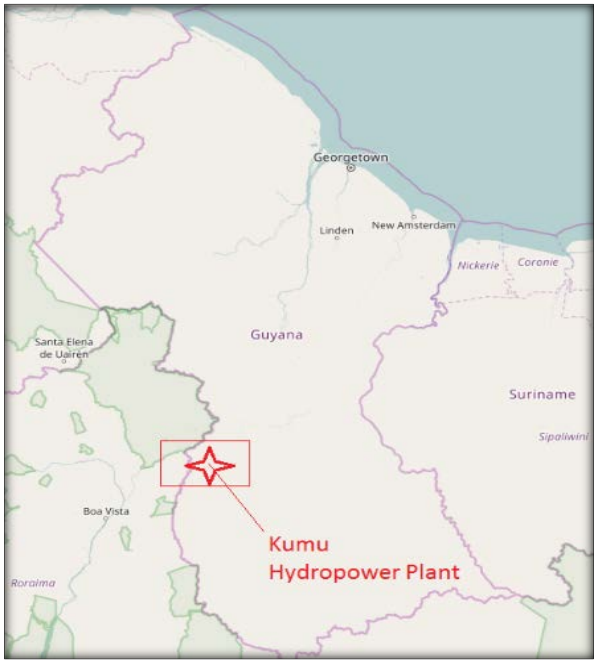
Project: Kumu 1.5 MW Hydropower Plant

NON-TECHNICAL SUMMARY



Introduction

Part of the mandate of the Guyana Energy Agency (GEA) is to advise and make recommendations to the Minister regarding any measures necessary to secure the efficient management of energy and the source of energy in the public interest; to encourage the development and utilization of sources of energy other than sources presently in use; and to carry out research into all sources of energy including those sources presently used in Guyana for the generation of energy. As such, the GEA and the Hinterland Electrification Company Inc. (HECI) is proposing to develop the Kumu Hydropower Site.

The project will be located on the Kumu River on the Kanuku Mountains at approximately 15 km from the Town of Lethem in Region 9 (Upper Takutu – Upper Essequibo) and 500 km from the Capital City of Guyana (Georgetown) at coordinates $3^0$19′60"N, $59^0$48′0"E.

Figure 1:Location of the project site from the Town of Lethem and the Guyana/Brazil Border

Why is the Project needed?

Construction of the Kumu Hydropower Plant will ensure a reliable supply of electricity in the Town of Lethem and surrounding villages from a renewable energy source, and it will do so without generating significant greenhouse gasses. Additionally, the Hydro-Power Plant (HPP) will increase the share of renewable energy sources within the country's electrical generation system in the context of sustainable energy development.

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Description of the Project

The Kumu Hydropower project is a run-of-the-river plant which is technically and economically feasible. It will comprise an installed capacity of 1.5 MW, which will generate approximately 9,700 MWh of energy on an annual basis. The hydraulic infrastructure proposed will also comprise a 3m high and 20m wide weir. The project is estimated to create jobs for approximately ten persons on a permanent basis during operation. The lifespan of this facility is estimated to be approximately thirty (30) years once a rigid maintenance program is followed. Materials are likely to be sourced from Georgetown, Kumu and Brazil.

Figure 2:Aerial View of the reservoir

The reservoir created by the weir will cover approximately 1 km^2 which is currently forested. A 500 mm headrace will be installed along the hillside on the right bank of the river which will extend 500 m from the weir to the forebay. From the forebay, water will flow 1750 m through a 300 mm penstock/pipe that will be fixed along the right bank of the river down to the power house which is 545 m lower than the reservoir. After passing through two turbines to generate electricity, the water will be returned to the Kumu River through the tailrace channel. In addition, a transformer station and a 14 km transmission line to carry 13.8 kv will connect the powerhouse to the Lethem power grid. The exist road network will be used to transport construction materials to site. However, concrete walkway will be required along penstock as in the case of Moco Moco.

Economic Analysis

In conducting the economic analysis, the following was considered;

Current Production Costs:	0.49 USD/kWh $_{diesel}$
Annual Production Costs:	2,450,000 USD/year
Sales Price:	0.33 – 0.40 USD/kWh
Subsidies:	500,000 USD/year

The energy infrastructure investment (except for transmission lines) has been estimated to be Three Million Nine hundred Thousand US dollars (USD3,900,000) which will yield the following:

Levelized cost of electricity (LCOE) 5% Weighted Interest Rate 25 years project lifetime	US cents/MWh	6.45
Estimated Sales Price to Grid (at hydro transformer)	US cents/MWh	18
Current Local Consumer Sales Price	US cents/MWh	35
Yearly Revenues	USD	3,395,000
Maintenance, Management, etc. (OPEX)	USD/year	192,600

Description of possible effects on the environment

In addition to positive benefits, the project could have negative impacts on the environment and people, if not managed carefully. Therefore, the Hinterland Electricity Company Inc. (HECI) will seek to implement certain actions to prevent, reduce, or mitigate all possible negative impacts. A summary of key impacts and mitigation measures have been identified in Table 1 below.

Pre-construction and construction phase

No.	Issue	Potential Impact	Who/What will be affected	Priority	Mitigation measurers
1.	Water availability and maintenance of a minimum ecological flow throughout the year	Impacts of the volume of water in the river.	Aquatic Fauna Plants Public	Medium Low Medium	- Carry out dedicated water assessment studies and integrate their results into the project engineering design. (Prior to the start of construction)
2.	Water quality	Impacts on water quality	Aquatic Fauna Public	High High	- Control erosion and sedimentation during construction. - Ensure that the facility does not contribute to deterioration of water quality and watershed either upstream or downstream of the facility. - Testing and monitoring of water quality against baseline.
3.	Protected species (fish and terrestrial fauna) and sensitive habitats	Impacts on fish species composition and numbers, impacts	Fishes, fauna and sensitive habitats	Medium	- Undertake pre-construction ecological surveys and associated assessments of the project footprints to establish a robust baseline.

		on terrestrial fauna and sensitive habitats			
4.	Tourism	Impacts on tourism and recreation	Individuals living near the site, as well as those in surrounding communities	Low	- Identify any recreational uses of the river around the site and plan construction and operation to minimize negative impacts;
5.	General construction activities	Impacts during construction of the main (dams, powerhouse, diversion tunnel) and associated (transmission line) project facilities, such as land excavation, dust, noise etc.	Individuals living near the site, as well as those in surrounding communities	Medium	- Prepare and implement construction management plan to reduce and mitigate general construction impacts, including noise, air emissions, waste generation, safety and disposal. - Continuously monitor impacts to comply with appropriate national environmental standards and requirements. - Apply requirements to all construction contractors.

6.	Emergencies: floods, landslides	Impacts of the project on the magnitude and mitigation of floods, landslides and other potential emergencies.	Plants Aquatic ecosystem Residents	High Medium High	- Develop appropriate emergency plans and maintain high level of staff preparedness for emergencies.

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Operation phase

No.	Issue	Potential Impact	Who/What will be affected	Priority	Mitigation measurers
1.	Water availability and maintenance of a minimum ecological flow throughout the year	Impacts of the volume of water in the river.	Aquatic Fauna Plants Public	Medium Low Medium	- Maintain the minimum ecological water flow in the river at all times. - Monitor the water levels in the river throughout the year to verify the minimum level is maintained. - Adjust minimum levels if needed to protected biodiversity.
2.	Water quality	Impacts on water quality	Aquatic Fauna Public	High High	- Ensure that the facility does not contribute to deterioration of water quality and watershed either upstream or downstream of the facility. - Testing and monitoring of water quality against baseline.

3.	Protected species (fish and terrestrial fauna) and sensitive habitats	Impacts on fish species composition and numbers, impacts on terrestrial fauna and sensitive habitats	Fishes, fauna and sensitive habitats	Medium	- Monitor ecosystem during operation and implement actions if needed to prevent or reduce unacceptable impacts.
4.	Tourism	Impacts on tourism and recreation	Individuals living near the site, as well as those in surrounding communities	Low	- Leave access to the water unchanged by the facility to accommodate recreational uses of the river to the extent technically possible.
5.	General construction activities	Impacts during construction of the main (dams, powerhouse, diversion tunnel) and associated (transmission line) project facilities,	Individuals living near the site, as well as those in surrounding communities	Medium	- Continuously monitor impacts to comply with appropriate national environmental standards and requirements as well as implement occupational safety and health guidelines

		such as land excavation, dust, noise etc.			
6.	Emergencies: floods, landslides	Impacts of the project on the magnitude and mitigation of floods, landslides and other potential emergencies.	Plants Aquatic ecosystem Residents	High Medium High	- Plan and implement techniques to minimise the exacerbation of effects caused by landslides or flooding, which could arise from land use changes due to project activities; - Develop appropriate emergency plans and maintain high level of staff preparedness for emergencies.

Closure Phase

No.	**Issue**	**Potential Impact**	**Who/What will be affected**	**Priority**	**Mitigation measurers**

1.	Water availability and maintenance of a minimum ecological flow throughout the year	Impacts of the volume of water in the river.	Aquatic Fauna Plants Public	Medium Low Medium	- Maintain the minimum ecological water flow in the river at all times.
2.	Water quality	Impacts on water quality	Aquatic Fauna Public	High High	- Monitor the state of aquatic ecosystems impacted by the project. - Closure
3.	Protected species (fish and terrestrial fauna) and sensitive habitats	Impacts on fish species composition and numbers, impacts on terrestrial fauna and sensitive habitats	Fishes, fauna and sensitive habitats	Medium	- Monitor ecosystem during project closure and implement actions if needed to prevent or reduce unacceptable impacts.

4.	Tourism	Impacts on tourism and recreation	Individuals living near the site, as well as those in surrounding communities	Low	- Leave access to the water unchanged by the facility to accommodate recreational uses of the river to the extent technically possible.
5.	General de-commissioning activities	Impacts after closure of the main (dams, powerhouse, diversion tunnel) and associated (transmission line) project facilities.	Employees and individuals living near the site, as well as those in surrounding communities	Medium	- Prepare and implement de-commissioning management plan to reduce and mitigate general impacts such as noise, air emissions, waste generation and disposal.