

SURFACE AND UNDERGROUND DRILL-HOLE GROUTING SERVICES

Field	Detail
Project	Kibali Gold Mine / Surface and Underground Grouting Programme - 12-Month Contract
Document Type	12-Month Scope of Work, Detailed Technical Procedures, BoQ and Pricing Schedule
Discipline	High-Pressure Surface, Open Pit and Underground Diamond Drill-Hole Grouting (PQ, HQ, NQ)
Pricing Basis	All-inclusive service rates based on accepted net cubic metres of grout injected, plus approved setup and test items. Linear metres are for planning and productivity tracking only. KGM-supplied cement, colloidal silica and fuel are excluded from Contractor rates unless otherwise stated.
Equipment Basis	Contractor-provided high-pressure pumps, colloidal/high-shear mixers, agitators, packers, drill-string plug systems, calibrated instruments and data loggers
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Evaluation Approach and TEAR Scoring Summary

1. Tender Return Instructions: Grouting Services

The Tenderer shall price this package strictly in the format provided. No alternative pricing schedule shall replace the required BoQ, although supplementary pricing notes and clearly stated assumptions may be submitted in the tender return schedules.

- **Pricing:** All prices shall be stated in USD unless the tender instructions state otherwise.
- **Measurement:** Volumetric rates shall be submitted per accepted net cubic metre of grout injected. Net volume excludes grout retained in surface lines, flushing water, washdown, rejected batches, spillage, leakage and grout returned to containment. Linear metres of boreholes sealed shall be reported for planning, backlog tracking and productivity monitoring, but shall not be a direct payment quantity unless specifically stated in the BoQ.
- **Transparency:** All rows marked TBA shall be priced by the Tenderer or marked Not Applicable with a clear reason.
- **Assumptions:** The Tenderer shall not assume historical rates from previous contracts apply to this one-year contract; identify any exclusions, assumptions, or qualifications in the dedicated return schedule.
- **Equipment:** Submit a list of proposed pumps, mixers, agitators, packers, drill-string plug launching and landing equipment, flow meters, pressure transducers, data loggers, high-pressure lines and lifting equipment. State the equipment age, condition, maximum allowable working pressure, tested pump curve, availability and mobilisation plan. Brand name alone does not demonstrate compliance.
- **Compliance:** The Tenderer must confirm that rates cover the specified grouting methods and geological conditions. The 10 MPa value stated in this SOW is the required plant capability and absolute system ceiling only; actual operating pressure and flow shall be hole- and stage-specific as defined in the approved Grouting Plan.
- **Experience:** The Tenderer must submit evidence of at least two (2) years of specialised grouting experience and at least two comparable projects involving pressure grouting, underground water control, consolidation grouting, curtain grouting or drill-hole abandonment. CVs shall demonstrate directly relevant experience for the proposed key personnel.
- **Capacity:** The Tenderer must demonstrate adequate mixing, agitation, pumping, testing and staffing capacity to meet the issued Grouting Plan. Pump capacity shall be demonstrated by manufacturer pump curves and shall not be represented as simultaneously delivering maximum pressure and maximum flow unless the proposed configuration is specifically rated for that duty point.
- **Registration:** The Tenderer must be a locally registered company in the Democratic Republic of Congo and must submit current company registration evidence.

- **Financials:** If the Tenderer plans to obtain new assets for this scope, it must clearly disclose the asset acquisition plan and submit cashflow projections demonstrating that the financial burden can be carried for the one-year period without compromising performance.
- **Contract:** The Tenderer must complete the Contract Template and the "Requested Contract Changes" table.
- **Measurement Philosophy:** Linear metres of boreholes sealed shall be used for planning, backlog tracking and productivity assessment. Payment for volumetric items shall be based on the net measured and accepted grout volume entering the borehole, verified by a calibrated flow meter and an independent secondary method such as calibrated pump-stroke counts or batch reconciliation. The m³/m grout-take ratio is a technical indicator only. Variance against a hydrogeological model shall trigger technical review and shall not, by itself, invalidate an otherwise verified quantity.

2. Mandatory Tender Eligibility Requirements

The following requirements are mandatory pre-qualification requirements. If the Tenderer does not meet these requirements, they may be deemed non-responsive before weighted technical, safety, commercial, and local-content evaluation.

- **Minimum Grouting-Sector Experience:** The Tenderer must have at least two (2) years' demonstrable experience in grouting services. Submit a company profile, project list, client references, completion certificates, and evidence of work performed during the last two years.
- **Minimum Grouting Capacity:** The Tenderer must demonstrate the ability to perform the minimum injection volumes and/or production capacity stated in the technical schedules for the duration of the one-year contract. Submit a production capacity statement, fleet allocation plan, personnel schedule, mobilization plan, and signed confirmation of ability to meet the stated minimum requirements.
- **Local Registration:** The Tenderer must be a locally registered company in the Democratic Republic of Congo. Submit current DRC company registration documents, a valid business licence/RCCM extract or equivalent, tax registration, and any required local operating permits.

3. Evaluation Approach and TEAR Scoring Summary

EVALUATION CRITERIA	WEIGHTING IN %
Commercial - 25%	
Price Competitiveness, detailed cost breakdown	30%
Local Content Compliance & Ownership, RCCM Registration	25%
Company Policies & Procedures	25%
Barrick – Terms and Conditions, Payment Terms	20%
Technical - 50%	
Company profile with proven experience and successful execution of comparable pressure-grouting work within the past five years.	25%
List of Resources with CV's of all experienced Personnel to be mobilized for completion of works	10%
List and specifications of equipment to be mobilised, including pumps, mixers, agitators, packers, plug systems, calibrated instruments, radios, LVs, lifting equipment and material-handling attachments.	35%
Demonstrated understanding of SOW	10%
Quality Assurance and Quality Control Plans and documentation	10%

EVALUATION CRITERIA	WEIGHTING IN %
Bidders OHS policy & procedures	10%
Safety – 25%	
Safety file compliance	50%
ISO 45001 certification or demonstrably equivalent OHS management system	20%
Safety personnel qualifications	20%
Three-year LTIFR/TRIFR safety performance	10%

Schedule 1 - Surface and Underground Grouting Scope of Work

4. Purpose

The purpose of this Scope of Work (SOW) is to establish the minimum technical, operational, safety, environmental, quality, reporting and commercial requirements for diamond drill-hole grouting, water shut-off and permanent hole sealing in underground, open pit and surface locations. The Contractor shall provide all activities necessary for successful execution, including:

- equipment mobilization;
- grout preparation, batching, agitation and quality control;
- operation and maintenance of grout pumps, mixers, agitators, calibrated instrumentation, wellhead and downhole packers, drill-string plug systems and related accessories;
- installation of drill-string/stinger assemblies, telescopic pipes, packers, check valves, top and bottom plugs, landing seats, grout retainers and permanent collar closures; and
- provision of all required manpower, supervision, spares, tooling, operational consumables, testing equipment and documentation.

5. Scope Summary

Status	Workstream	Description
Included	Surface and Open Pit Grouting	Grouting and permanent sealing of PQ, HQ and NQ diamond drill holes at surface and open-pit locations using approved packer, stage, toe-fed or full-column methods. Plant capability up to 10 MPa; actual operating pressure is defined by the Grouting Plan.
Included	Underground Grouting	Grouting, water control and permanent sealing of underground NQ/HQ/PQ holes, including up-holes. Methods include through-drill-string packers, single/double packer stages, toe-fed full-column grouting, and approved bottom/top plug displacement.
Included	Grouting Support & QA/QC Services	Provision and maintenance of pumps, mixers, agitators, packers, drill-string plug equipment and calibrated instruments; baseline testing; method-specific verification; daily digital logging; and KGM QA/QC and HSE compliance.
Excluded	Material and Utility Supply (unless specified)	KGM-supplied cement, colloidal silica, fuel, cap lamps/self-rescuers and specified KGM-owned telescopic pipes/valves. The Contractor supplies all other equipment, PPE, spares, tooling and operational consumables unless stated otherwise.

6. General Performance Requirement

The Contractor shall perform the grouting services during the contract period in a professional, safe, efficient, and workmanlike manner using standard industry practice and suitable equipment for the planned grouting method, ground conditions, access constraints, and production schedule.

- **The Contractor shall comply** with KGM instructions, approved grouting plans, refusal criteria, site procedures, and HSE requirements (including maintaining an updated KGM Safety file).
- **The Contractor shall maintain** sufficient resources, qualified personnel, and operational spares to achieve the monthly grouting plan targets and minimize unplanned equipment downtime.
- **The Contractor shall coordinate** its work and formal reporting with KGM underground hydrogeology management, geology, mining, QA/QC inspectors, and other contractors working in the area.
- **The Contractor shall immediately notify** KGM of any event likely to affect safety, production, injection parameters (pressure, volume, flow rate), hole integrity, costs, or the execution schedule.

7. Contractor Responsibilities

a. Equipment Supply & Maintenance

The Contractor must provide and maintain all specialized machinery required for execution. This includes:

- Grouting Machinery: Grout pumps (positive displacement), mixers, agitators, wellhead packers, and all related accessories.
- Vehicles & Logistics: Light Vehicles (LVs) for both underground and open pit operations, lifting equipment, baskets for grouting, and forks for lifting.
- Maintenance & Spares: Handling all planned and corrective maintenance, as well as supplying the necessary spare parts and operational consumables to minimize downtime.

b. Operational Execution & Site Preparation

The Contractor is responsible for the end-to-end operational workflow:

- Site Setup: Mobilizing to the designated areas and setting up the grout batching/mixing zone.
- Borehole Preparation: Preparing, flushing, or jetting the drill holes when required before injection begins.
- Grout Preparation: Mixing cementitious or chemical grout according to the designs provided by KGM, while controlling the water-to-cement ratio, additives, and viscosity.
- Injection: Executing the approved method, including wellhead or downhole packer grouting, through-drill-string stage grouting, and toe-fed full-column grouting using top/bottom plugs where specified. The pump shall be capable of up to 10 MPa and 100 L/min within its approved performance envelope; actual pressure and flow are controlled by the hole-specific Grouting Plan and the lowest-rated component.
- Site Clearance: Cleaning the boreholes and machinery, responsibly disposing of excess grout/waste, and restoring the work area upon completion.

c. Utility Distribution

While KGM provides the primary utility connections on an "as available" basis, the Contractor is strictly responsible for the distribution of power, water, and compressed air from the supply point to their specific work areas.

d. Quality Control, Monitoring & Reporting

The Contractor must strictly manage and document the technical integrity of the work:

- **Quality Checks:** Conducting density, flowability, and setting time tests on the grout mixes.
- **Verification Testing:** Performing pre-grout water-pressure/packer tests and post-grout verification tests only in designated stages, retained-access holes or verification holes as directed by KGM Hydrogeology. A permanently full-column grouted hole shall not be reopened solely to conduct a routine Lugeon test unless specifically instructed.
- **Data Logging:** Maintaining detailed grouting logs for every single hole (recording pressure, volume, time, mix type, and cumulative grout consumption).
- **Reporting:** Submitting daily grouting records, final grout take summaries, and test results to KGM for verification and payment approval. The crew must also formally report to the mine's shift supervisor and participate in daily production meetings.

e. Personnel & HSE Compliance

- **Manpower:** Deploying a qualified, well-trained, and competent workforce to execute the work safely and efficiently.
- **Safety Protocols:** Strictly adhering to KGM's HSE policies, site inductions, risk assessments, and incident reporting procedures.
- **Administrative Safety:** The Contractor shall maintain a complete and current KGM Safety File. Failure to maintain mandatory safety documentation may result in suspension of work, rejection of personnel/equipment or contractual action.
- **Asset Protection:** Ensuring existing site services are not damaged. Any services damaged during operations must be repaired entirely at the Contractor's expense.

8. Company Responsibilities

a. Material & Fuel Supply

KGM shall provide the following principal materials and fuel unless a written contract amendment states otherwise. The Contractor remains responsible for secure storage, controlled issue, reconciliation and prevention of avoidable waste:

- **Cement:** Supplying all cement required for the cementitious grout mixes.
- **Colloidal Silica:** Providing chemical grouting components where required.
- **Fuel:** Providing all fuel necessary to run the grouting operations and equipment.

b. Technical Design & Operational Planning

KGM maintains control over the engineering parameters and project direction:

- **Grout Mix Designs:** Approving project mix designs, water-to-cement ratios, additives, bleed limits, rheology, set-time and strength requirements. The Contractor shall submit trial mixes and method-specific recommendations for approval.
- **Refusal Criteria:** Defining the approved effective stage pressure, maximum stage volume, mix-change sequence, minimum terminal flow/take, required hold period and verification criteria for each hole or treatment stage.
- **Grouting Plan:** Issuing and confirming the monthly grout schedule and targeted meters.
- **Telescopic Pipes & Valves:** Supplying KGM-owned downhole installation components identified in the approved forecast. The Contractor shall submit a rolling requirement forecast at least two months in advance and remains responsible for compatibility checks and correct installation.

c. Underground Safety & Site Access

KGM is responsible for controlled site access and site-issued underground emergency equipment:

- **Site Access:** Providing the contractor with physical access to the required work areas across the mine site.
- **Cap Lamps & Self-Rescuers:** Supplying these mandatory personal safety devices to the contractor's underground workforce.

d. Primary Utilities (As Available)

KGM provides the primary source connections for **Power, Water, and Compressed Air** on an "as available" basis at the site, which the contractor then distributes to their specific workspace.

e. Quality Assurance, Oversight & Approvals

KGM acts as the final authority on work acceptance and performance verification:

- **QA/QC Inspections:** Conducting regular inspections and monitoring the contractor's adherence to quality standards.
- **Data Verification:** Reviewing calibrated flow-meter, pump-stroke, batch and line-volume records. Hydrogeological models and theoretical hole volumes shall be used as reasonableness checks rather than the sole basis for quantity rejection.
- **Final Sign-Off:** Reviewing daily records, test results, and final grout take summaries to issue the formal approvals required for monthly payment processing.

9. Responsibility Assignment Matrix

S No.	Item / Service Description	Contractor	KGM	Operational Context / Specific Terms
1	Cement		X	Supplied by KGM for grout mix preparation.
2	All Grouting Equipment (Pumps, Mixers, Agitators, wellhead Packers)	X		Contractor provides specialized equipment.
3	Equipment Maintenance and Spares	X		Contractor ensures maximum uptime via preventive care.
4	Cap Lamp and Self Rescue		X	Safety gear supplied by KGM for underground activities.
5	Critical Spares	Req. 2M Advance	X	Contractor submits needs 2 months ahead; KGM supplies.
6	LV for Underground and Open Pit	X		Contractor provided transport assets.
7	Lifting Equipment	X		Contractor-provided lifting and material-handling equipment, operators and certified accessories.
8	Fuel		X	All operational fuel provided exclusively by KGM.
9	Manpower	X		Qualified and trained workforce provided by Contractor.
10	PPE (Gloves, Reflective clothing, Boots, Mask, Harness) , Hard Hats , Miners belt	X		Contractor supplies task-specific PPE, respiratory protection, fall protection and chemical handling PPE. KGM supplies only site-issued items expressly identified in the Contract.
11	Grout Plan		X	Operational schedule and routing design issued by KGM.
12	Regular QA-QC Inspections & Monitoring	X	X	Quality compliance oversight maintained by KGM.
13	Supply of Power, Water and Compressed Air	Distribution	As available	KGM provides main connection source; Contractor handles distribution.
14	Access to Site		X	Clear and unhindered entry provided by KGM.
15	Additives / Bentonite , KCL	X		Contractor Supplied, Bentonite reduces Shrinkage , KCL increase setting time.

10. Minimum Personnel Requirements

Role / Position	Count per Shift	Primary Operational Responsibilities	Mandatory Technical & Safety Qualifications
Grouting Supervisor / Crew Lead	1	Leads shift execution, confirms the approved Grouting Plan, verifies pressure limits and hold points, controls line-of-fire exclusions, monitors refusal/stop criteria and coordinates with KGM Hydrogeology/MRM.	Minimum five years' relevant grouting experience, including high-pressure underground work; competent in risk assessment, pressure calculations, packer/plug methods and formal technical records.
Grout Pump Operator	1	Operates the positive-displacement pump, monitors calibrated pressure/flow instruments and stroke counts, controls pressure ramping, displacement volumes and emergency shutdown.	Mechanically skilled in operating specialized grouting plants, trained in real-time pressure tracking and routine/corrective machinery maintenance to minimize downtime.
Batching / Mixer Operator	1	Prepares approved grout batches, controls water-to-cement ratio, density, rheology, bleed and set time, and maintains continuous agitation. A second batching operator is required where manual feed or production demand makes this necessary.	Trained in handling raw materials (cement, colloidal silica), competent in performing required QA/QC density, flowability, and setting time verification checks.

Role / Position	Count per Shift	Primary Operational Responsibilities	Mandatory Technical & Safety Qualifications
Grouting Technicians / Riggers	2	Prepares the site and borehole; runs drill-string/stinger, packers, plug launcher and landing equipment; installs lines, restraints, valves and vents; and completes flushing, pressure testing and recovery.	Certified for manual handling and working with high-pressure lines, fully compliant with KGM site inductions, PPE, cap lamps, and underground self-rescuer deployment.
Total Minimum Crew Strength per Shift	5	Increase to 6 where manual batching, simultaneous testing or work-at-height controls require.	Crew size shall be confirmed in the approved JSA and production plan.

11. Work Schedule and Availability

Working hours, shift arrangements and rest periods shall comply with applicable DRC laws, and Company requirements. Any 24-hour grouting operation shall have competent supervision on each shift, formal fatigue management controls, adequate lighting, reliable communications and tested emergency-response arrangements.

a. Shift Structure and Coverage

Where continuous operation is instructed and workfronts are available, the Contractor shall provide the following coverage:

- **Shift Setup:** 2 shifts per day (Day Shift & Night Shift).
- **Shift Duration:** 12 hours per shift (e.g., 06:00 to 18:00 and 18:00 to 06:00).
- **Rotation Schedule:** A continuous "7 days a week" roster matching standard mine operational cycles to clear backlogs and maintain paste/grout sequencing.
- **Reporting Mandate:** The working crew must report directly to the mine shift supervisor at the start of every shift and formally provide progress logs daily during production meetings.

b. Required Production Availability Targets

The contractor must maintain equipment and manpower availability to successfully deliver the following scheduled volumes:

- **Daily Planning Target:** 300 to 400 linear meters of completed hole treatment or sealing per day, subject to approved stage lengths, grout take, curing, access, mine interaction and verification requirements.
 - **Monthly Planning Target:** Maintain resources capable of completing 9,000 to 12,000 linear meters per month where sufficient released work fronts are available.
 - **Asset Availability:** Maintain a minimum 90% mechanical availability for the nominated pumps, mixers and agitators, calculated against scheduled operating hours and excluding approved KGM no-work periods.
 - These linear-meter targets are planning and performance indicators only. They shall not override safety, curing, pressure limits, refusal criteria or quality hold points. Payment remains based on the BoQ measurement rules.

c. Contract Horizon & Extension Timeline

The timeline follows a multi-phase structural approach:

[Year 1: Base Period] -> [Optional 6-Month Extension] -> [Optional 6-Month Extension]

- **Base Term:** Tendered rates shall remain fixed for twelve months from the commencement date, unless otherwise stated in the Contract. Estimated quantities are not guaranteed.
- **Discretionary Extension:** KGM may, at its sole discretion and subject to written agreement, extend the contract for up to two additional six-month periods.

d. Availability Penalties and Default Risk

The schedule demands strict operational discipline, and failure to remain available carries contractual consequences:

Contract default shall be assessed against operational availability, planned work front coverage, accepted linear meters completed against the KGM-issued grouting plan, reporting compliance, safety performance and equipment uptime. Lower or higher grout volume caused by actual ground conditions shall not, by itself, constitute contractor default, provided that the Contractor follows the approved methodology, refusal criteria and reporting requirements.

12. Execution Requirements

Sequence Stage	Mandatory Action Items & Requirements	Verification / Compliance Check
1. Pre-Operational Directive	Before anything else, the Contractor must obtain explicit work instructions and technical approval from MRM Management.	MRM Management Sign-off / Work Order issuance
2. Borehole Verification	Once on-site, the Contractor must physically check and verify the exact Hole ID targeted for grouting against the MRM design sheet.	Hole ID Match Verification Log
3. Mandatory Safety Clearances	Complete all pre-start checks, Job Safety Analyses (JSA), field risk assessments, required work permits (e.g., confined space, hot work), and conduct a Shift Toolbox Meeting before any work starts.	Signed Prestart Document, JSA Worksheet, Approved Permits, Toolbox Attendance Sheet
4. Site Preparation & Setup	Mobilise equipment, establish containment and exclusion zones, verify hole depth/diameter/inclination, calculate volumes and pressures, flush or condition the hole, and complete any directed baseline water test.	Pre-pumping equipment inspection
5. Mixing & Pumping Execution	Prepare the approved grout. Execute the selected packer, stage or full-column method. Monitor pump discharge and calculated effective stage pressure, flow, volume, mix changes, packer pressure, returns and abnormal responses in real time.	Digital pressure/flow/volume record; packer and plug record; batch QA results; independent volume reconciliation.
6. Refusal & Verification	Apply the approved refusal or completion criteria. Verification shall be appropriate to the method and may include retained-access re-test, pressure hold, volume/return reconciliation, cured collar inspection, verification hole or directed re-drill.	Accepted grout log, refusal/stop record and method-specific verification evidence.
7. Completion & Handover	Clean boreholes and machinery, responsibly dispose of excess grout/waste, and submit finalized logs to KGM MRM management for sign-off.	Signed Final Acceptance Confirmation

13. HSE Requirements

The Contractor shall comply with all Company HSE requirements, applicable laws, site procedures, permit requirements and risk controls. The Contractor shall stop work where an unsafe condition exists and shall not resume until controls are in place.

HSE Area	Minimum Requirement
Pre-start controls	Daily equipment inspections, pre-start meetings, toolbox talks and job safety analysis.
Traffic management	Safe movement of rigs, support vehicles, light vehicles and pedestrians.

HSE Area	Minimum Requirement
High-pressure systems	Rated components; compliant relief valves, calibrated gauges; mechanically restrained wellheads; hose/coupling restraints; burst sleeves where required; remote operation; exclusion zones; controlled depressurisation; and zero-energy verification before disconnection.
Rotating equipment	Guarding, emergency stops, lockout, safe mixer/agitator operation and safe handling of rotating plant components.
Lifting and rigging	Certified lifting equipment, competent operators and controlled lifts.
Emergency readiness	First aid, communication, emergency contacts, fire protection and evacuation arrangements.
Fatigue management	Shift planning, rest management and supervision for extended operations.
Incident reporting	Immediate notification, investigation, corrective actions and closeout tracking.

14. Environmental Requirements

- Prevent spills and uncontrolled releases of fuel, oil, grease, hydraulic fluid, cementitious grout, chemical grout additives, flushing water, and flushing residue.
- Maintain spill kits and appropriate containment at each grouting station, batching area, and support vehicle sector.
- Manage grout mixing materials, cement bags, additive packaging, and waste in accordance with Company requirements.
- Use bunding or secondary containment for fuels, lubricants, and chemical additives (such as colloidal silica) under Contractor control.
- Report environmental incidents, near misses, and chemical spills immediately.
- Leave each grouting site in a safe and tidy condition, with all materials, excess grout, and waste responsibly removed within 3 days of hole completion, with rehabilitation obligations completed where assigned to the Contractor unless otherwise instructed by KGM due to operational constraints.

15. Quality Assurance and Acceptance Criteria

Acceptance Area	Acceptance Requirement
Hole verification	Hole ID verified on-site against MRM management design sheets; pre-starts, JSAs, and permits completed prior to startup.
Grout mix compliance	Density, flowability, and setting times verified on-site to match the design parameters provided by KGM.
Pressure & Flow tracking	Pressure and flow remain within the approved hole/stage limits. Pump-discharge pressure, signed hydrostatic head, groundwater pressure and measured line loss are used to determine effective stage pressure. The 10 MPa value is an absolute plant/system ceiling, not a default target.
Refusal criteria	Approved terminal flow/take is maintained at the approved effective stage pressure for the specified hold period, with no uncontrolled migration, jacking, packer movement or equipment distress. Maximum volume or leakage triggers stop and review.
Sealing validation	Method-specific verification is completed and accepted. Routine post-grout Lugeon testing is required only where access is retained, or a verification hole/test stage is directed.
Reporting & Logs	Daily grouting records, svolume drop logs, and verification charts fully compiled and submitted.
HSE closeout	Work area left safe, clean, and without uncontrolled pressure or chemical hazards.
Commercial sign-off	Accepted net volume is supported by two independent measurements that agree within 10%. Variance against geological or hydrogeological models is reviewed and explained but is not the sole basis for rejection.

16. Reporting and Deliverables

Daily grouting progress reports shall be prepared by the Contractor and submitted to the Company on the next working day unless otherwise agreed. The Contractor shall maintain records sufficient to support safety compliance, quality verification, production tracking, invoicing, contract administration and monthly performance assessment.

Deliverable	Frequency	Minimum Content
Daily grouting report	Daily	Hole ID, shift, crew details, meters grouted, pumping time, delays, grout mix type, pressure logs, volume consumed (via flow meters/stroke counters), fuel usage for monitoring purposes only, and incidents.
HSE report	Daily / Weekly	Inspections, updated KGM Safety File status, incidents, near misses, hazards, corrective actions, and toolbox meeting topics.
Water-pressure / verification data	As directed	Baseline packer-test data and method-specific verification results, including interval, effective pressure, water take, test sequence, retained access and acceptance decision.
Grout take summary	Per hole / shift	Cumulative net grout volume, mix/batch data, pressure-flow-time plots, packer setting and inflation pressures, plug release/landing/bump data, returns, line volumes and refusal/stop reason.
Equipment availability report	Monthly	Equipment mechanical uptime, detailed tracking of planned vs. corrective maintenance, component wear status, and spare parts inventory.
Monthly progress report	Monthly	Total executed cubic meters by category (UG OPEX, CAPEX Surface, CAPEX UG), productivity analysis, safety performance, backlog comparison charts, and next-month outlook.
Invoice backup	Monthly or as agreed	Signed daily records, approved crew time sheets, explicit measurement logs of each hole, final KGM acceptance confirmations, and volume drop data.

17. Detailed Grouting Operational Requirements

The following detailed requirements incorporate the Contractor's obligations and practical controls specific to the **Underground, Open Pit, and Surface High-Pressure Grouting Services** scope. These requirements apply in addition to general contract provisions.

a. Training and Competency

The Contractor shall maintain verified training and competency records for all shift personnel. Required competencies include:

- high-pressure grout plant operations,
- positive displacement pump maintenance,
- chemical batching/additive handling (including colloidal silica),
- mechanical wellhead packer installation,
- working at heights,

- electrical/hydraulic isolation and lock-out,
- fire response,
- First aid,
- manual handling of high-pressure lines,
- lifting/rigging,
- defensive driving,
- site induction,
- emergency response procedures, and
- environmental awareness.

KGM/Barrick management may request these competency records or validated personnel CVs at any time to verify compliance with technical evaluation standards.

b. Safety Requirements and Mandatory Grout Rig/Plant Safety Systems

Safety is a mandatory requirement of this scope. The Contractor shall strictly comply with Barrick Global Standards, Barrick Fatal Risk/Critical Controls, Kibali site procedures, contractor management requirements, isolation and lock-out protocols, lifting and rigging standards, and applicable DRC legislation.

Each high-pressure grouting plant, mixing unit, and pumping setup shall have, as a minimum:

- Emergency stop systems are accessible at both the mixer and the pump console.
- Physical guarding with effective safety interlocks on all rotating equipment (agitators and mixers).
- Certified pressure-relief devices set at or below the lowest maximum allowable working pressure in the complete system, protected against unauthorised adjustment.
- Burst-protection sleeves or equivalent guarding on high-pressure hoses where required by the Barrick Global Drilling Standard and the approved risk assessment.
- Engineered hose and coupling restraints suitable for the hose type, pressure and connection. Generic whipchecks shall not be treated as a substitute where the OEM requires a different restraint system.
- Mechanically restrained wellhead/packer assemblies, a defined line-of-fire exclusion zone and remote operation where practicable to control plug, packer or component ejection.
- Two independent pressure indications where practicable: one at the pump/manifold and one at or near the borehole, with downhole pressure measurement used for critical stages when specified.
 - Certified lifting points, lockable energy isolation points, safe access systems, and non-slip working platforms.

c. High-Risk Grouting Activities

The Contractor shall identify and control high-risk activities including handling high-pressure fluid delivery systems, line pressure testing, manual handling of cement bags and chemical additive containers, chemical mixing, working at heights during pipe routing, mechanical wellhead packer inflation, lifting and suspended loads, vehicle and equipment interaction, night shift operations, underground access/egress, and severe weather exposure on surface pads. Task-based risk assessments and **Job Safety Analyses (JSA)** shall be completed for all high-risk activities.

d. Lifting and Rigging

The Contractor shall ensure all lifting equipment utilized for moving grout plants, pumps, or batches of cement is certified, inspected, and fit for purpose. This includes crane components, shackles, lifting slings, eye bolts, and storage stillages. All lifting equipment shall display a rated capacity, unique identification number, inspection status, and valid certification. Non-certified lifting equipment shall not be used under any circumstances.

e. Standard Operating Procedures (SOPs)

The Contractor shall maintain current and approved SOPs for all grouting activities, including:

- Plant mobilization,
- Setup and leveling, **high-pressure line flushing/jetting**,
- Grout batching and mix optimization,
- wellhead, drill-string-conveyed single and double packer installation, setting, pressure testing, equalisation, release and recovery;
- Bottom and top plug launching, displacement-volume control, plug landing/bump confirmation and drill-string cementing;
 - Positive displacement pumping execution,
 - effective stage-pressure calculation, pump-discharge limits, pressure ramping and real-time monitoring;
 - **Refusal criteria verification**,
 - pre-grout water-pressure testing and method-specific post-grout verification;

NQ/HQ tremie-line high-pressure flushing, toe-fed grout placement, controlled tremie withdrawal and full-column verification;

- Washdown and line cleaning,
- equipment inspection, pressure testing, maintenance and critical-spares control;
- Equipment Isolation and lock-out,
- Fire response,
- Emergency evacuation, and
- Post-grouting site close-out within 3 days.

SOPs must be available in **English, French, and Lingala/Swahili**, and shall be reviewed with crews during training. Evidence of training shall be maintained.

f. Quality Assurance and Deliverables

The primary quantity-control tolerance is the agreement between two independent measurement methods, such as a calibrated flow meter and calibrated pump-stroke/batch reconciliation. A difference greater than 5% requires investigation and correction before invoicing. Variance from a hydrogeological model or theoretical annular volume is a technical review trigger only because actual grout take is ground-condition dependent.

The Contractor shall deliver:

- Safe and continuous high-pressure grouting operations meeting shift targets.
- Complete daily grouting records (including real-time pressure, stroke count, and volume drop logs).
- Water-pressure and method-specific verification data for designated stages, retained-access holes and verification holes.
- Weekly and monthly KPI reports, final end-of-hole grout take summaries, and an end-of-program performance summary report.

g. Standards and References

The Contractor shall comply with Barrick Global Standards and Critical Controls, the Barrick Contractor Management Standard, Kibali procedures, applicable DRC legislation, OEM manuals and approved engineering specifications. Technical guidance shall include USACE EM 1110-2-3506, Grouting Technology (2017), the USBR Engineering Geology Field Manual for water-pressure testing and grouting, and recognised grout-plant/packer manufacturer guidance. Where requirements differ, the most conservative approved requirement applies.

h. Specific Scope of Work

The Contractor shall undertake all activities required for safe, productive and continuous grouting operations during the contract period and any approved extensions. This includes mobilisation of positive-displacement pumps, batching and agitator plants, wellhead and downhole packers, drill-string plug equipment, lines, instruments, consumables and crew; site inspection and safe setup; MRM instruction and Hole ID verification; pre-starts, JSAs and toolbox meetings; approved mix preparation; execution of through-drill-string stage grouting, toe-fed full-column placement and bottom/top plug displacement where specified; method-specific verification; washdown and waste containment; preventive maintenance; and demobilisation and closeout.

i. Grouting Parameters and Performance Targets

Operations shall be resourced for two 12-hour shifts where KGM instructs continuous coverage. The baseline planning target is 350 to 400 linear metres per day and 10,500 to 12,000 metres per month where released workfronts are available. Actual output will vary with packer stages, grout take, pressure holds, water inflow, curing, verification testing and mining interaction. Delays and constraints shall be accurately coded and reported.

j. Equipment and Grouting Specifications

The Contractor shall provide positive-displacement grout pumps and mixing capacity suitable for the approved method and grout rheology. The plant shall have a verified operating envelope covering up to 10 MPa pump-discharge pressure and up to 100 L/min flow, but selection shall be based on the required duty point. Maximum pressure and maximum flow are not assumed to occur simultaneously unless demonstrated by the pump curve.

The absolute pump-discharge ceiling under this SOW is 10 MPa (1,450 psi / 100 bar). It is not a default operating target. Each Grouting Plan shall state the maximum allowable effective stage pressure and the corresponding pump-discharge limit after accounting for signed hydrostatic head, groundwater pressure and measured dynamic line losses. The pressure relief setting shall not exceed the lowest maximum allowable working pressure in the complete system.

k. Practical Grouting Execution Requirements

- Step 1: MRM Management Instruction: Before any activity takes place, the Contractor must obtain clear work instructions, localized hole locations, and approved mix designs directly from MRM Management.
- Step 2: On-Site Asset & Hole ID Verification: Once at the location, the Contractor must physically check and confirm the Hole ID intended for grouting against the MRM design sheets to ensure absolute accuracy.
- Step 3: Mandatory Safety Clearance Gate: Before work starts, the crew must fully complete and document:
 - Pre-start Checks: Comprehensive mechanical and safety walkdowns of the pump, mixer, and high-pressure line connections.
 - Job Safety Analyses (JSA): Site-specific risk evaluations for active pressure or chemical hazards.
 - Toolbox Meetings: Crew briefings covering tasks, safety controls, and target refusal limits.
- Step 4: Plant Set-up and Alignment: The grout plant and delivery lines must be positioned on stable, compacted ground free from overhead hazards and loose debris. Exclusion zones must be enforced around high-pressure lines during pressure testing and active pumping.

l. Grouting Methodology and Refusal Criteria

The Contractor shall select the grouting method and packer configuration for the actual hole geometry, inclination, measured diameter, ground condition and treatment objective. Approved methods include single- or double-packer stage grouting through the drill string, toe-fed full-column grouting, and purpose-designed bottom/top plug displacement through the drill string. Unvented collar-only injection into long up-holes is not acceptable unless specifically engineered and verified.

A grouting stage is complete only when the approved refusal or completion criteria are achieved without evidence of jacking, uncontrolled migration, packer movement, collar instability or pressure-system distress.

- The terminal grout flow/take reduces to or below the approved threshold while the approved effective stage pressure is maintained for the specified hold period.
- The approved maximum stage volume is a mandatory stop-and-review trigger; it is not, by itself, evidence of successful refusal.
- Grout return from adjacent holes, workings, fractures or the collar is a stop-and-review condition. Injection shall not continue until the migration path and containment method are approved.

m. Grout Line, Packer, and Pressure Valve Management

The Contractor shall maintain a documented inspection, pressure-test and replacement system for all high-pressure components. Lines, manifolds, swivels, rod adapters, valves, packers, plug heads and landing assemblies shall be compatible and traceable. Pressure gauges, transducers, flow meters and relief devices shall be calibrated at approved intervals and after damage or abnormal events. No component may be used above its rated working pressure, and all connections shall be depressurised and verified at zero energy before adjustment or disconnection.

n. Hydrogeological Deficit & Sealing Validation

The Contractor shall manage downhole hydrogeological risk using baseline water-flow observations and, where directed, water-pressure/packer testing. Verification shall be method-specific: retained-access stages may be re-tested after sufficient grout set; full-column sealed holes may be verified by controlled returns, calculated volume reconciliation, plug/bump records, pressure hold, top-up observations, cured collar inspection, nearby verification holes or re-drilling when specifically directed. Lugeon testing shall not be stated as a universal post-grouting test for every permanently sealed hole.

o. Material, Water, and Drill Fluid Management

The Contractor shall receive, store, protect, issue and reconcile all KGM-supplied cement and colloidal silica, and shall manage Contractor-supplied additives, water-distribution equipment and delivery lines. Cement and additives shall be protected from moisture, contamination and unauthorised use. No additive or change to the approved mix design is permitted without written approval from KGM Hydrogeology/MRM. Water-supply interruptions or quality concerns affecting grouting continuity shall be reported immediately.

p. Grout Waste and Material Handling

The Contractor shall ensure all raw materials and mixed grout are handled responsibly. Spent cement bags and chemical containers must be collected and contained. Washdown residue and excess grout must be directed to designated containment sumps or disposal areas. Uncontrolled discharge of grout or chemicals into active mine workings or the natural environment is strictly prohibited.

q. Fire Prevention and Emergency Response

Requirements include certified fire suppression systems on all diesel-powered grout pumps or support units, portable fire extinguishers at the batching station, fire watch protocols for any hot work, localized chemical spill kits, clear emergency communication channels, emergency shutdown procedures, muster point identification, and trained first-aid personnel on every shift.

r. Productivity, Performance, and KPI Requirements

The Contractor shall maintain the required performance, including equipment mechanical availability above 90% for positive-displacement pumps and batching plants. Contract continuity and any optional extension are subject to KGM review of safety compliance,

workfront coverage, approved production targets, reporting accuracy, measurement integrity and equipment reliability. Actual grout take caused by ground conditions shall not, by itself, be treated as poor Contractor performance where the approved method and refusal criteria were followed.

s. Maintenance, Critical Spares, and Consumables

The Contractor shall maintain all grouting machinery in a safe, reliable condition through daily pre-start inspections, shift handover walkdowns, and scheduled preventative maintenance.

Minimum on-site stock must be tracked using a dedicated register and include:

- Mechanical and inflatable packers, packer seals, and replacement inflation lines.
- High-pressure grout hoses, delivery pipes, heavy-duty manifolds, and high-pressure valves.
- Positive displacement pump parts (pistons, liners, check valves, seats, and seals).
- Mixer blades, agitator seals, hydraulic hoses, fittings, filters, and lubricants.
- Calibrated pressure gauges and replacement pressure relief valves.
- Safety items, including engineered hose and coupling restraints, burst-protection sleeves where required, barriers, warning devices and lighting spares.

Stockouts causing operational downtime require formal reporting and immediate corrective action.

t. Environmental Management

Controls shall include banded hydrocarbon and chemical additive storage, strategically placed spill kits at the batching station, strict waste segregation (separating paper cement bags from chemical liners), drill sump and washdown water control, sediment trapping, and thorough cleanup of the site within 3 days of hole completion. All spills or uncontrolled grout releases must be reported immediately.

u. Mobilisation and Demobilisation Requirements

Prior to mobilization, the Contractor shall provide comprehensive equipment compliance documentation, pump pressure ratings, fire suppression certifications, lifting equipment certificates, high-pressure hose inspection records, pressure gauge calibration sheets, personnel training records, medical clearances, risk assessments, and SOPs. KGM reserves the right to inspect and reject non-compliant equipment prior to site entry.

Upon completion or termination of works, the Contractor shall remove all pumps, plants, lines, waste materials, and unused consumables; clean the batching and pumping sites; safely close out sumps as instructed; and submit all finalized logs and records for commercial verification.

v. Commercial Considerations and Reporting

The contract is structured around fixed rates for the BoQ items, including accepted net cubic metres injected, approved borehole setup/packer activities, plug-placement activities and directed test blocks. Rates remain fixed for the initial twelve-month period unless otherwise stated in the Contract. Accepted net volume excludes surface-line contents, flushing, rejected grout, spillage, leakage and recovered returns.

All activities must be logged and submitted for KGM approval:

- Daily Grouting Reports: Must include pump number, Hole ID, shift, operator names, supervisor name, start/end times of injection, cubic meter treated, grout mix type/viscosity, pressure logs, stroke counts, volume consumed, delays, and safety/HSE topics.
- Weekly Reports: Must track total executed cubic meters by hole, pump utilization, mechanical availability analysis, safety metrics, consumable stock levels, and maintenance summaries.

- Monthly Reports: Must provide a comprehensive production summary against targets, KPI trend lines, downtime analysis, safety performance, core-yard/underground compliance metrics, and next-month scheduling outlooks.

w. Practical Minimum Expectations

At a minimum, the Contractor shall ensure:

- Grouting plants are fully compliant and safe prior to mobilization and throughout the contract horizon.
- High-pressure pumping and downhole packer configurations are fully verified for deep hole applications.
- Rigs, lines, and pressure relief valves are certified, pressure-tested, and tracked.
- No work begins without MRM Management instructions, physical Hole ID verification, completed JSAs, pre-starts, permits, and toolbox meetings.
- Critical spares are maintained on-site to guarantee 90% availability.
- Volumetric measurement is reconciled between calibrated flow-meter, pump-stroke and batch records. Material differences against theoretical hole volume or KGM hydrogeological models are investigated and technically explained, but are not automatically treated as non-compliance.

x. Approved Grout Plant / Pump Matrix

Equipment Type	Operational Application	Mandatory Requirement
High-Pressure Positive Displacement Pump	Deep high-pressure underground and surface borehole sealing.	Plant shall have an approved operating envelope covering up to 10 MPa discharge pressure and up to 100 L/min flow. The tenderer shall provide the pump curve and identify the actual duty point for each configuration.
Colloidal / High-Shear Batching Plant	Rapid, homogenous mixing of cementitious and chemical grout mixes.	High-shear/colloidal mixer with accurate water and cement batching; agitator sized for continuous supply; capability to produce stable, low-bleed mixes and approved chemical grout systems.
Downhole Packer Assembly	Single/double packer, stage isolation, water testing and through-drill-string injection.	Mechanical or inflatable packer sized to the measured hole diameter and rated for the approved differential pressure with OEM margin. Must include independent pressure indication, controlled equalisation/release and positive retrieval or approved sacrificial arrangement.
Drill-String Bottom/Top Plug System	Toe-fed full-column cement placement and separation of grout from preflush/displacement fluid.	Purpose-designed launcher, plugs/darts, landing seat or bypass/rupture assembly and non-return device compatible with the actual drill-string ID and joints. Field-improvised balls, foam or rags are prohibited.

y. KPI Reporting Matrix

KPI Parameter	Measurement Window	Mandatory Target / Requirement
Linear Metres Completed per Day	Reported Daily	Planning target of 350 to 400 linear metres per day where released workfronts are available; method and safety controls take precedence.
Linear Metres Completed per Month	Reported Monthly	Planning capacity of 10,500 to 12,000 linear metres per month where workfronts are available.
Equipment Mechanical Availability	Reported Weekly & Monthly	Minimum 90% uptime on pumps and mixers.
Measurement Variance Margin	Reported Per Hole	≤10% difference between the calibrated primary volume measurement and the independent secondary measurement. Model variance is a review trigger only.
Sealing Efficiency (Permeability)	Reported Per Hole	Method-specific verification meets the approved Grouting Plan. Lugeon testing is applied only to designated accessible stages or verification holes.
Pre-Work Safety Compliance	Reported Per Shift	100% completion of MRM instruction, Hole ID checks, pre-starts, JSAs, permits, and toolbox briefings before startup.
Unplanned Downtime Hours	Reported Daily	Logged, categorized, and tracked against critical spare part lead times.
Safety & Environmental Incidents	Reported Immediately	Zero critical injuries; zero uncontrolled chemical or grout releases to the environment.

z. Practical Activity Breakdown

Activity Stage	Contractor Operating Requirement	Key Contractual Control
Work Authorization	Obtain explicit coordinates, depths, and mix approvals from MRM Management before any site works.	Approved MRM Work Order / Instruction Sheet.
Site Asset Verification	Physically locate the designated drill site and check the Hole ID on the collar against the manifest.	Physical Hole ID Verification Log entry.
Pre-Start Clearance	Complete mechanical walkdowns, site hazard JSAs, active work permits, and interactive toolbox briefings.	Signed Pre-start Checklist, JSA sheet, and Toolbox attendance roster.
Plant Setup & Leveling	Position the pump and batching plant on stable ground; run delivery lines with whiplash protection.	Pre-pumping Line Inspection Checklist.
Borehole Preparation	Verify accessible depth, measured/estimated diameter, inclination, casing, water flow, obstructions and communication. Flush/condition the hole and conduct baseline testing where directed.	Hole preparation and baseline condition record.
Grout Batching	Mix cement, water, and approved additives (colloidal silica) according to design specifications.	Slurry Density and Mud Balance test records.
Downhole Isolation	Run and set the approved wellhead or downhole packer, or install the drill-string toe-discharge/plug assembly. Test the seal and verify all pressure paths before grout injection.	Packer/plug assembly checklist and pressure-test record.
Active Pumping	Ramp pressure and flow gradually within the approved limits while recording pump pressure, effective stage pressure, flow, volume, packer pressure, mix and returns.	Continuous digital pressure-flow-volume-time record.
Refusal Verification	Confirm terminal flow/take and hold period at the approved effective pressure. Maximum volume, leakage or abnormal ground response requires stop and engineering review.	Accepted refusal/termination record.
Sealing Validation	Complete the approved verification method: retained-stage re-test, plug/bump and volume evidence, pressure hold, collar/top-up inspection, verification hole or directed re-drill.	Method-specific verification and acceptance record.

Activity Stage	Contractor Operating Requirement	Key Contractual Control
Plant Washdown	Flush delivery lines, pumps, and mixers with water to prevent internal grout setup; contain residue.	Environmental Sump Containment control.
Site Handover	Clear all materials, spent packaging, and waste from the pad within 3 days of completion.	Signed Final Site Close-out & Handover Certificate.

Schedule 2 - BoQ and Pricing Schedule

The tendered shall complete all applicable rates in the tables below for the twelve (12) month period. Historical rates from previous contracts or amendments shall not be used in this twelve-month document. Quantities are estimates only and do not constitute a guarantee of volume, extension or ongoing work beyond the period. Payment shall be based on actual measured and accepted quantities, approved hours and approved reimbursable items.

1. COMMERCIAL PRICING NOTES & PRINCIPLES

Guideline Category	Contractual Interpretation & Billing Rule
1. Currency Framework	All rates and totals must be explicitly priced and quoted in United States Dollars (USD).
2. All-Inclusive Rates	Rates include all labour, supervision, Contractor-supplied equipment, spares, tooling, PPE, logistics, maintenance, operational consumables, KGM-supplied cement, additives and fuel are excluded unless otherwise stated. No material mark-up applies to KGM-issued materials.
3. Materials & Grouts	KGM supplies cement, and fuel as stated in the Responsibility Matrix. The Contractor shall forecast, receive, store, protect, issue and reconcile these materials. Avoidable loss, contamination or unapproved wastage is not billable.
4. Compliance Audits	Invoice validation requires signed shift records, calibrated quantity evidence, pressure/flow logs, batch QA, packer/plug records and the specified method-specific verification. The 10 MPa ceiling is not an invoicing target.

2. ACTIVITY MATRIX FOR BILLING CLASSIFICATION

Operational Field Activity	Primary Cost Type / Classification	Contractual Measurement Metrics
Mobilisation	Fixed Lump Sum	Payable following approved mobilisation, documentation review, site inspection and functional testing. Demobilisation is measured separately.
Borehole Setup & Packer Seating	Unit Rate (Per Setup / Action)	Fixed fee per approved borehole setup and packer seating cycle. Re-seating caused by Contractor error is not separately billable.
Active High-Pressure Pumping	Variable Volumetric Rate (OPEX / CAPEX)	Rate per accepted net cubic metre entering the borehole within the approved stage volume. Excludes KGM-supplied cement, colloidal silica and fuel, surface-line volume, flushing, rejected grout, spillage, leakage and returns.
Water-Pressure / Verification Test	Unit Rate (Per Test Block)	Rate per approved test block or verification activity executed and accepted by KGM. Testing may be pre-grout or post-grout where access is retained.
Operational Standby / Delays	Unit rate per hour / Company delays only	Approved upon confirmation of delay caused by company or inclement weather conditions. (Surface Works)
Mechanical / Contractor Breakdown	Non-Billable / Zero Rate	Contractor accountability. Zero billing applies during any plant failures, sub-90% uptime, or missing spares.

3. ALL-IN BILL OF QUANTITIES (BoQ) & PRICING SCHEDULE

Item No.	Description of Work / Asset	Unit	Estimated Qty	Unit Rate (USD)	Total Amount (USD)
1	OPERATIONAL GROUTING AND HOLE TREATMENT				
1.1	Mobilisation between work areas, borehole setup, alignment/Hole ID verification, containment, lines and one approved packer seating cycle	Each	200	\$0.00	\$0.00
1.2	Accepted net cementitious or approved chemical grout injected. Includes Contractor plant, labour, equipment, spares and operational consumables; excludes KGM-supplied cement, colloidal silica and fuel	m ³	827	\$0.00	\$0.00
1.3	Through-drill-string bottom/top plug placement, including launcher setup, plug release, displacement control and landing/bump record	Each	TBA	\$0.00	\$0.00
1.4	Full-column permanent hole closure and collar completion where separately instructed	Each	TBA	\$0.00	\$0.00
1.5	Approved water-pressure/packer or verification test block, including data record and interpretation	Test	627	\$0.00	\$0.00
2	NON-BILLABLE DELAYS AND BREAKDOWN				
2.1	Operational standby or field delay, unless expressly pre-approved under the Contract	Hour	0	EXCLUDED	\$0.00
2.2	Contractor mechanical breakdown, maintenance, crew shortage or missing spares	Hour	0	EXCLUDED	\$0.00
3	MOBILISATION AND DEMOBILISATION				
3.1	Initial mobilisation, compliance inspection and functional commissioning of all plant, tools, vehicles and environmental controls	Lump Sum	1	\$0.00	\$0.00
3.2	Final demobilisation, removal of plant/waste, site rehabilitation and handover of all final records	Lump Sum	1	\$0.00	\$0.00
	TOTAL ESTIMATED CONTRACT VALUE				\$0.00

Schedule 3 – Grouting Plan

The grouting plan shall be issued by the Company and may be updated during the twelve (12) month period. The Contractor shall use the grouting plan for resource planning, mobilisation planning, productivity tracking and monthly forecasting.

Planning Field	Value / Contractual Definition
Work area / pit / deposit	Kibali surface and underground grouting areas as issued by Barrick/KGM.
Grouting method	Method selected from the approved hierarchy: stage grouting using single/double packers; through-drill-string packer grouting; toe-fed full-column grouting; or purpose-designed bottom/top plug displacement through the drill string. Unvented collar-only injection in long up-holes requires specific engineering approval.
Estimated stages / holes	As issued in the monthly Grouting Plan. Quantities are estimates only and are not guaranteed.
Estimated volume / take	To be defined based on active downhole hydrogeological variance and KGM models.
Packer & hole diameter compatibility	Actual measured hole diameter and internal drill-string dimensions shall be confirmed. Nominal PQ/HQ/NQ bit or casing size alone is insufficient for packer/plug selection.
Planned depth range	Based on the dynamically drilled hole depth
Planned injection pressure range	Hole-specific. Maximum allowable effective stage pressure and pump-discharge pressure shall be stated in the Grouting Plan. Absolute pump-discharge ceiling is 10 MPa.
Mix design & material specs	KGM-approved stable cementitious grout and, where specifically authorised, chemical grout. Mix schedule shall define water-to-cement ratio, additives, density, rheology, bleed, set time and strength.
Priority / sequence	As explicitly instructed by the Company's Technical and MRM Management teams.
Planned start date	Based on the formal contract commencement date.
Planned completion date	1 year from formal contract execution date unless extended by the Company.
Minimum monthly grouting capacity	Planning capacity: 9,000 to 12,000 linear metres/month where sufficient released workfronts are available.
Contractor confirmed capacity to meet targets	TBA - Formal sign-off and equipment capacity commitment required from Contractor.

The estimated monthly breakdown for August 2026 to July 2027 is shown below. Linear metres and grout volumes are planning estimates only and do not guarantee work quantity or grout take.

Month	UG (m)	m3/m (NQ)	UG Volume (m3)	Surface CAPEX (m)	m3/m (PQ)	m3/m (HQ)	Surface CAPEX Volume (m3)
Aug-26	2,520	0.0045	11	4,919	0.0117	0.0072	58
Sep-26	2,520	0.0045	11	4,919	0.0117	0.0072	58
Oct-26	2,520	0.0045	11	4,919	0.0117	0.0072	58
Nov-26	2,520	0.0045	11	4,919	0.0117	0.0072	58
Dec-26	2,520	0.0045	11	4,919	0.0117	0.0072	58
Jan-27	2,520	0.0045	11	4,919	0.0117	0.0072	58
Feb-27	2,520	0.0045	11	4,919	0.0117	0.0072	58
Mar-27	2,520	0.0045	11	4,919	0.0117	0.0072	58
Apr-27	2,520	0.0045	11	4,919	0.0117	0.0072	58

Month	UG (m)	m3/m (NQ)	UG Volume (m3)	Surface CAPEX (m)	m3/m (PQ)	m3/m (HQ)	Surface CAPEX Volume (m3)
May-27	2,520	0.0045	11	4,919	0.0117	0.0072	58
Jun-27	2,520	0.0045	11	4,919	0.0117	0.0072	58
Jul-27	2,520	0.0045	11	4,919	0.0117	0.0072	58
Total	30,240		136	59,028			691
TOTAL: 89,268 m planning quantity / 827 m ³ estimated grout volume							

Schedule 4 - Technical Grouting Procedures

The following procedures are mandatory minimum requirements. They do not replace the hole-specific Grouting Plan, OEM instructions, JSA/FLRA or engineering approval. The Contractor shall not commence pumping until the selected method, maximum allowable effective stage pressure, pump-discharge limit, stage/plug volumes, mix schedule, refusal criteria, verification method and emergency response have been approved.

1. Definitions and Engineering Basis

Term	Contractual Definition
Approved Grouting Plan	The hole- or stage-specific instruction approved by KGM Hydrogeology/MRM defining method, geometry, mix, pressure, flow, volumes, hold points, refusal/stop criteria and verification.
Pump-Discharge Pressure	Pressure measured at the pump or manifold. It is not automatically the pressure acting on the rock mass.
Effective Stage Pressure	Pressure acting on the treatment interval after correction for signed hydrostatic head, groundwater pressure and measured dynamic line loss. Elevation head is added when the stage is below the gauge and subtracted when it is above the gauge.
Refusal	Approved terminal flow/take maintained at the approved effective stage pressure for the specified hold time, without abnormal ground, packer or equipment response.
Stop-and-Review Trigger	A condition requiring immediate suspension and engineering review, including maximum stage volume, uncontrolled returns, pressure instability, packer movement, collar distress, suspected jacking, loss of instrumentation or equipment limit.
Accepted Net Grout Volume	Grout volume confirmed to have entered the borehole, excluding surface-line contents, flushing, rejected batches, leakage, spillage and recovered returns.

Pressure correction shall use measured elevations and a signed convention. The Contractor shall establish dynamic head-loss curves by pumping the actual water and approved grout mixes through the assembled lines/drill string to free discharge at representative flow rates. Direct downhole pressure measurement shall be used for critical or uncertain stages when specified. Fixed rules of thumb or a blanket 10 MPa target shall not be used as a substitute for engineering assessment.

2. Calculation and Volume Control

All calculations shall use verified dimensions, consistent SI units and a documented signed pressure convention. A second competent person shall independently check the calculation sheet before pressure testing or pumping. Calculations shall be revised whenever the drill string, stinger, packer depth, hose length, fluid density or hole geometry changes.

Calculation	Minimum Requirement
Open-hole volume	$V = 0.7854 \times D^2 \times L$, using the measured or approved effective hole diameter. State theoretical volume and approved excess separately.
Annular volume	$V = 0.7854 \times (D_{\text{hole}}^2 - D_{\text{string_OD}}^2) \times L$. Separate cased, open-hole and enlarged intervals where dimensions differ.
Drill-string / stinger volume	Use the verified clear internal diameter through rods, joints, adapters, landing tools and discharge subs. Include launcher and tool dead volumes.
Surface-line volume	Calculate from the actual internal diameter and length of all hoses, pipes, manifolds and valves between the calibrated measurement point and the borehole.

Calculation	Minimum Requirement
Hydrostatic correction	Delta P = density x 9.81 x elevation difference / 1,000,000 MPa. Apply the approved sign convention for up-holes and down-holes and use the actual fluid density.
Effective stage pressure	Determine from pump/manifold pressure after correction for measured dynamic line loss, signed hydrostatic head and groundwater pressure. Direct downhole pressure measurement is required where specified.
Plug displacement volume	Calculate the fluid volume required to move the top plug from the launcher to its landing seat. Include launcher/line corrections and stop at the approved calculated volume or positive landing/bump indication, as defined in the Grouting Plan.
Reconciliation	Reconcile batch volume, calibrated flow-meter volume, pump-stroke volume, line/string contents, returns and accepted net borehole volume. Investigate a difference greater than 5%.

3. Method Selection

Hole / Ground Condition	Preferred Method	Critical Controls
Discrete fracture or water-bearing interval	Single or double packer stage grouting through drill string	Test packer seal; isolate competent wall section; grout deepest stage first unless design states otherwise; equalise before release.
Completed dry or low-flow hole requiring permanent full-column seal	Toe-fed grout through drill string/stinger, with bottom/top plug displacement where compatible	Verify string and annular volumes; provide collar vent/return; prevent drain-back; confirm plug landing/bump or uncontaminated returns.
Up-hole requiring permanent seal	Toe discharge at the highest practical point, filling back toward the collar; use dual plugs or controlled stinger displacement	Mechanically restrain collar assembly; maintain vent path; use stable low-bleed grout; control trapped air and drain-back.
High water inflow or grout washout	Targeted packer treatment or approved rapid-set/chemical pre-seal, followed by permanent cementitious grout	Chemical grout requires KGM/HSE approval, SDS controls and ventilation assessment; cementitious permanent seal remains the default.
Unstable, collapsing or highly enlarged hole	Casing, sleeve-port/tube-a-manchette, shorter stages or progressive drilling and grouting	Do not assume an open-hole packer will seal; revise method after camera/caliper/packer trial.
Unknown diameter, obstruction or possible connection to workings	Survey, depth probe, camera/caliper and low-pressure water test before production grouting	Stop if connection, void, gas, abnormal water or collar instability is identified.

4. Hold Points and Release Authority

Hold Point	Release Requirement	Minimum Release Authority / Evidence
HP1 - Design release	Hole-specific Grouting Plan approved, including method, mix, maximum effective pressure, pump-discharge limit, flow, stage/plug volumes, refusal criteria and verification method.	KGM Hydrogeology/MRM written approval.
HP2 - Workfront release	Hole ID, collar, access, ground condition, ventilation, drainage, services, exclusion zone, JSA/FLRA and permits verified.	KGM shift/Ground Control release and Contractor Supervisor sign-off.
HP3 - System readiness	Equipment inspections complete; assembly water-pressure test passed; relief setting confirmed; packer seal or plug compatibility trial complete; calculations independently checked.	Contractor Supervisor and KGM representative.
HP4 - Commence production injection	First stage or plug-launch sequence reviewed with the crew; data logging operational; emergency stop and depressurisation sequence confirmed.	KGM representative present or documented release.

Hold Point	Release Requirement	Minimum Release Authority / Evidence
HP5 - Refusal / termination	Approved refusal achieved or stop-and-review outcome resolved. Final pressure, flow, volume, hold time and abnormal observations accepted before packer release or moving stage.	KGM Hydrogeology/MRM representative.
HP6 - Final closure	Method-specific verification accepted; collar closure, identification, records, waste removal and mine register update complete.	KGM Hydrogeology/MRM final acceptance.

5. Pre-Grouting Borehole Preparation

1. Confirm Hole ID, collar coordinates, dip, azimuth, design depth, accessible depth, nominal and measured diameter, casing depth and intended final use.
2. Inspect the workplace and collar condition; obtain Ground Control release; verify ventilation, drainage, lighting, communications and emergency access.
3. Probe the hole and confirm the proposed packer, drill string, stinger, plugs and landing assembly can reach the required depth without obstruction.
4. Record static and flowing water conditions. Test for gas where required by mine procedures. Stop and escalate any unexpected pressure, gas, temperature, void or connection to another working.
5. Flush or condition the hole using an approved medium and pressure. Record return clarity, losses and any communication. Do not use uncontrolled air flushing in a water- or gas-risk hole.
6. Calculate open-hole, casing, drill-string, annular, surface-line, preflush, grout and displacement volumes. Record the calculation independently and have it checked by the Supervisor.
7. Pressure-test the assembled surface system with water in accordance with the approved test procedure. Verify relief devices, gauges, transducers, flow meter, data logger, non-return valves and emergency stops.
8. Establish the exclusion zone and line-of-fire controls. No person shall stand directly in line with the borehole collar, plug launcher, packer head, hose end, coupling or valve outlet.

6. Procedure A - Through-Drill-String Packer Grouting

This method applies where a specific interval must be water-tested or pressure-grouted while access is retained through the drill string. Single packers may isolate the hole below the packer. Double packers isolate a defined interval between two sealing elements.

1. Compatibility check: Remove the inner tube and confirm the clear internal diameter through every rod joint. The packer, setting tool, inflation line, injection ports and retrieval components shall be compatible with the drill-string ID, hole diameter, inclination and expected differential pressure.
2. Assembly check: Inspect threads, seals, inflation elements, check valves, ports and retrieval features. Record packer serial number, size, pressure rating and allowable expansion range. Bench-test inflation, pressure retention, controlled deflation/release and fluid passage.
3. Run in hole: Assemble and lower the packer on clean, correctly torqued drill rods or the approved conveyance string. Use centralisers where required. Record rod count and calculated packer depth; confirm against measured depth.
4. Set location: Position the sealing element in competent, reasonably uniform borehole wall and clear of known cavities, severe breakouts or intersecting joints where bypass is likely. The stage length shall match the approved Grouting Plan.
5. Set and restrain: Mechanically set or inflate the packer in accordance with the OEM procedure. Maintain independent indication of packer pressure. Secure the drill string and wellhead against axial movement and ejection.
6. Seal test: With water, slowly apply the approved low test pressure and confirm the packer holds without movement, bypass or pressure decay. Check for returns above the packer and communication with adjacent holes/workings.
7. Baseline test: Where directed, complete the approved stepped water-pressure test. Correct results for groundwater, elevation and line loss. Do not exceed the stage pressure limit or continue if dilation/jacking behaviour is suspected.
8. Grout injection: Begin with the approved starting mix and low flow. Increase pressure gradually. Record pump pressure, effective pressure, flow, volume, batch/mix, packer pressure and returns continuously. Change mix only in accordance with the Grouting Plan.

9. Refusal or stop: Continue until the approved refusal criterion is achieved. Stop immediately for maximum volume, uncontrolled migration, packer movement, abrupt unexplained pressure/flow change, collar distress, equipment limit or instruction from KGM.
10. String cleaning: If the packer is recoverable, displace or flush grout from the drill string and packer ports using the approved volume without flushing grout from the treated fractures. The flushing volume and destination shall be recorded.
11. Equalise and release: Shut the pump, isolate the system and bleed surface pressure to zero. Equalise pressure across the packer using the designed bypass. Deflate or mechanically release only after zero differential pressure is confirmed.
12. Recover or reposition: Verify release before pulling the drill string. Move to the next approved stage, normally progressing from the deepest interval toward the collar unless the design states otherwise. Inspect the packer before reuse.

7. Procedure B - Bottom and Top Plug Cementing Through the Drill String

The dual-plug method is used to place a defined grout column through the drill string while separating the grout from the fluid ahead and the displacement fluid behind. It shall only be used with a purpose-designed, pressure-rated plug launcher, plugs/darts, landing/bypass assembly and drill string confirmed compatible by the equipment supplier and KGM. Improvised foam balls, rags, timber, plastic bags or unverified plugs are prohibited.

1. Confirm the drill string is open, clean, pressure-tight and free of internal restrictions. Verify all rod joints are correctly made up and the internal passage through the complete string is suitable for both plugs.
2. Install the approved toe shoe, landing collar, rupture/bypass seat or discharge sub. The bottom plug must have a defined landing and bypass/rupture function that allows grout to exit after landing. The top plug must provide positive displacement completion indication.
3. Install a rated plug-launching head with positive isolation between chambers. Identify bottom and top plugs to prevent reverse loading. Confirm the launch sequence and pressure limitations with the full crew.
4. For an up-hole, extend the discharge point to the highest practical point. Fit a collar packer or grout-retaining head with a separate controlled vent/return line and positive mechanical restraint. Provide a non-return or float function to prevent drain-back.
5. Calculate and independently verify: surface-line volume; drill-string volume to the bottom seat; annular/open-hole volume; planned excess; grout batch volume; and displacement volume required to land the top plug without over-displacement.
6. Conduct a surface pass-through or representative joint trial for the proposed plugs before first use, after any change of rod type, plug type or landing equipment, and whenever internal damage or restriction is suspected.
7. Preflush: Pump the approved preflush/spacer if specified. Record the exact volume. The spacer shall be compatible with the grout and the existing borehole fluid.
8. Launch bottom plug: Load and release the bottom/leading plug ahead of the grout. Confirm launch by the designed mechanical, pressure or sensor indication.
9. Pump grout: Pump the calculated approved grout volume at controlled rate while maintaining agitation and batch QA. Monitor for unexpected pressure increase that may indicate a stalled plug or restriction.
10. Bottom plug landing: Confirm the bottom plug lands at the toe seat. Increase pressure only to the approved bypass/rupture value. Record the landing pressure and bypass/rupture event. Do not exceed the lowest system or formation limit.
11. Toe discharge and annular fill: Continue pumping grout through the opened toe port so the hole fills from the toe toward the collar. Keep the collar vent/return path open and directed to containment.
12. Return confirmation: Monitor return density and condition. For full-column sealing, continue until the approved return criterion is met, typically uncontaminated grout of the specified density at the collar vent or the calculated volume plus approved excess where no returns are possible.
13. Launch top plug: After the final approved grout batch, release the top/trailing plug. Confirm launch and commence displacement with the approved fluid.
14. Controlled displacement: Pump only the calculated displacement volume, adjusted for surface lines and plug position. Record cumulative displacement continuously and reduce rate as the top plug approaches the landing point.
15. Top plug landing/bump: Confirm top plug landing by the expected pressure increase or other positive indication. The allowable bump pressure and hold time shall be specified in the Grouting Plan. Stop pumping immediately at the approved bump; do not over-displace or repeatedly pressure-cycle the plugs.

16. Isolation and drain-back control: Close the approved isolation valve or rely on the verified float/non-return device. Maintain only the approved static pressure. Observe for pressure decay, return flow or collar leakage.
17. Completion: Secure the assembly against movement until the grout has achieved the specified initial set. Do not disconnect, rotate or pull the string while pressure remains or before the approved wait-on-cement period.
18. Recovery or sacrificial closure: Recover the string only where the method is designed for recovery and KGM has approved the timing. If the string, plug or stinger is sacrificial, record the final depth and component details on the hole completion record.
19. Collar closure: After set, inspect for settlement or drain-back, top up if directed, install the permanent collar plug/cap and identification plate, and update the mine plan/register.

8. Specific Controls for Up-Holes

1. Toe-fed placement is the preferred full-column method. Grout shall enter at the highest practical point and fill back toward the collar through a controlled annulus.
2. The collar head, packer, drill string and vent line shall be mechanically restrained for the maximum credible axial load. Friction alone is not an acceptable restraint.
3. Use a stable, cohesive, low-bleed grout to reduce segregation, free fall and void formation. The mix shall remain pumpable for the calculated placement time.
4. Maintain a dedicated vent/return path until the approved return criterion is achieved. The vent shall discharge into containment and shall not be closed prematurely.
5. Provide positive drain-back prevention using the approved top plug, float/check valve, grout retainer or mechanically secured closure. Observe the collar during the initial set and complete any directed top-up.
6. Unvented injection through a collar packer alone is prohibited for long up-holes unless a documented engineering assessment demonstrates complete air/water displacement and defines an independent verification method.

9. Procedure C - Toe-Fed Full-Column Grouting Without Wiper Plugs

1. Where a dual-plug system is not compatible, an approved grout tube or drill-string stinger may be run to the toe/highest practical point.
2. Calculate and mark the insertion depth. Provide a collar seal and controlled vent/return. Pressure-test the assembly with water.
3. Pump the approved grout from the toe back to the collar. Keep the discharge end submerged in grout where the string is progressively withdrawn, and control withdrawal so the outlet remains within the placed grout column.
4. Continue until the specified return quality or calculated volume plus approved excess is achieved. Prevent drain-back with a check valve, grout retainer or secured collar closure.
5. This method shall not be used where the stinger cannot reach the toe, the hole is obstructed, the annulus is not continuous, or complete filling cannot be verified.

10. Procedure D - NQ/HQ Tremie-Line Flushing and Full-Column Grouting

This method applies to NQ and HQ diamond drill holes requiring permanent full-column cementitious grouting where a flexible or semi-rigid tremie line can be safely run to the toe or highest practical point. The actual open-hole diameter, accessible depth, inclination, water condition, enlargement and restrictions shall be confirmed; nominal NQ or HQ designation alone is not sufficient for line selection or volume calculation. The tremie method shall not be used where the line cannot reach the required placement point, the annulus is discontinuous, returns cannot be controlled, or full-column filling cannot be verified.

1. Work release and design: Confirm the Hole ID and obtain the approved Grouting Plan. Record the required flushing medium, flushing pressure and flow limits, tremie size and rating, mix design, calculated volumes, planned excess, withdrawal method, return criterion, drain-back control, stop criteria and final verification method.
2. Hole and line verification: Confirm accessible depth by clean tagged line, drill rods or other approved depth probe. Inspect the collar, casing and surrounding ground. Select a pressure-rated tremie line with adequate internal diameter for the approved grout rheology and sufficient annular clearance for flushing water, displaced borehole fluid, air and grout to return without blockage.

3. Volume calculation: Calculate and independently check the open-hole volume using the measured or approved effective diameter, plus casing volume, tremie internal volume, surface-line volume and planned excess. Where the hole includes NQ and HQ sections, enlarged zones or casing, calculate each interval separately and sum the volumes. Record the theoretical minimum grout volume and the approved contingency volume.
4. Pre-flush setup: Run the tremie or dedicated flushing line to the toe of a down-hole, or to the highest practical point of an up-hole. Secure the collar assembly and line against movement. Route the annular return to a controlled sump or tank through a visible sampling point. Install calibrated pressure and flow indication, a pressure-relief device, non-return protection where required, and engineered hose restraints. Establish the exclusion zone and confirm emergency shutdown and controlled depressurisation.
5. Water pressure test: Before flushing, pressure-test the assembled pump, hoses, fittings, valves and tremie line with clean water to the approved test pressure. The test and operating pressure shall not exceed the lowest-rated component, the approved collar/casing limit or the hole-specific formation limit. Confirm free discharge and a continuous return path before increasing flow.
6. High-pressure flushing: Commence with clean water at low flow, then increase pressure and flow in controlled steps to the approved hole-specific flushing duty. Direct discharge from the tremie toe to mobilise drill cuttings, residual drilling fluid, loose material and contaminated water upward through the annulus. Where approved, slowly raise and lower or rotate the flushing line to clean the full section; do not whip, impact or damage the borehole wall or casing.
7. Flushing acceptance: Continue flushing until returns are continuous and substantially free of cuttings, settled solids, excessive drilling fluid and visible contamination; return clarity or turbidity is stable; the returned flow is reasonably consistent with injected flow after accounting for known formation losses; and at least the approved calculated flushing volume has circulated. Record pressure, flow, cumulative volume, return condition, losses and any communication with adjacent holes or workings.
8. Flushing stop criteria: Stop immediately for loss of return, sudden pressure increase or decrease, collar/casing movement, line blockage, uncontrolled discharge, communication with a working or adjacent hole, suspected hydraulic jacking, ground/support movement, abnormal water or gas, equipment limit or instruction from KGM. High-pressure flushing shall never be used merely to force through a restriction. Depressurise, investigate and obtain revised approval before restart.
9. Transition to grout: Following accepted flushing, maintain the tremie at the placement point and prevent sediment re-entry. If specified, pump the approved compatible spacer and record its exact volume. Confirm the mixer, agitator, pump, flow meter and secondary volume measurement are ready. Test and record grout density, flowability/viscosity, bleed and temperature before injection.
10. Prime and commence placement: Prime the grout circuit using the approved method and account for all water, spacer and grout retained in surface lines and the tremie. Pump grout through the tremie at low controlled flow until grout reaches the toe without entraining excessive air or segregating. Maintain continuous agitation and pumping wherever practicable.
11. Toe-fed full-column placement: Fill from the toe toward the collar so grout progressively displaces water, air and residual fluid upward through the annulus. Maintain the tremie discharge end continuously submerged within fresh grout. The approved minimum embedment shall be stated in the Grouting Plan and controlled using line markings, measured withdrawal and pumped-volume reconciliation.
12. Controlled tremie withdrawal: Withdraw the tremie gradually in increments coordinated with the net grout volume pumped and calculated rise of the grout column. Do not lift the discharge end above the grout surface. Stop withdrawal if pumping is interrupted, return quality deteriorates, pressure becomes unstable or the calculated grout level cannot be confirmed. Re-lower the tremie into fresh grout before restarting where practicable and approved.
13. Full-column confirmation: Continue placement until the calculated hole volume plus approved excess has been delivered and stable, uncontaminated grout of the approved density is observed at the collar return. Collect and test return samples. Reconcile calibrated flow-meter volume against pump strokes or batch totals, less measured surface-line/tremie contents, flushing water, spacer, leakage and recovered returns. A difference greater than 5% requires investigation before acceptance.
14. Holes without observable returns: Where formation loss prevents collar returns, pumping shall not continue solely to chase an arbitrary volume or pressure. Stop at the approved maximum volume or other stop criterion and obtain KGM Hydrogeology/MRM review. Full-column acceptance shall then require an approved combination of volume reconciliation, pressure response, staged treatment, tremie depth evidence, top-up observations, verification drilling or another engineered verification method.
15. Completion and drain-back control: When the full column is confirmed, withdraw the tremie under controlled pumping to the approved final position, or leave it sacrificially where specified. Install the approved non-return device, grout retainer, collar plug or mechanically secured closure. Maintain containment and observe for settlement, leakage or drain-back during the initial set.

16. Top-up and final closure: After the specified initial set or settlement period, inspect the collar and top up with compatible grout where directed. Complete the permanent cap/plug, Hole ID marking and protection. Do not pressure-test, disconnect or disturb the assembly until zero pressure and the required wait-on-cement time are confirmed.
17. Records and acceptance: Complete the flushing and grouting record with hole geometry, actual tremie depth, line dimensions and ratings, calculated volumes, flushing pressure/flow/volume, return observations, grout batches and QA tests, injection pressure/flow/volume/time, tremie withdrawal increments, collar-return density, volume reconciliation, losses, abnormal events, top-up and final sign-off.

11. Refusal, Termination, Stop and Restart Criteria

Category	Minimum Requirement	Required Action
Refusal	Approved terminal flow/take at approved effective stage pressure for the specified hold time, with stable pressure and no abnormal response.	Record final pressure, flow, volume, mix and hold time; obtain KGM acceptance before release or moving stage.
Maximum stage volume	Approved maximum volume reached before refusal.	Stop pumping; isolate safely; assess grout migration, ground model and need for mix change, accelerator, staged treatment or alternate method.
Uncontrolled return / communication	Grout appears at adjacent hole, working, crack, support, drain or uncontained collar path.	Stop immediately; contain release; notify KGM; map the communication; do not resume without revised instruction.
Suspected jacking / dilation	Sudden increased take at similar pressure, ground/support movement, crack opening, abnormal noise or new water/grout path.	Emergency stop; bleed down in a controlled manner; barricade and obtain Ground Control/engineering assessment.
Packer or plug anomaly	Packer slips, loses inflation, cannot equalise/release; plug fails to launch/land; unexplained bump or blockage.	Stop; do not exceed pressure limit to force the tool. Apply the approved stuck-tool/plug contingency and OEM recovery procedure.
Instrumentation failure	Loss of reliable pressure, flow, volume or packer-pressure indication.	Stop injection unless a specifically approved redundant system remains functional. Repair, calibrate and document before restart.
Restart after interruption	Grout remains within pump/string or stage after unplanned shutdown.	Assess set time and blockage risk; verify zero pressure; clean or replace affected components; use a revised batch and restart plan approved by the Supervisor/KGM.

12. Verification and Final Acceptance

1. Compare calibrated flow-meter volume with pump-stroke or batch reconciliation. Investigate differences greater than 5% before invoicing.
2. Confirm actual grout volume against calculated string, annular and line volumes. Explain excess take, short take, returns, losses or void indications.
3. For stage grouting with retained access, complete the directed water-pressure re-test only after the required grout set time and without exceeding the approved test pressure.
4. For permanently sealed holes, verification may include plug release/landing/bump record, pressure hold, stable return density, absence of drain-back, top-up record, cured collar inspection, verification drilling or nearby test holes as directed.
5. Acceptance requires all hold points, QA results, pressure/flow/volume logs, packer/plug records, abnormal-condition records, environmental closeout and permanent collar details to be complete and signed.

13. Mandatory Hole and Stage Record

Record Field	Minimum Information
Hole and geometry	Hole ID, location, level/pit, dip, azimuth, design and accessible depth, diameter, casing, up-/down-hole orientation and water condition.

Record Field	Minimum Information
Method and equipment	Selected method, pump/mixer IDs, line sizes/lengths, packer or plug model/serial, setting depth, stage length, drill-string/stinger configuration and ratings.
Engineering limits	Approved pump-discharge limit, effective stage pressure limit, hydrostatic correction, groundwater pressure, line-loss curve, flow limit, stage volume and hold/refusal criteria.
Mix and QA	Batch number, materials, water-to-cement ratio, additives, density, viscosity/flow time, bleed, temperature, set time and sample results.
Injection data	Start/finish time, pressure-flow-volume-time record, mix changes, packer inflation pressure, plug launch/landing/bump pressures, displacement volume and returns.
Outcome	Refusal or stop reason, abnormal events, leakage/communication, recovery/release, verification result, accepted net volume, collar completion and sign-off.

14. Technical References

1. Barrick Global Standards, Critical Controls and Kibali site procedures.
2. USACE EM 1110-2-3506, Grouting Technology, 31 March 2017.
3. U.S. Bureau of Reclamation, Engineering Geology Field Manual, Volume II, water-pressure testing and grouting guidance.
4. Applicable OEM manuals for grout pumps, packers, drill rods, plug launchers, landing/bypass assemblies, non-return valves and data-recording systems.
5. ISO 45001 or equivalent occupational health and safety management requirements, together with applicable DRC legislation.

Schedule 5 - Key Personnel Return Schedule

1. Overview & Instructions to Tenderers

Tenderers must complete the return schedules below for all key supervisory, technical, and operational personnel designated for this contract.

- **All-In Rate Accountability:** All personnel costs (including salaries, allowances, PPE, travel, site rotations, R&R (Rest and Recreation), and insurance must be fully built into the all-in operational rates. KGM will not pay separate personnel mobilization, standby, or coverage fees.
- **Minimum Requirements:** The contractor must guarantee the presence of the minimum required personnel per 12-hour shift as defined by KGM.

2. Key Personnel Technical & Experience Return

The contractor must nominate qualified individuals for key leadership roles.

Designated Role	Proposed Personnel Name	Years of Industry Experience	Specific Grouting / Experience	Key Professional Qualifications
Project Manager / Contract Lead				e.g., Degree in Mining/Civil Eng.
Grouting Supervisor / Crew Chief (Shift 1-2-3)				e.g., High-Pressure Grouting Cert.
Lead Pump & Plant Technician / Mechanic				e.g., Mechanical Trade / Hydraulic Cert.
QA/QC Data & Log Officer				e.g., Database / Geotechnical Tech.

3. Roster Schedule

Tenderers must provide a detailed crew structure capable of maintaining continuous 24/7 site operations for the duration of the one-year contract. To ensure consistent coverage, the crew must adhere to a 21-day rotation cycle consisting of seven (7) day shifts, seven (7) night shifts, and seven (7) days of rest (7/7/7 roster).

Schedule 6 - Contractor Deliverables & Reporting

The Contractor is required to submit the following deliverables with strict adherence to quality and timeline. **Submission of complete, verified deliverables is a mandatory condition for invoice validation and payment processing.**

1. Operational & Technical Deliverables

- **Daily Grouting Report:** Comprehensive log detailing total volume injected, average pressures sustained and total cement/additives consumed per hole.
- **Water-Pressure and Verification Data:** Baseline packer-test and method-specific verification results for designated stages/holes, signed by the KGM representative.
- **Automated Pressure, Flow and Volume Logs:** Raw digital records showing pump-discharge pressure, calculated or directly measured effective stage pressure, flow, cumulative volume, time, mix changes and packer pressure. Any approach to the approved limit shall be traceable.
- **Weekly HSE & Compliance Report:** Summary including Job Safety Analysis (JSA), pre-start checklists, active work permits, and safety audit outcomes.

2. Commercial & Performance Deliverables

- **Monthly Progress Report:** Technical synthesis covering total cubic meter treated, production variance analysis, and operational forecasting for the upcoming month.
- **Billing Support Documentation:** Consolidated monthly pack of signed field sheets and independent volume reconciliations. The calibrated primary and secondary quantity measurements shall agree within 5%; variance against models shall be explained but is not a mandatory billing rejection.

3. Acceptance Criteria & QA (The "Quality Gate")

Execution is formally accepted only when the following criteria are met:

Acceptance Zone	Mandatory Compliance Criterion
Borehole Verification	Hole ID validated against MRM plans; all permits, JSAs, and pre-starts signed prior to site access.
Mix Conformity	Density, viscosity, and setting times must strictly match KGM-approved design specifications.
Pressure & Flow	Pressure and flow remain below the approved hole/stage limits. The absolute pump-discharge ceiling is 10 MPa, but the approved effective stage pressure will generally be lower and is determined by the Grouting Plan.
Refusal Criteria	Refusal is achieved only when the approved terminal flow/take is maintained at the approved effective stage pressure for the specified hold period, with no abnormal response. Maximum volume and uncontrolled returns are stop/review triggers.
Verification	The specified method-specific verification is complete and accepted. Routine post-grout Lugeon testing is not required for every permanently full-column sealed hole.

Sign-Off

Field	Selected contractor
Contractor company name	
Authorised representative	
Position	
Signature	
Date	