HARDROCK MINING CO. INC.

OKO GOLD LEACH PROJECT

PROJECT SUMMARY

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1. Project Summary

The Oko Gold Leach Project is managed by Hardrock Mining Co. Inc., headquartered in Georgetown, Guyana. The project aims to extract gold using an environmentally friendly leaching process using a cyanide base agent called Jinchan, targeting previously mined hammer mill tailings. The project site is located approximately 40-50 kilometers southwest of Bartica, a key logistical hub.

The processing facility is designed to treat 172,800 tons of ore annually, using a heap leach method to extract gold. The site includes necessary infrastructure such as a water management pond and perimeter drainage channels to manage stormwater and reduce environmental impact.

The project will employ 22 people directly, with additional jobs created through local contractors. It aims to benefit local communities by sourcing supplies from indigenous farmers and providing training programs to enhance local skills and employment opportunities. Health awareness campaigns on HIV, STDs, and malaria will be conducted for workers and surrounding communities.

The project is financially robust, with an estimated capital cost of approximately $375 million Guyanese dollars. It is expected to generate significant revenue from gold production, with an internal rate of return (IRR) of 20% and a payback period of 2.59 years.

Upon project completion, the site will be reclaimed to a stable and safe condition, promoting ecological restoration and reducing the need for long-term monitoring. The closure plan aims to ensure physical, biological, and chemical stability of the site, returning it to a high ecological value.

2. Location & Plant Site Layout

1. Location

Oko is located to the southwest of Bartica in Guyana. Bartica serves as a key gateway to the interior mining regions, including Oko. The approximate distance from Bartica to Oko is around 40-50 kilometers (25-30 miles), depending on the specific route taken. This journey typically involves traveling through dense forested areas and may require river transport, given the challenging terrain and limited road infrastructure. The proximity of Bartica to Oko makes it a strategic hub for logistical support and access to mining operations in the region.

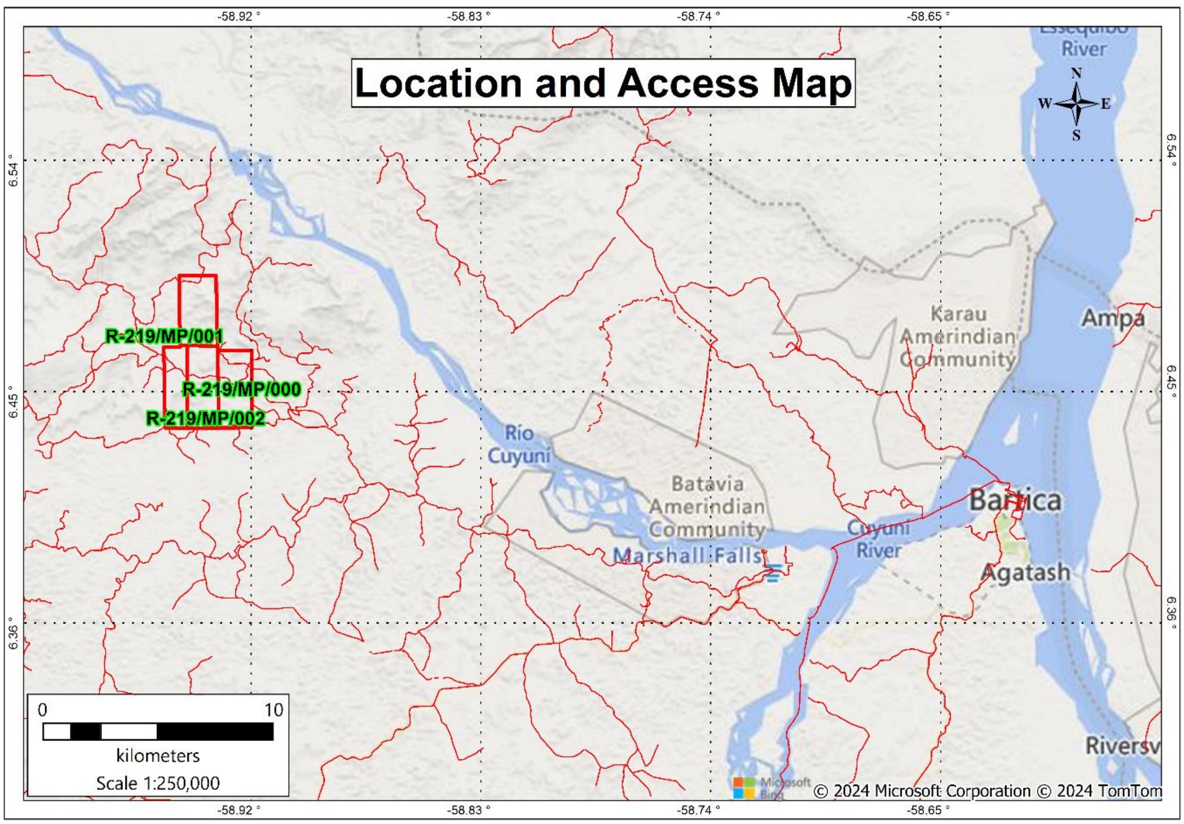

Figure 1: Location and Access Map

2. Site Layout

The overall engineering approach is to design a process facility that can process hammer mill tailings within simple operating parameters that confirm industry standards and regulatory requirements. The table below shows the key project and ore-specific criteria for the process facility design.

Criteria		Units	Design
Mine Life		Years	2
Heap Availability		%	80
Heap Days per year		days	365
Heap Hours Per day		Hr.	24
Ore Characteristics			
Hammer Mill Tailings		NA	NA
Ore Specific Gravity		g/ ton	1.5
Production Rates			
Annual		t/annum	172,800
Heap Monthly		t/mth	14,400
Heap Daily		t/d	544
Gold			
Grade (LOM Average)		g/t	0.5
Recovery (LOM Average)		%	90
Leach Circuit Type			Heap Leach
Leach Circuit Residence Time		Days	30
Leach Stages			2
Carbon Adsorption Stages			10
Detoxification Process		NaOCl	$Na_2O_2O_5$
Detoxification Target	CN(WAD)	ppm	0.5
Lime Consumption (CaO)		kg/t	2
Chlorine Consumption		kg/t	0.1
Sodium Metabisulphite Consumption (SMBS)		kg/t	0.4
Jinchan		Kg/t	1

Table 1:Project Design Criteria

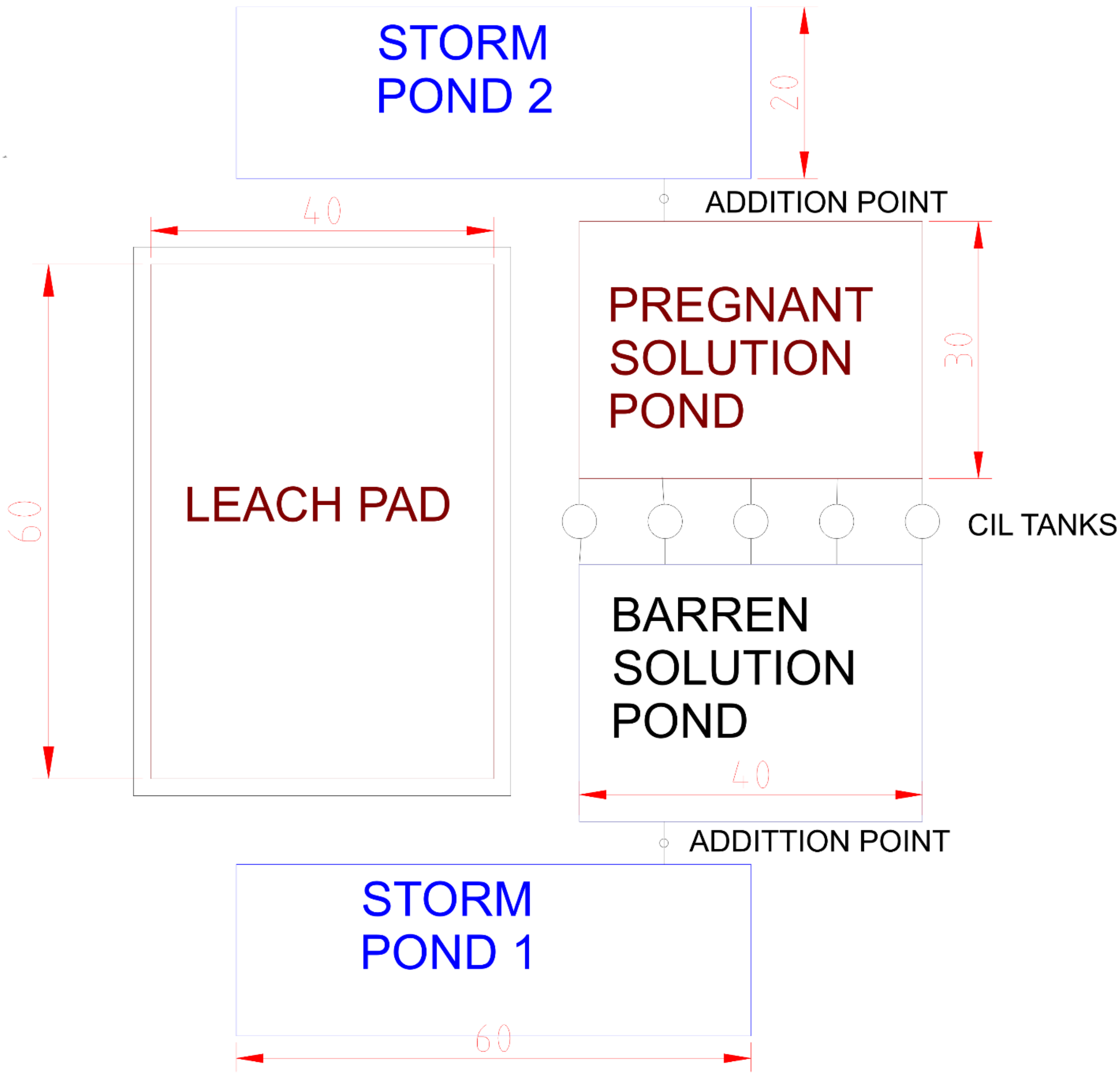

Figure 2.Site layout of IGLP Project.

3. Proximity to Settlements

The closest Settlement is Karrau approximately 15km east and Bartica is the closest town located approximately 40 km east of this location. It can be seen that the Oko River is 2.1km from the proposed processing site. The Cuyuni river is 7.2km and Aremu Landing is 5.8km from the proposed processing site.

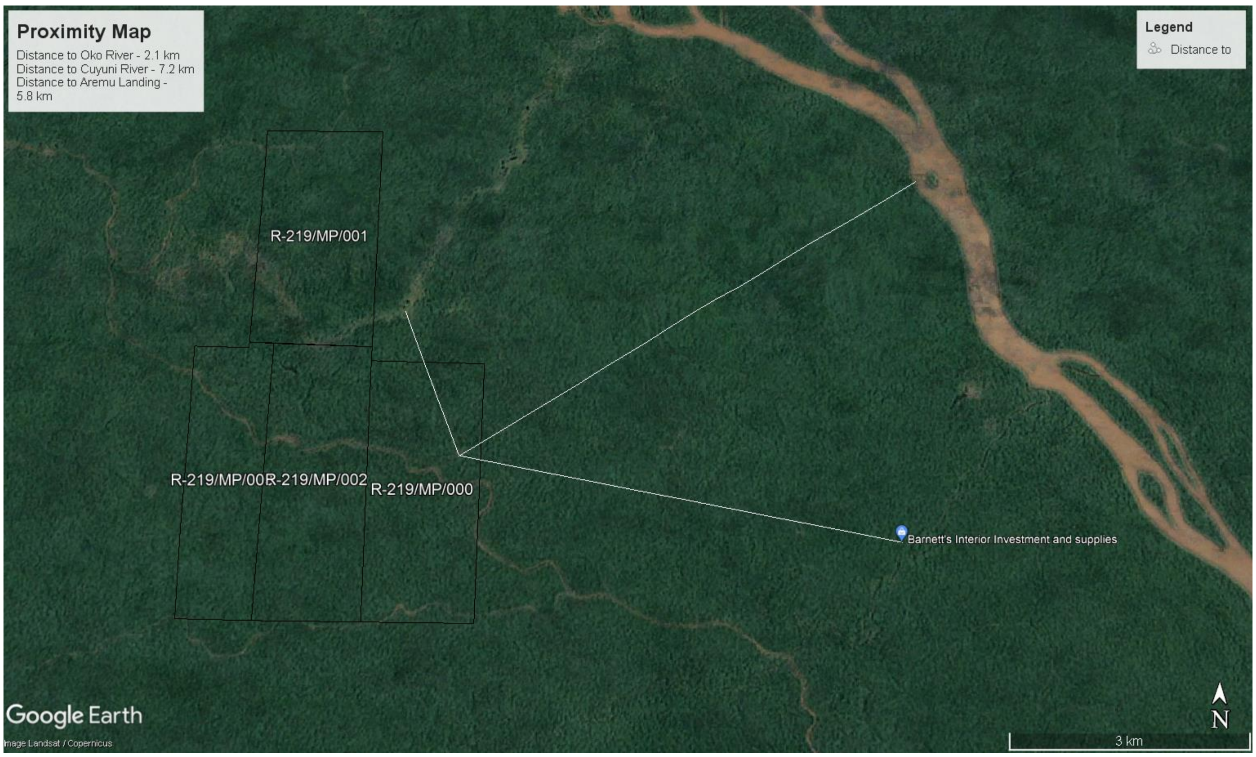

Figure 3: Proximity Map

3. Description of the physical environment

4. Climate

Guyana features a Tropical Humid Climate characterized by high but variable rainfall, humidity, and a small temperature range, with two wet and two dry seasons. The climate is heavily influenced by the Inter-Tropical Convergence Zone (ITCZ) and phenomena such as El Niño and La Niña. Coastal regions and savannas experience different rainfall patterns, with high-altitude regions being cooler compared to the coastal lowlands and savannahs. Average temperatures hover around 26°C, with significant inter-annual variations in rainfall.

5. Topography

The topography around the Cuyuni River and Oko River areas is primarily hilly, covered with dense, tall evergreen flooded riparian forests. Rainfall in this region ranges from 405 mm to 867 mm monthly, and temperatures vary between 24°C and 34°C.

6. Soils

Soils in the project area are developed on old deltaic and continental deposits, including red-yellow latosols and sandy regosols with various phases like steep gravelly and truncated phases. These soils are categorized into different types based on their composition and characteristics, such as Regosols with white quartz phases and red-yellow latosols with varying textures and gradients.

7. Geology

The geological composition of the project area includes significant mineral deposits, primarily gold, which is the focus of extraction efforts. The region's geology is studied to understand better and manage the potential environmental impacts of mining activities.

8. Hydrology

Guyana has an extensive network of rivers and streams, with surface water primarily used for agricultural and industrial purposes. Only about 10% of drinking water comes from surface sources. Hydrological studies focus on understanding the water flow and quality in these water bodies to mitigate mining impacts.

9. Surface Water

Surface water quality is critical for aquatic life and human health. Testing for parameters like pH, turbidity, total iron, total nitrogen, and total dissolved solids helps establish baseline conditions and identify potential pollution sources. High occurrences of certain pollutants can indicate contamination risks that need addressing.

10. Ground Water

Groundwater quality and quantity are assessed to ensure that mining activities do not adversely affect water resources. Measures like installing impermeable liners and maintaining equipment to prevent leaks are critical to protecting groundwater from contamination.

11. Noise Quality

Noise pollution from construction and mining activities is monitored to ensure compliance with guidelines. Prolonged exposure to high noise levels can affect both human health and wildlife. Noise mitigation strategies include using sound suppression devices and providing personal protective equipment to workers.

12. Air Quality

Air quality assessments focus on pollutants like particulate matter, carbon monoxide, and other contaminants. Mining activities can significantly impact air quality, necessitating strict monitoring and control measures to protect environmental and human health.

13. Utilities

Utilities required for the project include water, fuel, and electricity. Water will be sourced from ground wells, and a 5000-gallon fuel tank will support power generation. The electricity demand, estimated at 65 KVA, will be supplied through high-tension lines, with emergency backup provided by standby generators.

4. Health Safety and the Environment (HSE) Plan

Our Company. will develop and enforce an HSE plan that will comply with Guyana's Occupational Safety and Health Act (Cap 99:06) where it "provides for the registration and regulation of industrial establishments, for occupational safety and health of persons at work and, for purposes connected therewith or material thereto". Moreover, it will observe Section 41 which "prohibits the employment of persons under the age of 15 ("children") in factories."

5. Jinchan Agent Leaching Process

The process facility design is based on a flowsheet with unit process operations that are proven in the minerals processing industries. The OGLP gold circuit includes the following unit processes:

1: Tailing/ore Preparation:

The tailing is mixed with water and any necessary additives, such as lime, to adjust the pH, once it has been stacked on the peach pad. Lime is often added to maintain alkalinity. This promotes the stability of the leaching agent solution and increases the efficiency of the leaching process.

HARDROCK will be continuously testing the ore/ tailings to determine if any mercury is present. However, the likelihood of mercury being present is negligible since the recovery methods used by the mining operations did not use amalgam sheets. The use of amalgam sheets would have required the miners to “spike” their ore with mercury in order to facilitate recovery. Instead, gravity separation methods were used thus mercury would not have been required to “spike” the ore. The presence of residual mercury from the previous processing should therefore be negligible. If at any point mercury is detected, then mercury mitigations measures will be followed.

The tailings will be loaded or staked onto the leach pad using CAT 950 Wheel Loader from the Run of Mine (ROM) stockpile. This stockpile will be positioned at the edge of the leach pad in order to reduce travel time for the loader. The ROM stockpile will be supplied by the Howo dump truck which in turn will haul tailings from the various tailings spoil piles.

2: Leaching:

The leaching process consists of stacking the tailings on the leach pad in lifts and leaching each individual lift to extract the gold. Barren Leach Solution (BLS) referred to as the lixiviant containing diluted Jinchan and pH balancing agent(lime) will be applied to the ore heap surface using a combination of drip emitters and sprinklers at an application rate of 6 L/hr/m^2. The leach cycle for each batch of ore being processed should be approximately 30 days.

The leaching solution or lixiviant will percolate through the tailings to the drainage system above the pad liner, where it will be collected in a network of perforated drain pipes. These drain pipes will be covered with pervious geotextile and embedded within a 0.6 m minimum thick granular cover drain fill layer above the liner. The solution now termed the Pregnant Leach Solution (PLS) will gravity flow to the pregnant solution pond. PLS collected in the pregnant solution pond will then be pumped to the carbon columns for gold adsorption the gold. After gold absorption the lixiviant now termed the Barren Leach Solution (BLS) is collected within the barren leach solution pond where the concentration of the leaching agent and pH balancing is adjusted before recycling the lixiviant/BLS to the leach pad.

Figure 5: An example Heap Leach Facility

3: The solution /lixiviant;

Consideration must be given to the concept that Jinchan has been developed as an alternative leaching agent to Sodium Cyanide. Jinchan utilizes a leaching mechanism similar to cyanide, however the cyanide within the carbonized sodium cyanurate is not easily dissociated thus making Jinchan much less toxic. Jinchan is considered a more environmentally friendly lixiviant and has a simpler operating procedure than sodium cyanide.

Jinchan will be administered at a concentration of 1.0 g/l of lixiviant with consumption being estimated to be approximately 1kg/ton of ore processed. To obtain maximum recovery parameters the pH of the lixiviant within the HLF will be maintained at a pH of 11. Lime (CaO) will be administered to the lixiviant, lime consumption is estimated to be approximately 2kg/ton of ore processed. The administration rate of lime will be between 1.5 to 2 g/L of lixiviant. The dosage rate will be adjusted as the leaching process continues in order to maintain the pH balance.

4: Pregnant leach solution;

as the lixiviant percolates through the ore it dissolves gold particles, this pregnant leach solution (PLS) flows to the PLS pond under gravitational forces. The PLS is then pumped from the process pond to the adsorption feed head tank. From there, the PLS discharges to a single train of 10 carbon adsorption columns. These columns stacked with activated carbon are used to adsorb the metals from the solution.

5: Adsorption:

After the leaching stage, the PLS is pumped through the adsorption circuit, where it passes through a series of activated carbon columns or tanks. The PLS enters carbon column 1, flows through the Carbon-in-column (CIC) circuit, finally discharging from carbon column 10 over a carbon safety screen to the barren solution pond. The dosage rate of activated carbon is estimated at approximately 45 g/L. The carbon adsorbs the gold from the solution, forming a loaded carbon.

6: Smelting and Refining:

The final step in the process is to recover the gold from the loaded carbon and to remove impurities and obtain a high-purity gold. This is typically done through smelting. This process is where the gold is melted along with the addition of borax and silica in order to remove the impurities. Silica, borax, nitrate and soda ash will be combined to form a flux, which will be used to remove impurities during smelting. The fluxes will be weighed out according to the desired mix and combined using a flux mixer. The flux will be combined with the loaded carbon and smelted in the gas-fired furnace.

7: Tailings detoxification:

process using alkaline chlorination and sodium metabisulphite to reduce the weak acid dissociable cyanide (CNWAD) levels in the leach tailings prior to discharge to the TMA. The free cyanide or residual; cyanide in the leach heap will be oxidized by the use of chlorine or hypochlorite under alkaline conditions. This will reduce the free cyanide in the processed ore to an environmentally safe level of 0.2 mg/l prior to disposal. The Cyanide detoxification process will be accomplished in a -day cycle after leaching. The process is proposed to require 2 days for draining, 2 days for alkaline chlorination treatment, one day for SMBS treatment to neutralize chlorination and two days for final draining. The operating parameters of this process will however be adjusted to meet the tailings detoxication requirements.

The chlorine detoxification solution is sprayed on the heaps, using the same sprinkler system used in the leaching cycle. After the solution percolates through the heap, it is collected in the chlorine pond and recycled after adjusting the chlorine content. This process is repeated with SMBS to neutralize the chlorine.

Sections of the leach pad will be sampled separately using 1.5-inch (37 mm) diameter pipes driven vertically through the heap to the pad, before the spent ore is emptied form the leach pad. The core samples will be analyzed for free cyanide and total cyanide.

8: Tailings Management Area;

TMA, for leach residue after washing and detoxification is discharged to the engineered TMA for further detoxification through natural aging process and thence mine reclamation.

9: Storm water ponds;

Built into the leaching facility will be two storm water ponds. These ponds will be contingency for the storage, treatment and discharge of excess pregnant and barren leach solutions due to excess water within the facility due to excessive rainfall.

6. Oko Gold Leaching Processing

The OGLP processing facility is designed to treat 172,800 tons of ore/tailings per annum. Preliminary tests have shown that the mine tailings in the Oko area is readily amenable to conventional Jinchan leaching. Jinchan or Metallic Ore Dressing Agent/SHJCA02 is a brand of leaching reagents specifically designed by Guangxi Senhe High Technology Co LTD of Guangxi, China for the extraction of gold from ores. It has been developed as an alternative leaching agent to Sodium Cyanide. Jinchan is considered a more environmentally friendly lixiviant and has a less complex operating procedure than sodium cyanide. It is also patented as a product for "environmentally friendly gold extraction". Jinchan has advantages such as: low toxicity, environmental protection, high recovery, low cost and safer storage and transportation Since the tailings/ore consists primarily of hammer mill tailings that has already been stockpiled there is no requirement for a milling circuit. There is also no requirement for pre-treatment or washing to remove clays since the tailings have not been contaminated by siltation due to surface run off. Leaching will be done in batches of 9,600 m^3 or 16,320 tons. Pregnant leach solution will be treated in carbon- in columns (CIC) circuit to recover gold from the lixiviant. The barren lixiviant will then be recycled in the leaching process after the pH and leaching agent concentrations have been adjusted. Gold will be recovered by direct smelting of the loaded carbon. All of the processes outlined will follow industry proven standards.

All of the heap leach tailings will be treated using the alkaline chlorination cyanide neutralization method prior to tailings disposal. Tailings from the leach pad will then be excavated, loaded and hauled to an engineered tailings management area (TMA) for safe disposal. Further neutralization of the cyanide if present will be achieved here with aging and natural degradation. The chlorine solution will be diverted to the chlorine pond where it will be recycled through neutralization systems.

The chemical composition of Jinchan chemical ore dressing is;

Component/Substance	Percentage by weight %
Carbon (C)	22.0
Sodium (Na)	3.3
Ammonia (NH_3)	155.42
Oxygen (O)	22.92
Ferrum (Fe)	0.96
Chlorine (Cl)	0.36

Table 2 Chemical composition of Jinchan

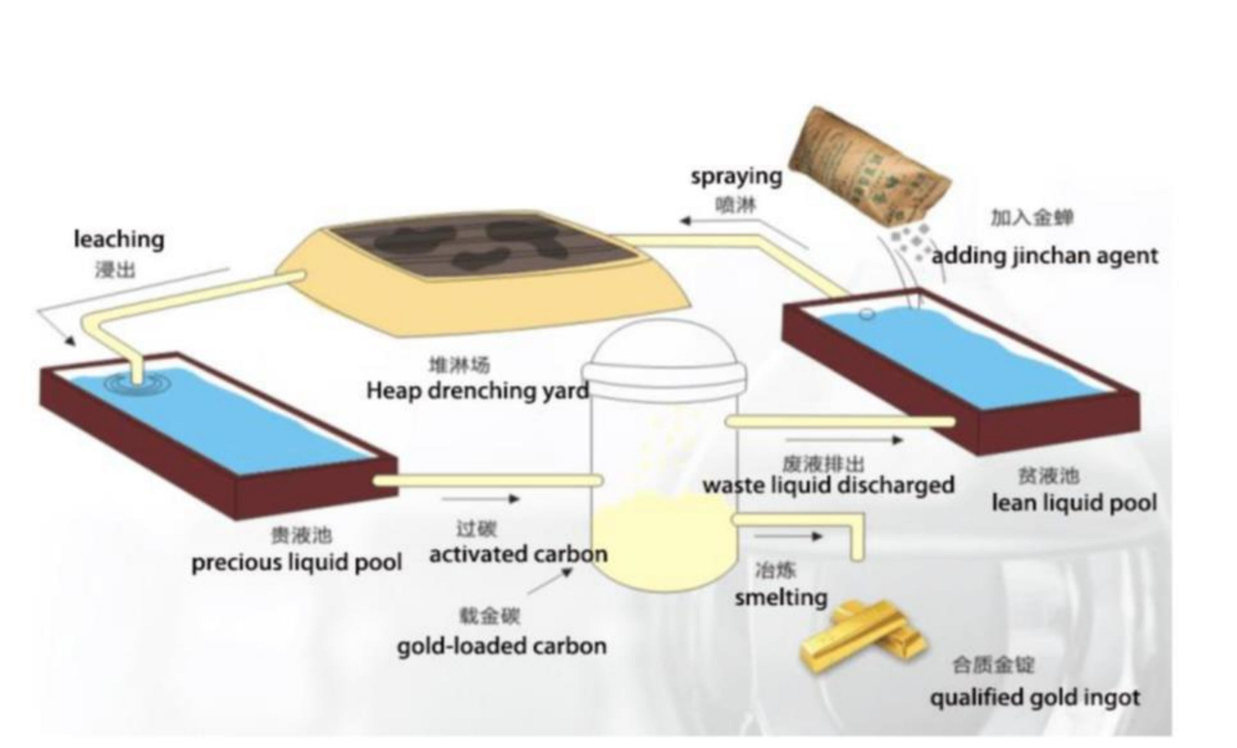

Figure 6: Design Flow of Proposed Mine Plan

The current mineral resource model and volume of hammer mill tailings reported herein is based on physical measurements and volumetric calculation. Visual estimation was also done for some tailings, this has therefore been referred to as inferred reserves. Currently mining is still being conducted, and as such the mineral resource estimation will have to be revised periodically to include the increase in tailings that are now being produced. There are also hammer mill tailings on adjoining properties that are being considered, however negotiations to acquire these rights has not been finalized at this time

Reserve Estimate	**Volume of Tailings m^3**	**Mass Of Tailings Tons**	**Ore Grade (g/t)**	**Recovery Efficiency (%)**	**Total (Au Ounces)**
Indicated	176,800	265,200	0.5	90	3,833
Inferred	62,910	94,365	0.5	90	1,364
Total	186,400	359,565	0.5	90	5,197

Table 3: Consolidated Mineral Resource Statement Oko Gold project

7. Employment Requirements

HARDROCK will directly employ a total of Twenty-Two (22) persons as shown in table below. However, transportation/delivery services for fuel, rations and supplies will be outsourced local contractors.

NO	STAFF	NO OF EMPLOYEES
1	Site Manager	1
2	Mechanic/technician	2
	Supervisors and others	
3	Loader Operator	1
4	Excavator Operator	3
5	Heavy duty drivers	2
6	Chemical Engineer	1
7	Laborers	8
	Auxiliary Staff	
8	Cooks	1
9	Security	2
10	Medic	1
Total		**22**

Table 4: Manpower required for OGLP

8. Financial Analysis

1. Production Schedule

The overall mine production schedule was developed to feed the leach pad approximately 172,800 tons of tailings per year.

Heap Leaching	Year1	Year 2
Tailings (tons)	172,800	172,800
Overburden (tons)	0	0
Feed Grade (g/t)	0.5	0.5
Recovery Rate (%)	90	90
Gold recovered (g)	77,760	77,760
Gold recovered (Oz)	2,498	2,498
Cashflow (US2,000/Oz)	US$ 4,996,000	US$ 4,996,000
Cashflow (Ex Rate $205/US$1)	$ 1,024,180,000	$ 1,024,180,000

Table 1:Open Pit production schedule

The OGLP is scheduled to operate 365 days per year on a 24 hours per day basis. The work schedule will utilize crews working in 8-hour shifts. An allowance of 80% workforce availability and mine productivity has been factored into the production schedule to compensate for weather/climatic conditions delay.

2. Capital Cost Estimates

Project Capital is summarized in the Table below. Initial Capital Costs are estimated to be $375,350,000.

ITEM	COST (GUY$)
Plant, Machinery and Equipment	216,350,000
Machinery Re-capitalization	25,000,000
Mine development mobilization expenses	18,000,000
Building and civil works	4,000,000
Furniture and Fixtures	3,000,000
Reclamation & Closure	10,000,000
TOTAL	**276,350,000**
NET INITIAL WORKING CAPITAL	**69,087,500**
PROJECT COST	**345,437,500**

Table 2: Project Capital Cost estimate

3. Cash Flow Analysis

Economic Results are summarized in Table 20; the analysis suggests the following conclusions assuming no gearing with a discount rate of 10%:

- Mine Life: 4 Years
- NPV @ 10%: $76,057,023 ($421,494,523)
- Pay-Back Post Tax: 2.59 years
- Total Taxes Paid: $354,585,576
- Royalties 8%: $327,737,600
- Peak Funding of Initial Project Capital: 345,437,500

Year	0	1	2	3	4	TOTAL
Project Discount Rate	0.1					
Tax Rate	0.4					
Equipment purchase price	($345,437,500)					
Sales		$ 1,024,180,000.00	$ 1,024,180,000.00	$ 1,024,180,000.00	$ 1,024,180,000.00	
Operating Cost		$ 659,750,400.00	$ 659,750,400.00	$ 659,750,400.00	$ 659,750,400.00	
Admin, Rehab Expenses		$ 60,480,000.00	$ 60,480,000.00	$ 60,480,000.00	$ 60,480,000.00	
Royalty 8%		$ 81,934,400.00	$ 81,934,400.00	$ 81,934,400.00	$ 81,934,400.00	
NIS 8.4%		$ 399,840.00	$ 399,840.00	$ 399,840.00	$ 399,840.00	
EBIT		$ 221,615,360.00	$ 221,615,360.00	$ 221,615,360.00	$ 221,615,360.00	
Tax Rate (40%)		$ 88,646,144.00	$ 88,646,144.00	$ 88,646,144.00	$ 88,646,144.00	
Operating Cash Flow		$ 132,969,216.00	$ 132,969,216.00	$ 132,969,216.00	$ 132,969,216.00	
Discount Factor (6%)		0.9091	0.8264	0.7513	0.6830	
Present Value		$120,881,105	$109,891,914	$99,901,740	$90,819,764	**$421,494,523**
Net Present Value	($345,437,500)					**$76,057,023**
IRR	**20%**					
Payback Period (years)	**2.59**					

Table 7: OGLP Cashflow Analysis

9. Socioeconomic Conditions and Management Plan

Guyana, with an estimated population of 782,000 in 1999, has a significant portion (85-90%) residing along the Atlantic coast, where the population density is approximately 100 persons per km^2, compared to a national average of 3.6 persons per km^2. The capital, Georgetown, houses about 25% of the population. The average household consists of 4.7 persons, with nearly one-third of households headed by women, a trend more prevalent in urban areas. Approximately one-third of the population is under 14 years old, and the gender ratio is about 0.97 men to women. Ethnically, Guyana's population is diverse, with East Indians (49%), Africans (36%), Amerindians (7%), mixed races (7%), and others (1%). Amerindian tribes predominantly reside in the interior, while coastal regions have a mix of East Indians, Africans, and mixed races.

Guyana's economy is primarily driven by agriculture, forestry, fishing, mining, and manufacturing, with sugar, rice, bauxite, and gold accounting for 75-80% of export earnings. The manufacturing sector contributes 10% to GDP and 12% to employment. Although tourism is underdeveloped, it holds significant potential for economic benefits, particularly through leveraging the country's natural and cultural assets.

HMCI's project aims to manage the potential influx of people into the concession area by actively discouraging settlement around the site. Training programs will be implemented to handle influx sensitively, without conflict or security issues, and health awareness campaigns on HIV, STD, and malaria will be promoted among workers and local communities.

To align with local community expectations, HMCI will engage in dialogues to create employment strategies and promote community development projects. These initiatives will focus on enhancing skills, education, health, and infrastructure. The company will also ensure residents do not abandon their current livelihoods by building capacity and training workers for future employment opportunities in other industries post-project closure.

HMCI will maintain open communication with indigenous communities, prioritizing the recruitment of unskilled labor from these communities. Training programs and apprenticeships will be offered to boost local labor supply, with the intent to have a significant majority of the unskilled workforce represented by indigenous individuals. Additionally, the project will support local suppliers by sourcing provisions for the company's canteen and kitchen from local residents, thereby sustaining indigenous farming practices.

This comprehensive management plan aims to mitigate social and economic impacts while fostering sustainable development and community benefits.

10. Potential Impacts and their significance

1. Air Quality Management

The operation phase of the project will see the generation of dust and combustion emissions from:

- Stripping topsoil and overburden
- Loading and unloading of haul trucks
- Transport/haulage of extracted material from the pit to the processing facility
- Vehicles traversing site roads
- Wind erosion of stockpiles and spoil piles
- Operation of heavy duty equipment

Stripping topsoil and overburden will generate dust when undertaken in the dry season. Dust emissions from loading and unloading of haul trucks, haul roads, crushing and screening equipment, material stock piles and other fugitive dust generating operations would occur over the duration of the operation. This will result in moderate impacts (high likelihood, low severity). Dust and other emissions from haul roads and other sources will be mitigated by employing the following measures:

- Minimising drop heights from vehicles
- Limiting vehicle speed
- Employing dust suppression technique such as applying water or non-toxic chemicals
- Maintaining construction equipment according to manufacturer’s specifications
- Implementation of these mitigation measures will result in minor impacts (low likelihood, low severity).

2. Geology

During processing, tailing fine sediments will be taken to process site, no new area will be exploited. The present geologic profile of the area consists of a stratum of alluvial soils overlying residual soil material derived from weathered sedimentary rocks underlain by igneous and intrusive rocks. The pits, spoil and ore stockpiles will alter the topography, slope relief intensity, degree of shaping and exposure of the area. These are moderate impacts (high likelihood, low severity). These impacts would be localised to the site and will not be mitigated.

3. Generation of Solid Wastes Management

The operation of the gold project will generate very minimal volumes of solid wastes, including spoils, trash, scrap, rubble, domestic wastes, and hazardous wastes. If not properly managed, these wastes could lead to contamination of soils and water, as well as generation of odours, attraction of vermin, and creation of human health and safety hazards.

This impact is rated as medium (medium likelihood, low severity). The Project will minimise and mitigate these potential impacts by developing and implementing the respective waste management plans for each type of solid waste anticipated to be generated by the operation phase of the Project. Reuse and recycling would be preferred over disposal to the extent practicable. Under proper management (for cyanide management see its plan), the residual impact associated with solid waste generation is considered to be minor (low likelihood, low severity).

4. Water Management

Potential Impacts

Processing activities at the project site can lead to significant surface water impacts, including sediment loading and low pH due to acid mine drainage (AMD). Precipitation may cause leaching of chemicals from waste rock and overburden stockpiles, potentially resulting in slope failures and stormwater discharge containing heavy metals and sediments, which degrade surface water quality. Major impacts from these activities are categorized as having high likelihood and medium severity.

Mitigation Measures

To mitigate these impacts, the following measures will be implemented:

1. **Perimeter Drainage Channels**: Installed around waste stockpiles to collect stormwater runoff.

2. **Water Management Pond**: Stormwater from perimeter drainage will be discharged to a water management pond before final discharge to surface water.

3. **Leachate Collection System**: Installation of an impermeable liner to minimize potential impacts.

4. **Monitoring Stockpiles**: Regular monitoring of the physical integrity of overburden stockpiles to prevent slope failures.

These measures aim to reduce impacts to minor levels (low likelihood, low severity).

Major Impacts and BMPs

Breaches and overtopping of the water management pond present major risks (high likelihood, high severity). To mitigate these, Best Management Practices (BMPs) will be used during the design, construction, and operation phases, including monitoring dam integrity, resulting in minor impacts (low likelihood, low severity).

Wastewater Discharges

Potential impacts from wastewater discharges from onsite sewer systems and stormwater runoff from developed areas include physical, chemical, and biological changes to surface water quality, categorized as major impacts (high likelihood, high severity). Mitigation measures include:

1. **Proper Sewer System Design and Maintenance**: Including regular de-sludging and adherence to Guyanese septic tank standards.

2. **Proper Sludge Disposal**: Secure landfill disposal.

3. **Oil-Water Separators**: Channeling stormwater runoff through separators before discharge.

4. **Effluent Monitoring**: Ensuring discharged stormwater meets water quality standards.

These measures will minimize impacts to minor levels (low likelihood, low severity).

Groundwater and Operational Wastewater

Operational wastewater includes groundwater from site dewatering and slurry from crushing operations. Groundwater will be discharged to surface water after treatment in the water management pond. Sediment discharge will be controlled per the Erosion and Sediment Control Plan, with impacts considered minor (low likelihood, low severity).

Fuel Spills and Releases

Surface spills and releases of fuels and oils from mining equipment pose moderate impacts (high likelihood, medium severity). Mitigation measures include:

1. **Spill Containment and Prevention**: During transport, refueling, and equipment maintenance.
2. **Stormwater Management**: Channeling discharge from fuel storage areas through oil-water separators before release.

These measures aim to reduce the severity and likelihood of surface water contamination from operational activities.

5. Biodiversity Management

Loss of Aquatic Habitats

The operation of the mine and associated infrastructure will impact swamp habitats within the concession area. These habitats will have already been affected by construction phase activities, but the initiation of mining operations will bring additional impacts to these affected aquatic habitats.

Impacts to aquatic habitats associated with the operation of the area, the water management pond and other areas where major conversion of the land surface occurs will be unavoidable due to the nature of the activities. Upstream and downstream segments of streams will be affected. Water discharged from the diversion channels surrounding the waste stockpile areas will affect downstream receiving bodies and their aquatic fauna.

The loss of aquatic habitats in the concession area is considered to be a minor impact (low likelihood, low severity). With application of the mitigation measures, for surface waters and groundwater, the residual impact rating will be low (low likelihood, low severity).

Loss of Terrestrial Habitats and Flora

During operation, the additional loss of habitats and flora will not affect any threatened or restricted- range endemic species of flora and fauna. Much of the fauna will have likely already left the affected habitats due to disturbance during the construction phase. This impact is rated as moderate (medium likelihood, medium severity). These impacts will be minimised by implementation of the following:

- Minimisation of the Project footprint;
- Initiating restoration as soon as practicable in temporary work areas.

Implementation of these measures will result in minor residual impacts (low likelihood, low severity).

Loss of Terrestrial Fauna

During the operation of the mine, most of the larger animals would have already abandoned the area during the construction phase. Only small fauna accustomed to disturbed environments are likely to remain in or enter mining areas and other work sites. It is likely that small numbers of small animals such as amphibians and snakes will experience mortality due to equipment and vehicle use.

The loss of terrestrial fauna during the mining operations phase is rated as moderate (high likelihood, low severity). These impacts will be mitigated by implementation of the following:

- Minimisation of the Project footprint; and,
- Performance of preclearance surveys.

6. Noise and Vibration Management

During the moving of tailings operations, noise levels above the WHO industrial/commercial noise level guideline value of 70 dBA will be emitted from heavy equipment and earthmoving machines operation and from process equipment such as crushers. Maintenance operations in workshops and the process plant area will generate noise levels in the vicinity of 72-110 dBA. Noise levels from diesel power generation plants will range from 90-105 dBA. Exposure to noise levels above 90 dBA can cause noise induced hearing loss. Noise levels above the tolerable threshold of 72 dBA may result in fatigue, tiredness, low morale and decreased production levels. Tired workers are prone to accidents which may contribute to an increase in work-related accidents. These are major impacts (high likelihood, medium severity).

In addition to the earthen noise barriers created to minimise impacts, additional mitigation measures, to mitigate impacts to both the community and the mine site employees, will consist of the following:

- Installation of sound suppression devices (such as mufflers) on earthmoving equipment and generators, as necessary;
- Employing best available work practices on-site to minimise occupational noise levels;
- Isolation of noise source from employees' living and dining area;
- Using acoustic insulating materials such as silencers on exhaust systems;
- Issuing/requiring use of PPE (e.g., ear plugs or ear muffs) especially in high noise locations;
- Posting visible warning signs in areas of high noise levels instructing employees to wear ear protection;
- Periodically monitoring noise levels to ensure compliance with recommended threshold levels;
- Conducting regular hearing tests and maintaining records of results for workers exposed to high noise levels.

11. Cumulative Impacts Associated with Proposed Action

Cumulative impacts refer to the collective effects of various impacts caused by current projects, the proposed project, and potential future initiatives. These effects might be either significantly negative or positive, and they would not be anticipated if each project were considered individually. This section offers a detailed explanation and evaluation of the possible combined effects of the suggested gold project and previous or upcoming actions/projects on the environmental and socio-economic surroundings.

To assess the overall environmental impact of the planned action, it is necessary to identify and understand the cause-and-effect links between the various acts and the resources, ecosystems, and human communities that may be affected. The lack of available data on the environmental impacts of current and anticipated actions in the project's area of influence limited the scope of this cumulative impact analysis.

1. Potential Cumulative Impacts

Guyana exhibits a significant degree of poverty. Nevertheless, Guyana is abundant in natural resources, and there is an estimated workforce of around 100,000 individuals engaged in the direct or indirect exploitation of gold and other mineral resources. The region is renowned for its mining operations and has traditionally been the primary geographic location for extracting gold deposits. Communities within the project's area of influence provide evidence that mining, logging, and other subsistence livelihood activities are the primary sources of employment in the region.

The area is extensively depleted of minerals and contains a significant amount of tailings that can be treated to extract gold, rather than allocating new areas for mining. An increase in unregulated resource extraction and related activities can have substantial negative impacts on the natural environment, social and economic situations, as well as the overall health of the area and region. These consequences have a significant severity and a moderate likelihood. The impacts will be addressed through the establishment of a Multi-Stakeholder Influx Management Committee. This group will consist of representatives from existing communities, GGMC, GFC, and significant players such as loggers, miners, and HMCI. The committee shall establish a continuous system to oversee and address any unauthorized attempts to reach the areas adjacent to the access road and site with the intention of exploiting presumed resources in those regions. The group will convene on a quarterly basis, or more frequently if necessary, to address access issues and concerns pertaining to the development of the access road and site. The committee will conduct regular stakeholder and access management evaluations as a minimum requirement. These measures will have little effects, with both low severity and low likelihood. The area's cumulative impacts will be effectively controlled through the implementation of a comprehensive, long-term regional planning program that involves several stakeholders. The process of planning would involve establishing agreement, cooperation, and alliances among the people involved and accountable. Key stakeholders who would be included in the process are:

- Government of Guyana through authorities in the Bartica Sub-Region;
- Guyana Forestry Commission;
- Guyana Geology and Mines Commission;
- Guyana Gold and Diamond Miners Association;
- Local WWF and CI conservation NGO offices;
- Other regional stakeholder organizations.

12. Implementation Schedule

The project schedule is shown in Table .

Task	Years								
	2024	2025	2026	2027	2028	2029	2030	2031	2032
Construction of Dwellings & Admin Structures	■								
Acquisition and Construction of Process Plant	■	■							
Acquisition of Haul Truck & Loader	■	■							
Production of Gold	■	■	■	■	■				
Monitoring & Reporting Operational Phase	■	■	■	■	■				
Rehabilitation Works		■	■	■	■	■			
Monitoring & Reporting Post Closure Phase					■	■	■	■	■

Table 8. Oko Gold Leach Project Implementation Plan

13. Closure and Decommissioning Planning

The objectives of the Closure and Decommissioning Plan are to:

1. Prevent, reduce or mitigate the adverse environmental effects associated with the project;
2. Provide for the reclamation of all affected sites and landscapes to a stable and safe condition;
3. Provide for the return of all affected ecosystems to healthy and sustainable functioning;
4. Reduce the need for long-term monitoring and maintenance by designing for closure and instituting progressive reclamation;
5. Provide for long-term monitoring and maintenance of the sites affected by the project as required;
6. Provide for mine closure using the most current available proven technologies consistent with sustainable development. The closure plan's overall intent is to achieve the Hardrock Mining Co. Inc. objective of restoring the site and aquatic environment to a high ecological value. Besides, the closure will result in the establishment of conditions that support public safety through physical stability (Physical Stability), it would encourage productive end land use by the promotion of revegetation and promote conditions for biological stability (Biological Stability) in addition to ensuring that mechanism is in place to protect water resources and the receiving environment thereby providing chemical stability (Chemical Stability). Criteria/performance standards, which would function as measures of accomplishment of the closure objectives, are:

- **Physical Stability** - Preservation of protective safety measures (in a state in which the measures can be effective) throughout the post-closure monitoring period, once there has been no external human influence.
- **Biological Stability** - Effective revegetation and restoration evidenced by vegetative proliferation on 70% of the site areas intended for revegetation by the end of the post-closure monitoring period.
- **Chemical Stability** - Water quality is similar or improved compared with historical data at the end of the post-closure monitoring period, once there has been no human or related influence. The conceptual closure plan incorporates the use of storm-water management practices and soil and wildlife conservation.