-	
	• Puruni Landing	Shared approach to the use of RLSS' access road and concession based roads.
	• Tiger Creek Junction	Shared approach to the use of RLSS' access road and concession based roads, road corridors
E	**Indigenous communities**	
	• Kartabu Village	Conservation of livelihood values
	• Batavia	Conservation of livelihood values
	• Kurutuku	Conservation of livelihood values
F	**Business Community**	Collaboration on environmental management

4.2.2 Public agencies

Most of the concerns of public agencies and environmental NGOs, and Amerindian NGOs were articulated at a scoping meeting at the EPA on May 8, 2018. These concerns were considered in the elaboration of the TOR for the ESIA process and report.

Public officers, including Regional Officials at Bartica, were duly consulted (see Annex XXI). There were no categorical rejection of timber harvesting operations in the area. In fact, the general opinion was that more economic development in the Kartabu Triangle will be an advantage for all agencies.

4.2.3 Mining Communities

4.2.3.1 Mining community: Riverine Communities/Business community

Mining communities develop from the association of miners and businesspersons. The businesspersons vend rations, fuel, mining supplies and clothes to miners in transit. Business persons also trade in gold.

Opportunistic informal discussions were the norm when consulting with miners or business persons at far-flung landings. Most miners displayed disinterest in general discussions on the one hand but showed intense interest in any talks about new roads. Interviews were restricted to 30 minutes due to concerns about the COVID-19 Pandemic. Occasionally the consultants met with friends or relatives in the area and in those instances, the consultants were able to garner more credible information.

4.2.3.2 General concerns about mining activity re SFEP 2/2017

The vagaries, modalities, and consequences of mining practices in Guyana have been addressed by several experts (Lowe, 2006; Hammond, et al, 2007; Bulkan & Palmer, 2016; and APA-FPP, 2016).

In the context of RLSS's project, the primary challenges with mining are as follows:

a) Each miner has his own timetable for the development of his mineral license and ***there is no overarching exploration development plan with which RLSS could align its operations***;

b) There is currently no post mining rehabilitation plan and mining pits are simply abandoned (see Figure 29)

Figure 29: Typical post mining situation seen around a few areas within SFEP 2/2017.

c) It is relatively easy to discuss issues with staffs of GGMC or GGDMA staffs but not the 'small' miners themselves. Generally, the mining community expressed a willingness to work along with loggers. The general problem however is that in practice it is difficult to organise meetings for itinerant miners and so it is difficult to get them to commit to any obligations or agreement. *For example, at a lively engagement with miners at Tiger Creek Junction on March 6, 2021, a group of small miners indicated that they would support any development in the area and they prefer to see logging done in mining areas rather than witness the massive waste of merchantable timber on mining concessions; however they refused to allow the team to record their names*.

RLSS is however encouraged by initiatives of GGMC (see Figure 23), including the development and dissemination of Codes of Practice, including the *Draft Occupational Standards Codes of Practice on Environmental Management.* (GGMC's initiatives provide windows of opportunity for RLSS's collaboration on environmental awareness and education for miners).

4.2.4 Indigenous Communities

4.2.4.1 Overview

There is only one Amerindian Community in the vicinity of the concession, **Kurutuku Amerindian Village** at the north-western extremity of the concession area, SFEP 2/2017. Batavia Amerindian Village lies at least 120km from the concession area, however the community is situate near to Pine Tree Landing where RLSS will maintain a large log depot and wharf, and where there will be at least tug and barge trips on a 10-12 day cycle.

It was challenging to reach Kurutuku: the consultants did not want to confirm a visit to the community unless transportation were guaranteed; the converse was also true, the consultants did not want to just go to Kurutuku with a rented boat and then not find the Toshao et al. The other challenge is that there is no village centre at Kurutuku……everyone is scattered over the current village area and it takes a few days to organise a meeting. *(Meeting with individual households was not considered due to the COVID-pandemic, the time taken to traverse the area and the cost for renting a boat for about one week).*

During a visit to Dukwarri, upper Cuyuni River on September 27, 2020 the consultants resolved to go to Kurutuku for at the minimum, a scanning visit, however they could not find a captain who was willing to take them there. (The captain from Dukwarri who used to do that run-an ex-GDF soldier nicknamed Rambo, who had taken an FTCI team to Dukwarri on a GPS training exercise a few years ago, migrated to Bartica).

Eventually the team relied on a publication by the APA (APA et al 2019) to garner information on the community.

(Incidentally, the fear factor sets in as one leaves Dukwarri and approaches the border with Venezuela. The consulting team never exceeds four persons and no one carries a firearm. Bandits and fugitives from both the Guyanese and Venezuelan jurisdictions respectively frequent the upper Cuyuni and Upper Puruni Areas. It is for this reason that many boat captains are reluctant to go beyond Devil Hole, Cuyuni River).

4.2.4.2 Communities-Kartabo Triangle Batavia, *Kartabu Point*

The consultants conducted consultations with Iteballi on March 2, at Kartabu Point on March 3, 2021 and at Batavia March 4, 2021(see Annex XXI**).**

All the communities were essentially in favour of economic development and there were no major objections to RLSS' proposed logging project, especially as RLSS' timber harvesting operations will not occur in their vicinity. In the case of Batavia, residents have collaborated with RLSS' current operations near Batavia and they enjoy a sound working relationship. Batavia residents intend to capitalize on employment opportunities with RLSS.

There were some general concerns about the needs for predictable pay dates for employees of timber enterprises. (Most of the concerns also dealt with logging trucks traversing Iteballi Community, but these were not applicable to RLSS proposed logging operations).

4.2.4.3 Other communities

During period March 5-10, 2021, informal consultations were conducted along Puruni River, Puruni Landing, Tiger Creek Junction and Takutu 'Village'.

All miners were in favour of the logging operation: they believed that logging roads would create new opportunities to access 'productive' mining areas and create new routes for critical mining inputs such as fuel to the upper Puruni River district, beyond Paiyuka Falls. They all expressed a willingness to work with RLSS and indeed any other developer.

(Unfortunately, the members of the GDF, Guyana Police Force and GGMC had just arrived at Puruni Landing on transfer and they were all trying to settle in).

Note that only residents at Takutu will be impacted directly by RLSS timber flows along the KPR. Residents of Takutu are used to logging trucks (from holders of large forest concessionaires such as WTTCL, TPL and JSLY) and so far they haven't had any major problems. Of course, even when RLSS starts production, RLSS vehicles will comprise about 5% of the number of vehicles traversing Takutu Village on a daily basis.

4.3 The way forward

In planning for stakeholders' issues in the management of the forest concession, a stakeholder map (see Table 8) was prepared and in addition detailed stakeholder analysis is set out in Table 9).

Table 8: Stakeholder map for RLSS' Project, SFEP 2/2017.

POWER→		
	Disinterested Stakeholders: FMP, AOP, other reports available for scrutiny)	**Extremely interested stakeholders: (Documents –FMP, AOP, other reports provided for scrutiny)**
	• MOPW • MOH • GGMC • GGMDA	• EPA • MNR • GFC • ENV. NGOS • EMPLOYEES, RLSS
	Disinterested parties: their interests and concerns to be monitored closely.	**Extremely interested stakeholders: information provided on request:**
	• RDC-REG 1, 7 • Logging Community • Timber Dealers • MOAA	• MOHA/GPF • Indigenous (Amerindian) Communities • Mining Community • Business Community
	INTEREST→	

Table 9: Stakeholder analysis-RLSS' project, SFEP 2/2017

#	Stakeholders	Involvement in Project	Interest in Project	Influence/Power	Impact on Project
1	MNR	Prescribes the overarching policy framework for natural resources development	Facilitating RLSS's investments in line with the national political investment framework; monitors the use of the BHR.	High interest/high power approves SFA-TSA based on recommendations from the GFC.	Supports company's investment framework; determines arrangements for the use of the BHR.
2	GFC	Direct statutory responsibility for forest concession administration	Support for sustainable forestry management and timber production	High interest/high power evaluates applications for SFA-TSA; approves FMPs, AOPs.	Monitors the company's compliance with the terms of the SFA-TSA, the COP and the GFFO. Monitors implementation of FMPs and AOPs.
3	GGMC	SFEP area overlaps with Mining Districts 4 & 5, respectively.	Supporting sustainable forest management and sustainable mining in Mining Districts Nos. 4 & 5.	Low Interest/High Power: Mitigates conflicts Responsible for the mining industry within the concession area	Facilitates engagements with the mining community; supports natural resources management.
4	EPA	Overarching implications for compatibility with GSDS, allied conservation goals, and applicable international treaties & conventions.	Conservation of biodiversity, ecosystems, and landscapes in Region 7; determines whether the proposed project addresses wider stakeholder concerns.	High interest, high power determines whether the proposed project addresses wider stakeholder concerns; determines whether an environmental authorization may be issued.	Monitoring implementation of environmental management (plans).
5	Environmental NGOs-CI, WWF	National and regional scale initiatives on forest conservation and climate change mitigation.	Sustainable mining & sustainable forestry practices respectively	High interest, high power: considerable advocacy in the natural resources sector (in Guyana and abroad).	Informal oversight of natural resources management across the Guiana Shield.
6	Miners, GGMDA	Shared use of the concession area and the BHR.	Unrestricted, enhanced access to their claims or mineral licences on the concession area	High power, Low interest: Disinterested in logging, just want to promote their own business.	Could potentially stymy RLSS's access to some timber resources; shared use of RLSS's logging roads is a major administrative burden
7	Public Agencies (MOPW)	Regional scale public road network.	The use of the BHR and allied linkages to Karrau, Tapir Landing and environs, Upper Waini, etc.	Low interest/High power; MOPW has overall responsibility for hinterland road networks	Sets standards for road construction/maintenance and the application of a toll structure for road use.
8	Public Agencies-MOH	Management of critical health hazards in rural areas.	Monitoring health hazards in the logging & mining industries, respectively.	Low interest/High Power: major interest in health matters generally.	RLSS will be expected to provide for the accommodation of health teams during MOH's extension services to the general area.

#	Stakeholders	Involvement in Project	Interest in Project	Influence/Power	Impact on Project
9	Public Agencies-MOHA/GPF	Oversight of security issues	Maintenance of law and order at Aranka-historically, a community notorious for criminal behaviour.	High interest/Low Power: the actions of the agency will have little impact on the project	Support for checkpoints the monitoring of unlawful activities
10	Regional Administration, Region #7	Regional development: coordination of regional initiatives on health, sports, etc.	Employee data, investment levels. Ensuring that regional initiatives reach RLSS's employees.	Low interest/Low Power: helps determine which projects are a priority	RLSS will be expected to support regional initiatives as part of their CPR and to accommodate regional teams on (business)
11	Logging Community	Shared use of roads infrastructure	Shared environmental management, especially in relation to the use and maintenance of the BHR	Low interest/Low Power; valuable ally in fostering sustainable forest management.	Co-mitigation of applicable environmental challenges.
12	Businesses-vendors, transport services.	Expanded business opportunities	Business opportunities	High interest/Low Power: RLSS's business is expected to generate forward and back economic linkages	The business community will offer services to employees that RLSS will not…. but worker welfare is vital to RLSS
13	Employees	Execute the project, and the environmental plans	Skills development, economic benefits, experience	High interest/High Power: RLSS will depend on their support to meets its economic targets and its environmental obligations.	Various-cost control, production levels, compliance with GFC'S prescriptions, etc.
14	Regional communities	Source of knowledge, skills set	Economic benefits	High interest/Low Power: RLSS's business is expected to generate forward and back economic linkages	Economic and political support
15	Regional & urban timber dealers	Expanded timber trade, business opportunities.	Expanded timber trade, business opportunities.	Low interest/Low Power: demand and supply modalities for timber	Project feasibility drives competitive behaviour.

5.0: LEGISLATIVE AND INTRODUCTORY FRAMEWORK

5.1 The natural resources sector

This section relates the suite of policies, legislation, standards, and guidelines applicable to the natural resources sector.

Guyana is endowed with considerable natural resources, including a diversity of forest resources. The importance of the conservation of local forest resources is reflected in the provisions of the Constitution and diverse ancillary policies, legislation, and standards across the natural resources sector. Several public agencies are involved in the management of local forest resources (see Figure 30)[2021]. In addition, NGOs OR CIVIC groups and communities are routinely consulted about the development of sectored initiatives.

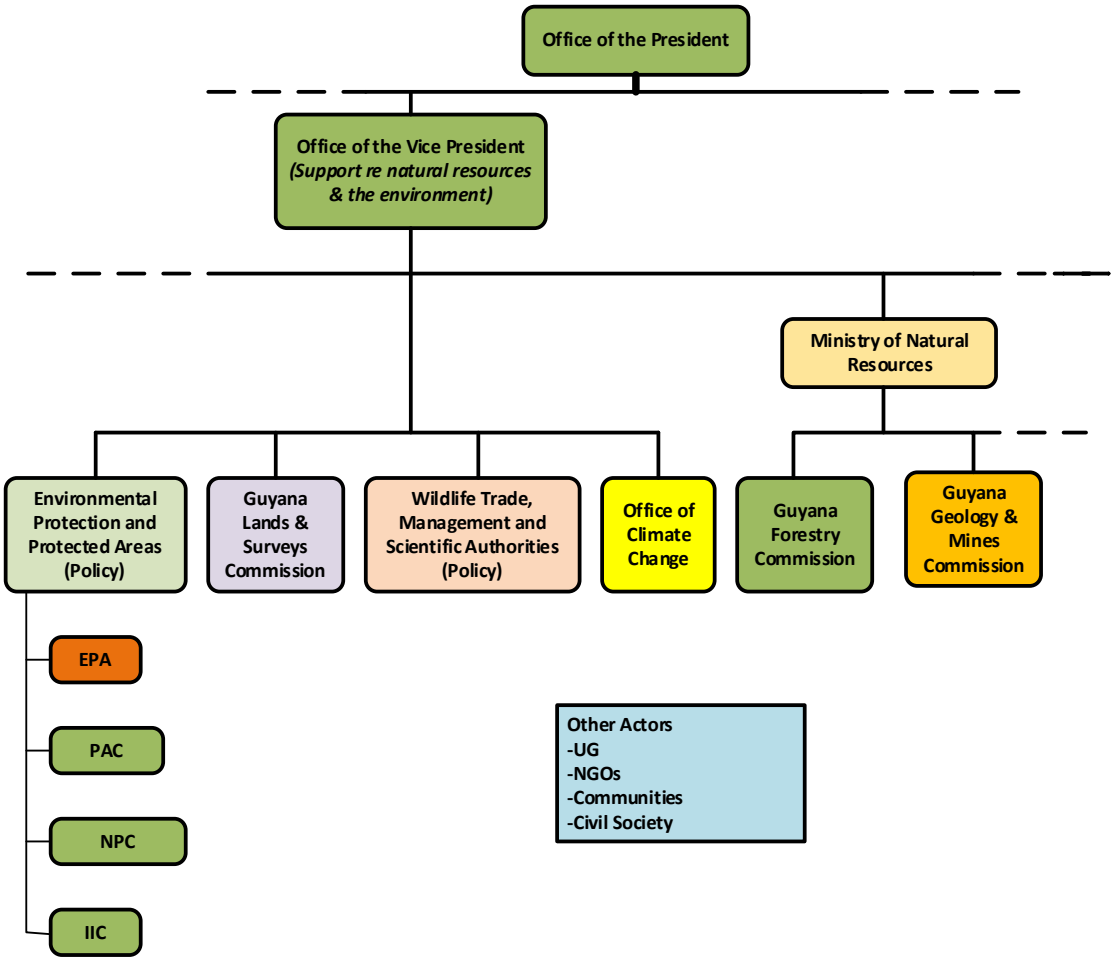


Figure 30 : Chart showing the core organizational framework for the natural resources sector.

Major drivers of recent changes in the forestry sector were the overarching LCDS, GSDS2040 and the FLEGT-VPA between GOG and the EU. Other drivers of change emerged from

[20] The chart is based on The Official Gazette 133/2020 of Friday, September 11, 2020. (Legal Supplement B-Constitutional Appointments).

[21] On November 8, 2020 the Department of Public Information reported that Vice President Hon Bharrat Jagdeo said that the Department of Environment and the Office of Climate Change would be merged to form a Department of Environment and Climate Change.

engagements with FAO, ITTO, ACTO, the NGO community, and bilateral arrangements such as that between GOG and (the Kingdom of) Norway.

RLSS keeps abreast of developments in the natural resources sector primarily through direct engagements with the GFC, regular scanning of the websites for public agencies and for NGOs, and review of applicable content in the local newspapers.

5.2 Overarching frameworks

5.2.1 The Constitution of Guyana

Article 36 of the Constitution of the Cooperative Republic of Guyana Act (1980) is the primary basis for the environmental initiatives across the entire natural resources sector by prescribing the following: *'In the interests of the present and future generations, the State will protect and make rational use of its land, mineral and water resources, as well as its fauna and flora, and will take all appropriate measures to conserve and improve the environment'.* The provisions of the Environmental Protection Act, 1996 and supplementary legislation in 2000, among others, lead the translation of the provisions of the Constitution into practical measures.

5.2.2 National Environmental Action Plan (NEAP) 1994 (GOG 1994).

The major objective of the NEAP is to identify major (emerging) environmental problems and to formulate appropriate **policies** to manage them.

This ESIA study is consistent with the general aims of the NEAP1994, including the following:

a) Assure all people living in the country the fundamental right to an environment adequate for their health and well-being;

b) Achieve a balance between the use and conservation of the nation's resources to meet the needs of economic development and improved standards of living;

c) Ensure that, where environmental damage occurs, remedial action will be taken with the cost being covered by those responsible for causing the damage;

d) Conserve and use the environment and natural resources of Guyana for the benefit of both *present and future generations*, based on the principle of the exercise of sovereignty;

e) Maintain ecosystems and ecological processes essential for the functioning of the biosphere to preserve biological diversity and to observe the principle of optimum sustainable yield in the use of renewable natural resources and ecosystems, both on land and the sea;

f) Rehabilitate damaged ecosystems where possible and reverse any degradation of the environment. Ensure prior environmental assessments of proposed activities which may significantly affect the environment;

g) Ensure that conservation is treated as an integral part of the planning and implementation of development activities;

Due to heightened environmental awareness, public interest in sustainable development, and stringent environmental protection laws and regulations, RLSS is passionate about forest conservation and allied areas such as the conservation of wildlife.

Further, RLSS is cognizant of the fact that the management of forestry resources has been reinforced by the UN driven SDG 15 which aims to 'protect, restore and promote the sustainable use of terrestrial ecosystems, sustainable manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss'.

According to the UN, technology will help to address the challenges for sustainable forestry in the 21st century[22]. Thus, RLSS has conducted research and has noted that the trend in literature shows that ICTs have been used two key areas for forest management: firstly, mapping and monitoring of forest resources and environmental threats, and secondly, raising awareness of the need for sustainable forestry practices[23].

Further RLSS has noted studies which showed that ICTs have been used effectively forest management (Castren and Pipai 2011); (Jacob, et al. 2013).

Thus, in light of this, RLSS's operations will be based on the use of ICT and RIL principles and will in effect comply with established standards and guidelines on sustainable forest management that emphasizes planning of all forest interventions and machine use. RLSS is also fully committed to compliance with all national standards, including those set out in GFC's COP.

To ensure this is accomplished, RLSS will establish an in-house GIS/RS department that will collaborate with various land-use agencies to compile and build up a functional GIS/RS database for use in its logging operations. RLSS will invest in UAV technology to map and monitor the forests at every stage of the logging operation. All data collected will be shared with the GFC and EPA.RLSS will utilise the information gathered from the GIS/RS database to ensure that the company is in full compliance with the GFC log tagging and tracking system which will be integrated in the GIS database.

5.2.3 The National Biodiversity Strategy and Action Plan (NBSAP), 2012-2020 (GOG 2014).

The NBSAP, 2012-2020 was developed by the MNR and the EPA in partnership with several stakeholders, with funding from GEF. The NBSAP seeks to align Guyana's initiatives on biodiversity with those of regional and global partners.

In the context of this ESIA report, priority areas for action set out in the Plan include:

a) Expansion of protected areas to meet the goal of 17% of terrestrial area in-situ conservation in legal protection by 2020. To ensure that these areas would also be effectively managed, capacity would be built for planning, establishment, and management of protected areas. A National Protected Areas Trust Fund would be established which is expected to contribute significantly to the financial sustainability of these protected areas.

b) Reviews of existing legislation and outcomes of Environmental (and Social) Impact Assessments (ESIAs) and their roles in protecting biodiversity.

c) Compilation and consolidation of biodiversity data from local, international, and web-based sources including traditional knowledge and development of a database system for biodiversity which makes data freely available to users.

[22] https://unstats.un.org/sdgs/report/2016/goal-15

[23] FAO and UNEP. 2020. The State of the World's Forests 2020. Forests, Biodiversity and People. Rome.; https://doi.org/10.4060/ca8642en

RLSS expects that any lessons learnt from the management of its biodiversity reserve can support national initiatives. On acquisition of a TSA, RLSS will set up a network of permanent monitoring stations within its biodiversity reserve.

RLSS recognizes and has noted the issue of illegal logging and the significance of its impacts on forest degradation, climate change, and habitat loss, and community livelihoods. In collaboration with the GFC, RLSS will establish a GIS/RS database to collect and analyse geospatial data for use in monitoring land use activities within the concession area. RLSS will build in-house capacity using best practice guidelines and technology to detect and prevent any illegal harvesting and land clearing activities not sanctioned by the company and will utilise UAV technology to map and to monitor the forest concession.

5.2.4 The National Land Use Plan (GL&SC 2013)

The National Land Use Plan (NLUP) provides *'a strategic framework to guide land development in Guyana'* and is distilled from several national policies and strategies that have a direct relevance for land use and land management. The NLUP further attempts to *'provide for the co-existence of multiple land uses and provide clear, implementable guidelines for making decisions on multiple land uses and mutually exclusive, competing land uses.* The NULP is administered principally by the Guyana Lands & Surveys Commission (see Section 5.6.1.6).

RLSS believes in a multiple-use approach to natural resources management. Specifically, RLSS has no specific objections to mining. RLSS will always try to coordinate the development of parcels of forest resources so that its objectives and those of the miner(s) can move forward amicably.

Further RLSS recognizes that mining operations trigger multiple impacts, both positive and negative. Examples of positive impacts include road upgrades, access to a greater range of health services, upgrades to community facilities and greater education and employment opportunities for surrounding communities. Potential negative impacts range from increased crime rates to higher cost of living and respiratory health risks caused by dust pollution.

In order to address negative impacts, RLSS plans to conduct a strategic impact assessment to identify and assess environmental, social and health impacts and other land-use activities within the forest concession. The outcome of the strategic impact assessment will be utilised to ensure that management and mitigation strategies minimise adverse impacts and enhance the benefits of surrounding communities and the environment.

In collaboration with the GFC and GGMC, RLSS will compile the location of all allocated and active mining concessions/lease within the concession area. This will inform the development of a comprehensive logging and mining plan which will be submitted to GFC for approval. New roads and trails will be mapped and shared with MNRE, GFC, GGMC and EPA.

5.2.5 The LCDS, 2013 (GOG 2013)

The Government of Guyana launched a *Low Carbon Development Strategy* (LCDS) on June 8, 2009. The strategy elaborates Guyana's vision for promoting economic development while at the same time combatting climate change. The context for the LCDS included deliberations on climate change and its consequences for Guyana's low-lying coastland, the fact that Guyana's forest resources could be used to mitigate climate change, and the dilemma that with its current development goals, Guyana cannot simply keep all its forest resources intact. Essentially, Guyana was willing to put measures in place to conserve its forests providing that it could realize alternative options for meeting its developmental needs. As a policy instrument, the LCDS was intended to provide the framework in which all interventions in local forest resources occur.

In November 2009, the Governments of Guyana and of Norway signed an MOU that entailed Norway contributing the sum of US$ 250 million to the Government of Guyana provided that the *avoided deforestation rate for Guyana* can be kept within agreed values for a specific period. After a series of consultations, revised versions of the document were published in May 2010 and March 2013.

Many aspects of the LCDS, 2013 has been subsumed by the GSDS, 2040 (see Section 5.3.7)

RLSS is aware that the recent development of oil and gas sector will bring considerable development and benefits to Guyana. RLSS notes that the recent commitment by GOG to reinstitute an expanded LCDS to include wider environmental services, water resources management, climate resilience, biodiversity, renewable energy, and the marine economy.

Guyana stands to earn substantial revenue and benefits from Payments for Ecosystem Services (PES). In light of this recent development, RLSS commits to the development and implementation of policies and best practice principles that will ensure the conservation and sustainable management of the forest resources within concession areas.

5.2.6 National Development Strategy, 2001-2010 (GOG 1997)

The Ministry of Finance held responsibility for the NDS 2001-2010. The strategy attempted to identify the entire array of socio-economic factors that stymy the development of Guyana. It represented the sum of consultants' efforts firstly to collate and analyse critical statistics for each sector and secondly, to present detailed, objective, and overarching policy measures to achieve national economic development.

The NDS, 2001-2010 is organized into thematic areas; within the thematic area '*the productive sectors'*, Chapter 30 deals with *Forest Management.*

Many of the ideas articulated in the NDS have been the basis for other developments such as the NLUP2013, the NEAP1994, and *recent* sectored (forest) policies.

5.2.7 Environmental Protection Act, 1996

(Cap. 20:05), The Environmental Protection Act, 11 of 1996 revised by Act 17 of 2005 prescribes the basic institutional and regulatory framework within which all activities that impact on the natural, social, and cultural environments are assessed. The Environmental Protection Agency (EPA) is mandated under the Act to make assessments and to issue environmental permits prescribing conditions for developmental activity. The EPA has established guidelines for conducting and reviewing environmental impact assessments; the guidelines explain provisions of the Act in relation to the environmental impact assessment procedure and outline the level of detail required in the environmental baseline study, impact assessment and the environmental impact statement.

5.2.8 Green State Development Strategy (GSDS), Vision 2040

In April 2017, the Government of Guyana, with support from UNEP, launched the Green State Development Strategy (GSDS) to pilot the development of a *green* economy. Since then, the document evolved into the GSDS: Vision 2040, published in May 2019.

The GSDS Vision 2040 "provides a comprehensive development policy to guide public investment over the next 20 years. It captures a holistic view of the country's social, economic, and environmental well-being in line with the Unites nations Sustainable Development Goals (SDGs). It aims to foster sustained economic growth that is low carbon and climate resilient (consistent with the LCDS) but also promotes social cohesion, good governance, and careful management of finite resources in accordance with green economy principles".

Section 2.3 Development Objective B addresses *'Sustainable Management of Natural Resources'.* There is the recognition that conflicts routinely arise from activities in the extractive sector. The document also indicates an *'immediate concern' about the loss of forests from mining activity,* and looking ahead, the loss of forests from factors including *'expanding industry, commerce, infrastructure and settlements'.* There is the assertion that henceforth *'economic development must be considered alongside social development, and source conservation practices should be adopted at every scale wherever a planning-design-implementation cycle exists within the public, private and civil space'.*

Section 2.3.2 contains the goal that 'by 2040, Guyana preserves its natural capital through institutionalized and prudent management of natural resources (land, forests, minerals and water) for the purposes of meeting the objectives and intent of Sustainable Development Goal #15 (land use and biodiversity)

RLSS believes that its own passion for sustainable forest management aligned to prescriptions in a SFA-TSA agreement, especially in relation to the COP and GFFO, and GFC led approval of its FMPs and AOPs throughout its production cycle will ensure that RLSS's practices are fully aligned with the GSDS-Vision 2040.

Further, RLSS recognizes that the climate change issue has become an important part of development planning given the recent commitment by GOG to review and renegotiate a new LCDS regime that will bring more funding and initiatives for Guyana. This will open up opportunities in emerging international markets for forest climate services. Importantly, however, the LCDS of itself will be expanded to include wider environmental services, water resources management, climate resilience, biodiversity, renewable energy and the marine economy.

Thus, given the commitment by GOG to revise and update the LCDS, RLSS will ensure that vulnerable ecosystems within the allocated area that are important for the provision of ecosystem and environmental services are preserved through the development of suitable guidelines and by adhering to GC's established guidelines for SFM

5.2.9 Environmental Protection Regulations

In 2000, under the EPA Act, regulations on Water Quality, Air Quality and Noise Management (among others) were established. These pollution management regulations were developed to prescribe standards for developmental projects during construction and operation.

5.2.9.1 Environmental Protection (Water Quality) Regulations (Reg.6/2000)

These regulations require, among other matters the registration and environmental authorization by any person whose construction, installation, operation, modification, or extension of any facility cause the discharge of effluents. Guidelines on the discharge of effluents and disposal of waste are detailed in these regulations. A Standard for water quality has been developed by the Guyana National Bureau of Standards[24]. The provisions of these regulations have been considered during baseline studies conducted by RLSS.

RLSS will collaborate with the EPA to monitor water quality at the *permanent monitoring stations* it will operate throughout the life of the concession. Water samples will tested by recognized laboratories as mandated in the regulations. RLSS will establish a database to containing the location of sample stations and the corresponding water quality results. Information from the data base will be shared with the EPA, Hydro-meteorological Department and other GOG agencies involved in the management of fresh water resources in Guyana.

[24] See GNBS GYS 262: 2004: Specification for drinking water.

5.2.9.2 Environmental Protection (Air Quality) Regulations (Reg.9/2000).

The requirements for registration and environmental authorization by persons with facilities that emit air pollutants from any process into the atmosphere are outlined in these regulations. Elements related to parameter limits on air contaminants and emission samplings are also stated in the regulations. *The EPA and the GNBS are currently developing air quality standards.* RLSS will use RIL practices which emphasize planned interventions in the forest environment and will use fully functional mechanical equipment to manage air quality in the forest environment.

Further RLSS has noted the parameter limits as outlined in the regulations and will therefore develop a comprehensive database that will be populated with air quality measurements collected at various stages of its logging operations. This information will be shared with the EPA and will be made available to any other GOG agency for scrutiny. The data collected will be analysed to identify any inherent trends and patterns that may be of significance as required by the regulations.

5.2.9.3 Environmental Protection (Noise Management) Regulations (Reg. 8/2000).

The EPA is responsible for the establishment of standards for permissible noise levels in industry, construction, and other areas. The categories for which permissible noise levels are to be fixed by the EPA were identified as follows: Residential, Institutional, Educational, Industrial, Commercial, Construction, Transportation and Recreational

The GNBS, in collaboration with the EPA, has published guidelines (see Table 11).

RLSS will ensure that all its machines are maintained properly to keep noise levels within the manufacturers' standards and the local standards. Normally, no work will take place after 18:00 hrs. However at least one generator will be used at night at the base camp on the concession.

RLSS will develop a register and comprehensive database that will be populated with noise quality measurements collected at various stages of its logging operations. This information will be shared with the EPA and will be made available to stakeholders for scrutiny. The data will be analysed to ensure that noise emanating from various stages of the logging operation are within the required parameters prescribed by the regulations.

Table 10: GNBS' Guidelines for Noise Emission into the Environment (GNBS: GYS263:2010)

Categories	*Daytime (06:00h-18:00h) Limits in dB (A)*	*Night-time (18:00h-06:00h Limits in dB (A)*
Residential	75	60
Institutional	75	60
Educational	75	60
Industrial	100	80
Commercial	80	65
Construction	90	75
Transportation	100	80
Recreational	100	70

5.2.9.4 Environmental Protection (Authorization) Regulations (Reg. 10/2000, Reg. 14/2005)

These regulations cover the legal basis and modalities for the application and receipt of an Environmental Authorization, the management of the conditions under which the Authorization is granted, and the conditions under which the Authorization may be renewed.

This ESIA Report is a direct consequence of Section 3 'Environmental Impact assessment' of the Environmental Protection (Authorization) Regulations 2000, 2005.

5.2.9.5 Environmental Protection (Hazardous Waste Management) Regulations (Reg. 7/2000, Reg.13/2005)

These regulations cover the management of (hazardous) substances that may modify the environment in a negative way. RLSS will take due care to avoid any form of potential contaminant within the forest environment. Specifically, only petroleum products (fuel, oil, grease) and OTC drugs for the combat of mosquitoes at the base camp and at forward camps are contemplated for use on the concession area.

5.3 Forestry Policy & Forestry Legislation

5.3.1 Forest Policy, and applicable standards and guidelines

5.3.1.1 The National Forest Policy Statement, 2018 (GFC 2018).

The NFPS, 2018 is projected to cover the period 2018 to 2028. GFC is the lead agency for the implementation of the NFPS 2018, however actual implementation is carried in partnership with other stakeholders (see Section 5.5.1.2). The overall objective of the NFPS, 2018 is to *conserve, protect and utilise the State's forest in a manner that ensures social, economic, and environmental attributes and benefits, are sustained, and enhanced for current and future generations*.

The NFPS, 2018 is the continuation of the various forest policies used by the (Forestry Department) and subsequently the GFC since its inception). The policy includes forest resourced based considerations set out in the LCDS, GSDS: Vision 2040 and other policy documents. The NFPS was developed in 1997 and was later revised in 2011 in response to the publication of the Low Carbon Development Strategy (LCDS). However, with the development of the Green State Development Strategy (GSDS) a further revision of the Policy was made in 2018 after a series of multi-stakeholder consultations countrywide.

The NFPS, 2018 reflects GFC's a focus on all the values of forest resources rather than valuing the forest resources simply for its timber stocks.

5.3.1.2 National Forest Plan, 2018 (GFC 2018).

The National Forest Plan (NFP), 2018 complements the NFPS: the NFP comprises seventy (70) activities to operationalize and implement the overall objectives, goals, and strategies of the NFPS 2018. The NFP also outlines a performance-based framework for the goals, strategies, and activities by providing a timeframe and activity indicators for the successful accomplishment of expected outcomes. The implementation of the Plan will be facilitated by the GFC; however, due to the significant roles by multiple institutions in the Plan, the Ministry of Natural Resources and, as appropriate, the Ministry of the Presidency, will support and coordinate the planning and implementation of (non-timber) activities by other agencies.

RLSS participated in consultations linked to the NFP and will continue to support its development and implementation (by methods including providing feedback to the GFC).

5.3.1.3 Code of Practice for Forest Operations for State Forest Authorizations, 2018 (GFC 2018)

The **original** Code of Practice for Timber Harvesting, 2nd Ed. 1996 was based on FAO's Model Code of Forest Harvesting Practice and provided applicable standards for local forest conditions. The COP was revised in 2001, 2013 and 2018.

The *Code of Practice for Forest Operations for State Forest Authorisation (COP), 2018* is a gazetted document. This 2018 version of the COP is based on practical experience locally and abroad, multi-stakeholder consultations, and the need for its alignment with other forest management standards and practices, including measures developed and distilled under LCDS, GSDS and FLEGT/VPA framework.

The Code provides *mandatory* standards, on forest harvesting and allied practices for all holders of Timber Sales Agreements, Wood Cutting License, State Forest Exploratory Permits, State Forest Permissions, and Community Forestry Management Agreements. In so doing the COP aims to ensure sustainable management of the forest; keep forest activities compatible with international directives; conserve biological diversity, help forest regeneration, and protect wildlife. The COP also aims to promote enhanced productivity, sustainability, and economic viability of forest harvesting; improve living conditions and safety of the workforce; and improve relations between logging companies and local communities.

RLSS fully embraces the COP and will ensure that all its operations are fully aligned with the COP. In addition, full and continuous compliance with the GFC legality requirements and other ancillary documents and guidelines at all stages of the logging operation will ensure that the requirements for SFM are met and maintained.

5.3.1.4 Guidelines for Forest Operations for State Forest Authorizations 2018 (GFC 2018)

The Guidelines for Forest Operations for State Forest Authorisations are associated with the Code of Practice for Forest Operations (large concessions). The guideline requirements were developed based on the 2018 edition of the Code of Practice for Forest Operations (large concessions), which itself benefitted from research and practical experience, locally and abroad, over a period of 20 years. The guidelines developed were also informed by extensive multi-stakeholder consultations of the Code over the last four (4) years.

The document therefore provides **guidance** on the specific activities which the Forest Sector Operators of large concessions may undertake to comply with the principles and objectives of the COP for Forest Operations (large concessions). The guidelines are enforced by the GFC and thereby regulates any class or description of forest operations for holders of SFAs. RLSS intends to share responsibility for the sustainable development of the forestry sector by ensuring that all its interventions in the forest resources are in line with the GFFO. Thus full compliance with GFC's robust forest monitoring system and guidelines will ensure that SFM principles are maintained.

5.3.1.5 Forestry Management Plan Guidelines

The Forestry Management Plan Guidelines, first published in 1999, elaborates the basis for strategic and operational planning. Guidelines for annual plans of operational (AOP) have also been published. RLSS has used the guidelines to develop an FMP and an AOP for the SFEP. These documents were subject to heavy scrutiny and interrogation by the GFC before approval.

5.3.1.6 Environmental Impact Assessment Guidelines: Volume 5 – Forestry, 2000

These guidelines produced by the EPA and the EAB and in consultation with the GFC, provide a framework for conducting and reviewing EIAs for forestry projects in Guyana. RLSS endeavours to keep track of these requirements and all changes made from time to time. RLSS has taken note of the revised ESIA Guidelines developed by the EPA and will ensure full compliance therewith.

5.3.2 Forestry Legislation

5.3.2.1 Forests Act 2009

This Forests Act 2009 authorizes the GFC to, among other things:

(a) Grant forest concession agreements to individuals and companies to harvest timber or non-timber products or to undertake research or to carry out approved community-based activities or to generate approved forest services (including ecotourism) from defined tracts of State forests;

(b) Regulate the conveyance of timber along public roads, and timber exports;

(c) Regulate the rights and privileges of Amerindians in relation to State Forests

The Act also outlines the ownership of forest produce, offences and legal proceeding under the Act, and penalties that may arise as a result.

RLSS contributes to discussions on forest policy and forest legislation as often as the opportunities to do so present themselves.

RLSS notes that the Act provides for the protection and conservation of forests, and include measures to conserve biological diversity, protect specific trees and plants, conserve soil and water resources, and protect forests against degradation, fires, pests, and diseases. The EPA may declare specially protected areas, prohibiting any disturbance of the soil, vegetation, rivers, or creeks in any specially protected area(s). The Act also provides for the prevention of fires, the protection of trees and plants, forest conservation on private lands and provides rules for forestry operations. Therefore, one objective of RLSS' GIS/RS geospatial database is to ensure that the Company complies with the requirements of the Forests Act and Forest Regulations, respectively.

5.3.2.2 Forests Regulations 2018

The Forest Regulations No. 2 of 2018 made under the Forest Act was developed to guide the management of State Lands inclusive of the State forest, protected areas, and research areas. The regulations address the requirements and stipulations for a State Forest Authorisation inclusive of exploratory permits, forest concession agreements, use permits, community forest management agreements, transfers, and registrations.

The regulations also outline requirements for forest conservation, establishment of primary conversion plant, movement of forest products, the resale, export and import of forest products. Additionally, the regulations provide a framework for the fees, charges & levies imposed and any offences & penalties which occur.

RLSS has noted that the key requirement of the forest Regulations is to promote sustainable forestry through participation with local communities. The Regulations also provide forest conservation by formulating fire protection plans, the management of programs for protected species and the management plans for specifically protected areas with a particular focus on biodiversity.

Moreover, regarding forest management, communities are permitted to use forest resources to meet local needs in terms of income generation and economic development on a sustainable basis and with due consideration to the enhancement of environmental stability.

RLSS will ensure adherence to the forest regulations so that all activities are conducted in keeping with the legal requirements of the Country. Thus, full compliance with GFC's SFM guidelines will ensure de facto compliance with the Forest Regulations, 2018.

5.3.2.3 Guyana Forestry Commission Act, 2007

The Guyana Forestry Commission Act No. 20 of 2007 provides specifically for the establishment, organization, mandate and functions and responsibilities of the Guyana Forestry Commission.

The object of the Commission is to encourage the development and growth of forestry in Guyana on a sustainable basis.

The primary functions of the Commission include:

a) Develop, advise the Minister, and carry out Forestry Policy.

b) Research, collate, analyse, and prepare and disseminate data, statistics, and other information about forests and all aspects of forestry and forestry related jobs; and

c) To administer the Forests Act, 2009

5.4 Other Relevant/Applicable Laws

5.4.1 The Protected Areas Act of 2011

The Protected Areas Act of 2011 provides for (a) the protection and conservation of Guyana's natural heritage and natural capital, (b) the creation, management and financing of a national system of protected areas; (c) the maintenance of ecosystem services of national and global importance including climate regulation; (d) the establishment of a protected areas commission; (e) the establishment and management of a protected areas trust fund; (f) the fulfilment of Guyana's international environmental responsibilities; (g) participation in protected areas and conservation; and (h) related purposes.

The Act aims to provide for the conservation of biological diversity, natural landscapes, seascapes, and wetlands and to safeguard ecosystem services. RLSS's conservation practices will have to be aligned with the objectives of this Act.

RLSS will establish several biodiversity reserves throughout the concession in keeping with GFC's COP. This will ensure compliance with GFC SFM guidelines and systems.

RLSS intends to manage the biodiversity reserves and other freshwater ecosystems and important watersheds in a prudent manner so that they may be added to the NPAS as a means of combatting climate change.

5.4.2 The Wildlife Conservation and Management Act 2016

This 'ACT' provides for the protection, conservation, management, sustainable use, and internal and external trade of Guyana's wildlife.

RLSS will do its utmost to conserve Guyana's wildlife; the company's employees and contractors will not be allowed to hunt or fish on the concession area. RLSS intends to create a supportive mechanism cognisant of the national goals for wildlife protection whereby local indigenous villages may participate in the effective, protection, conservation, management and sustainable use of wildlife on their titled lands. Thus, any observed cases of illegal wildlife trade will be reported to the relevant authority in keeping with the Wildlife Conservation and Management Act 2016. RLSS will utilise UAV technology to monitor its forest concession and will document and report any suspicious activities to the relevant authorities.

5.4.3 National Insurance and Social Security Act 1969

The Act establishes the national insurance and social security system, which covers and protects workers. The individuals to be insured under this act by payment of contributions are sixteen (16) years to under sixty (60) years of age; both self-employed and gainfully employed. The

national and social security system provides benefits for old age, invalidity, survivors' benefits, sickness, maternity, funeral, and industrial benefits.

RLSS will ensure compliance with NIS to maintain workers contributions.

RLSS will establish a register to ensure that records of contributions and annual compliance reports will be provided to employees on an annual basis. Such records will be available for scrutiny by Labour Department (Ministry of Social Protection), the GFC and other stakeholders upon request. Records of accidents or diseases in the course of legal employment will be kept.

5.4.4 Labour Act 1942

The Labour Act 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.

RLSS is committed to ensure that all workers are paid within the confines of the law.

RLSS will collaborate with the MOL in data collection on labour and skill availability in order to recruit workers and persons who are seeking employment.

5.4.5 Occupational Safety and Health Act 1997

This act provides for the registration and regulation of industrial establishments/ operation ensure the occupational safety and health of workers. The act requires the safety of machinery and plants; provision of enough sanitary facilities and access to potable drinking water; identification of hazardous chemicals and regulation of its use and storage.

RLSS notes the requirements of an employee under the OSH Act requires employers and employees to ensure a safe work environment and for the appointment of safety committees in workplaces. RLSS will work closely with the GFC and MOL to ensure that workers' rights are protected through the establishment of OSHA committee. The company will collaborate with the inspector of Labour and medical inspector in any OSHA matters through safety and health representatives and joint workplace and health committees with defined functions and powers.

The company also notes the requirements of the Trade Union Act, 1921 which sets out the basis for the establishment and registration of trade unions in Guyana. The company intends to honour the requirements as set out under the law for employees to freely join a trade union.

In relation to hazardous chemicals, physical and biological agents, the Act requires their identification hazardous nature with appropriate inventories, and regulates their use, storage, instruction and training. Notification of accidents and occupational diseases, in case of death by accident or occupational disease are further requirements of the Act. RLSS is fully committed to comply with the law to protect and safeguard the welfare of employees.

5.4.6 Amerindian Act, Cap 29:01

The Amerindian Act provides for 'the good Government of the Amerindian Communities of Guyana. RLSS is particularly concerned with Section 3 that includes provisions for 'Amerindian Villages' and how these are defined, Sections 18 and 23 which more or less set out the modalities for communicating with Amerindian Villages and Section 33 which deals with the employment of Amerindians.

RLSS values the natural abilities and intellectual capital of Amerindians particularly in tree identification and 'bush craft' and will offer employment to any Amerindian who has attained

the age of eighteen years and who has voluntarily expressed interest in working for the company and on the concession area.

RLSS also notes the recent commitment by GOG to revise and update the Amerindian Act through consultation and utilize every opportunity to contribute to the revision of the Act[25].

5.4.7 Combating of Trafficking in Persons Act 2005

This Act is intended to 'provide comprehensive measures to combat trafficking in persons'. RLSS will not engage in any unethical behaviour in the recruitment of employees. RLSS will only employ persons who are not less than 18 years of age and who express an interest in working for RLSS via a written application, accompanied by an acceptable form of identification. For foreigners, the applicant must present evidence of a work permit issued by Ministry of Home Affairs.

RLSS will also ensure that its contractors have employees who are working voluntarily with them and who have proper enumeration packages and job descriptions. RLSS will establish a database and register to gather data on any reported cases. Any such cases will be reported to the relevant authorities as mandated by the Act.

5.4.8 Employment of Young Persons and Children Act, Cap. 99:01

This Act relates to certain Conventions relating to the employment of young persons and children. RLSS will employ persons who are not less than 18 years of age. RLSS will insist that its contractors do not employ anyone whose age is less than 18 years. RLSS will maintain a register of all employees and this register will available for stakeholders' scrutiny as prescribed by the Act. RLSS will at all times comply with the requirements of the Act and take any necessary steps to avoid human rights and environmental violations in the course of conducting its business.

5.4.9 Prevention of Discrimination Act, Cap 99:09

This Act provides for the elimination of discrimination in employment, training, recruitment and membership of professional bodies and the promotion or equal remuneration to men and women in employment who perform work of equal value, and for matters connected therewith.

RLSS is an equal opportunity employer. RLSS will employ women at its Base Camp as soon as adequate facilities are available for them. Given the hazardous nature of logging, RLSS will not employ more than 20% of its field operatives as women. From January 2022, more women will be employed mostly for record keeping, timber grading and forest monitoring tasks.

The Company will adhere to the provisions of the Act and instruments which provides for the promotion of equal remuneration for work of equal value and prohibits discrimination in employment, and protection against discrimination in other areas.

5.5 Regulatory Agencies/Departments

5.5.1 Ministry of the Presidency

5.5.1.1 Office of Climate Change (OCC)

The Office of Climate Change has direct responsibility for managing consultations and other liaison responsibilities for the LCDS. The OCC manages GOG's engagements with the Forest Carbon Partnership Facility (FCPF), the Forestry Investment Programme, and UN-REDD.

RLSS's forest monitoring officer will scan the OCC's website regularly.

[25] https://guyanachronicle.com/2020/12/13/revision-of-amerindian-act-2006-is-of-highest-priority/

The Office of Climate Change and the Department of Environment has been merged to form a Department of Environment and Climate Change.

5.5.1.2 Environmental Protection Agency (EPA)

The Environmental Protection Act provides for the establishment of the (Guyana) Environmental Protection Agency (EPA) as the principal authority for environmental management in Guyana. 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 "coordinate 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 Authorizations, 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…."

The EPA has been aggressive in fostering awareness on environmental management (EPA, 2017). Apart from environmental clubs countrywide, the agency produces a weekly article published in the national newspaper highlighting critical aspects of environmental management. In addition, it publishes a biannual magazine and a monthly news bulletin.

The EPA has recently been working with holders of SFAs-small concessions to alert them about the requirement of environmental authorizations for timber harvesting practices and the process towards achieving such authorizations.

Of course, the EPA does extension works outside the natural resources sector. The EPA's Monthly bulletin for June-July 2019 proudly proclaimed that the agency had trained 33 additional police officers in noise management.

5.5.1.3 The Protected Areas Commission

This Commission enforces the Protected Areas Act, 2011.

5.5.1.4 The Guyana Wildlife Conservation and Management Commission

This agency inter alia is the designated CITES management authority for Guyana. RLSS looks forward to liaising the Commission in any of its work on the concession area.

5.5.1.5 Guyana Lands and Surveys Commission (GL&SC)

The core function of the Guyana Lands and Surveys Commission is to survey and map the land and water resources of Guyana, to be custodians of all public lands, to administer these effectively in the national interest, and to provide land-based information to a broad range of public and private sector entities and interests.

The GFC consults with the Guyana Lands and Surveys Commission before issuing forest concession agreements. GL& SC is the authority for the determination of boundaries of the `Amerindian Villages. RLSS looks forward to working with GL&SC and MOAA to ensure the proper demarcation of the extended *Kurutuku Amerindian village* and will explore opportunities for collaboration with GFC's community MRV program.

5.5.2 Ministry of Natural Resources (MNR)

5.5.2.1 Overview

The Ministry manages the overarching initiatives to coordinate policy development for the following agencies in the natural resources sector: the GFC, the GGMC and the GGB. The MNR is expected to oversee the multiple use approach to natural resources generally and the

resolution of emerging conflicts. The MNR also helps determine priorities for hinterland road construction and toll structures; for example, the MNR, is responsible for the toll on the Buckhall Road. RLSS will provide MNR (via GFC) with biannual maps of its primary and access road network. The company will also share spatial data and information from its GIS/RS data base with MNR and other stakeholders.

5.5.2.2 Guyana Forestry Commission (GFC)

Of the 214,970 km2 of which nearly seventy-five percent is covered with natural vegetation, approximately four fifths are classified as State Forests under the jurisdiction of the GFC. The GFC is responsible for advising the subject Minister on issues relating to forest policy, forestry laws and regulations and forestry practices. The Commission is also responsible for the administration and management of all State forests. The work of the Commission is guided by a Draft National Forest Plan that has been developed to implement the forest policy. The Commission develops and monitors standards for forest sector operations, develops and implements forest protection and conservation strategies, oversees forest research, and provides support and guidance for forest education and training. The functions and responsibilities of the GFC are assigned under the Guyana Forestry Commission Act. The GFC is the institution responsible for prescribing conditions for the use of forest resources and implementing forest monitoring programmes.

The GFC works with FAO (Caribbean), UNDP, ITTO and ACTO to develop the local forestry sector, including the provision of technical assistance to loggers' associations and community-based organizations.

The GFC has been partnering with the EPA to create awareness within the forestry sector on the need for environmental management generally, the need for an Environmental Authourisation for timber harvesting practices and the process for achieving an Environmental Permit. The GFC has been partnering with its Associate Body-the FPDMC –to create awareness of the FLEGT-VPA and its implications for the sector. Finally, the GFC has been partnering with another Associate Body to provide training in RIL and other ancillary forestry practices.

RLSS keeps track of all developments at the GFC to inform its own operations.

5.5.2.3 Guyana Geology & Mines Commission

The Guyana Geology and Mines Commission (GGMC) was created in 1979 from the Department of Geological Surveys and Mines which itself was the successor to the Geological Survey of British Guiana Department.

Objectives of the GGMC, include:

Reduce the occurrences of identified pollution violation levels associated with mines and production processing facilities from year end 2014 levels by *identifying and correcting existing environmental threats* and by working with and using the financial and other resources of the property owners, the government and GGMC.

The functions of the Commission include:

a) Promotion of mineral development;

b) Mineral exploration; research in exploration, mining, and utilization of minerals and mineral products; and

c) Enforcement of the conditions of Mining Licenses, Mining Permits, Mining Concessions, Prospecting Licenses (for Large Scale Operations), Prospecting Permits (for Medium and Small-Scale operations) and Quarry Licenses;

GGMC, in association with the GMSTCI and partners (WWF and CI, see Section 5.8) are engaged in several initiatives to manage mining practices. These are expected to bear fruit countrywide in another two to five years. The mining community is well established within the same area in which RLSS intends to conduct its logging operations. To the maximum extent possible, RLSS will support 'greener mining'[26] piloted by the GGMC and the GMSTCI.

RLSS will work closely with MNR, GGMC and GFC in developing a mining and logging plan for the forest concession area. The Company will plan its logging operation within blocks that are targeted for mining to extract all commercial species from those blocks before the commencement of mining. The Company recognizes that ad hoc arrangements may result in conflicts and as such will work closely with MNR, GGMC and GFC to identify suitable alternatives to avoid the destruction of prime commercial species found within pre-harvest blocks in the concession area.

5.5.3 Other Relevant Agencies

5.5.3.1 Ministry of Labour

The Ministry regulates the relationship between the employers and employees. Specifically, the Ministry deals inter alia with wage agreements, industrial relations, industrial training and occupational health and safety.

RLSS's field operations depend on the quality of its field staff, especially in sharing responsibility for environmental management even as the company pursues sustainable production levels. RLSS will therefore build up and maintain adequate corporate discipline to promote the overall welfare of its employees.

5.5.3.2 National Insurance Scheme (NIS)

NIS is a social security organization which maintains a system of social security by securing contributions from both employees and employers to generate benefits during sickness/ accidents. NIS also provides other benefits such as old age, invalidity, industrial etc.

RLSS will ensure that its obligations in respect of NIS matters are addressed in a timely manner.

5.6 Treaties & Conventions

Guyana has signed on to several international and regional treaties and conventions (see Table 8) to ensure that forest-based developments in Guyana are consistent with global and regional approaches to such development.

5.7 Environmental NGOs & International Agencies

WWF-Guyana and Conservation International (Guyana) Inc. are two very proactive environmental NGOs[27] in the natural resources sector. For example, since 2013, a grant agreement was signed between WWF and GGMC which provides financial and technical support for national capacity building through education and awareness activities, baseline studies and training of stakeholders within the gold mining sector. Also, CI in partnership with the GGDMA and GGMC, is implementing a programme to advance green development of the mining sector by enhancing efficiency, reducing pressure on the environment, and improving livelihoods. There is evidence that GGMC staffs have been sharing pamphlets at camps within the concession area with a view to promoting responsible behaviour during mining operations.

[26] http://dpi.gov.gy/small-and-artisanal-miners-are-learning-how-to-mine-greener/

[27] https://www.nre.gov.gy/environmental-management-in-the-mining-sector-wwf/

RLSS will be sharing an extensive forest area with miners in the long term and will endeavour to develop partnerships with the miners and so that everyone shares responsibility for proper environmental management.

Table 11: List of treaties/international conventions and agreements to which Guyana is a party.

No.	Conventions	Ratification/Accession
II.	Biodiversity	
1	+United Nations Convention on Biological Diversity +Cartagena Protocol on Biosafety +Nagoya protocol on Access to genetic Resources and the fair and equitable sharing of benefits arising from their utilization.	+Signatory in 1992, ratified in 1994. +Acceded to in 2008. +Acceded to in 2014
2	+Convention on International Trade in endangered species of wild fauna and flora (1973)	+Ratified in 1977
3	+Cartagena Convention or the Protection and development of the Marine environment of the wider Caribbean region (1983). +Specially protected Areas and Wildlife (SPAW) Protocol (1990)	+Ratified in 2010. +Ratified in 2010
4	+International plant protection convention (1952)	+Acceded to 1970
5	+Convention on the Protection of the World Cultural and the Natural.	+Acceded to in 1977
6	+Ramsar Convention on Wetlands (1971)	+Party
7	+Convention on the Protection of the World Cultural and Natural Heritage (1972)	+Signatory 1977
8	+International Tropical Timber Agreement 1994, 2006	+Signatory 2006
III.	Environmental conventions to which Guyana is a party	
9	+United Nations Framework Convention on Climate Change +Montreal Protocol +Kyoto Protocol +Paris Agreement	+Signatory in 1992, ratified in 1994. +Acceded to in 1993. +Acceded to in 2003. +Acceded to in 2016
10	+Vienna Convention on the protection of the Ozone Layer	+ Acceded to in 1993
11	+United Nations Convention to Combat Desertification	+Signatory in 1996, ratified in 1997
12	+International Convention for the Prevention of pollution (MARPOL 73/78)	+Acceded to 1997
13	+Basel Convention on the Control of Trans-boundary Movement of Hazardous Waste and their Disposal	+Acceded to in 2001
14	+Stockholm Convention on Persistent Organic Pollutants	+Acceded to in 2007
15	+Rotterdam Convention on Prior Informed Consent for Certain Chemicals and pesticides in International Trade	+Acceded to in 2007
	+International Plant protection Convention (IPPC), 1951	+Adherence 1970
16	+Minamata Convention on Mercury	+Signatory in 2013
IV.	Other relevant items	
17	+Caribbean Planning for the Adaptation to Climate Change CPACC (and its sequel Mainstreaming Adaptation for Climate Change in the Caribbean (ACCC)	+Signatory 1997
18	+Caribbean Regional Environmental Programme (CREP)	+Signatory 2001
19	+Caribbean Environmental Programme and its Specially Protected Areas and Wildlife (SPAW Protocol)	+Signatory 1990
20	+Treaty for Amazonian Cooperation	+Signatory 1978
21	+Guiana Shield Initiative (and Guiana Shield Facility)	+Signatory 1993

6.0 DESCRIPTION OF PROPOSED LOGGING PROJECT

6.1 Overview

This section relates RLSS' proposed logging project and the overall framework driving the enterprise's options.

Section 6.2 describes the national context for forestry projects, section 6.3 describes the structure of RLSS' proposed operations, and Section 6.4 and 6.5 set out RLSS' corporate management philosophies. Section 6.6 describes overarching preparatory activities undertaken by RLSS and Section 6.7 provides the forest management parameters driving RLSS' production options. Section 6.8 sets out the requisite planning activities and Section 6.9 provides details of RLSS operational practices.

6.2 Context for forestry projects

All holders of large concessions are required to produce forest management plans for a 3-5 year period as well as annual operations plans for the year at hand. *(GFC provides detailed guidelines for the preparation of these documents).*

RLSS' primary business is the sustainable extraction of merchantable logs from the concession area; RLSS will then use the logs to produce high grade, value added products for sale locally, and for export worldwide.

Logging operations are normally conducted in three phases, as follows:

a) Preparatory works: these are related to *overarching events* such as management of concession boundaries, organization of the concession area into management units (-compartments and 100ha blocks), the acquisition of the suite of permits or licenses applicable to logging and sawmilling, staff recruitment and training, the establishment of a field base, forest monitoring programmes, and stakeholder liaison events.

b) Planning works: these are works normally confined to a period of time and a unit area (compartment or set of 100ha blocks) in line with the *annual allowable cut*. Planning works over a five year period are normally set out in a FMP, while planning events over a calendar year is set out in an AOP. Planning works are repeated cyclically and sequentially as the logging occurs in one block then moves on to another block. GFC's requirements for all planning to be documented and approved ensures that loggers comply with GFC's robust systems and guidelines for sustainable forest management and environmental protection.

c) Operations**:** these are the actual interventions (road, skid trail and log market construction, directional felling activities) that occur on a block by block basis, based on the planning works already completed, and set out in an annual plan of operations, and duly approved by the GFC. Operations are repeated cyclically and sequentially as logging moves from one unit area (block) to a next. The operator is required by law to comply with GFC's procedures and guidelines for the entry, re-entry and closure of blocks approved for harvesting.

It follows then that normally logging operations only occur at one geographic area[28] on the concession area at any one time. GFC prescribes the maximum area harvested annually and the GFC and the concessionaire routinely agree on the geographic location. Concessionaires choose

[28] Occasionally, market conditions may require the logger to operate at different geographic locations simultaneously.

geographic areas in line with ground conditions, merchantable tree stocking and their marketing goals.

The GFC and local and international stakeholders support third party certification of local forest enterprises, their forest management systems and ancillary corporate social practices. (The GOG is engaged with the EU to develop a FLEGT based VPA that would eventually facilitate the acceptance of local timber within the EU markets.

6.3 Over view-Structure of RLSS' Logging project

In pursuit of its business objectives, RLSS will run a three stage operation as follows (see Figure 31):

a) Logs harvested on the concession area will be taken to a depot near to Ekabago Base Camp, within the concession area for sorting and grading.

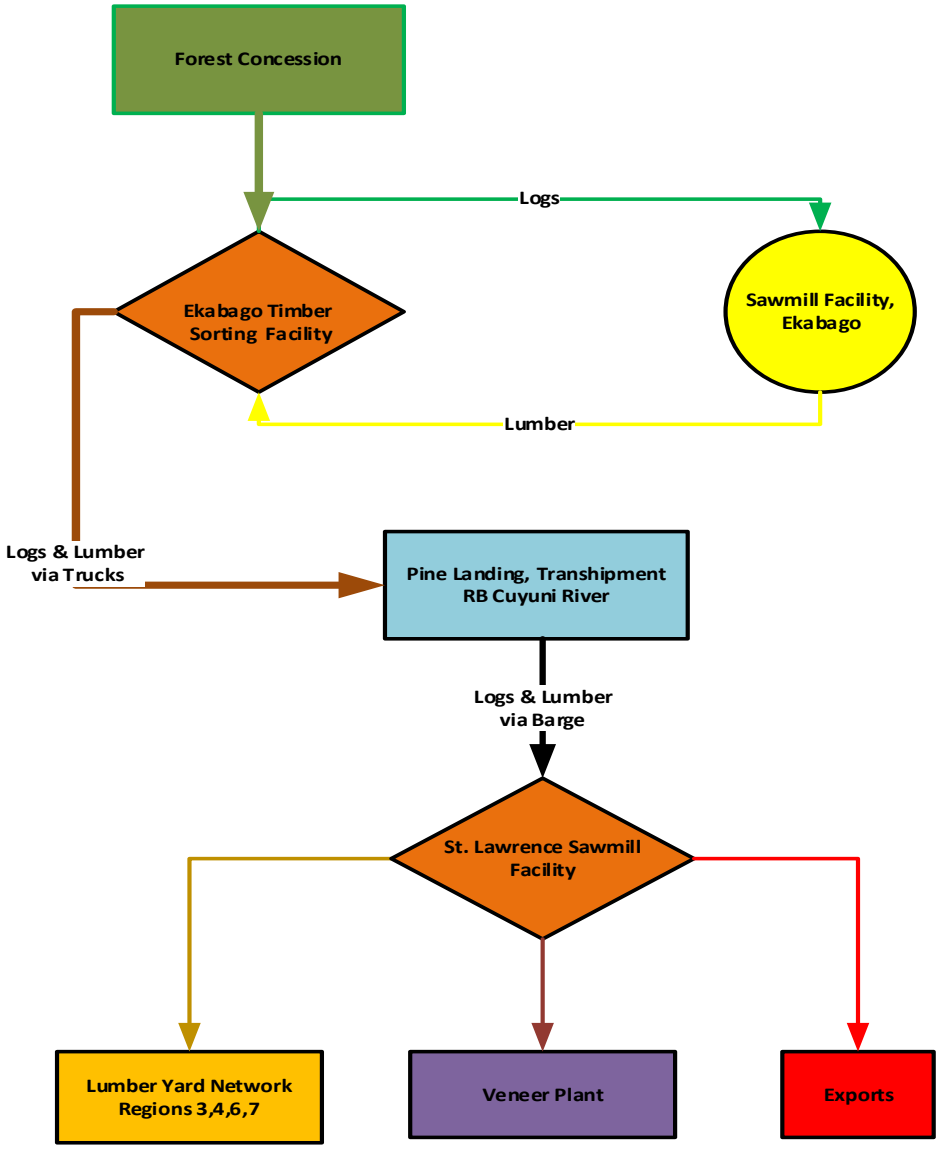


Figure 31: Illustration of the overarching structure of RLSS' Operations.

b) Thereafter, the logs will be hauled by road to the log depot at Pine Tree Landing, right bank Cuyuni River.

c) t Pine Tree Landing logs will be transferred to a barge, for conveyance to the company's primary wood processing facility, at St. Lawrence, East Bank Essequibo.

Meanwhile, merchantable logs with *tolerable* defects as well as logs salvaged from mining areas will be processed into cants, squares or planks, at Ekabago Base Camp; the rough cut products will then be transported to St. Lawrence for further processing.

6.4 RLSS' vision, mission, and values

6.4.1 RLSS' Vision

RLSS' vision is to enter the top quintile of timber producers in Guyana, producing and exporting timber products worldwide that meet and exceed customers' standards and preferences.

6.4.2 RLSS' Mission

RLSS primary mission statement is to build up a dynamic, efficient, and exemplary timber enterprise investing heavily in the use of technology to garner and maintain a competitive edge in global timber markets.

6.4.3 RLSS values

RLSS has historically adopted the following values:

a) human resources development-trained employees are critical to successful forest enterprises.
b) technology: RLSS will invest in and exploit technology in every applicable area of its operations
c) forest conservation and conservation of items with archaeological and/or indigenous significance
d) corporate discipline that ensures full compliance with statutory requirements
e) corporate social responsibility

6.5 Forest management objectives

6.5.1 Core forest management objectives

The following objectives underlie RLSS' stewardship of the forest concession:

a) Support local policies, legislation, standards, and initiatives that promote forest resources conservation-including biodiversity, watersheds, fauna and landscapes.

b) Support measures that preserve indigenous assets and enhance the livelihoods of indigenous peoples.

c) Develop a world class workforce that share the enterprise's passion for forest conservation using reduced impact logging practices and applicable technologies and strict adherence to local laws, standards, and guidelines.

d) Optimize value from the forest concession through the sustainable harvesting, optimal utilization, the full use of applicable technologies-including ICT, and marketing of not less than 30 species of timber.

e) Develop and implement exemplary forest monitoring and environmental management practices respectively based a suite of technologies - including but not be limited to the use of drones -available for such purposes.

f) Develop partnerships with stakeholders for sharing responsibility for environmental management, and to enhance the national efforts towards a green economy, forest conservation and environmental management.

g) Support forest resources-based research and ancillary subjects (such as climate change) that contribute to better management or conservation of local forest resources.

h) Support multiple use approaches to forest resources utilization and management.

6.5.2 Silvicultural and other forest conservation considerations

6.5.2.1 Passive ecological restoration of the forest environment

RLSS will practice passive ecological restoration of the forest environment. RLSS will use RIL principles and practices that have been introduced into tropical forests explicitly for the purpose of reducing the environmental and social impacts associated with industrial timber harvesting (Dykstra, 2001).

In the course of its timber harvesting operations, RLSS will carry out simple restoration wherever feasible: for example, practices that eliminate water ponding or practices that free up natural drainage channels blocked by sediments due to accelerated erosion. RLSS will attempt to log every block in a single logging operation so that when the block is closed, no more interventions will occur there in the short term and the block will remain closed.

RLSS will pay attention to prescriptions of the GFC Code of Practice, especially in relation to Chapter 5-Construction of road networks, Chapter 6-Logging operations, Chapter 8-Operational Hygiene, and Chapter 9-Camp Hygiene (GFC , 2018 (a)).

6.5.2.2 Conservation of fauna

RLSS will discourage hunting and fishing, fires and pollution hazards and any other measure necessary to avoid mortality of fauna that facilitate plant pollination and seed dispersal. Interconnections between plants and animals in the ecosystem are essential for its functioning (Whitmore, 2012), and timber management of tropical forests has both direct and indirect effects on wildlife populations and their habitats (Fimbel, Grajal, & Robinson, 2001).

6.5.2.3 Forest Research

RLSS is prepared to collaborate with the GFC, UG, EPA and any other stakeholder to foster forest conservation engaged in

a) Ecological or botanical studies approved by the GFC and EPA within the concession area.

b) Research activities or projects targeting the rehabilitation of ex-mining areas or degraded areas generally.

c) New growth and yield studies for local species

6.5.2.4 Permanent Sample Plots

Given the paucity of botanical data for this region, RLSS will set up permanent sample plots within the biodiversity reserve on right bank Puruni River, by 2024.

6.6 Overarching preparatory activities

6.6.1 Forest organization

6.6.1.1 Overview

RLSS's initial actions on the ground has been extensive reconnaissance work in Compartment 1 to establish prevailing land use. For the systematic management of the concession, RLSS has organized the concession into compartments and blocks, respectively.

6.6.1.2 Compartments

RLSS has organized the concession area into seven compartments and a biodiversity reserve (see Figure 32, Table 12).

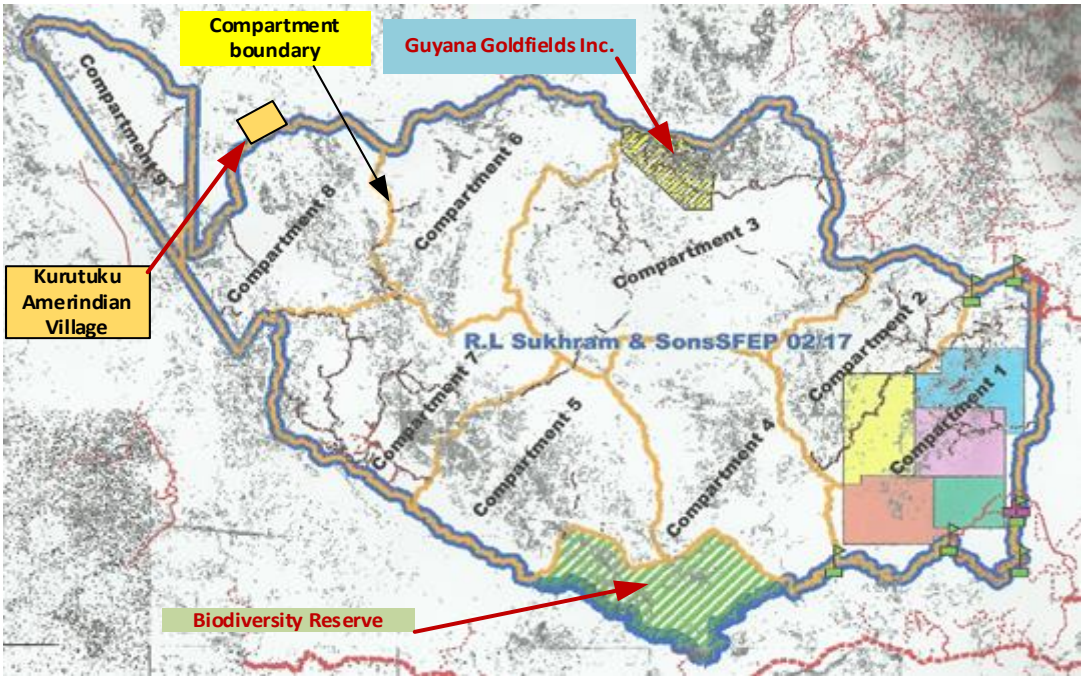


Figure 32: Map showing organization of the concession area into compartments, biodiversity reserve.

Compartments are delimited by rivers or creeks for easy identification and demarcation. The compartment area corresponds generally to the estimated area worked during a five-year period; for example, RLSS FMP 2020-2024 is based on the development of Compartment 1.

Signs indicating the respective compartment names (see Figure 33) will be put up along the compartment boundary, with the signpost for the adjacent compartment posted on the opposite side of the boundary.

Figure 33: Typical specimens of RLSS signboards marking the boundaries of compartments

Table 12: List of compartments and the biodiversity reserve.

#	Compartment Name	Area (Ha)	General Location
1	Compartment 1	50,238.76	Eastern end of concession area, right bank Ekabago River, left bank Pareware Creek, right bank Waikuri River
2	Compartment 2	32, 964.48	Left bank Waikuri and right bank Pareware Creek;
3	Compartment 3	83, 272.26	Right bank Cuyuni River, right bank Maipuri River, left bank Kartuni River, left bank Akaiwong River
4	Compartment 4	45, 827.11	Right bank Kartuni River, right bank Tumeng River
5	Compartment 5	44, 507.24	Left bank Tumeng River, right bank Kartuni River, left bank Toraparu River
6	Compartment 6	45, 280.16	Right bank Cuyuni River, Right bank Towaparu River, Left bank Maipuri River
7	Compartment 7	45, 867.64	Left bank Puruni River, Right bank Toroparu River
8	Compartment 8	40, 947.61	Right bank Cuyuni River; right Otomung River, Left bank Towaparu River
9	Compartment 9	23, 577.86	Extreme western end of the concession, west of the Kurutuku projected village extension.
10	Biodiversity Reserve	19, 779.48	Left bank Puruni River: Extending from UTM (21N) Easting value 183000 to 211000.
Total Area		432,262.60	

6.6.1.3 Blocks

The concession area is further divided into blocks 1000m x 1000m (100ha) blocks (see Figure 34) that serve to:

a) Provide the basic unit for 100% inventory (see GFFO, Section 4.3 Pre-harvest Inventory), the selection of harvesting stock, yield control, and the application of;

b) Provide the basic unit for skid trail planning and tree marking;

c) Provide the basic unit for implementing prescriptions of the COP for example Sections 6.5.1 (ground conditions) and 6.5.2 (soil conditions).

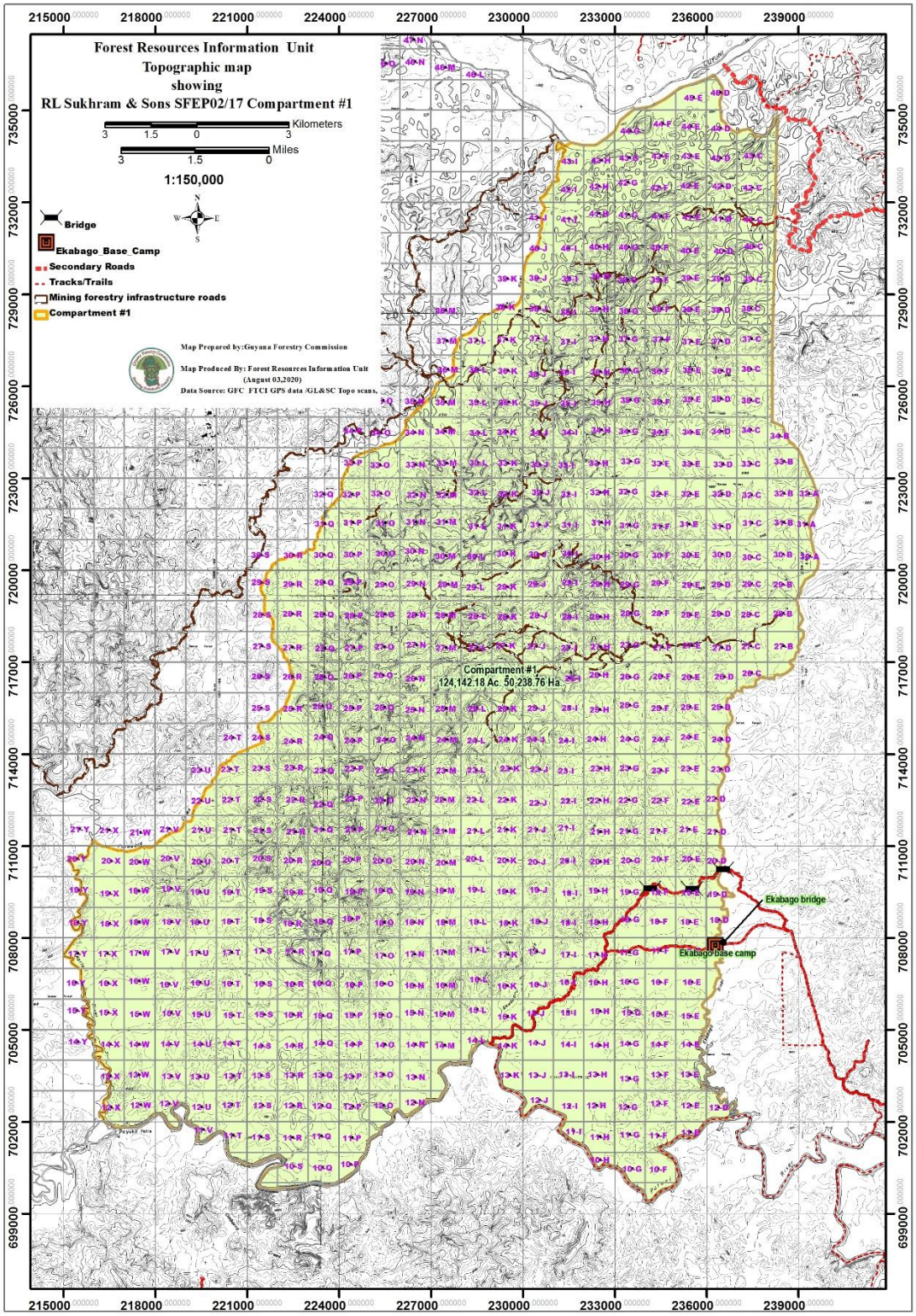


Figure 34: Map of Compartment 1, SFEP 2/2017 showing layout of blocks.

6.6.1.4 Other events

a) Base Camp

RLSS has established its primary base camp on right bank Ekabago River, within Block 17D, Compartment 1. The UTM Coordinates for the Camp are 21N 0236274, 0707758. The completed base camp base camp (see Annex XXII) will have facilities for up to 30 persons, including women.

Approximately two hectares of degraded forest approximately 500m north of the Base Camp will be cultivated with food crops to meet the dietary needs of employees: 0.5 ha will be used for cash crops, 0.5ha will be used for ground provisions and 1 ha will be used for permanent crops.

b) Primary Road Network.

RLSS' primary road network is a function primarily of the terrain. RLSS will avoid bridges, culverts wherever possible to reduce interference with stream banks, stream flow and water quality. (Please see Section 11.5.3)

c) Forward Camps

No decision has been taken yet on the location of forward camps. For 2021-2022, everyone will operate from the base camp.

6.7 Production parameters

6.7.1 Yield regulation and organization of production

6.7.1.1 Yield regulation

Generally, yield regulation is determined by:

a) Available volume/ha or per block for merchantable species based on preharvest inventories

b) Restrictions at the level of species-minimum diameter limits, protected species,

c) Site restrictions- based on degree of slope, the occurrence of buffer zones, proximity trees protected trees, and in some cases whether there are nests of certain species of fauna on a tree targeted for felling

d) Agreed cutting cycles and annual allowable cut

e) Cutting cycles and annual allowable cut are predictable and are dealt with in Section 10.1.2. Items a) through c) are determined from tree marking operations that precede timber harvesting operations.

6.7.1.2 Calculation of cutting cycle and annual allowable cut

Based on initial discussions and reconnaissance level data garnered to date, RLSS and GFC have agreed on the parameters (see Table 13) to guide the development of timber harvesting operations.

Table 13: Core forest management parameters for SFEP 2/2017

No.	Parameter	Unit	Value
A.	**General Parameters**		
1	Concession size	ha	432, 269.59
2	Felling Cycle	years	40
3	Sustained yield re 40yr. cycle)	**m^3**/ha	13.33
B.	**Concession based parameters**		
4	Non-productive forests	ha	110,652.88
5	Productive forests	ha	321, 609.71
6	Biodiversity reserve	ha	14, 472.44
7	Net productive area	ha	307, 137.27
8	Available productive area	ha	245, 709.82
C.	**Operational parameters:**		
9	Total sustained yield	**m^3**	3, 275, 311.88
10	Annual Allowable area (AAA)	**ha**	6142.75[29]
11	Annual allowable cut (AAC)	**m^3**	81,882.80

6.7.2 Schedule of timber production

In line with forest management parameters agreed with GFC (see Section 10.1.2), RLSS will submit a schedule of blocks to be harvested for the approval of the GFC.

6.7.3 Other products to be harvested

The primary focus of RLSS is merchantable timber. No other forest product or forest use is contemplated at this time.

RLSS will not restrict indigenous peoples or other duly authorized persons from traversing the concession area or from utilizing any forest resources.

6.8 Forest Planning Operations

6.8.1 Forest Inventory

To conduct timber harvesting operations in local forests RLSS must deal with variables such as forest type diversity, the proportion and spatial distribution of the merchantable trees across the concession, and the distribution of diameter classes. RLSS will undertake two kinds of forest inventory *prior* to logging: management (reconnaissance) level, and pre-harvest (100%) level. In addition, after logging, a post-harvest inventory is conducted to garner information on the efficiency of the logging process, compliance with timber harvesting standards and the nature of the condition of residual merchantable trees.

6.8.2 Management Level Inventory

Fairly recent reconnaissance level information on the forest resources have already been published (ter Steege, 2000). That information has guided RLSS' initial interest and investment decisions. However, more than twenty years have elapsed since the publication of the reconnaissance level data and the actual award of SFEP 2/2017. Consequently, the actual condition of the vegetation is not known; for example, stands of timber may have been damaged by storms or wildfires, or the area might be subjected to extensive mining. Through

[29] ~(61 blocks)

GFC's MRV System, some information on the condition (degradation level) of the vegetation is available (LTS International, 2020).

To date, RLSS has been studying the condition of the vegetation in Compartment 1, and the enterprise expects to garner information on the broader condition of the vegetation in other compartments after it acquires a TSA.

The methodology that RLSS will use for ML Inventory is that prescribed by GFC and FTCI (Forestry Training Centre Inc., 2012). Prior to the ML inventory, maps of the area will be studied, and attempts are made to estimate forest conversion to other uses, especially gold mining, based on access options for the concession. For this concession, aerial surveys will be undertaken and RLSS is considering the use of drones for the purpose of aerial surveys (and subsequent forest monitoring).

The broad elements of RLSS' effort are as follows:

a) To complement data already at hand RLSS has targeted 0.01% of the concession area or 43.2 ha for ML Inventory

b) Circular plots of 18m radius and area of 0.1 ha will be used: therefore 432 plots will be set out across the concession.

c) Each plot will have a sub-plot of 0.01ha (see Figure 35).

d) Plots will be placed 500m apart on 8km lines cut specifically for the purpose across various forest types.

e) Lines will be cut in a north-south orientation (true bearing 360°) due to the general east west orientation of the primary drainage system-the Kartuni River.

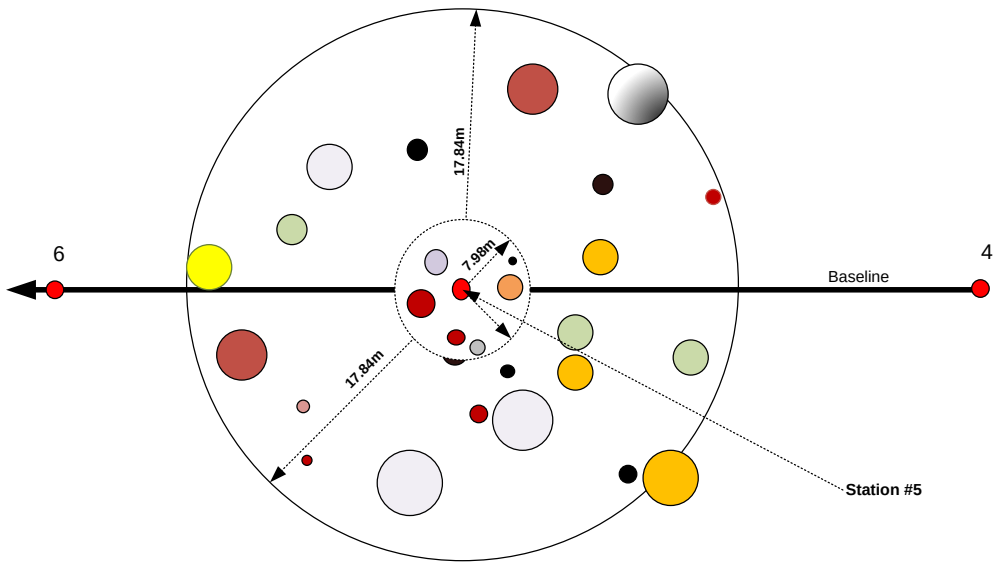


Figure 35: Illustration of layout of plot used for ML Inventory.

The results of this data will be published in RLSS' ESIA Report and reproduced in revised versions of this FMP and in AOPS prepared from 2021.

Generally, it is the case however, that notwithstanding the data set out in ML reports, that RLSS will conduct pre-harvest for every block targeted for harvesting. For Compartment 1, RLSS has traversed approximately 70% of the area due to a high density of ATV trails and has moved directly into 100% inventory.

6.8.3 Pre-harvest inventory

6.8.3.1 Methodology

Pre-harvest inventory is vital for planning timber harvests in the face of the following:

a) Diversity in forest types and terrain

b) The number, spatial distribution, and diameter classes for merchantable species

c) Assessment of ground conditions for felling trees including proximity trees, buffer zones, slope values

d) Assessment of locations for roads, skid trails and log markets

FTCI, in collaboration with the GFC, has published procedures for preharvest forest inventory (Forestry Training Centre Incorporated, 2004). GFC requires 'a schedule for the planning and implementation of harvesting operations' and includes pre-harvest inventory as a major planning requirement (GFC , 2018 (a)). GFC also prescribes the standard for reporting on pre-harvest forest inventory (GFC, 2018 (b))

Pre-harvest inventory methods may be summarized as follows:

Productive areas of compartments are organized into blocks 1,000m x 1,000m (100hectares) and each block is divided into 20 strips, 50 meters wide in a north –south orientation, and each strip numbered, starting from the western boundary of the block.

A reconnaissance of each bloc targeted will be conducted to:

a) Determine operable ground conditions in terms of prevailing gradients, surface conditions-whether rocky or swampy or the extent of degradation by mining activity.

b) Establish whether, for areas already mined, whether there is sufficient residual merchantable timber (standing or felled trees) worth harvesting or salvaging

c) Establish whether logging near any ex-mining sites will lead to further soil degradation through accelerated erosion.

d) 100% enumeration of the trees within each strip (and then each block) is carried out using a specific set of equipment or tools (see Figure 36); the 100% enumeration requires that at the minimum that each potential merchantable tree be identified by species, the tree is given a number (a tag) is placed on the tree, and the strip #, diameter, estimated merchantable height and the x, y coordinates recorded.

The data is subsequently processed in a manner that a stock map (or tree location map) showing the location of each merchantable tree, along with topographic data and buffer zones are represented. The stock map is then used to plan access roads, skid trails and log markets.

Figure 36: Typical tools /equipment used for pre-harvest inventory

6.8.3.2 Blocks targeted for pre-harvest inventory

Each calendar year, RLSS submits a list of blocks to the GFC that it plans to enumerate.

6.8.5 Post-harvest inventory

RLSS' post-harvest inventory is an internal audit exercise to establish whether internal SOPs are being followed. For example, RLSS may wish to verify the efficacy of tree marking operations, especially in relation to merchantable trees targeted for felling, proximity trees and buffer zones, stump tagging practices, or whether all logs produced were removed from the forest floor. Post-harvest inventory may also be used to address the veracity of complaints emerging from GFC field audits, including concerns about road conditions, diameter limits for trees felled, stump tagging operations, species identification or the quality of line cutting practices. Post-harvest inventory may be used to establish residual stock that could be available in the short term in roll-over blocks or in cases where potential merchantable trees were not cut due to the prevailing market conditions during harvesting operations.

RLSS will also use post-harvest inventory to support its forest monitoring programme (see Section 13).

6.8.6 Growth yield and defect data

RLSS is aware of data available on growth, yield, and defect data for local timber species (FIDS, 1970), (Alder, Dennis, 2000) (see Annex XV. It is RLSS' understanding that that data has informed GFC's protocols to produce options for felling cycles and the corresponding annual allowable parameters used by GFC (see Section 10). RLSS is aware that no major forestry research has been undertaken in the State forests in upper Region 7 and RLSS will, in partnership with the GFC, set up and manage at least three permanent sample plots for the purpose of collecting data on tree growth and mortality.

6.9 Harvesting Operations

6.9.1 Overview

RLSS timber harvesting operations are summarized in Figure 37 and Table 14.

6.9.2 Briefing sessions

RLSS will formalize regular (monthly) briefing sessions with all field operatives to ensure that the various phases of the logging operation are well coordinated and that logs are removed from the forest floor as quickly as possible. Briefing sessions are also intended to get every operative to share responsibility for OSH practices and for environmental management. Generally, briefing sessions will be the responsibility of the Forest Manager, but each supervisor or team leader will conduct briefing sessions for their teams. Briefing sessions for heavy-duty equipment operators and mechanics will be scheduled on a weekly basis because of cost centres associated with heavy-duty equipment as well as their potential for generating environmental impacts.

Briefing sessions will cover adherence to checklists for preventative maintenance of all equipment and measures designed to control noise and vibration. Special attention will be paid to training needs for operators and to record keeping. Briefing sessions for other operatives will be held monthly. These will address mostly production schedules in line with market demand, compliance with prescriptions of the COP, environmental management, feedback from monitoring reports, and documentation.

6.9.3 Planning teams

RLSS will put together a Planning Team the main purpose of the team is to conduct RLSS' preparatory tasks before undertaking work major interventions in the forest resources. Specific tasks for the Planning Team include:

a) plotting road alignment on maps and on the ground;

b) Designing bridges and culverts;

c) Plotting skid trail alignment and log market surveys on the map and on the ground;

d) Tree marking.

e) Preparing maps for persons engaged in field operations-for example, each feller will have a tree location map showing the trees to be felled per block or other designated work area, along with the location of the skid trail.

The work of planning teams allow machine operators to focus on their specific tasks and not to spend time (and fuel) looking for alternatives or options. The minimal or controlled use of machines will lead to cost savings.

Table 14 shows how RLSS assigns responsibility for various operational events, but ideally, RLSS wants a situation where every field operative is sufficiently trained to work in any team.

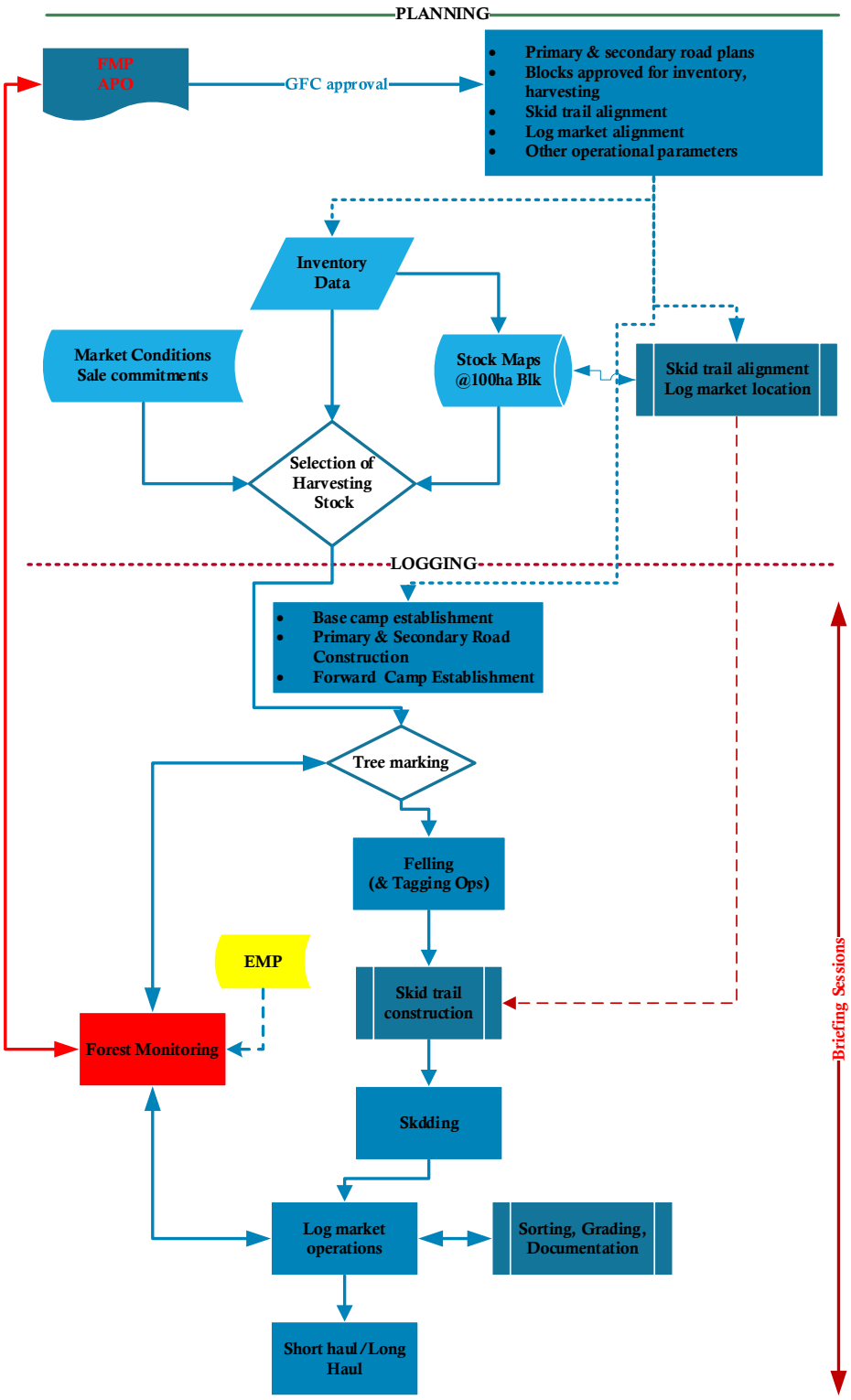


Figure 37: Illustration of the scope of RLSS Operations.

Table 14: Summary of the various tasks associated with RLSS operations.

#	TASK/ACTIVITY	CORE ELEMENTS	RESPONSIBILITY
1	FMP	Forest organization 5 yr. projections for: • inventory, • road construction works • production by block and compartment • staff recruitment and training	Operations Manager
2	APO	Annual projections for • 100% inventory • Road construction and maintenance works • Base camp, forward camp works • Forest inventory • Production by block and compartment • Staff recruitment and staff training	Forest manager
3	Forest reconnaissance, general forest surveys	General forest reconnaissance looking at: • topography, • forest type area and distribution, • proportion of merchantable species and their diameter classes, • existing roading infrastructure, and existing land use	Supervisor-Forest Planning
4	Primary and secondary road alignment	Forest surveys to identify options for road location considering: terrain, soil, stream network, and the location of merchantable stocks of timber.	Supervisor-Forest Planning
5	Primary and secondary road construction	Forest mensuration and forest surveys, identification of sites for borrow pits, culverts, and bridges Under-bushing and flagging of road alignment Road works, including bridge and culvert construction, using chainsaws, bulldozers, excavators, front end loaders, dump trucks, and motor-graders	Road/skid trail construction crew
6	Block demarcation and forest inventory	Surveying and cutting lines to create 1000m x 1000m blocks-block lines are aligned to selected UTM Coordinates assigning an alpha-numerical code to each block dividing each block into 50m strips, by cutting lines in a vertical (North-south) direction	Supervisor-Forest Planning
7	100% forest inventory	Enumerating trees as per GFC guidelines	Supervisor-Forest Planning
8	Skid trail planning, alignment in the field.	Preparation of tree location maps Selection of harvesting stock Skid trail alignment on maps	Supervisor-Forest Planning
9	Tree marking	Validation of merchantable stocks after consideration of tree form and vigour, and evaluation of site conditions marking felling direction	Supervisor-Forest Planning
10	Skid trail construction	Grubbing and light dozing along marked skid trail	Supervisor-Forest Operations
11	Felling	Directional felling of trees Bucking of trees	Supervisor-Forest Operations/Felling team
12	Skidding	Extracting logs from stump to log market	Supervisor-Forest Operations Skidding team
13	Tagging & documentation	Ensuring all stumps are tagged Ensuring all logs are tagged GFC documentation	Supervisor-Forest Operations
14	Log market operations	Grading logs Sorting logs Loading logs on to logging trucks	Supervisor-Forest Operations

#	TASK/ACTIVITY	CORE ELEMENTS	RESPONSIBILITY
15	Forest monitoring	Ensuring compliance with national standards and guidelines Reviewing performance in terms of forest inventory, road construction and production	Forest Manager
16	Stakeholder liaison	Engaging with stakeholders for the resolution of any emerging conflicts	Operations Officer

6.9.4 Machinery

RLSS, using its experience, purchased an assortment of heavy-duty equipment to boost its productivity and profitability. The use of the right machine for specific tasks (see Figure 38) is a critical consideration in purchasing assets. RLSS believes that its current assets (see Annex XVII, will give it a competitive edge.

Figure 38: Illustration of an excavator used for bridge building works.

Beyond basic preoccupation with increased profitability through intensive operator training, attention to OSH practices and adequate preventative maintenance, RLSS intends to manage environmental impacts generated by such equipment.

Specifically, fixed assets will only be used when required. In addition, all heavy-duty vehicles will be required to follow practices summarized in Figure 39.

A pre-service check or machine walk around to check for safety and maintenance issues will be conducted during the period 06:00-06:30: operators' primary focus will be the detection and correction of any oil or fuel leaks. For machines stationed away from the base camp, a 'travelling mechanic' will assist the operator with the routine preventative maintenance steps.

Under normal circumstances, no equipment except generators would be in use after 18:00 hrs. RLSS will use solar units for security lights between 22:00 hrs. and 04:30 hrs.

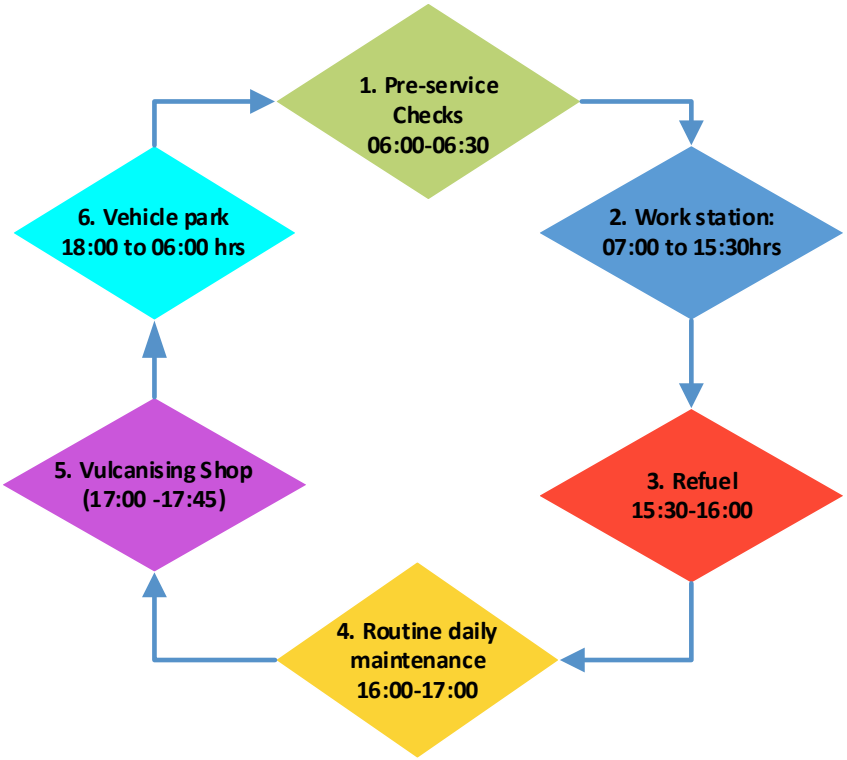


Figure 39: Chart showing guide for management of RLSS vehicular fleet

RLSS will develop extensive SOPs covering the use of heavy equipment, including the following:

a) Operators' codes, including the use of seat belts and personal safety gear

b) The use of chocks for all parked machines

c) The use of headlights and rotating beacons on all heavy-duty vehicles in active use

d) Checklists for preventative maintenance.

e) Reporting on defects

f) Logbook and documentation

g) Designated locations for refueling, servicing, and cleaning heavy-duty vehicles

h) Operators' behaviour when confronting fauna traversing roadways

The core heavy-duty equipment that RLSS will use specifically for timber harvesting operations are set out in Table 15 (see also Annex XVII)

Table 15: heavy-duty equipment deployed for timber harvesting operations.

#	Machine type	Core function
Road construction		
1	Bulldozer	Dozing trees, grubbing of roadway, light scarification of the soil surface; skid trail construction
2	Front-end loader	To collect earths from borrow pits and carry it to points on the road requiring earth fills or capping with lateritic earths
3	Excavator	Used for borrow-pit construction and excavation, preparatory earth works for bridge and culvert construction, placing logs or beams in position during bridge construction, a limited amount of pile driving
4	Motor-grader	Road levelling, profiling, roadside drainage.
Tree felling & bucking		
5	Chainsaws	Directional felling of trees, bucking logs, ripping logs for bridge and culvert construction
Skidding operations		
6	Skidder	Limited skid trail construction; extracting logs from stump to log market; sorting logs at log market
Loading trucks with logs and cants		
7	Front-End (Log) Loader	Loading, unloading logging trucks; sorting logs.
Hauling logs		
8	Logging trucks (6 x 6) or (6 x 4) with pole trailers.	Haul about 42m3 of logs per trip.

6.9.5 Logging procedures

6.9.5.1 Overview

Two senior staffs of RLSS have done FTCI's Decision Makers' Course to ensure that the company positions itself to use best practices on its forest concession.
For convenience, RLSS' defines its logging protocols in eight phases:

a) Base camp set up

b) Primary and secondary road construction

c) Tree marking & skid trail alignment

d) Skid trail construction and log market construction

e) Felling and bucking of trees
f) Skidding ,
g) Log market operations
h) Short haul to a central log depot

6.7.5.2 Base Camp set up

Based on a series of reconnaissance trips and access options to the concession area, RLSS chose a location on right bank Ekabago River, with UTM Coordinates 21N 0236274, 0707758 within Compartment 1.

The completed base camp will occupy an area of about 6.0 hectares and would include a sawmill facility, timber depot, forest station and fuel bond. No decision has yet been made on the location of any forward camps for period 2020-2024. Temporary (6-week) camps will be set up from time to time to accommodate inventory crews, road building crews and felling crews during period 2021-2024.

6.9.5.3 Primary and secondary road construction

a) Overview

RLSS will be guided by the following items in the development of its road network:

a. GFC's COP (Section 5)

b. GFC's GFFO (Section 5 Construction of Road Network, Drainage Structures and Water Course Crossings).

c. FTCI's Manual on Forest Roads (FTCI, 2007).

d. RLSS' experience with constructing roads and bridges in the Kartabu Triangle, including the access road to the concession (see Figures 40, 41)

e. Existing road networks formerly used by miners in the area

b) Road alignment

Based on the hilly nature of the terrain, topography will play a more significant role in road alignment than the spatial distribution of merchantable timber. To the maximum extent possible, RLSS will take advantage of any existing road networks to reduce road density on the concession area.

Figure 40: Photograph showing a segment of RLSS access road.

Figure 41: Photograph showing RLSS Bridge across Ekabago River

RLSS will use GFC's recommended standards for road design (see Tables 16, 17) as references for its road construction works. Those standards are set out in Section 5.1 Road Standards in GFC's Guidelines for Forest Operations for State Forest Authorizations for Timber Sales Agreements (GFC, 2018 (b)). The necessity for roadway drainage and drying after a rainstorm, road construction costs and safety issues are also major considerations30.

Table 16: RLSS road classification categories

Class	Description
Primary road	A road designed for permanent all weather use, permanent side drains, with bridges and culverts duly designed for continuous use by heavy-duty equipment over many years
Secondary road	All weather roads spur roads to primary roads
Spur road	Temporary roads linking one or more log markets to a secondary road

The alignment of primary and secondary roads respectively depends primarily on topography while the alignment of spur road is heavily influenced by the stocking available at any location. RLSS intends to close spur roads after use.

Table 17: Maximum road widths (meters) for each class of road.

Class	*Maximum width (m) by category*				*RLSS Max Speed*
	Canopy clearance	Earthworks	Roadbed	Main carriageway	
Primary road	30	12	9	5	64 km/hr
Secondary road	20	10	8	4	40 km/hr
Spur road	15	8	6	3	24 km/hr

[30] Http://www.nrs.fs.fed.us/fmg/nfmg/docs/mn/roads.pdf

c) Road Construction schedule

At this point in time, RLSS is still conducting reconnaissance work to determine its primary road network. One critical consideration is to what extent, RLSS will be able to use any existing mining roads or trails.

d) Road signage

RLSS will use signage (see typical examples in Figure 42) to reinforce briefing sessions on responsible road use.

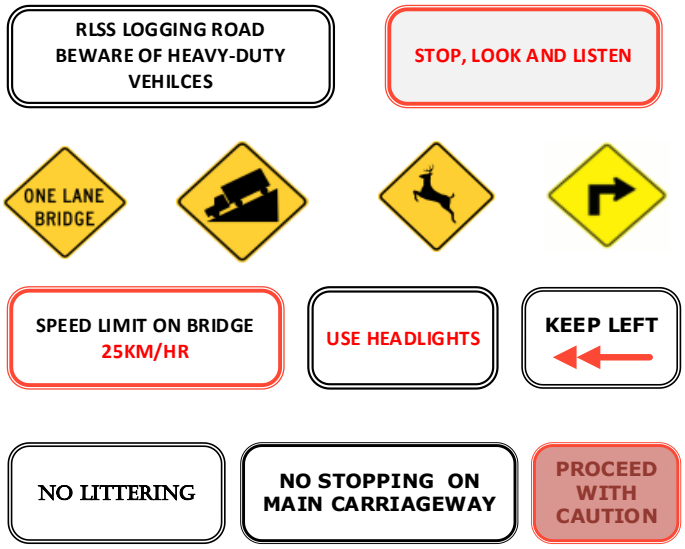


Figure 42: Examples of signs that RLSS will deploy on its roads.

e) Road Closure

RLSS plans to remove the optimum merchantable volume from blocks harvested. Once this is accomplished RLSS will not re-enter blocks for harvesting purposes. Spurs roads not intended for further use will be closed or decommissioned after post-harvest activities are conducted.

Roads will be formally closed six months after harvesting, unless other stakeholders-such as miners, start using the road.

Road closure practices include the following:

a) Posting road 'Closed' signs
b) Remove culverts if any
c) Removing flagging tapes and all other debris such that the only items left in the area would be tags on the stumps of trees harvested
d) Drains any post harvesting ponds created from skidding or log hauling activity.

6.9.5.4 Tree marking and skid trail alignment

a) Tree marking

Once tree location maps per block with provisional skid trail alignment, the next step is to choose the trees that will be harvested. The 'harvesting stock' would depend on market demand for certain species and the outcome from tree marking activities.

The following practices represents RLSS' approach to tree marking:

a. In the first instance, tree marking serves to validate some aspects of the inventory data, especially as tree marking is done a couple of weeks before actual harvesting starts (whereas 100% inventory may be done up to one year before timber harvesting). In validating inventory data, tree marking operatives will check that the correct species and its dbh have been recorded and the quality of the bole is acceptable-good form and free from major defects such as heart rot.

b. Establishing that site conditions are acceptable-the tree is not on a steep slope, it is not within a buffer zone, and that it meets spatial distance criteria relative to other (protected or merchantable trees). The evaluation of site conditions also includes the verification on whether the tree harbours any fauna, for example nests of harpy eagles or sloths, in which case the tree would not be felled.

c. Once there is no impediment to felling the tree the next step is to cut any live lianas that may be 'tying its crown with other tree crowns' to the extent that felling the tree may lead to accidental, uncontrolled or sympathetic felling of other trees.

d. Finally, the tree marking staff will place an X on the bole of the tree, indicating (for the feller) that the tree should be felled as part of the felling plan. In addition, a white vertical strip about 50cm is painted on the bole at dbh that indicates the direction in which the tree should be felled. The safety and productivity of skidding teams is highly dependent on how logs are positioned relative to the direction of extraction (ILO, 1998).
e. Tree marking is usually done between 2-6 weeks from the planned felling schedule for the block.

b) Skid trail alignment

For compartment 1, characterised by very hilly terrain, and thus few alignment options, skid trails will be conducted before felling. On flat terrain, skid trails will be constructed after felling so that there is more economy in skid trail layout, in fact on flat terrain, skidding distances are likely to be shorter.

The same team that does the tree marking will also do the skid trail alignment on the ground based primarily on Section 4.7 of the COP 'Layout of skid trail network' (GFC , 2018 (a)) as well as Section 4.7 of GFFO 'Layout of skid trail network' (GFC, 2018 (b)).

For RLSS, the key considerations that inform skid trail alignment are:

a. The spatial distribution of trees to be harvested-it is more cost effective to harvest many trees per unity area

b. Ground conditions along the provisional alignment, particularly slope grade, rock outcrops, or swampy terrain not captured or mapped in sufficient detail on tree stock maps
c. The avoidance of large trees along the provisional alignment (such as large defective trees not recorded in the inventory data)

d. The avoidance of too many curves-curves create conditions for damaging logs during skidding

e. Soil type-for main skid trails, sand loams or lateritic earths are preferred)

f. Skidding distance-the shorter haul distances lead to less environmental impact

The tree marking team will use a combination of cut lines and flagging tape to demarcate the skid trail for the convenience of the skid trail construction team.

6.9.5.5 Skid alignment and log market construction

a) Skid trail construction

Skid trail construction is done a few days before actual felling and skidding operations. Since skid trail construction, felling and skidding are all noisy activities that may scare fauna, RLSS wants all these activities accomplished within a three-week period.

Provisional skid trail alignment is made on the tree stock map shortly after the tree location map is generated, based on topographical parameters, the spatial distribution of merchantable species, the proposed location of log markets and buffer zones based on the stream network within the block. A few weeks prior to the felling of trees, the tree marking team will align skid trails on the ground.

The modalities for skid trail construction are laid out in Section 6.3 'Skid trail construction' of GFC's COP (GFC , 2018 (a))Section 6.3 'Skid trail construction' of GFC's GFFO (GFC, 2018 (b)).

RLSS essential skid trail construction activities will constitute the following:

A chainsaw will be used to buck any 'takuba' (old log) lying along the skid trail alignment

A bulldozer will be used to bulldoze trees and tree sections along the skid trail alignment with the aim of facilitating skidding of logs with rubber-tyred skidders. Primary skid trails will receive more attention than secondary skid trails.

b) Log market construction

a. Log markets represent the initial destination for logs skidded from stump. The location of log markets is first indicated on tree stock maps at the level of blocks based on:

b. the alignment of secondary and spur roads respectively

c. the configuration of the terrain

d. whether the log market will accommodate logs from more than one blocks.

e. Tree marking teams then select the final location based on:

f. the skid trail alignment set out on the ground
g. site conditions at the location indicated: well drained sites, with sandy soils or lateritic earths are preferred; areas devoid of large trees are also preferred.

h. The area should be big enough to allow for the sorting of logs by species or intended use and to loading of logging trucks. Front-end log loaders will be used for sorting logs and for loading logging trucks.

6.9.5.6 Felling and bucking of trees

RLSS will be using directional felling techniques because it is safer for the chainsaw team, it helps protect the tree bole from damage during tree fall and helps reduce damage to other merchantable trees during tree fall.

Tree felling operations are prescribed by Sections 6.1 'Controlled felling' in GFC's COP (GFC , 2018 (a)) and FTCI's Manual Course in Reduced Impact Logging: Chainsaw Use, Safety Practices and Directional Tree Felling Techniques (FTCI, 2010).

Tree felling is a very hazardous activity. Chainsaw operators are subject to exhaust gases, noise and vibration (ILO, 1998) and RLSS will ensure that its felling teams use adequate personal safety equipment as well as the proper tools (see Figures 28).

Figure 43: Tools and PPE to be used by RLSS' felling teams

RLSS fellers are duly trained in all aspects of chainsaw use and preventative maintenance. All fellers are trained in the basics of directional felling (see Figure 44) and generic considerations influencing the tree felling process (see Figure 45) and preparatory tree felling activity (Figure 46).

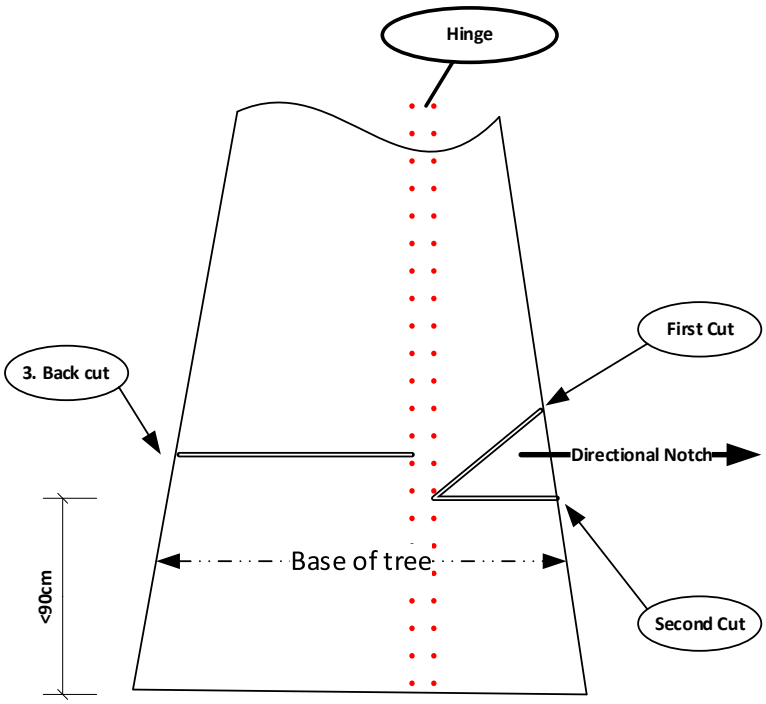


Figure 44: Illustration of basic directional tree felling techniques

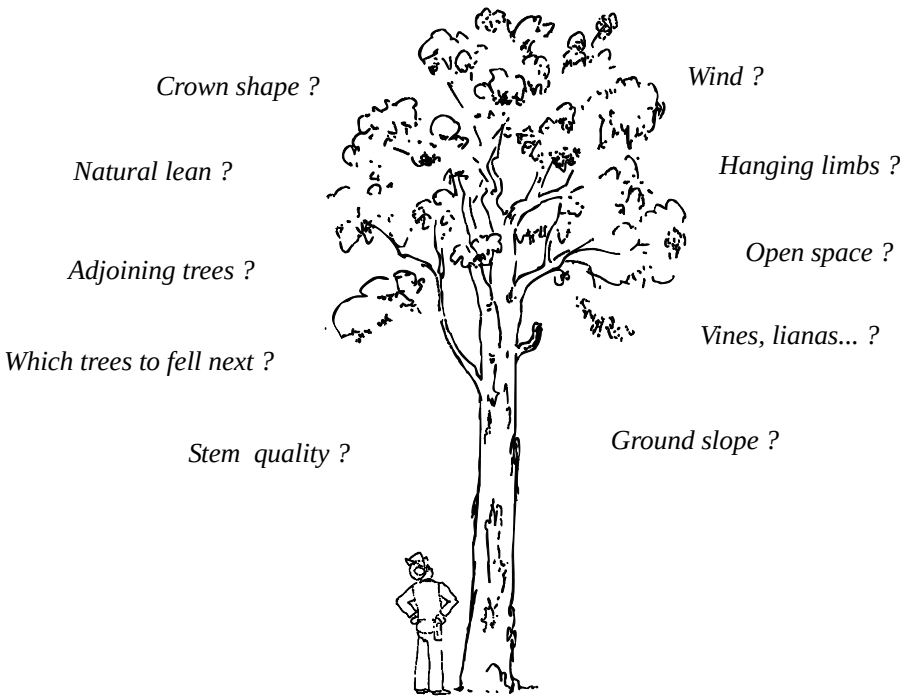


Figure 45: Generic considerations for felling trees ©FTCI

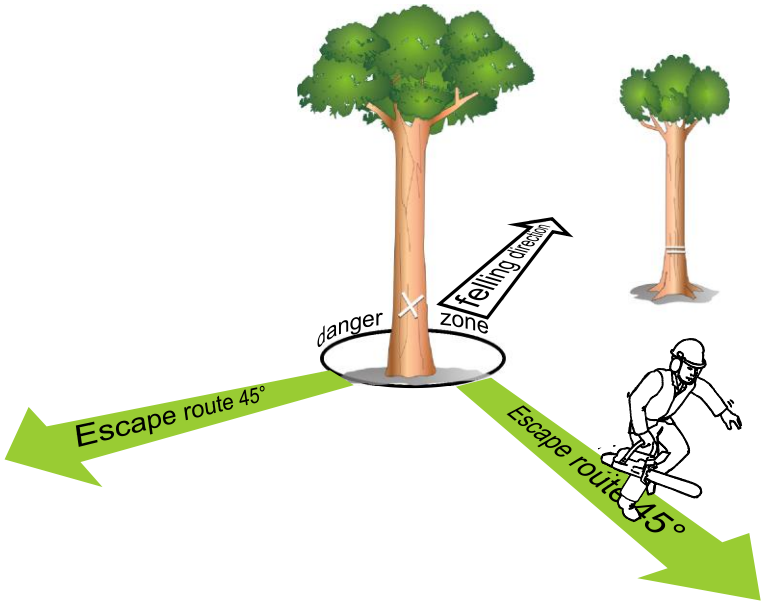


Figure 46: Basic preparatory safety practice for felling trees ©FTCI

The following basic procedures will be followed by RLSS' chainsaw operators/felling teams:

a) Each feller has an assigned felling area, normally delineated by strip lines.
b) Each feller must always be accompanied by an assistant who will assist with carrying tools, help locate trees and assess and advise on felling hazards missed by the feller.
c) The team will first cut lianas (not removed by the tree marking team as well as underbrush in the vicinity of the trees to be felled to ensure safety and reduce the incidences of trees being pulled or pushed over in the felling
d) Fellers only cuts trees based on the tree location map provided by the planning team
e) Trees are felled in predefined sequences and angled to the skid trails in line with markings placed by the planning team.
f) During the bucking phase, the team will ensure that the stem is cut completely through so that extraction is facilitated.
g) The chainsaw operator will ensure that the stump of any tree felled is duly tagged and that the tagging information is available to the skidding team.

6.9.5.7 Skidding

RLSS ensures that skidder operators are duly trained in the use and preventative maintenance of skidders. Skidder operators and their assistant (choker-man) must do a walk-around of the skidder at the start of the workday. All machines are refueled at the end of the working day and any 'defect' addressed.

The morning walk around will focus particularly on tire pressure, engine oil level, transmission and hydraulic fluid levels, brakes, and evidence of oil leaks. The operator will also ensure that lights, horn, and the rotating beacon are functional.

As far as possible, skidders will not be used for the construction of skid trails; skidders will be used for skidding tasks only.

Skidding teams will be provided with maps showing where felled trees are lying on the forest floor. These maps will include the skid trail alignment.

The choker-man will verify that all stumps from which logs are extracted carry a tag before removing the log.

As far as practicable, logs will be winched from stump, using the choker rig on the skidder.

6.9.5.8 Log market operations

Log market operations include the following:

a) Ensuring that tag information for all logs arriving at the log market is available and recorded in Registers provided for the purpose

b) Establishing whether there is need for the cross-cutting of any log due to its size or due to damage sustained during skidding operations

c) Sorting logs by species and/or dimensions-using the skidder and/or log loader

d) Grading the logs if necessary

e) Organize log loads (25-35 m3) for shipment of Ekabago

f) Organize GFC documentation for logs being extracted

g) Loading trucks using a log loader

h) Short haul to a central log depot

The short haul occurs within the concession area. For period 2020-2024, the short haul refers to hauling logs via RLSS' logging roads from any log market in Compartment 1 to RLSS' Ekabago base camp. (The long haul in contrast will occur from Ekabago Base Camp to Batavia, about 120km).

RLSS' intentions are that, 72 hours is the maximum time that should elapse between the bucking operations at stump and the extraction of the log to Ekabago base camp.

6.10 Summary of developments to date

Table 18 sets out a summary of developments to date.

Table 18: Summary of key phases of the logging project at June 30, 2021.

	OBJECTIVE	ACTIVITIES	STATUS AT MAY 31, 2018
1.0	PREPARATORY TASKS		
1.1	Establish concession boundaries: Determine/demarcate borders	Line cutting activities, posting of signboards	90% of the boundary is formed by waterways. Line cutting awaiting issue of TSA
1.2	Determine existing land use	Traverse of the forest area on foot/boat/ATV	90% of area traversed to date by Company & Consultants
1.3	Determine Productive vs. non-productive forests	Map based activity + recce information.	Completed, but the expansion of mining activities require that this exercise be repeated on receipt of the TSA

	OBJECTIVE	ACTIVITIES	STATUS AT MAY 31, 2018
1.4	Identify primary biodiversity reserve	Traverse of area identified, posting of sign boards, line cutting activities.	Completed
1.5	Identify compartment boundaries	Surveying/Line cutting activities	Completed
1.6	Identify primary road layout	Map based or if an existing road, an extended traverse on foot or ATV along the entire length of the road	40% complete-southern part of the concession prioritized.
1.7	Identify possible sites for forward camps	Map based, or if an existing road, an extended traverse on foot	Area for primary base camp for 10yr period identified
2.0	PLANNING OPERATIONS		
2.1	Alignment of Primary Road	Surveying works; traverse of road alignment, identification of points for bridges, culverts, mining pits, earth works	Completed for Compartment Ekabago
2.2	Selection of area for setting up base camp, forward camps	Surveying works, site assessment (soil, vegetation and drainage conditions, etc.).	Completed
2.3	Secondary road alignment	Surveying works (including grades and angle of curvature for road alignment, identification of points for bridges, culverts, mining pits, earth works	30% completed for Compartment Ekabago
2.4	Setting up of temporary camps for road crews, inventory crews	Minimal clearing for tarpaulin covered camps, vehicle park, etc.	Ongoing in Compartment Ekabago
2.5	Block Demarcation	Surveying, line cutting	15% completed; Compartment Ekabago prioritized
2.6	Forest Inventory	Forest enumeration	In progress; southern part of concession prioritized
2.7	Stock map preparation	Desk task	Completed for 15 blocks, Compartment Ekabago
2.8	Selection of merchantable stock to be harvested	Desk task	Completed for 15 blocks, Compartment Ekabago
2.9	Skid trail alignment	Surveying, line cutting, cutting of trees, and takubas along skid trails	Not started
2.10	Log market location	Site assessment and site surveys	Not started
3.0	FIELD OPERATIONS-FOREST CONCESSION		
3.1	Deployment of machinery	Transporting all equipment to the project site	Not started
3.2	Primary, secondary road construction.	Tree removal, earthworks	Not started
3.3	Log market construction.	Tree removal, earthworks	Not started
3.4	Skid trail construction	Tree removal, earthworks	Not started
3.5	Felling & bucking of trees.	Mechanical felling, bucking of trees	Not started
3.6	Skidding logs to log markets.	Dragging/hauling logs along skid trails	Not started

	OBJECTIVE	ACTIVITIES	STATUS AT MAY 31, 2018
3.7	Log market operations (sorting and grading of logs).	Sorting, stacking logs, loading logs onto lorries	Not started
3.8	Hauling logs	Transporting 35-40m^3 logs via heavy duty trucks	Not started
4.0	FIELD OPERATIONS-THE KARTABO-PURUNI ROAD		
4.1	Logs transiting the Kartabu-Puruni Road	Transporting 35-40m^3 logs via heavy duty trucks	Not started
4.2	Managing stakeholder issues	Engagement with stakeholders to address complaints	Not started
5.0	FIELD OPERATIONS: THE ITEBALLI COMMUNITY		
5.1	Logs transiting the Iteballi Community	Transporting 35-40m^3 logs via heavy duty trucks	Not started
5.2	Riverside log depot operations	Transferring logs to a barge at Iteballi waterfront	Not started
6.0	CORPORATE SOCIAL RESPONSIBILITY		
6.1	Support preventive maintenance of Kartabu-Puruni Road	Deploy machines for earth fills, road grading, road compaction and drainage works	Not started
6.2	Support the development of Iteballi Community	Support simple community events as requested by NDC.	Not started
6.3	Manage stakeholder issues	Engagement with community representatives to address complaints.	Not started

7.0 WATER RESOURCES

7.1 Introduction

Guyana is often referred to as the 'Land of many waters'. Water is important ecologically for it is the medium in which many organisms live (Boyd, 2015). The concession area is within the national **Physiographic Region Zone II, Interior Plains** which is characterised by enormous quantities of fresh water from April through August and from November through January; large quantities of fresh water are available for the remainder of the year (GLASC, 2013). Figure 47 shows the main surface drainage network, the Kartuni River and its main tributaries, within the concession area.

7.2 Definitions and scope.

Forests are an integral part of the hydrological cycle that generate water resources. Rain forest canopies *redistributes* rainfall: '*Interception'* refers to that fraction of rainfall reaching a forest canopy which is intercepted and evaporated; '*throughfall*' refers to rainfall that goes through the canopy and falls onto the forest floor; and *'stemflow'* refers to the fraction of rainfall that reaches the forest floor by flowing down the trunks of trees or the stems of other plants (Richards, 1998) .

The following definitions are also useful:

(a) **Quantitative terms** (GLASC, 2013).
Enormous quantities of water refer to discharge rates of >400,000 litres /min.
Very large quantities refer to discharge rates of 40,000 to 400,000 l/m.
Large quantities: refer to rates of 10,000-40,000 l/m.

(b) **Qualitative terms** (GLASC, 2013)
Fresh water: maximum of totally dissolved solids <1,000 mg/l.
Brackish water: maximum >1,000mg/l but less than 15,000mg/l.
Saline water: TDS>15,000 mg/l

(c) ***Water hardness*** (GLASC, 2013).
Soft water: 0-60mg/l
Moderately hard water: 61-120mg/l
Hard water: 121-180mg/l
Very hard water: >180mg/l C

(e) **'Soil Water balance'** refers to *the amount of water available at any given time in the soil: it is a function of primarily of precipitation, evapotranspiration, soil water storage and water surplus* (Strahler & Strahler, 1997)

(f) **Water Quality Standards**. '*Water quality standards are the quantitative values for acceptable ranges of physical, chemical, biological, and aesthetic characteristics of water (or criteria in stream classification standards, and other water quality standards'* (Boyd, 2015).

7.3 Legislation

The Water and Sewerage Act, 2002 *provides the following definitions:*

a) 'Surface water systems' includes creeks and rivers.

b) 'Water resources' mean water systems, conservancies, canals and all other water arising from rainfall or run off from the land that has been stored or captured within Guyana.

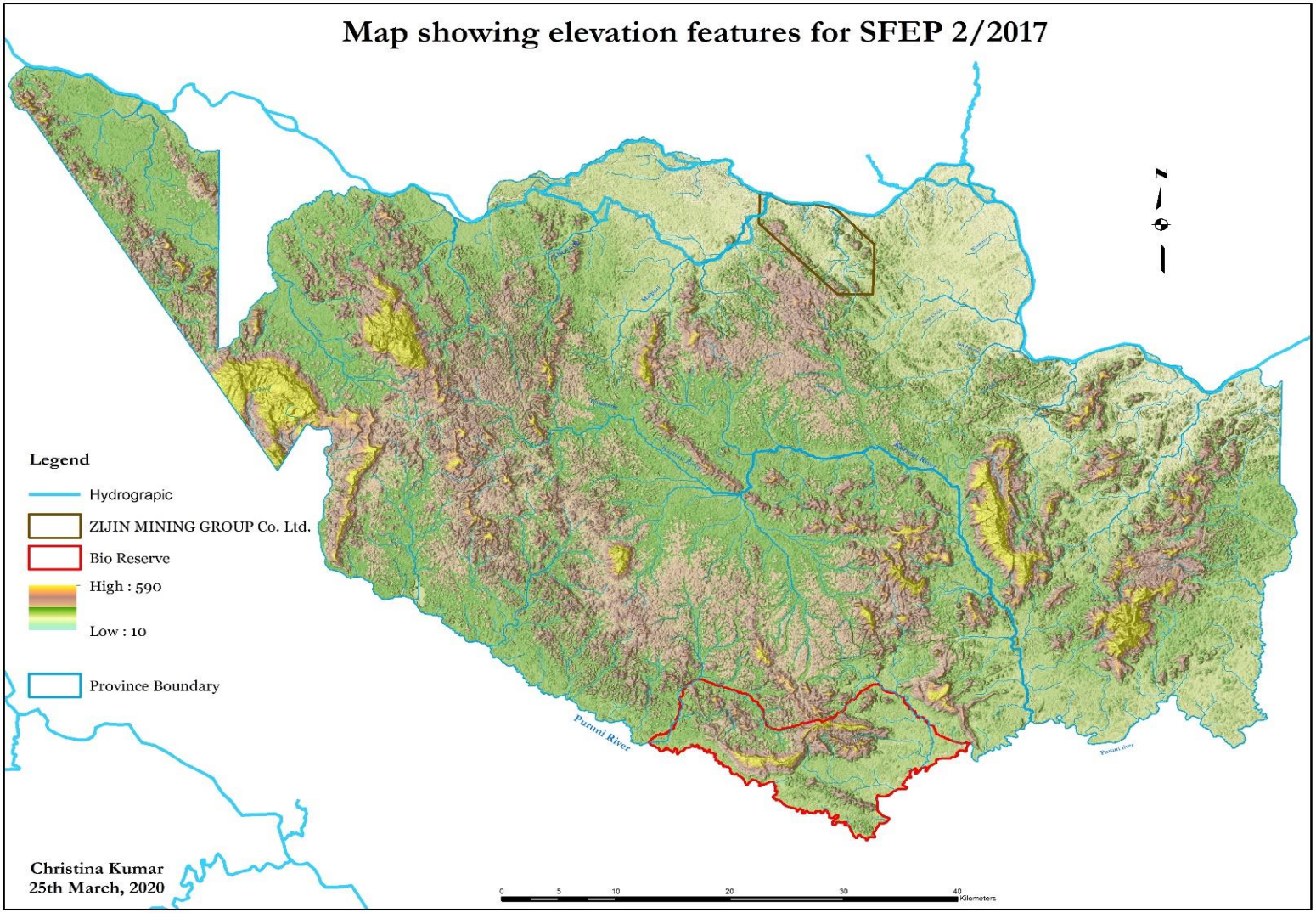


Figure 47: Map showing elevation and core stream pattern-SFEP 2/2017

The Water and Sewerage Act, 2002 provides for the setting up of the ***Hydro Meteorological Department*** whose functions include '*to establish, manage, and operate national systems to monitor the availability, quality and use of surface water and ground water'.*

The Environmental Protection (Water Quality) Regulations (Reg.6/2000) (see Section 5.2.9.1) made under the provisions of the EPA Act require, among other matters the registration and environmental authorization by any person whose construction, installation, operation, modification, or extension of any facility cause the discharge of effluents. Guidelines on the discharge of effluents and disposal of waste are detailed in these regulations.

7.5 Methodology for base line studies undertaken by RLSS.

7.5.1 Challenges

The consultants developed a sampling plan see (Figure 48) that targeted surface water sampling near the mouth of the main rivers in the concession area, because those locations appeared accessible. The intention was that the sampling would be done in two phases: it emerged however that access to areas on the upper right bank Cuyuni River and the upper Left Bank Puruni River was extremely challenging. In addition, sample sites near to major waterways are not always accessible in the rainy season due to flooding for up to 1500m inland during the rainy season.

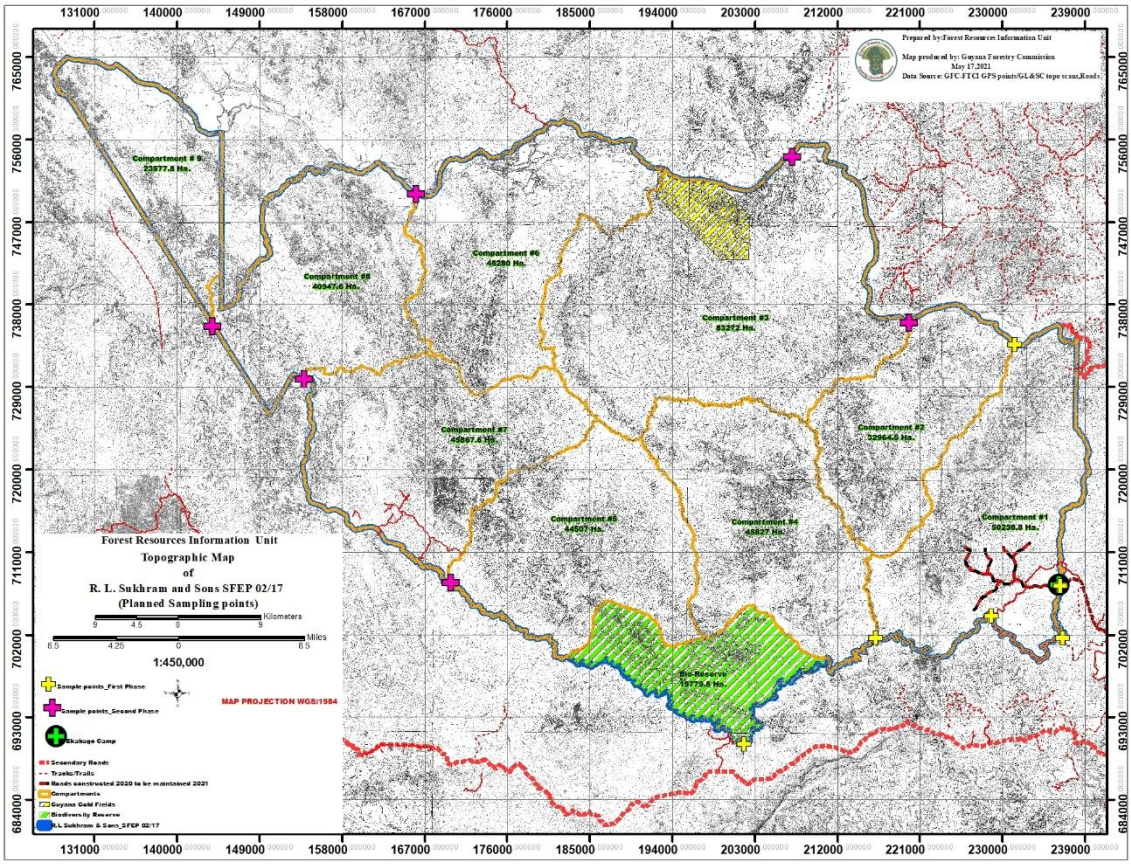


Figure 48: Map showing planned sample points for SFEP 2/2017

For the Puruni River, access beyond Paiyuka Falls in the Puruni River was extremely dangerous and could only be attempted at the peak of the wet season; alternatively, the river was approached by travelling along the Puruni Road west of Puruni Landing, then travelling in a northerly direction to

landings on right bank upper Puruni River, for example at Kumong-Kumong; it was then necessary to rent a boat if available to access left bank Puruni River. Many of the branch roads-constructed by miners- leading off on the northern side of the Kartabu-Puruni Road west of Puruni Landing carry manned or unmanned road barriers; for example the security at ETK's manned barrier refused to allow access to the consultants. The consultants were able to rent a boat at Kumong-Kumong but they could not go past Tumble-Down Falls, about 10km upstream of Kumong-Kumong.

For the Cuyuni River, it was challenging to go beyond Devil Hole because the river widens considerably –assuming a *braid pattern*. At Dukwarri, the braid pattern has a width of up to 4km wide. The official river channel runs along the left bank of the Cuyuni River. The consultants could not find a boat captain willing to traverse *off-channel* parts of the river in the vicinity of the right bank of the River.

In addition, the consultants imposed a 4 day limit on themselves: water samples must be delivered to Kaizen Laboratory in Georgetown not more than four days after their collection in the field.

Finally, the consultants visited the sample sites in September and October respectively but found that it was not always easy, based on the prevailing weather to differentiate between the dry season and the wet season.

To conclude, the issue is that access to the western part of the concession area was a major challenge. Apart from hazards such as rock bars and rock outcrops (see Figure 49), it was difficult to find boat captains willing to travel upstream beyond Devil Hole, Cuyuni River and beyond Kumong-Kumong in the Cuyuni River. Also, inland road access to the central and western parts of the concession area is virtually non-existent. (The consultants were always on the quest to find anyone who knew of any road or path in the western part of concession area).

Figure 49: Photographs showing examples of rock bars and rock outcrops.

7.5.2 Water sample collection

A modest water sample set covering just four (4) sample points was collected; however the sample covered a very large geographic area, including right bank Cuyuni River and left bank Puruni River. (Data for samples collected earlier in 2018 and 2019 were discarded because the parameters were recorded by a different technician and are not compatible with those taken in 2020).

Initial attempts to target water sample collection at the mouth of the main rivers were abandoned after it was observed that the flood plain for the Cuyuni and Puruni Rivers respectively extended

nearly 1500m inland in the rainy season[31]. Further, it is only possible to take wet season and dry season samples at the same location for inland points and these inland points will only become available with road access. It is possible to hike to some locations, as was the case with Sample Rk01; however lugging the required equipment for distances of about 8km over hilly terrain, as well as lugging the additional weight water samples on the return trip, proved quite exhaustive for the engineers collecting samples.

Water samples were collected using **new**, wide mouth polypropylene bottles[32] (see Figure 50). Bottles are discarded after use; they are never reused or recycled.

Figure 50: Photographs illustrating water sample collection, Bio-reserve

Once the proper notation was placed on the bottles, they were stored in a cooler with ice for the trip to Georgetown. Trips were organized in such a way that water samples were not stored for more than four days and special arrangements were put in place to deliver the water samples to Kaizen Laboratory within a few hours of the arrival of the consultants in Georgetown.

Water samples were collected in the *dry season*, three samples were taken during period September 25-27, 2020 and one set was taken on October 9, 2020 on right bank Cuyuni River.

Two sets of water samples were taken at each of the four sampling points reported. One set of the four samples was used for in situ analysis of parameters such as temperature, pH, and turbidity. The values for the respected parameters as recorded Messrs and Andre M^{c} Curdy are reported in Tables 19, 21 for samples taken in September and by Isidro Ubaldo and Shamika Higgins for the sample taken in October in Tables 20, 22). The other set of samples for each location were taken to KAIZEN Environmental Services (Guyana) Inc.'s for analysis of parameters such as pH, Chemical Oxygen, Total Suspended Solids; the values for each parameter analysed by KAIZEN are reported in Annex XXII. The respective locations on the concession area where the samples were taken are shown in Figure 51.

The samples collected were analysed for several parameters which are important and generally used to determine the quality of water, i.e. measurements of pH, Temperature, Biological Oxygen

[31] In June 2021, rising water levels in the Cuyuni River rendered the airstrip at Aurora inoperable.
[32] These were sourced from either Kaizen Laboratory or Gaffons Industries Ltd; in the rare case that the bottles were not available, ordinary new water bottles-based on advice from Kaizen Laboratory - were sourced from Weiting & Richter Ltd.

Demand (BOD), Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), Oil and Grease, Turbidity, Electrical Conductivity, Total Nitrogen, Nitrate and Phosphate Ions were taken to assess the spatial changes of the quality of water.

In the absence of a specific national standard on surface water quality, comparison was made with the Guyana National Bureau of Standards (GNBS) for Industrial Effluent Discharge (see Table 23) as well as internationally acceptable limits from the US-EPA, 1986 standards for Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, the World Bank Group International Finance Corporation (IFC) Environmental, Health and Safety (EHS) Guidelines for Wastewater and Ambient Water Quality, and European Union (EU) 1998 Drinking Water Standards (see Table 24).

Table 19: Water sampling-field data report: Sep 24-29, 2020.

Distribution of copies:	Isidro Espinosa, EES Office File Records	**Sheet No. 207**
1. General		
Location (Site): RL Sukhram and Sons		**Samplers: Isidro Espinosa/ Andre McCurdy**
Sample Date: September 24-29, 2020 Survey		**Observer: Biodiversity and Forestry Team**
Measurement Duration: 6 days		**Sample Type**: Surface Water Quality
2. Field Observations		
Current Weather	Sunny Weather Conditions.	
Relative Humidity	Relative Humidity average of 67 %.	
Ambient Temperature	The Ambient Temperature Reading was between: **23.10 ^{0}C to 24.00 ^{0}C**	
Description of Location	Description of area where Samples were taken/read: The samples were taken around the RL Sukhram and Sons Logging concession to investigate the environmental conditions prior to the logging operations. The Samples SUK-01 and SUK-02 were taken September 25 and 27, 2020. The location coordinates for all the sample points and representative results from Waster Quality Testing infield are shown in the Table 21.	

Table 20: Water sampling-field data report: October 10, 2020

Distribution of copies: (List)	Isidro Espinosa, EES Office File Records	**Sheet No. 307**
1. General		
Location (Site): SFEP 02-2017 (RLSS)		**Samplers: Shamika Higgins**
Sample Date: October 10, 2019 Survey		**Observer: Biodiversity and Forestry Team**
Measurement Duration: 3 days		**Sample Type**: Surface Water Quality
2. Field Observations		
Current Weather	Sunny Weather Conditions.	
Relative Humidity	Relative Humidity average of 66.36 %.	
Ambient Temperature	The Ambient Temperature Reading was between **24.50 ^{0}C to 31.70 ^{0}C**	
Description of Location	Description of area where Samples were taken/read: The samples RLSS-01 were taken in the day of 9 October 2020. The location coordinates for all the samples point and representative results from Water Quality Testing are shown in the following Table 22.	

Table 21: Surface water analysis re samples collected September 25, 27 respectively.

1. Measurements (Raw Data)																	
Surface Water Quality Analysis																	
Sample ID	Clltn. Date	Coordinates		Other Data	Time	Water Parameters Data											
		UTM Values (21N)		Elvtn (meters	Start	T°C	pH	Conductivity µS/cm *0-2000*	Tbdty NTU	DO mg/L	TDS ppm	Total Hardness mg/L*	LEAD mg/L*	Nitrate mg/L*	Cyauric mg/L*	Free Chloride/ Bromide*/ FLUORIDE	Flow Rate m/s
		Easting	Northing														
Suk-01	25/09/20	0227025	0704640	80	08:00	23.5	8.1	82	27.0	5.4	16	50	0	100	30	0.5/10	0.338
Suk-02	25/09/20	0236426	0707600	109	03:55	23.7	7.98	40	28.2	5.4	8	25	0	50	0	0/0	0.090
Suk-03	27/09/20	0193376	0695876	95	16:30	24.0	7.58	99	21.5	5.3	12	25	0	100	30	0/0	0.030
2. Comments: • No constraints during the survey. • Overall Water Quality Assessment: Excellent water quality conditions, suitable for aquatic life, safe for human recreational activities and human consumption with primary treatm Reference: US EPA Standards and World Health Organization Guidelines																	
3. Personnel: Isidro Espinosa/ Andre McCurdy																	
Sampled By: Andre McCurdy/Isidro Espinosa						Checked By: Isidro Espinosa Date : October 22th, 2020											

Table 22: Surface Water Quality Analysis for sample collected October 9, 2020.

1. Measurements (Data)																	
Surface Water Quality Analysis																	
		Coordinates		Other Readings	Time	Water Parameters Data											
Sample ID	Clltn. Date	UTM 21N		Elvtn. (meters)	Start	Temp °C	pH	Conductivity µS/cm *0-2000*	Tbdty NTU	DO mg/L	TDS ppm	Total Hardness mg/L*	LEAD mg/L*	Nitrate mg/L*	Cyauric mg/L*	Free Chloride/ Bromide*/ FLUORIDE	Flow Rate m/s
		Easting	Northing														
RLSS-01	9/10/20	0207085	0752200	45	14:01	28.2	9.81	45.00	127.40	5.40	19.00	50	0	100	0	0.0/10	0.367
2. Comments: • No constrains during the survey. • Overall Water Quality Assessment: Excellent water quality conditions, suitable for aquatic life, safe for human recreational activities and human consumption with primary treatment. Reference: US EPA Standards and World Health Organization Guidelines.																	
3. Personnel: Shamika Higgins																	
Sampled By: Shamika Higgins						Checked By: Isidro Espinosa Date: November 10th, 2020											

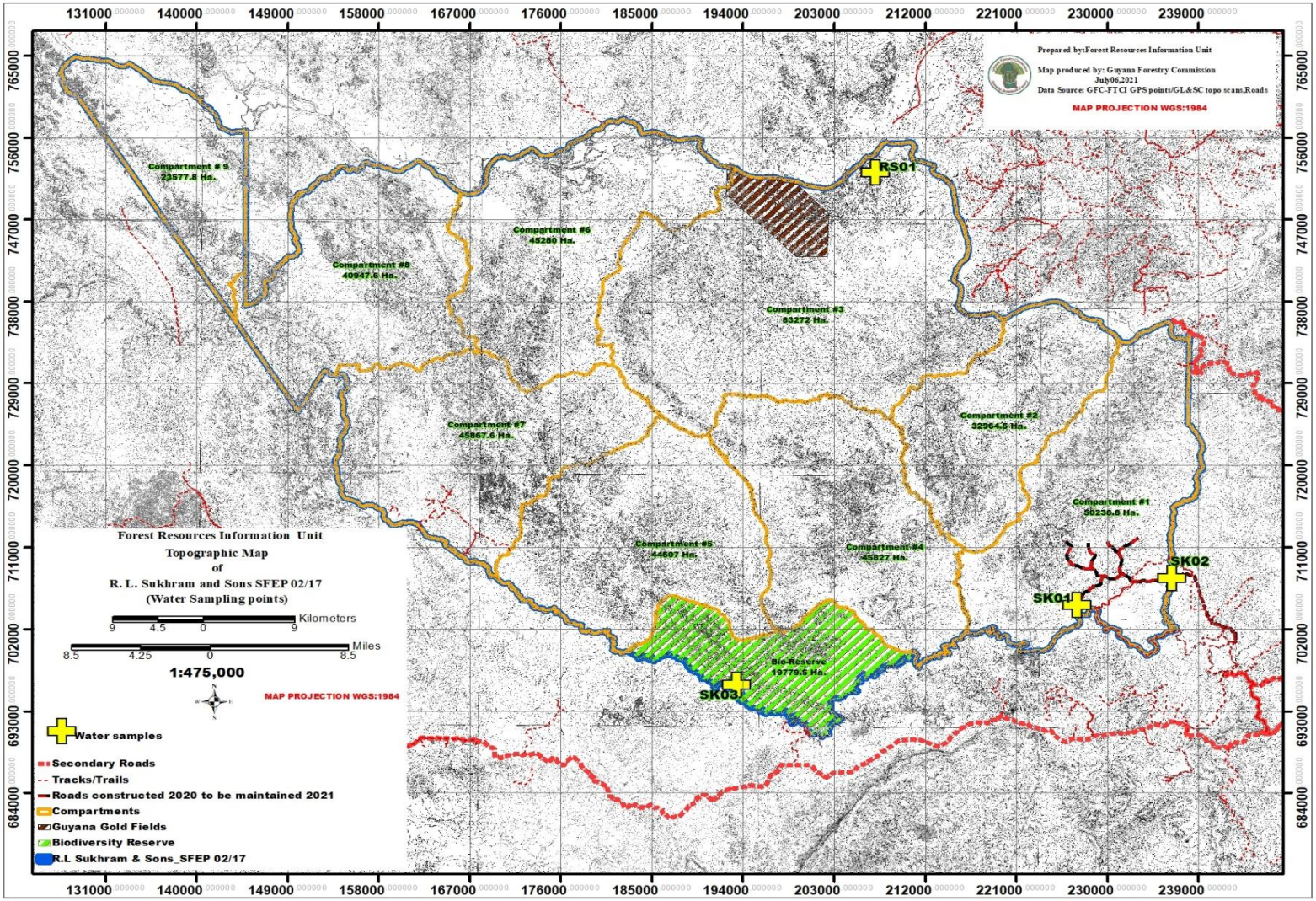


Figure 51: Map showing points where water samples were collected.

Table 23 : GNBS Standards for Industrial Effluent Discharge

Point source discharge Limits for Industrial Effluent for Operations other than Mining, Forestry and Agriculture

Parameter and Maximum Allowable Limits (All values expressed as mg/L except pH, temperature and as otherwise noted)

Sector	pH	Temp.	BOD5	COD	DO	TSS	N as HN3	Total N	P	CN (Tol.)	P04	C1	Surfac-tant	Phenols	Coli-form	O &G	Other and/or Comments
Breweries	5.0-9.0	< 40	<100 (t.v<50)	<250		<100 (t.v. <50)	<50	N as NH3								10	
Cement bagging, manufacturing	5.0-9.0	<40			>4.0	50											WHO Standards for Industries Manufacturing Operations. Turbidity NTU: Max. dy: <150
Citrus processing plants	5.0-9.0	<40	<50	<250		<50	<50									<10	
Distilleries-(a) Blending halls and wineries	5.0-9.0	<40	<50			<50	<50										
Distilleries –(b) Fermentation/Distillation units	5.0-9.0	<40	<500 (t.v. 100)														
Edible oils	5.0-9.0	<40	<50	<250		50		<10								<10	
Meat and seafood processing	5.0-9.0		<100 (t.v.<50)	<250		<100 (t.v. <50)		<50								<30 (t.v.< 10)	
Metal finishers	5.0-9.0	<40				<100 as settle-able solids				<0.5	<10						CD:2.0; Cr(tot):2.0; Hg: 1.0; Cu: 3.0; Pb: 0.1; Zn:3.0; Ni:3.0; Fe:5.0; Ba:10; Cr VI: 0.5
Milk based industries	5.0-9.0	<40	<100 (t.v.<50)	<250		<100 (t.v. <50)	<50									<30 (t.v.< 10)	
Paint and ink manufacturing	5.0-9.0		<100			<100								<1.0		<30 (t.v. <10)	Cu:<3.0; PH.:<1.0; Cr: <2.0; Cr VI: 0.5; Ni: <3.0; Zn: <3.0; Hg:<1.0
Pharmaceutical /chemical production	5.0-9.0			<150	>4.0								<0.2	<0.5		<10	Secondary parameters: No3: 40; SO4 2: 1000; CI: 300; NH4 as N:1.0

Sector	pH	Temp.	BOD5	COD	DO	TSS	N as HN3	Total N	P	CN (Tol.)	P04	C1	Surfac-tant	PHenols	Coli-form	O &G	Other and/or Comments
Petroleum bulk terminal	5.0-9.0	<40	<50	,250		<100										TPH:<40	Pb: 0.1, Cr GT 0,.1 Cr (+A) 05
Printers and photo-processing establishments	5.0-9.0	<40	<30	<150		<50										<10	Ag:0.5; Cd:0.1; Cr VI: 0.1; Cr (tot): 0.5; Cu: 0.5 Zn: 2.0
Soft drinks plants	5.0-9.0	<40	<100 (t.v. <50)	<250		<100 (t.v.<50)	<50										
Breweries	5.0-9.0	< 40	<100 (t.v<50)	<250		<100 (t.v. <50)	<50	N as NH3								10	
Sugar factories	5.0-9.0	<40	<250 t.v.<100	<250	>4.0	<250 (t.v.<100	<250 t.v.<100										
Textiles	5.0-9.0			<250	>4.0	<500 (t.v. 100)						300	<0.2 deter-gents	<0.5	400 MPN Per 100 mls	<10	Cr(tot): 0.5 Cu:0.5; Ni: 0.5; Zn: 2.0; Co: 0.5
Thermal power	5.0-9.0	<40									5	<free Cl: 0.5				<20	WB Stds for metals: Cr (tot): 0.2; Fe: 1.0; Zn: 1.0; Cu: 1.0; New units are to meet these stds. Old units will be phased out within 3 yrs. or pollution equipment will be installed. New WB stds available. No WB std for phosphate, limit taken from India and Sir Lanka.
General environmental guidelines	5.0-9.0	<40	<50	<250		<50 as TSS	<10		<2	<1 Free: 0.1		<Cl: 0.2		<0.5	<400 MPN per 100 mls	<10	WB Std: Fluorine: 20; No limits given for metals.

Table 24: US EPA Standards for Recreation, propagation and maintenance of a healthy, Well-balanced population of fish and wildlife.

(a) Florida USEPA standards for Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife

Florida USEPA standards for Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife		
Parameter	**Fresh**	**Marine**
Phosphorous (mg/L)		≤ 0.1
pH	6.5-8.5	6.5
Faecal Coliform (CFU/100ml/day)	800	800
Dissolve Oxygen (mg/L)	< 5	<5

(b) World Bank Group International Finance Corporation (IFC) Environmental, Health and Safety (EHS) Guidelines for Wastewater and Ambient Water Quality

Pollutants	**Units**	**Guideline Value**
pH	pH	6 - 9
BOD	mg/l	30
COD	mg/l	125
Total Nitrogen	mg/l	10
Total Phosphorus	mg/l	2
Oil and Grease	mg/l	10
Total Suspended Solids	mg/l	50
Total Coliform Bacteria	MPN / 100 ml	400

(c): European Union (EU) 1998 Water Standards

Pollutants	**Units**	**Guideline Value**
Electrical Conductivity	μS/cm	2500

7.6 Results and Discussion

7.6.1 Overview

The modest sample size over a wide geographic area gives a fair assessment of the parameters of the surface water on the concession area. For the results of the surface water quality analysis conducted for RLSS's forest concession, some of the parameters analysed were within the acceptable standards set out in Tables 23 and 24; others were not.

7.6.2 Significance of values

- ***PH*** - The pH analysis done in situ for the surface water samples collected within and around the RLSS' concession in September and October ranged from 7.58 to 9.81, all outside the pH parameters for the limits (5.0 - 9.0 pH) GNBS Guidelines for Industrial effluent into the Environment as well as the US-EPA and World Bank Group IFC EHS Guidelines. However the values obtained from the laboratory tests for the same samples were not only more uniform, ranging from 6.15 to 6.64, and were all within the GNBS guidelines(5-9) as well as the US EPA (6.5-8.5)and World Bank group IFC EHS Guidelines (6-9).
- ***Water Temperature***– The surface water temperature reading ranged from 23.5 to 28.2 ^{0}C during time of collection in the field. All values are within the GNBS accepted range of <40 ^{0}C, which is considered healthy for living organisms.
- ***Total Suspended Solids*** **-** TSS results of the surface water samples collected were within a range of 4.00mg/l to 169mg/l.

  Samples Sk01, Sk02 and Sk03 yielded TSS values of 5.00, 4.00 and 4.33mg/l respectively while Sample Rs01 yielded values a value of 169mg/l. Therefore samples Sk01, Sk02 and Sk03 are within the GNBS range of <50m/l and under the World Bank group IFC EHS Guidelines of 50mg/l. It should be noted that water samples for Rs01 came directly from the Cuyuni River, and below Aurora Gold Mines. *The suspended particles maybe be related with organic matter decomposition and high content of sediment driven by the water flow*.
- ***COD (Chemical Oxygen Demand)*** COD levels of the water samples ranged from <4mg/l to 14mg/l. and were all within the GNBS accepted range of <250 mg/l and the World Bank Group IFC EHS Guidelines of 125 mg/l.
- ***Oil and Grease (OG)*** **-** OG levels of the water samples ranged from 34.2 mg/l – 46.4 mg/l and were well above the GNBS and World Bank Group IFC EHS limits of <10 mg/l. It is apparent that many practices employed by miners, or traders in fuel, (see Figure 52) who are the only people active in the area contribute to inadvertent spillage of oil or grease into the water bodies.

Figure 52: Illustration of practices with a high probability for oil spills

In Figure 52, at left, poor management of the transfer of full and empty fuel containers or their storage possibly causes leakage of oil into the soil and surrounding water bodies. In figure 52, at right, 'floating pumps' are used extensively in the dry season for periods up to 15hours to transfer water from the Puruni River to inland worksites; this widespread practice provides ample avenues for leakage of oil and grease into the river.

- ***Turbidity***- The turbidity level of the water samples ranged from 21.5 to 127.40 ntu. Therefore, the turbidity levels of the water samples were all above the accepted 10 ntu GNBS standards, due to the soil being rich in organic matter-the normal forest conditions, as well as the particulate matter in streams near to mining operations. *High turbidity levels were expected because of particulate matter that is usually prevalent in streams near mining operations. Turbidity generally increases with distance closer to the bank of a stream or flowing canal.*

  Also frequent boat movement in shallow water keeps agitating the water and sediments on the stream bed.

- ***Electrical Conductivity-*** Electrical Conductivity of the surface water samples within the RLSS area ranged from 40 - 99 µS/cm and were all within the European Union (EU) standards for drinking water i.e., 0 - 2500 µS/cm. Most streams range between 50 to 1500 µS/cm. Freshwater streams ideally should have electrical conductivity ranging from 150 - 500 µS/cm to support aquatic life.

- ***Total Nitrogen-*** Total Nitrogen ranged from 0.3mg/l to 0.9mg/l. therefore all values were all below the World Bank Group IFC EHS Guidelines of 10 mg/l.

- ***Nitrates-*** Nitrate levels of surface water samples ranged from 50mg/l to 100mg/l and were all above the accepted range of 10 mg/l.

- ***Total Dissolved Solids (TDS) -*** All sources of natural water contain minerals. These minerals characterise the total dissolved solids in inorganic form or salts like potassium, calcium, magnesium, chlorides, bicarbonates, and sulphates. Heavy metals may be present too but normally in low concentration from natural sources. During the surveys, the values found ranged from 8-19 ppm. Normally the higher values are found in the rainy season due to the water force that develop great mixing of organic and inorganic matter and water.

7.7 Impact prediction and assessment

7.7.1 Overview

Most impacts on water resources are likely to emerge from three situations: soil erosion during earthworks, soil compaction- due to road construction and skidding activity- that forces more surface flow of water rather than its infiltration after rainstorms and the (accidental) discharge of pollutants such as oil and grease on the forest floor.

7.7.2 Impacts from earthworks.

Earthworks include grubbing roadways-felling trees then bulldozing stumps, scarification of the soil surface to remove the root mat, cut and fills on sloping terrain, and compaction. Other impacts come from excavation works for side drains, culverts, bridges and borrow pits.

The hydrological balance in watersheds depend on the nature of the vegetative cover and capacity of the soil to retain water. According to ter Steege et al (1996) the removal of trees during road construction disrupts both the interception of rainfall and the opportunity for plant debris on the soil surface to trap moisture; further grading soil removes root masses and soil fauna which are generally responsible for soil porosity. Ter Steege et al argue that in respect of

changes to the hydrological balance, both interception and uptake are reduced to zero. Soil porosity is further reduced by compaction which in turn is due to deforestation (D'Almeida et al, 2006; ter Steege et al 1996). On sloping terrain, soil particles not protected by leaf litter, may be eroded by rainfall (and even wind) and these particles may enter streams where they modify the physical and chemical properties of the water.

7.7.3 Impacts from Skidding

Skidding is responsible for residual stand damage which impacts forest degradation, soil scouring and soil compaction and therefore the hydrological cycle; less skidding will lead to less compaction (ter Steege, Hans et al 1996) (van der Hout 1999).

7.7.4 Impacts from oil spills, other pollutants

In the use of heavy-duty machines in logging, it is possible to inadvertently spill oils, fuel, and grease. During logging, the accumulation of small spills during routine operations, may seriously contaminate soils and drainage water; all oils, especially diesel migrate quickly through the soil.

7.8 Mitigation and monitoring

RLSS is committed to conserving water resources within the concession area, and conservation measures will be mentioned at every briefing session for field operatives. The Forest Monitoring Officer will be tasked to provide briefing sessions to all employees to instill in them the need to think about conservation of the environment generally and the conservation of water resources.

The company plans five key initiatives to translate its concerns into action (please also see Table 21).

a) **Adherence to the COP**: Guidelines of the COP will be followed to the letter: specifically, Sections 4.4.1-4.4.4 which refers to prescribed buffer zones along waterways; Section 5-*'Construction of road network, drainage structures, and water course crossings'*, Section 8-'*Operational Hygiene', and Section 9 'Camp Hygiene'* will be followed to the letter. At no time whatsoever will vehicles be washed in natural waterways.

b) **Planning versus weather sensitive events**: All earthworks and skidding operations will be planned with great care to reduce the deployment of machines. Road construction and road maintenance works will be avoided during the rainy season.

c) **Side drains**: RLSS will take measures to avoid water running from roadside drains directly into streams; the storm water will be channeled to pits ('dead sumps') at roadside to allow the storm water to infiltrate into the soil rather than flow over land. Another option is to lead the run-off to masses of vegetation, leaf litter or rocks which would help filter out the sediment.

d) **Permanent Monitoring Stations**: Initial plans targeted sites close to the mouth of the main rivers. However, now that the company has been able to assess water levels in the rainy season, RLSS will identify inland points on streams (not impacted by the Cuyuni or Puruni River respectively). Water samples will be taken quarterly, guaranteeing samples during dry spells and also during the rainy season.

e) **Extension works with other land-users (miners**): RLSS will encourage the mining community to respect its earth work practices and to follow its own practices as far as

practicable. RLSS will post advisory signs within selected buffer zones targeting its own operatives, as well as miners.

The forest monitoring officer will be responsible for water conservation practices. Technical inputs will be sought from a duly qualified consultant to retrieve and interpret water quality data.

Table 25: Water quality monitoring plan for RLSS

ACTIVITY	INSTITUTION (S) RESPONSIBLE	FREQUENCY OF MONITORING	LOCATION OF MONITORING
Conduct 'Environmental Awareness sessions' for all field operatives using GFC's Cop.	RLSS(Forest Monitoring Officer)	Quarterly	Ekabago BASE CAMP
Avoid earthworks during the rainy season.	RLSS (Forest Monitoring Officer)	(Several times during the rainy season)	Roadways
Surface water drainage off roads, log markets and other clearings;	RLSS (Forest Monitoring Officer)	Wet season	Roads, skid trails & log markets
Cleaning of drainage structures (bridges, culverts) along roads and skid trails;	RLSS (Forest Monitoring Officer)	Quarterly	Roads, skid trails & log markets
Observance of the integrity of buffer zones along water ways	RLSS(Forest Monitoring Officer)	Quarterly	Current work areas re (AOP)
Data Collection at Permanent Monitoring Stations	RLSS (Forest Monitoring Officer)	Quarterly	Permanent Monitoring Stations
Requirements Transportation (ATV) GPS Device Water bottles Laboratory Services **BUDGET** G$2,500,000.00 per annum (including costs for laboratory analysis)			

NB. Given the size of the area, the time taken to organize trips to riverine areas (particularly in the dry season), and the time taken to collect samples, transport same to Kaizen Laboratory, RAI will opt for quarterly sampling, taking the entire suit of water quality parameters. (Where permanent monitoring stations are degraded or lost due to mining, RAI will, as far as possible, choose another area within 1000m of the permanent monitoring station degraded or lost).

8.0 SOILS, LAND & GEOLOGY

8.1 Overview

The prevailing geology, soil type and landform are critical considerations in planning logging activities. There is substantial correlation between soil type, the natural floristic composition and the occurrence of timber species for any given area: for example root depth and morphological plant features such as buttresses and stilt roots indicate special adaptations to soil and landform. As edaphic characteristics of the soil vary considerably, so do the forest features (Richards, 1998). Variations in forest formations are linked to geology which manifests itself in various ways relating to topography and to the chemical and physical properties of the soil (Whitmore, 1998).

'Soils are a key reservoir of global biodiversity which ranges from microorganisms to flora and fauna. This biodiversity has a fundamental role in supporting soil functions and therefore ecosystems goods and services associated with soil. Therefore it is necessary to safeguard soil biodiversity to safeguard these functions' (FAO, 2020).

The earthworks necessary to construct forest roads for timber harvesting operations coupled with log skidding operations produce considerable impacts on soil, perhaps the major impact being **soil compaction**. Soil compaction decreases the volume of macropores and consequently alters soil structure, penetration resistance, soil pore distribution and bulk density (FAO, 2020). John Hendrison on researching problems with soil compaction on a logging concession in Suriname, reported that after four passes of a skidder on a particular parcel of soil, its bulk density changed from 1.25 g m^{-3} to 1.60 g m^{-3} (ter Steege, Hans et al 1996). Soil microbial activity and biomass are affected by soil compaction: for example, changes in soil bulk density due to compaction affect the burrowing action of macrofauna such as earthworms (FAO, 2020).

Soil conservation practices inform many of the prescriptions in GFC's COP: for example, Section 5.4 Road Construction and Section 9.3 Water ponding. Similarly measures such as those prescribed in Section 8.0: 'Operational Hygiene' of the GFFO, speak to the conservation of water resources through proper soil protection and soil conservation practices.

8.2 Definitions and scope

Geology refers to the science of the solid earth, including the earth's origin and history, materials comprising the earth, and the processes acting within the earth and upon its surface (Strahler & Strahler, 1997).

Soil is the natural terrestrial surface layer containing living matter and supporting or capable of supporting plants (Strahler & Strahler, 1997).

8.3 Baseline information

The entire concession area is part of the local, natural physiographic region designated as *Crystalline Shield Uplands* characterised by highlands, mountains and plateaus (GLASC, 2013).

From a lithological perspective, GLSC (2013) categorizes the geology of the concession area as partly Lower Proterzoic Supracrystals, characterised further by the *Barama-Mazaruni super group* comprising Greenstone Belts-metasedimentary and metavolconic lithology together with younger granites of the Trans Amazonia Tectonic-Thermal event. The Greenstone belts, are a major resource for gold mining operations.

Turning to soil types, detailed thematic soil maps (see Annex X) available at the GFC indicate that Kanhapludults constitute 84.45% of the soil types on the concession area (see Table 26). Kanhapludults are deep, well drained soils with slight to high erosion hazards.

Table 26: Soil types, etc., based on GFC's soil maps for SFEP 2/2017.

#	DESCRIPTION	AREA (HA)	%	REMARKS
1	Endoaquepts	116.19	0.03	Soils with restricted drainage , waterlogged, or alluvial soils
2	Kanhapludults	365,032.11	84.45	Very deep, well drained soils, slight to high erosion hazard
3	Quartzpsamments	5,229.28	1.21	Deep , white sandy soils; excessively drained, low fertility, slight erosion hazard
4	Ustochrepts	8,578.55	1.98	Very deep, well drained soils, slight erosion hazard
5	Ustchrepts	42,759.51	9.89	Deep, alluvial soils, mottled in the subsurface, poorly drained; not suitable for road works.
6	Water bodies	1,503.71	0.35	
7	No data	9,043.26	2.09	
TOTAL		**432,262.6**	**100**	

8.4 Methodology

The consultants collected and analysed soil samples during visits to the concession area. The area selected for each sample was first cleared of litter and then the samples were collected at a depth of about 15cm. Samples were stored in Ziploc bags pending analysis.

8.5 Results

The basic results for the initial data for period September 24-29, 2020 are summarized in Table 27. Soil samples were collected in the vicinity of waterways and those reflected relatively darker hues and higher levels of organic content, than soils at other altitudes that were characterised by a yellow or red colour at other locations (see Figure 53).

Figure 53: Typical colour of soils in the concession area.

8.6 Impact Statement and Assessment

Logging produces physical damage and erosion hazards due to the passage of tractors that compact top soil during skidding of logs and earth works linked to road construction (Richards, 1998).

Table 27: Soil type classification report.

Distribution of copies: Isidro Espinosa EES Office Files		**Sheet No. 207**	
1. General			
Location (Site): RL Sukhram and Sons		**Sampler:** Isidro Espinosa /Andre McCurdy	
Sample Date: September 24-29, 2020		**Observer: Biodiversity and Forestry Team**	
Measurement Duration: 6 days		**Sample Type:** Outdoor/ Soil	
2. Field Observations			
Current weather:	☐ Rainy ☐ Stormy ☑ Sunny ☐ Cloudy ☑ Hot ☐ Cold ☑ Dry ☐ Wet		
Relative Humidity:	Average Relative Humidity during the survey was 63.51%		
Ambient Temperature:	The Ambient Temperature Reading was between **23.10 ^{0}C to 24.00 ^{0}C.**		
Description of Location:	Description of area where Samples were Taken/Read: Samples of soil and measurement of moisture content were taken within the **RL Sukhram and Sons** Logging Concession.		

3. Measurements (Data)

Initial Soil Type Classification

Soil Description

Sample ID	Collection Date	Coordinates UTM, 21N Easting	Northing	Time (24hrs.)	Moisture Content %	Texture	Consistence	Colour	Picture of soil samples collected within logging concession
SUK-01	25/09/2020	**0227025**	**0704640**	10:30	28.3	Loamy/soft	Soft/loose	Dark brown: organic soil	
SUK-02	25/09/2020	**0236426**	**0707600**	15:44	36.3	Clayey/Organic material	Friable/firm	Dark brown/Red: organic soil	
SUK-03	27/09/2020	**0193376**	**0695876**	10:55	34.3	Sandy	Loose/weak	Yellow/White: sandy/quartz	

4. Comments

- **Soil moisture content can be determined by the 'feel' of the soil in the hand. It will vary over time depending on rainfall or irrigation frequency and proximity to the water table.**
- **Soil texture is determined by the proportions of organic material, sand, silt, and clay in a soil. If a soil is dominated by decomposed plant fibers then it is called an organic soil (commonly known as peat). Mineral soils generally have a small amount or no organic material, and are composed of sand, silt and clay.**
- **Soil consistence describes the strength and coherence of a soil.**
- **Soil colour is an easily observed characteristic for determining different types of soil materials. Usually Munsell colour charts are used to place a soil into a colour grouping. For the purposes of this Soil Identification Key a few broad groups were used. Source: Field Manual for Soil Type Identification (2018).**

5. Personnel

Sampled By: Isidro Espinosa/ Andre McCurdy

Checked By: Isidro Espinosa Date: October 22th, 2020

8.7 Mitigation measures

The **forest monitoring officer** will be responsible for overall soil conservation practices.

RLSS's efforts to manage water and waterways are also linked to soil conservation and the two activities will be done at the same time.

Other specific actions will be as follows:

a. All interventions will be planned so that heavy-duty machines will impact the minimal distance possible and for the minimal time possible; major road works will be limited to the dry season. (*Only emergency interventions will be scheduled during the rainy season*).

b. Soil samples will be taken and analysed at the same time as the water samples from the PMS.

c. Staff will be briefed quarterly on the need for proper soil and water conservation practices.

d. RLSS will post signs (see Figure 54) at workplaces to remind staffs about environmental conservation. (**See also Annex XXIII**).

Figure 54: Typical aids for nurturing employees' behaviour in relation to soil conservation.

9.0 AIR QUALITY

9.1 Introduction-Air quality

In the pursuit of its general logging operations RLSS's vehicles will be emitting exhaust fumes and creating dust clouds while traversing roads within and beyond the concession area. Air quality is a major concern for RLSS as it addresses air pollution hazards confronted by its employees and other persons and fauna in the vicinity of its operations.

9.2 Definition and scope

Air pollution may be defined as the contamination of atmosphere by gas-phase and particulate phase substances that results in adverse or undesirable environmental effects (Godish, Davis, & Fu, 2015). The term 'air pollution' covers all air contaminated by substances, whatever their physical state, which are harmful to health or otherwise dangerous (ILO, 1977).

'Air pollution may divided into *natural air pollution* and *anthropogenic air pollution*. Natural air pollution may arise from wild fires, plant and animal decomposition, pollen and spores and even soil erosion. Anthropogenic air pollution arise from human activity such as burning wood, gaseous pollutants from internal combustion engines and waste disposal, and noise' (Artiola, Pepper, & Brusseau, 2004), (Godish, Davis, & Fu, 2015).

Particulate Matter (PM) – are particles suspended in air, also called aerosols, that area capable of entering and being deposited in the human respiratory system, and chronic studies have shown that long term exposure to particulate matter is associated with various cardiac and pulmonary health effects (Godish, Davis, & Fu, 2015). Smaller aerosols travel farther into the respiratory system and generally cause more health effects than larger particles: for this reason, the US EPA has divided airborne particles into two size particles, PM_{10} which refers to particles ≤2.5µm (Artiola, Pepper, & Brusseau, 2004).

Total Suspended Particulates (TSP) - This refers to all particles in the atmosphere that are less than 100 micrometres per cubic meter. The amount of PM10 and PM2.5 are related to the amount of total suspended particulates (TSP) in the air (Alias, Hamzah, and Kenn 2007). Particulate Matter guidelines and standards are instituted (Table 4) due to short term and long-term health effects including premature mortality, chronic respiratory disease, acute respiratory systems, decreased lung functions and aggravated asthma, persistent cough, phlegm, wheezing and physical discomfort (Fierro 2000, p.5) (Alias, Hamzah and Kenn 2007, p.258). These health effects are especially associated with PM10 and PM2.5. The PM10 fraction from TSP can reach the lower regions of the respiratory tract. On the other hand, PM2.5 can absorb more toxic and carcinogenic compounds than larger particles and penetrate more easily deep into the lungs (Alias, Hamzah and Kenn 2007, p.256). Additionally, there is increased harm to the environment as PM is a major source of haze that reduces visibility, causes changes to nutrient and chemical balance of the soil and aquatic environment, erosions and staining of structures (residential, commercial, or cultural monuments) (Hedges 2004, p.58).

9.3 Air Quality Standards/Guidelines

The purpose of the ambient air quality standards are to establish maximum limits on parameters of air quality considered desirable for the preservation and enhancement of the quality of air resources and health (Mecklenburg-County-NC 2012). Air quality standards are set by each country to protect the public health of their citizens and as such are an important component of national risk management and environmental policies. National standards will vary according to the approach adopted for balancing health risks, technological feasibility, economic considerations and various other political and social factors, which in turn will depend on, among other things, the level of development and national capability in air quality management (World-Health-Organisation 2006).

The measured parameters recorded are some of the key indicators generally used to determine air quality. These parameters of primary focus for this assessment are mainly that of Total Suspended Particulate (TSP), Particulate Matter (PM2.5 and PM10), Formaldehyde (HCHO) and Total Volatile Organic Compounds (TVOC). High occurrences and changes in these parameters will aid in providing a good indication or assessment of possible air pollution that can affect the atmosphere and human health. Consequently, the parameter measurements recorded were assessed in comparison with the USA National Ambient Air Quality Standards (NAAQS) (Table 28), the World Health Organization and EAS Inc. Indoor Air Quality Guidelines (Table 29) Source: Air Quality Survey Rice Mill Industries, EES files, Strangroen, Guyana 2019).

Air quality data in Guyana is extremely limited given the constraints relating to the unavailability of equipment and cost associated with this type of data collection. There was no historical air quality data for SFEP 2/2017, however, a preliminary assessment of air quality was done in September 2020 and October 2020, and the data reflected the Total Suspended Particulate (TSP) concentration of the Project location.

9.4 Methodology/Monitoring Procedure

The Total Suspended Particulate (TSP) measurements were taken using the Thermo pDR-1000AN personalDataRAMTM Particulate Monitor (Figures 55 and 56). TSP measurements recorded in milligram per cubic meter (mg/m3), were taken at various sample sites (see Map 3) after a log interval of 5 minutes (Thermo-Electron-Corportation 2005). After the 5-minute interval log time, the real time Concentration value, the Maximum Concentration value, and the Time Weighted Average (TWA) concentration in milligrams per cubic meter (mg/m3) were recorded from each sample site. The wind direction and temperature at time of monitoring at each site was recorded. Conversions from milligrams per cubic meter (mg/m3) to micrograms per cubic meter (µg/m3) were done by taking the milligrams per cubic meter (mg/m3) measurements x 1000 (Hedges 2004, p.23). Micrograms per cubic meter (µg/m3) results were then compared to the United States Environmental Protection Agency (USEPA) 1971 National Ambient Air Quality Standards (NAAQS) for Particulate Matter, as a current TSP limit permissible utilized (See Table 18). Quality assurance and quality control (QA/QC) was practiced, as well as routine parts of the air quality monitoring during the calibration, operation, and maintenance of the monitoring equipment.

Figure 55: Photographs showing consultants engaged in data collection.

Figure 56: Photograph of the Thermo pDR-1000AN personal DataRAMTM Particulate monitor used by EES.

Table 28: National ambient air quality standards (US EPA, 2016).

Parameter	Type	Averaging Time	Level	Form
$PM_{2.5}$	Primary	Annual	12.0 µg/m³	Annual arithmetic mean, averaged over 3 years.
	Secondary	Annual	15.0 µg/m³	Annual arithmetic mean, averaged over 3 years.
	Primary and Secondary	24-hour	35 µg/m³	98th percentile, averaged over 3 years.
PM_{10}	Primary and Secondary	24-hour	150 µg/m³	Not to be exceeded more than once per year on average over a 3-year period.
Total Suspended Particles (TSP)	Primary	24-hour	260 µg/m³	Not to be exceeded more than once per year.
		Annual	75 µg/m³	Annual geometric mean.
	Secondary	24-hour	150 µg/m³	Not to be exceeded more than once per year.
		Annual	60 µg/m³	Annual geometric mean.

Table 29: Indoor air guidelines for TVOC and HCHO (EAS Inc., 2015; WHO, 2010.

Parameter	Guideline		Notes
TVOC	0.3 mg/m³	300 µg/m³	Low Level of Concern
	0.5 mg/m³	500 µg/m³	Accceptable Level
HCHO	0.1 mg/m³	100 µg/m³	Short-term (30 min)

9.5 Results and Discussion

9.5.1 Overview

The Tables 30 and 31 shows the results of Total Suspended Particulates (TSP) concentration, PM2.5, PM10, TVOC and HCHO taken within and around SFEP 2/2017. In addition, values for the Average Concentration, Time Weighted Average (TWA) and Maximum Concentration of the air quality during the monitoring period are presented. Due to restrictions linked to the COVID 19 pandemic, only dry season data was collected.

9.5.2 Total Suspended Particles

Monitoring showed the TSP levels of TWA and Maximum Concentration (Max. Conc.). TWA of the monitored area ranged from 0.00 to 0.003 µg/m3, while maximum concentration ranged from 0.05 to 0.49µg/m3 respectively, during the monitoring period (Tables 30, 31). The values recorded were all below the TSP Air Quality Standard during the monitoring period. It should also be noted that not all of TSP consist of particulate matter harmful to human health then an analysis of PM2.5 and PM10 will describe the air quality and the risk during working conditions.

9.5.3 PM2.5 and PM10

The material particulate in the air with a nominal diameter of 10 micrometres (PM10) and a nominal diameter of 2.5 micrometres (PM2.5) were monitored during the survey exercise (See Tables 30 and 31).

The values for PM2.5 recorded were 6.20, 10.00, 14.00 and 18.10 µg/m3; with two of the values exceeding 12.0 µg/m3 as a primary exposure during an Annual arithmetic mean, averaged over 3 years. Sample Rs01 (with the highest value of 18.10 *µg/m3*) is within a 5km radius of gold mining operations at Aurora , right bank Cuyuni River, while Sample Sk02 (14:00 µg/m3), Ekabago River was within a 2km radius of road construction and base camp construction efforts; and Sample SK01 was within a 5km radius of road construction works.

Particulate material concentrations with a nominal diameter of 10 micrometres found during the survey at RLSS concession are shown in Tables 30 and 31. The range values are from 8.60 to 26.80 µg/m3 in comparison with the standard of 24 hours exposure that is 150 µg/m3, the study indicate that the air is safe and healthy for life within the concession. PM10 density can be higher in comparison with PM2.5 this make them safer to the environment because are more likely to settle to the ground in less time, avoiding or reducing the exposure time.

9.5.4 Formaldehyde (HCHO)

The concentration of the HCHO hydrocarbon at the sample points ranged from 0.018 µg/m^3 to 0.05 µg/m^3, during the monitoring period, all values being below the WHO Guidelines of 100 µg/m^3 short-term (30 minutes). (Formaldehyde is also released to the environment because of natural processes, such as forest fires and natural decomposition of vegetation).

9.5.5 Total Volatile Organic Compounds (TVOC)

Concentration of TVOC at the sample points ranged from 0.41 µg/m^3 to 3.203 µg/m^3, during the monitoring period. Based on the results obtained, it was observed that TVOC readings were below the Guideline of 300 µg/m^3 which is the ideal target for a low level of human health impact.

Generally, in intact forests or monitoring in forest concession before the logging operations, the VOCs come from three main sources, these source indicators by source type are anthropogenic, biogenic, or natural forest wildfire. The anthropogenic activity is low, no forest wildfires were found during the survey, then the data obtained for VOCs came from biogenic source type, meaning produced or brought about by living organisms that populate the forest system.

Table 30: EES: Air Quality-Noise Sampling Field Data Report (a)

Distribution of copies:		**Isidro Espinosa/ EES Office Files**												**Sheet No. 207**			
1. General																	
Location (Site): RL Sukhram and Sons				**Sampler:** Isidro Espinosa /Andre McCurdy													
Sample Date: September 24-29, 2020 Survey				**Observer: Biodiversity and Forestry Team**													
Measurement Duration: 6 days				**Sample Type:** Outdoor													
2. Field Observations																	
Current weather:				Rainy ☐ Stormy ☐ Sunny ■ Cloudy ☐ Hot ■ Cold ☐ Dry ■ Wet ☐													
Relative Humidity:				Average Relative Humidity during the survey was 73.31%													
Ambient Temperature:				The Ambient Temperature Reading was between **24.50 ^{0}C to 36.90 ^{0}C.**													
Description of Location:				Description of area where Samples were Taken/Read: Samples of Air and measurement of noise were taken within RL Sukhram and Sons (SUK).													
3.	**4. Measurements (Raw Data)**																
	Air Quality and Total Suspended Particulate (TSP) mg/m³																
				Time		**Data RAM**			**TEMPO**						**Noise**	**Temp.**	**Elev.**
Sample ID	**Collection Date**	**UTM Coordinates 21N E**	**N**	**Start**	**%RH**	**TWA**	**Max. Con**	**Ave. Con**	**PM2.5**	**PM10**	**HCHO**	**TVOC**	**Direction**	**Speed (m/s)**	**dB Low**	**˚C**	**meter**
SUK-01	**25/09/20**	**0227025**	**0704640**	10:30	85.20	0.00	0.05	0.01	14.00	18.80	0.00	0.43	0.00	0.00	52.60	31.60	24.00
SUK-02	**25/09/20**	**0236426**	**0707600**	15:44	78.40	0.00	0.00	0.00	10.00	13.80	0.05	0.41	0.00	0.00	41.70	28.30	76.00
SUK-03	**27/09/20**	**0193376**	**0695876**	10:55	53.90	0.00	0.49	0.00	6.20	8.60	0.02	0.70	0.00	0.00	46.30	36.90	69.00
5.	**6. Comments**																
The Samples of Air were taken along the concession to have an initial environmental examination of the weather conditions and the quality of Air in the area of study. The data presented in during this survey reflect the quality of the air present conditions. The data assessment reflects an overall good quality of Air RL Sukhram and Sons (SUK).																	
7.	**8. Personnel**	**Sampled By: Isidro Espinosa/ Andre McCurdy**							**Checked By: Isidro Espinosa**				**Date: October 22th, 2020**				

Table 31: EES: Air Quality-Noise Sampling Field Data Report

Distribution of copies: Isidro Espinosa, EES Office Files														**Sheet No. 307**			
9. General																	
Location (Site): SFEP 02-2017 (RLSS)				**Sampler: Shamika Higgins**													
Sample Date: October 09-11, 2020 Survey				**Observer: Biodiversity and Forestry Team**													
Measurement Duration: 3 days				**Sample Type: Outdoor**													
10. Field Observations																	
Current weather:	Rainy ☐ Stormy ☐ Sunny ■ Cloudy ■ Hot ■ Cold ☐ Dry ■ Wet ☐																
Relative Humidity:	Average Relative Humidity during the survey was 66.36%																
Ambient Temperature:	The Ambient Temperature Reading was between **24.50 °C to 31.70 °C.**																
Description of Location:	Description of area where Samples were Taken/Read: Samples of Air and measurement of noise were taken within the SFEP 02-2017 (RLSS) SFEP 01-2017 (RAI) logging concessions.																
11.	**12. Measurements (Data)**																
	Air Quality and Total Suspended Particulate (TSP) mg/m³																
				Time		**Data RAM**			**TEMPO**						**Noise**	**Temp**	**Elev.**
Sample ID	**Collection Date**	**Coordinates (UTM, 21N) E**	**N**	**Start**	**%RH**	**TWA**	**Max. Con**	**Ave. Con**	**PM2.5**	**PM10**	**HCHO**	**TVOC**	**Direction**	**Speed (m/s)**	**dB Low**	**˚C**	**meter**
RLSS-01	**09/10/20**	0206725	0753995	14:01	66.60	0.003	0.008	0.005	18.10	26.80	0.018	3.203	-	-	35.40	31.5	45.00
13.	**14. Comments**																
The Samples of Air were taken along the concessions to have an initial environmental examination of the weather conditions and the quality of Air in the area of study. The data presented in during this survey reflect the quality of the air present conditions. The data assessment reflects an overall good quality of Air SFEP 02-2017 (RLSS).																	
15.	**16. Personnel**	**Sampled By: Shamika Higgins/ Checked By: Isidro Espinosa**											**Date: November 10th, 2020**				

9.5.6 Noise (see also Section 13.0)

Noise pollution is the regular exposure to elevated sound levels that can possibly lead to adverse effects in humans or other living organisms (Environmental Pollution Centre, 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.

Measurement Site: The measurement site must be located at least 3.5m from an acoustically reflective surface other than the ground. If conditions limit the available measurement location to positions within 3.5m of such a surface then the measurement location should be positioned 1 meter from the surface.

Calibration. Collection of data and calibration protocols respectively were conducted according to the Instruction Manual[33]. Calibration exercises are recommended at least once per year. The calibration of a sound level meter is checked at about 94dB (A) using a 100oHz acoustic calibrator. Any variation from the calibration method should be noted. Environmental noise levels are often significantly lower than 94 dB (A).

Noise Level readings. The meter must be set to fast time response and A-weighted frequency response. The results are read directly from the meter's display screen. All measurements should be accompanied by a written record of the measurement conditions.

Time measurements. The time of day of any measurement must be noted to an accuracy of ±5minutes. The duration of any measurement periods for statistical and/or integration measurements must be measured and noted to an accuracy of ±5% of the duration.

The noise levels founded during the survey have the range of 40.3 dB (SA3-20) to a maximum of 73.1 dB (SA3-12) for industrial activities (80 dB night-time and 100 dB daytime) the limits are between the ranges for safety operations.

9.6 Mitigation measures

9.6.1 Overview

The forest monitoring officer will be responsible for mitigation measures targeting air quality. RAI is committed to taking whatever measures are feasible to ensure that air quality remains at tolerable levels, and always within the established ranges.

9.6.2 Concession area

The forest monitoring officer will be responsible for air quality management including addressing complaints from stakeholders and for preparing reports in this regard to the EPA and GFC. Technical inputs will be sought from a duly qualified consultant to take and interpret air quality data. At the *concession level*, dust may not be much of a problem because trucks will make one trip per day and will not travel more than 50km/hr. Every effort will be made to maintain vehicles in a fully functional state so that exhaust emissions are within the projected parameters for the machine.

9.6.3 Permanent Monitoring Stations

Air quality will be monitored initially at the permanent monitoring stations to be implemented by RLSS while water quality and soil quality parameters are taken.

[33] The Manual can be found online

9.6.4 The KPR

On the KPR, the following measures will apply (see also Table 32):

a) Trucks will always travel at speeds < 65km/hr. by day only and will always be using rotating orange beacons on the top of the cab or travel with its main headlights in the 'on' position.

b) Trucks will always slow down to 25 km/hr. near communities, camps or other human dwelling, unless there are humps on the road, in which case when trucks will come to a stop before crossing the humps.

Table 32: Summary of mitigation measures for air quality monitoring, SFEP 2/2017

ACTIVITY	PARTY RESPONSIBLE	FREQUENCY OF MONITORING	LOCATION
Data Collection at PMS	RLSS	Quarterly	PMS
Ensure all vehicles are in a fully functional state	RLSS	Quarterly	RAI B/Camp
Engagement with the mining community, other stakeholders	RLSS	Quarterly	Buckhall
Requirements • Transportation (ATV) • GPS Device • Thermo pDR-1000AN personalDataRAMTM Particulate Monitor • Laboratory Services			
BUDGET G$2,500,000.00 per annum (including costs for laboratory analysis)			

10.0 CLIMATE AND CLIMATE CHANGE

10.1 Overview-definitions, concepts

Climate may be defined as 'a generalized statement of the prevailing weather conditions at a given place based on statistics of a long period of record and including mean values, departure from those means, and the probabilities associated with those departures' (Strahler and Strahler 1997).

Basics of Climate Change. Climate change is one of the defining issues of our time. Greenhouse gases in the atmosphere, including water vapour, carbon dioxide, methane, and nitrous oxide, absorb heat energy and emit it in all directions (including downwards), keeping Earth's surface and lower atmosphere warm. Adding more greenhouse gases to the atmosphere enhances the effect, making Earth's surface and lower atmosphere even warmer (National Academy of Sciences. 2020).

The term ***global warming*** is used to describe the rising temperatures resulting from human activities while the term climate change refers to the complete suite events that will change, including patterns of temperature, wind, and rainfall (Primack and Corlett 2005).

Forests contain a substantial part of the Earth's **carbon**, current rates of forest loss contribute 20% of total emissions of CO_2 (Van Bodegom, Savenije and Wit 2009). According to Richards (1998), forests maintain climatic equilibrium through its impacts on microclimates based on damping effects on wind movement, humidity in the forest environment, temperatures in the forest environment, transpiration, evapotranspiration, and hydrological influences (Richards 1998).

10.2 Introduction-Guyana's climate

Guyana lies on the north-eastern part of South America, between 56°20'W and 61°23'W and 1°10'N and 8°35'N. The climate of Guyana is strongly influenced by the movement of the Intertropical Convergence Zone, and therefore most climatic variables show a bi modality through the year; there are two wet and two dry seasons per year (ter Steege et al, 1996).

On the coastal plain there is precipitation for 200 days per year: 50% of the annual rainfall occurs from mid-April to mid-August, and there is a second wet season December through February (GL&SC, 2013; ter Steege et al, 1996). Annual rainfall varies from about 2,200 mm on the coastal plain to 2800mm inland, although it rises to over 4000mm in the upper Mazaruni/Pakaraima Mountains Area; October is generally the driest month of the year (ter Steege et al, 1996). In the *drier* savannahs there is only one wet season from April to August when annual rainfall ranges from 1400 to 1800mm, most of it occurring from April to May (GL&SC, 2013).

Mean air temperature ranges from 25°C through 27°C throughout the year in most regions except the upland regions on the western edge of the country where mean temperatures range from 20°C through 23°C.

Climate data for Georgetown (on the coastland) and for Dukwarri (on the northern perimeter of the concession area) are presented below (see Figures 57 and 58). A temperature graphs for Dukwarri is shown in Figures 59.

Georgetown's climate is classified as tropical. There is a great deal of rainfall in Georgetown, even in the driest month. This climate is Af according to the Köppen-Geiger climate classification. The average annual temperature is 26.8 °C in Georgetown. About 2363 mm of

precipitation falls annually. Precipitation is the lowest in September, with an average of 84 mm. The greatest amount of precipitation occurs in June, with an average of 330 mm. At an average temperature of 27.6 °C, September is the hottest month of the year. The lowest average temperatures in the year occur in January, when it is around 26.1 °C. Between the driest and wettest months, the difference in precipitation is 246 mm. The variation in temperatures throughout the year is 1.5 °C.

Dukwarri's climate is classified as tropical. Dukwarri is a city with a significant rainfall. Even in the driest month there is a lot of rain. The Köppen-Geiger climate classification is Af. In Dukwarri, the average annual temperature is 26.0 °C. The average annual rainfall is 2183 mm. Precipitation is the lowest in September, with an average of 111 mm. Most of the precipitation here falls in June, averaging 290 mm. At an average temperature of 27.0 °C, September is the hottest month of the year. January is the coldest month, with temperatures averaging 25.2 °C. Between the driest and wettest months, the difference in precipitation is 179 mm. Temperatures vary by 1.8 °C throughout the year.

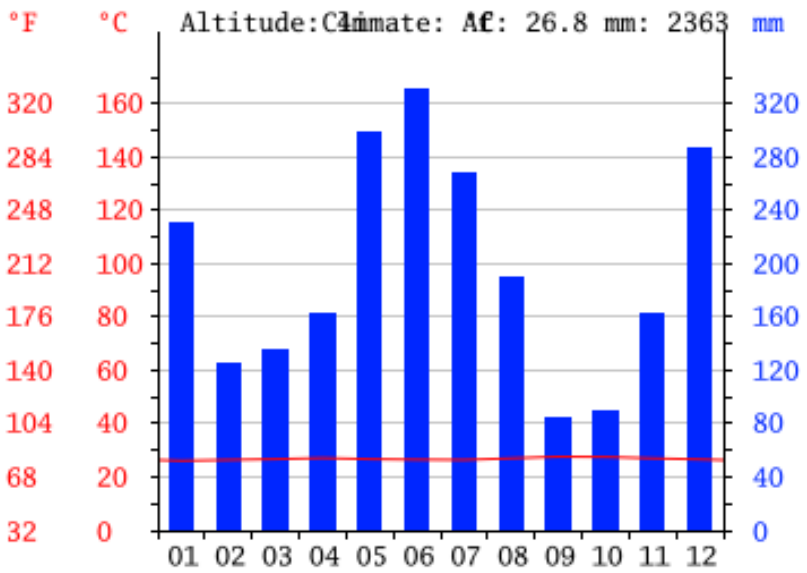


Figure 57: Climograph for Georgetown, Guyana

A Climograph for Dukwarri[34] is presented in Figures 58 and a temperature graph is set out in Figure 59.

[34] https://en.climate-data.org/south-america/guyana/dukwari/dukwari-691343/

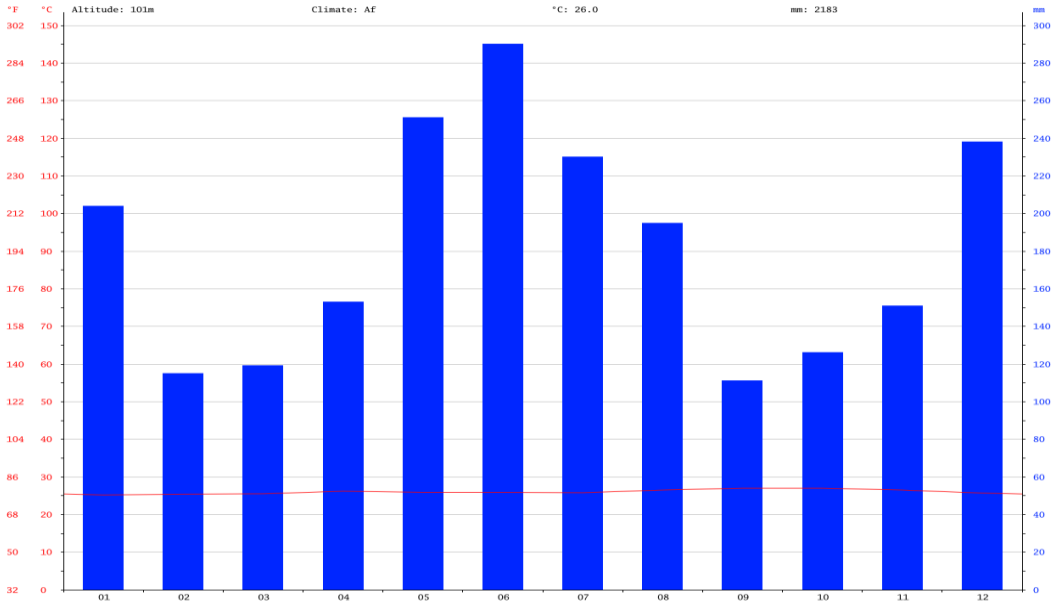


Figure 58: Climograph for Dukwarri, LB Cuyuni River

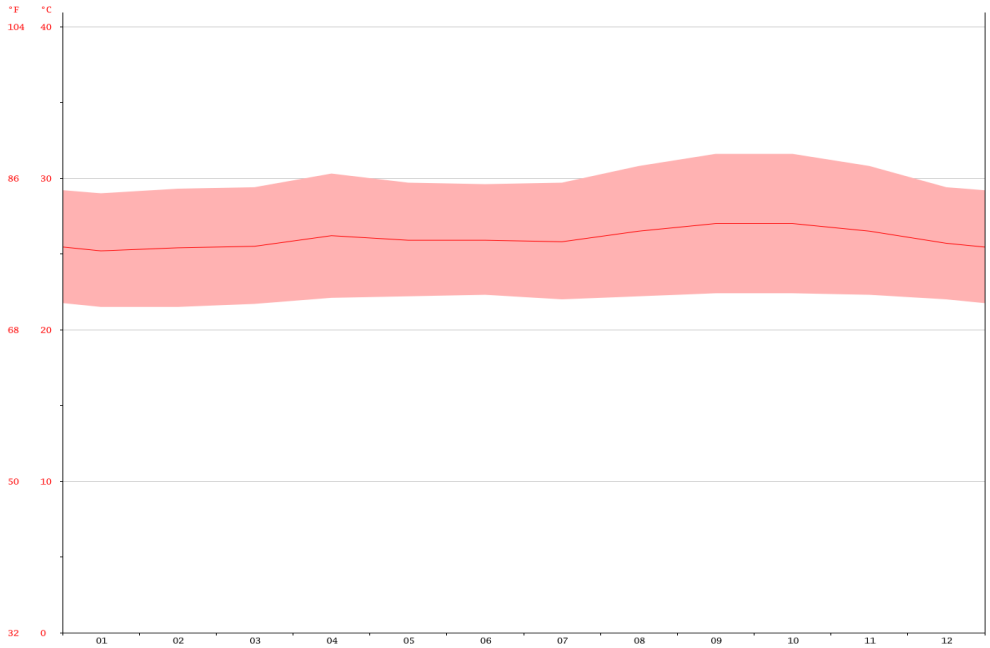


Figure 59: Temperature graph for Dukwarri, LB Cuyuni River.

Climate data dictate operational activities: there is a reduction of most field operations such as tree felling, and road construction and maintenance during the rainy season. The trucking of logs may also be reduced in the rainy season due to visibility hazards during rainfall or due to slippery road surfaces.

10.3 Key relevant policy, legislation, guidelines, standards etc.

Section 24 (h) of the Protected Areas Act, 2011 sets out that Objectives of the National protected Areas System includes '*assist in combatting climate change by*

a) Ensuring that Guyana's existing forests are maintained, and protected degradation and their ecosystem functions are safeguarded;

b) *Promoting the restoration and expansion of Guyana's natural forest cover*

c) *Protecting marine ecosystems*

d) *Protecting freshwater ecosystems and important watersheds*.

The Water and Sewerage Act, 2002 provides for the setting up of the Hydro-Meteorological Department whose functions include 'to establish, manage, and operate national systems to monitor atmospheric conditions, climate change and water resources'.

A Department of Environment and Climate Change (OCC), within the OOTP was established in 2021 to drive the Government's *Green Development Agenda*. The motto for the new department is likely to be the same one used by OCC, '*building the Government's climate resilience'*.

10.4 Global Initiatives to safeguard forests.

Over the years the international community have developed initiatives to help countries with major forest resources to safeguard them on the one hand and on the other to encourage countries with massive industrial bases to put limits on their gas emissions.

According to (Ghazoul and Sheil 2010) the major international and bilateral initiatives to conserve forests are:

a) **Emphasis on conservation areas**: protected area systems, indigenous and extractive reserves, conservation concessions and debt for nature swaps;

b) **Forest conservation and livelihoods**: sustainable forest management, reduced impact logging, forest certification, ecotourism, payment for environmental services (PES), bioprospecting, wildlife management, ecotourism and enterprises based on NTFPS. *Certification is widely advocated as a strategy to conserve the world's forests and the biodiversity which they contain* (Sheil, Douglas; Putz, F; Zagt, R. Eds 2010).

c) **Governance**: combat on corruption, the Kyoto Protocol and REDD+

The UNFCCC was established at the Earth Summit in Rio-de-Janeiro in 1992, followed in 1997 by the more powerful and legally binding Kyoto Protocol (see Table 8).

10.5 Initiatives in Guyana

In Guyana, the Office of Climate Change (OCC), situate within OOTP, works across the Government of Guyana to support work on climate adaptation, mitigation, and forest conservation; it drives the development of the GSDS the advancement of the Government's green agenda; it also and coordinates the Government of Guyana's engagement with international forestry programmes such as the Forest Carbon Partnership Facility, the Forestry Investment Programme and UN-REDD.

A major initiative of the OCC is its engagement with UNDP-which has pledge support for Guyana's 'green' endeavours-to finalize official guidelines for the reduction of Green House Gases (GHG) of municipalities across Guyana. The guidelines were defined in the final draft of the Nationally Appropriate Mitigation Actions (NAMA): greening of Towns in Guyana.

Generally, Guyana-collaboration with international agencies and environmental NGOs, has been very proactive in putting measures in place to contribute to climate mitigation initiatives.

Initiatives include:

a) The establishment of the Iwokrama International Centre, 1996;

b) The establishment of the Environmental Protection Agency (1997);

c) The requirement for ESIAs and/or Environmental Management Plans for large land based or industrial projects;

d) The development of a protected areas system;

e) The development of Codes of Practices for the forestry sectors and the mining sectors respectively;

f) The adoption of *reduced impact logging* as the basic standard for commercial timber operations;

g) The establishment of a Faculty of Earth and Environmental Sciences, University of Guyana, 2017;

h) The establishment of a PES project with Norway;

i) The development of a VPA with the EU (2018)

j) Revised forest policy and forestry legislation that address broader forest values (rather than timber production), 2018.

k) The signing onto many international agreements and conventions (see Table 3);

l) The development of a Low Carbon Development Strategy;

m) The development of a Green State Development Strategy, 2017.

10.6 Initiatives by RLSS

Climate change mitigation requires a shared understanding of the issues and a collective approach to generating solutions for problems as they emerge. A major issue is the availability of data to guide decision makers in adopting prescribed practices.

RLSS will take five approaches to local initiatives to manage climate change:

a) Keep abreast of national policy positions and discussions initiated mainly by the DOE-OOTP:

b) Follow the guidelines, standards and practices recommended by the GFC and the EPA: RLSS will engage directly with the GFC in development of its logging operations and engage with the EPA in reporting on environmental matters.

c) Participate in discussions on sectored initiatives on issues of sustainable forest management climate such as those embodied in formal initiatives like the VPA between GOG and the EU; and

d) Participate in initiatives on waste management, noise abatement or dust nuisances.

RLSS's **forest monitoring officer** will be responsible for managing the company's efforts at climate change mitigation. RLSS's climate change-based initiatives will be linked to data collected on water quality and air quality, respectively.

11.0 BIOLOGICAL RESOURCES

11.1 Overview

RLSS acquired 432, 262.59 ha of forest resources for the purpose of extracting merchantable timber on a sustainable basis. It is critical that interventions made to retrieve merchantable timber do not unduly foster forest degradation or forest fragmentation. In addition, in the course of its logging operations, it is necessary that RLSS works to conserve fauna. Flora and fauna are integral parts of the ecosystem and they are both necessary for its existence. Plants and products are vital for the sustenance of fauna, while fauna is necessary for processes such as flower pollination and seed dispersal.

(It is encouraging that GGI, the major industrial operation within the concession protects the fauna in and around its mining operations at Aurora and monitors mammalian fauna through a network of trail cameras).

11.2 Flora

11.2.1 Desk review-the forest resources

Although the concession area was a part of BCL's TSA 4/91, the area was never logged. Also its remoteness meant that it was shielded from any form of illegal logging. There are several areas along upper left bank Puruni River where miners have either worked or set up landings.

Miners have occupied the right bank Cuyuni River at Aranka Landing and there are several mining camps on upper left bank Puruni River. The miners have used small quantities of timber for the construction of camps, bridges and sluice boxes. Occasionally miners also use timber for reinforcing ATV trails. By and large the volumes used by miners have been insignificant. Apart from mining, the consultants did not detect any other form of land use within the concession area: no agricultural schemes of any kind, no ecotourism resorts, no evidence of widespread storm damage, and no extensive damage due to fire.

The setting up of Aurora Gold Mines was the first major clearance of vegetation within the concession area: the actual property held by AGM is 1.2% of the concession area, but the actual mines area where gold retrieval occurs is probably less than 0.4% of the concession area.

Based on a general report by Hans ter Steege (ter Steege, 2000) on species densities -number of trees per 100ha) for the Cuyuni -Mazaruni District, the most abundant species per 100 ha in the concession area are:

a) Mora (*Mora excelsa):* 593 trees/100ha
b) Wallaba (*Eperua spp)* 545 trees/100ha
c) Greenheart (*Chlorocardium rodiei)* 380 trees/100ha
d) Wamara (*Swartzia spp)* 272 trees/100ha
e) Black Kakaralli (*Eschweilera spp*) 392 trees/ha
f) Kautaballi (*Licania spp*.) 147 trees/ha
g) Baromalli (*Catostemma commune)* 121trees/ha

The concession area embraces the transition between two forest types cited by ter Steege: **Northwest Wet Forests** and **Central Guyana Wet Forests**. For this reason, RLSS will rely on more detailed forest type information available at the GFC (see Table 33, Annex IX.

Table 33: vegetation types recorded for SFEP 02/2017 (source GFC, 2020)

#	Description	Area (ha)	%	Remarks
1	Mixed forest on undulating to hilly terrain	159,171.29	36.8	Productive forests
1b	Mixed forest on flat to undulating terrain	78,124.32	18.1	Productive forests
1c	Mixed forest on deeply dissected terrain	89,869.14	20.8	Productive forests
1h	Mixed forest on high hills	96,652.48	22.4	Designated non-productive pending ground assessment
1p	Low stemmed forests on steep high hills	2,436.58	0.6	Designated non-productive
3	Low swamp	235.12	0.1	Designated non-productive
3b	Mora	246.98	0.1	Productive forests
	No data	5526.70	1.3	Designated non-productive pending ground assessment
		432,262.61		

11.2.2 Perusal of pre-harvest inventory data

An analysis of data from 10 blocks in Compartment 1, enumerated at 100% revealed that just 9% of the species are responsible for 71.5% of the stems with Dbh≥35cm (see Figure 60).

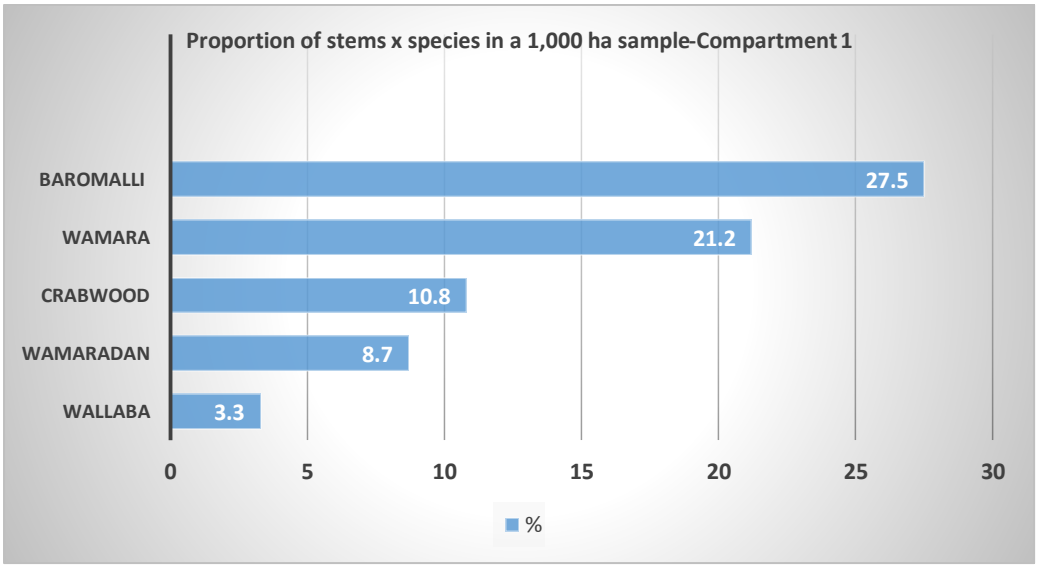


Figure 60: Chart illustrating the relative abundance of five species based on 100% inventories of trees with dbh >=35cm over 1000ha.

11.2.3 Field work

Due to the intact nature of the forest resources, and more particularly the challenges with access, no ML inventory was conducted, particularly as in the case of work on other concessions nearby, the results obtained were very similar to data published by ter Steege ((ter Steege, 2000).

Taking into account the strong prevalence of mining in the area, the priority was to determine the condition of the vegetation, to determine to what extent mining might have impacted on extensive areas of forest, as is the case on left bank Cuyuni River, where extensive areas of forest have been removed through mining in the Aranka and Big Hope districts, or on right bank Puruni River, where extensive mining occurred at Million Dollar Mountain and at Kumong-Kumong. (No such areas exist within the concession, apart from AGM).

However, the consultants did take advantage of RLSS' lines put in for 100% forest inventory to study the species composition.

11.2.4 Main observations

The data set generated from RLSS' pre-harvest inventory data validates the data published by Ter Steege (ter Steege 2000).

There is evidence of extensive overtopping of river banks in the rainy season. *Mora excelsa* is the dominant swamp species in the upper Cuyuni River and the Puruni River. For the Cuyuni the species is associated with Trysil (*Penthaclethra macroloba*), Corkwood (*Pterocarpus spp.),* and Crabwood (*Carapa guianensis*); while for the Puruni River, Mora is strongly associated with Kamarakata (*Acosium nitens*).

Forest gaps and road edges are quickly dominated by light demanding pioneers such as *Cecropia spp*., *Goupia glabra*, and *Vismia spp*. (see Figure 61). Other species typical of road edges include (edible) *Inga spp.* and *Passiflora spp*.

Figure 61: Photograph showing colonization of road edges by Cecropia, etc.

As is typical of forests on rolling terrain, where lianas proliferate due to higher canopy exposure to sunlight, the understory is quite dark. All the popular lianas are in evidence including Monkey ladder (*Bauhinia guianensis)*, Kufa (*Clusia sp*.), Kapadulla (*Tetracera volubris),* and Nibbi *(Heteropsis jenmanni).*

Palms are also very much in evidence: the more popular ones are *Astrocaryum spp*., *Bactris acanthocarpa, Euterpe edulis, Jessenia bataua*, and *Mauritia flexuosa.*

There is a robust understory vegetation, comprising primarily juvenile trees of the species in the canopy layer. However, juvenile trees of the species Mora (*Mora gonggrijpii*), Aromata (*Clathrotropis brachypetala*), Yariyari (*Dugetia spp*) Crabwood (*Carapa guianensis*) and Maho (*Sterculia spp*.) were widespread in understorey of most forest types.

11.2.5 Conclusion

RLSS has been able to validate the data published by Ter Steege, 2000 (ter Steege 2000). RLSS is delighted with the species spread and the opportunity to diversify its operations by engaging in the production of furniture or veneer.

There was no evidence of commercial scale logging. Most mining camps are made from spars (and tarpaulin) but many are also built with chainsaw milled lumber.

Current indications point to an expansion of the gold mining industry and gold output, particularly as the current price of gold is attractive and there is strong policy support for the industry.

Wherever *feasible*, RLSS will use existing roads to reduce forest fragmentation.

11.3 Fauna

11.3.1 Overview

Guyana is a relatively rich country in terms of faunal assets (see Tables 34, 35).

Table 34: Number of vertebrates in Guianan countries (Hammond 2005).

Class	Guyana	Suriname	French Guiana	Guianas
Mammals	**221**	**180**	**191**	**234**
Birds	**752**	**672**	**699**	**812**
Fish, skates, and eels*	**420**	**318**	**334**	**440**
Amphibians	**81**	**94**	**72**	**118**
Reptiles	**140**	**143**	**162**	**206**
Total[35]	**1,426**	**1,365**	**1,416**	**1765**

**Fresh water only.*

Table 35: Number of described mammals, Guianan countries (Hammond 2005).

ORDER	Guyana	Suriname	French Guiana
Marsupialis	15	11	12
Xenarthra	10	10	10
Chiroptera	126	105	109[a]
Primates	8	8	8
Carnivores	16	15	15
Perissodactyla	1	1	1
Artiodactyla	5	5	5
Rodentia	40	25	31
Total	**221**	**180**	**191**

[a] Including a new species and name revisions in Simmon and Voss (1998) and Voss et al (2001).

[35] The computation of the values for totals are not quite clear to the consultants.

Frequent sightings of a variety of fauna have been recorded for the concession area. Meanwhile, no hunters, or evidence of hunters (such as a 'wabini') were observed at any point within the concession area. Also, at no point did the consultants encounter anyone selling wild meat.

11.3.2 Methodology

The consultants travelled frequently in and around the concession area and were able to observe a large number of fauna. In addition, boat captains, miners and RLSS field operatives were consulted about wildlife in the area. Other casual means used to identify fauna were animal tracks and scat.

Formal wildlife surveys were done during period May to September, 2020. For terrestrial surveys one camera was deployed for period March to July 2020 at a point about 8km west of RLSS' Ekabago Base Camp; a second camera was deployed about 10km west of RLSS' for 48 hours.

Nets were used for birds and bats: these were set up for 30-minute periods in shaded areas in the early morning and in the late afternoon. Seines and rods were used for capturing fishes: and the consultants released them as soon as they were extricated from the hook or seine.

Several publications were used to support this baseline study: (Eisenberg, 1989); (Braun, Robbins, & Schmidt, 2007) and (Gallo, 1988).

11.3.3 Results

Images of some of the fauna recorded in the concession area are set out in Figures 62, 63, 64, 65, and 66. Detailed lists are presented in and Tables 36 (Mammals), 37 (Reptiles), 38 (Birds), 39 (Fishes), 40 (Insects) and 41 (Amphibians).

Figure 62: Examples of fishes recorded within the Puruni River, SFEP 2/2017: Red belly Piranha (left), Banana Catfish (right)

Figure 63: Examples of avian fauna recorded in SFEP 2/2017 (*Crax daubentoni*)

Figure 64: Examples of mammalian species in SFEP 2/2017 (Tayassu tajacu)

Figure 65: Examples of mammalian spp encountered at SFEP 2/2017 (Cebus sp.)

Figure 66: Examples of rodents present at SFEP 2/2017: Agouti *Dasyprocta sp.*(left), *Eira barbara* (right)

Table 36: List of mammals recorded in SFEP 1/2017

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R		
1.0 MARSUPIALIA/Opossums								
1.1	DIDEPHIDAE/Didelphinae: Opossums							
1.1.1	Philander opossum	Gray four-eyed opossum				+		
1.1.2	Marmosa murina	Murine mouse Opossum				+		
2.0	CHIRPOTERA/BATS							
2.1	PHYLLOSTOMIDAE							
2.1.1	Carollia perspicillata	Common short-tailed bat	+					
2.1.2	Rhinophylla pumilio	Little fruit bat	+					
2.2	MOLOSSIDAE							
2.2.1	Molossus molussus	Free tailed bat	+					
2.3	EMBALLONURIDAE							
2.3.1	Saccopteryx bilineata	White lined sac winged bat				+		
2.3.2	Saccopterx leptura	Brown Sac-winged bat				+		
3.0	PRIMATES							
3.1	CEBIDAE							
3.1.1	ALOUATTINAE: Alouatta seniculus	Howler monkey	+				II	
3.1.2	CEBINAE: Cebus olivaceus	Wedge-capped Capuchin				+	II	
3.1.3	CEBINAE: Saimiri sciurieus	Squirrel Monkey				+	II	
4.0	CARNIVORA/Carnivores							
4.1	PROCYONIDAE							
4.1.1	PROCYONIDAE: Nasua nasua	South American Coati	+					
4.2	FELIDAE							
4.2.1	PANTHERINAE: Panthera onca	Jaguar		+	+		I	CR
4.2.2	FELINAE Leopardus pardalis	Ocelot				+	I	
4.2.3	FELINAE Puma concolor	Puma					II	
4.2.4	FELINAE Herpailurus yagouaroundi	Jaguarondi				+	II	
5.0	PERISSODACTYLA							
5.1	TAPIRIDAE/Tapirs							
5.1.1	Tapirus terrestris	Tapir			+		II	CR
6.0	ARTIODACTYLA							
6.1	TAYASSUIDAE/Peccaries							
6.1.1	Pecari tajacu	White-lipped peccary				+	II	
6.1.1	Tayassu tajacu	Collared peccary				+	II	

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R		
6.2	CERVIDAE/Deer							
6.2.1	Mazama americana	Red brocket deer	+					
6.2.2	Mazama gouazoubira	Gray brocket deer						
7.0	RODENTIA							
7.1	DASYPROCTIDAE							
7.1.1	Dasyprocta agouti	Red-rumped agouti	+					
7.2	AGOUTIDAE							
7.2.1	Agouti paca	Paca				+		
7.3	SCIURIDAE							
7.3.1	Sciurus aestuans	Guianan squirrel				+		
8.0	XENARTHRA							
8.1	DASIPODIDAE							
8.1.1	Dasypus septemcinctus	Armadillo	+					

Method of detection: S-seen; Heard T-Track/Sign; R-reported.

Table 37: List of reptiles recorded in SFEP 1/2017

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R	I	II
1.0	LEPTODACTYLIDAE							
1.1	Eleutherodactylus sp.							
1.2	Leptodactylus knudseni							
1.3	Leptodactylus sp.							
2.0	TEIIDAE							
2.1	Ameiva ameiva	Lubo lizard	+					
2.2	Kentropyx calcaratus	Forest lizard	+					
3.0	GEKKONIDAE							
3.1	Hemidactylus mabouia	Skink lizard				+		
4.0	TROPIDURIDAE/Lizards							
4.1	Tropidurus hispidus					+		
4.2	Plica plica	Forest lizard	+					
4.3	Plica umbra	Forest lizard	+					
5.0	Amphisbaenidae							
5.1	Amphisbaenidae alba					+		
6.0	DENDROBATIDAE							
6.1	Epipedobatuss femoralis		+					
7.0	COLUBRIDAE/Serpents							
7.1	Chironus carinatus	Black racer				+		
7.2	Leptophis ahaetulla	Vine snake	+					
8.0	BOIDAE							
8.1	Corallus caninus	Emerald tree boa				+		
8.2	Boa constrictor	Land Camoudi				+		
8.3	Epicrates cenchria	Rainbow boa				+		
9.0	VIPERIDAE/							
9.1	Laches muta	Bushmaster				+		
9.2	Bothrops atrox	Labaria	+					
10.0	ALLIGATORIDAE							
10.1	Melanosuchus niger	Black caiman				+		
11.0	TESTUDINIDAE							
11.1	Geochelone denticulata	Yellow foot turtle	+					
14.0	IGUANIDAE							
14.1	Iguana iguana	Iguana	+					LC

Table 38: List of avian fauna encountered in SFEP 1/2017

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R		
1.0 ACCIPITRIDAE: Hawks, Eagles								
1.1	Ictina plumbaea	Plumbeous kite	+					
1.2	Leucoternis albicollis	White hawk	+					
1.3	Elanoides forticatus	Swallow tailed kites	+					
1.4	Spizaetus tyrannus	Black hawk eagle	+					
2.0 AOPDIDAE: Swifts								
2.1	Chaetura spinicaudus	Band rumped swift	+					
3.0 BUCCONIDAE: Puffbirds								
3.1	Nonarchus tectus	Pied puffbird	+					
3.2	Bucco capensis	Collared puffbird	+					
4.0 CRAPRIMULGIDAE: Nighthawks, Nightjars								
4.1	Caprimulgus nigricans	Blackish nightjar	+					
5.0 CARDINALIDAE: Grosbeaks, Saltators								
5.1	Saltator grossus	Slate coloured grosbeak	+					
5.2	Cyanocompsa cynaoides	Blue-black grosbeak	+					
5.3	Caryothraustes canadensis	Yellow-green grosbeak	+					
6.0 CATHARTIDAE: Vultures								
6.1	Cathartes melambrotus	Greater yellow head vulture	+					
6.2	Sarcoramphus papa	King Vulture	+					
7.0 COLUMBIDAE: Pigeons, Doves								
7.1	Patagioenas plumbea	Plumbeous pigeon	+					
7.2	Leptotila rufaxilla	Gray fronted Dove	+					
7.3	Patagioenas subvinacea	Ruddy pigeon	+					
8.0 COTINGIDAE: Cotingas								
8.1	Querula purpurata	Purple throated fruit crow	+					
8.2	Lipaugus vociferans	Screaming pia		+				
9.0 CRACIDAE: Curassows, guans								
9.1	Penelope sp.	Spix's guan	+					
9.2	Crax alector	Black Curassow	+					
10.0 CUCULIDAE: Cuckoos								
10.1	Piaya melanogaster	Black bellied cuckoo	+					
11.0 EMBERIZIDAE: Emberizine Finches								
11.1	Oryzyborous angolensis	Chestnut bellied seed eater		+				

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R		
12.0 FALCONIDAE: Falcons, Caracaras								
12.1	Falco rufigularis	Bat falcon		+				
12.2	Ibycter americanus	Red throated caracara	+					
12.3	Herpetotheres cachinnans	Laughing falcons		+				
13.0 FORMICARIDAE: Ground Antbirds								
13.1	Formicarius analis	Black face ant thrush	+					
13.2	Hylopezus macularis	Spotted Antpitta	+					
14.0 FRINGILLIDAE: Cardueline finches								
14.1	Euphonia cayennensis	Golden sided euphonia	+					
14.2	Euphonia plumbea	Plumbeous euphonia	+					
15.0 FURNARIIDAE: Ovenbirds								
15.1	Dendrocolaptes certhia	Amazon barred wood creeper	+					
15.2	Xiphorhynchus pardalotus	Chestnut rumped wood creeper	+					
16.0GALBULIDAE: Jacamars								
16.1	Galbula dea	Paradise Jacamar	+					
16.2	Jacamerops aureus	Great Jacamar	+					
17.0 ICTERIDAE: New World Black birds								
17.1	Psarocolius viridis	Green Oropendola	+					
18.0 PARULIDAE: Wood warblers								
18.1	PHaeothlypis rivularis	Riverbank warbler	+					
19.0 PICIDAE: Woodpeckers								
19.1	Melanerpes cruentatus	Yellow tufted woodpecker	+					
19.2	Dryocopus lineatus	Lineated woodpecker	+					
19.3	Celeus undatus	Waved woodpecker	+					
19.4	Piculus flavigula	Yellow throated woodpecker	+					
19.5	Piculus chrysochloros	Golden green woodpecker	+					
19.6	Campephilus rubricollis	Red necked woodpecker	+					
20. PSITTACIDAE: Parrots								
20.1	Touit batavicus	Lilac tailed parakeet	+					
20.2	Brotogeris chrysoptera	Golden winged parakeet	+					
20.3	Gypopsitta caica	Caica parrot	+					
20.4	Amazona dufresniana	Blue cheeked parrot	+					

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R		
20.5	Pionus menstrus	Blue headed parrot	+					
20.6	Amazona farinosa	Mealy parrot	+					
20.7	Ara chloropterus	Red and green macaw	+					
20.8	Pionus fuscus	Dusky Parrot	+					
20.9	Pionites melanocephalus	Black headed parrot	+					
21.0 PSOPHIIDAE: Trumpeters								
21.1	Psophia crepitans	Gray winged trumpeter	+					
22.0 RAMPHASTIDAE: Toucans								
22.1	Pteroglossus viridis	Green aracari	+					
22.2	Ramphastos vitellinus	Chanel billed toucan	+					
22.3	Pteroglossus aracari	Black necked aracari	+					
22.4	Selenidera culik	Guianan toucanet	+					
22.5	Ramphastos tucanus	White throated toucan	+					
23.0 THAMNOPHILIDAE: Typical antbird								
23.1	Cymbilaimus lineatus	Fasciated antstrike	+					
23.2	Thamnophilus murinus	Mouse coloured antstrike	+					
23.3	Thamnophilus doliatus	Barred antstrike	+					
23.4	Ceromacra tyrannina	Dusky antbird	+					
23.5	Myrmeciza ferruginea	Ferruginous backed antbird	+					
23.6	Herpsilochmus stictocephalus	Todd's antwren	+					
23.7	Myrmotherula menetriesii	Gray antwren	+					
24.0 THRAUPIDAE: Tanagers								
24.1	Ramphocelus carbo	Silver beaked tanager	+					
24.2	Tangara punctata	Spotted tanager	+					
24.3	Coereba flaveola	Bananaquit	+					
24.4	Tangara velia	Oral rumped tanager	+					
25.0 TINAMIDAE: Tinamous								
25.1	Crypturellus variegatus	Variegated Tinamou	+					
26.0 TROCHILIDAE: Hummingbirds								
26.1	PHaethornis superciliosus	Long tailed hermit	+					
26.2	PHaethornis ruber	Reddish hermit	+					
26.3	Topaza pella	Crimson topaz	+					
27.0 TROGLODYTIDAE: Wrens								

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R		
27.1	Henicorhina leucosticta	White breasted wood wren	+					
28.0 TROGONIDAE: Trogons								
28.1	Trogon viridis	Green backed trogon	+					
29.0 TYRANNIDAE: Flycatchers								
29.1	Tomomyias poliocephalus	Gray crowned flycatcher	+					
29.2	Myiopagis gaimardii	Forest Elaenia	+					
29.3	Colonia colonus	Long tailed tyrant	+					
29.4	Tyrannus melancholicus	Tropical king bird	+					
29.5	Zimmerius gracilipes	Slender footed tyrannulet	+					
29.6	PHilohydor lictor	Lesser kiskadee	+					
30.0 VIREONIDAE : Vireos								
30.1	Hylophilus thoracicus	Lemon chested greenlet	+					
30.2	Vireolanius leucotis	Slaty-capped shrike vireo	+					
30.3	Hylophilus musicicapinus	Buff-cheeked greenlet	+					

Table 39: List of Fishes recorded within SFEP 1/2017.

#	SCIENTIFIC NAME	COMMON NAME	IDENTIFICATION			CITES	IUCN
			S	R	O		
1	SERRASALMIDAE						
1.1	Serrasalmus nattereri		+				
1.2	Metynnis hypsauchen						
2	LORICARIIDAE		+				
2.1	Ancistrus spp						
3	ERYTHRINIDAE						
3.1	Erythinus erythrinus	Yarrow	+				
3.2	Hoplias malabaricus	Huri	+				
3.3	Hoplias marcpthalmus	Haimara	+				
4	CYNODONTIDAE						
4.1	Hydrolicus scomperoides	Biara	+				
4.2	Leporinus falcatus		+				
5	CICHLIDAE						
5.1	Cichlasoma festivum	Patwa	+				
5.2	Crenicichla alta	Sunfish	+				

Table 40: List of insects recorded within SFEP 1/2017

#	SCIENTIFIC NAME	COMMON NAME	IDENTIFICATION				CITES	IUCN
			S	H				
1.0	COLEOPTERA/ Beetles							
1.1	1.1 CERAMBYCIDAE							
1.1.1	1.1.1 Long horned beetles		+					
1.2	1.2 CURCULIONOIDEAE							
1.2.1	1.2.1 Snout beetles		+					
2.0	LEPIDOPTERA/Butterflies		+					
3.0	HEMIPTERA/Cicadas, etc		+					
4.0	ORTHOPTERA/Grasshoppers		+					
5.0	MANTODEA/Praying Mantis		+					
6.0	ODONATA/Dragonflies		+					
7.0	HYMENOPTERA/Ants, bees, etc		+					
8.0	DIPTERA/Flies		+					

Table 41: List of amphibians recorded at SFEP 1/2017

#	SCIENTIFIC NAME	COMMON NAME	METHOD OF DETECTION				CITES	IUCN
			S	H	T	R	I	II
1.0	BUFONIDAE/Toads							
1.1	Bufo marinus	Common Toad	+					
1.2	Bufo guttratus	Land toad	+					
2.0	HYLIDAE/Frogs							
2.1	Hyla granosa	Tree frog	+					
2.2	Hyla boans	Barking frog		+				

11.4 Impact Assessment

11.4.1 Flora

A major impact of the selection system of timber harvesting based on diameter limits for merchantable trees, the selection of merchantable species, and the selection of trees of good form, is the *high grading* or *creaming* of the logged forest((Fimbel, Grajal, & Robinson, 2001). Logging robs the forest of the best (quality) trees. To attempt to counter act such creaming in Guyana , a maximum yield per hectare, felling cycles and site restrictions are prescribed (GFC, 2018); for example, in Guyana, a maximum of 20m^3/hectare for a felling cycle of 60 years is applied. Logging also removes trees from the forest at a faster rates of natural mortality.

Logging disrupts ecological relationships between plant species by brutally changing understorey conditions within a few minutes, and over a period of the roughly 20 days it takes to harvest a 100ha, major changes in habitats and plant niches occur.

Road building operations and timber harvesting leads to forest degradation and the alteration of microclimate (in terms of wind, humidity temperature and light conditions in the understory. The sudden shock in the understorey influences seed germination and seedling development. The combination of numerous gaps and disrupted soil surface facilitate the establishment of pioneer species (for example *Goupia glabra*[36], *Renialmia spp*, *Miconia spp,* and *Trema spp)* which eventually influence the floristic composition of the forest in the long term (ter Steege, Hans et al 1996).

The removal of logs during timber harvesting tasks represents a loss of nutrients for the soil as well as plant genetic material; trees of good form are normally harvested so perhaps the best genetic material may be exported.

Poorly executed logging and skidding damages residual trees and may unwittingly produce forest gaps and forest fragmentation which creates a modified, mostly unfavourable environment for seedlings of merchantable species that thrive in shade.

The short term and long term effects of RIL based, sustainable logging is a function of the forest type, the patchiness of species distribution, soil type, slope position, and care taken with directional felling and skidding operations respectively. Forest fragmentation represents the worst scenario wherever sustainable logging is practiced. (Forest fragmentation due to logging in Guyana is rare).

11.4.2 Fauna

The species composition of gaps is an indicator of animal activity: for example, the seeds of Burburu (*Solanum stramonifolium*) are dispersed by bats, birds, and monkeys (van Andel 2000)

One reason that fauna thrives in tropical forests is that forests provide innumerable habitats and niches: for example, many animals dwell only at the ground level (tapir, deer, agouti), others dwell at mid-storey /understorey (squirrels, monkeys) and others dwell in the canopy itself (eagles, sloths) (Whitmore 2012). Some animals are active only by day, some only by night and some are active by day and by night (tapir, jaguars, peccaries) (Whitmore, 2012).

Logging directly impacts forest dependent wildlife through the destruction or degradation of habitats, disruption of faunal movements, and interruption of ecological interactions between organisms…..the intensity of impact of these 'disruptions' depend a great deal on the species of animals and their capacity to adapt quickly to changes (Fimbel, Grajal and Robinson 2001).

The consultants think that old camp grounds and old farms or kitchen gardens are frequented by many kinds of animals. Deer and tapir have been encountered frequently on RLSS' access roads as they forage on new roadside vegetation such as Cecropia spp.

11.5 Mitigation and Monitoring Measures

For flora, RLSS will follow strict RIL practices, **planning all interventions** in the forest resources and paying special attention to *directional tree felling* and *skid trail planning*. RLSS will make every effort to avoid water ponding in any form which restricts tree growth.

RLSS will take measures, for example 'no hunting policies', to protect all fauna-animals, including bats- that aid in seed dispersal and ultimately foster the regeneration of trees.

[36] This is a commercial species, but the mass of seedlings does not always translate into well stocked stands of the species.

RLSS's employees will be forbidden from lighting fires on the forest floor.

Based on RIL, forest degradation may be regarded as 'commercial degradation'. The residual forests continues to carry out all forest functions and while some ecological relationships are destroyed, new ones emerge.

For fauna, RLSS's field operatives would *avoid* confrontation with fauna; vehicles will always stop and allow animals crossing the road to do so safely; this applies particularly to snakes, sloths, anteaters, and ground dwelling birds. **Strict no hunting and no fishing policies will be enforced by RLSS**. Signage to this effect will be posted along the primary roads. (RLSS and its consultants will rely on trail cameras for all future work related to wildlife censuses at the monitoring stations or elsewhere).

Forest gaps stymy the movement of fauna that will not use open spaces (Fimbel, Grajal and Robinson 2001). Every effort will be made to avoid gaps and fragmented forests. Prescriptions of the COP regarding logging operations (Chapter 6) operational hygiene (Chapter 8) and Camp Hygiene (Chapter 9) will be followed. Field operatives will be encouraged to take an interest in fauna. Registers will be kept at the base camp where field operatives can record sightings of mammals.

12.0 ECOSYSTEM SERVICES

12.1 Introduction

Natural ecosystems develop over long periods through the process of ecological succession; also environmental changes occur naturally and are part of or the result of multiple cycles and interactions (Artiola, Pepper, & Brusseau, 2004). Ecosystem services are the multitude of benefits that nature provides to society (FAO, ITPS, GSBI, & EC, 2020).

RLSS values the overarching benefits of the forest environment on our livelihoods. RLSS recognizes the efforts of local and international agencies that foster a heightened awareness of the critical need for the conservation of (tropical) forest resources. RLSS has studied the value of non-timber resources and benefits and supports GFC's development of forest policies, forest management standards and guidelines that prescribe forest conservation during timber harvesting. RLSS ensures that it keeps abreast of the national and international discussion on biodiversity, the conservation of natural landscapes and issues of climate change. RLSS is passionate about sustainable forest management and its employees pay close attention to local and global developments on sustainable forest resources management.

12.2 Definitions and scope

Strahler and Strahler (1996) define '*ecosystem' as* a 'group of organisms and the environment with which the organisms interact'. The livelihoods human societies are highly dependent on biodiversity and the ecosystem services it provides (FAO, ITPS, GSBI, & EC, 2020).

The Protected Areas Act, Act 14 of 2011, defines an ecosystem as *'the dynamic complex of animal, plant and microorganism communities and their non-living environment interacting as a functional unit'*.

An ecosystem comprises 'all *plants, animals and micro-organisms in an area together with their physical environment, interacting as a functional system'* (ITTO/IUCN 2009).

Three terms are also worth looking at: ***'Ecosystem approach'*** is 'a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (ITTO/IUCN 2009); ***'Ecosystem management***' refers to the integrated management of an ecosystem (ITTO/IUCN 2009); and **'Ecosystem services'** refer to the direct and indirect contributions of ecosystems to human well-being; the concept *'economic goods and services'* is synonymous with ecosystem services (TEEB 2010).

An ecosystem refers to a set of biotic and abiotic components woven together in such a way that the system sustains itself. The biotic components refer to animals, plants, and micro-organisms while the abiotic components refer to edaphic and atmospheric parameters, respectively.

The coexistence of plants and animals in the forest environment lead to the following:

(a) *plant-plant* interactions (such as epiphytic plants or parasitic plants on a host tree),

(b) *animal-plant* interactions (such as animals feeding on plants or their fruits, bees pollinating flowers or birds disseminating seeds); and

(c) *animal-animal* interactions (such as predation, for example carnivores feeding on herbivores)

For local tropical forests, abiotic components include:

a) ***Soil***-which provide mechanical support to plants, facilitate their growth through nutrient cycling processes from the weathering of primary rock, the decomposition of organic material and the leaching of solutes (Richards, 1998). Soil ph., soil temperature, soil moisture, soil texture and water retention capacity are also major factors influencing plant growth and soil biology. Edaphic properties are frequently linked to landform; for example, the classification of montane and sub-montane forests is based on altitude. Certain edaphic properties (soil texture, ph., extremely free drainage, or impeded drainage due to hardpans) in association with landform may severely restrict the nature of the vegetation present. David Hammond (2005) refers to the Guiana Shield as a vast expanse of low-land forests, mountains, wetlands, and savannah (Hammond 2005). The diversity of forest types in Guyana (see Figure 67) is aligned to terrain.

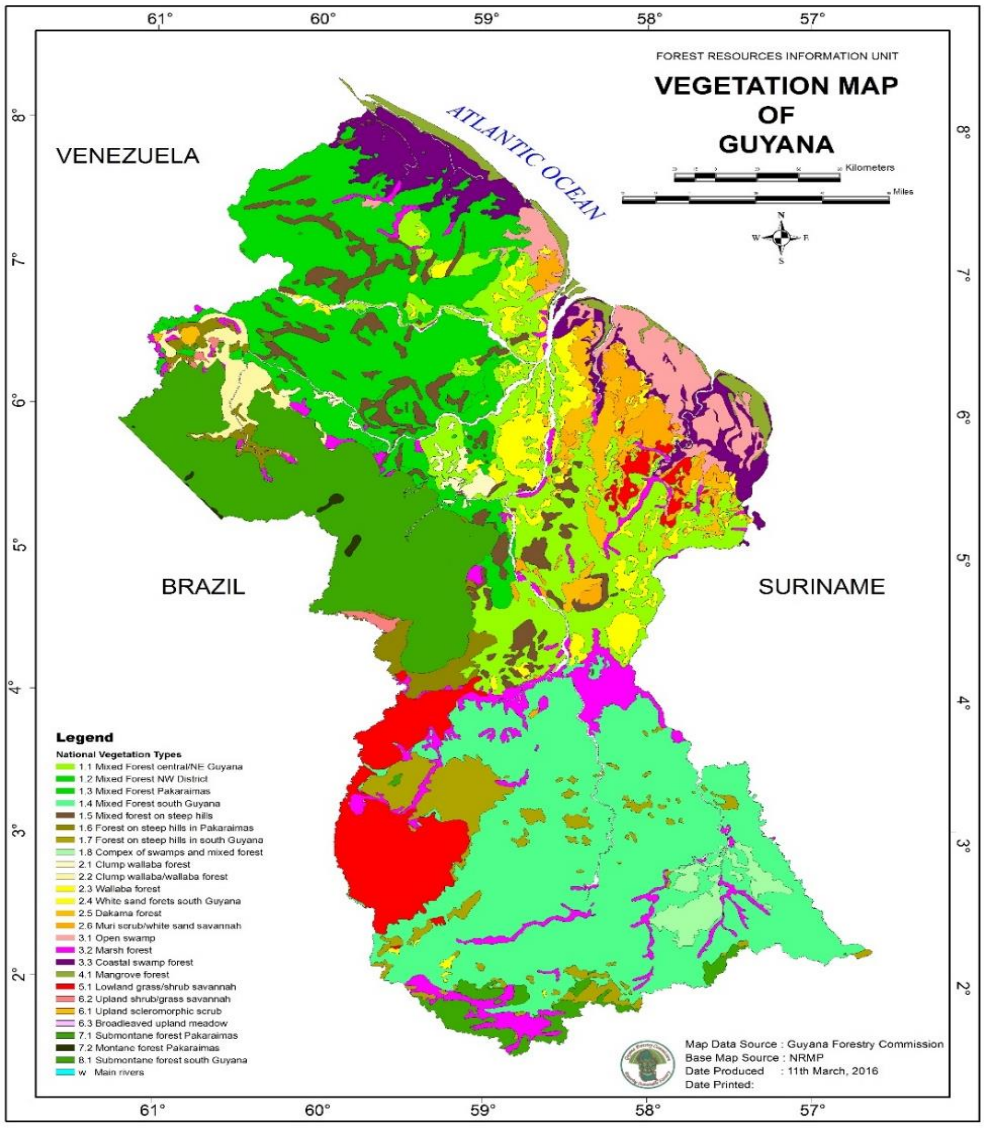


Figure 67: Vegetation map of Guyana ((GL&SC 2013).

b) ***Environmental phenomena:*** rainfall, wind, sunlight, relative humidity.

The interaction of biotic and abiotic components of ecosystems creates what are commonly referred to geo-chemical cycles: for example, the carbon cycle or the hydrological cycle.

12.3 Key relevant policy, legislation, guidelines, standards etc.

Section 5(a) of the Guyana Forestry Commission Act No. 20 of 2007, mandates the GFC to prepare plans, codes of practice and guidelines for the *conservation and management of forests*; this by implication includes the *conservation of ecosystems*.

Section 5(b) of the same Act, mandates the GFC to research, collate, analyse, prepare, and disseminate data, statistics and other information about forests and all aspects of forestry including forest ecology and the use of forest produce. The GFC prescribes that a minimum of 4.5% of the *productive forests* within State forest authorizations ≥8,000ha must be preserved (and managed as biodiversity reserves). RLSS has already earmarked an area of **19,779** ha for a biodiversity reserve (see Annex XIX).

The *Protected Areas Act 2011* has the following preamble: an Act to provide for the protection of Guyana's natural heritage and natural capital, the creation, management and financing of a national system of protected areas; *the maintenance of ecosystem services of national and global importance* including climate regulation; the establishment and management of a protected areas trust fund; the fulfilment of Guyana's international environmental responsibilities; public participation in protected areas and conservation; and related purposes.

Section 24 of the Protected Areas Act 2011 specifies that the objectives of a national protected areas system, includes:

a) Conserving Guyana's biological diversity;

b) Protecting ecologically viable areas representative of all ecosystems and habitats naturally occurring in Guyana, and its natural landscapes and seascapes;

c) Protecting ecologically significant areas which are vulnerable; and

d) Safeguarding and maintaining ecosystem services

12.4 Existing information, Surveys and Baseline studies

The protected areas network (see Figure 68), the forests managed by the Iwokrama International Centre and forest reserves managed directly by the GFC are all part of the attempts at the national level to conserve ecosystems. The total current protected areas comprise those areas that *formally* constitute the NPAS, in addition to an area of 3716.81km^2 managed by IIC and an area of 6,250 km^2 of *private property* managed by the *Konashen Indigenous Community*. In addition, within the '*productive forests'* category on *active* forest

concessionaires, forest concessionaires *and* the GFC together co-manage a total of 866.6 km^2 of biodiversity reserves[37].

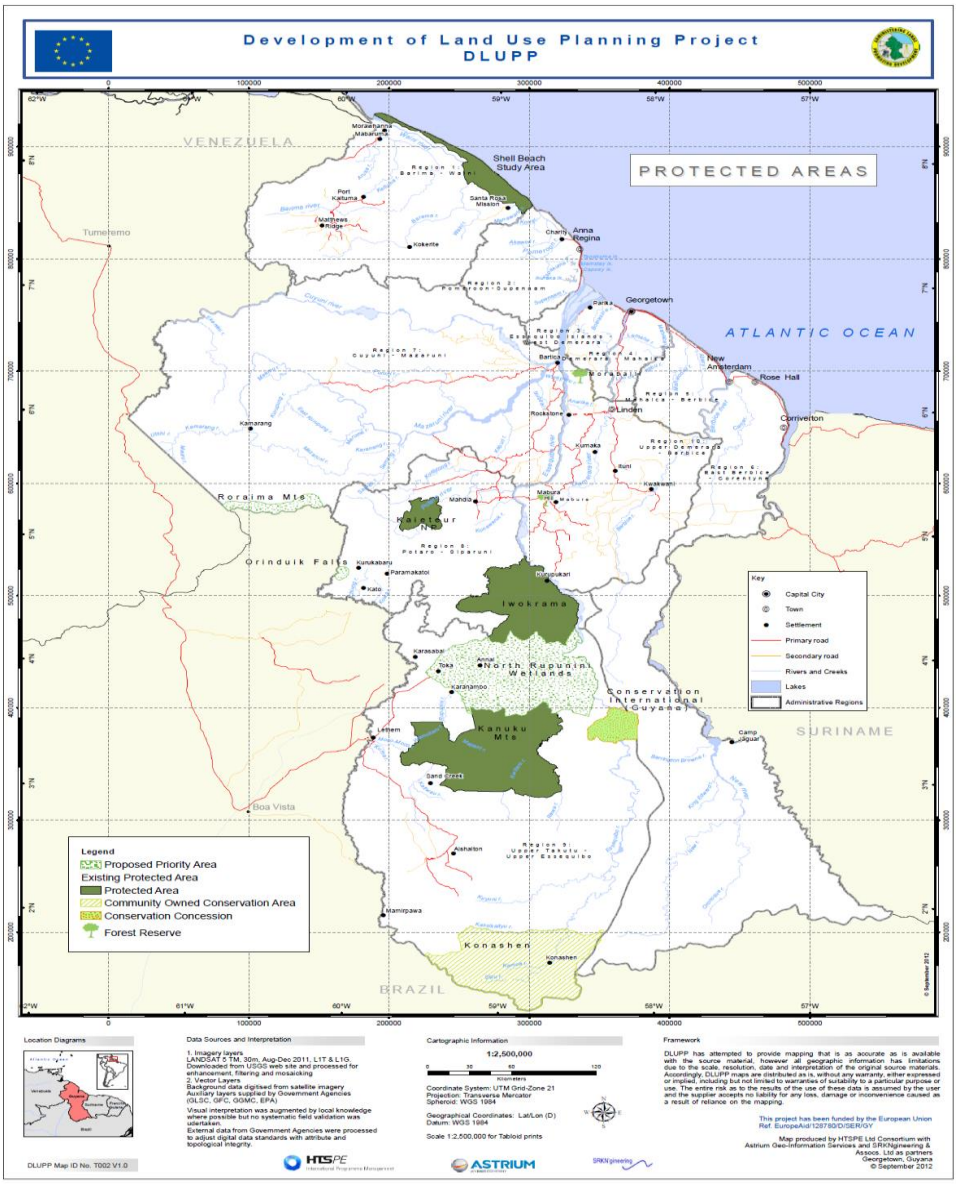


Figure 68: Map of protected areas at December 2012. (GL&SC 2013).

According to TEEB (2010), ecosystems are critical because they provide humans with *four categories* of services (see also Table 42):

(a) *Provisioning services*-ecosystem services that describe the material or energy outputs from ecosystems, including food and fresh water;

(b) *Regulating services*: these are services that ecosystems provide by acting as regulators, for example in regulating the quality of air and soil;

[37] Holders of forest concession agreements/ State forest authorizations for areas >8000 ha must establish a biodiversity on an area equivalent to 4.5% of the area designated as *productive forests* of the concession. The location of the reserve must be agreed with the GFC.

(c) *Habitat or supporting services*: for example, habitats provide the means for survival; and

(d) *Cultural services*: experiences with aesthetic phenomena.

Table 42: Typical ecosystem services garnered from forest resources (TEEB 2010).

THE EONOMICS OF ECOSYSTEMS AND BIODIVERSITY: CATEGORIES OF ECOSYSTEM SERVICES (http://www.teebweb.org/resources/ecosystem-services/)
1.0 Provisioning Services: Provisioning Services are ecosystem services that describe the material or energy outputs from ecosystems. They include food, water, and other resources.
1.1 Food: Ecosystems provide the conditions for growing food. Food comes principally from managed agro-ecosystems, but marine and freshwater systems or forests also provide food for human consumption. Wild foods from forests are often underestimated.
1.2 Raw materials: Ecosystems provide a great diversity of materials for construction and fuel including wood, biofuels and plant oils that are directly derived from wild and cultivated plant species.
1.3 Fresh water: Ecosystems play a vital role in the global hydrological cycle, as they regulate the flow and purification of water. Vegetation and forests influence the quantity of water available locally.
1.4 Medicinal resources: Ecosystems and biodiversity provide many plants used as traditional medicines as well as providing the raw materials for the pharmaceutical industry. All ecosystems are a potential source of medicinal resources.
2.0 Regulating Services: Regulating Services are the services that ecosystems provide by acting as regulators, for example, regulating the quality of air and soil or by providing flood and disease control.
2.1 Local climate and air quality: Trees provide shade whilst forests influence rainfall and water availability both locally and regionally. Trees or other plants also play an important role in regulating air quality by removing pollutants from the atmosphere.
2.2 Carbon sequestration and storage: Ecosystems regulate the global climate by storing and sequestering greenhouse gases. As trees and plants grow, they remove carbon dioxide from the atmosphere and effectively lock it away in their tissues. In this way forest ecosystems are carbon stores. Biodiversity also plays an important role by improving the capacity of ecosystems to adapt to the effects of climate change.
2.3 Moderation of extreme events: Extreme weather events or natural hazards include floods, storms, tsunamis, avalanches, and landslides. Ecosystems and living organisms create buffers against natural disasters, thereby preventing possible damage. For example, wetlands can soak up flood water whilst trees can stabilize slopes. Coral reefs and mangroves help protect coastlines from storm damage
2.4 Waste-water treatment: Ecosystems such as wetlands filter both human and animal waste and act as a natural buffer to the surrounding environment. Through the biological activity of microorganisms in the soil, most waste is broken down. Thereby pathogens (disease causing microbes) are eliminated, and the level of nutrients and pollution is reduced
2.5 Erosion prevention and maintenance of soil fertility: Soil erosion is a key factor in the process of land degradation and desertification. Vegetation cover provides a vital regulating service by preventing soil erosion. Soil fertility is essential for plant growth and agriculture and well-functioning ecosystems supply the soil with nutrients required to support plant growth
2.6 Pollination: Insects and wind pollinate plants and trees which is essential for the development of fruits, vegetables, and seeds. Animal pollination is an ecosystem service mainly provided by insects but also by some birds and bats. Some 87 out of the 115 leading global food crops depend upon animal pollination including important cash crops such as cocoa and coffee (Klein et al. 2007)

THE EONOMICS OF ECOSYSTEMS AND BIODIVERSITY: CATEGORIES OF ECOSYSTEM SERVICES (http://www.teebweb.org/resources/ecosystem-services/)
2.7 Biological control: Ecosystems are important for regulating pests and vector borne diseases that attack plants, animals, and people. Ecosystems regulate pests and diseases through the activities of predators and parasites. Birds, bats, flies, wasps, frogs, and fungi all act as natural controls.
3.0 Habitat or Supporting Services
Habitats for species: Habitats provide everything that an individual plant or animal needs to survive food; water; and shelter. Each ecosystem provides different habitats that can be essential for a species' lifecycle. Migratory species including birds, fish, mammals, and insects all depend upon different ecosystems during their movements.
Maintenance of genetic diversity: Genetic diversity is the variety of genes between and within species populations. Genetic diversity distinguishes different breeds or races from each other thus providing the basis for locally well-adapted cultivars and a gene pool for further developing commercial crops and livestock. Some habitats have an exceptionally high number of species which makes them more genetically diverse than others and are known as 'biodiversity hotspots.
4.0 CULTURAL SERVICES
4.1 Recreation and mental and physical health: Walking and playing sports in green space is not only a good form of physical exercise but also lets people relax. The role that green space plays in maintaining mental and physical health is increasingly being recognized, despite difficulties of measurement.
4.2 Tourism: Ecosystems and biodiversity play an important role for many kinds of tourism which in turn provides considerable economic benefits and is a vital source of income for many countries. In 2008 global earnings from tourism summed up to US$ 944 billion. Cultural and eco-tourism can also educate people about the importance of biological diversity.

12.5 Impact prediction and assessment.

The key issues of interest for loggers are the functional aspects of forests and the need to ensure that these processes are not unduly disrupted because they form the basis of forest sustainability.

The core processes include:

a) **Soil conservation**: everything should be done to avoid soil degradation and to avoid soil pollution given the critical role of soil biodiversity in the vigour of ecosystems.

b) **Pollination**: this refers generally to the transfer of pollen between flowers: birds and insects are the main agents

c) **Seed dispersal**: seed dispersal and seed predation affect the regeneration potential of forest stands; the higher the quantity of viable seeds, the more robust the regeneration. Most animals that feed on fruit facilitate seed dispersal. Seed predation may have negative effects on forest regeneration; insects that feed on seed and seedlings have the potential to kill their host.

d) **Nutrient cycling**: nutrient cycling depends on soil moisture, soil ph., soil texture and the nature of the soil itself-whether shallow or deep or whether freely draining or waterlogged, etc.

e) **Infiltration of water into the soil**: forest floor conditions such as the presence of a litter layer, soil organisms, soil texture and site conditions help determine the degree to which water infiltrates into the soil and percolate in the subsurface.

12.5 Mitigation and monitoring - Environmental and Social Management Plan

Ecosystem conservation considerations have been built into the forestry legislation, the COP and forest management guidelines.

The legislation grants power to the GFC to set conditions for timber harvesting, restrictions on felling trees, and restrictions on felling species.

The Forest management guidelines include prescribing fell cycles, forest organization-compartments and blocks; annual allowable area, annual allowable cut, maximum yield per hectare.

RLSS will be using RIL principles and practices in association with the COP and GFFO. Other measures to be taken to conserve water resources, soil and air quality will also contribute to ecosystem conservation. These measures will be articulated in FMPs, AOPs and annual reports to the EPA.

Damage to the shared ecosystems within the area held by SFEP 2/2017 is inevitable. Mining leads to the removal of entire habitats and modification of the geological features underlying them (TEEB 2010). Miners within the concession area will be encouraged to support conservation projects by RLSS. The draining and/or filling of exploratory pits and mined sites are areas where miners and RLSS can cooperate.

13.0 NOISE AND VIBRATION

13.1 Introduction

'In most cases, noise is produced as a result of human activities: noise is sound energy that is objectionable because of its physiological and psychological effects on humans' (Godish, Davis, & Fu, 2015). Heavy duty equipment is required for the construction of forest roads, for skidding logs and organizing these at log markets, and for conveying logs from log market to any log depot. These heavy-duty equipment produce noise and vibration. Also, at base camps, generators and other mechanical equipment in workshops generate noise and vibration. Chainsaws are relatively noisy machines for their size.

The proximity to noise is a major hazard for humans *as well as animals*. Common effects of prolonged exposure to noise causes various effects including hearing impairment and sleep disturbance. RLSS is committed to mitigating noise and vibration in every case where this is achievable. Careful planning of the use of machines and employee sensitization about the issues of noise and vibration and their respective mitigation will be RLSS' main thrust in its noise and vibration *mitigation* practices.

13.2 Definitions and scope

Noise may be defined as any unwanted sound that may cause hearing impairment, speech interference, annoyance, and any other effects (Godish, Davis, & Fu, 2015).

The term 'vibration' covers any vibration which is transmitted to the human body through solid structures and is harmful to health or otherwise dangerous (ILO 1977).

For forestry activities, chainsaw operators, operators of skidders, bulldozers excavators and front end loaders and mechanics are particularly exposed to noise for many hours at a time on a regular basis. Manufacturers of heavy-duty machines goes to great lengths to prevent reduce the noise and vibration emanating from their machines.

13.3 Legislation

The Environmental Protection (Noise Management) Regulations 2000 (see Section 5.2.9.3) is the primary noise management legislation in Guyana. The EPA and the GNBS have published standards (see Tables 11, 43) to guide developers. Noise decibel levels are not to be greater than the established permissible noise levels/limits of the Guyana National Bureau of Standards (GNBS) Guideline values for noise in specific environment which has been adopted by the Environmental Protection Agency (EPA).

Table 43: GMBS' Guidelines for Noise Emission into the Environment (GNBS: GYS263:2010 First Revision)

Categories	Daytime Limits (dB) (06:00-18:00)	Night-time Limits (dB)
Residential	75	60
Institutional	75	60
Educational	75	60
Industrial	100	80
Commercial	100	80
Construction	90	75
Transportation	100	80
Recreation	100	70

13.4 Baseline information

Clusters of noise measurements were taken in at various locations within and around the concession during September and October 2020 using a Sound Level Meter (ExTech 407730) (Figure 69).

Noise decibel levels are not to be greater than the established permissible noise levels/limits of the Guyana National Bureau of Standards (GNBS) Guideline values for Noise in specific environment which has been adopted by the Environmental Protection Agency (EPA).

RLSS's SFEP is characterised by itinerant mining and for all practical purposes the SFEP area is considered an 'industrial zone'.

Figure 69: Noise Recording exercise SFEP 2/2017

13.5 Results and Discussion

Noise levels within RAI's forest concession ranged from 35.40dB to 52.60 (see Table 44). Noises emanated primarily from motor driven water pumps, generators in the vicinity and passing motorboats.

13.6 Impact Assessment

Employees of RAI will be exposed to noise and vibration across the whole gamut of the company's field operations almost daily because they are in the frontline of operations.

Mining operatives or persons transiting the forest concession may be affected temporarily if they happen to be in the vicinity-less than 300m - of logging operations. (RAI will not conduct felling operations in the vicinity (<1000m) of logging camps.

Logging practices impact wildlife generally by altering habitats and dispersing populations but there is reason to believe that different faunal groups react differently to these practices (Fimbel, Grajal, & Robinson, 2001). For noise emanating from tree felling and skidding operations, nuisances will normally be very temporary, a maximum of about three weeks duration per 100ha block. However, noise and vibration impacts will persist along the main primary roads that are used a regular basis.

Table 44: Noise data recorded at SFEP 2/2017 (EES)

Sample ID	*Date*	*UTM Coordinates 21N*		*Time*	*Noise Data*	*Wind*	
		Easting	Northing	Start	dB	Direction	Speed (m/s)
Sk-01	25-09-20	0227025	0704640	10:30	52.60	-	-
Sk-02	25-09-20	0236426	0707600	15.44	41.70	-	-
Sk-03	27-09-20	0193376	0695876	10.55	46.30	-	-
Rs-01	09-10-20	0207085	0752200	14.01	35.40	-	-

13.7 Mitigations Measures

RLSS will apply the following basic measures:

a) All employees will be sensitized about the dangers of exposure to noise and vibration.

b) Employees will be provided with ear plugs or other appropriate hearing protection apparatus to restrict noise and vibration entering their ear.

c) The use of all machinery will be planned the extent that engines will always be turned off after use. Machines will be serviced and maintained in a state where they emit only noise in line with their optimum performance. Care will be taken that all machines will carry fully functional exhaust systems.

d) Timber harvesting operations will be restricted to periods between 7:00hrs and 18:00hrs. However, when the haul distance between the concession area and Buckhall exceeds 200km, trucks will start hauling timber at 4:00hrs.

14.0 LAND SCAPE AND VISUAL RESOURCE

14.1 Introduction

Landscapes in the concession area are a combination of the prevailing stream network, forest types, and landform (see Figure 70).

Figure 70: A view of SFEP 2/2017 from right bank Cuyuni River.

Key features that characterizes the landscape across the concession area is illustrated in Annexes IX and X, respectively. A large number of small degraded areas or abandoned buildings (see Figures 71) occur along riverine zones due to mining activity along the right bank Cuyuni River and the left bank Puruni River, respectively: these rob the landscape of critical aesthetic qualities and possibly restrict the growth of trees typical of those zones.

Figure 71: Photograph of an abandoned shop, left bank Puruni River.

Logging leads to interventions in forest canopies that alter the quality of, or degrade landscapes. Poor logging practices could lead to forest fragmentation which further degrade landscapes. It is possible to do logging and still preserve the aesthetic values of landscapes. Poor logging practices may also lead to major transformation of the vegetation types, where grasses, lianas or shrubs may dominate.

Another major transformative force is forest fires, which are not common in Guyana in forests but quite common in savannahs.

14.2 Definitions and Scope

Primary forest formations such as Wallaba Forests –dominated by *Eperua spp*. or coastal mangrove communities dominated by an association of *Rhizophora sp. and Avicennia sp*.) or riparian communities dominated by *Mora excelsa* frequently define unique subsets of landscapes.

Landscapes are more than just physical spaces: they are contexts in which species and communities interact and function. Rainforest landscapes are influenced by variables such as weather, drainage, and soil (Ghazoul and Sheil 2010).

Some authors use the term **landscape ecology**-the study of spatial patterns, processes and change across biological and cultural structures within areas encompassing multiple ecosystems (Wade and Sommer 2006).

At a regional scale, Hammond (Hammond 2005) describes 'a massive landscape designated the Guiana Shield simply as a land of old rock, poor soils, much water, extensive forests and few people'.

14.3 Key relevant policy, legislation, guidelines, and standards.

RIL practices, selective logging, felling site restrictions (linked to gap control and terrain) and buffer zones, all mandated by GFC's forest management standards, are the primary practices used to restricting forest fragmentation. For example, Sections 4.3.1 and 4.3.2 of the (mandatory) COP contain prescriptions on the need for pre-harvest data for more 'economical forest harvesting' and Section 5.1 seeks to 'limit the area cleared' for road networks in essence restrict the formation of forest gaps, forest fragmentation and forest degradation.

14.4 Impact prediction and assessment

Logging alters forest structure through the felling of and the removal of merchantable trees from the forest and the consequent need for roads and skid trails. Felling trees alter landscapes by altering the distribution of diameter classes and height classes respectively and by changing the proportion of each species per unit area and eventually the forest architecture (van der Hout, 2000; Ghazoul & Sheil, 2010).

Wild fires lead to violent or abrupt changes in landscape through tree mortality. Heavy sediment loads due to accelerated erosion after diverse earth works degrades the aesthetic values of the waterways and by default, the landscape.

14.5 Mitigation and monitoring

RLSS anticipates that its embrace of RIL practices will support forest conservation and conservation of landscapes. Every effort will be made to avoid forest fires, stream pollution, deforestation, and any other form of forest degradation.

RLSS' first priority is to ensure that all employees share responsibility for avoiding forest fires and stream pollution. RLSS will hold quarterly briefing sessions with employees to discuss problems associated with fires and stream pollution. The relevant sections of GFC's COP, 2018, specifically:

a) Chapter 5: sections 5.5 *(drainage*) & 5.7 (*water course crossings*),
b) Chapter 8
c) Chapter 9

d) Chapter 10: section 10.4 (*fire prevention and suppression)* and section 10.11 (*water operations).*

RAI's employees and contractors will be prohibited from lighting any kind of open fire on the forest floor. Smokers will be asked to carry a small bottle or tin to store cigarette butts until these can be disposed of in pits near the camp.

There will be two main measures to avoid stream pollution, as follows:

a) No major road works will be carried out in the rainy season, and no activity requiring earthworks will be done during a rain storm

b) No water from side drains or ditches will be allowed to enter directly into water courses: preferably such water will be led into special pits ('*dead sumps'*) where it will lodge and allowed to infiltrate into the soil. Alternatively, the water will be channelled through any suitable structure or debris deliberately put in place to trap most of the sediments suspended in the drainage water before it reaches the watercourse.

RAI will post signs (see Figure 66) at workplaces to reinforce information passed on during briefing sessions.

Figure 72: Illustration of signage to be used to support briefing sessions for field operatives.

15.0 CULTURAL HERITAGE

15.1 Introduction

Society is in a constant quest to discover and conserve or record any facet of local livelihoods that have either informed our present existence or had the potential to do so. It is very probable, that the first peoples to occupy the Upper Cuyuni were the Akawaio and the Arecuna Indigenous Peoples respectively; in fact the upper Cuyuni marks the north-western extent of Akawaio territory (APA, FPP, & RFF, 2019). It is desirable that the activities and behaviour of those peoples of yesteryear be recorded and inform our cultural heritage. RLSS will be in the quest to discover, conserve and record any asset of evidence of archaeological importance.

15.2 Baseline information

All Amerindian villages along the Upper Cuyuni were formed relatively recently, considering the developments in other regions: Kartabo-1900; Kaikan-1920; Karrau-1940; Kurutuku- 1967; Batavia- 1970; in contrast villages in the upper Mazaruni such as Kako, Kamarang and Philipai have been around since time immemorial (APA, FPP, & RFF, 2019).

Apart from the proximity of Kurutuku, there is no historical information on any indigenous village within SFEP 2/2017; however, there is information on aged exploratory mining activities within the forest concession. To date, no assets of archaeological importance have been detected within the concession area.

RLSS' field operatives will be deployed throughout the area over the next 40 years (at least) and they will be instructed to look for any archaeological materials including products made from pottery, ancient tools, old cemeteries, rock paintings.

15.3 Impact predictions

In the pursuit of its logging operations, RLSS will develop the concession area in a general east west orientation. Unless field operatives are vigilant, assets of indigenous or archaeological importance may be destroyed.

15.4 RLSS' policies

RLSS will adopt the following policies in the development of the concession:

a) RLSSS will not operate near communities; specifically, RLSS will not operate less than 300m from the banks of the left bank Puruni River and right bank Cuyuni Rivers respectively; also, RLSS will not operate within a radius of 500m of *Kurutuku Village.*

b) RLSS will be vigilant in isolating and protecting any asset of archaeological interest on the concession area and then bringing the relative facts to the authorities.

16.0 SOCIO-ECONOMIC AND CULTURAL IMPACTS (DIRECT AND INDIRECT)

16.1 Introduction

RLSS believes that its logging project will transform the socio-economic environment for Kartabu triangle because of the impacts its operations will have on cash inflows to residents, improved options for road access to untapped mineral and timber resources respectively. An increase in the volume of economic activity in the Kartabu Triangle could attract new public spending (at the regional and national budgetary levels) to improve social services and security in the area. RLSS' operations will improve the performance of the forestry sector: more revenue will enter state coffers, more timber will be available timber on the local market to bolster the current building boom, while exports of timber will see a projected 30% increase in foreign exchange earnings.

It is anticipated that RLSS' sawmilling facilities at St. Lawrence will be fully utilized, necessitating a 30% increase in employment levels, while the projected expansion of RLSS lumber yard network in Regions 3, 4, 6, and 7 will create additional job opportunities.

The core impacts are summarized in Table 45 and prioritized in Table 46.

Table 45: Identification of core socio-economic and cultural impacts.

#	Issue	Nature of Impact
1	Employment	• Creation of opportunities for employment and training • Expanded businesses
2	Concession road network	• Expanded gold mining operations. • Restrictions on road use leading to conflict. • Opportunities for expanded services by public agencies • Increased opportunity for disagreeable activities
3	Road hazards	• Dust hazards • More congestion, more risk of accidents

16.2 Definitions and scope

SFEP 2/2017 has a gross area of 432,262.59 ha of mostly intact forests and stakeholders' interest covers a wide range of interests, including the integrity of watersheds and the conservation of fauna. The National Forest Policy Statement 2018 (GFC, 2018) deliberately includes not only provisions for the sustainable harvesting of timber but also the whole gamut of services generated by forests. TEEB (2010) described the services as -provisioning services, regulating services, habitat or supporting services, and cultural services (TEEB, 2010).

16.3 Baseline studies

RLSS' consultants engaged in extensive formal and informal consultations with stakeholders, including residents of Batavia Amerindian Village, Kartabu Village, Iteballi, and Puruni Landing. These yielded information on the perspectives of stakeholders in the face of the projected logging operations within SFEP 2/2017 and ancillary benefits for stakeholders, particularly in terms of employment opportunities, increased trade in goods, new access options for areas in the upper Puruni District and Upper right bank Cuyuni River, and more attention from Central Government and the Regional development Council, Region 7.

16.4 Impact prediction and assessment

16.4.1 Positive Direct Impacts

a) Employment opportunities

RLSS' projected operations will witness a massive recruitment and transfer of people and equipment to the Ekabago Base Camp and to Pine Tree Landing. RLSS requires a large number of field operatives, auto-mechanics, auto-electricians and heavy-duty machine operators. As far as possible RLSS will recruit employees from the Kartabu Triangle.

RLSS will increase the capacity of its wood processing plant at St. Lawrence to align it with the volume and species of merchantable timber originating from the concession area. RLSS will recruit additional workers from the East Bank Essequibo in line with the capacity and product output from the plant.

RLSS' projections are that it will open additional[38] lumber yards on the East Bank Demerara-Region, 4 New Amsterdam-Region 6 and Bartica-Region 7, by December 2022. Six employees will be recruited for each lumber yard.

b) Skills training for employees

RLSS will create a cadre of skilled technicians in the Kartabu Triangle within two years. RLSS will expend huge sums of money to train new employees to function within an enterprise whose timber harvesting systems will be built up on RIL principles and practices. RLSS will also ensure that its employees share responsibility for compliance with GFC standards and with the provisions of its *Environmental Authorization*.

c) Road network development

RLSS will develop road networks within the Kartabo Triangle. RLSS constructed 23km of new roads just to access its forest concession. RLSS plans to share responsibility for the maintenance of the Kartabu Puruni Road by deploying its road construction assets as required to fix selected segments of road. (If necessary, RLSS will accept contracts with MOPW/MNR/GGMC for the scheduled maintenance of selected or agreed road segments).

Also, the area embodied within SFEP 2/2017 is devoid of any road network that allows for all-weather conveyance of inputs such as fuel in a timely manner. RLSS' planned road network, the first segments of which are set out in its FMP 2020-2024 will afford access to miners opting to work in the upper Puruni District. These miners are currently stymied from accessing their concession areas due to natural barriers in the Puruni River, such as Paiyuka Falls; even where miners have been able to use the Puruni River above Paiyuka Falls, conditions in the river during the dry season makes it tedious, even hazardous to transfer goods and fuel.

Public officials will take advantage of improved road networks developed by RLSS for outreach exercises for monitoring or managing matters of public interest, including matters of public health and security.

d) Economic expansion-Kartabu Triangle

RLSS expects it will expend G$100 million annually within the Kartabu Triangle on enumeration packages and the purchase of goods from merchants or farmers at Batavia, Iteballi and Puruni Landing.

[38] The enterprise already owns two: one at St. Lawrence itself, and the other at Versailles, West Bank Demerara.

e) Revenue for Government

The imminent new large scale logging operations will lead to a significant increase in revenue for the GFC. The Government will benefit directly from taxes linked to remuneration packages and taxes on the expanded trade in the volume of goods and services. Agencies such as the NIS and GEA

16.4.2 Positive indirect impacts

a) Enhanced interest by public agencies and private developers

The consequent increase in the workforce within the Kartabu Triangle as well as the higher proportion of employed workers within communities caused by RLSS' operations and the corresponding increase in the volume of cash flows will lead to the expansion of existing businesses as well as create opportunities for new businesses to the area. More businesses will attract more political attention and more political attention will in turn lead to better social services that allow communities to develop.

There are no known eco-tourism ventures in the Kartabu Triangle itself. However there are many beautiful landscapes with amazing aesthetic characteristics worthy of a tourism venture. There are hotels of reasonable quality at Bartica, at Aruwai, White Water near Iteballi and at Puruni Landing. There are opportunities for many more.

b) Community development

Regular paid employment is key to the youth remaining and building their communities. Many residents of Kartabu Village and Batavia Amerindian Village prefer to live at those locations. (Any villager can easily do a return trip to Bartica or Georgetown on any business day). A major concern for most residents however is the point at which students attend secondary school, at Bartica or a coastal location; parents need a regular source of cash to sustain their children and they are happier if they can stay at home and do so.

Similarly, young people who have left school, and young women in particular will stay in their villages if they can get jobs there. The advent of cell phones, internet and solar technology and more security at home have stymied the urge to migrate to urban centres.

RLSS' operations will afford both jobs and training for people willing to work on its forest concession. Further the proposed use of Information Technology and UAVs for forest monitoring purposes will ensure adequate challenges for young people.

c) Regional Development

RLSS' proposed logging operations will lead to the structured exploration of the area embodied under ASEP 2/2017. RLSS is committed to sharing responsibility for the maintenance of the Kartabu Puruni Road; a fully functional road will lead to an increase in the flow of goods, expanded economic activities, and provide more justification for bridges at Iteballi and at Puruni Landing, respectively.

The concession based road network will facilitate faster flow of goods to mining sites in the upper left bank Puruni District with the real possibility that annual gold outputs for the district will increase. Increased mining activity generates more employment for citizens.

16.4.3 Negative Direct Impacts

a) Conflict due to restrictions on the use of RLSS' concession based road network

RLSS will need to manage the use of its roads within the concession area for its own security and for ensuring compliance with its FMP and its Environmental Authorization. Such management includes putting restrictions on hunting, fishing, and littering through the use of barriers and this may not go down well with persons trying to access the concession area. Any restrictions could be a cause for conflict.

To date, a few miners, or persons claiming to be miners, have already approached RLSS' base camp at Ekabago trying to get information on the general orientation of RLSS' concession based road network. Miners are already using RLSS' access road and RLSS has not tried to restriction them in anyway. In fact relations with miners have been cordial so far.

No commercial scale hunting has been observed in the area to date. However, RLSS' road network could open the gates for commercial hunting in intact areas.

Another source of conflict is the tendency for small business men to set up shops along new roadways vending an array of goods, including alcoholic beverages. The presence of these shops are an administrative burden because they create the need for cash, which in turn leads employees or idlers associated with such shops to steal goods such as fuel and machine parts from loggers and miners, generating uncomfortable, time wasting situations, or forcing loggers to invest excessively in security measures.

b) Contribution to hazards on KPR

RLSS' vehicles transiting the KPR will add to the volume of impacts from dust (see typical example at Figure 73), noise, and vibration associated with the use of the road. Dust clouds due to the passage of heavy-duty vehicles are particularly common in the dry season. Only the communities at Takutu Village and a few camps along the road will be affected. However for small utility vehicles such as ATVs and motor cycles, dust clouds are particularly dangerous. Occasionally, pedestrians are encountered on the road, walking between camps and work grounds.

Figure 73: Example of typical dust hazards on the Kartabu-Puruni Road.

c) Accelerated degradation of the KPR

RLSS logging trucks, with a mean laden weight of about 40 tons will contribute to the degrade of the segment of the KPR it uses. RLSS expects to deploy a minimum of six (6) trucks per day, five days per week, doing round trips between Ekabago Base Camp and Pine Tree Landing. Trucks will carry pole trailers and full size logs: therefore the mean total length of a laden truck is projected at 18.5m. Unlike typical cargo trips along the KPR, RLSS' trucks (and those of other loggers are laden on the 'outward-east bound- trip'[39]. RLSS' use of the KPR will result in more costs for the maintenance of the road.

16.4.4 Negative indirect impacts

a) Potential scarcity of mechanics, technicians

RLSS will start logging operations in an area already occupied by other loggers and miners who require the same skills sets that RLSS has or will recruit. New enterprises create new employment options for people already working in the area. RLSS will eventually find itself competing for heavy-duty drivers, mechanics and field operatives. RLSS will have to spend more time and costs on efforts to retain its employees, preventing them from transferring to other enterprises. Eventually, some enterprises will suffer loss in performance due to competition among enterprises in the area for highly skilled workers.

b) Expansion of public agencies' budgetary provisions

Expanded activity in the upper Puruni District will force public agencies expand the scope of their field operations by posting staffs in those areas, forcing them to procure bigger budgets, more man-power, or to transfer resources from other geographic areas. For example, just recently at Puruni Landing, the GPF has had to change from random patrols at Puruni Landing to actually creating a police outpost at Puruni Landing: eventually, the GPF will have to build up its own facilities at Puruni landing and equip its operatives there with vehicles/outboard boats.

16.5 Mitigation measures

The following measures will form the basis of RLSS' response:

a) RLSS will follow the provisions of the COP, forest management guidelines and prescribed tasks set out in its Environmental Authorization.

b) RLSS' Forest Monitoring Officer will be proactive in engaging stakeholders so that any issues of concern will be addressed in a timely and amiable manner.

c) All logging trucks and heavy-duty vehicles will carry rotating beacons and trucks will also travel with their headlights lights in the on position.

[39] Typically, trucks associated with miners are loaded on the west bound trip, and empty on the east bound (outward trip).

Table 46: Matrix of potential social impacts expected to emerge from RLSS' operations

Predicted Impacts	PROJECT ACTIVITIES								
	Planning Phase				Operations Phase				
	Const. of forward camps	Const. of primary access roads	100% Pre-harvest Inventories	Tree marking operations	Construction of secondary roads	Constr. of Skid trails, Log markets	Felling trees & skidding logs	Log market operations	Log haul to Pine Tree Landing by trucks
Employment	Lo: Rv: St: Av: Im: In: Lp	Ex: Rv: St: Un: M: Sig: Hp	Lo: Rev: St: Un: M: In: Lp	Lo: Rev: St: Un: M: In: Lp	Ex: Rev: St: Un: M: Sig: Hp	Ex: Rev: St: Un: M: Sig: Hp	Ex: Rev: Lt: Un: Im: Sig: Hp	Lo: Rev: St: Av: M: Sig: Hp	Ex: Ir: Lt: Un: Im: Sig: Hp
Concession based conflicts	Lo Rev Lt Un M In Hp	Ex Rev Lt Un M In Hp	Ex Rv Lt Av M In Hp	Lo Rv St AV M In Lp	Ex Hp Ir. Lt Un Sg	Ex Hp Ir. Lt Un Sg	Ex Hp Ir. Lt Un Sg	Lo Rv St Un M In Lp	Lo Ir. Lt, Un M Sg Lp
Other Conflicts	Lo Rev St Av M In Lp	Ex Rv St Un M In Lp	Ex Rv Lt Un M In Lp	Ex Rv St Un M In Lp	Ex Rv Lt Un M In Lp	Ex Rv St Un M In Lp	Ex Rv St Un M In Lp	Lo Rv Lt Un In LP	Lo Ir Lt Un M In Lp
Road Hazards	Lo Rv St Un M In Lp	Ex Rv Lt Un M Sg Hp	Ex Rv Lt Un M In Lp	Ex Rv Lt Un M In Lp	Ex Rv Lt Un M Sg Hp	Ex Rv Lt Un M Sg Hp	Ex Ir Lt Un M Sg Lp	Lo Rv Lt Un M In Lp	Ex Rv Lt Un M Sg Hp

Impact Significance (parameters)

Lo-localised, Ex-Extensive/ Rv-Reversible, Ir-reversible/St-short term, Lt-long term/ Av-Avoidable, Un-Unavoidable/ M-Mitigable, Im-Immitigable/ Sig-Significant, In- Insignificant/Hp-High probability, Lp-Low probability

Note: All Extensive, Mitigable, Long term, and significant impacts will have to be prioritized.

17.0 RISKS AND RISK ASSESSMENT

17.1 Introduction/Overview

RLSS has been active in the Kartabu Triangle for many years conducting timber harvesting on small concessions. Therefore RLSS has accumulated considerable experience and has a firm grasp of the variables that will impact on production. More importantly, mining activity is not considered as a formidable a threat to sustainable logging as first contemplated.

17.2 Access

RLSS constructed 23km of access road. After further evaluation of gradients in the vicinity of Tiger Creek Junction, RLSS began construction of another road segment to improve access to the concession area (see Figure 74).

Figure 74: Access road via properties held by other parties.

17.3 Forest Resources

RLSS is satisfied with the following parameters for the forest resources:

a) The quality of the merchantable stock, both in terms of the species composition and the distribution of diameter classes;

b) Terrain that is manageable for road construction and RIL based timber harvesting operations;

c) Opportunities for value added wood processing in the plywood sub-sector;

d) Opportunities to develop wood products based on the large number of lesser used species in the concession.

17.4 Choice of technology

RLSS' timber harvesting operations will be based on RIL principles and practices which require that every aspect of the forest interventions be ***planned*** to reduce environmental impacts and achieve cost savings.

Consequently, RLSS will deploy the appropriate machine for every intervention including but not limited to:

a) Chainsaws designed for directional tree felling and with the proper safety features for the protection of the chainsaw operator.

b) Bulldozers, motor graders, compactors for main road clearance and surfacing works.

c) Excavators for mining burrow pits, roadside draining design, and bridge and culvert construction.

d) Front-end loaders (with fork and bucket) for loading earths into trucks and for loading logging trucks.

e) Skidders for transferring logs from stump to log market.

f) Heavy-duty logging trucks with a proven performance under local forest conditions.

RLSS is confident that spare parts and the proper maintenance services are available to keep all equipment in their proper functional state. RLSS is confident that the use of RIL practices associated with a maximum yield of 20 m^3 /ha and prescriptions on felling trees set out in the COP will neither lead to accelerated forest degradation or forest fragmentation and further, will create minimal impact on fauna.

17.5 Constraints-stakeholder engagements

RLSS is committed to engaging with stakeholders to minimize conflict and create conditions for continuous operations. One staff will be assigned specific responsibility for engaging stakeholders and for managing their concerns.

RLSS anticipates simple conflicts with stakeholders and RLLSS anticipates that these will be resolved by dialogue.

RLSS will push for large scale loggers to organize in some way so that they as a body can make a stronger impact on matters affecting loggers.

17.6 Constraints-shared road use

For RLSS, shared road use at the **concession level** is manageable: the enterprise will erect barriers to control access. In addition, wherever access is granted, the company will post signs requiring other users to give way to RLSS' vehicles. Generally, RLSS will engage with other road users to ensure that all concerns are managed properly and not escalate into conflict.

RLSS has concerns over the KPR, a public road without any specific road maintenance programme. The MOPW, MNR, and GGMC do occasional maintenance of the road, but it is not clear which agency is responsible for road maintenance.

The KPR is critical for RLSS' operations: however the enterprise does not exercise any control over its use, and cannot, for example, post road signs to regulate its proper use. When using the road, RLSS will simply apply basic 'care, consideration, caution, courtesy and common sense' practices in the face of other road users. RLSS is also committed to supporting road maintenance efforts, by placing some of its equipment at the service of the authorities or simply proactively undertaking maintenance efforts at its own initiative and cost.

RLSS is concerned about the time and effort traditionally required to address conflicts with stakeholders, in an environment dominated by miners.

17.7 Security Issues

RLSS believes that currently security considerations are unlikely to stymy its operations. However, in a couple of years when its road system is developed, restrictions on hunting and fishing, the proximity

of itinerant mining operations, and a diversity of 'bush businesses' traversing the concession area are all potential sources of security concerns. RLSS will rely on its stakeholder engagement protocols to identify and manage stakeholder issues.

17.8 Labour challenges

To maintain a viable operation fully compliant with the legal framework for logging as well as forest management standards, RLSS needs a critical number of skilled field operatives. RLSS will compete with other regional enterprises for such field operatives, Specifically, RLSS will take reasonable measures, including competitive remuneration packages, to prevent the loss of its employees to other enterprises.

RLSS values its employees and their respective training for the tasks required of them. RLSS will ensure that it optimises the use of available technology to bolster the management of field data and records, and to achieve efficiency in the conduct timber harvesting and forest monitoring functions, respectively.

The enterprise has developed a human resources policy for consistency in managing employees. The peculiarities of logging require flexible working hours to address time sensitive (production) targets to ensure the enterprise remains competitive and profitable.

17.9 Markets

RLSS' intends to garner a minimum of 8% of the volume of Guyana's timber exports, banking on its existing relationships with 'overseas' customers and the intention to invest in technology to bolster its value adding capability.

Local contractors are currently utilizing large volumes of imported (Pine) lumber as they respond to the existing building boom and the rapid expansion of housing schemes, country wide. In addition, steel beams seem to be the choice for buildings with more than three stories. However RLSS predicts that the demand for flooring and (outdoor) furniture from local species will continue to create demand for local timbers.

RLSS believes that tropical hardwood flooring and decking will be in demand in tourism markets in the Caribbean and North America. RLSS is confident that the minimum price achievable for value added timber products from local species will be reach US$1,800.00 per cubic meter by 2023.

17.10 Main cost centres

RLSS has computed its primary cost centres (*totalling about 98% of expenditure*) for period 2021-2025 as follows:

a) Capital purchases of equipment;

b) 100% pre-harvest forest inventory;

c) Road construction and road maintenance respectively;

d) Timber harvesting and extraction (including hauling logs to St. Lawrence);

e) Preventive maintenance of equipment;

f) Labour costs and employee welfare, including training of field operatives;

g) Concession administrative costs, including costs linked to the ESIA study and report as well as forest concession charges-acreage fees, royalties, and taxes;

h) Corporate taxes;

i) Administrative costs linked to Ekabago Base Camp and forward camps;

j) Forest monitoring tasks;

k) International marketing practices; and

l) Corporate social responsibilities.

17.11 Analysis and conclusion

The twelve (12) items identified at 17.10 will be responsible for 98% of the operational costs and will be expressed eventually in cost/*m3*. RLLS is convinced the company will recover its investments comfortably within ten (10) years.

Table 45 shows a simple SWOT Analysis for RAI, Table 46 shows a simple risk assessment template for the enterprise and Table 47 shows that staffs with a score ≥9 require special attention.

Table 47: SWOT Analysis for RLSS prior to the start of operations.

STRENGHTS	WEAKNESSES
• **Location: RLSS's concession boundaries are well defined, virtually no problems with neighbours, and there are no (Amerindian) Communities within the concession area.** • **Large stocks of merchantable timber are available.** • **Wide ranging experience: RLSS has a strong and experienced, management team.** • **Markets: RLSS has access to markets based on current operations.**	• **Itinerant nature of mining: this refers to miners starting operations in blocks targeted for harvesting, extensive use of RLSS' logging roads and skid trails, etc.: these situation can complicate RLSS's strategic planning.** • **Unfamiliarity with the mining community *in situ:* it will take considerable time and effort for RLSS to get to know the owners of mining concessions so that the enterprise can begin positive collaboration with them.**
OPPORTUNITIES	**THREATS**
• **New technologies: RLSS can capitalise on new emerging technologies for wood processing.** • **New product lines: RLSS can capitalise on the large number of merchantable species to generate new wood products, including outdoor furniture.** • **New market opportunities: RLSS is in a position to adapt to new market conditions and customer behaviour.**	• **Competing land use-need to share road use: RLSS will share its concession road network with many people who use a wide assortment of vehicles: conformity with RLSS's road use protocols can lead to time consuming conflicts.** • **Strong national policy support for miners, whose activity drive economic activity in Region 7.** • Inability to compete with the mining sector re remuneration packages for heavy-duty operators.

Table 48: Table illustrating RLSS' general assessment of risks

ID	Risk	Consequence	Probability	Rating	Risk score	Assessment
1	Workers consider their welfare packages inadequate:	High staff turnover	0.4	5	2	Extreme
2	Worker indiscipline	Inability for compliance with standards	0.3	4	1.2	High
3	Conflict arising from shared road use	Administrative burden, reduced efficiency	0.4	4	1.6	High
4	New mining activity in blocks targeted for harvesting	Reduces production	0.3	4	1.2	High
5	Onerous legal framework	High administrative burden	0.3	4	1.2	High
6	Security issues with third parties, conflict	Reduces efficiency	0.3	3	0.9	Low
7	Unpredictable markets	Planning production becomes challenging	0.2	4	0.8	Low

Table 49: RLSS' assessment of which staffs are at the most risk.

#	EMPLOYEE/CATEGORY	WORKSPACE												Total
		OFFICE	Mechanical Workshop (Base Camp) (Wood processing complex-Manaka)				Field Camps/Field Operations					BHR		
		Electric Shock	Inhalation of toxic fumes	Bruises, burns, cuts	Fractures , punctures	Electric Shock	Snakebites/ Insect bites	Bruises, burns, Cuts	Fractures , punctures	Fatal injury (falling trees)	Lost in the forest	Minor Accidents	Fatal Accidents	
1	FOREST MANAGER	0	0	0	1	0	1	0	1	1	1	1	1	7
2	SUPERINTENDENT -ROAD SURVEYS	0	0	0	0	0	1	1	1	1	2	2	1	9
3	SUPERINDTENDENT-LOG PRODUCTION	0	0	0	0	0	0	0	0	1	1	1	1	4
4	SUPERINTENDENT -WORKSHOP	0	1	1	1	1	0	0	0	0	0	1	1	6
5	BLOCK INSPECTORS	0	0	0	0	0	2	2	2	1	1	2	2	12
6	HVY -DTY MACHINE OPERATORS	0	1	1	0	0	1	1	1	0	0	2	2	9
7	CHOKER-MEN FOR HVY-DTY MACHINES	0	1	1	1	1	1	1	1	1	0	2	2	12
8	LORRY DRIVERS & CHOKERMEN	0	1	1	1	0	0	1	0	0	0	1	2	7
9	CHAINSAW OPERATORS & CHOKERMEN	0	1	0	0	0	2	2	1	2	1	2	2	13
10	FOREST TECHNICIANS	0	0	0	0	0	2	2	2	2	2	2	2	14
11	MECHANICS	0	1	1	1	1	1	1	1	0	0	2	1	10
12	SAWMILL TECHNICIANS	0	1	2	2	1	0	0	0	0	0	0	0	6
13	CLERICAL STAFF	0	0	0	0	0	0	0	0	0	0	1	0	1
14	SECURITY	0	1	0	0	0	1	0	0	0	0	0	0	2
15	MEDEX	0	1	0	0	0	0	0	0	0	0	0	0	1
16	COOKS	0	1	0	0	0	1	1	0	0	0	0	0	3
17	STORE KEEPERS	1	0	0	0	0	0	0	0	0	0	0	0	1
	UNLIKELY, VERY LOW PROBABILITY													
	LIKELY, REAL CHANCE OF OCCURRENCE													
	VERY LIKELY, REAL CHANCE OF OCCURRENCE AT ALL TIMES													

18.0 CUMULATIVE IMPACTS

18.1 Introduction

RLSS expects to produce around 80,000 m^3 of round logs annually, which translates to about 56,000 m^3 of lumber: therefore RLSS' operations would be the largest in the Kartabu Triangle and one of the largest in Guyana. Apart from wood processing operations at RLSS St. Lawrence sawmill facility and a lumber yard at Versailles, RLSS intends to establish lumber yards in New Amsterdam and Bartica to support housing construction in those areas. *(House builders in Bartica purchase dressed lumber at Parika).*

The introduction of logging operations elsewhere in Regions 1, 6, 7 and 10 led to a corresponding increase in the scale of mining activity, because miners take full advantage of logging roads to access their mineral licences. A similar situation is expected to prevail in the area and the entire gold trade will be impacted by additional gold production.

The Kartabu-Puruni Road is the primary access road in the Kartabu Triangle, and RLSS' will deploy at least six (6) 40 ton trucks on a 95 km segment of the road at least 5 days per week. The more developers using the road, the easier it is for MNR, MOPW and GGMC to justify higher budgetary allocations to maintain the road.

The increased road traffic due to RLSS' vehicles would encourage mechanics and persons offering vulcanizing services to increase the scope of their businesses.

18.2 Definitions and scope

Cumulative Effects/Impacts for this study may be defined as the impact on the environment which results from the incremental effects of the timber harvesting when added to mining activities, past, present, and reasonably foreseeable future actions. Cumulative effects result from individually minor, but collectively significant, actions taking place over a period.

Cumulative impacts related to socio-economic impacts (including those linked to jewellery businesses) in Administrative regions 2, 3, 4, 6 and 7 are more difficult to quantify.

The nature of the project, particularly the projections for employment and the planned interventions into the resources along with existing land use are the elements used to determine cumulative impacts.

18.3 Cumulative Impacts

18.3.1 Positive impacts

Residents of communities in the area are willing to stay and live within their villages providing they can get **regular and constant** employment. Regular and constant employment are essential for parents of children attending secondary school at Bartica or other coastal locations. Able bodied men (and women) in the Kartabu Triangle not comfortable with the hazards of gold mining will be able to find employment with RLSS. In addition RLSS will provide many of its new employees with regular training that will improve their skills and position them to earn better remuneration packages.

RLSS' operations will attract more people to the Kartabu Triangle who will stay for extended periods. Regional farmers at Kartabu Point, Batavia and Iteballi stand to benefit from the higher demand for foodstuffs while merchants trading in clothes, beverages and fuel may extend the scope of their business. There are unconfirmed reports that merchants such as Banks DIH, Demerara Distilleries Limited and Massy Stores (Guyana) Inc. will be expanding their operations at Bartica: a direct result of incremental increases in the population in the **region** as well as increased economic activity at Bartica and the wider region (7). (For example, the increase in the volume of business and GOG revenue at Bartica has led to GPL installing a new power plant,

MOPW expanded the Bartica Stelling, and MOH improving the services provided by the Bartica Regional Hospital).

RLSS' operations will install a fully functional road network within the concession area and its very likely that new mineral licenses will be developed, leading to the expansion of gold mining activity and increases in gold output. Gold mining is a major driver of regional and national level economic activity. *"The sector is both labour and capital intensive, the high degree of mechanization requiring a considerable range of support services, including metal fabrication, machine construction and repair, transportation, carpentry, plumbing, welding, pipefitting, and blasting"* (GOG, 2000). Therefore RLSS' operations will lead to many ancillary benefits for the economy.

18.3.2 Negative Cumulative Impacts

(a) Stress on families

RLSS will not cater for accommodation for the families of all workers deployed on the concession area. Therefore field operatives based at the concession will be away from their families for extended periods, and unless managed well, this could lead to undesirable tension within families. In addition. Employees' children will also not benefit from the coaching and counselling of their fathers on a regular basis and this can only be to their disadvantage.

(b) Expanded road network.

Stakeholders, including miners, are sure to take advantage of the expanded road network that RLSS will construct. Unlike typical mining roads, these roads will be well constructed and maintained to accommodate heavy-duty timber trucks. An expanded road network could prove to be a challenge for the security forces trying to track down people engaged in illegal practices.

(c) Intensity of interventions on the concession area

The concession area is already impacted by mining operations and it is straightforward at this time to assign responsibility for current environmental issues to mining activities. The interventions necessary to undertake logging will increase the intensity of environmental impacts on the concession area. Over time it will be tedious to assign responsibility for the source of major environmental problems such as forest degradation or poor water quality in streams; the perception could very well be that RLSS is responsible and this has implications for RLSS's overseas marketing strategy.

(d) Conflicts with national policy

Until mining practices improve dramatically (in a few years) based on current initiatives by the GGMC and the GMSTCI, the expansion of negative environmental impacts in the short term based on mining and logging on the same area could produce data that are not compatible with national level commitments for a green economy or with international obligations set out in various treaties and conventions to which Guyana is a party.

18.4 Mitigation and monitoring - Environmental and Social Management Plan

RLSS is committed to running a successful logging operation in line with the terms of its State Forest Authorization and its Environmental Authorization.

19.0 EMERGENCY RESPONSE PLAN

19.1 Overview

The ERP is the basis for the management of predictable and potential hazards that may arise during its logging operations. The ERP specifically provides information and guidance to assist operatives of the enterprise to prevent, report on or respond to mishaps. More importantly, the ERP prescribes responsibilities and a chain of command for responding to emergencies.

19.2 Purpose

The purposes of the ERP include:

(a) To eliminate the potential causes of fire and other emergencies, prevent loss of life and damage to property, and to conserve the natural environment.

(b) To prescribe procedures to be followed in case of emergencies.

(c) To establish a command chain in responding to emergencies

19.3 Policies

All personnel must be aware of and take steps to manage hazards in their work area. In addition, all personnel are expected to alert security if they discover a fire or oil or chemical spill in keeping with the procedures set out in this plan. However, only duly trained personnel would respond to fires. Response procedures shall be posted at strategic points in all work areas.

Emergency Response Teams (ERT) and Fire Response Teams (FRT), respectively will be organized and trained to respond to fire, oil spills, chemical spills, and medical emergencies. These teams will be drawn from the relevant departments based on the nature of the potential hazards associated with each section.

19.4 Responsibilities/ chain of command

(a) Forest Operations Manager.

The forest manager will

a. Ensure implementation and maintenance of this plan.

b. Report to relevant authorities in case of an emergency

c. Review event analysis reports with relevant line managers/ supervisors and the Administrative Manager.

d. Get as much information as possible about the nature of the emergency from the person making the initial report.

e. Ensure that the Administrative Manager and members of the relevant ERT are immediately alerted and given the information obtained on the emergency.

f. Ensure the Operations Manager is informed of the emergency.

(b) Line Managers or Supervisors

Line managers and supervisors will ensure that field operatives are aware of the potential hazards of their workplace and take the necessary precautions.

Specifically, line managers will:

a. Ensure staffs under their supervision is familiar with and trained in emergency response procedures.

b. Ensure personnel are provided with and use the prescribed safety equipment to carry out their duties safely.

c. Ensure an inspection of electrical wiring in each section/ department on a yearly basis. Conduct regular visual checks to ensure wiring is safe and in good condition.

d. Ensure that oil and other petroleum products used by staff are labelled, safely stored, and handled in accordance with the ERP and any other guidelines provided by the Company.

e. Ensure that all incidents of fire are reported on in accordance with this plan. Prepare an Event Analysis of any fire, or oil spill that occurs in your Department with the assistance of the

(c) Personnel Clerk

The personnel clerk will ensure the following:

a. Provide on-going safety training and briefing sessions for staff related to operational hazards.

b. Oversee and conduct regular inspections of all emergency response/ clean up equipment to ensure they are in working order.

c. Ensure that the ERTs receive appropriate Training to respond to fire, oil, or chemical spills.

d. Assist line managers/ supervisors with the completion of the spill report and incident investigations after any spill or fire.

e. Assist line management with the preparation of an Event Analysis for any oil product spill that exceeds 5 gallons.

(d) Emergency Response Teams (ERTs)

ERT teams comprise: A *Fire Response Team* whose main objective is to respond promptly to fires or threats of fires; and a Medical Response Team whose priority is to respond to medical emergencies as trained and as set out in this plan.

Generally, ERTs must:

a. Be aware of the potential hazards of your work area and take precautions to prevent them from occurring during carrying out your duties.

b. Follow good housekeeping practices to prevent accidents, fires, and other emergencies.

c. Be alert for fire, oil, or chemical spills in your work area.

d. Sound the alarm and call security immediately upon notice of any fire.

e. Call security immediately once you notice an oil sheen, spill, or unplanned release of any chemical anywhere.

f. Follow the emergency response procedures set out in this document.

19.5 Fire prevention and response

(a) Potential Fire Hazards

Fires can be prevented if potential hazards are identified and managed. Good housekeeping is a major factor in prevention of fires. Discarded combustible material would not be allowed to accumulate. Each work area would be provided with enough non-combustible waste or trash receptacles. Use of flammable cleaning solvents to clean floors, walls, furniture, and equipment would be manage carefully or avoided altogether.

Some potential fire hazards to be avoided are listed below:

a. Overloaded electrical circuits, unsafe wiring, and defective extension cords;

b. Improper disposal of cigarette butts;

c. Mishandling or improper storage of flammable material e.g., gasoline, waste oil, paint;

d. Improper housekeeping resulting in accumulation of flammable material e.g., paper, cardboard boxes, oil-soaked rags, flammable liquids; and

e. Improper or careless use of welding torches and wet cell batteries.

(b) Types of Fires and Fire Extinguishers

There are four different types of fires and that may occur on the concession area and these determine the type of extinguisher to be used in an emergency.

Four kinds of fires may occur

a. *Class A Fire*: involves ordinary combustible material such as wood, paper, rags, rubbish, and other solids. These may occur at any work site: typical red coloured water fire extinguishers will be posted at all work sites, including forward camps. For buildings, the extinguishers will be placed near the exits for the building.

b. *Class B Fire*: involves flammable or combustible liquids such as gasoline, fuel oil, paint, and hydraulic fluids. Such fires may occur mainly around workshops, fuel storage areas and parking areas for vehicles. Foam fire extinguishers will be deployed in those areas.

c. *Class C Fire*: fires due to flammable gases such as natural gas and propane. RLSS anticipates that only in the mechanical workshop will there be a need for such an extinguisher and at least one of these will be stored near to bottles of flammable gases.

d. *Class E Fires*: these relate to fires of electrical origin and RLSS anticipates that such may only occur in the workshop. At least one CO_2 extinguisher will be used in the workshop near to the generator room.

(c) Fire Response Procedures:

Any field operative or security personnel who discovers a fire should:

a. Activate the fire alarm (gong)

b. Call security (number to be established) and report the location of the fire. (Security will inform the emergency response personnel who will respond to the fire as trained.)

c. Ask for help if someone needs rescuing…

d. Confine the fire by closing doors, windows, and other openings if time permits and if possible.

e. Evacuate the area and wait in the nearest designated waiting and meeting area.

f. Provide as much information as you can to emergency response personnel.

19.6 Oil (petroleum product) spill prevention and response

(a) Storage of Oil

The following considerations apply:

Mismanagement of waste oil can lead to the contamination of water and soil. Many components of oil are toxic to living organisms. Contamination from waste oil results mainly from improper storage or disposal. Waste oil must therefore be carefully stored.

The following practices would apply:

a. Waste oil must be stored in drums. Use of rusting drums must be avoided as they may leak at a future time. Each drum must be labelled with the date that the accumulation started as well as the terms “Hazardous Waste”, “Waste Oil”, and “Toxic”.

b. All drums containing waste oil must be stored in the waste oil storage area which will have retaining walls and floor made of material which is impervious to the migration of oil. The storage area must have a clearly legible sign stating: “Waste Oil.” The storage area must also be protected from the weather by a shed.

c. The drums will be stored off the ground raised pallets to facilitate detection of any leakage.

d. Monthly inspection of the waste oil storage area must be carried out to check for any leakage or potential leaks. During these inspections, the condition of the drums must be checked. The floor and the palettes must be checked for any sign of oil leakage.

(b) Oil Spill Response Procedures

In the event of an oil spill the following steps must be taken:

a. Evacuate the area and warn others, as necessary.

b. Contact security immediately.

c. Ask for help if anyone is injured and/ or needs rescuing…

d. The security staff responding to the call will notify the Administrative Manager, the Oil Spill Response Team, and the Forest Manager

e. If possible, stop the release e.g., by turning off any valve left open.

f. Visually inspect the site of the oil spill to obtain enough information to describe the situation to security and response personnel (see Table 36)

g. Be careful, be alert and keep clear if any hazardous chemical is involved.

h. The following minimum information would be gathered:
   - ✓ Spilt material (e.g., used oil or gasoline)
   - ✓ Estimated quantity of spilt material (or surface area covered or rate of flow)
   - ✓ Location and direction of the spilt material and direction of flow
   - ✓ People involved, injuries…

i. Help to direct response personnel to location of the spill.

j. Response personnel must ensure the release is stopped and clean up the released oil and manage the resultant contaminated material.

k. On the same day of the spill submit event information to your line manager/supervisor and Administrative Manager. This will assist them in completion of the Oil Spill Report Form.

l. Line management with assistance from the Administrative Manager and relevant Department Personnel will perform an Event Analysis.

19.7 Plant maintenance

Regular drills would be carried out to ensure the functional aspects of the ERP. This initial draft plan will be refined within six months of start-up of operations. After this, the plan would be reviewed on a yearly basis and updated, as necessary.

19.8 Other protocols

RLSS developed an Emergency Response Chart for general application (see Figure 75), a simple reporting format in case of emergencies (see Table 50) and a list of contact numbers in the event of an emergency (see Table 51) to guide the effective management of emergencies.

The Forest Monitoring Officer will review the whole emergency response process to guide its development and make sure everyone understands and internalize the process.

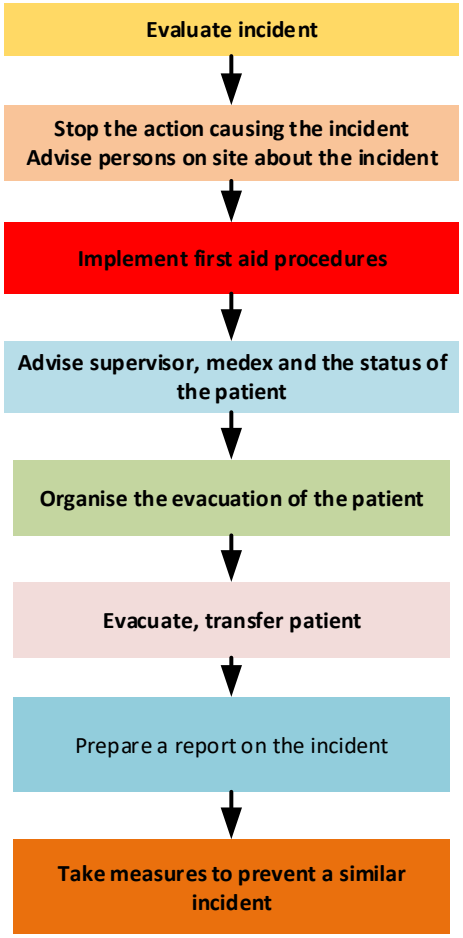


Figure 75: Outline of RLSS' provisional emergency procedures.

Table 50: Outline of RLSS' protocols for addressing emergencies.

#	EVENT	REMARKS
A	**EMERGENCY:**	
1	Time discovered	
2	Date discovered	
3	Name of responder	
4	First reported by	
B	**Reported Injuries**	
5	Medical response team dispatched	
C	**FIRE HAZARD**	
6	Fire response team dispatched?	
D	**OIL /FUELSPILL**	
7	Type of Oil or Fuel discharged or spilled:	
8	Estimated Quantity Spilled	
9	Exact Location of Spill	
10	Is it flowing/contained?	
11	Weather Conditions:	
12	Ground Conditions	
13	Action Taken: (A, B or C)	

Table 51: Contact phone numbers for emergencies.

#	Agency	Phone No(s).
1	RLSS Head Office, Georgetown	592 266 5841
3	Bartica Hospital	592 455-2339
3	Speed Boat Services	To be registered
4	Georgetown Hospital	592 227-8210/2
5	Air Services Limited/Helicopter	222-4537, 222-4368, 222-2993
6	Bartica Police Station	592 455 2222
8	GFC-Bartica Office	592 455 2332
10	Commissioner of Forests, GFC	592 226-7271/4
11	Environmental Protection Agency	225-4679, 225-5469, 225-4173

20.0 CONCEPTUAL CLOSURE PLAN

20.1 Factors that may lead to the closure of RLSS Operations:

The expected life of the project is 40 years following which the company could exercise the option for a renewal of their TSA for another 40 years.

RLSS has prepared a Closure Plan based on the following scenarios:

a. If the GFC does not grant an extension of the TSA, after its expiry;

b. If there is an increase in mining activities within the compartments, or the mining activities in the compartments make field operations inoperable and unprofitable for RLSS to continue logging operations.

c. If, for any reason there is a heightened threat to the safety and security of field crews.

20.2 Objective of Closure Actions

The primary objectives of the closure actions are to:

a. Conclude all contractual agreements with employees and their Union.

b. Conclude all obligations to the Government of Guyana (taxes, royalties, fees, etc.)

c. Decommissioning and removal of all fixtures and structures, equipment, machinery, and other infrastructure from the concession

d. Clean up all debris (tyres, machine parts, oil drums, etc.) from the forest floor.

e. Provide for the redeployment of employees, where practicable

20.3 Closure Actions:

The core closure actions will be as follows:

a) In event of the Company's closure, the GFC, the employees, the designated trade union, RDC and relevant Government authorities, institutions and organizations would be notified. The authorities would be given adequate notice prior to the closure of the field operations (see Table 52).

b) If the enterprise assumes new ownership, or be transferred to any other entity, the employees, the relevant Government authorities, institutions, and organizations would be notified. The notification would be provided six (6) months prior to the change in ownership.

c) NIS and PAYE contributions for staff be discontinued; employees would be advised of the status of their payments, that is whether all the appropriate contributions have been handed over to the NIS, GRA, respectively. Severance Pay for Employees/Workers will be paid and other moneys due to them as required by Labour Act and the Termination and Severance Payment Act (TESPA). Acreage fees, royalties and taxes of all descriptions required by the Laws of Guyana shall be honoured.

d) The disposal of physical assets at monitoring stations will be managed in consultation with the GFC. A comprehensive site clean-up activity will be undertaken at all workplaces to remove all foreign debris from the forest environment.

e) RLSS will duly inform the FPA regarding the availability of trained technicians. RLSS will also explore other ways of assisting ex-workers in any material away (for example gifts of tools, priority in the sale of vehicles, etc.). Expatriate staff will be repatriated in accordance with national immigration procedures.

f) If the Company would have logging or sawmilling operations in other locations in Guyana, the transfer of employees/workers would be considered.

Table 52: Summary of actions to be taken towards closure of RLSS' operations.

#	Action	Responsible Party	Consultations	Schedule
1	Prepare a checklist of all activities to be undertaken toward the closure of operations	Operations Manager	Forest manager	-180 days
2	Advise the GFC, GRA and NIS about the closure and address any concerns they have	Operations Coordinator	Personnel Clerk	-90 days
3	Prepare a list of all redundant staffs and their CVs or profiles with a view to sharing the lists with other companies.	Operations Manager	Forest manager	-90 days
4	Brief employees about the reasons for closure	Operations Manager	Forest manager	-90 days
5	Prepare redundancy packages & Letters of Reference	Operations Manager	Forest manager	-90 days
6	Ensure records related to remuneration packages are up to date	Operations Manager	Chief Clerk	-90 days
7	Take care to secure company assets, especially records	Forest Monitoring Officer	Chief Clerk	-45 days
8	Plan to clean up the base camp in the forest area and dispose of all items that could injure animals	Forest Monitoring Officer	Chief Clerk	-45
9	Give employees preference in the sale of disposable assets	Forest Monitoring Officer	Chief Clerk	-30

21.0 THE ENVIRONMENTAL MANAGEMENT PLAN -SUMMARY

21.1 Overview

This chapter summarises the key elements of RLSS's environmental management plans.

It comprises the following elements:

a) Mitigation measures/Mitigation Plan

b) Basic road management plan

c) Wildlife management plan

d) Capacity building and Training plans

e) Monitoring Plan

The development of the plans is based on several considerations:

a) **Management experience**: Since 2006, RLSS developed robust corporate discipline and respect for the public agencies with whom it has engaged; these agencies include GFC, GRA, GEA, and the EPA.

b) The value of **trained employees**. RLSS has ensured through training courses, regular briefings, and coaching that its employees appreciate the company's philosophy on the conservation of the environment and the need for them to share responsibility for full compliance with national guidelines.

c) **Customer base**: RLSS's marketing thrust depends a great deal on customers' confidence that the company is a *responsible* forest operator.

d) **Value system/Spiritual values**: The management of RLSS believes that the forest could be exploited for financial benefits and at the same time continue to offer a range of aesthetic and therapeutic values.

21.2 Mitigation measures/Mitigation Plan

Impact significance has been taken as a function primarily of the following criteria:

a) Magnitude and extent.

b) Reversibility.

c) Longevity.

d) Probability of occurrence.

Based on these criteria the main significant impacts, which need to be mitigated, are as follows:

d) Impacts associated with physical environment: earthworks of various kinds and for various purposes, air quality, water resources, and soil resources.

e) Impacts related to the biological/ecological environment: timber harvesting activities, wildlife, and ecological relationships.

f) Impacts related to the socio-economic environment: conflicts over land use, social problems, and road use.

g) safety, waste management

These matters are presented in Tables 53, 54 in terms of the following:

a) Predicted impact and proposed mitigation measure and the time frame for implementation (Table 53).

b) Projected situation after implementation of mitigation measures (Table 54).

The issue of **waste management** (see Item 3.4, Table 51) require further elaboration, even though RLSS will follow prescriptions of the COP.

Tree debris, comprising tree crowns and log ends due to the bucking of logs at stump will be left in the forest (at stump). Log ends arising from trimming logs at log markets and bark will be collected and deposited in natural depressions on the forest floor or special pits constructed to receive effluents from camps. Wood ends will also be used in conjunction with road side ditches to restrict sediments from entering natural waterways.

Wood waste will also be generated at the wood processing site. Such wood waste will be taken into the forest and dumped in natural depressions. A limited quantity of strips generated by the mills will be utilized by employees engaged in the cultivation of vine crops such as bora (*Vigna unguiculata*) Karela (*Momordica charantia*), squash (*Cucurbita spp*.) or passion fruit (*Passiflora edulis*).

Liquid waste generated at base camps and forward camps will be channelled to special pits dug to a depth of about 9m, and lined with tree debris where some filtration will occur and where the filtered waste water will infiltrate into the soil. Such pits will be put at least 500m from camps and 300m from waterways. Kitchen waste including cooked food as well as discarded plant based material will be put into pits lined with wood ends. Cans and bottles will be duly covered with earth after dumping to avoid injury to animals that forage in such pits.

RLSS will employ both septic tanks and pit latrines for the disposal of human waste. The effluent from septic tanks will be channelled to pits lined with wood waste to facilitate its infiltration into the soil. Pit latrines and septic tanks will be put at least 300m from natural water courses.

Plastics, metal parts, batteries will be put into drums and buried at pre-determined points that will be well marked. RLSS' chainsaw operators will re-use waste oil in their chainsaws. Chemical waste such as paint and grease will be put into drums and buried at pre-determined duly designated points on the forest floor.

Table 53: Potential negative impacts and corresponding mitigation measures.

Predicted impact.	Proposed mitigation measures	Lead agency	Time frame for implementation
1.0 Physical Environment			
1.1 Earthworks will lead to , scarification of soil surface, sub-soil exposure , erosion, soil compaction, and water logging	• Plan roads, bridges and culverts paying attention to topography and the use of stock maps. • Use appropriate machines for all earth works to reduce the time taken to complete each activity. • Consider the weather pattern before initiating major earthworks. • Follow the recommendations of the CoP (Sections 4.5-4.7, Section 5)	RLSS	**During the entire time frame for the project.**
1.2 Air quality: Dust and smoke (especially along roads) minor changes in micro-climate	• Vehicles will travel slowly <25 km/hr whenever they pass homesteads or communities. • All machines must be fully functional to maintain emissions within manufacturers' parameters.	RLSS	**During the entire time frame for the project.**
1.3 Water resources: negligible increases in turbidity, temperature, ph.; oil spills	• Strict adherence to RIL principles and prescriptions of the CoP, especially regarding buffer zones along waterways. • Maximum care to be taken to ensure all vehicles and machinery are in a proper state. Dispense or change lube oil only in designated areas. • EPA's Brochure on Water conservation to be placed at all public points around the concession. • Regular briefing sessions for field staff would be formalised. • Care taken to avoid excessive spillage of borax solutions whenever used to treat (some species of) timber.	RLSS, GFC	**During the entire time frame for the project.**
2.0 Biological/ecological environment			
2.1 Timber harvesting: destruction of juvenile trees, genetic erosion of species, decline in soil fertility, spillage of oil, increased potential for blow downs	• Implement a system for conducting pre-harvest inventories and preparing stock maps. • Use directional felling techniques for felling trees. • Plan skid trails based on stock maps. • Use winching techniques. • Use heavy duty machines that are fully functional. • Train all field operatives in RIL practices	RLSS	**During the entire time frame for the project.**
2.2 Wildlife: modification, destruction of habitats, population changes	• Ensure a systematic manner of timber harvesting so that once a block is harvested, the operation moves on, so that no further disturbances occur. • Prohibit employees from hunting and fishing. • Unique ecosystems, habitats and species will be conserved, by restricting logging in areas where they occur.	RLSS	**During the entire time frame for the project.**
2.3 Ecological relationships; Modifications of ecological relationships.	• Implement proper RIL practices and prescriptions of the CoP (Sections 8, 9 & 10) • Prohibit the use of fires on the forest floor.	RLSS, GFC	**During the entire time frame for the project.**

3.0 Socio-economic environment			
3.1 Conflicts: restrictions of access, alienation of rights	• Engage residents in discussion and consultations to address mutual concerns: ensure the company is positioned to receive and address complaints.	RLSS	**As required**
3.2 Social problems: crime, use of alcohol, other disagreeable behaviour; increase in life threatening behaviour through exposure to various illnesses.	• Work with public agencies (Police, staff of the Ministry of Health, and staff of the Ministry of Regional Development) in Regions 7, to address emerging issues. • Keep proper records of emerging problems and pass these on to the appropriate agencies.	RLSS	**As required**
3.3 Road safety: high probability of road accidents.	• Work with MOPW, the GPF, the mining community and other stakeholders to ensure adherence to proper road use practices and to identify road locations requiring special attention. • Make sure that each vehicle is in a full functional state prior to its use on the roadways, within and outside of the concession area. • Place appropriate cautionary signs at sharp turns, steep grades, and bridges and near populated areas. • Promote proper skills set among drivers through Training.	RLSS	**During the entire time frame for the project.**
3.4 Waste management: illnesses resulting from a polluted environment	• Observe prescriptions of the Code of Practice for forest operators. 3rd Ed. Sections 8.0, 9.1, 9.2. • Hold frequent briefing sessions with staff to ensure a shared understanding of the consequences of poor control over waste management. • Distribute and put-up EPA's brochure on waste management at all camps.	RLSS	**Monthly**
3.5 Indigenous, archaeological assets: loss , destruction modification of habitats, landscapes	• **Identify and isolate any assets encountered and post appropriate advisory signs and notices; ensure such sites are recorded on all stock maps.** • **Consult with the Amerindian Affairs Ministry and the Walter Roth Museum on collaborative efforts to protect any assets discovered.** • **Collaborate with communities to address the conservation of existing and emerging assets.** • **Offer Training & incentives where appropriate**	**RLSS**	**As required**

Table 54: Projected situation following mitigation measures.

Environment Type	Project Activities	Project Phase	Potential Environmental Impact	Main Mitigation Measure	Impact Significant after Mitigation
Physical Environment (Land/Soil)	Clearing of lands for the construction of base camps, roads, log markets and mechanical workshops	Operations	• Removal of specific site vegetation to facilitate the construction of project facilities has the potential to expose the soil to erosion, • Scarification of soil surface and sub-soil, soil compaction.	• Minimize removal of vegetation and encourages the re-vegetation of site impacted by clearance. • Installation of drainage system to accommodate surge in storm water.	Ex: Ir: Lt: Un: M: In: Lp
	Operation of Machineries	Operations	• Soil compaction from multiple passes of heavy vehicles over soil surface.	• Avoid the use of heavy vehicles during periods of heavy rainfall. • Design specific routes for heavy vehicles and equipment to use.	Ex: Ir: Lt: Un: M: Sig: Lo
	Waste Disposal (solid and liquid waste)	Operations	• May result in soil contamination from indiscriminate disposal of liquid, solid and hazardous waste	• Implementation of a sound waste management system at the location of operation	Lo: Rv: St: Av: M: In: Hp
	Fuel and Oil transportation, handling, and storage	Operations	• Pollution from fuel and oil because of a spill during transportation, handling, or storage.	• Ensure that fuel, oils, and hazardous liquids are stored in a bunded are that has an impervious surface. • Due care will be applied to prevent spillage whilst handing fuel, oils, and potential hazardous liquids.	Lo: Ir: Lt: Av: Im: In: Lp. Lo: Ir: St: Av: Im: In: Lp
	Clearing of lands for the construction of base camps, roads, log markets and mechanical workshops	Construction/ Operations	• Potential increase in sediment loads and turbid streams due to surface run off and erosion. Removal of vegetation	• Implementation of erosion control measures. • Channel storm water to a settling/forested area before discharge into creeks. • Create buffer zone around streams and creeks.	Lo: Ir: St: Un: M: Sig: Hp

Environment Type	Project Activities	Project Phase	Potential Environmental Impact	Main Mitigation Measure	Impact Significant after Mitigation
Physical Environment (Water Resources)	Construction of bridges and the installation of culverts	Construction/ Operations	• Possible reduction of stream flow from the installation of bridges and culverts	• Construct bridges and culverts in accordance with the GFC's Code of Practice for Timber Harvesting Operations • Temporary water-crossings to be decommissioned after usage to ensure that they do not collapse and block stream flow. • Design bridges to allow for the free flow of water, taking into consideration water flow during period of extremely high intensity rainfall. • Road culverts should be aligned perpendicular to the road and horizontal to the flow of water	Lo: Ir: Lt: St: Un: Im: Sig: Hp: Av: Lp
	Waste Disposal (solid and liquid waste)	Construction/Operation	• Contamination of water in proximity to disposal, modifications in water temperature, turbidity, ph.; • Pollution with oil	• Avoid the dumping of waste in creeks and streams. • Development and implementation of a waste management plan.	Lo: Ir: St: Un: M: In: Lp
	Fuel and Oil transportation, handling, and storage	Construction/Operation	• Contamination of water in proximity to disposal, modifications in water temperature, turbidity, ph.; • Pollution with oil	• All fuel, oils and hazardous liquids will be stored away from streams and creeks. • Ensure that all fuel, oils, and hazardous liquids that will be used by the operation is stored and used in a bunded area.	lo: Ir: Lt: Un: M: In: Lp
Physical Environment (Air)	Operation of chainsaws	Construction/Operation	• Noise, dust, and smoke generated from the operation of the various equipment. • Changes in microclimate.	• Ensure that all operative working in proximity to mills and saws be provided with personal protective gear.	Lo: Ex: Ir: Lt: Un: M: Sig: Hp
	Operation of heavy-duty vehicles and equipment	Construction/Operation	• Noise generated for the operation of the various pieces of equipment.	• Ensure that all operative working on and in proximity to are provided with personal protective gear	Lo: Ex: Ir: Lt: Un: M: Sig: Hp

Environment Type	Project Activities	Project Phase	Potential Environmental Impact	Main Mitigation Measure	Impact Significant after Mitigation
	Clearing of lands and of logs and other materials	Construction/Operation	• Excessive exposure of soil and constant traversing of heavy-duty vehicles over exposed soil	• All employees working in dusty environs will be provided with dust masks. • Speed limits will be instituted for vehicles using dusty areas. • During extensive dry periods dusty areas will be soaked on a regular basis.	Lo: R: St: Av: M: In: Lp
	Operation of heavy-duty vehicles and equipment.	Operation	• Dust and particulate matter resulting from the operations of chainsaws and movement of vehicles.	• All employees working in dusty environs will be provided with dust masks.	Lo: Ex: Ir: Lt: Un: M: Sig: Hp
	Disposal of wood Waste	Operation	• Improper disposal of waste generated wood processing activities at Base Camp	• All dust generate from chainsaws and mills will be spread on the forest floor.	Lo: Ex: Ir: St: Un: M: Sig: Hp
Biological & Ecological Environment (Flora)	Clearing of lands for the construction of base camps, roads, log markets and mechanical workshops	Construction	• Destruction of trees and from the clearing of lands for construction purposes.	• Clearing of vegetative areas will be restricted to areas where construction activities will occur.	Ex: Rv: St: Un: Im: In: Hp:
	Harvesting of Logs (Logging and extraction)	Operation	• Reduction in tree species specific to the areas of logging. • Genetic erosion of species • Decline in soil fertility due to removal of biomass from poor soils, • Increased potential for blow downs of residual trees due to freer flow of air though the canopy/under-storey.	Use of the GFC COP2018	Lo: Ex: Ir: Rv: Lt: St: Un: M: Sig: Hp: Lp
Biological & Ecological Environment (Fauna)	Clearing of lands for the construction of base camps, roads, log markets and mechanical workshops	Construction	• Modification, fragmentation, and destruction of habitats (especially in terms of cover and food sources); depletion in	• Use of the GFC's COP related to the harvesting of logs and all other guidelines that protect biodiversity.	Ex: Rv: St: Un: Im: In: Hp:

Environment Type	Project Activities	Project Phase	Potential Environmental Impact	Main Mitigation Measure	Impact Significant after Mitigation
			number, /variety of some species.		
	Presence of humans	Construction and Operation	• Increase in the level of predation, modifications of prevailing ecological relationships: plant-plant, plant-animal, animal-animal	• All employees will be educated on the conservation and protection of wildlife.	Lo: R: St: Av: M: In: Lp
Socio-economic Environment (Occupational Health & Safety)	All construction and Operation activities	Construction/Operation	• Risk of accidents from the used of the various equipment onsite	• All employees will be educated about the Company's OSH practices. • All working environments will be presented with First Aid kits. • Appropriate signage will be posted around all working areas. • Relevant and appropriate safe gear will be provided to all employees.	Lo: R: St: Av: M: In: Lp
	Operation of machineries and equipment	Construction /Operation	• Continuous exposure to excessive noise and vibration from the operation of equipment.	• All employees working in environs that cause them to be exposed to occupational hazards will be provided with protective gear.	Lo: Rev: St: Av: M: Sig: Hp
	Conflict results from the Change in Land Use activities	Construction /Operation	• Restriction of access, alienation of rights, unplanned changes in lifestyle, restrictions on hunting.	• All employees will be educated on how to defuse conflicts. • Regular monitoring will be conducted to ensure that no illegal activity occurring within concession and if such is observed it will be reported to the relevant authority.	Lo: Rev: St: Av: M: In: Lp
	Increase in workforce	Construction /Operation	• Increase in the incidences of crime, increase in the use of illicit drugs and alcohol, socially	• Illicit drugs and alcohol will not be allowed at camps.	Lo: Rev: St: Av: M: Sig: Hp

Environment Type	Project Activities	Project Phase	Potential Environmental Impact	Main Mitigation Measure	Impact Significant after Mitigation
			unacceptable behaviour and inappropriate with members of close-by communities.	• All employees will be trained at a minimal level on how to engage with members of close-by communities.	
Socio-economic Environment (Employment)	Hiring of Workforce	Construction /Operation	• Skills transfer , Training opportunities job creation, increase incomes and cash flows	• Members of close-by communities will be sought after.	Lo: Rev: St: Av: M: Sig: Hp
	Regional Development	Construction /Operation	• Improvement of infrastructure. • Crime; use of alcohol; health risks, disagreeable behaviour	All staff will be trained in-house on OSH and security	
Socio-economic Environment (Archaeological Resources)	Construction and operational activities	Construction /Operation	Loss, destruction, or modification of the assets	• If evidence is found, all activities in the vicinity of findings will be suspended. • The relevant authorities will be notified.	

Impact Significance (parameters)
Lo-localised, Ex-Extensive/ Rev-Reversible, Ir-reversible; / St-short term, Lt-long term/ Av-Avoidable, Un-Unavoidable;
M-Mitigable, Im-Immitigable/ Sig-Significant, In- Insignificant/Hp-High probability, Lp-Low probability

21.3 Basic Road Management Plan

21.3.1 Overview

RLSS's road corridor plan has two main components (see also Table 55):

a) Maintaining its concession-based roads in a fully function state through proper road maintenance procedures, and adequate road signs.

b) Monitoring road use by other parties.

Table 55: Core elements of RLSS's plan for road corridor management.

Action	Responsibility	Objective	Intervals
1. Monitor the road for tree fall, erosion. Also check bridges and culverts to establish their state.	Forest Manager	Maintain the road in a proper state always for maintaining production and safety.	Daily & weekly depending on which specific road segments are used
2.Post signs at junctions, turns , steep grades and bridges		Safety issues	As required
3.Monitoring the use of the road by third parties	Forest Manager	Find out and maintain a data base of who is co-using the concession area.	Daily, as often as the opportunity presents itself or via random visits to areas not being logged

21.3.2 Partnerships

In the pursuit of this plan, RLSS will seek support from the EPA, the GFC, the GGMC, GGMDA and the Police

21.4 Wildlife Management Plan

RLSS's management has an interest in the conservation of wildlife and RLSS is prepared to work with the authorities to manage wildlife, not only to check on illegal hunting, but also to support concession-based research. The key activities for RLSS are set out in Table 56.

Table 56: Core elements of RLSS' Wildlife Management Plan

Action	Responsibility	Objective	Intervals
1. Maintain a register of sightings of mammals within the concession area. (The register will state Date/Time of sighting/Common name of species observed).	Field Operatives	A data base would be critical to track the number, variety and possibly habits of large fauna	On sight
1. Train field operatives to recognize the various fauna in the concession area. RLSS will also source posters from WWF and other agencies for the benefit of its field operatives	Field Operatives	Workers should be able to describe accurately the type of animal observed.	Quarterly
2. Post and maintain no hunting and no fishing signs along the concession roads	Field Operatives	This is an attempt to enforce RLSS's no hunting policy.	Not applicable. (*All major road junctions*, and bridges)
3. All heavy-duty vehicles to be equipped with *'rotating beacons'* to warn animals using the road. (Horns may unduly scare the animals).	Drivers/ Mechanics	The objective is to avoid hitting animals using the roadways	Whenever the vehicle is traversing the road.
4. Be on guard for nesting animals during tree felling operations	Fellers	RLSS does not wish to kill wildlife or unduly put them at risk	During operations
5. Monitor whether any third party is extracting wildlife from the concession area.	Drivers, technicians	• To check on hunting activities. • To ensure that RLSS's technicians are not blamed unnecessarily for harvesting wildlife	During operations
6. RLSS's employees will avoid all unnecessary noise, open fires and littering and ensure that waste is properly disposed of	All employees	These activities will help conserve fauna.	During operations

21.5 Capacity Building and Training Plans

21.5.1 Overview

RLSS intends to build capacity to address obligations emerging from this EIA Report and to better implement approved forest management prescriptions. The objectives are:

a) To ensure that each worker at the company takes responsibility for good environmental conduct generally and good forest management practices.

b) To address the requirements of lead agencies and to better comply with national standards.

21.5.2 Training content

Training for selected staff will be as set out in Table 57. RLSS will conduct a Training needs analysis to inform its general capacity building strategy.

Table 57: Training options prioritized for RLSS's capacity building project.

#	Target group	Subject areas	Agencies
1	Senior staff	Reduced Impact Logging (Decision Makers' Course)	FTCI
2	Forest Manager Forest Monitoring Officer	• Environmental management • Code of Practice	FTCI/GFC/EPA
3	• Forest Managers, • Block Inspectors, • Forest Monitoring Officer	• Code of Practice • RIL Foundation Course • OSH	FTCI Consultant
4	Forest Monitoring Officer	• Conflict management • Introduction to sustainable mining	Consultant GMSTC
5	Technicians	• Forest Surveying • Tree marking • Directional Felling • Timber Grading Course, • Tree ID Courses	GFC/FTCI
6	Technicians	First Aid	Guyana Red Cross

21.5.3 Methodology

The mechanisms to be used to build capacity, include:

a) Workshops (Trainers provide workshops to groups of participants, usually ranging from three days to fourteen days)

b) Onsite internship or field work:

c) Training of Trainers' courses

d) Training materials: manuals brochures, etc.

e) Briefing sessions

21.6 Monitoring Plan

21.6.1 Overview

This monitoring plan is intended to address the mitigation measures in a timely and consistent manner. RLSS needs to collaborate with several agencies to ensure that the mitigation measures are addressed in a meaningful and realistic manner. Table 58 lists the agencies and the collaboration anticipated. Table 59 provides details of monitoring activities; Table 60 provides a checklist for monitoring activities and Table 61 provides a budget for monitoring the environment management plan.

Table 58: List of agencies targeted for collaboration.

#	Agency	Nature of collaboration
1	Ministry of Agriculture (Meteorological Department)	Collection of rainfall data
2	EPA	Collection/monitoring of environmental data;
3	Guyana Forestry Commission	Consultations, Training, forest management
5	FTCI	Training
6	MOH	Consultations on health issues
7	TPL	Collaboration
8	GGMC	Consultations (mining)
9	GGMDA	Consultations: shared road use
10	MPOW	Ministry of Public Works: roads

It is important to note that RLSS, as part of its routine operations, will be maintaining appropriate records.

Table 59: RLSS's plan for monitoring operations at the concession area.

Parameter	Responsible Party	Frequency	Location of monitoring
Physical Environment			
Earthworks: • Field operatives have stock maps. • Field operatives have copy of the Code of Practice. • All roads, skid trails, sawmill sites, log markets and borrow pits are marked. • Machines are in a proper functional state	RLSS, GFC	Quarterly	• Sites where earthworks are occurring. • Field camps
Water Quality: • Surface water drainage off roads, log markets and other clearings; • Cleaning of drainage structures (bridges, culverts) along roads and skid trails; • Observance of the integrity of buffer zones along water ways	RLSS, GFC	• Biannually (PMS) • Routine checks, especially in the wet season	• PMS • Areas being logged; • logged over areas; • Primary roads and associated drainage structures.
Air Quality: • Number of illnesses among field operatives apparently related to smoke or dust	RLSS	Biannually	Camp site: sick leave register.
Biological/Ecological Environment			
Timber harvesting. • canopy openings, • retention of seed trees, • Integrity of Biodiversity Reserves. • quality of stock maps	RLSS	Quarterly	Active logging areas, permanent sample plots and Biodiversity reserves
Wildlife Trapping /hunting • Movement of live animals away from the concession area • Trade in wild meat • Traps, firearms, shells	RLSS/GFC	Random checks Random checks Random checks	70 km check point

Parameter	Responsible Party	Frequency	Location of monitoring
Ecological Relationships • Unusual trends, for example accelerated plant mortality, pollution of streams, dead fishes, or other fauna	RLSS, GFC	On observance	Concession area
Socioeconomic Environment			
Conflicts • No. of mining camps, type of mining, vehicle movements, • Complaints lodged with the company. • Complaints lodged with the RDC or another public agency	RLSS, GFC,RDC #2 GGMC, Min. of Human Services	Quarterly	Concession area,
Social & Employment issues • Number of persons recruited from Regions 2, 3. • Number of persons trained. • Rate of absence from work • Disciplinary measures taken	RLSS	Biannually	Concession area
Road safety • Number of accidents/records • Number of fatal accidents/records • Number, type, and position of advisory road signs/records	RLSS	Quarterly	Parika Police Station,
Health and Safety • Emergency Response Plans, • Health and safety committees, • Status of first aid kits, fire hydrants, • Implementation of OHS practices & the regular use of safety gear	RLSS, GFC	Biannually	Sawmill site, field locations, housing quarters
Waste Management • Waste accumulation & waste disposal procedures • Apparent increase in vectors (rats, roaches & ,flies)	RLSS	Monthly	Sawmill complex, field camps
Indigenous/Archaeological assets • Auditing of archaeological and anthropological resources	RLSS	On observance (Quarterly if observed)	Logging operations [blocks] and sawmill complex

Table 60: RLSS's general checklist for monitoring its operations.

ITEM	STATUS (Y-OK/ R-REQ. ATTN.)		
	OK	Requires attention	Responsible Party
Office Area/Field Camp • Emergency Response Plan posted and visible. • First Aid box complete and clean • Litter bins are available			
Personnel : • Records of issue of safety gears • All personnel have and are using safety equipment			
Fuel Storage Tanks and Fill Point – Transit Log Yard and Camp • Fire extinguishers and other firefighting aids available nearby • Physical condition of storage tanks, hoses, valves (evidence of leaks)			
Communication Equipment • Check base station radio set is in working order and signal strength is good with base and with handset for field personnel. • Check all field handsets are in working order and fully charged			
Fire Fighting Equipment and Emergency Equipment • Check that all fire extinguishers are present, fully charged and the correct number are present with no sign of damage. • Check sand buckets are full of dry sand. • Check contents of First Aid box are all present and correct			
Warning/Advice Notices • Check all notices and signs are posted as required, are undamaged, clean, and legible at Transit Log Yard and Camp and on secondary roads			
Soak away/Filter at Transit Log Yard and Camp • Soak away filter is clear of all solid particles. • Check drains are not blocked or full			
Stock maps • Updated stock maps are available for use by all field crews			
Basic equipment • Compass, clinometers, flagging tapes and GPS are available for use by staffs. • Equipment tailored for the needs of specific departments (fire extinguishers-workshop; flasks for water collection-forest management division; etc.)			

ITEM	STATUS (Y-OK/ R-REQ. ATTN.)		
Vehicles • All vehicles equipped with horns, lights and rotating amber lights. • All vehicles are equipped with appropriate tools, first aid kits. • All trucks/lorries are equipped with basic communication equipment. • All vehicles have chains, rope, or straps as appropriate. • Maintenance schedules for vehicles are in force.			
Security • All employees have a security badge, carry, and display them on their uniforms			
Camp Hygiene • All camps are provided with potable water. • All camps are cleaned regularly, equipped with fires extinguishers, lights and pesticides, other supplies. • Waste disposal practices/mechanisms are monitored			
COMPLETED BY: (signature and date)			

Table 61: breakdown of annual budget for monitoring field operations

Impact/Event	Actions	Equipment/tools/items	Duration	Annual cost (G$)
1.Earthworks & soil	Field visits, briefing sessions, review of stock maps & other records; review of SOPs	Stock maps, GPS, Compass, Clinometer, Vehicle (ATV)	3 days every three months	600,000
2. Air quality[40]	Review of medical records of field operatives; consult medical personnel	N/A	2 days every three months	500,000
	Analysis of air quality at PMS	Digital Anemometers, Sound Level Meters, Air quality Detectors, etc.	At least one day per Station per quarter. (*PMS' within 5 km of RLSS' Base Camp will be monitored once per month*)	2,000,000
3. Water quality	Review of medical records of field operatives consult medical personnel	N/A	2 days every three months (At the same time being assessed for illnesses linked to air quality).	0
	Quarterly monitoring of water quality (PMS)	Clean bottles, ice, cooler to store water earmarked for a laboratory (Kaizen) (Laboratory services)	1 day per PMS, every three months	2,500,000
4. Timber Harvesting	Visits to field crews to verify the use of stock maps, CoP, etc.1	Vehicle	3 days every three months	500,000
5. Wildlife	Recruitment of wildlife expert; physical check of camera traps	Vehicle, trail cameras	Quarterly	1,000,000
6.Eco-relationships	Recruitment of a consultant; field tour across logged over sites within the concession area	Vehicle, camera	Annually	500,000

[40] RLSS will seek further legal advice on the issue of medical records.

Impact/Event	Actions	Equipment/tools/items	Duration	Annual cost (G$)
7. Conflicts	**Formal discussions** with community leaders, representatives of miners, public officials (RDC)	Vehicle, camera	Biannually (one-day session)	400,000
8. Employment	Review of company records		Minimum: 2 days every six months	200,000
9. Social problems	Discussions with public officials (Police, RDC) and community leaders	Vehicle, camera	2 days every three months	800,000
10. Occupational Health & safety	Verify the use safety gear, SOPs; check on the frequency of briefing sessions	Vehicle, camera	2 days every six months	200,000
11. Road safety	Install, replace, and rehabilitate road signs; review safety records	Vehicle, camera, carpentry tools	3 days every three months	200,000
12. Fire equipment	Verify the state of all firefighting equipment	Fire extinguishers, sand buckets, etc.	2 days every six months	150,000
13. Training	Review performance of trained personnel, identify new Training opportunities	Manuals, posters, briefing notes	2 days every six months	1,000,000
14. Archaeological sites, indigenous assets	Replace or rehabilitate signs, fences or remove debris.	Vehicle, camera, carpentry tools	Approximately 3 days every three months	300,000
15. Co-monitoring of the Cuyuni & Puruni River Corridors, respectively	Joint patrols, faunal surveys, other consultations	Drone, Boat & o/b engine; digital camera; radio/phone	One trips per quarter for each corridor	2,000,000
15. Contingencies				1,000,000
TOTAL				**13,350,000**

NB. While some activities may be conducted 'in-house', others require the recruitment of experts.

21.6.2 Core approach to stakeholder issues

RLSS will set up a website on which it will post its half- yearly environmental report or part thereof and at the same time set up a mechanism to respond to feedback or reasonable information requirements from stakeholders.

A copy of its environmental reports will also be placed at:

a) GFC Divisional Forest Station, Bartica.

b) RLSS's Administrative Centres: St. Lawrence, Pine Tree Landing, and RLSS' Ekabago Base Camp.

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ANNEXES

Annex I: Extracts from the TOR for the ESIA Report

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DRAFT TERMS OF REFERENCE FOR ENVIRONMENTAL IMPACT ASSESSMENT

R.L.SUKHRAM & SONS (RLSS)

SFEP 02/2017- Left Bank Puruni River, Right Bank Cuyuni River, Kartabu Triangle, Region No. 7

Annex I: Extracts from the TOR for the ESIA Report

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CONTENTS

Annex I: Extracts from the TOR for the ESIA Report

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PREAMBLE

The Draft Terms of Reference (ToR) herein has been developed to guide the preparation of the Environmental and Social Impact Assessment (ESIA) for a proposed large scale logging and sawmilling operation by R.L.SUKHRAM & SONS (RLSS) SFEP 02/2017- Left Bank Puruni River, Right Bank Cuyuni River, Kartabu Triangle , Region No. 7 .

The ToR was prepared in consultation with the Consultant, Forestry Training Centre Incorporated (FTCI) which has been approved by the Environmental Protection Agency (EPA) to undertake the Environmental and Social Impact Assessment (ESIA) for the above stated project.

In accordance with the Environmental Protection Act, Cap 20:05 (hereafter EP Act) the EPA published a notice of the project and made available to members of the public a summary of the proposed project. The public had 28 days to make written submissions setting out those questions and matters which they require to be answered or considered in the ESIA. The ToR herein was developed following this public notification period. The ToR set out the requirements, both general and specific, that the consultant should address in the conduct of the ESIA.

Annex I: Extracts from the TOR for the ESIA Report

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(j) The developer's programme for rehabilitation and restoration of the environment; and

(k) A non-technical summary of the information provided under the preceding paragraphs.

4. REQUIREMENTS FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT AND ENVIRONMENTAL IMPACT STATEMENT

4.1 ORGANIZATION OF THE REPORT (ENVIRONMENTAL IMPACT STATEMENT)

The EIA Report shall focus on significant environmental issues and must provide all the relevant information needed by the EPA to consider fully any adverse or beneficial impacts of the proposal.

The introduction to the EIA shall provide an explanation of the scope of the proposal and the issues and decisions which led to the proposal at this time and in this context, including a history of events leading up to project formulation, envisaged time scale for implementation and project life, anticipated establishment costs and actions already taken at the project site.

Suggested table of contents;

Glossary
Executive (non-technical) Summary
Chapter 1: Introduction and Background, ESIA Team (Detail CV in appendices)
Chapter 2: Approach and Methodology, Significance Criteria, Area of Influence
Chapter 3: Project Alternatives
Chapter 4: Stakeholder identification and consultation (records/minutes etc. in appendices)
Chapter 5: Legislative and Regulatory Framework
Chapter 6: Description of Proposed Project (location, design etc)
Chapter 7: Water Resources

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Existing information, Baseline studies on the biophysical and socio-economical setting for the proposed project area*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Annex I: Extracts from the TOR for the ESIA Report

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Chapter 8: Soils, Land and Geology

- *Introduction*
- *Definitions and scope*
- *Key relevant policy and legislation*
- *Existing information, Baseline studies*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 9: Air Quality

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Existing information, Baseline studies*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 10: Climate and Climate Change

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Existing information, Baseline studies*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 11: Biological Resources

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Existing information, Surveys and Baseline studies*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 12: Ecosystem Services

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Existing information, Surveys and Baseline studies*

Annex I: Extracts from the TOR for the ESIA Report

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- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 13: Noise and Vibrations

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Baseline*
- *Impact prediction and assessment*
- *Mitigation and monitoring- Environmental and Social Management Plan*

Chapter 14: Landscape and Visual Resources

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Baseline*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 15: Cultural Heritage

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Baseline studies*
- *Impact prediction and assessment*
- *Interactions*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 16: Socio-Economic and Cultural Impacts (direct and indirect)

- *Introduction*
- *Definitions and scope*
- *Key relevant policy, legislation, guidelines, standards etc.*
- *Baseline studies*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Social Management Plan*

Chapter 17: Risks and Risk Assessment

- *Introduction*

Annex I: Extracts from the TOR for the ESIA Report

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- *Definitions and concepts*
- *Key relevant legislation*
- *Prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Chapter 18: Cumulative Impacts

- *Introduction*
- *Definitions and scope*
- *Key relevant legislation, guidelines*
- *Baseline*
- *Impact prediction and assessment*
- *Mitigation and monitoring - Environmental and Social Management Plan*

Appendices

- All relevant documentation from the ESIA including records of consultations, data collection/survey forms etc.
- Emergency Response Plan
- Conceptual Rehabilitation and Closure Plan

4.2 STUDY AREA/AREA OF INFLUENCE

The study area/area of influence for the purposes of this ESIA is initially delimited by the Left Bank Puruni River, Right Bank Cuyuni River (It is expected that the ESIA will determine and delineate the actual area of influence by considering the extent of direct and indirect interactions between the proposed project and the physical, biological and social environments. The study area will include the areal extent of the proposed logging site, watercourses (including under water resources etc.) Surrounding communities that can be affected by noise, air emissions or upset conditions also need to be considered in defining the area of influence.

Specific Project Location

Describe project location to include overall positioning of the block(s) to be logged; an indication of the proposed components in relation to one another and surrounding areas; acreage to be logged, boundaries, buffer zones/setback distances, roads, rivers, streams, outfalls, and any community settlements; relationship to other logging activities in the area; and clear definition of the boundaries within which the activity is intended to occur.

Annex II: List of Consultants

A. External Consultants

1. EES
2. Philip Odwin

B. FTCI Staffs

3. Robert Skeete
4. Luann NERO
5. Mariea Suegrim

C. Resource persons

6. Jagdesh Singh
7. G. Marshall

1. ENVIRONMENTAL ENGINEERING SOLUTIONS

A. Environmental Engineering Solutions EES

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ENVIRONMENTAL ENGINEERING SOLUTIONS (EES)

GENERAL INFORMATION

Business Name :	ENVIRONMENTAL ENGINEERING SOLUTIONS (EES)
Address (main office) :	356 Block B, Farm, East Bank Demarara. Georgetown. Georgetown, Guyana. Tel.: +(592) 6500373 E-Mail: isidro_eem@yahoo.com.mx E-Mail: eesguyana@gmail.com
Business No.:	Certificate 130433
Management Staff:	M. Sc. & Eng. Isidro Ubaldo Espinosa (Director) M. Sc. Env. Osbert Ellis (Project Manager)
Services Offered:	Environmental Engineering (Design and Supervision): • Air Pollution Control • Solid Waste Management • Wastewater Treatment • Contaminated sites: prevention, control and restoration Environmental Studies: • Environmental Impact Assessment • Environmental Management Plan • Environmental Annual Report • Environmental Planning • Project Development • Research /Training • Site Inspections

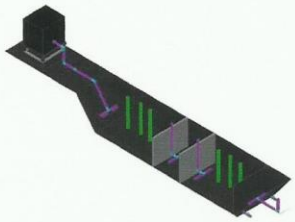
Fields of activity and services provided

EES was founded in 2011. EES is the first consultant company in Guyana that offers environmental engineering based on demands in the engineering field. EES is rapidly gaining recognition as a technical qualified company by the Government of Guyana and the Private Sector. Projects developed for the private sector are examples of EES ability to provide local assessment, design and engineering that helps to prevent, control and mitigate the environmental impacts from the public, residential, commercial and Industrial sectors.

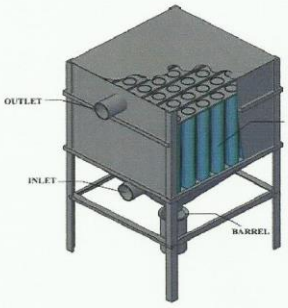
A. Environmental Engineering Solutions EES-Page 2 of 7

EES has carried out the following projects for the Private Sector and the Government of Guyana:

Constructed Wetland Design (2011).
The project implied a conceptual design of a wastewater treatment system – Subsurface Flow System type.
Project beneficiary: Beharry Company Limited.

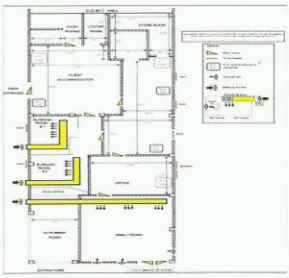


Dust Collector System Design (2011).
The project implied a conceptual design and supervision of a dust collector system, for the air pollution control.
Project beneficiary: A. Cayume Hakh & Sons, Rice Farmer's Millers & Exporters



Integrated Solid Waste Management Initiatives (2011).
The project also included the design of bins, containers and the routes collection for recyclable waste for the city of Georgetown. It is supported by the Ministry of Natural Resources and the Environment in collaboration of the University of Guyana and primary and secondary schools.

Preliminary Design, Fabrication and Installation of a Dilution Ventilation System to Remove Hot Air from Room Spaces and to Dilute Toxic Gases at the Guyana Gold Board Lab Facilities (2011).
Project beneficiary: The Geology and Mines Commission from Guyana.



"Converting Rice Husk Waste into Building Material (Particleboard)" using rice husk and styrofoam from the waste stream – 2012
Project beneficiary: University of Guyana.

"Environmental and Social Impact Assessment (ESIA) for Logging Concessions A, B & C- 2014 (in progress).
Project beneficiary: Baishanlin International Forest Development Inc.

Environmental Management Plan (EMP) for the Construction of a Septage Treatment Plant in Bartica- March 2015).
Project beneficiary: Countrywide Disposal Services (CDS).

A. Environmental Engineering Solutions EES-Page 4 of 7

Environmental and Social Impact Assessment (ESIA) Update for Sherwood Forrest Inc. Logging Concession (March, 2015).

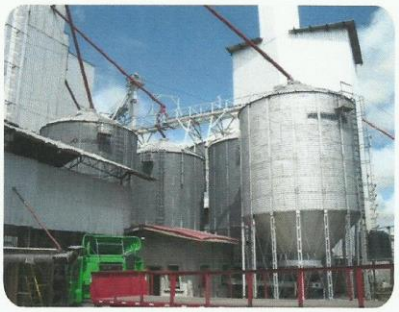
Project beneficiary: Baishanlin International Forest Development Inc.

Environmental and Social Management Plan (ESMP) for Sanitary Landfill Operation in Bartica (April, 2015).

Project beneficiary: General Sanitation Enterprise.

Consolidated Annual Report for Cayume Hakh and Son Cane Grove Rice Mill Operation (April, 2015).

Project beneficiary: A. Cayume Hakh & Sons, Rice Farmer's Millers & Exporters



Environmental Management Plan (EMP) for the Wood Processing and Ship Building Facility at Linden (June, 2015).

Project beneficiary: Baishanlin International Forest Development Inc.

Consolidated Annual Report for Golden Grove Rice Mill Operation (June, 2015).

Project beneficiary: A. Cayume Hakh & Sons, Rice Farmer's Millers & Exporters

Environmental and Social Management Plan (ESMP) for Sanitary Landfill Operation in East Berbice (June, 2015).

Project beneficiary: Advanced Environmental Solutions (AES)

A. Environmental Engineering Solutions EES: Page 6 of 7

Consolidated Annual Report for Service Station (Bartica) (July, 2015).
Project beneficiary: David Coates Service Station

Environmental Report for the Asphalt (Bitumen) Plant Project, Upper Demerara-Berbice (August 2015).

1. Project beneficiary: Region 10, Environmental Impact Assesment.

Environmental and Social Impact Assessment (ESIA) - Physical Environment Chapter Forest Concession (August 2015).
Project beneficiary: Rong-An Inc.

A. Environmental Engineering Solutions EES: Page 7 of 7

Environmental and Social Impact Assessment (ESIA) - Physical Environment Chapter for Forest Concession (August 2015).

Project beneficiary: Variety Woods and Greenheart Ltd.

Consolidated Annual Report for s Service Station (Lethem) (November, 2015).

Project beneficiary: David Coates Service Station

Environmental Engineering Solutions (EES) works in accordance with international specifications and the Environmental Protection Agency in Guyana to comply with the Environmental Standards and Regulations.

2. PHILIP ODWIN.

PHILIP ODWIN: CURRICULUM VITAE

1. Personal Details

Name: Philip Sylvester Odwin
Date of Birth: October 31, 1989
Place of Birth: Bartica, Guyana
Address: 34 Fort Street, Kingston, Georgetown
Email: odwinphillip@gmail.com
Contact details: Telephone: 592-227-1500, 592-671-8050

2. Education

2000-2004: Kingston Community High School
2005-2007: Adult Education Remedial School
Acquired: Junior High certificate in English Language, Mathematics, and Social Studies

3. Skills: Trapping animals

- Fishing (rod, seine, cast net)
- Bird identification, colouration, call, flight pattern
- Bush craft

4. Work Experience:

- 2008-2010: Employer: Total Logistics:
  Position held: Port Agent.
  Job Description: Clerical task, record keeping.

- 2010-2014: ***Wildlife surveys*** with various professionals including Michael Braun.

- 2015-2016: **Forestry Training Centre Incorporation**:
  Forest Technician (18 days), Kaburi, West Mazaruni
  Job Description: measuring, assessing trees, and creating circular plots for a 2% ML inventory; identifying and recording fauna encountered at or near sample plots.

- Wildlife technician (2016-January-February 2016), **Forestry Training Centre Incorporation**
  Job Description: **Trapping animals**, photographing, and identifying the various species of animals encountered UNAMCO Road, Kwakwani Ituni, Bissaruni and Haimorakabra.

2016-2017:

- *Wildlife surveys* (2 weeks-2016) with **Eustace Alexander, Region 1** (Barama, Barima & Waini) and Region 3 (Fort Island); Region 7 (Bartica to Sherima; Kartabo-Marshalls Falls, Kartabo-Kamaira falls)

- **Aurora Goldmines** Wildlife surveys (20 days-March 2016, 20 days September 2016, and 20 days January 2017) supporting **Leon Moore**, bird expert.

2017:

- September 24-30, 2017: **Forestry Training Centre Inc.**: Wildlife surveys-Rong-An Inc forest concession, right bank upper Berbice River.

- October 6-8, 2017: **Forestry Training Centre Inc.:** Wildlife surveys-Toolsie Persaud Timber Traders Inc. forest concession, Puruni District

- October 13-18, 2017: **Forestry Training Centre Inc.**: Wildlife surveys-Toolsie Persaud Timber Traders Inc. forest concession, Puruni District

- October 26-November 2, 2017: **Forestry Training Centre Inc.**: Wildlife surveys-TTPTI forest concession (SFEP 2/2013), Puruni District

2018:

- February 19-March 1, 2018: **Aurora Gold Mines**. Wildlife Studies: Bird Surveys

- March 26-April 5, 2018: **Aurora Gold Mines**. Wildlife Studies: Bird Surveys

- April 22-27, 2018: **Forestry Training Centre Inc.** / Toolsie Persaud Timber Traders Inc. (Waiamu, right bank Cuyuni River, Kartabo Triangle). Wildlife surveys.

- May 22-28, 2018: **Forestry Training Centre Inc. / Toolsie Persaud Timber Traders Inc. (Waiamu, right bank Cuyuni River, Kartabo Triangle**). Wildlife surveys

- September 24: Tour guide duties, **Wilderness Explorers**, Mahaica River

- September 30 – October 4, 2018: Bird surveys: Accompanying **Waldyke Prince** on a shore bird survey, Essequibo Islands (Region 3).

- October 6, 2018 (Botanical Gardens); October 13, 2018 Botanical Gardens), November 2, 2018 (Abary River): Bird Surveys, **Wilderness Explorers**.

- November 20-25, 2018: **Forestry Training Centre Inc** /Faunal surveys: TPTTI, Puruni District

2019

- January 17-21, 2019: **Forestry Training Centre In**. Faunal surveys: Aranka District-Ianna District, NWD, Region 1

- January 23-Feb 2, 2019: **Environmental Resources Management** (www.erm.com/en/service**):** Coastal bird surveys: -Guyana's Coastland, from 63 Beach, Corentyne to Essequibo Islands & Dartmouth, Essequibo Coast. Accompanied Waldyke Prince.

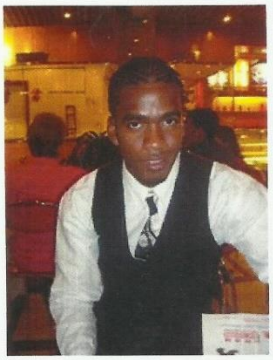
5. References:

a) Leon Moore-Bird specialist, wildlife photography
b) Waldyke Prince-Wildlife Specialist

3. ROBERT SKEETE

Curriculum Vitae
Robert Skeete

Personal Information



Name: Robert Dellon Skeete

Address: Lot 26 & 27 Windsor Castle, Essequibo Coast, Guyana, South America.

Date of Birth: 24th July, 1989.

Nationality: Guyanese

Marital Status: Single

Contact Information:

Phone #: 592-679-6686, 592-695-2343, 592-651-1748

E-mail: rskeete724@gmail.com

Education

2013: University of Guyana: BSc. Degree in Forestry.

2010: University of Guyana: Diploma in Forestry.

2005-2006: Guyana School of Agriculture: Certificate in Forestry.

2001-2005: Anna Regina Multilateral School.

Experience

2016- Present – Forestry Training Centre Inc; Forester

2013- 2015 – Guyana Forestry Commission; as a Monitoring Inspector.

2009: Sand Springs Mining Company: Field Technician for ESIAs

2008: Amaila Falls Hydro Project; Field Technician for Rapid Assessments

Training Courses Attended

2016: Dale Carnegie: Skills for Success. Supervisory Management Course

2015: FTCI; Chainsaw Operation and Maintenance

2009: University of Guyana; Anthropology Summer School

2008: FTCI: Reduce Impact Logging

2006: FTCI: Reduce Impact Logging

4. LUANN NERO

Curriculum Vitae

Personal Information

Name:	Luann Aderita Nero
Date of Birth:	January 25, 1986
Nationality:	Guyanese
Current Address:	Lot 3 Tain Public Road, Corentyne, Berbice, Guyana
Marital Status:	Single
Mobile:	615 – 0602
Telephone:	337 – 2898
Email:	aderita252003@hotmail.com or luannnero28@gmail.com

Key Competencies

Forest Management: Over six years of knowledge and experience in the field of forest audits and management, with emphasis on forest monitoring and compliance.

Middle Management and Planning: Over five years of experience in supervising staff, planning, and developing conflict resolution skills.

Communication and Capacity-building: Good writing and communication skills, with experience in planning and organizing Capacity Building Workshops for Guyana Forestry Commission (GFC), Independent Forest Monitoring (IFM) and European Union Forest Law Enforcement Governance and Trade (EU FLEGT).

Educational Background

INSTITUTION	DATE	QUALIFICATIO
Technische Universität Dresden *(Centre for International Postgraduate Studies of Environmental Management* (CIPSEM)	January – July, 2013	Post Graduate Diploma – Environmental Management
University of Guyana	2005 – 2010	Bachelor of Science - Agriculture (General)

Experience

Organization	Designation	Period	Brief Overview of Duties and Responsibilities
FTCI	Course coordinator	2018+	Plan projects and logistics for training programmes, executed by FTCI training staffs
GFC	Environmental Auditing Officer	2011 - 2018	Mainly, ensuring that stakeholders comply with the requirements of the Forests Act Chapter 67:01 of 2009 of the Laws of Guyana (the Forest Act).
	Management Trainee	2010-2011	Conducted audits at lumberyards and sawmills as well as 100% audits at concessions for compliance.

Additional Qualifications and Skills

1) Mastering English Language for Report Writing - February – May 2012
2) Geographic Information System Fundamentals – November 2011 – February 2012
3) Women in Forestry in the Caribbean Symposium – October 23 -25, 2011

5. MARIEA SUEGRIM

Mariea Alessa Suegrim

102, First Street, Craig Village, East Bank Demerara, Georgetown / Tel: (592) 690-9757/
Marieasuegrim@rocketmail.com

PERSONAL INFORMATION

Date of Birth:	20/10/1992
Age:	25
Nationality:	Guyanese
Marital Status:	Single

PROFILE

I am an Aspired Career Oriented Individual and I am hoping to become a mature in the near future with my interest specifically in Public Sector. I have great writing and statistical analysis skills that were acquired and developed throughout my academic exposures. I am courteous, dedicated and a very hardworking individual who takes pride in completing any task that is assigned to me. I am very organized, logical and reliable and have great interpersonal skills. As such, I have the capacity to work in a team or individually with minimal guidance. Moreover, honesty and trustworthiness are the two pillars for which I am known for.

EDUCATION

Craig Nursery School	1997-1999
Craig Primary School	1999-2005
Friendship Secondary School	2005-2009
University of Guyana	2012-2016

QUALIFICATIONS

2014-2016	**BSc. Public Management:** (Grade Point Average {GPA} 2.9) University of Guyana, Turkeyen Campus, Georgetown, Guyana.
2012-2014	**Diploma in Public Management:** University of Guyana, Turkeyen Campus, Georgetown,Guyana.
2011	Basic Foundation: Benschop Foundation, Grade A
2010-2012	Microsoft Word: Benschop Foundation, Grade A

2009	**CXC General Proficiency**	**Grade**
	Mathematics	Three
	English A	Three
	Office Administration	Two
	Electronic Document Preparation and Management	Three
	Principles of Business	Two
	Principles of Accounts	Three
	Integrated Science	Three
	Social Studies	One
	Visual Arts	Three

WORK EXPERIENCES

Human Rights Commission: General Clerk 2 – Administrative Assistant (Acting)

Responsibilities included:

Preparing and Assembling daily Reports to Administrative Officer, Answering telephone, scheduling Appointments, Composing of Correspondence, composing necessary Notices and Memorandum. In addition, arrangement of Monthly Statutory Meeting, Attend various meetings and preparing minute, reports, review invoices and prepare cheques for payment, Maintains files and prepare documentation, Manage Asset Inventory, Procure request for Quotation, Manage Ledgers, Make purchases of all Janitorial, Stationery and Refreshment, Maintain Call Logs, Timesheets Update, Store and File all relevant Document, Photocopying and Printing of Documents, experience in Government Accounting (IFMAS), schedule Bookings for Travelling, Prepare Agenda for Meetings, Assist with Preparation for Outreaches and Activity of the Commission.etc

Nand Persaud International Communication: Call Agent [2010]

Responsibilities included:

Converting Voice to Text Conversation –Typing at 30-40 words per minute -- Making daily reports to management – Devising new means of attracting potential clients .

EXTRA CURRICULAR ACTIVITIES

Assistant Counselor at Church Camp (Brethren Assembly)

2008-Present: **Brethren Assembly**

Main responsibilities include assisting Senior Counselor with preparation of Camp Activities Typing, Printing of Documents, Camp Registration and Assisting with Finance of Tuc Shop.etc

PROFESSIONAL SKILLS

I am computer literate and proficient in Microsoft Word, Excel and PowerPoint.

INTERESTS

I like to keep up-to-date with current news and events taking place both locally and internationally, travelling, meeting and interacting with persons of different background, culture and race, participating in cultural activities, writing and I also have good time management.

ACCOMPLISHMENTS

Best Graduating Social Studies Student at Friendship Secondary School and Best Camper for Three (3) Consecutive Years (2009-2011).

OTHER

- Holder of US Visa
- Long term goal – to obtain Master's Degree in Project Management and possibly PHD thereafter

REFEREES

Ms. Sharon Nelson
Human Resources Manager
Banks D.I.H Limited
Thirst Park
Tel: (592) 225-0910 ext 2216/680-7407
Email: snelson@banksdih.com

Mr. Deoraj Gyandat
Superintendent of Prison
Timehri Prison
Timehri
Tel: (592)604-7305

6. JAGDESH SINGH

164 Section A, Block Y Grove,
East Bank Demerara, Guyana.

Date of Birth: 28-12-78
Marital Status: Married
Nationality: Guyanese
Language: English

Tele: (592) 641-1451
E-mail: jagdesh_singh@hotmail.com
jagdesh.singh@gmail.com

Jagdesh Singh

Background Summary	Natural Resources Management professional with strong skills in project development and management, Geographic Information Systems/Remote Sensing design, management and analysis, Sustainable Forest Management, Forest Law, Policy and Governance, Environmental Law and Policy, Sustainable Development and Climate Change.
Qualifications	1. September, 2020 – LLB (Bachelor of Laws), University of Guyana. 2. October 2003 – September 2004. Chevening Scholar (2003). MSc in Geographical Information Science/Remote Sensing (GIS/RS), Department of Geography, University of Edinburgh. 3. October 2000. BSc Forestry, Department of Forestry, University of Guyana 4. October 1998. Dipl. Forestry, Department of Forestry, University of Guyana 5. December 2001. Certificate Professional Development Program, Institute of Business, University of the West Indies.
Specialist Skills	• Natural Resources Management and Sustainable Development planning and implementation • Environmental Law, Climate Change, Sustainable Forest Management (SFM) planning and implementation • Forest Law, Policy and Governance • Planning and project management • Monitoring, Reporting and Verification Systems (MRVS) design and implementation • National Forest Monitoring System (NFMS) design and implementation • Communication, team building and training

Experience	1. 2018 – Present - Technical Officer, Guyana Forestry Commission. 2. 2014 – 2018 - National Technical Coordinator (NTC) for the implementation of the Project "Forest Cover Monitoring in the Amazon Region", GFC 3. 2008 – 2014 - Deputy Commissioner of Forests – Forest Resources Management Division (FRMD), GFC. 4. June – December, 2007 - Head, Forest Resources Information Unit, GFC 5. 2004 – 2007 - Head, Geographical Information Systems Unit, EPA. 6. 2004 – 2007 - Lecturer, Department of Forestry, University of Guyana. 7. 2001 – 2003 - Assistant Commissioner of Forests – Forest Resources Management Division (FRMD), GFC. 8. 2000 – 2001 - Environmental Monitoring Officer – Forest Monitoring Division (FMD), GFC.
Interests	➢ Environmental Law, Sustainable Development, Climate Change, Natural Resources Management, Sustainable Forest Management. ➢ Use of GIS/Remote Sensing in Natural Resources Management and Environmental Applications ➢ Developing methods for mapping and managing tropical forest stands and species using satellite/radar imagery
Other Information	1. Chevening Scholar, 2003. 2. Special Award. Awarded the Vice-Chancellor Special Award for Best Graduating Student in the Faculty of Agriculture, University of Guyana. 3. Member of the Board of Directors of the Guyana Lands and Surveys Commission (GL&SC) and the Environmental Protection Agency (EPA), 2010 – 2014.

7. GODFREY MARSHALL

CURRICULUM VITAE: GODFREY EMERSON MARSHALL: FORESTER

48+ years with the Guyana Forestry Commission, and exposure to forestry field tours in Brazil, Malaysia, Sweden, Trinidad & Tobago, and the United Kingdom.

A. PERSONAL DETAILS:

Name: Godfrey Emerson Marshall
Date of birth: 12 November 1954
Place of birth: Bartica, GUYANA
Nationality: Guyanese
Address: 1393 Section A, Block X, Diamond Housing Scheme, East Bank Demerara, Guyana
Email: gemar@guyana.net.gy
Phone: 592-216-4602 (H); 592-642-1910 (Cell)

B. EDUCATION:

2000: Executive Diploma in Business, University of the West Indies School of Business (sponsored by Guyana Forestry Commission), Georgetown, Guyana.

1999: M.Sc. Forestry – Department of Plant Sciences, University of Oxford, United Kingdom.

1992: B. Sc. Forestry - Universidade Federal de Lavras (*formerly Escola Superior de Lavras),* Lavras, Minas Gerais, Brazil.

1982: Diploma in Forestry - Eastern Caribbean Institute of Agriculture & Forestry, Trinidad & Tobago.

C. PROFESSIONAL EXPERIENCE:

Appointed a Forest Officer, Guyana Forestry Commission on December 7, 1972 and served in various positions (see below) before secondment to Forestry Training Centre Incorporated as a Project Coordinator in September 2002 and as Director, 2005-2014. Formally retired from the Guyana Forestry Commission in December 2014 after 42 years and was re-employed as Technical Adviser with effect from January 1, 2015.

Key positions held at the GFC are as follows:
2015+: *Technical Adviser/Consultant* with the GFC/FTCI; provide technical support to the GFC and Forestry Training Centre Incorporated. (I also engage *informally* in extension services, advising concessionaires, sawmillers and loggers' associations on their projects).

2005 to 2014: *Director, Forestry Training Centre Incorporated*: Co-managed two ITTO projects, PD 68/01 Rev.2(I) and PD 333/05 Rev.2(I), while maintaining collaboration with several partners/donors including the Tropical Forest Foundation, Virginia (USA), Tropenbos International, WWF (Guyana), Iwokrama International Centre, Basic Needs Trust Fund (Guyana), and Board of Industrial Training (Guyana).

2002-2004: *Project Coordinator*, Forestry Training Centre Incorporated: *understudied the Project Director, Peter van der Hout PHD.*

2001-2002: *Head, Planning & Development Division*: *Assisted in identifying and developing strategic goals for the GFC. A strategy for managing research sites and a local forest zonation paper were produced during that period.*

1995-2001: Deputy Commissioner of Forests, Forest Resources Management Division: *Assisted with the development of forest management standards and practices, including leading a task force that prepared the first draft of GFC's Code of Practice and draft guidelines for the preparation of forest management plans and annual plans of operations.*

1992-1995: *Senior Assistant Commissioner of Forests*-Field Operations. *Coordinated Guyana Forestry Commission's forestry extension, enforcement, and monitoring functions.*

D. Field Tours

I have been exposed to field tours in various countries, including Malaysia, Sweden, Brazil, and the United Kingdom.

E. Languages

I am fluent in English and Portuguese.

F. Recent Publication

Marshall, G. & Kerrett, R. 2010. The Chainsaw milling subsector in Guyana. ETFRN NEWS Issue No. 52, December 2010. Pages: 91-97.

G. Projects/Consultancies

I have written project proposals for donor funds from ACTO, FAO, ITTO, and WWF. On a personal basis, I have done consultancies for FAO, ACTO and ITTO projects, respectively. Also, I have written many Forest Management Plans and Annual Plans of Operations for logging companies in Guyana. I have been engaged with ESIAs for local developers since 2006.

H. Other

- Served for one year as a member of the Board of Directors, Guyana Mining School and Training Centre (January -December 2014).
- Received a *national award*: *Medal of Service*: November 2015.

ANNEX III: CERTIFICATE OF INCORPORATION

GUYANA R. No. 656338
Fee $ 5,000.00

No. of Certificate 1413

BUSINESS NAMES (REGISTRATION ACT, CHAPTER 90:05)

CERTIFICATE OF REGISTRATION

I HEREBY Certify that a statement containing the prescribed particulars for registration furnished by RAGUNAUTH LALL SUKHRAM AND SONS of Lot 6 Hubu, East Bank Essequibo, pursuant of Section 5 of the above-mentioned Act was registered on the 29th day of March, 2006

Dated this 18th day of July 2006

for Registrar of Business Names

Office of Registrar of Business Names,
Georgetown, Demerara.

REGISTRAR OF JOINT STOCK COMPANIES GUYANA

NAME	ADDRESS
RAGUNAUTH L. SUKHRAM	Lot 6 Hubu, East Bank Essequibo,

Attention is drawn to section 8 of the Business Names (Registration) Act, Chapter 90:05.
8. Whenever a change is made or occurs in any of the particulars registered in respect of any firm or person that firm or person shall within fourteen days after the change or any longer period allowed by the Registrar on application made in any particular case, whether before or after the expiration of the fourteen days, furnish by sending by post or delivery to the Registrar in the Country in which the aforesaid particulars are registered a statement in writing in the prescribed form specifying the nature and date of the change signed and where necessary verify, in like manner is the statement required on registration.

This registration ceases on the 31st December, 2006

If this registration is renewed on or before the 15th January, 2007 the fee is $2,500.00 (two thousand five hundred) dollars, if after the 15th a new registration

GOVERNMENT OF GUYANA

VALUE ADDED TAX

Registration Certificate

07297

Name:	**RAGUNAUTH SUKHRAM**
Business Name:	**RAGUNAUTH LALL SUKHRAM AND SONS**
Address of Business:	**LOT 6 HUBU** **EAST BANK ESSEQUIBO**

Has been registered under the provisions of the

VALUE ADDED TAX ACT #10 OF 2005

with effect from

January 01, 2007

Taxpayer Identification Number

110159459

Commissioner General
Guyana Revenue Authority

ANNEX V: EXTRACT OF SFEP DOCUMENT

Copy of SFEP Agreement
Page 1 of 6

GUYANA FORESTRY COMMISSION

STATE FOREST AUTHORIZATION- STATE FOREST EXPLORATORY PERMIT

SFA- SFEP: 02/2017

R. L. SUKHRAM & SONS

July 2017

STATE FOREST AUTHORIZATION-
STATE FOREST EXPLORATORY PERMIT
Regulation 7B(1)

No. SFA- SFEP: 02/2017

Permission is hereby granted to **R.L. Sukhram & Sons** of **Lots 6 & 7 St. Lawrence, East Bank Essequibo, Guyana** under **Regulations 7B** of the Forest Regulations made under the Forests Act, Cap 67:01, to occupy and commence exploratory operations within the area of State Forests shown on the plan annexed hereto, more particularly described as falling within the following boundaries:

R.L. Sukhram & Sons - SFA- SFEP 02/2017

Left Bank Cuyuni River, Left Bank Puruni River, Right Bank Ekabago River, Right Bank Otomung River;

Commencing at the **mouth** of the **Otomung River** and its' junction with the **Cuyuni River** having approximate **UTM** geographical coordinates of **01 58 048 E, 07 53 449 N**, thence down the right **bank Cuyuni River** to the **mouth** of a small unnamed tributary having approximate **UTM** geographical coordinates of **02 36 265 E, 07 36 165 N**; thence up the **left bank of this small unnamed tributary** to a point near its **source** having approximate **UTM** geographical coordinates **02 38 322 E, 07 34 847 N;** thence by a **cut line** in a **Southerly** direction for an approximate distance of **10 km** to a point on the **Ekabago river** having approximate **UTM** geographical coordinates of **02 38 134 E, 07 24 856 N;** thence down the **right bank Ekabago river** to its **mouth** on the **left bank Puruni river** having approximate **UTM** geographical coordinates of **02 36 740 E, 07 02 169 N;** thence up the **left bank Puruni river** to a point near its **source** having approximate **UTM** geographical coordinates of **01 52 622 E, 07 30 645N**; thence by a **cut line** in a **South westerly** direction for an approximate distance of **5.2 Km** to a point near the **source** of the **Putareng river** having approximate **UTM** geographical coordinates of **01 50 150 E, 07 26 041 N**, thence by another **cut line** in a **North-westerly** direction for an approximate distance of **41Km** to a point near the **source** of an unnamed tributary of the Cuyuni River having approximate **UTM** geographical coordinates of **01 28 170 E, 07 61 183 N** ; thence by another cut line in a westerly direction for an approximate distance of 0.18 km to a point near the source of another unnamed tributary of the Cuyuni River having approximate **UTM** geographical coordinates of **01 27 999 E, 07 61 145 N;** thence **down the right bank** of this **unnamed tributary** to its **mouth** on the **Cuyuni river having approximate UTM geographical coordinates of 01 28 117 E, 07 65 384 N;** thence down the **right bank Cuyuni River** for an approximate distance of 20 km to a point having approximate **UTM** geographical coordinates of **01 45 024 E, 07 57 183 N;** thence by a cut line in a Southerly direction for an approximate distance of 19.2 km to a point having approximate **UTM** geographical coordinates of **01 44 938 E, 07 37 939 N;** thence by another **cut line** in a **North-easterly** direction for an approximate distance of **1.2 km** to a point on the left bank **Otomung River** having approximate **UTM** geographical coordinates of **01 46 072 E, 07 38 326 N**; thence down the right bank Otomung River to its mouth on the Cuyuni River (shaded

area represents Takutu Proposed Amerindian Village –GL&SC)this being the point of commencement.

Save and except all lands legally held.

Coordinates have not been field-tested.

Description subject to change upon verification.

Estimated boundary is subject to change upon transformation to UTM 20N

Map reference:16NE,NW,SE,SW,17NE,NW,SE,SW,18 SW,24 NE,25 NE,NW,SE,SW,26 NW.

Area approximately: 1,068,139.86 acres (432,262.59 hectares)

1. This permit conveys only the right to carry out the exploratory operations specified in Application 02/2017 (and no other rights whatsoever), in accordance with internationally accepted standards and practices for such operations and the **Commission's Code of Practice for Forest Operations**, as revised from time to time, on payment of the prescribed fees and charges.

2. The permittee may, for good cause amend the details of the program of work and expenditure set out in his application, where the amendment does not reduce the minimum requirements of the overall programme of work and expenditure, with the prior written consent of the Commissioner.

3. The permittee may not fell any tree or remove any forest produce, construct any roadway or cart path, bridge, building, other installation or permanent structure, without the prior written consent of the Commissioner.

4. The permittee may apply to the Commissioner for permission to fell and remove a specified volume of timber or to take and remove a specified quantity of other forest produce, for the purposes of research and investigation, including the investigation of markets therefore, which shall be granted if the Commissioner is satisfied that the permittee has carried out an adequate study of existing information relating to the

proposed research and investigations and has shown that further research and investigations are necessary.

5. The rights and privileges granted by this permit are not exclusive and the Commission reserves the right to allow more than one holder of an exploratory permit to occupy the same area.

6. The exercise of the rights and privileges granted by this permit shall not interfere with or hinder the lawful operations of any other person within or outside of the exploratory area occupied hereunder.

7. The permit issued is hereby not transferable and, where the holder of the permit is a body corporate, if there is any change in control of the corporation, the Commission reserves the right to revoke or re-negotiate the terms of the permit.

8. This permit is issued without any obligation on the Commission to grant a wood cutting permission, licence or lease, a timber sales agreement or any other concession for forest operations in respect of the exploratory area or any other area of State Forests or State lands.

This permit may be suspended or withdrawn, if any of the laws of Guyana, or any of the terms and conditions herein, are breached by the holder of the permit, provided the holder is given an opportunity to state his case.

The bond entered into by the holder as a pre-condition for the issue of this permit will be released by the Commission upon expiry of the permit, provided that the commission is satisfied that the holder has settled any claim that may lawfully by made under the Act.

Issued this 5th day of July 2017

James Singh
Commissioner of Forests

APPENDIX I

SFA- SFEP: 02/2017

1. **Area:**
   1,068,139.86 acres (432,262.59 hectares)

2. **Period:**
   Three (3) years

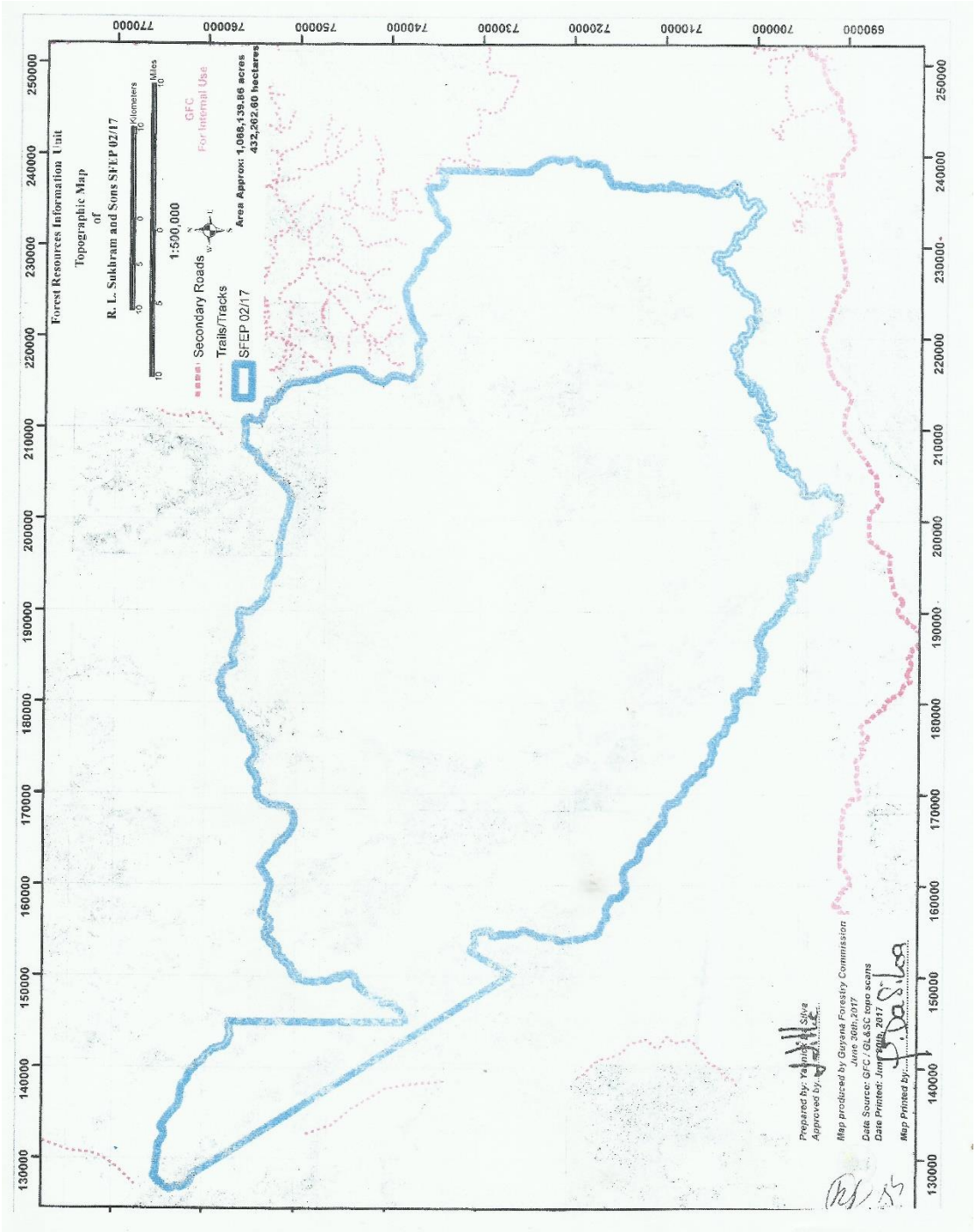
3. **Land to be excluded**
   All lands legally held.

4. **Type of Forests**
   Mixed forest

5. **Penalty for Offences:**
   As set out in the Forest Act No. 6 of 2009: Forest Act 2009 and its regulations.
   As set out in the Environmental Protection Act No. 11 of 1996.

6. **Acreage Fees:**
   A fee of **US$0.15 per acre, per annum** is charged on all forested area as amended by regulations made under the Forests Act.

Annex V: Copy of SFEP Agreement
Page 6 of 6

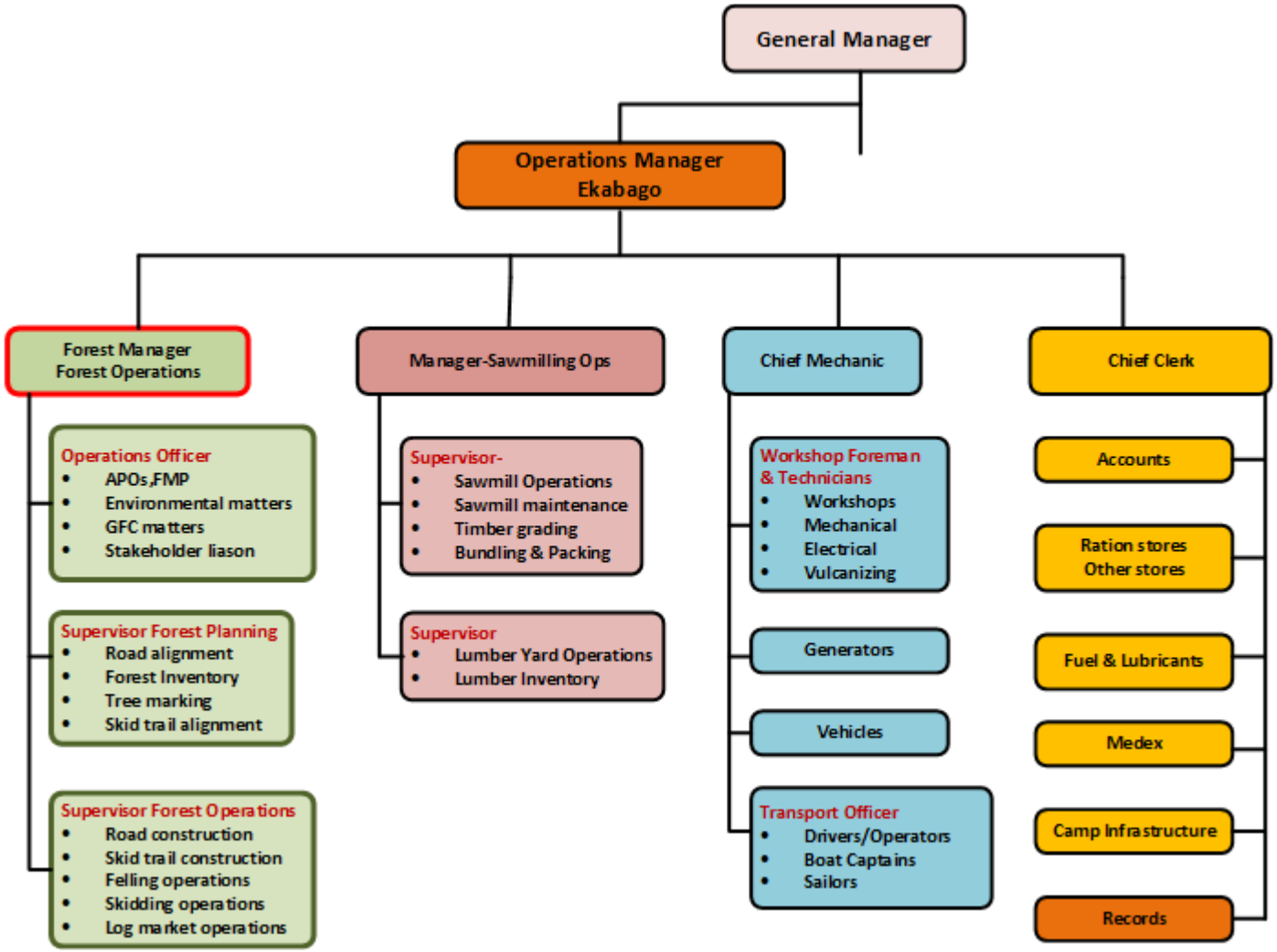


ANNEX VI: DESCRIPTION-R.L. SUKHRAM AND SONS- SFA-SFEP 02_17

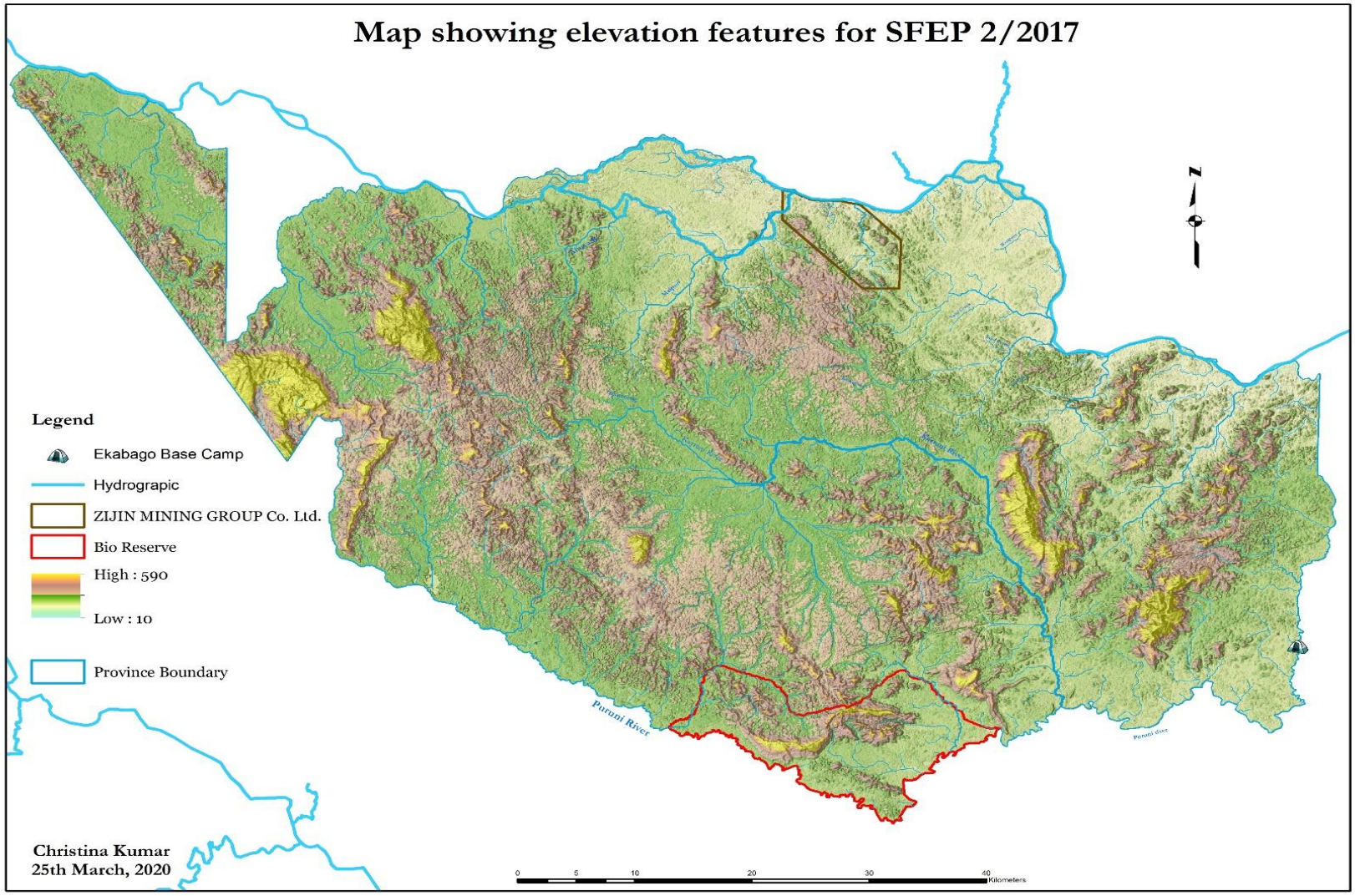
Left Bank Cuyuni River, Left Bank Puruni River, Right Bank Ekabago River, Right Bank Otomung River: Commencing at the **mouth** of the **Otomung River** and its' junction with the **Cuyuni River** having approximate **UTM** geographical coordinates of **01 57 884 E, 07 53 066 N**, thence down the right **bank Cuyuni River** to the **mouth** of a small unnamed tributary having approximate **UTM** geographical coordinates of **02 36 087 E, 07 35 804 N**; thence up the **left bank of this small unnamed tributary** to a point near its **source** having approximate **UTM** geographical coordinates **02 38 158 E, 07 34 506 N;** thence by a **cut line** in a **Southerly** direction for an approximate distance of **10 km** to a point on the **Ekabago river** having approximate **UTM** geographical coordinates of **02 37 984 E, 07 24 508 N;** thence down the **right bank Ekabago river** to its **mouth** on the **left bank Puruni river** having approximate **UTM** geographical coordinates of **02 36 570 E, 07 01 802 N;** thence up the **left bank Puruni river** to a point near its **source** having approximate **UTM** geographical coordinates of **01 52 470 E, 07 30 256 N**; thence by a **cut line** in a **South westerly** direction for an approximate distance of **5.2 Km** to a point near the **source** of the **Putareng river** having approximate **UTM** geographical coordinates of **01 50 060 E, 07 25 950 N,** thence by another **cut line** in a **North-westerly** direction for an approximate distance of **41Km** to a point near the **source** of an unnamed tributary of the Cuyuni River having approximate **UTM** geographical coordinates of **01 28 028 E, 07 60 796 N ;** thence by another cut line in a westerly direction for an approximate distance of 0.18 km to a point near the source of another unnamed tributary of the Cuyuni River having approximate **UTM** geographical coordinates of **01 27 850 E, 07 60 758 N;** thence **down the right bank** of this **unnamed tributary** to its **mouth** on the **Cuyuni river having approximate UTM geographical coordinates of 01 27 958 E, 07 65 006 N;** thence down the **right bank Cuyuni River** for an approximate distance of 20 km to a point having approximate **UTM** geographical coordinates of **01 44 880 E, 07 56 828 N;** thence by a cut line in a Southerly direction for an approximate distance of 19.2 km to a point having approximate **UTM** geographical coordinates of **01 44 807 E, 07 37 546 N;** thence by another **cut line** in a **North-easterly** direction for an approximate distance of **1.2 km** to a point on the left bank **Otomung River** having approximate **UTM** geographical coordinates of **01 45 925 E, 07 37 957 N**; thence down the right bank Otomung River to its mouth on the Cuyuni River (shaded area represents Kurutuku Proposed Amerindian Village –GL&SC)this being the point of commencement.

Save and except all lands legally held.
Coordinates have not been field-tested.
Description subject to change upon verification.
Estimated boundary is subject to change upon transformation to UTM 20N
Mapreference:16NE,NW,SE,SW,17NE,NW,SE,SW,18SW,24NE,25 NE,NW,SE,SW,26 NW.
Area approximately: 1,068,171.84acres (432,275.54 hectares)

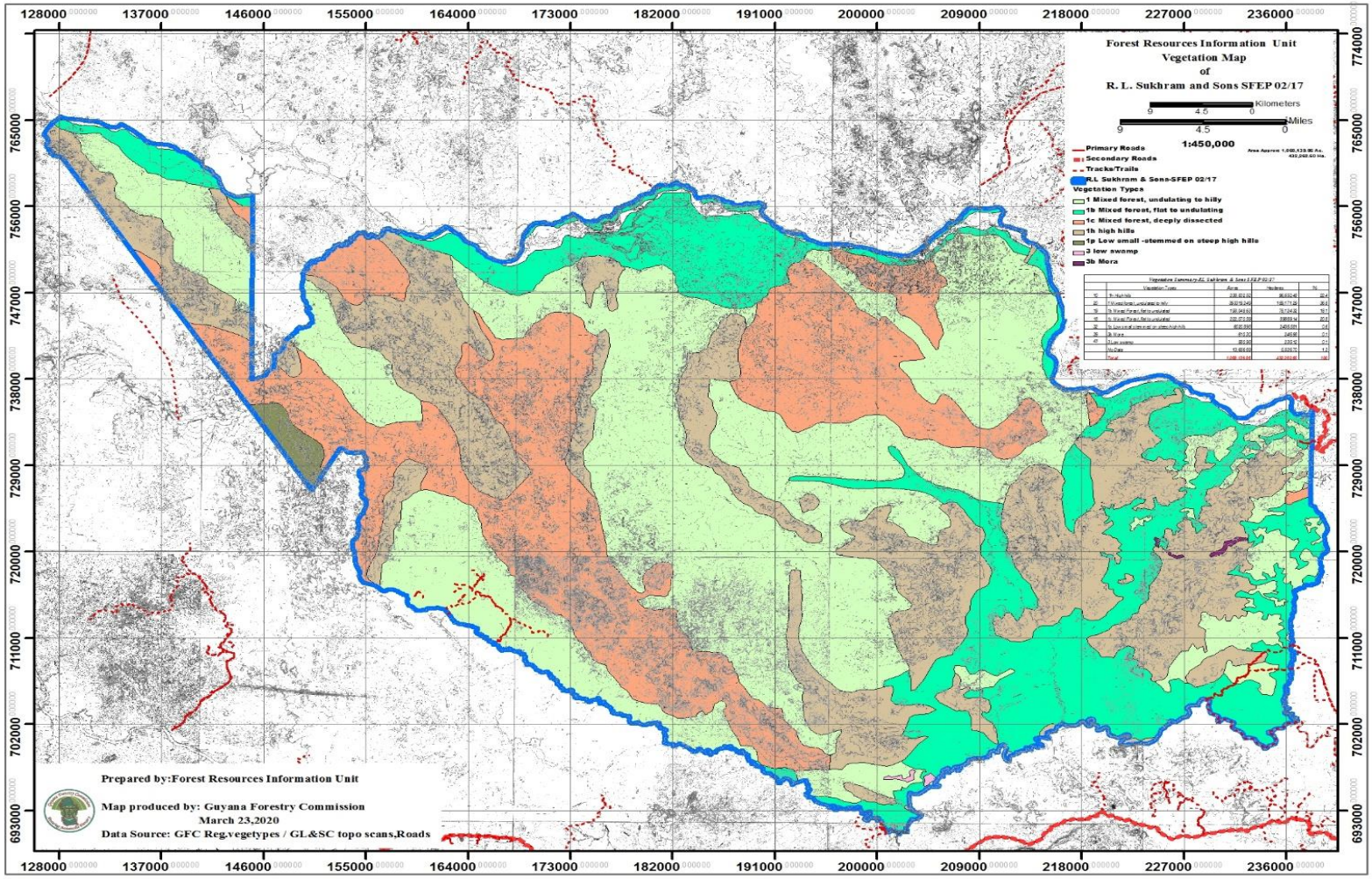
ANNEX VII: ORGANIZATIONAL CHART-RLSS



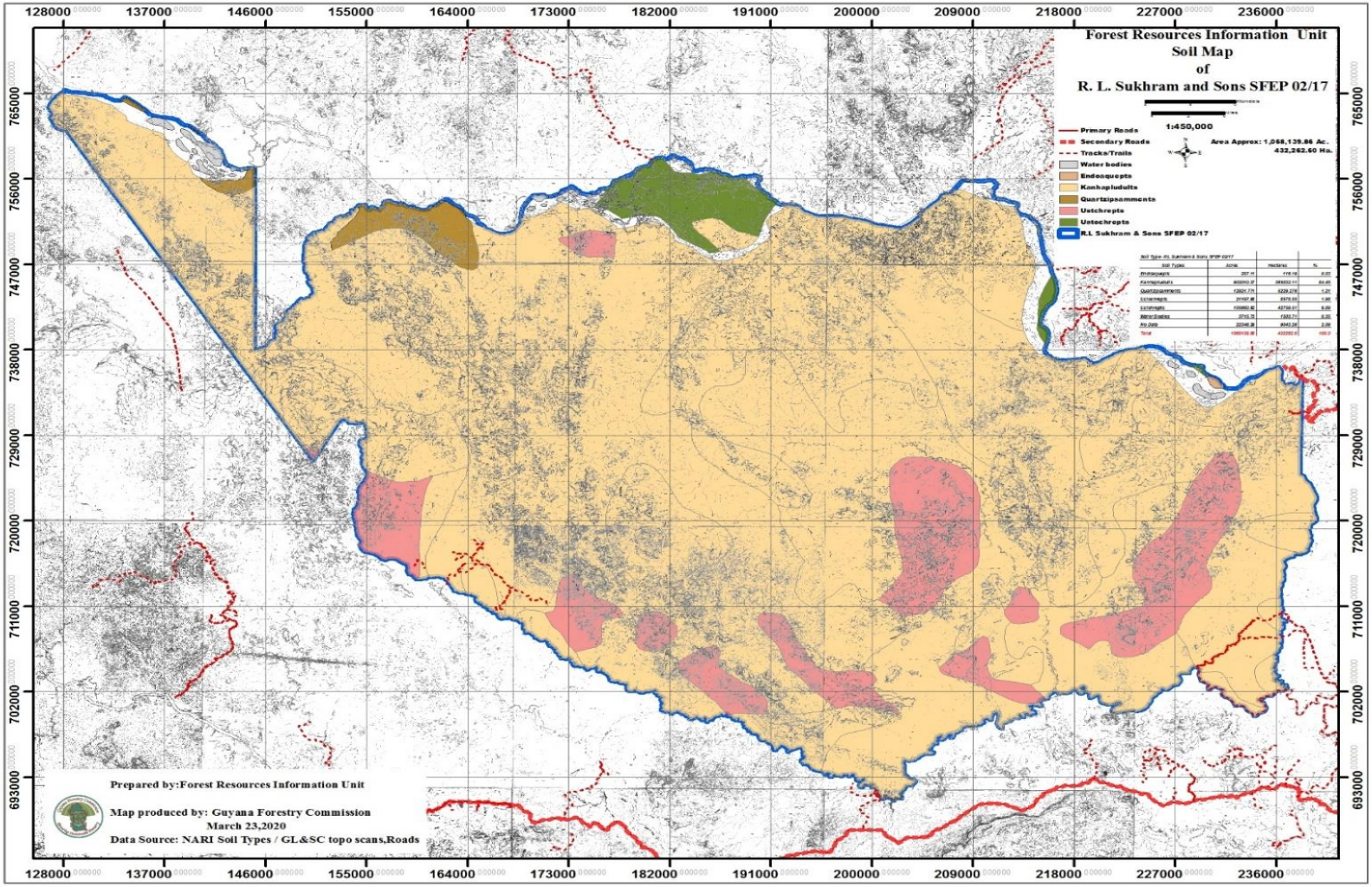
ANNEX VIII: MAP SHOWING ELEVATION FEATURES FOR SFEP 2/2017



ANNEX IX: OUTLINE VEGETATION MAP OF SFEP 2/2017



ANNEX X: OUTLINE SOIL MAP OF SFEP 2/2017



ANNEX XI: RLSS STAFF RECRUITMENT & SELECTION POLICIES AND PROCEDURES

Policy

RLSS aims to recruit and retain the best field operatives to enable the business to manage the forest concession in a responsible manner, fully compliant with national laws, standards, and guidelines. RLSS' policy is to ensure that recruitment and selection decisions are based on the ability of the applicant to meet the requirements of the job description, person specification and any other relevant criteria. All applicants and employees will be treated fairly and according to this policy and procedure, and our relevant equality policies.

Scope

These procedures apply to all full time and contracted operatives. The good practice elements of the procedure apply to all appointments.

Procedures

1. Statutory Requirements

1.1 Current employment law imposes obligations on employers not to discriminate on the grounds of age, disability, gender reassignment, race, religion or belief, sex, sexual orientation, marriage and civil partnership, pregnancy, and maternity. RLSS is committed to taking a positive and pro-active approach to diversity and equality which extends beyond the statutory obligations.

1.2 In addition, RLSS will consider the applicable practical guidance and recommendations of non-statutory codes of practice.

2. Responsibilities

2.1 HR Services will provide advice, guidance, and support to recruiting managers so that:

a) Job descriptions, person specifications and recruitment advertisements are drafted in such a way as to make clear the requirements of job vacancies.
b) Staff involved in recruitment and selection are aware of their role and responsibilities in this area.

2.2 HR Services will monitor applications by equalities criteria.

2.3 HR Services will organize training and development to support recruitment and selection.

2.4 Heads of Departments are responsible for the identification of vacancies for staff in their area; for ensuring that these procedures are followed, and that unfair discrimination does not occur.

2.5 All staff involved in recruitment and selection have a responsibility to behave in a non-discriminatory manner.

3. Criminal Convictions

3.1 RLSS retains the right to request Police Clearance Certificates from potential employees

4. The Recruitment Process

4.1 The recruitment procedures are designed to:

a) create a positive image to applicants who may be future employees.
b) give a clear understanding of the nature of RLSS' business and what will be expected of them as employees.

c) enhance the quality of the candidate pool.
d) reduce the risk of a bad selection decision.

An essential component of the recruitment process is the **briefing note** prepared for candidates, such as *job description*, *person specification* and *further details*.

5. First Step

5.1 If an employee leaves, or additional staff resources are required first check with the Operations Director that there is 'in principle' support for filling the vacancy and that budget is available. The OD or Forest Manager (FM) may determine the need for new or replacement posts based on the current and future requirements of the Company and may authorize moving to the next stage of the recruitment process where all of the following conditions are met:

a) Where the nature of the post fits our HR frameworks and a budget can be identified to cover the cost involved.
b) The grade has been determined in accordance with our procedures.

5.2 The Company Director or Head of Department must initially discuss and agree with the relevant Management that the budget is available to fill the vacancy. Staff Recruitment & Selection Policy and Procedure

5.3 If the job is new, or the duties of the job have changed significantly over time, it may be necessary for the job grading to be reviewed; the outcome may impact on the budget required. Advice on this should be sought from HR Services.

5.4 Supervisors wishing to recruit new employees are advised to discuss their recruitment plans with HR Services so that the appropriate level of guidance and support can be provided to ensure that the process runs smoothly. Consideration needs to be given at this stage to the shape and content of the recruitment activity appropriate to the vacancy.

5.5 If selection tools other than an interview-for example, practical sessions- are planned, these should be directly related to the requirements of the job, should be carefully selected, professionally designed and properly applied to ensure that there is no bias in the selection process. Further advice is available from HR Services.

6. Getting Started

6.1 Vacancies normally must be approved by the operations manager. The recruiting manager who is seeking to recruit to a post must provide all the recruitment documents, job description, person specification to the Company Director or Head of Department, who will collate this for submission to advertisers.

7. Job Description

7.1 Structure and other considerations for the job description

7.1.1 The job description:

a) provides a 'snapshot' of the job at a given time;
b) defines the job purpose and principal accountabilities of the job;
c) indicates where the job sits within the organizational structure;
d) outlines reporting relationships;
e) changes as the job develops

7.1.2 The job description must be prepared by the employing sectional head in the standard format. Advice on production of job descriptions may also be sought from HR Services.

7.1.3 Where there is an existing job description for the vacancy, this will need to be reviewed, and updated where necessary and set out in the latest version of the appropriate standard template.

7.2 Person Specification

7.2.1 Person specifications are designed to identify the qualifications, experience, knowledge, skills/competencies, and personal qualities required of the successful candidate to ensure the job is carried out effectively. It is crucial to the recruitment process that it is clear and precise Staff Recruitment & Selection Policy and Procedure since it outlines the criteria by which candidates will be shortlisted and selected. It is important to keep the person specification succinct. If candidates are not going to be assessed against a criterion during the recruitment process, then it should not be included.

7.2.2 The person specification should make clear what is essential and what is desirable. Essential criteria are necessary pre-requisites whilst desirable criteria are 'nice to haves' which would be advantageous for the candidate to possess. The person specification with the job description is used to provide a realistic basis for an advertisement. Time spent at this stage will help at subsequent stages of the process.

7.2.3 Particular care must be taken when devising the criteria used in person specifications to ensure that these do not unlawfully discriminate against groups of people either directly or indirectly.

7.2.4 Where a *police clearance certificate* is required for the post this should be specified as an essential requirement.

7.3 Additional Information/Further Details for Candidates

7.3.1 The forest manager may provide further information to supplement the job description and person specification e.g. giving the job context.

7.4 Recruitment Advertisement

7.4.1 The recruitment advertisement should be designed to:

a) give a snapshot of the job;
b) attract those applicants whose experience, qualifications etc. match the requirements of the job and quickly eliminate those who do not.
c) convey a positive image of RLSS as an 'employer of choice'.

7.4.2 The forest manager or sectional head is responsible for providing a draft advertisement. It should be succinct and interesting, aiming to have maximum impact with a minimum of text. All adverts will include one of a selection of regularly reviewed and updated standard short generic opening remarks.

Applicants initially scan publications very quickly for 3 main things:

a) Job Title
b) Salary
c) Location

This information should be followed by:

a) The job (the main thrust of what the jobholder will be doing or be expected to achieve)
b) Key requirements - what the candidate needs to do the job e.g. essential and
c) desirable qualifications, experience, background, personal qualities

HR Services will add standard text such as the *closing date* and *equality statement*.

8. Advertising the Vacancy

8.1 HR Services hold an advertising budget that is used for campaigns to increase our visibility as an employer of choice, encouraging traffic to our website, therefore improving the pool of candidates. These include sponsoring words on Facebook, external advertising campaigns and a subscription with job advertisers.

8.2 All posts will be advertised for a minimum of two weeks to attract the best pool of candidates

9. Shortlisting

9.1 Shortlisting should normally be carried out by at least two members of the selection panel, one of whom will normally be the forest manager.

9.2 It is important that the criteria set at the beginning of the recruitment process in the person specification are used to assess all candidates as objectively as possible.

9.3 Internal applicants 'at risk' should be shortlisted if they meet most of the essential criteria. The likely duration and cost of staff training and development will need to be considered in deciding whether the job would be suitable alternative employment for an ‘at risk’ applicant.

10. Selection Administration

10.1 For all staffs, references may be obtained after successful interview but prior to offering employment. The forest manager may decide that references are required prior to interviewing candidates.

10.2 Where references are to be requested prior to interview a longer lead in time is required to allow referees reasonable time to respond prior to interview. At least 12 working days’ notice should be given to HR Services.

10.3 For internal appointments within the same section further references will not normally be required. For other internal candidates, the chair of the recruitment panel (or another panel member) should obtain a telephone reference from the appropriate manager and then inform HR Services.

11. The Interview

11.1 The aim of the interview is to select the best candidate for the job. It is a two-way process during which the details of the job can be discussed, and the candidate’s suitability assessed.

11.2 Where the candidate’s application reveals any unexplained gaps in employment or inconsistencies, these should be explored with the candidate at interview.

11.3 Candidates will have been asked to bring with them to the interview their original qualification certificates plus a copy, which must be verified against the originals and forwarded to HR Services.

11.4 The purpose of collecting the above documents on the interview day is to ensure that any offer of employment may be expedited. If the documents are not collected or are not available, HR Services will need to make alternative arrangements, which may delay any formal offer being made.

11.5 The Chair of the panel must identify administrative support within the recruiting department to meet and greet candidates on the day of the interview and to collect and

photocopy the appropriate documentation. HR Services will provide the Chair of the panel with a checklist of required documentation in the interview pack.

12. Chair's Actions head of the recruitment panel after an Interview session.

12.1 Following interviews, the Chair of the panel/recruiting manager may make a verbal conditional offer of appointment to the successful candidate. It must be made clear that the offer is subject to completion of our pre-employment checks as follows:

a) receipt of references which are satisfactory to RLSS
b) evidence of essential qualifications
c) for foreigners, confirmation of right to work in Guyana

12.2 HR Services should then be notified of the outcome and the successful candidate's documents returned together with all the recruitment documents to HR Services including:

a) Verified copies of the candidates' qualifications
b) Verified copies evidencing the right to work in Guyana

Failure to provide any of these documents could delay the process.

12.3 It must be made clear to the candidate that they should not resign their current position and that we will only proceed to a formal offer of employment if all the above pre-employment checks are satisfactory to us.

12.4 Although you may wish to explore the successful candidate's availability to start work e.g. notice period, it is not appropriate to agree a potential start date at this stage.

12.5 The successful candidate must not be allowed to start work in advance of all the pre-employment requirements being met.

12.6 Any unsuccessful internal candidates must be contacted by the Chair of the panel (or some other nominated member of the selection panel) to confirm the decision and provide feedback. This should be by telephone or by face-to-face.

12.9 The unsuccessful candidate documents should be disposed of in confidential shredding.

13. Salary /wages

13.1 On appointment the successful candidate will normally be placed on the first point of the advertised salary range for the job.

13.2 There may be situations where it is appropriate for the successful candidate to be placed on a higher salary point e.g. job-related experience. In such cases it will be for the head of the recruitment panel (in liaison with the budget holder) to decide the appropriate starting salary and put forward the appropriate justification.

14. Actions after Interview

14.1 Unsuccessful external candidates will be informed of the outcome by email issued by the section head usually within 5 working days of receipt of the interview outcome.

14.2 Confirmation of the conditional offer of employment will be sent to the successful candidate by the section head or forest manager normally within 3 working days.

15. Formal Offer of Employment

15.1 When all pre-employment conditions have been met, HR Services will email the recruiting manager confirming that this is the case and will forward copies of the references to them to determine that they are satisfactory.

15.2 It is the recruiting manager's responsibility to confirm by a reply email to HR Services whether references received are satisfactory and whether a formal offer of employment should be made.

15.3 Advice should be sought from HR Services if there are any concerns about the content of

references or if there are omissions on the reference. References should always be checked to ensure that:

a) questions have been answered unambiguously – omissions should be followed up
b) employment dates match those listed on the application form –discrepancies should be followed up and clarified

15.4 The section head will then agree a start date with the candidate and arrangements for the first day of work and then forward these details to HR Services by e-mail.

15.5 Once HR Services have been notified by the recruiting manager that a formal offer of employment can be made, paperwork will be sent to the candidate within 3 working days.

16. Induction

16.1 Once an appointment is made, the section manager must ensure practical arrangements for the new member of staff are organized before their arrival such as their workspace.

16.2 HR Services will request a staff ID card on receipt of a passport-sized or digital photograph from the candidate.

16.3 The recruiting manager should also ensure a local induction programme is planned for the new member of staff in readiness for their first day. This should incorporate standard briefing notes which are common to all staff within the department, plus elements which are specific to the role.

17. Review of Policy & Procedure Staff Recruitment & Selection Policy and Procedure

17.1 This procedure is subject to review in the light of relevant developments in legislation and employment practice. We reserve the right to amend the procedure from time to time at our discretion

ANNEX XII: RLSS-OCCUPATIONAL SAFETY AND HEALTH POLICY

Overview

'Forestry continues to one of the most hazardous industrial sectors in most countries' (ILO 1998). RLSS must comply with the provisions of Section 10-Health and Safety and other applicable prescriptions of GFC's COP (Guyana Forestry Commission, 2018). In addition, there are the provisions of the Occupational Safety and Health Act, Cap 99:10 ((Government of Guyana, 1997) as well as the Labour Act, Cap. 98:01 (Government of Guyana, 1942).

Background/Context

RLSS will be involved in large scale logging, harvesting some 80,000m^3 of timber annually and processing at least 40% of that volume within several sawmilling units. During its operations RLSS will utilize many pieces of heavy equipment, several chainsaws, and several portable sawmills.

Accountability

RLSS takes full responsibility for OSH practices during its operations.

Compliance

RLSS is committed to full compliance with all sectored and applicable policies, laws, standards, and guidelines concerning employee safety in Guyana.

Purpose

This policy statement is designed to communicate RLSS' to employees, clients, public agencies, creditors and shareholders, RLSS resolve to develop and implement effective occupational safety and health practices.

Scope

The requirements of this policy apply to all departments and employees of the company. Sectional heads are responsible for the application of the policy.

Definitions

- Employer-any person or business that provides work for another person and remunerates that person.
- Hazard-a source of, or exposure to, danger
- Occupational disease-any disease arising during one's employment
- Risk-the probability that an injury to a person or degradation of one's environment will occur
- Worker-anyone who is in the employ of another person or a business
- Workplace-a place or premises where a person works during his or her employment

Policies

a) RLSS will take measures to ensure familiarization with the legal framework for OSH policies and practices in Guyana. Essential elements of these will be posted at all workspaces.

b) RLSS will develop the capability for all issues related to occupational safety & health (OSH). Specifically, RLSS will ensure that all employees are duly educated, trained, and motivated to implement and take responsibility for adequate OSH practices.

c) RLSS, in collaboration with employees and other stakeholders will set up an OSH Committee specifically to address OSH issues associated with Ekabago logging and sawmilling operations.

d) RLSS, in collaborations with an OSH Committee will develop and monitor standards for OSH at Ekabago and other base camps or forward camps developed from time to time.

e) RLSS, in collaboration with the OSH Committee and other stakeholders shall drive OSH awareness of the various workplace hazards common at the workplace(s). RLSS, in collaboration with the OSH Committee and other stakeholders will conduct biannual OSH awareness workshops at Ekabago Base Camp

f) Regularly review performance on its OSH standards and take measures (or set targets) to achieve continuous improvement. RLSS will put in place incentives to reward the achievement of targets.

g) Copies of Section 10 of GFC's COP will be placed at all work sites.

h) RLSS will provide personal safety gear for all employees engaged in field operations. RLSS will provide personal safety gear for all personnel working in and around its sawmills.

Responsibility-RLSS

The Operations Officer will be personally responsible for ensuring that every section head for Ekabago Operations has a copy of this policy and that every section head takes measures to inform their staff about the policy.

Responsibility-Employees/contractors

Workers will participate in the OSH Committee, other safety committees and their activities, and will duly report any hazardous situation to their respective supervisors.

ANNEX XIII: RLSS-DRAFT ENVIRONMENTAL POLICY

1. Overview

RLSS recognizes that its operations will have a direct impact on the environment and is fully committed to minimizing the impacts of its operations on the environment and integrating environmental considerations in all phases of its operations.

2. Background/Context

The harvesting of logs requires major interventions in the forest resources, including:

a) constructing roads, skid trails, and log markets, and ancillary structures such as borrow pits, bridges, and culverts
b) felling trees, and
c) traversing the forest floor with a variety of heavy-duty machines.

These activities will modify the forest environment. The type, severity, and duration of any such modification depend on the degree of planning and mitigation measures applied to each intervention.

3. Accountability

RLSS takes full responsibility for environmental outcomes during its operations.

4. Compliance

RLSS is committed to full compliance with all sectored and applicable policies, laws, standards, and guidelines concerning environmental management in Guyana. RLSS will respond positively to responsibilities embodied in its environmental authorization, environmental management plan, forest management plan and annual operations plans.

5. Purpose

This policy statement is designed to communicate RLSS' environmental policy to employees, clients, public agencies and other stakeholders, RLSS resolve to be good stewards of the forest resources that form an integral part of the SFA.

6. Scope

The requirements of this policy apply to all departments and employees of the company. The Forest Manager is personally responsible for this environmental policy; however, all departmental and sectional heads must share responsibility for its application. The Forest Manager will chair an environmental management committee to ensure action on this policy.

7. Policies

RLSS will develop an environmental management capability to address current and emerging challenges. Specifically, RLSS will ensure that all employees are duly educated, trained, and motivated to implement and take responsibility for proper environmental practices. RLSS will identify and manage all drivers of environmental impacts or environmental modification, paying special attention to those that pollute or contaminate the environment generally and water bodies. RLSS will regularly review environmental performance and take measures (or set targets) to achieve continuous improvement. RLSS will put in place incentives to reward the achievement of targets.

Responsibility

The Forest Manager will be solely responsible for ensuring that every departmental head for Ekabago Operations has a copy of this policy and that every department head takes measures to inform their staff about the policy.

ANNEX XIV: LIST OF SPECIES TARGETED BY RLSS

1)	Arisauro	*Vatairea guianensis* Aublet [Leguminosae/Papilionoideae]
2)	Aromata	*Clathrotropis bracypetala* (Tul.)[Leguminosae/Papilionoideae]
3)	Baromalli	Catostemma commune Sandw. [Bombacaceae]
4)	Brown Silverballi	*Licaria canella* (Meissner) Kosterm [Lauraceae]
5)	Bulletwood	Manilkara bidentata (A. DC.) Chev. [Sapotaceae]
6)	Burada	Parinari campestris Aublet [Chrysobalanceae]
7)	Crabwood	Carapa guianensis Aublet [Meliaceae]
8)	**Darina**	*Parkia pendula* (Willd.) Benth. Ex Walp [Leguminosae/Mimosoideae]
9)	Determa	*Ocotea rubra* Mez./Nectandra rubra (Mez) Allen [Lauraceae]
10)	Devil Door	*Glycydendron amazonicum* Ducke [Euphorbiaceae].
11)	Dukali	Parahancornia fasciculata (Poir.) Benoist [Apocynaceae]
12)	Durban Pine	*Pithecellobium spp.* [Leguminosae/Mimosoideae]
13)	**Greenheart**	*Chlorocardium rodiei* (Schomb.) Rohwer, Richter & van der Werff. [Lauraceae].
14)	Hububalli	*Loxopterygium sagotii* Hook [Anacardiaceae].
15)	Huruasa	*Pithecellobium jupunba* (Willd.) Urban [Leguminosae/Mimosoideae]
16)	Kabukalli	*Goupia glabra* Aublet [Celastraceae]
17)	Kereti Silverballi	*Ocotea wachenheimii* Benoist [Lauraceae]
18)	Kurokai	Protium decandrum (Aublet) Marchal Burseraceae
19)	Limonaballi	*Chrysophyllum pomiferum* (Eyma) Penn [(Sapotaceae]
20)	**Locust**	*Hymenaea courbaril* L.[Leguminosae/Caesalpinioideae]
21)	Manni	*Symphonia globulifera* L.f. [Guttiferae]
22)	Manniballi	*Moronobea coccinea* Aublet. [Guttiferae]
23)	Monkey-Pot	*Lecythis zabucajo* Aublet [Lecythidaceae]
24)	Mora	*Mora excelsa* Benth. [Leguminosae/Caesalpinioideae]
25)	Morabukea	Mora gonggrijpii (Kleinhoonte) Sandw. [Leguminosae/Caesalpinioideae]
26)	Muniridan	*Siparuna guianensis* Aublet [Monimiaceae]
27)	Purpleheart	*Peltogyne venosa* (Vahl) Benth.[Leguminosae/Caesalpinioideae]
28)	Red Cedar	*Cedrela odorata* L. [Meliaceae]
29)	Rose of the Mountain	*Brownea latifolia* Jacq. [Leguminosae/Caesalpinioideae]
30)	Sarebebeballi	*Vouacapoua macropetala* Sandw. Leguminosae/Caesalpinioideae]
31)	Shibadan	*Aspidosperma desmanthum* Benth. Ex Muell. Arg. [Apocynaceae]
32)	Simarupa	Simarouba amara [Simaroubaceace]
33)	Soft Wallaba	Eperua falcata Aublet [Leguminosae/Caesalpinioideae]
34)	Suradan	*Hyeronima alchorneoides* Allemão. [Euphorbiaceae]
35)	Suya	*Pouteria speciosa* (Ducke) Baehni [Sapotaceae]
36)	Tatabu	*Diplotropis purpurea* (Rich) Amshoff Leguminosae/Papilionoideae]
37)	Tauroniro	*Humiria balsamifera* (Aublet) A. St. Hil. [Humiriaceae]
38)	Tonka-Bean	*Dipteryx odorata* (Aublet) Willd. [Leguminosae/Papilionoideae]
39)	Ulu	*Trattinickia rhoifolia.* Willd. [Burseraceae]
40)	Uya	*Parkia nitida* Miq. [Leguminosae/Mimosoideae]
41)	Wamara	*Swartzia leiocalycina* Benth. [Leguminosae/Papilionoideae]
42)	Wamaradan	Dicorynia guianensis [Leguminosae/Caesalpinioideae]
43)	Washiba	*Tabebuia sp. nov.* [Bignoniaceae]
44)	Yellow Silverballi	*Aniba hypoglauca* Sandw. Mez. [Lauraceae]

Appendix A : Species statistics

The *Tim.* column is ticked for commercial species. If more than one local name is used for the same species, they are separated by semi-colon (;). Where two species names are shown joined by an ampersand (&), different nomenclature is used by Barama and Tropenbos for the same local name. *N* shows the total number of trees on all PSPs. *Dinc* is mean diameter increment in cm yr^{-1}. *SE%* is the standard error of Dinc as a %. Annual mortality is shown as % yr^{-1}. The defective tree value includes damaged or decaying trees, but not simply poor form. *Dmax* is the 95% percentile of the cumulative diameter distribution. *Model* shows the growth model group. This table only includes species above 20 cm dbh occurring on the PSPs.

Species identification			Trees	Diameter increment		Annual mortality rate		Dmax	Model
Tim.	*Common name*	*Botanical name*	*N*	*Dinc*	*SE%*	*Sound*	*Defective*	*P .95*	
✓	Huruasa	*Aberema jupunba*	18	0.566	12.1%	2.56%	14.29%	87.0	N
	Limonoballi	*Achrouteria pomifera*	1					29.4	A
✓	Haiariballi	*Alexa*	1906	0.631	1.4%	2.03%	4.31%	56.2	G
	Ubudi	*Anacardium giganteum*	1	0.276	10.5%		0.00%	23.6	C
	Gale, almond	*Aniba citrifolia*	1	0.624	23.8%	0.00%		27.5	F
	Gale, greenheart	*Aniba excelsa*	5	0.284	15.6%	0.00%	0.00%	37.5	D
	Silverballi, yellow	*Aniba hypoglauca*	1	0.061	55.4%	0.00%		33.1	A
	Gale, ginger	*Aniba kappleri*	1	0.066	52.1%		0.00%	25.5	A
	Mababalli	*Aparisthmium cordatum*	2	0.182	42.9%	0.00%	33.33%	23.8	A
	Duru	*Apeiba echinata & petoumo*	126	0.529	5.5%	2.62%	0.00%	63.4	K
✓	Shibadan	*Aspidosperma cruentum & album*	221	0.540	3.7%	1.07%	0.00%	83.2	P
	Yaruru	*Aspidosperma exselsum*	82	0.356	6.8%	0.00%	13.33%	69.7	L
	Cowwood	*Bagassa tiliafolia*	32	0.487	12.3%	2.00%	0.00%	56.1	E
	Manariballi, common	*Balizia pedicellaris*	11	0.680	15.8%	3.57%	0.00%	81.1	P
	Arara, fine leaf	*Bocageopsis multiflora*	17	0.220	12.9%	0.00%	10.53%	38.6	D
	Silkcotton	*Bombax*	20	0.982	9.5%	4.17%	0.00%	73.6	R
	Wild Cocoa	*Bombax jermanii*	23	0.441	19.9%	1.85%	8.33%	63.2	E
	Leopardwood; Tibo-kushi	*Brosimum guianense*	10	0.175	23.7%	0.00%	11.11%	32.7	B
	Dukaliballi	*Brosimum rubescens*	12	0.384	16.0%	0.00%	0.00%	43.6	E
	Arikadako	*Byrsonima aerugo*	1	0.111	13.2%	0.00%		23.4	A
	Hicha	*Byrsonima spicata*	54	0.983	7.6%	4.76%	9.09%	40.6	H
	Kanoaballi	*Byrsonima stipulacea*	4	0.425	26.9%	25.00%		40.3	C
	Wild Guava	*Calycolpus goetheanus*	4	0.228	39.0%	0.00%		30.7	B
	Kakirio	*Calyptranthes forsteri*	5	0.207	59.7%	7.69%		43.3	D
✓	Crabwood	*Carapa guianensis*	490	0.548	2.9%	1.88%	7.12%	61.8	K
	Sawari	*Caryocar nuciferum*	3	0.227	32.7%	0.00%	0.00%	80.0	M
	Warua	*Cassia cowanii*	3	0.470	34.1%	11.11%		40.2	C
✓	Baromalli, swamp	*Catostemma commune*	1072	0.510	2.1%	0.74%	2.94%	75.5	P
✓	Baromalli, sand	*Catostemma fragrans*	480	0.220	3.4%	1.42%	14.73%	43.0	D
	Congo Pump	*Cecropia angulata & obtusa*	160	1.073	4.1%	3.35%	6.90%	50.1	H
✓	Red Cedar	*Cedrela odorata*	3	0.823	42.2%	0.00%		65.2	G
	Kumaka	*Ceiba pentandra*	4	0.872	22.6%	0.00%		45.2	H
	Ruri	*Chaetocarpus schomburgkianus*	126	0.171	11.1%	2.04%	1.59%	37.9	D
	Hiwaradan	*Chaunochiton kappleri*	25	0.078	15.7%	1.69%	0.00%	25.3	A
✓	Greenheart	*Chlorocardium rodiei*	1070	0.218	1.4%	0.48%	1.57%	70.8	M
	Paripiballi	*Chrysophyllum pomiferum*	1	0.116	24.8%	0.00%		63.7	J
	Barataballi	*Chrysophyllum sanguinnolentum*	3	0.481	12.0%	0.00%		46.7	E
✓	Aromata	*Clathotropis*	153	0.653	5.5%	2.33%	2.13%	37.4	F
	Iron Mary	*Clathotropis paradoxa*	14	0.309	18.2%	0.00%	6.67%	71.2	L
	Table tree	*Cordia exaltata*	9	0.161	36.8%	0.00%	12.50%	30.9	B
	Antswood	*Cordia nodosa*	17	0.402	20.1%	2.63%	0.00%	28.5	C
	Gamma Cherry	*Cordia tetrandra*	97	0.358	7.7%	0.00%	14.29%	44.3	E
	Aruadan	*Couepia exflexa*	41	0.310	7.7%	1.02%	15.38%	50.4	E
✓	Wadara	*Couratari guianensis*	60	0.516	10.1%	0.65%	4.00%	78.1	P
	Kulishiri, hairy black	*Cupania hirsuta*	6	0.073	39.9%	0.00%	20.00%	27.4	A
	Barabara	*Diospyros*	59	0.332	11.3%	1.31%	0.00%	50.1	E
✓	Tatabu	*Diplotropis purpurea*	33	0.391	9.5%	0.00%	0.00%	67.0	L
✓	Tonka Bean	*Dipteryx odorata*	16	0.425	25.9%	0.00%	0.00%	54.6	E

Species identification			Trees	Diameter increment		Annual mortality rate		Dmax	Model
Tim.	Common name	Botanical name	N	Dinc	SE%	Sound	Defective	P .95	
	Yarriyarri, White	*Duguetia*	3	0.437	23.6%	0.00%		46.3	E
	Hishirudan	*Dulacia guianensis*	3	0.156	23.2%	0.00%		29.5	B
	Bartaballi	*Ecclinusa guianensis*	199	0.395	5.5%	1.10%	0.92%	67.4	L
	Manobodin	*Emmotum fagifolium*	7	0.211	25.8%	14.29%	50.00%	58.6	J
	Devil's ear	*Enterolobium cyclocarpum & barbebianum*	2	0.418	53.7%	0.00%	0.00%	75.8	P
	Wallaba, Hill	*Eperua*	1	0.450	43.4%		0.00%	79.9	P
✓	Wallaba, Soft	*Eperua falcata*	211	0.215	4.1%	2.56%	7.45%	68.5	M
	Kakaralli	*Eschweilera spp.*	4527	0.384	1.2%	0.73%	2.34%	51.0	E
	Banyaballi?	*Eugenia coffeifolia*	30	0.237	27.1%	0.00%	7.14%	41.9	D
	Wild Cherry	*Eugenia patrisii*	50	0.300	12.5%	1.64%	0.00%	42.6	D
	Wild Fig	*Ficus*	5	1.424	26.5%	0.00%	0.00%	65.0	R
	Kumakaballi	*Ficus mathewsii*	2	0.657	62.1%	0.00%	0.00%	90.5	N
	Manyokinaballi	*Geissospermum sericeum*	18	0.210	11.4%	0.00%	6.67%	74.2	M
	Devildoor tree	*Glycydendron amazonicum*	15	0.279	13.3%	0.00%	0.00%	110.5	S
✓	Kabukalli	*Goupia glabra*	125	0.562	7.1%	1.80%	1.59%	90.0	N
	Karabababalli	*Guarea guidonia*	37	0.640	8.5%	0.00%	5.08%	81.4	P
	Arara, smooth skin	*Guatteria*	75	0.255	9.5%	3.59%	8.70%	29.4	B
	Shiballidan	*Hebapetalum humiriifolium*	5	0.281	14.3%	0.00%		28.5	C
	Ituri-ishi-lokodo	*Helicostylis tomentosa*	4	0.258	28.0%	0.00%		31.5	B
	Jack-in-the-box	*Hernandia giunensis*	3	0.676	27.4%	0.00%	0.00%	37.9	F
	Wild Rubber	*Hevea*	30	0.461	10.3%	2.11%	0.00%	63.1	K
	Mabwa	*Himathanthus articulatus*	3	0.079	39.3%	0.00%	0.00%	34.9	A
	Suradan	*Hyeronima laxiflora*	93	0.594	6.4%	2.86%	6.98%	72.1	P
✓	Locust	*Hymenaea coubaril*	17	0.455	10.4%	2.50%	25.00%	103.0	N
	Darina	*Hymenolobium flavum*	1	0.282	34.6%		0.00%	62.9	L
	Koraroballi	*Hymenolobium sp.*	16	0.690	14.2%	0.00%	0.00%	143.5	S
	Kakotaro	*Ilex martiniana*	1	0.000		0.00%		23.8	A
	Warakosa	*Inga*	58	0.282	9.9%	1.63%	13.79%	36.8	D
✓	Maporokon	*Inga alba*	34	1.301	7.3%	3.19%	0.00%	91.8	R
	Waiki	*Inga rubiginosa*	691	0.787	2.2%	2.24%	6.17%	52.5	G
✓	Futui	*Jacaranda copaia*	62	0.619	8.8%	6.21%	9.09%	55.9	G
	Warakaioro	*Laetia procera*	65	0.480	8.0%	0.54%	6.06%	51.8	E
	Wirimiri	*Lecythis confertiflora*	807	0.174	2.9%	1.62%	7.49%	52.9	J
	Wina	*Lecythis corrugata*	2	0.180	49.1%	33.33%	0.00%	38.7	D
	Monkey Pot	*Lecythis davisii & zabucajo*	130	0.327	8.3%	1.09%	5.00%	58.9	E
	Haudan	*Lecythis holcogyne*	6	0.217	31.3%	8.33%	0.00%	31.9	B
	Kautaballi	*Licania alba & majuscula*	207	0.167	4.0%	2.00%	4.96%	39.9	D
	Marishiballi	*Licania canescens & micrantha*	205	0.204	3.5%	1.68%	6.76%	35.5	B
	Kauta	*Licania guianensis & laxiflora*	2299	0.306	1.8%	1.21%	4.03%	48.9	E
	Buruburuli	*Licania heteromorpha & divaricata*	340	0.259	4.2%	2.47%	8.70%	46.5	D
	Unikiakia	*Licania hypoleuca*	28	0.243	9.0%	1.45%	25.00%	37.3	D
	Konoko	*Licania sp.*	30	0.262	24.0%	1.82%	3.70%	57.5	J
✓	Silverballi, brown	*Licaria cannella*	5	0.323	31.3%	0.00%	12.50%	51.8	E
✓	Hububalli	*Loxopterygium sagottii*	3	0.652	23.5%	8.33%		88.3	N
	Swizzle Stick	*Mabea*	165	0.347	6.7%	3.88%	4.23%	31.2	C
	Barirkuti	*Mabea piriri*	1					24.9	A
	Wallaba Water	*Macrolobium*	1	0.139	47.9%	0.00%		24.8	A
✓	Bulletwood	*Manilkara bidentata*	64	0.566	7.7%	0.00%	0.00%	114.7	S
	Kulishiri, white	*Matayba oligandra*	4	0.159	34.2%	11.11%	33.33%	26.8	A
	Kairima	*Maytenus myrsinoides*	3	0.255	42.9%	20.00%	0.00%	41.5	D
	Waraia, punctata	*Miconia punctata*	1	0.254	33.8%	0.00%		28.0	B
	Kudibiushi	*Micropholis venulosa*	53	0.242	9.5%	3.19%	7.14%	35.2	D
	Wanania	*Minquartia guianensis*	2	0.047	64.7%	0.00%		46.3	D
✓	Mora	*Mora excelsa*	5	0.163	26.7%	0.00%	0.00%	60.5	J
✓	Morabukea	*Mora gongrijpii*	295	0.299	3.9%	0.87%	7.47%	72.4	L

Species identification			Trees	Diameter increment		Annual mortality rate		Dmax	Model
Tim.	Common name	Botanical name	N	Dinc	SE%	Sound	Defective	P.95	
	Mamuriballi	*Mouriria huberi*	16	0.561	15.2%	0.00%		122.9	S
	Silverballi, pear leaf	*Ocotea acutangula*	2	0.274	23.3%	0.00%		21.7	C
	Silverballi, sawari skin	*Ocotea canaliculata*	3	0.577	16.0%	0.00%		49.3	G
	Silverballi, "pea's" leaf kere	*Ocotea floribunda*	4	0.609	11.8%	0.00%		37.7	F
	Silverballi, Shirua	*Ocotea guianensis*	15	0.399	10.4%	0.00%	0.00%	58.3	E
	Silverballi, Kereti	*Ocotea puberula*	197	0.576	4.6%	2.49%	7.92%	45.5	F
	Baradan	*Ocotea tomentella*	37	0.600	13.7%	2.63%	0.00%	94.4	N
	Lu	*Oenocarpus bacaba*	10	0.019	48.0%	4.55%	50.00%	34.7	A
✓	Barakaro	*Ormosia coccinea*	14	0.198	20.3%	6.06%	40.00%	60.7	J
	Korokororo	*Ormosia coutinhoi*	3	0.159	35.7%	0.00%		62.5	J
	Lancewood; Karishiri	*Oxandra asbeckii*	57	0.300	8.9%	0.79%	0.00%	41.5	D
	Mahoballi	*Panopsis sessilifolia*	1	0.033		50.00%		55.5	J
✓	Dukali	*Parahancornia fasciculata*	1	0.094	52.2%	0.00%		36.3	A
✓	Burada	*Parinari campestris*	84	0.598	6.6%	2.46%	3.45%	98.0	N
	Hipanai	*Parkia pendula*	1	0.332	52.1%		0.00%	101.7	N
	Uya	*Parkia ulei*	5	0.506	26.8%	22.22%	0.00%	49.7	E
	Adebero	*Paypayrola guianensis & longifolia*	1	0.050	50.9%	0.00%		23.8	A
✓	Purpleheart; Saka	*Peltogyne*	55	0.632	6.6%	1.94%	2.78%	109.0	S
	Trysil	*Pentaclethra odorata & macroloba*	1352	0.495	2.0%	1.71%	3.77%	41.2	F
✓	Hachiballi	*Pera*	5	0.211	33.8%	0.00%		39.5	D
	Manariballi	*Pithecellobium pedicellare*	16	0.677	17.1%	3.13%	0.00%	91.2	N
	Soapwood	*Pithecelobium jupunba*	53	0.620	8.7%	1.69%	1.92%	97.1	N
✓	Buruma	*Pourouma essiquiboensis & guianensis*	20	0.787	11.4%	1.89%	14.29%	37.6	F
	Kamahora, fine leaf	*Pouteria filipes & venosa*	6	0.226	29.0%	0.00%		40.2	D
	Asepokoballi, fine leaf	*Pouteria caimito*	2	0.329	22.7%	0.00%		27.1	C
	Aiomorakushi	*Pouteria cladantha*	35	0.256	10.2%	0.00%	3.13%	34.3	B
	Asepoko	*Pouteria guianensis*	149	0.385	8.3%	0.66%	4.00%	55.0	E
	Moraballi	*Pouteria minutiflora & coriacea*	235	0.499	4.5%	1.49%	3.41%	56.5	K
	Kokoritiballi	*Pouteria reticulata*	165	0.445	7.1%	1.01%	2.22%	61.4	E
✓	Suya	*Pouteria speciosa*	18	0.212	12.5%	0.00%	0.00%	60.1	J
	Kamahora, medium leaf	*Pouteria trigonosprema*	1	0.908	44.9%	0.00%		34.9	H
	Haiawaballi	*Protium beglectum & tenuifolium*	19	0.289	15.7%	0.00%	0.00%	70.7	L
✓	Kurokai	*Protium decandrum*	880	0.728	1.7%	2.33%	5.81%	48.4	G
✓	Haiawa	*Protium guianense*	24	0.375	10.4%	1.89%	0.00%	28.7	C
	Manariballi , like	*Pseudopiptadenia suavolens*	2	1.014	45.8%	0.00%		56.1	H
	Corkwood	*Pterocarpus officinalis*	65	0.998	7.6%	0.56%	0.00%	60.5	H
	Okokonshi	*Quiina obovata & indigofera*	14	0.273	12.5%	0.00%	11.11%	30.0	C
	Muneridan	*Ruizterania albiflora*	4	0.196	44.1%	0.00%	33.33%	84.7	M
	Dukuria	*Sacoglottis guianensis*	10	0.543	9.8%	0.00%	20.00%	58.3	K
✓	Karohoro	*Schlefflera morototoni*	53	0.705	8.3%	4.07%	0.00%	67.7	G
✓	Kaditiri	*Sclerolobium guianense*	32	1.299	8.8%	6.58%		66.3	R
✓	Hachiballi	*Simaba multiflora*	5	0.207	21.3%	14.29%	0.00%	43.0	D
✓	Simarupa	*Simarouba amara*	26	0.937	9.6%	2.44%	12.50%	85.4	R
	Muniridan	*Siparuna sp.*	1	0.000		33.33%		22.4	A
	Aruadan	*Sloanea guianensis*	57	0.153	8.1%	1.77%	3.92%	42.3	D
	Black Maho	*Sterculia exsucca*	30	0.685	13.0%	7.25%	14.29%	39.6	F
✓	Maho	*Sterculia pruriens & rugosa*	343	0.558	3.9%	2.23%	5.36%	64.7	K
✓	Itikiboroballi	*Swartzia benthamiana*	53	0.192	7.3%	0.00%	8.82%	58.8	J
	Parakusan	*Swartzia jenmanii*	52	0.746	8.4%	5.95%	6.67%	127.1	S
✓	Wamara	*Swartzia leiocalycina*	194	0.170	4.8%	0.50%	4.84%	55.7	J
	Serebedan	*Swartzia oblanceolata*	9	0.205	33.0%	0.00%	0.00%	52.2	J
✓	Manni	*Symphonia globulifera*	19	0.960	8.9%	0.00%	0.00%	76.6	R

Hakia	*Tabebuia*	23	0.363	15.7%	0.00%	4.35%	104.1	N

ANNEX XVI: SPECIMEN CONTRACT FOR INVENTORY SERVICES

(RLSS may modify this template to meet other contract-based service requirements)

REPUBLIC OF GUYANA
COUNTY OF DEMERARA

AGREEMENT FOR CONSULTANCY SERVICES-100% FOREST INVENTORY-RLSS

CONTRACT signed on Day/Month/Year, 2020 between RL Sukhram & Sons (hereinafter referred to as RLSS) of ST. Lawrence, East Bank Essequibo, Guyana represented by Raghunath Sukhram, General Manager , and *Name of Individual or Name of Enterprise* (hereinafter referred to as the Consultant) of Address

WHEREAS RLSS desires to engage the services of the Consultant on the terms and conditions hereinafter set forth, and the Consultant is ready and willing to accept the assignment of service with RLSS on the said terms and conditions.

Now thereafter the parties hereto agree as follows:

I-NATURE OF SERVICES

The Consultant shall perform the following services:

(a) Enumerate [Number] 100ha blocks within TSA xxx/xx assigned by the Forest Manager, RLSS.

(b) Conduct all work related to the block enumeration, including block demarcation and the organization of each 100ha block into 50m strips in a north-south orientation

(c) Identify, isolate, and protect any asset of item that may have indigenous or archaeological importance

(d) Record the coordinates of any land use event or activity encountered during enumeration exercises

II-DURATION OF AGREEMENT

The Agreement is valid for the period DAY/MONTH/YEAR to DAY/MONTH/YEAR

III-CONSIDERATION

a) As full consideration for the services performed by the Consultant, RLSS shall pay the Consultant the sum of GYD $X upon certification of a forest officer that the work set out in Clauses (a) through (d) have been conducted according to Section 4.3 of GFC's Guidelines for Forest Operations for State Forest Authorizations ((GFFO), 2018.

b) Notwithstanding, section (a) above, the consultant may at the discretion of RLSS be paid the projected cost of the exercise (number of blocks x fee per block) as follows:

i. 40% of the projected fee on the signing of the contract
ii. 40% of the projected fee at the completion of the enumeration exercise
iii. 20% of the projected fee on GFC's approval of the blocks inventoried by the GFC

IV-COMPENSATION FOR SERVICE-INCURRED INJURY

(a) In the event of death, injury, or illness attributable to the performance of services on behalf of RLSS under the terms of this Agreement, the Consultant shall not be entitled to compensation.

(b) In all circumstances, the Consultant shall be responsible for taking out for himself and his employees, at his own expense, such medical insurance as the Consultant may consider advisable covering the period of this agreement.

V-STATUS OF THE CONSULTANT

The Consultant shall be considered as having the legal status of an independent contractor.

VI-RIGHTS AND OBLIGATIONS OF THE CONSULTANT

(a) The rights and obligations of the Consultant are strictly limited to the terms and conditions of this agreement. Accordingly, the Consultant shall not be entitled to any benefit, payment, subsidy, compensation, or entitlement, except as expressly provided in this agreement.

(b) The Consultant shall be solely liable for claims by the third parties arising from the Consultant's own negligence, acts or omissions in the course of performing this agreement, and under no circumstances shall RLSS be held responsible for such claims by third parties.

(c) The consultant shall employ and be responsible for all the persons and skills sets required to carry out forest inventory. The consultant will be responsible for OSH gear and practices in respect of his employees. The consultant is responsible for any briefing and training of employees required from time to time.

(d) The consultant is responsible for providing all tools, stationery and equipment required for conducting forest inventory in the approved manner as well as for setting up, organizing and dismantling field camps set up at agreed locations.

(e) The Consultant shall be solely responsible for the payment of all taxes and all other payments and/or obligations related to his or her or its remuneration package.

(f) The Consultant is responsible for undertaking and addressing any remedial work associated with the forest inventory, until the requirements of the GFC are fully satisfied.

VII-RIGHTS AND OBLIGATIONS OF RLSS

RLSS shall provide:

a) A copy of RLSS SOPs in relation to camp hygiene, waste management as well as any policies covering the use of drugs and alcohol as well as a copy of GFC guidelines for 100% forest enumeration (specifically Section 4.3 of the GFFO).

b) Such maps at appropriate scale as are necessary for the inventory exercise under consideration as well as transportation for the consultant, its crew and field gear to agreed points within the concession area.

c) Lists of blocks to be enumerated and any related special field conditions to be recorded.

VIII-UNPUBLISHED INFORMATION

(a) The Consultant shall not communicate to any person, government, or other entity external to RLSS any information made known to the Consultant by reason of his or her or its association with RLSS except as required by this agreement or upon written authorization by RLSS.

(b) The Consultant shall not advertise or publicize his or her association with RLSS under this agreement, nor shall the name, logo, or official seal of RLSS be used for business or professional purposes or otherwise without the prior approval of RLSS. This provision shall survive the expiration or termination of this agreement.

IX-TERMINATION

(a) Either party may terminate this agreement at any given time, without assigning any reason or justification, by giving the other party one week's notice in writing of its intention to do so. In the event of such termination the Consultant shall be compensated for the actual amount of work performed to the satisfaction of RLSS on *a pro ratio basis*.

(b) RLSS shall have the right to withhold 20% of payment due to the Consultant if RLSS has to incur additional costs resulting from the termination of this agreement by the Consultant in a manner contrary to the preceding subsection, or from failure by the Consultant to complete the terms of this agreement to the satisfaction of RLSS.

X-ARBRITRATION

Any dispute arising out of or in connection with this agreement shall be submitted to arbitration in Guyana by a single arbitrator agreed to by both parties if attempts at negotiation have failed. If the parties are unable to agree on a single arbitrator within thirty days of the request for arbitration, then each party shall proceed to appoint one arbitrator and the two arbitrators thus appointed shall agree on a third. The decision rendered in the arbitration shall constitute final adjudication of the dispute.

In **WITNESSS WHEREOF**, the parties hereto have executed this agreement.

By:

…….	……
Consultant	General Manager, RLSS

ANNEX XVII: LIST OF RLSS' CORE LOGGING ASSETS

#	Item #	MAKE	TYPE	MODEL	CHASSIS #	Engine #
A.	LOGGING TRUCKS					
1	T31	Mercedes-Benz	Logging Truck	3836K	134511	826392
2	T33	Mercedes-Benz	Logging Truck	3836K	910025	931441
3	T39	Mercedes-Benz	Logging Truck	3836KL	715004	994776
4	T56	Mercedes-Benz	Logging Truck	3836K	725671	995336
5	T57	Mercedes-Benz	Logging Truck	3836KL	705454	994351
6	T63	Mercedes-Benz	Logging Truck	3836K	715012	994432
7	T38	Mercedes-Benz	Logging Truck	3836K	715003	994759
8	T28	Mercedes-Benz	Logging Truck	3836KL	910024	931442
9	T62	Mercedes-Benz	Logging Truck	3836K	715011	994429
10	T32	Mercedes-Benz	Logging Truck	3836KL	910022	931444
B.	TRACTORS					
1		CATERPILLAR	Wheel Loader	936F	8AJ00869	07Z29571
2	G78	CATERPILLAR	Log Loader	966E	35803048	10Z16335
3	G264	CATERPILLAR	Log Loader	966F		
4	G265	CATERPILLAR	Log Loader	966F	8BG02773	10Z31151
5	G272	CATERPILLAR	Log Loader	966F II	8BGO2825	10Z315574
6	6161	CATERPILLAR	Wheel Skidder	528B	8SJ00251	8Z83841
7	G68	CATERPILLAR	Wheel Skidder	528B	08Z83813	08Z83813
8	G163	CATERPILLAR	Wheel Skidder	528B	8SJ00252	8Z83839
9	G158	CATERPILLAR	Wheel Skidder	528B	8SJ00225	08Z28916
10		CLARK	Grapple skidder	120C	560H001054667F	

#	Description	Model	Serial #	
C.	SAWMILLS, EDGER, MOULDER/PLANER			
1	Wood Mizer Portable sawmill	LT70HDE30(30HP ELECTRIC MOTOR; LENGTH 20')	456C 7241 09NLB3774	To be deployed to the forest concession
2	Wood Mizer Portable sawmill	LT70HDE30(30HP ELECTRIC MOTOR; LENGTH 20')	456C724118NA8673	To be deployed to the forest concession
3	Wood Mizer Portable sawmill	LT70HDE30(30HP ELECTRIC MOTOR; LENGTH 20')	456C72416ENLB6995	To be deployed to the forest concession

D. TUGs, Barges

#	NAME	Type	ID #	Power	Dimensions	Propulsion
1	VIKING 13	Tug	326713	400 X bHP	L 70.9'; Beam 19'; Depth 7.7'	Inboard caterpillar
2	Viking 16	Tug	0000034	940 Hp		Inboard caterpillar
3	Barama 3	Barge				
4	Attila 7	barge				

E. Draglines , Excavators						
#	Item #	MAKE	TYPE	MODEL	CHASSIS #	Engine #
1	Dragline	Rustin Bucyrus	30RB	-	-	S534766
2	Excavator	Doosan		DX340		
3	Excavator	Caterpillar		320		

Chainsaws				
#	**MAKE**	**MODEL**	**CHASSIS #**	**Serial #**
1	**STIHL**	**051**		**363942711**
2	**STIHL**	**051**		**363943776**
3	**STIHL**	**051**		**363944184**
4	**STIHL**	**051**		**363946179**

ANNEX XVIII: NOTES ON GUYANA GOLD FIELDS INC.

Extracted from **Guyana Goldfields Inc.:** ***Technical Report on the Aurora Gold Mine, Guyana, South America.*** **NI 43-101** *Roscoe Postle Associates Inc*. March 31, 2020

1. INTRODUCTION

Guyana Goldfield Inc. a Canadian-based company, engaged in the exploration, development, and operation of gold deposits on a 5208ha property at Aurora, right bank Cuyuni River, Guyana, between 2015 and 2020. The Aurora Gold Mine (AGM) was constructed in 2014 and 2015. AGM is an open pit operation, feeding a Carbon-in-Pulp (CIP) plant with a capacity of 7,500 tonnes per day (tpd) for mixed saprolite and fresh rock. AGM poured its first gold in August 2015 and commercial production was declared on January 1, 2016. In 2019, the mine produced 124,000 ounces of gold in doré. In August 2020, GGI sold their operations to **Zijn Mining Group Ltd**. a multinational mining company headquartered on mainland China.

2. PROPERTY DESCRIPTION AND LOCATION

Property Location

The Mine is located at Aurora, right bank Cuyuni River, Guyana. It lies approximately 170 km west of the capital city of Georgetown and 130 km west, northwest of the town of Bartica, at the confluence of the Mazaruni River and the Essequibo River. The center of the property is located adjacent to the Cuyuni River at latitude 6°45'N, longitude 59°45'W. The Aurora district is largely uninhabited with the nearest settlement approximately 50 km away. The Mine is situated on right bank Cuyuni River and it is linked to the Buckhall Port Facility, left bank Essequibo River via a 170km road and a ferry crossing the Cuyuni River at Tapir (the Tapir Crossing). The Buckhall Port Facility and Cuyuni River properties have leases for a period of 50 years until 2063. The general area of the Mine has been subject to mineral exploration since the 1940s.

Property Description:

Description of property is as follows (as per the Aurora Mining License, 2011):

A tract of state land located in the Cuyuni Mining District No. 4 as shown on Terra Surveys Topographic Map 17NE, NW, SE, SW, at scale 1: 50,000 with reference point 'X' located at the confluence of the Abuya River and the Cuyuni River with geographical co-ordinates of longitude 59°54'3T 'W and latitude 6°46'46"N. Thence at true bearing of 90°, for a distance of approximately 8 miles 1423 yards, to point of commencement. Point A, located at geographical coordinates of longitude 59°46'55"W and latitude 6°46'43"N, thence at true bearing of 360°, for a distance of approximately 1 mile 1383 yards, to Point B, located at geographical coordinates of longitude 59°46'53"W and latitude 6°48'16"N, thence down the right bank of the Cuyuni River, for a distance of approximately 4 miles 512 yards, to Point C, located at geographical coordinates of longitude 59°43' 18"W and latitude 6°47'32"N, thence at true bearing of 135°, for a distance of approximately 3 miles 115 yards, to Point D, located at geographical coordinates of longitude 59°41 '25"W and latitude 6°45'38"N, thence at true bearing of 181°, for a distance of approximately 2 miles 1754 yards, to Point E, located at geographical coordinates of longitude 59°41 '29"W and latitude 6°43 '2"N, thence at true bearing of270°, for a distance of approximately 1 mile 1622 yards, to Point F, located at geographical coordinates of longitude 59°43'10"W and latitude 6°43'2"N, thence at true bearing of315°, for a distance of approximately 6 miles 68 yards, to the point of commencement at Point A. Thus enclosing an area of approximately 14,339 acres (~5,802ha), save and except all lands lawfully held or occupied.

3. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

Accessibility

The Aurora Gold Mine constructed a 1,200 m long runway on the right bank of the Cuyuni River which is suitable for helicopters and short-takeoff-and-landing aircraft. AGM operates charter flights several times per week from JF Correia Airport, Ogle, East Coast Demerara to the Mine site. The Mine is also accessible via a 170 km road from the Buckhall Port Facility: the road alignment initially follows the left bank Cuyuni River to a point named Tapir on left bank Cuyuni River. At Tapir, a barge or ferry allows vehicles to cross from the left bank Cuyuni River to the right bank Cuyuni River (Tapir Crossing). Tapir Crossing (lies approximately 26 km west of the Mine. Much of the existing road on left bank Cuyuni River was constructed by Barama Company Limited (Barama) for logging purposes. The last 26 km of the road (the segment on right bank Cuyuni River was built by AGM. Barama closed operations in 2016, and since then GGI has undertaken primary responsibility for the access road maintenance.

Buckhall Port Facility is the logistics hub for AGM and is located on the left bank of the Essequibo River. From Georgetown, Buckhall Port Facility is accessible by barge; alternatively, one may drive the 42 km via public highway from Georgetown to Parika, on the east bank of the Essequibo River. From Parika, the Buckhall Port Facility is accessible via boat or barge on the Essequibo River.

Climate

The Mine is situated in the forested region of Guyana. Guyana lies within the equatorial trough zone and its weather and climate are influenced by the seasonal shifts of this trough and its associated rain bands. Although one can expect rain every day in the forested region, the seasons are determined primarily by the variation in Rainfall patterns. There are two wet seasons, from April to August and from December to January, and two dry seasons, from February to April and from August to December. Average Rainfall in the forest region is 2,124 mm per annum. Relative humidity is high, ranging from 65% to 100%. Temperatures range from 22°C to 34°C year round. The humid tropical climate of Guyana is moderated by the northeastern trade winds. Exploration activities and mining operations can be conducted year-round.

Physiography

Aurora extends southeast from the Cuyuni River, which is approximately 50 meters above sea level (MASL). The area is of moderate relief and covered with dense rainforest. The hills in the Mine area reach up to an elevation of 130 m. The low-lying areas result in large swampy areas during the Rainy seasons. There are hills near the river, and a series of flat-topped hills that rise approximately 200 m above the river level to the southeast of Aurora. Small hills are also present to the southwest of Aurora and rise approximately 40 m above the river level. These hills are formed of granitic rocks and clay-rich residual deposits that are cut by streams that drain into the Cuyuni River.

4. GEOLOGY AND MINERALIZATION

a) History

Gold mineralization in the area was discovered in 1911 during the Pigeon Island gold rush (Brace well, 1949). Limited activity is reported after the gold rush until 1934, when numerous mineral

claims were staked over a three year period (1934-1937). Solar amalgamated these claims in 1938 and explored the area during 1938 and 1939. Exploration efforts during this time were primarily focused on the Mad Kiss area though gold mineralization at Aleck Hill and Walcott Hill was also identified.

b) Exploration Status

The Aurora Mineral Resources are confined within an area referred to as the Golden Square Mile (GSM). The GSM is located within a broad regional, northwest trending, and high strain zone characterized by a sub-vertical, penetrative foliation.

Exploration since GGI acquired the property has been primarily by airborne magnetic, radiometric and electromagnetic surveys, trenching and channel sampling, and, diamond drilling. Since acquisition GGI has drilled 1,591 drill holes for a total of 403,639 m. GGI owns a 100% interest in the Sulphur Rose Project located approximately 35 km from Aurora where Micon International Limited (Micon), in 2011, estimated Indicated Mineral Resources of 8.28 Mt, grading 1.04 g/t Au, containing 278,000 ounces of gold and Inferred Mineral Resources of 6.33 Mt, grading 1.42 g/t Au, containing 289,000 ounces of gold.

c) Mineral Processing

The processing plant at Aurora was commissioned in 2015 and reached commercial production in January 2016. The original plant was designed to process 5,000 tpd of mixed saprolite and fresh rock feed. The plant was expanded in two phases during 2017 and 2018 with completion of the second phase in February 2019. The first phase increased the plant throughput to 7,000 tpd fresh rock plus 1,000 tpd saprolite. The second phase of the expansion included the installation of a pre-crushing circuit. It allows the processing of mixed saprolite and fresh rock at the rate of 7,500 tpd. In 2019, the mill processed 2.66 Mt (7,296 tpd) grading 1.61 g/t Au and containing 137,850 ounces of gold. Gold recovery was 90.2% and gold recovered totaled 124,211 ounces.

The mill circuit includes:

a) Single stage primary crushing circuit utilizing a jaw crusher
b) Pre-crushing circuit including a jaw crusher and cone crusher
c) Crushed ore stockpile and re-feed bin for storage and surge management
d) 5,500 kilowatt (kW) SAG mill including a pebble crushing circuit
e) Gravity concentration circuit including centrifugal concentrator and intensive cyanide leaching of the concentrate
f) CIP circuit including five leach tanks and six carbon adsorption tanks
g) Four tonne carbon elution circuit
h) Cyanide detoxification circuit with two tanks and final tailings pumps
i) All required reagents and plant services including power station, plus water and air services

5. ENVIRONMENTAL, PERMITTING, AND SOCIAL CONSIDERATIONS

a) Permits and Authorization

All exploration programs to date were conducted under appropriate authorization, license, or equivalent control documents, which were obtained from the appropriate regulatory authority in Guyana. GGI received its Environmental Permit from the Guyana Environmental Protection Agency on September 27, 2010. The Environmental Permit was renewed and varied on October 4, 2017. The Mining License, obtained in November 2011, gives GGI the right to build and operate the Mine. At the same time the company signed a Mineral Agreement (MA) with the Government of Guyana and the Guyana Geology and Mines Commission (GGMC) which sets

the fiscal regime, taxation, and royalties as they affect the operation of the Mine. This Mining License and the MA were signed by GGI and its wholly owned subsidiary AGM Inc. (AGM) and are valid for 20 years and renewable on application for further seven year periods for as long as mining operations continue on the property.

b) Environmental Considerations

GGI contracted Ground Structures Engineering Consultants Inc. (GSEC) of Georgetown, Guyana in 2005 to begin baseline environmental and social investigations. In April 2007, an initial Environmental and Social Baseline Report was prepared. As part of the preliminary environmental survey, baseline data was collected for the physical, biological, and socio-cultural environments, including field surveys for water quality, flora, and fauna. In addition, baseline data was collected in May 2009 and public consultation was conducted as part of an environmental and social report that was submitted to the Guyanese authorities on June 1, 2009 as part of the application process for a mining license.

An Environmental and Social Impact Assessment (ESIA) has been completed in line with the International Finance Corporation's (IFC) Performance Standards (PS) on Social and Environmental Sustainability. To date, no significant social or environmental issues have been identified. In February 2020, the Mine submitted an ESIA as required by the underground construction permit.

All activity at the Mine has been conducted under appropriate authorization, license, or equivalent control documents that were obtained from the appropriate regulatory authorities in Guyana. Additionally, GGI is committed to international industry best practices, as specified by the IFC, and the International Cyanide Management Code (ICMC). RPA is not aware of any environmental liabilities on the property. The Mine has all required permits to conduct the proposed work on the property. RPA is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the property.

GGI is committed to environmental and social practices that comply with the legal and regulatory requirements of the Co-operative Republic of Guyana (Guyana), applicable IFC Standards, Guidelines, and Procedures, and the International Cyanide Management Code (ICMC).

The EPA issued the current Environmental Permit on October 4, 2017. The permit is valid for five years until September 30, 2022. The permit was issued based on an Updated ESIA completed by Ground Structures Engineering Consultants (GSEC) in 2015. The ESIA reported the results of numerous Environmental and Social Baseline Studies that were conducted at the Aurora sites as early as 2006.

In February 2019, the EPA issued a Construction Permit for the Exploration Mine Decline. As required by a condition of this permit, a revised ESIA, including expansion of the decline and the underground mine, was prepared by GCEC and submitted to the EPA in February 2020.

The key conclusion of the Environmental Baseline Studies is that the environment in the Aurora Area of Influence (AOI) has been impacted by artisanal and small scale mining (ASM), logging, hunting, and other human activities for over a century. This conclusion is supported by the fact that large species of fauna that are common in similar pristine habitats were not observed or were rarely observed. The water quality in the Cuyuni River and tributaries is impacted by high concentrations of total suspended solids, mercury, and other contaminants associated with

ASM activities particularly in Venezuela. Waste rock is not expected to result in Acid Rock Drainage (ARD) Metal Leaching so the rock is classified as non-acid generating (NAG).

Aurora's Environmental Management System (EMS) was developed to support effective ESHS performance associated with mining activity, while also contributing to overall sustainability. Aurora's EMS was also developed to align with the IFC Performance Standards and applicable EHS guidelines.
Due to the remote location, the Mine is not legally bound to actively participate in social and community requirements, however, they are very active in supporting numerous communities and charities in Guyana.

6. LAND TENURE

GGI owns 100% of the Mine covering a total area of 5,802 ha. The former prospecting license (the A1 License), which was granted in 2004, was replaced by a Mining License (ML/G1) in November 2011, which gives GGI the right to build and operate the Mine. The shape of the Mining License trends approximately southeast-northwest, south of the Cuyuni River. The northern edge of the Mining License follows the right bank of the Cuyuni River; all other edges are straight and are defined by six corner points, which are listed in Table 1.

TABLE 1 Corner Points of Mining License: Guyana Goldfields Inc. – Aurora Gold Mine

Corner Point ID	Latitude	Longitude
A	6°46'43"N -	59°46'55"W
B	6°48'16"N -	59°46'53"W
C	6°47'32"N -	59°43'18"W
D	6°45'38"N -	59°41'25"W
E	6°43'02"N -	59°41'29"W
F	6°43'02"N	59°43'10"W

GGI has confirmed that the mineral tenure and surface rights as well as access and permitting issues of the Mine have been reviewed and were found to be in good standing by independent legal counsel.

The Mining License confers upon AGM the right to operate a large-scale mining operation. The Mining License is valid for an initial 20-year term commencing November 18, 2011, with provisions for a seven-year extension on application by AGM.

Prospecting Licenses contiguous with Guyana Goldfields Inc. AGM's ML/G1 mining license are set out in Table 2.

Table 2 Prospecting Licenses Contiguous with the Aurora Gold Mine's Ml/G1 Mining License

PL	Name Held by	Area (ha)	Grant Date	Status
G-188	Alligator Creek GGI	2,209	20-Apr-15	Pending Renewal
G-189	Akaiwong GGI	4,014	20-Apr-15	Pending Renewal
G-190	Akaiwong GGI	4,832	20-Apr-15	Pending Renewal
G-191	Akaiwong GGI	4,654	20-Apr-15	Pending Renewal
G-204	Alligator Creek GGI	2,592	20-Apr-15	Pending Renewal
Total		**18,301**		

7. UNDERLYING AGREEMENTS

GGI acquired its interest in the Mine in accordance with an agreement dated May 20, 1998 between GGI and Mr. Alfro Alphonso. GGI was originally required to make annual advance royalty payments to Mr. Alphonso in the aggregate of US$225,000 per year during the three year period following the commencement of commercial production, and to pay an additional 2% net smelter royalty (NSR) to Mr. Alphonso thereafter. On March 18, 2004, the original agreement was amended, pursuant to which GGI agreed to pay Mr. Alphonso an annual fee of US$100,000 for as long as GGI maintains an interest in the Mine, up to a maximum of US$1,500,000.

8. PROJECT INFRASTRUCTURE

The Mine is located in a remote area with no local services and must be self-sufficient in all matters. The Mine facilities include:

a) Camp, dining, recreation, and health services
b) Airstrip and passenger area
c) Site access roads
d) Communications systems and internet
e) Solid refuse disposal area and incinerators
f) Secure explosives storage area
g) 16 MW (nominal) diesel powered generating plant and site power distribution system
h) Offices for mine, mill, and administration
i) Maintenance shops
j) Assay laboratory
k) Tailings management area
l) Fresh and mine water ponds
m) 170 km access road to Buckhall Port Facility
n) River barge at the Tapir Crossing of the Cuyuni River
o) Extensive fleet of surface support equipment
p) River port facility at Buckhall including
    a. Dock and barge landing area
    b. Camp
    c. Offices
    d. Shops
    e. Fenced storage area
    f. Fuel storage tanks
    g. Maintenance shops
    h. Equipment storage

Basic supplies are available in Georgetown, which has a population of approximately 240,000. The city is located approximately 40 km east of the Buckhall Port Facility. Access to the site is primarily by barge and road or air. Equipment and supplies entering the site clear customs at Georgetown and are transshipped by barge to the Buckhall Port Facility and then by 170 km long road to site.

ANNEX XIX: NOTES RE RLSS' BIODIVERSITY RESERVE

1.0 Choice of Location of Biodiversity Reserve

The area of 19,779ha designated as RLSS' biodiversity reserve is situated on left bank Puruni River. The area was selected based on its accessibility and its diversity in topographic conditions. The area can be easily accessed via the Kumung-Kumung access road junction with the Kartabu -Pappy show road, west of Puruni Crossing, the said junction having approximate UTM Coordinates 21N 199400, 687300, thence northerly to Kumung-Kumung Village, left bank Kumung -Kumung River and right bank Puruni River; thence across the Puruni River to its left bank. At a point on left bank Puruni River, where there is a shop, having UTM Coordinates of 21N 0192845, 0696055, there is an old trail heading north through the reserve.

2.0 Description of Area

Left Bank Mazaruni River, left bank Puruni River:

-Commencing at the mouth of an unnamed tributary on left bank Puruni River, having UTM Coordinates 21N 183600, 699940; thence up the left bank of the said unnamed tributary to a point near its source, the said point having UTM coordinates 198000, 701940; thence by a cut line in a north easterly direction for about 800m to a point near the source of an unnamed tributary on left bank Puruni River, the said point having UTM Coordinates of 198650, 702275; thence down right bank of the said unnamed tributary to it mouth on left bank Puruni River, having UTM Coordinates 211000; thence up left bank Puruni River to the mouth of an unnamed tributary, on its left bank, at a point having UTM Coordinates 21N 183600, 699940, the point of commencement; the said area described having about 19,799 ha and a perimeter of 97.673km.

3.0 Demarcation of Biodiversity Reserve

The entire reserve perimeter boundary has a length of 97.673 km, comprising 0.8km of cut lines and 96.873km of riverine boundaries. The cut line will be demarcated on the ground within two weeks of RLSS' acquisition of a TSA: RLSS will post a total of six (6) signs (see Figure 1) along the boundary and trails within the reserve.

Figure 1: Standard Signboard for the Biodiversity Reserve

4.0 Baseline Information

a) Topography

The area is very hilly: two ridges are prominent, one on the western side of the Reserve with altitude up to 800' (~244m) and the other, on the eastern side with altitude reaching 1,100ft (~335m).

b) Hydrology

Most of the reserve area is drained via rivers on its northern side via the large unnamed tributaries of the Puruni River that form the northern boundary of the reserve as well as tributaries forming the source of the Tumeng River, right bank Cuyuni River-the said Tumeng

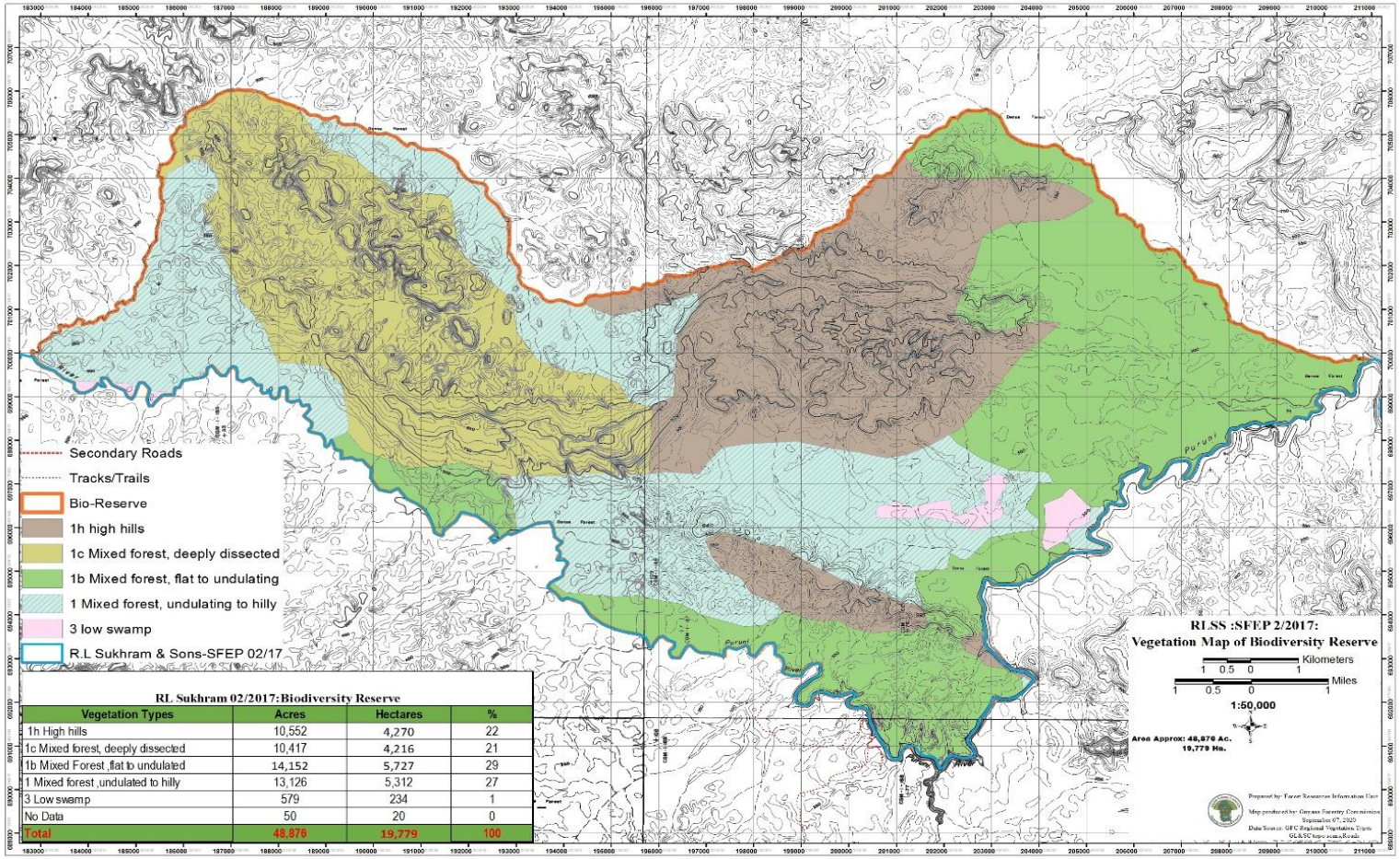


Figure 2: Map of SFEP 02/22017 showing the diversity of forest types within the Biodiversity Reserve

River being a tributary of Kartuni River and forming the boundary between Compartments 4 and 5. In addition, the southern side of the reserve is drained by about twenty-seven (27) small tributaries on left bank Puruni River.

c) Fauna

RLSS is still engaged in wildlife surveys of the Biodiversity reserve. RLSS has deployed trail cameras at various points on the concession area and the same methodology will be followed in the biodiversity reserve. Meanwhile hunters and miners in the area have provided RLSS' consultants with especially useful information which will be validated in September-October 2020.

Mammals. Hunters and miners have reported frequent sightings of pumas (*Puma concolor*) and tapir (*Tapirus terrestris*) in the higher terrain of the area. Other common animals reported are red brocket deer (*Manzama americana*), wild hogs (*Tayassu tajacu* & *Tayassu pecari*), labba *(Cuniculus paca*), armadillo (*Dasypus novemcinctus*), ant eater (*Cyclopes didactylus*), Tyra (*Eira barbara*) and agouti (*Dasyprocta leporina*). (During a site visit to the reserve, consultants observed numerous tracks of tapir, deer, and peccaries). Miners have reported sightings of capybara (*Hydrochoerus hydrochaeris*) in the swampy areas along the Puruni River. Common arboreal animals reported include spider monkeys (*Ateles paniscus*), baboons (*Alouatta seniculus)*, capuchin monkeys (*Cebus appella*) and sloths (*Bradypus spp*). A diversity of **bats**, including the vampire bat (*Desmodas rotundus*) have been reported.

Common species of fish reported include stingray (*Potamotrygon spp*), Daray (*Leporinus spp*) Haimara (*Hoplerythrinus unitaeniatus*), Patwa (*Chaetobranchus flavenscens*) and Black Perai (*Serrasalmus rhombeus*).

For birds, miners and hunters in the area have reported numerous and frequent sightings of powis (Crax alector), warakabra (*Psophia crepitans*) macaws (*Ara spp)*, parrots (*Amazona spp*.), woodpeckers (*Celeus spp*.), toucans (*Ramphastos spp*.), Screaming Piha (*Lipaugus vociferans*) vultures *(Sarcoramphus papa*; *Coragyps atratus*), roadside hawks (*Rupornis magnirostris)* and owls (*Megascops choliba).*

Reptiles reported for the area include an array of lizards (Plica spp), snakes such as Labaria *(Bothrops atrox),* yellow foot turtles *(Geochelone denticulata)* and caimans *(Melanosuchus niger).*

(A large diversity of insects and amphibians respectively have been observed. RLSS will relate more details on these in its ESIA Report)

d) Vegetation

The forests in the reserve have never been logged at a commercial scale. Miners and shop owners have been routinely felling trees for basic domestic or mining infrastructure needs for itinerant miners, and for road works -corduroy, culverts & bridges.

Five forest types characterize the area (see Table 1, Figure 2), one of the primary reasons for the choice of the area. Mixed forests dominated by *Eschweilera, Swartzia, Dicymbe*, and *Mora gonggrijpii* dominate the area. Dry evergreen forests are virtually absent from the area although indicative species such as Eperua, Alexa, Hymenea, Catostemma, and Ormosia, typical of white sands and to some extent brown sands are well distributed across the area. Swamp and marsh forests are relatively insignificant.

During site visits, mixed forests on lateritic soils were the main forest types recorded; the main species with dbh >30cm were Aromata (*Clathrotropis sp*.), Morabukea (*Mora gonggrijpii*), Black Kakaralli (*Eschweilera spp*), Kabukalli (*Goupia glabra*) and Purpleheart (*Peltogyne pubescens*).

Palms observed in the reserve include *Astrocaryum spp*, *Attalea spp*., *Euterpe spp*., *Manicaria spp*., and *Mauritia spp*. Common lianas there include *Bauhinia spp*, *Clusia spp*., *Ficus spp*., and *Heteropsis spp.*

In disturbed areas and gaps, *Cecropia*, *Vismia* and *Scleria* are abundant over small areas.

#	Vegetation type	Area (ha)	%	Remarks
1	1 Mixed forest on undulating to hilly terrain	5,312	27	*Catostemma spp., Eschweilera spp, Mora gonggrijpii , Swartzia spp., Licania, Clathrotropis spp.*
2	1b Mixed forest, on flat to undulating terrain	5,727	29	*Catostemma spp., Eschweilera spp, Mora gonggrijpii , Swartzia spp., Licania, Clathrotropis spp., Goupia glabra, Licania spp.*
3	1c Mixed forest on deeply dissected terrain	4,216	21	*Catostemma spp., Eschweilera spp, Mora gonggrijpii , Swartzia spp., Licania, Clathrotropis spp.*
4	1h Mixed forest on high hill (non-productive)	4,270	22	*Catostemma spp., Dicymbe sp., Eschweilera spp, Mora gonggrijpii , Swartzia spp., Licania, Manilkara bidentata, Clathrotropis spp.*
5	3 Low swamp (non-productive)	234	1	*Tabebuia insignis, Symphonia sp., Pterocarpus spp, Carapa guianensis, Mora excelsa, Terminalia sp.*
6	No data (non-productive????)	20	0	

e) Land use

RLSS estimates that currently about 40 persons, comprising miners and hunters, either live on or traverse the reserve area on a regular basis. Many miners have cultivated small areas with pepper, cucumber, papaya, thyme, and pumpkin.

Small scale, Itinerant mining is the major land use within the area currently. (The area falls within *Mining District #3* and residents at Kumung-Kumung reported that staffs of GGMC, based at Puruni Landing, routinely patrol the area). However, the extent of mining is not widespread, apparently confined to the margins of the left bank Puruni River no doubt due to the nature of the terrain which mitigates against the use of heavy-duty machines. At least 30 km of road have been constructed in the western part of the concession and the area of *active mining* is about 100ha (0.5% of the area of the biodiversity reserve).

5.0 Research/Management

RLSS will do whatever it can to conserve the biodiversity and landscapes embodied in the forest reserve. RLSS will support any ecological type research approved by the EPA and the GFC. RLSS has specific interest in conserving waterways and the rehabilitation of areas degraded due to mining. Finally, RLSS will attempt to document the folklore that generated the description 'haunted' for the area.

ANNEX XX: QUARTERLY MONITORING CHECKLIST-RLSS

1.0	**BASECAMP**		
1.1	**Office**		
1.1.1	Copy of current FMP Available	☐Yes	☐NO
1.1.2	Copy of AOP, CY- available	☐Yes	☐NO
1.1.3	Copy of COP available	☐Yes	☐NO
1.1.4	Stock maps – CYTD available	☐Yes	☐NO
1.1.5	Register re road construction, maintenance -CYTD	☐Yes	☐NO
1.1.6	Register re 100% forest inventory- CYTD	☐Yes	☐NO
1.1.7	Register re skid trail construction- CYTD	☐Yes	☐NO
1.1.8	Register re production output-CYTD	☐Yes	☐NO
1.1.9	Register of monitoring patrols/reports -updated	☐Yes	☐NO
1.1.10	Register of correspondence with the Police-updated	☐Yes	☐NO
1.1.11	Register of correspondence with GGMC, GGMDA-	☐Yes	☐NO
1.1.12	Register of correspondence with regional authorities	☐Yes	☐NO
1.2	**Personnel Records Available/Updated**		
1.2.1.	*Staffs*		
1.2.1.1	Updated lists of employees	☐Yes	☐NO
1.2.1.2	Copies of Employment Contracts	☐Yes	☐NO
1.2.1.3	Remuneration Records	☐Yes	☐NO
1.2.1.4	Leave register	☐Yes	☐NO
1.2.1.5	Register of disciplinary memos	☐Yes	☐NO
1.2.1.6	Register of briefing sessions/meetings	☐Yes	☐NO☐
1.2.1.7	Register of PPE issued to staffs	☐Yes	☐NO
1.2.2	*Contractors*		
1.1.2.1	Updated lists of employees	☐Yes	☐NO
1.1.2.2	Copies of employment contracts	☐Yes	☐NO
1.1.2.3	Remuneration Records	☐Yes	☐NO
1.1.2.4	Copies of minutes of meetings between RLSS x CNTR	☐Yes	☐NO
1.3	**Documentation Available/Updated**		
1.3.1	*Documentation-GFC*		
1.3.1.1	Copies of correspondence with GFC	☐Yes	☐NO
1.3.1.2	Register of tags received CY	☐Yes	☐NO
1.3.1.3	Register of removal permits-CY	☐Yes	☐NO
1.3.1.4	Register of visits-GFC staffs-CY	☐Yes	☐NO
1.3.2	*Documentation-EPA*		
1.3.2.1	Copy of environmental permit	☐Yes	☐NO
1.3.2.2	Copies of recent RLSS environmental reports	☐Yes	☐NO
1.3.2.3	Register EPA correspondence	☐Yes	☐NO
1.3.3.3	Register of visits-EPA staffs	☐Yes	☐NO
1.3.3.4	Copies of monthly water quality analysis-CYTD	☐Yes	☐NO
1.1.3.5	Copies of monthly air quality analysis-CYTD	☐Yes	☐NO
1.3.3	*Documentation-Community Liaison*		
1.3.3.1	Register of sightings of mammals kept	☐Yes	☐NO
1.3.3.2	Listing 'visitors' to RLSS' base camp, forward camp	☐Yes	☐NO
1.3.3.3	Minutes of meetings with stakeholders	☐Yes	☐NO
1.3.3.4	Register of technical or material support provided/CSR	☐Yes	☐NO

2.0	**BASE CAMP ENVIRONS**		
2.1	Signage and advisory notices in place	☐Yes	☐NO
2.2	Litter bins in place	☐Yes	☐NO
2.3	Firefighting tools in place	☐Yes	☐NO
3.0	**MEDEX/STORES**		
3.1	Basic OTC drugs available	☐Yes	☐NO
3.2	Malaria testing kits available	☐Yes	☐NO
3.3	Register of referrals (to Bartica Hospital?)	☐Yes	☐NO
3.4	Register of participation in MOPH outreaches	☐Yes	☐NO
4.0	**MECHANICAL WORKSHOP**		
4.1	***Workshop Hygiene, etc.***		
4.1.1	Firefighting tools available, functional	☐Yes	☐NO
4.1.2	Lighting adequate	☐Yes	☐NO
4.1.2	Warning notices re OSH posted	☐Yes	☐NO
4.1.3	Waste management bins available	☐Yes	☐NO
4.1.4	Electrical installations in order/intact	☐Yes	☐NO
4.1.5	Plumbing installations in order/intact	☐Yes	☐NO
4.2	**Vehicles & Equipment**		
4.2.1	*Stationary equipment (Generators, etc.).*		
4.2.2.1	Service records up to date/available	☐Yes	☐NO
4.2.2	*Vehicles*		
4.2.2.1	Seat belts present, functional	☐Yes	☐NO
4.2.2.2	Manual for all vehicles in a secure place	☐Yes	☐NO
4.2.2.3	Logbooks on vehicle	☐Yes	☐NO
4.2.2.4	Service records per machine available	☐Yes	☐NO
4.2.2.5	Lights, horns, brakes functional -all vehicles in use	☐Yes	☐NO
4.2.2.6	Rotating amber lights (HD Vehicles) functional?	☐Yes	☐NO
5.0	**SAWMILL**		
5.1	Litter bins in place	☐Yes	☐NO
5.2	Firefighting tools in place, functional	☐Yes	☐NO
5.3	Lighting fixtures functional	☐Yes	☐NO
5.4	Systems for eliminating waste wood functional	☐Yes	☐NO
5.5	Electrical installations intact, functional	☐Yes	☐NO
5.5	Plumbing installations intact, functional	☐Yes	☐NO
6.0	**LOG YARD**		
6.1	Advisory, warning signs in place	☐Yes	☐NO
6.2	Litter bins placed at designated locations	☐Yes	☐NO
6.3	All water drainage structures functional	☐Yes	☐NO
7.0	**LUMBER YARD**		
7.1	Advisory, warning signs in place	☐Yes	☐NO
7.2	Litter bins placed at designated locations	☐Yes	☐NO
7.3	All water drainage structures functional	☐Yes	☐NO

8.0	**FUEL BOND**		
8.1	Advisory, warning signs in place	☐Yes	☐NO
8.2	Litter bins placed at designated locations	☐Yes	☐NO
8.3	All pipes, valves & hoses intact	☐Yes	☐NO
9.0	**FORWARD FIELD CAMPS**		
9.1	***Personnel***		
9.1.1	List of staffs at camp available	☐Yes	☐NO
9.1.2	All field operatives have PPE	☐Yes	☐NO
9.1.3	All staffs have mosquito nets	☐Yes	☐NO
9.2	***Camp hygiene***		
9.2.1	Routine testing of water quality/results available	☐Yes	☐NO
9.2.2	Litter bins available/designated waste disposal sites	☐Yes	☐NO
9.2.3	Designated waste disposal sites duly marked	☐Yes	☐NO
9.2.4	Toilet facilities at least 100m from water courses	☐Yes	☐NO
9.2.4	Firefighting kits available	☐Yes	☐NO
9.2.5	First aid kits available	☐Yes	☐NO
9.2.6	Flammable substances are stored properly	☐Yes	☐NO
9.2.7	Site drainage adequate	☐Yes	☐NO
9.3	***Documentation/Maps***		
9.3.1	Copy of AOP available	☐Yes	☐NO
9.3.2	Copy of COP available	☐Yes	☐NO
9.3.3	Stock maps available	☐Yes	☐NO
9.3.4	Compartment map available	☐Yes	☐NO
10.0	**RANDOMLY SELECTED LOGGING AREAS**		
10.1	***LOGS***		
10.1.1	Skid trail Instructions of planning team followed	☐Yes	☐NO
10.1.2	Stump height within legal limits	☐Yes	☐NO
10.1.3	All logs extracted	☐Yes	☐NO
10.1.4	Tagging protocols followed	☐Yes	☐NO
10.1.5	Documentation/GFC requirements complete	☐Yes	☐NO
10.2	***Buffer zones***		
10.2.1	Buffer zones respected	☐Yes	☐NO
10.3	Proximity distances	☐Yes	☐NO
10.3.1	Proximity distance respected	☐Yes	☐NO
10.4	***Log market***		
10.4.1	Site drained	☐Yes	☐NO
10.4.2	All logs removed as scheduled	☐Yes	☐NO
11.0	**FOREST ROADS**		
11.1	Signage legible and at the designated locations	☐Yes	☐NO
11.2	Side drains maintained	☐Yes	☐NO
11.3	Main carriageway well drained	☐Yes	☐NO
11.4	Buffer zones in the vicinity of creeks and rivers maintained	☐Yes	☐NO
11.5	No unnecessary debris on forest roads	☐Yes	☐NO
11.6	No evidence of animals killed by RLSS' vehicles	☐Yes	☐NO
11.7	No unauthorized structures at roadside	☐Yes	☐NO
11.8	Documentation on roads constructed, maintained available	☐Yes	☐NO

ANNEX XXI: SUMMARY RESULTS FOR SOCIAL SURVEYS CONDUCTED AT THE KARTABU TRIANGLE MARCH 1-4, 2021.

FORESTRY TRAINING CENTRE INCORPORATED

A. Introduction

FTCI conducted a social surveys within the Kartabu Triangle during period March 1-4, 2021. The activity was delayed for more than one year due primarily to restrictions linked to the COVID-19. Pandemic. The communities targeted will not be impacted directly by RLSS' concession based operations, situated more than 120km away; however RLSS' log flows between the concession area and its log depot at Pine Tree Landing will include major segments of the KPR. Also, both Kartabu and Batavia are in close proximity to RLSS' proposed log transshipment facility at Pine Tree Landing.

Barama Company Ltd. ran a similar log depot and wharf facilities at Pine Tree Landing and residents of Batavia and of Kartabu did not register any complaint with the GFC or regional officials.

In the course of the survey, considerable care was taken to minimize interpersonal contact with interviewees to the maximum extent possible; consequently, hand sanitization and the use of masks were standard practices.

B. Methodology

In order to reach as many people as practicable in the shortest possible time, a five-person team visited the area during period March 1-4, 2021. The team was based in Bartica and used a boat to visit the three riverine communities, targeting one of the three communities each day.

The first order of business on March 1, 2021 was to make as many appointments as possible, especially for Batavia Amerindian Village and Kartabu Village. Appointments were also made with Regional Officials at Bartica.

Interviews were done via one to one meetings with residents; a few regional officials in Bartica were interviewed by phone following earlier appointments.

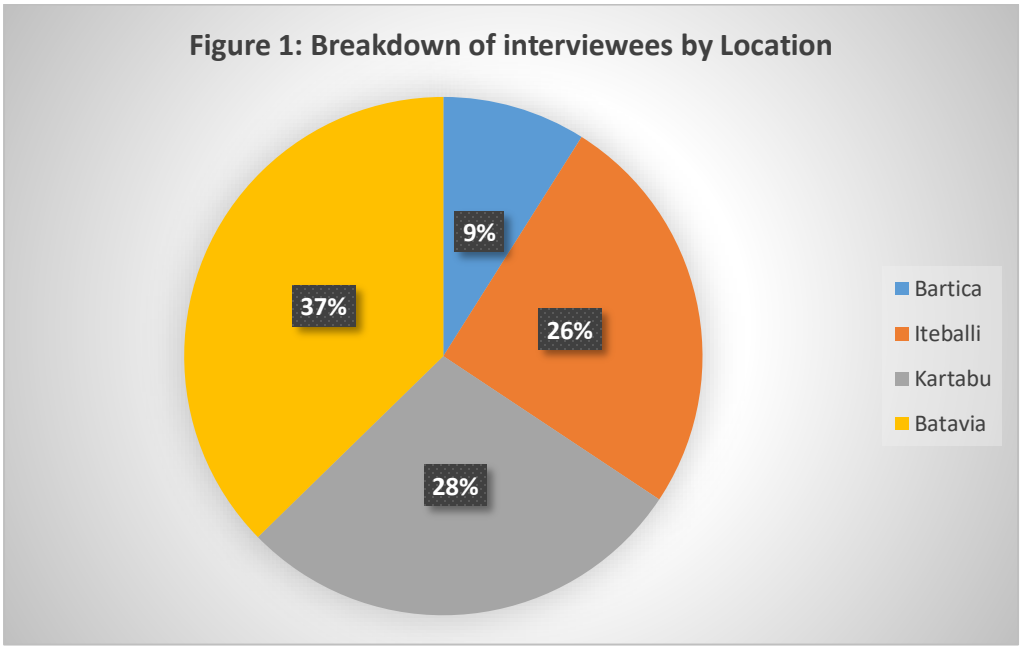
For one to one meetings, FTCI used a general questionnaire (see Annex II). The consultants explained briefly the nature of RLSS project and the reasons for soliciting feedback from residents. Specifically, the interviewees were advised that RLSS' concession area is about 120km west of the villages in the Kartabu Triangle and that RLSS will not be sending its vehicles to Iteballi, as is the case with the other large loggers in the Kartabu Triangle.

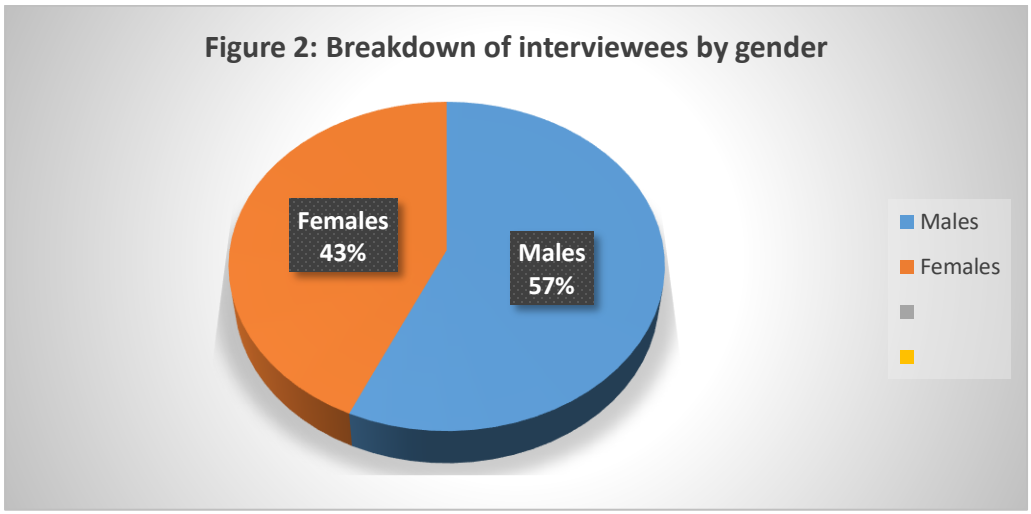
Although forms were used for a consistency in the respective interviews, residents were encouraged to provide their own views about the general impact of logging on their livelihoods. The team also provided each interviewee with their contact numbers in the event that they wanted to contribute additional information at a later post-interview date.

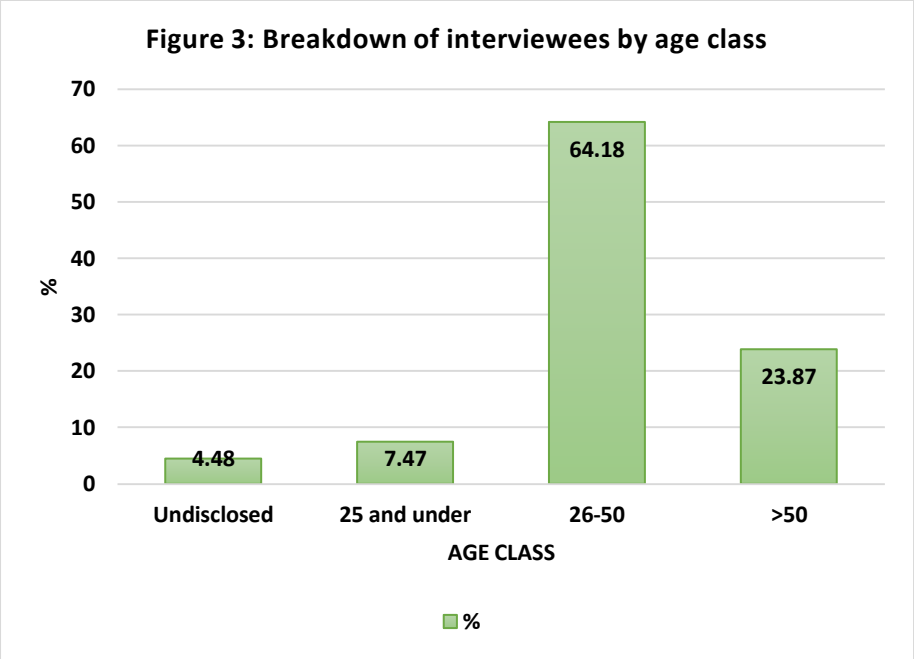
C. Core Results

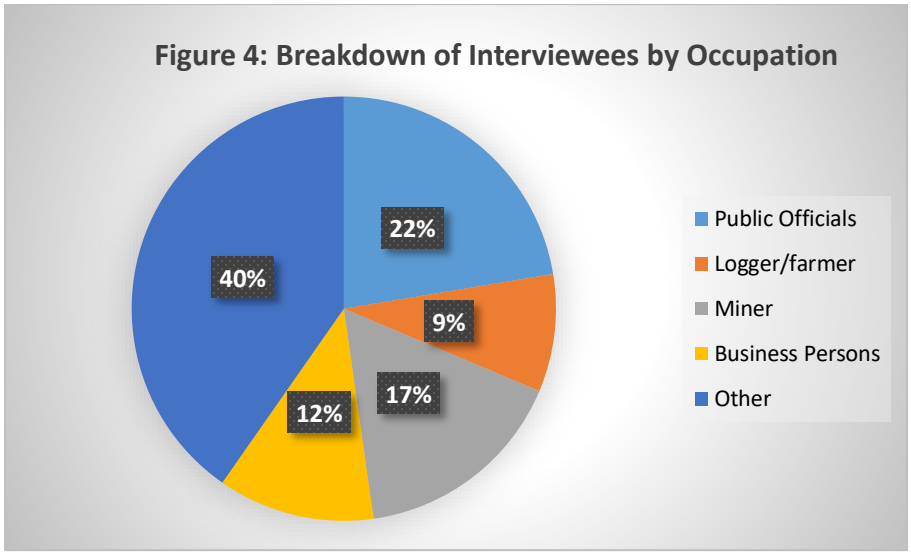
A total of 67 persons were interviewed with just 3 persons (4.5%) declining to give their names (see Annex A). The response from public officials was exceptional and the team was able to speak to the Regional Chairman-Region 7, representatives of NIS (Bartica) and staffs of the Bartica regional hospital

The overall response to the survey was encouraging and there was satisfactory diversity in the interviewees. Figure 1 shows the interviewees by location, Figure 2 shows the relative gender mix of the interviewees, Figure 3 shows the interviewees by age group and Figure 4 shows the interviewees by occupation.









There were three main concerns recorded:

a) Residents at Kartabu Point believes that water flowing past Iteballi Waterfront to Kartabu Point is tainted with rotting bark. This is a general cause for concern but RLSS will not be storing logs there

b) Trucks traversing Iteballi create a major dust nuisance for residents: although trucks carrying timber were mentioned, the fact is that the mining community also use heavy trucks that traverse the community due to the ferry crossing there.

c) Residents want their residents who are employed with loggers to have fixed pay dates for their remuneration. This concern also relates to their NIS payments.

D. Discussion

The commercial sector at Iteballi is expanding rapidly, while housebuilding projects at Iteballi and at Batavia are also expanding rapidly. Residents of Kartabu and Batavia cherish their quiet lifestyles

The team paid careful attention to the views of residents. Unlike 'residents' of other areas in the Kartabu Triangle, the residents of the three communities **live** there and are not inclined to migrate. (In the case of other communities, the residents treat their 'communities' as work places, and they actually live outside the Kartabu Triangle, at Bartica, Linden or coastal locations.

Overall, everyone is looking forward to more employment opportunities in the area, especially for females, since none of the residents want to migrate from their villages.

None of the interviewees in Bartica, Kartabu and Iteballi gave any particular opinion about RLSS' proposed logging operations; many are aware of planned timber harvesting discussions in other forest concessions west of Puruni River because, unlike RLSS, those concessionaires have been making inquiries about space at the waterfront at Iteballi (for lease, rental or even sharing facilities with existing holders of timber depots there).

It also emerged that many loggers had done 'consultations' at Iteballi and Kartabu and not all commitments given were eventually honoured.

E. Main recommendations/conclusions

In view of the surge in business over the last ten years, and residents' disposition to invest more in the community, the authorities need to start paying attention to the strategic planning of Iteballi Village.

RLSS will employ and train youth from all communities in the area. RLSS will contribute to ongoing education and youth welfare initiatives at Iteballi and Kartabu Point. RLSS already enjoys a business relationship with Batavia Amerindian Village and this will be strengthened.

In view of the proximity of RLSS' Pine Tree Landing facility to Batavia Village as well as the western part of Kartabu Village, RLSS will avoid working after 18:00 hours. In addition, in line with the religious preferences of Batavia, work will be suspended on either Saturday or Sunday.

Annex A: List of Persons Interviewed during Social Surveys-Kartabu Triangle-March 1-5, 2021

#	Name of Interviewee	Occupation	Gender	Age	Community / Location	Engagement	
						Mode	Date
1	LEON CRAWFORD	Police Officer	M	29	Bartica	Meeting	05-Mar-21
2	SHERRY LEWIS	Nurse	F	47	Bartica	Meeting	05-Mar-21
3	KAREN PRATT	Office Supervisor	F	47	Bartica	Meeting	05-Mar-21
4	KEVIN PERREIRA	Forest Ranger	M	38	Bartica	Telephone	05-Mar-21
5	KENNETH WILLIAMS	Regional Chairman	M	48	Bartica	Telephone	05-Mar-21
6	Anonymous	Doctor	F	NIL	Bartica	Telephone	05-Mar-21
7	COLEEN SINGH	Pastor/Village Chairman	F	50	Iteballi	Telephone	02-Mar-21
8	GARFIELD GIBSON	Boat Captain	M	36	Iteballi	Meeting	02-Mar-21
9	CARL GILFORD	General Assistant	M	64	Iteballi	Meeting	02-Mar-21
10	ANONYMOUS	Mines officer	M	37	Iteballi	Meeting	02-Mar-21
11	TREVON CUDJOE	Forest Ranger	M	NIL	Iteballi	Meeting	02-Mar-21
12	MOHAMED BAKSH	Miner	M	44	Iteballi	Meeting	02-Mar-21
13	RICHARD CREEM	Miner	M	64	Iteballi	Meeting	02-Mar-21
14	JIMMY	Mechanic	M	41	Iteballi	Meeting	02-Mar-21
15	MARCELL JEFFERY	Self-employed	F	23	Iteballi	Meeting	02-Mar-21
16	ROBINARA	Maintenance Supervisor	M	56	Iteballi	Meeting	02-Mar-21
17	ORIN RENAE	Construction worker	M	55	Iteballi	Meeting	02-Mar-21
18	RANDY WADE	Security	M	46	Iteballi	Meeting	02-Mar-21
19	MARK THOMAS	Captain	M	28	Iteballi	Meeting	02-Mar-21
20	AMANDA JONES	Businessman	F	25	Iteballi	Meeting	02-Mar-21
21	SHAWN DANIELS	Community Health Worker	M	19	Iteballi	Meeting	02-Mar-21
22	MARK DE FREITAS	Manager	M	44	Iteballi	Meeting	02-Mar-21
23	SUZANA ASAN	Business person	F	28	Iteballi	Meeting	02-Mar-21
24	FARIDA DA SILVA	Business person	F	64	Kartabu	Meeting	03-Mar-21

#	Name of Interviewee	Occupation	Gender	Age	Community / Location	Engagement	
						Mode	Date
25	MARRISA CREAME	Community Health Worker	F	27	Kartabu	Meeting	03-Mar-21
26	NATESHA GOUVEIA	Shop Assistant	F	24	Kartabu	Meeting	03-Mar-21
27	ANONYMOUS	Logger	M	35	Kartabu	Meeting	03-Mar-21
28	SANDRA WILLIAMS	Housewife	F	56	Kartabu	Meeting	03-Mar-21
29	BEVERLY MC CURDY	Housewife	F	50	Kartabu	Meeting	03-Mar-21
30	RONDA FREEMAN	Housewife	F	35	Kartabu	Meeting	03-Mar-21
31	LISA	Teacher	F	27	Kartabu	Meeting	03-Mar-21
32	WILLIAM MC INTYRE	Miner	M	57	Kartabu	Meeting	03-Mar-21
33	CECELIA CORNELIUS	Business person	F	44	Kartabu	Meeting	03-Mar-21
34	JUNE WILLIAMS	Business Person	F	40	Kartabu	Meeting	03-Mar-21
35	CECIL DA SILVA	Businessman	M	72	Kartabu	Meeting	03-Mar-21
36	SAMANTHA PERSAUD	Community Support Worker	F	32	Kartabu	Meeting	03-Mar-21
37	CARLA LAWLIST	Community Health Worker	F	33	Kartabu	Meeting	03-Mar-21
38	LLOYD WILLIAMS	Village Chairman/Farmer/Logger	M	44	Kartabu	Meeting	03-Mar-21
39	ANNETTA STRAUGHT	Housewife	F	45	Kartabu	Meeting	03-Mar-21
40	ARLAN WILLIAMS	MINER	M	54	Kartabu	Meeting	03-Mar-21
41	MARK WILLIAMS	Miner	M	32	Kartabu	Meeting	03-Mar-21
42	REUBEN STRAUGHT	Miner	M	45	Kartabu	Meeting	03-Mar-21
43	VANESSA BOYAL	Housewife	F	42	Batavia	Meeting	04-Mar-21
44	AUDREY RODRIGUES	Housewife	F	29	Batavia	Meeting	04-Mar-21
45	DIANE THOMAS	Housewife	F	43	Batavia	Meeting	04-Mar-21
46	DONNA BOYAL	Self-employed	F	29	Batavia	Meeting	04-Mar-21
47	GENE ANITA	Logger/Farmer/Hunter	M	NIL	Batavia	Meeting	04-Mar-21
48	ELON WILLIAMS	Boat Captain	M	31	Batavia	Meeting	04-Mar-21
49	VALDA FERREIRA	Teacher	F	45	Batavia	Meeting	04-Mar-21
50	JACINTHA THOMAS	Housewife	F	28	Batavia	Meeting	04-Mar-21
51	FELIX GOMES	Pastor/farmer	M	65	Batavia	Meeting	04-Mar-21

#	Name of Interviewee	Occupation	Gender	Age	Community / Location	Engagement	
						Mode	Date
52	SOFIA PHILLIPS	Housewife	F	29	Batavia	Meeting	04-Mar-21
53	SUBRINA	Housewife	F	24	Batavia	Meeting	04-Mar-21
54	ROY PRINCE	Labourer	M	56	Batavia	Meeting	04-Mar-21
55	MALITA WILLIAMS	Self-employed	F	33	Batavia	Meeting	04-Mar-21
56	BEVON CREAME	Housewife	F	32	Batavia	Meeting	04-Mar-21
57	FITZROY MC WATT	Businessman	M	68	Batavia	Meeting	04-Mar-21
58	PAUL REEVERS	Boat Captain	M	38	Batavia	Meeting	04-Mar-21
59	BRYAN	Logger	M	41	Batavia	Meeting	04-Mar-21
60	RYAN JOSEPH	Community Health Worker	M	34	Batavia	Meeting	04-Mar-21
61	HAROLD DASS	Farmer	M	58	Batavia	Meeting	04-Mar-21
62	HARRY HERALALL	Miner	M	45	Batavia	Meeting	04-Mar-21
63	ROMEL WILLIAMS	Logger	M	52	Batavia	Meeting	04-Mar-21
64	EXLY BOYAL	Miner	M	37	Batavia	Meeting	04-Mar-21
65	ROYSTON WILLIAMS	Miner	M	59	Batavia	Meeting	04-Mar-21
66	ALBERT JOSEPH	Cook	M	60	Batavia	Meeting	04-Mar-21
67	OREN WILLIAMS	Toshao/Boat Captain	M	47	Batavia	Meeting	04-Mar-21

ANNEX XXI: FORMS USED FOR SOCIAL SURVEYS

Page 1 of 2

TPTTI: SFEP 2/13

FORESTRY TRAINING CENTRE INCORPORATED
17 Access Road, Kingston, Georgetown, Guyana
Tel: 592-223-5061/5062

Q#:.....

Date:...../...../2018.

Objective: To document and characterize stakeholders' concerns about logging at or near their community or workplace.

A. Basic Information

1. Personal Information (Optional).

Name _____ Occupation _____ Gender _____ Age _____

2. What is the size of your household?

☐ ≤ 3 persons. ☐ 3-5 persons ☐ 5-7 persons ☐ >7 persons

3. How long have you been living or working in this area?

☐ < 1 yr. ☐ 1-5 yrs ☐ >5 yrs ☐ N/A (In transit)

B. Social Issues

4. What do you <u>like</u> most about this area? (You may choose more than one option)

☐ The people. ☐ Landscape ☐ Economic opportunities ☐ Other.....

5. What <u>features</u> do you <u>dislike</u> most about this community or neighbourhood or area?

☐ 6. Employment opportunities ☐ 5. Level of social services ☐ 4. Security Issues
☐ 3. Landscape/aesthetics/environment ☐ 2. People ☐ 1. Other:.....

6. Are you satisfied with the level of community developments in this area?

☐ Very satisfied ☐ Somewhat satisfied ☐ Neither satisfied or dissatisfied
☐ Somewhat dissatisfied ☐ Very dissatisfied ☐ N/A

C. Logging Activities

7. What aspects of logging are you most concerned about?

☐ Concession allocation? ☐ Expanded road networks? ☐ Timber harvesting/ timber transport
☐ Employment practices ☐ All of the foregoing ☐ Not sure/not interested

8. Is logging an important or significant contributor to livelihoods in this area?

☐ Strongly disagree ☐ Disagree ☐ Neutral/Neither agree nor disagree
☐ Agree ☐ Strongly agree

9. How would you rate the physical impacts of log transport or storage on this community or neighbourhood?

☐ Major irritant/disgusting ☐ Minor irritant/hardly noticeable ☐ No discernable impact

Page 1 of 2

ANNEX XXI: FORMS USED FOR SOCIAL SURVEYS

Page 2 of 2

TPTTI: SFEP 2/13

10. **Have you ever lodged a complaint about any aspect of logging in your neighbourhood to the CDC, GFC or any other agency?**

☐ Yes | ☐ No

11. **If your answer to Q10 is 'yes', how would you characterize the response to your complaint?**

☐ Very helpful. ☐ Somewhat helpful ☐ Not at all helpful ☐ No Response

12. **Do you think that *additional logging* activity in proximity to your community will bring benefits?**

☐ Yes ☐ No ☐ Not sure

CLIMATE CHANGE

13. **Do you think that our everyday actions and activities affect weather patterns in the long term (climate change?)**

☐ Yes ☐ No ☐ Not sure

14. **Do you think that there is a special link between logging and climate change?**

☐ Yes ☐ No ☐ Not sure

BIODIVERSITY

15. **Do you think that our livelihoods depend on plants and animals occurring naturally in our environment?**

☐ Yes ☐ No ☐ Not sure

16. **Do you think that logging affects plants and animals in our environment in a very negative way?**

☐ Strongly agree ☐ Agree ☐ Neutral
☐ Disagree ☐ Strongly disagree ☐ Don't know

FUTURE

18. **In relation to logging activities, can you kindly state three (3) things that you would not want to see happen in your area?**

1.
2.
3.

19. **Additional Feedback: Please share any additional comments:**

Thank you for taking the time to fill out our survey. We rely on your feedback to help us address your welfare. Your input is highly appreciated.

Page 2 of 2

ANNEX XXII: COPIES OF 'ANALYSIS DATA REPORT' ON WATER SAMPLES FROM SFEP 2/2017 (KAIZEN)

Page 1 of 2

KAIZEN
Environmental Services (Guyana) Inc.

50 High Street
Kingston
Georgetown, Guyana
Tel: (592) 231-8040; (592) 231-8048
Email: enquiries@kaizen.gov.com

ANALYSIS DATA REPORT

Customer: Isidro Espinosa
Customer's Address: 356 Farm East Bank Demerara, Guyana
Customer Contact: Isidro Espinosa
Client Job #: 20-0175
Item(s) Analyzed: Surface Water Samples
Date of Sampling: 13-Oct-20
Sampled By: Client
Date of Receipt: 13-Oct-20
Report Date: 3-Nov-20

Lab File # : 001085-1-3

ANALYSIS RESULTS

Parameter Name	Units	Results		
		001085-1 RAI # 1	001085-2 RAI # 2	001085-3 RLSS # 3
pH	pH units	5.79	6.56	6.64
Chemical Oxygen Demand	$mg.L^{-1}$	27.0	40.0	Not Detected
Total Suspended Solids	$mg.L^{-1}$	28	8.33	168
Oil & Grease	$mg.L^{-1}$	79.2	34.6	35.0
Total Nitrogen	$mg.L^{-1}$	0.90	0.50	0.80

** Detailed Test Methodologies and QA/QC data available upon request.*

Test Methodologies:
pH: SMEWW 4500 H+B
Total Suspended Solids: SMEWW 2540 D
Total Nitrogen: SMEWW -N-C, HACH Method 10071
Chemical Oxygen Demand: SMEWW 5220 D
Oil & Grease: USEPA 1664

Comments: Chemical Oxygen Demand & Total Nitrogen were subcontracted

Report Authorized By:
Laboratory Manager

ANNEX XXII: COPIES OF 'ANALYSIS DATA REPORT' ON WATER SAMPLES FROM SFEP 2/2017 (KAIZEN)

Page 2 of 2

KAIZEN
Environmental Services (Guyana) Inc.

58 High Street
Kingston
Georgetown, Guyana
Tel:(592) 231 0340/ (592) 231-0340
Email: inquiries@kaizen-guy.com

ANALYSIS DATA REPORT

Lab File # : 001077-1-3

Customer:	RL Sukhram & Sons
Customer's Address:	Farm, East Bank Demerara, Guyana
Customer Contact:	Mr. Isidro Espinosa
Client Job #:	20-0157
Item(s) Analyzed:	Waste Water Sample
Date of Sampling:	30-Sep-20
Sampled By:	Client
Date of Receipt:	30-Sep-20
Report Date:	21-Oct-20

ANALYSIS RESULTS

Parameter Name	Units	Results		
		001077-1 Sample 1	001077-2 Sample 2	001077-3 Sample 3
pH	pH units	6.15	6.19	6.15
Chemical Oxygen Demand	$mg.L^{-1}$	< 4	14	4
Total Suspended Solids	$mg.L^{-1}$	5.00	4.00	4.33
Total Nitrogen	$mg.L^{-1}$	0.3	0.9	0.6
Oil & Grease	$mg.L^{-1}$	34.2	46.4	41.8

** Detailed Test Methodologies and QA/QC data available upon request*

Test Methodologies:
pH: SMEWW 4500 H+B
Chemical Oxygen Demand: SMEWW 5220 D
Total Suspended Solids: SMEWW 2540 D
Total Nitrogen: SMEWW 4500 -N-C HACH Method 10071
Oil & Grease: USEPA 1664

Comments: Chemical Oxygen Demand & Total Nitrogen were subcontracted

Report Authorized By: K. Ramrattan
For Laboratory Manager

This test report relates only to the items tested and shall not be reproduced except in full, without written approval of the laboratory.

ANNEX XXIII: SPECIMEN OF 'EDUCATIONAL' POSTERS TO BE POSTED AT WORK SPACES
Page 1 of 2: LITTERING (©EPA, Guyana)

This is a

LITTER FREE ZONE

All garbage MUST be disposed of in bins provided

OR

Kept until you can dispose of it properly

Our Environment reflects us
Let's Keep it Clean and Beautiful

Make your surroundings a

LITTER FREE ZONE

Environmental Protection Agency, Ganges Street, Sophia, Georgetown
Tel: (592) 225-5467-9, 225-5471-2, 225-6044, 225-6048 *Fax: (592) 225-5481
Email: epa@epaguyana.org

ANNEX XXIII: SPECIMEN OF 'EDUCATIONAL' POSTERS TO BE POSTED AT WORK SPACES
Page 2 of 2: WASTEWATER (©EPA, Guyana)

Wastewater

Wastewater contains pollutants

Wastewater is water containing wastes from residential, commercial, and industrial processes. This is water we dispose of from our homes, offices, and industries.

Wastewater may contain waste oils, pesticides, fertilizers washed off the land, debris from streets and human and animal waste or sewage. Wastewater from a typical household includes toilet wastes, used water from sinks, baths, showers, washing machines, etc. that flows into drains or is flushed down the toilet.

Wastewater also includes storm runoff. or rain water that collects pollutants that wash off roads, parking lots, and rooftops that can be harmful to our rivers.

Wastewater affects our environment

Dirty water that we flush down our toilets, sinks and drains, and some of it is not so dirty, goes into the nearest waterway, river or beach. However, untreated wastewater when released into waterways may be toxic to fishes, plant, animal and human life by:

- Altering the habitat harming the breeding grounds of fishes leading to a decline in certain species.
- Allowing fertilizers to enter the waterways which then promotes excessive plant growth blocking our waterways and lowering oxygen supply to fish and other water species.
- Polluting our beaches so that we can no longer enjoy swimming, picnics and other fun activities .
- Harming our health from water borne diseases and consumption of contaminated fish and shellfish.

We can Reduce Wastewater at Home

Reducing the amount of water that we use will in turn reduce the amount of wastewater that we produce, so we could:

- Thawing foods on the lowest shelf of the fridge overnight rather than in a container of water.
- Using a container with water instead of running water to rinse your razor while shaving or brushing your teeth.
- Turn off faucets while soaping your skin when taking a shower.
- Use a filled sink to wash dishes rather than running the tap and reuse washing water to water plants.

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ANNEX XXIV: TOOLS USED TO COLLECT BASELINE DATA DURING FIELD SURVEYS.

#	Device/equipment	Description
Social Data		
1	Questionnaires	To record information
Physical data		
1	Thermo pDR-1000AN PersonalDataRAM (Thermo-Electron-Corporation	Air sampling: assessment of total suspended particles (TSP)
2	Temptop Airing-1000	Air sampling: assessment of Pm2.5 and Pm10 particle size
3	EGVOC-100 EG EVERGOLD LLC.	TVOC and HCOH Sampling equipment
4	Sound Level Meter (ExTech 4077730)	Noise sampling: assessment of noise pollution (dB)
5	Vernier Labquest2	Water quality assessment
6	Garmin eTrEX20 GPS	Geo-referencing of samples
Biological Data		
Fauna		
7	Tape recorder with pre-recorded bird calls	Attracting birds to verify their presence
8	Seine	Capturing primarily fish specimens
9	Bird/Bat net	Capturing birds and bats
10	Trail camera: Blaze Video 16Mp, 1080P Full HD, 20m night vision	Remote capture of mostly terrestrial fauna-night and day
11	Binoculars	Identification of specimens
12	Cameras	Recording specimens
13	Fishing rod	Capturing fishes
14	Texts	Proper identification of fauna, especially birds
15	Traps/cages	Cages used for trapping rodents
Flora		
16	Diameter Tape	Tree diameter
17	Linear 30m tape	Field measurements
Other		
18	Forms	Recording data
19	Texts	References
20	Maps	Field orientation
21	Containers/zip bags/bottles	Isolating, protecting samples
22	Markers	Marking samples, field notation
23	Garmin GPS74	Geo-referencing of samples
24	Knives	Utility purposes
25	Flagging tapes, batteries, etc.	Routine operations

ANNEX XXV: LIST OF PERSONS CONSULTED OVER PERIOD 2019-2021

(*Please see also Annex XXI for persons consulted at Kartabu, Iteballi and Batavia*)

#	NAME	DESIGNATION	AFFILIATION
FORMAL CONSULTATIONS			
1	Ragunauth Lall Sukhram	Manager	RL Sukhram & Sons
2	Devendra SUKHRAM	Operations Manager	RL Sukhram & Sons
3	Santiago SIOKO	Forest Manager	RL Sukhram & Sons
4	Mohamed Khan	Deputy Commissioner of Forests, FMD	GFC
5	Ewart Moore	Assistant Commissioner of Forests, Forest Resources Management Division	GFC
6	Lashanna **PERKINS** (Mrs.)	Assistant Commissioner of Forests-Head, FRIU	GFC
7	Yannick **DASILVA**	Assistant Commissioner of Forests, FRIU	GFC
8	Colleen **GRIFFITH** (Mrs.)	Forest Resources Information Officer	GFC
9	Carlos **TODD**	Environmental Officer	GGMC
10	Krishna **BASDEO**	Marketing Manager	Barama Company Limited
11	Brian 'Rambo' **RAMBHARAT**	Dukwarri Village	Businessman/speed boat operator
INFORMAL CONSULTATIONS			
12	Boat captains, Bartica (2)		
13	Miners, Devil Hole, Cuyuni River (8)		
14	Business Persons, Dukwarri		
15	GFC staffs-Iteballi		
16	Speed boat captains (2)-Kumong-Kumong		
17	Business persons, Kumong-Kumong, Puruni River (7)		
18	Speed boat owner/despatchers-Fourth Avenue, Bartica (2)		
19	Miners, Tiger Creek Junction, Kartabu Puruni Road (8 persons) (Meeting)		
20	Businesspersons (2), Takutu Village		

NB.

1. **Prior to this work, FTCI consulted with 49 persons in the Kartabo Triangle in respect of SFEP 2/2013.**

2. **Many public agencies maintain excellent websites and in view of the COVID-19 pandemic, the consultants gave preference to information on websites rather than interviews. (In fact during the past 20 months, it was difficult to secure meetings with public officials.**