# GEOVERT

MINING GROUND SUPPORT Geovert is the recognized global authority in ground support solutions for large open pits.



# Ground Support Services

8000m3 Geohazard blast removal above Y-Ramp, Superpit - Western Australia

Mining ground support is critical to maintaining safe and productive operations throughout the life of an open pit mine. As mines develop deeper and more complex pit geometries, effective ground control becomes increasingly vital for both operational continuity and personnel safety.

Our ground support solutions are designed to address the challenges faced in Large Open Pit (LOP) mining operations. Drawing on experience across global mining environments, we deliver solutions that enhance safety, optimize productivity, and ensure long-term stability. From managing large-scale highwall stability to implementing targeted rockfall protection measures, our expertise spans these key areas:

- **Highwall Stabilization & Bench Stability** •
- **Mechanical Ground Support** .
- **Rockfall Protection & Scaling Services** .
- **Design Build & Emergency Response** •

Some of our valued partners ...







Newmont.

Our experienced ground support teams have firsthand understanding of the challenges involved in operating a large open pit 24/7.





# Geovert Ground Support: Our Approach

## **Ground Support Strategy**

Geovert has transformed ground support strategies through integrated project delivery methods and extended service agreements.

By aligning our design and construction resources with our clients' geotechnical teams, we deliver both conventional reactive maintenance and innovative proactive solutions for ground support programs.

### Industry-Leading Experience

With over 20 years at the forefront of mining ground support across four continents, from subarctic conditions to volcanic terrain, we enable geotechnical teams to maintain their focus on production.

Our in-house designed High Reach Drilling (HRD) equipment, developed in collaboration with leading mining companies, delivers verified solutions that provide proven safety improvements and cost savings.

# Multi-Disciplinary Teams

Our experienced multi-disciplinary crews are equipped to respond to both planned activities and emergent situations, supported by engineering expertise and access to leading mining consultants.

This versatility, combined with our 24/7 operational capability, enables consistent delivery across all operating conditions.





# **Highwall Stabilization** & Bench Stability





# Highwall Stabilization & Bench Stability

**GOAL:** Optimize inter-ramp angles and bench heights to maximize mine productivity while ensuring long-term stability **SOLUTION:** Our engineering and construction teams collaborate with site geotechnical teams to design and execute

comprehensive bench stabilization programs through:

- Engineered mesh drape systems for large-scale wall protection •
- Active slope stabilization systems for dynamic ground control •
- Specialized shotcrete applications for enhanced surface support •
- Custom design solutions for varying geological conditions •
- Progressive implementation strategies to maintain production schedules •

## CASE STUDY: Rio Tinto Kennecott Bingham Canyon **Copper Mine, USA**

Under our Master Service Agreement with Rio Tinto Kennecott, Geovert developed a design build slope stabilization solution for the altered weak ground of the Fortuna Sill in the Bingham Canyon Copper Mine.

Our bespoke High Reach Drilling equipment was deployed to enable production drilling of 50ft batters from the bench, minimizing interruptions to Rio's mining sequence and greatly reducing the planned program. The drilling equipment was also set up to use self-drilling anchors to eliminate issues with collapsing ground and provide program surety for mine planning.







# Mechanical Ground Support





# Mechanical Ground Support

**GOAL:** Address common geotechnical hazards and instabilities to ensure ongoing operational safety

**SOLUTION:** Our advanced ground support methods include:

- High-capacity bar and cable bolting systems
- Self-drilling rock bolts and soil nails for varying ground conditions •
- Post-tensioned ground anchors for deep-seated stability
- Active and passive mesh systems for surface support
- Advanced shotcrete solutions •

CASE STUDY: Newmont Boddington Gold Mine, Western Australia

Newmont has retained Geovert's ground support services in Australia's largest gold mine for 12 years ongoing at the Boddington Gold Mine, including 3 contract renewals.

The partnership represents a long-term commitment to collaboration which is why the program is considered a world class example of ground support.

It has resulted in advancement of our HRD to deliver manual handling free ground support drilling to 21m and has produced unparalleled industry safety records with over 4,600 days LTI free. .





# **Rockfall Protection &** Scaling Services





# **Rockfall Protection & Scaling Services**

**GOAL:** Proactively identify and mitigate geohazards to ensure operational safety and continuity

to the installation of:

- High-energy retention systems
- Rockfall barriers and attenuators •
- Self-cleaning catch systems •
- Debris flow protection measures •
- Shallow landslide mitigation solutions

CASE STUDY: Freeport McMoRan Grasberg Mine, Indonesia

This project delivered the world's largest rockfall and debris flow barrier system at altitudes reaching 4,000m/13,000ft above sea level in challenging tropical conditions.

The installation included three Geobrugg 7.5m-high barriers rated at 5,000kJ capacity (equivalent to stopping a 16,000kg impact at 90km/h) and pioneered the first 8,000kJ barrier system, capable of arresting a 20,000kg impact at 100km/h.

Construction utilized helicopters and cableways to protect critical mine assets and personnel from frequent debris flows and rockfall events in this extreme environment.



- **SOLUTION:** We provide end-to-end rockfall protection services, from initial drone surveys and rockfall modeling



# Design Build & **Emergency Response**





# Design Build & Emergency Response

**GOAL:** Provide comprehensive solutions to urgent ground support challenges while maintaining the highest safety and technical standards.

**SOLUTION:** Our emergency response capability delivers immediate design-build solutions through:

- Rapid deployment of teams and specialized equipment •
- Multi-disciplinary crews equipped for diverse technical challenges •
- Real-time engineering and design solutions delivered on-site •
- Direct access to leading mining consultants for complex situations •
- . Emergency stabilization methods
- Risk assessment and mitigation strategies •

CASE STUDY: Rio Tinto West Angelas Iron Ore Mine, Western Australia

The West Angelas Centre Pit North remediation project addressed a critical 150m-wide highwall failure that created a hazardous overhang 180m above the pit floor, halting mining operations at Rio Tinto's site.

Led by Geovert, the solution involved installing 6,000m<sup>2</sup> of engineered mesh and nearly 1,000 rockbolts using advanced rigging and roped access techniques. The comprehensive stabilization program included extensive rock anchoring, TDR cable installation for monitoring, and systematic scaling operations.







Innovation is one of the core values that underpin Geovert's brand promise.

# In-House Design & Build Ground Support Drilling Equipment: Geovert High Reach Drill

Our High Reach Drill (HRD) units provide ground support for large open cut pit batter stability at heights ranging from 15m to over 30m. The Geovert design has eliminated the need for manual handling and incorporates numerous specialized safety adaptations.

These drills are designed, engineered, and built in-house to meet international mine safey standards, with full Mines Department approval and independent professional engineering certification.

Multiple HRD units are currently in operation or on order as part of Geovert ground support service contracts for mining operations across Australia, USA, and Canada. Our clients include major companies such as Newmont, Talison, Rio Tinto, and Agnico Eagle.

Additionally, Geovert HRD units are being utilized on major infrastructure projects throughout Australia and New Zealand.

# Geovert High Reach Drill Evolution



18m (2015) mont Boddingto Gold Mine

Hydraulic Rotary

**32m** (2016)

Singapore Defense Facility -Quarry Conversion

360° Slew

One-off Custom Built Hydraulic Top Hammer

Remote Operation



# **21m** (2018)

### Newmont Boddington Gold Mine

Hydraulic Top Hammer 360° Ślew Remote Operation

# 21m (2021)

### Newmont Boddington Gold Mine

Interchangeable Top Hammer / Rotary 360° Rotating Base Automated Rod Changing Remote Operation

# 26m (2024)

### Talison Lithium **Greenbushes Mine**

Interchangeable Top Hammer / Rotary 360° Rotating Base Automated Rod Changing Remote Operation

Our commitment to innovation ensures we exceed industry standards.



# In-House Design & Build Ground Support Drilling Equipment: Geovert Custom Wagon Drills

Geovert Wagon drills deliver ground support solutions for large slopes in both open cut pits and transport corridors, specifically designed to meet specialized access requirements. The Geovert design features various bespoke modifications and additions to its engineered base design, allowing customization for project-specific needs including slope height, ground conditions, and drilling specifications such as hole diameter and depth. These drills are designed, engineered, and built in-house, with independent professional engineering certification ensuring their quality and safety.

Our hydraulic and pneumatic Wagon Drill units operate daily throughout Geovert's global operations, serving projects across New Zealand, Australia, PNG, Canada, USA, and extending as far as Kazakhstan.

# CASE STUDY: Mt Gibson Koolan Island Iron Ore - Highwall Stabilization

Koolan Island Iron Ore Mine produces the highest grade iron ore in Australia. Following repeated rockfall from slopes parallel bedding failures on the 50° footwall, a preliminary ground support design was produced. The Geovert team developed a bespoke high production drilling solution to complete the large scale ground support program across the 320,000m2 highwall.

Our innovation allowed for double the production of other competitors, thereby reducing program time and providing earlier access, allowing the safe mining of ore to recommence and to generate cashflow for the client.







# **Project Examples**







## Agnico Eagle Detour Lake Mine, Northern Canada

Geovert were engaged to execute ground support works in subarctic conditions with temperatures between -12°C and -35°C. Working through limited hours, our team utilized the Superboom to optimize installation of 76 rock dowels up to 9 meters long in challenging Canadian Shield basalt. Over 21 consecutive 12-hour days, the multi-disciplinary crew showcased exceptional resilience and self-sufficiency, efficiently delivering comprehensive geotechnical solutions including scaling, drilling, and grouting. The project showcased the team's ability to adapt their methods and specialized winterized equipment to challenging conditions.

# DESIGN/BUILD OF DEEP ANCHORED BUTTRESSING FOR FAILED HIGHWALL

### Vedanta Rampura Agucha Zinc Mine, Rajasthan, India

Following a 230m high failure in the highwall of Rampura Agucha above the primary ramp access Geovert we bought in to develop a design build solution. Due to the height and depth of the failure, huge reactionary forces had to be developed to retain with a reduced FoS modelled from increased pore water pressure during monsoon. A reinforced concrete buttress with deep post tensioned anchors was developed to remediate this and to maintain a satisfactory FoS during monsoon.

# **BLASTING, GEOHAZARD REMOVAL & SCALING**

### Northern Star Superpit Gold Mine, Kalgoorlie, Western Australia

The Geovert team were sole sourced to provide a solution for an 8000m3 wedge threatening the primary ramp access and severely undermining the economics of one of the world largest goldmines. Our solution was to eliminate the hazard by designing a construction blast to surgically remove the wedge using a hole-by-hole detonation sequence to target the mapped defect planes without damaging the highwall with backbreak. An excellent result quickly had the Y-Ramp successfully and safely reopened.



# AUSTRALIA'S LARGEST HIGHWALL STABILIZATION PROJECT

### Mt Gibson Koolan Island Iron Ore Mine, Western Australia

Koolan Island Iron Ore Mine produces the highest grade iron ore Australia. Following repeated rockfall from slope parallel bedding failures on the 50° footwall a preliminary ground support design was produced. The Geovert team collaborated with the Mt Gibson team to develop a bespoke high production drilling solution to complete the large scale ground support program across the 320,000m2 highwall. This reduced program time and provided earlier access, allowing safe mining of ore to commence and to generate cashflow for the mine.



### **EROSION & ROCKFALL CONTROL IN VOLCANIC TERRAIN**

### Newmont Lihir Gold Mine, Papua New Guinea

Geovert undertook erosion control works on the B0 bench of Newmont Mining's open-cast gold operation, evolving from a two-month installation into an 18-month project in a challenging volcanic region with extreme tropical conditions. The team installed comprehensive protective measures including rockfall barriers, erosion control mesh, and drainage systems, which proved crucial when an extreme rain event triggered a significant slope failure. The installed barrier successfully contained the failure, and despite being loaded beyond design capacity, Geovert's team restored its integrity within 48 hours, averting a potential catastrophe and enabling swift resumption of mining operations.

"Geovert have worked collaboratively with Rio Tinto Kennecott at their Bingham Canyon mine in Utah, to install ground support and stabilize the eastern wall allowing for additional ore recovery. Geovert crews became an integrated part of the Kennecott Team, continually adjusting their schedules around mine plans to maximize utilization of their bespoke drilling equipment, execute the ground support work, and minimize mining delays."

> - Greg Abrahams, Manager Geotechnical and Hydrogeology, Bingham Canyon Mine

"Geovert's exemplary safety record not only safeguarded the well-being of all personnel but also resulted in uninterrupted project progress and avoided costly delays associated with accidents.

Their dedication to safety has set a benchmark for industry standards and has provided the Government with the confidence that the project is being managed with the highest regard for human life and safety. Their performance in safety is truly commendable and justifies the Exceptional rating, as it has been a significant benefit to the Government throughout the contract."

- US Bureau of Reclamation commenting on Geovert's Safety record after 6 years of Rockfall Mitigation at the Hoover Dam

# GEOVERT

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