Million Mountain Gold Project – Project Description

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MP ESTABLISHMENT
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Million Mountain Gold Project – Mine Plan of Operations (Heap Leaching with Jinchan)

The Million Mountain Gold Project (MMGP) operated by MP Establishment, proposes a best-practice, small-footprint heap-leaching operation to recover residual gold from legacy tailings at Puruni along the Mazaruni River (Mining District #3). Our approach embraces circular resource use, reprocessing old tailings rather than disturbing new ground, while deploying modern engineering controls, a closed-circuit water system, and rigorous monitoring. The plan below details how MMGP will build and operate three engineered leach pads (each 50 m × 50 m × 4.5 m) in parallel, irrigated with Jinchan ore-dressing reagent (a cyanide-free lixiviant), to safely and efficiently extract gold from tailings averaging 1.5 g/t. It has been prepared to demonstrate to regulators and stakeholders that the Project is protective of environmental quality and worker health from construction through closure and post-closure.

Executive summary

MMGP will re-handle and upgrade legacy tailings, stack them in thin lifts on three composite-lined heap pads, and leach with Jinchan using drip irrigation. Solutions drain via graded over-liner gravel to perforated collection laterals and then to dedicated pregnant and barren solution ponds; surge capacity is provided by a separate storm/emergency pond sized with conservative freeboard for extreme rainfall typical of north-western Guyana. Gold is recovered from pregnant solution in a carbon-in-column (CIC) circuit, stripped, and smelted to doré. The barren stream is reconditioned (pH/redox) and recycled, maintaining a closed water circuit and minimizing discharge.

The design meets or exceeds the intent of the Environmental Protection Act (1996) and Environmental Protection (Authorisations) Regulations (2000), relevant EPA Water/Air/Noise/Hazardous Waste Regulations, the GGMC Codes of Practice, and the adopted IFC/World Bank Group Environmental, Health & Safety (EHS) Guidelines. Controls include an engineered liner system; minimum 1.0 m operational freeboard in all ponds; bunded fuel and reagent storage; secondary containment at all transfer points; and a robust Emergency Response Plan (ERP). Progressive rehabilitation proceeds pad-by-pad, with final rinsing, neutralization, cover placement, and revegetation with native species.

1.0 Project description and objectives

The Million Mountain Gold Project (MMGP) is designed to recover residual gold from legacy tailings and, in doing so, convert a historical liability into both environmental and economic value while minimizing new disturbance, protecting water resources, and restoring the site at closure. The facility comprises three compact leach pads, each 50 metres by 50 metres and 4.5 metres high constructed on competent ground above flood levels to ensure long-term stability and access. Solution containment is provided by double-lined pregnant and barren ponds and a larger emergency/surge pond, all equipped with active leak detection appropriate to the foundation conditions. A carbon-in-column adsorption train with elution and smelting is sited immediately adjacent to the ponds to shorten pipe runs and reduce pumping head. Supporting infrastructure includes a laydown yard, a bunded and roofed fuel farm, and a dedicated, bunded JinChan storage and dosing area with sumps, and spill kits at transfer points. Administration, health–safety–environment and security offices, a small camp with potable water systems, an assay area, and housed generators with acoustic treatment complete the core services. Internal laterite roads with crown or cross-fall, side drains, and silt traps connect the pads, ponds, workshop, and camp while controlling runoff and dust. Operationally, legacy tailings are hauled about 0.5 kilometres from deposition areas to the pads, placed in thin courses of approximately 0.5 to 0.7 metres to build each lift, and lime-conditioned to the target pH prior to irrigation with JinChan solution. Leach, rinse, and neutralization are sequenced across the three-pad circuit so that two pads are typically under irrigation while one is stacking or rinsing, maintaining a stable solution balance and delivering consistent doré production throughout the mine life.

2. Geology and legacy tailings characterization

At the Million Mountain Gold Project, the legacy tailings to be reprocessed originate from historic alluvial workings and small hard-rock operations in the Puruni area, yielding a material that is dominantly silt to fine sand with occasional clayey lenses. Gold is present mainly as fine, liberated grains and as weakly bound coatings on iron oxides and clays forms that respond well to JinChan leaching when the material is properly conditioned. Site composites indicate an average head grade of about 1.5 grams per tonne, with short-range variability managed through on-pad blending to maintain steady solution grades and leach performance. Particle-size distribution is moderately fine (D80 roughly 200–400 micrometres), supporting uniform percolation under drip application when agglomeration and moisture are controlled. In situ moisture typically ranges from 10 to 18 percent depending on season; this is addressed operationally by moisture correction prior to stacking so lift density and permeability remain within design targets. Geotechnical testing shows drained frictional behaviour with low plasticity, allowing conservative lift thicknesses of up to 0.7 metres and stable side slopes when traffic loads are limited and compaction targets (≥95 percent of maximum dry density) are achieved through dozer traffic at controlled moisture. Baseline water chemistry is circumneutral and of low salinity; however, localized sulphate and iron can increase in seepage if not contained, so the facility's composite liner and drainage system are designed to keep contact water fully captured and hydraulically separated from non-contact storm water, preserving the closed-circuit performance required by the MPO.

3. Location and Access

The facility sits within the Puruni basin in an area of tropical rainforest with lateritic soils and seasonal high-intensity rainfall. The site has been influenced by prior small-scale mining, including historical tailings placement in low-lying areas. The selected HLF footprint is on competent ground above flood influence with favourable drainage to facilitate storm controls and separation of contact and non-contact waters.

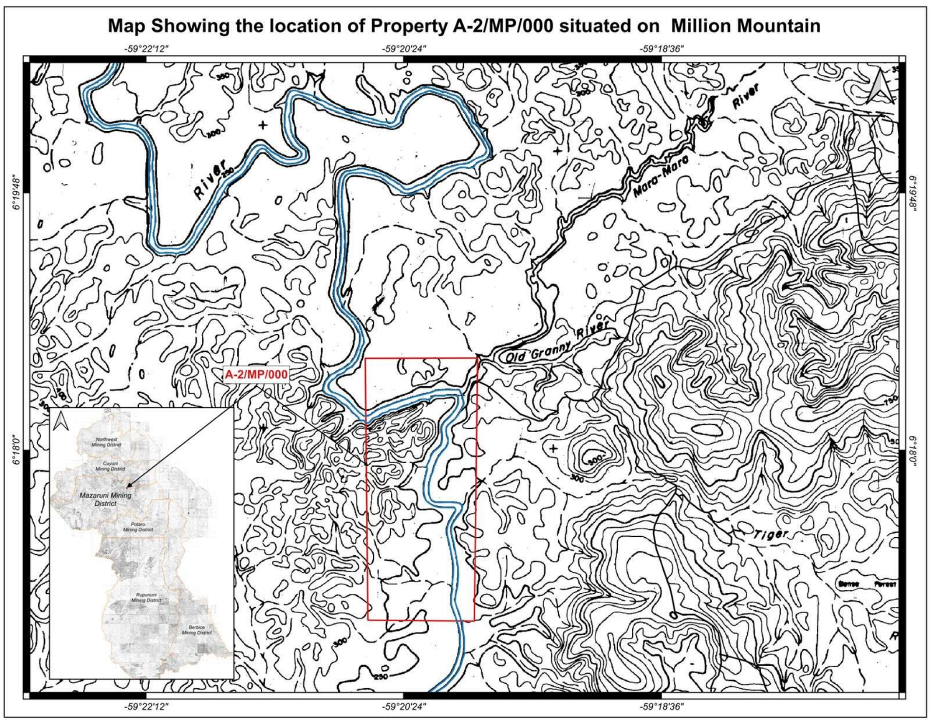

Figure 3-1: showing the project site

4. Standards, Authorizations, and Compliance

The Million Mountain Gold Project will operate under an Environmental Authorisation issued by the Environmental Protection Agency (EPA) of Guyana and will comply with the Environmental Protection Act (1996) and its amendments, together with the EPA's regulations for water quality, air quality, noise management, and hazardous waste. In addition, the project will follow the Guyana Geology and Mines Commission (GGMC) Codes of Practice covering water management, tailings management, cyanide alternatives such as JinChan, and mine safety, and where referenced by the EPA will align with the

International Finance Corporation Performance Standards (specifically PS1, PS2, PS3, PS4, and PS6) and the World Bank Group Environmental, Health and Safety Guidelines for both General and Mining sectors. Potable water systems will be designed and monitored with reference to World Health Organization drinking-water guidelines and applicable workplace health guidance. Demonstration of compliance will be maintained through documented quality assurance and quality control records, an environmental monitoring program with defined triggers and corrective actions, routine and annual environmental reporting to the authorities, and periodic independent audits to verify performance and drive continuous improvement.

4. Site layout and infrastructure

The MMGP site is arranged to prioritize safety, operating efficiency, and clean traffic separation. Three geomembrane-lined heap-leach pads are positioned on a gently graded, benched terrace at the centre of the footprint, with surfaces contoured to drain by gravity toward a lined pregnant solution pond on the downslope side, while a separate lined barren solution pond is located upslope for makeup and recirculation; in addition, each pad includes an adjacent storm-water or equalization pond sized for extreme rainfall events and hydraulically isolated from the process circuit. A ventilated, bunded chemical storage and dosing area equipped with eyewash stations, safety showers, and integral spill containment is sited downwind and at least fifty meters from accommodations, and is hard-piped to the barren-pond charging station to minimize manual handling. The mechanical workshop and laydown yard stand on a concrete apron and hydranted fire protection, and they are served by a one-way haul loop that keeps heavy truck movements segregated from light-vehicle traffic. The camp, including accommodations and kitchen/mess is buffered by vegetation, with the ablution block located well away from creeks and any process ponds to protect water quality. Security fencing, controlled access gates, directional lighting, and all-weather laterite roads complete the layout, and perimeter drainage swales and culverts route clean runoff around, not through the processing areas to maintain the project’s closed-circuit water management.

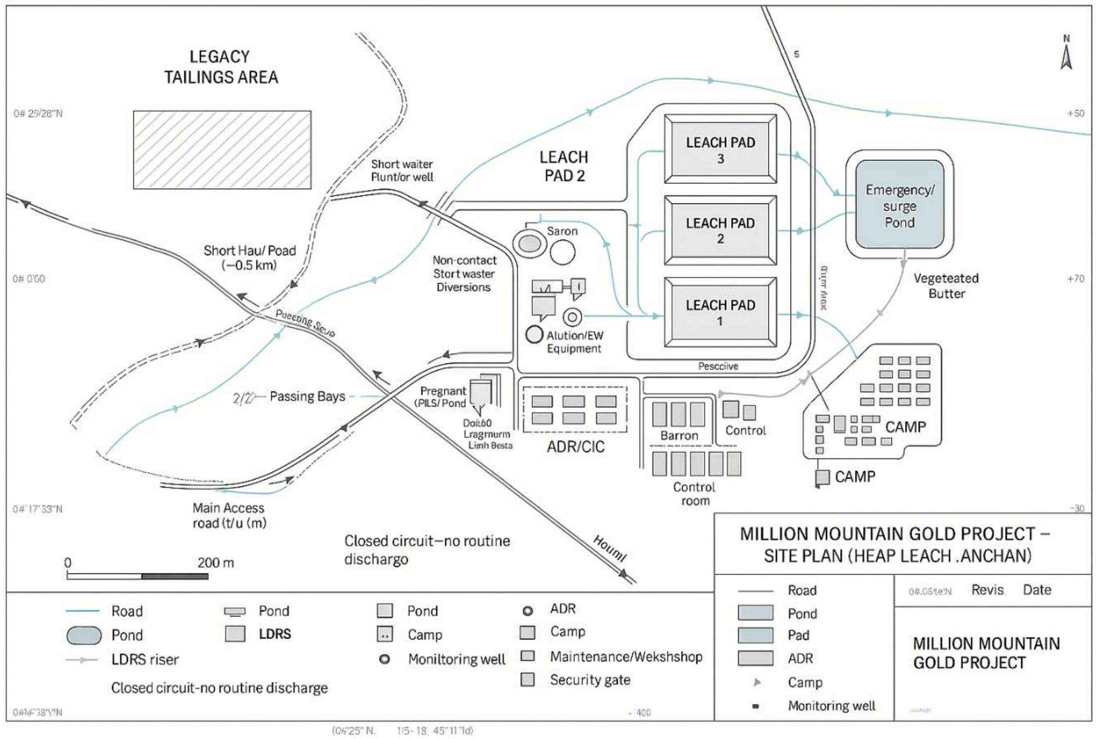

Figure 4.1-1 showing the site layout of the MMGP project

5. Leach pad engineering and pond design

Each MMGP leach pad measures 50 metres by 50 metres with an operational height of 4.5 metres and is constructed on a proof-rolled subgrade compacted to at least 95 percent of maximum dry density, with a gentle two percent cross-fall toward a lined collection channel to promote positive drainage. The containment system comprises a low-permeability foundation layer either compacted clay achieving a hydraulic conductivity of no more than 1×10^{-9} metres per second or a geosynthetic clay liner overlain by a 1.5-millimetre textured HDPE geomembrane protected by a geotextile cushion. Above the geomembrane, a 300-millimetre over-drain of graded drainage gravel houses perforated HDPE laterals at approximately ten-metre spacing, which convey percolate to the collection channel and then to the ponds; perimeter anchor trenches secure the liner at the crest. Stacking proceeds in thin courses of roughly 0.5 to 0.7 metres, dozer-spread to maintain uniform lift thickness and surface grade, with moisture adjusted to preserve permeability and shear strength; lime is added as required to reach the target pH, and compaction is controlled primarily through planned traffic patterns to avoid over-densification and preserve void structure for flow. Irrigation is delivered by UV-stabilized drip lines spaced approximately one to two metres apart and equipped with pressure control and sectional isolation valves so operators can balance application across panels; rates are set from column and pilot-panel results (typically 5 to

10 litres per hour per square metre during early leach) and can be tuned panel-by-panel to sustain uniform percolation with minimal drift, dust, or wind losses. Overall heap stability is verified by static and pseudo-static analyses, supported by operational rules for wheel loads and edge loading and by routine visual inspections of faces, benches, and berms.

Solution storage and routing are managed by dedicated, HDPE-lined ponds with separate duties to protect circuit segregation and maintain closed-circuit performance. The pregnant solution pond receives percolate by gravity and feeds the carbon-in-column circuit via a pumped suction fitted with isolation valves, level transmitters with alarms, and N+1 (duty/standby) pumping redundancy. The barren pond receives treated return solution, provides inline pH and oxidation–reduction conditioning as needed, and supplies the irrigation manifold through dedicated return lines to prevent cross-contamination. A separate storm or emergency pond provides surge capacity for extreme events and is hydraulically isolated from potable supplies and non-contact storm water. Operating freeboard is maintained at a minimum of one metre, with additional storm allowance sized from the site hydrology and a design event of at least the 1-in-100-year, 24-hour storm; fencing or netting is installed where appropriate to deter wildlife and prevent accidental access. Instrumentation across the pond system includes staff gauges and electronic level transmitters tied to alarms, flow meters on transfer lines, and accessible sampling points to support routine monitoring and reconciliation.

6.0 Mining Method

MMGP's mining and materials-handling operations are organized to sustain continuous heap-leach processing of legacy tailings on three concurrently operated pads while keeping the water, reagent, and solution circuits in a fully closed loop for hydraulic balance and regulatory compliance. Each pad is equipped with a dedicated four-inch pump set to manage pad hydraulics and maintain the water balance during stacking, irrigation, and rinse. Leach solution delivery is driven by two engine-powered four-inch pumps assigned to JinChan application, which feed the drip or spray laterals so that irrigation is distributed uniformly across active panels and sectional flow can be adjusted without interrupting adjacent areas. Pregnant solution is lifted by a separate engine-driven four-inch pump to a compact, skid-mounted adsorption train composed of twelve plastic drums plumbed as carbon-in-column vessels, allowing efficient gold loading with short residence times and low head losses. To preserve containment during extreme rainfall, each pad is paired with a lined storm water and emergency pond that provides surge capacity, prevents overtopping, and protects the closed-circuit solution inventory.

Tailings excavation and pad loading are carried out with 1.53-cubic-metre class excavators sized for steady placement in thin, levelled lifts; the primary fleet comprises two CAT 323D3 units and two Zoomlion ZE370E Pro units, which together provide sufficient reach and production to support simultaneous stacking on the three pads and to conduct routine berm maintenance and surface trimming. Haulage from legacy stockpiles or depositional areas to the pads is performed by two 30-ton SINOTRUK dump trucks operating on a short internal loop road; this configuration minimizes cycle times, keeps fuel consumption moderate, and allows the loading fleet to work without interruption. At the conclusion of each thirty-day leach cycle, the same 1.53-cubic-metre excavators execute a partial reclaim down to roughly a one-metre residual lift to enable either re-leach of the remaining inventory or rapid re-stacking of fresh feed, thereby preserving heap permeability and smoothing the transition between cycles. In combination, this arrangement of pumps, engines, carbon columns, lined surge capacity, excavators, and trucks delivers reliable reagent application, controlled recovery to the adsorption train, robust wet-weather resilience, and efficient tailings movement to sustain steady-state gold production.

7. Process description — Jinchan heap leaching

At the Million Mountain Gold Project, legacy tailings are excavated and hauled along the short 0.5-kilometre haul road to the lined leach pads, where they are blended to smooth out grade and improve drainage, and conditioned with lime to bring the pulp to the target pH established in test work. The material is then stacked in thin, controlled lifts that are lightly compacted to maintain trafficability and permeability, with moisture adjusted to the agglomeration set point followed by a brief cure so the stack accepts solution uniformly. Leaching begins with JinChan solution applied by drip irrigation at the pad surface; sectional valves and flow monitoring maintain the application rate proven in pilot tests and ensure even distribution and efficient reagent use across each panel. Percolating solution moves through the overliner and into the leak-resistant drainage system of perforated HDPE laterals and sumps, from which it gravitates or is pumped to the pregnant solution pond; headers, laterals, and sumps are inspected routinely to confirm free drainage and no ponding. Gold is recovered in a carbon-in-column circuit where dissolved metal is adsorbed onto activated carbon; loaded carbon is eluted and the eluate proceeds to downstream refining where gold is smelted to doré, while carbon is thermally regenerated and returned to the columns to close the adsorption loop. Eluate and other process solutions are reconditioned for pH and oxidation–reduction potential and recirculated as barren solution so that the water balance remains a closed circuit with high reuse. When a leach panel meets recovery and time criteria, irrigation ceases and the heap is rinsed until discharge endpoints are achieved; a lime-based neutralization step finalizes the chemistry, after which the cell is readied for regrading and closure in accordance with the mine plan.

7.1 Reagent Stewardship

JinChan is managed under a dedicated stewardship program that covers delivery, storage, mixing, and dosing within bunded, roofed chemical areas equipped with forced ventilation, eyewash stations, safety showers, and spill-response kits. All points of use display the current Safety Data Sheets (SDS) and site Standard Operating Procedures (SOPs), and only trained personnel wearing fit-for-purpose PPE handle reagent transfer or dosing. Deliveries are reconciled against manifests, on-hand volumes are tracked through a controlled inventory system, and decanting/mixing occurs over lined containment with dry-break couplings to minimize loss. Emergency preparedness is maintained through spill drills conducted in accordance with the site Emergency Response Plan (ERP), with each drill documented and any corrective actions entered into the commitments register.

7.2 Lixiviant Dispersion Mechanism

Jinchan lixiviant is applied uniformly across each MMGP's leach pad via a duty/standby system of two 4-inch centrifugal pumps that maintain hydraulic balance and constant application pressure. A central 4-inch HDPE header, laid along the pad's spine, feeds a grid of 1-inch perforated hoses arranged in a square pattern at 0.5 m spacing across the full pad width. Inline valves and flow meters at each lateral allow fine control of distribution, while quick-shutoff couplings enable safe isolation of segments during maintenance. The solution is emitted evenly across the stacked legacy tailings and percolates downward through the heap, dissolving gold into the circulating liquor.

Beneath the heap, a double-lined (HDPE over compacted clay) pad with geotextile protection supports a sloped over liner and a perforated under-drain network that captures the percolate. The collected pregnant solution is conveyed by under-drain laterals to a lined collection trench and into an engineered weir box for flow measurement and sampling, before gravity discharge to the geomembrane-lined pregnant solution pond. Secondary containment berms, leak-detection sumps, and pressure alarms on the 4-inch header provide additional safeguards to prevent off-pad releases and to keep the leach circuit hydraulically stable.

7.3 Drainage Control

To ensure hydraulic containment and protect surrounding waterways, MMGP employs a tiered drainage system. All solution collection ponds are encircled by engineered 6 m berms that intercept and retain external run-on and internal run-off, while each heap-leach pad is ringed by 5 m berms that provide an additional barrier against storm water ingress and egress. Collection ponds are operated with a maintained freeboard of 1.0–1.3 m to accommodate design storm events and surge conditions. Every leach pad is paired with a dedicated, lined storm water pond sized for extreme precipitation, allowing temporary detention and controlled return of non-contact water to the circuit. Surface grades, diversion channels, armoured spillways, and energy-dissipation structures direct flows toward lined containment; routine inspections verify berm integrity, freeboard, and outlet performance, ensuring run-off is contained and off-pad releases are prevented.

7.4 Water Balance

MMGP intends to operate the heap-leach circuit as a closed, actively managed system to minimize make-up water and prevent uncontrolled discharge. For each pad, the total operating inventory is maintained between 1,000–1,500 m³ (pad-size dependent). Steady-state distribution targets keep approximately 76–79% of solution volume secured in lined collection ponds (lixiviant/barren and pregnant solution ponds), while the remaining 21–24% is deployed across the leach pad surface to sustain uniform percolation and metallurgical performance. Daily dip-level readings, calibrated weir measurements, and pump run-time logs are used to reconcile inflows (rainfall, make-up) and outflows (evaporation, entrainment, carbon adsorption withdrawals), ensuring adequate freeboard and rapid response to storm events.

7.5 Reagent Consumption

To benchmark reagent use under steady-state conditions, MMGP completed a 30-day bench evaluation representing a full leach cycle for a pad with a geometric volume of approximately 9,000 cubic metres. Over this cycle, total JinChan consumption was about 10,350 kilograms (roughly 414 standard bags), while cement added for agglomeration totalled about 55,000 kilograms. Normalized to heap volume, these values equate to a JinChan intensity of approximately 1.15 kilograms per cubic metre of stacked ore and a cement intensity of about 6.1 kilograms per cubic metre. The observed intensities are consistent with the design basis and reflect calibrated dosing required to achieve target percolation, stable solution application, and efficient gold dissolution while preserving heap structural integrity. During operations, reagent usage will be reconciled routinely by comparing daily stock counts with metered make-ups, with adjustments made as needed to account for seasonal moisture changes, feed moisture and particle-size distribution, and variations in leach kinetics.

8. Mine Sequencing & Construction Phasing

MMGP will advance in three tightly managed phases to deliver a safe, compliant start-up and a predictable ramp to steady-state operations. **Phase A (Months 0–3)** covers detailed design finalization, survey control, and bulk earthworks, followed by installation of composite liners for the pads and ponds under third-party construction quality assurance, placement of over-drain and leak-detection systems, and construction of pipelines, manifolds, and the ADR/CIC plant. During this period the team also installs and commissions power generation, fuel storage and dispensing, raw and potable water systems, storm-water diversion channels, and internal road upgrades with drainage controls to segregate clean runoff from contact areas. **Phase B (Month 4)** focuses on commissioning of utilities and control systems, dry-running pumps and valves, and completing leak/pressure tests on ponds and pipework prior to introducing solution. Stacking begins on Pad A with SOPs verified through EHS drills; once percolation acceptance criteria are met, the project initiates first irrigation using JinChan at the design application rate with sectional control. **Phase C (Months 5–6)** expands stacking to Pads B and C, establishes two-pad irrigation while maintaining one pad in stacking/rinse, and tunes flows, carbon contact time, and reagent set points to stabilize recovery. The full monitoring suite water/solution inventories, leak-detection checks, environmental sampling, and metallurgical accounting, operates continuously through Phase C, supporting the transition to the steady 90-day operating cadence defined in the MPO.

9. Production Schedule & Reconciliation

9.1 Throughput & Gold Forecast

Year	Tonnes Stacked	Contained Au (oz)	Recovery (%)	Produced Au (oz)
1	30,000	1,447	80	1,158
2	30,000	1,447	80	1,158
3	30,000	1,447	80	1,158
4	30,000	1,447	80	1,158
5	30,000	1,447	80	1,158
Total	**150,000**	**7,235**	—	**5,790**

Table 9.1-1: Annualised gold throughput and production for LOM

Assumptions: 1.5 g/t head, 80% recovery, 1 t = 0.03215 oz.

9.2 Pad Cycling Strategy

- Two pads irrigated at steady state, one pad in stack/dry/turnaround.
- Cycle control: Solution tenor trend (decline to cut-off), percolation inspection, structural checks, freeboard vs. rainfall.

9.3 Metallurgical Accounting

Metallurgical accounting at MMGP follows a disciplined, auditable process that reconciles metal movement from solution through carbon to doré. Operations record daily pregnant solution pond flow and dissolved gold grade to establish the primary metal input to the adsorption circuit, while weekly carbon balances track inventory, movements, and loadings across the CIC, elution, and regeneration steps. Smelting performance is reconciled to eluate mass and grade, and final doré assays are compared with plant production records to confirm recovered ounces. A monthly variance analysis integrates these datasets solution inputs, carbon movements, and refinery assays against work-in-process estimates, with defined investigation thresholds and corrective actions (e.g., instrument calibration, sampling frequency adjustment, column operating changes, or carbon activity management) implemented whenever discrepancies exceed control limits.

10. Water management and balance

MMGP's water management is based on a closed-circuit strategy that prevents routine discharge and keeps clean and contact waters fully separated. Clean, up-gradient runoff is intercepted and routed around the facility in bermed diversion channels so it never enters lined process areas, while all contact waters from leach pads, sumps, and handling zones are captured and conveyed to the lined pond system for controlled storage and reuse. Pond capacities are sized to accommodate the design storm with additional operational freeboard, and duty/standby pumps with backup power maintain safe operating levels under adverse weather. Water-quality controls include oil–water separators at the workshop and chemical transfer pads, along with routine monitoring of pH, oxidation–reduction potential, turbidity, and total suspended solids; if a regulator-approved, controlled discharge is ever required, effluent would meet applicable EPA/GNBS limits. Operations keep daily records of rainfall, pond levels, transfer flows, and make-up water, and use clear action thresholds with defined pump rules to ensure inventories remain within safe, compliant ranges.

11. Anticipated Environmental Concerns and Proposed Mitigations

Within the MMGP's Mine Plan of Operations, the main environmental concerns anticipated at the site include potential seepage or overtopping of process solutions during extreme rainfall, accidental releases of reagents during handling and refuelling, erosion and sediment transport from earthworks and haul roads, dust and noise affecting nearby receptors. To mitigate these risks, the project is designed and operated as a closed circuit with no routine discharge, using composite-lined pads and double-lined pregnant, barren, and emergency/surge ponds equipped with active leak detection and action thresholds; minimum freeboard is maintained with pre-storm drawdown rules, duty/standby pumps, and backup power to preserve containment under adverse weather. Clean storm water is routed around processing areas via diversion ditches, and culverts, while contact water is captured by the LCRS and conveyed to lined ponds; erosion and sediment controls (crowns/cross-fall on roads, silt traps, stabilized outlets, progressive surface armoring and revegetation) limit off-site sedimentation. Reagents (JinChan) and fuels are stored and dosed in roofed, bunded areas with sumps and oil–water separation, supported by SOPs, SDS postings, trained personnel, spill kits, and drills under the Emergency Response Plan. Air quality and noise are managed through water-cart dust suppression, speed limits, equipment mufflers, and daytime scheduling where practicable. Wildlife safeguards include fencing or netting where needed, lighting and access control, vegetated buffers around ponds, and a camp sanitation system sited away from creeks. Performance is verified through an environmental monitoring program; upstream/downstream surface-water sampling for pH, conductivity, turbidity/TSS; pond freeboard and leak-detection readings; surrogate indicators of JinChan management (e.g., COD/TOC); and dust/noise spot checks with defined triggers and corrective actions to ensure impacts remain within permitted limits.

12. Health, safety, and emergency preparedness

HSE system. Induction, task-specific competency, JSAs, PTW, LOTO, hot work, and contractor HSE management. Routine inspections and near-miss reporting drive continuous improvement.

ERP coverage. Jinchan handling incidents; major spills/leaks; liner/pad damage; heap instability; extreme rainfall and pond overtopping; fires; power loss; medical emergencies; and security events. The site maintains a medical post, AEDs, eyewash/showers, and trained Emergency Response Team. Regular drills (table-top and full-scale) verify readiness.

13. Operations & maintenance

SOPs for stacking, irrigation control, pond operations, carbon handling, furnace, and gold accounting. Preventive maintenance scheduled by a CMMS for pumps, valves, generators, and mobile equipment; critical spares in laydown. Metering and instrumentation (flow, pH, ORP, level) are calibrated per schedule.

14. Risk assessment and controls

The MMGP risk assessment identifies extreme rainfall, liner damage, heap instability, reagent or hydrocarbon mis-handling, dust and noise, power interruptions, and site security/community interface as the principal hazards, and embeds specific controls for each within design and operations. Hydrometeorological risk is mitigated through dynamic water management supported by ponds sized to the design storm, an operational freeboard of at least 0.60 metres, a dedicated emergency/surge pond, duty/standby (N+1) pumping capacity, and storm standard operating procedures that mandate pre-storm drawdown and generator-backed transfer capability. Potential liner damage or leakage is addressed by third-party construction quality assurance and control during installation, use of a protective over-liner, strict traffic and edge-loading rules, continuous leak-detection monitoring against action thresholds, and a rapid repair protocol under a lined-work permit. Heap stability is protected by stacking in thin lifts with controlled moisture and compaction, geotechnical surveillance of slopes and benches, conservative stand-off distances from crest edges, and restrictions on heavy equipment near faces. Reagent risk is reduced by bunded, roofed storage and dosing areas with posted SDS and SOPs, trained personnel, eyewash/showers, and spill kits, reinforced by regular emergency response drills; hydrocarbon risks are managed through oil–water separators at service pads, drip pans, spill kits, and scheduled inspections. Nuisance impacts are controlled with water carts and speed limits for dust, equipment enclosures and acoustic treatments for noise, and periodic monitoring to verify compliance. To maintain operability during power outages, the site relies on housed generators with N+1 redundancy, managed fuel inventories, and auto-start or UPS support for critical pumps and controls. Finally, security interface risk is managed through controlled access and fencing.

15. Rehabilitation and closure

Progressive closure. Each completed cell is rinsed to discharge criteria, neutralized, drained, graded to stable slopes, covered with growth medium, and revegetated with native species. Ponds are decommissioned or repurposed after liner inspection; redundant infrastructure is removed and concrete scarified; soils are tested and remediated if required.

Post-closure monitoring. Surface/groundwater and vegetation/erosion metrics for a defined period (e.g., five years), with success criteria aligned to EPA permit conditions. Adaptive management addresses any variance early.

16. Site services and camp

Potable water is treated to WHO guidance; sewage is treated and disposed of per EPA requirements; kitchen operate under food-safety standards. Camp and shop areas are separated from reagent/fuel routes; waste is segregated, recycled where feasible. Lighting complies with safety and wildlife-friendly practices where practicable.

18. Training and competency

All personnel receive HSE induction and task-specific training (reagent handling, spill response, working at heights, confined space, LOTO, traffic rules, environmental monitoring). Drills for ERP scenarios occur at least semi-annually. Competency is tracked; refreshers are scheduled, and contractor compliance is verified.

19. Data management and QA/QC

Monitoring follows documented SOPs, calibrated instruments, and chain-of-custody. Data are stored securely, trended for early warning, and reported to regulators at required intervals. Pad construction, liner QA, and seam tests are archived for lifetime record.

20. Costing and resourcing

Capital covers pads, ponds, liner/CQA, CIC/Elution/EW, pumps and piping, workshop/OWS, camp, lab, power plant, and environmental controls. Operating costs include labour, fuel/power, Jinchan and lime, carbon and reagents, maintenance/spares, monitoring, and progressive rehabilitation. Contingencies are carried for extreme rainfall pumping, emergency repairs, and accelerated rehab if needed.

21. Conclusion

The Million Mountain Gold Project advances a circular mining model: recovering residual gold from legacy tailings with best-in-class environmental safeguards. Engineered leach pads, conservative water management, bunded reagent/fuel systems, and rigorous monitoring deliver robust protection for people and the environment while restoring a previously disturbed site. Our team is committed to transparent reporting, independent audits, and continuous improvement, establishing a benchmark for responsible gold recovery in Guyana.