SNC-Lavalin Environment’s MDH Engineered Solutions team is committed to providing comprehensive, state-of-the-art consulting and laboratory services for a range of technically challenging hydrogeological, geotechnical, geoenvironmental and water resource projects.

**RELATED SERVICES**

› Geotechnical
› Mine Waste Management
› Liners and Subsurface Barriers
› Solid Waste Landfills
› Slope Stability
› Low Ground Pressure Drilling
› Foundation Design
› Construction Management and QA/QC
› Industrial Waste and Tailings Research Group

**EXPERTISE**

We have a reputation for technical excellence in consulting, design and engineering for the mining industry. We offer a wide array of mining-related services including construction management and supervision, site investigation, inspection and assessment, design and detailed engineering, and reclamation and closure planning. We also operate a state-of-the-art soils and materials testing laboratory providing standard and client-specific testing programs.

› Site selection and conceptual design
› Soil, rock, tailings and waste investigations
› Geohazard risk management
› Environmental impact assessment and permitting
› Dam/dike design
› Foundation design and site development
› Site water management
› Hydrology, hydrogeology and water resource management
› Contract administration and project management
› Construction inspection and quality control
› Ground-based LiDAR and surveys
› Advanced air quality, noise, groundwater and surface water numerical modelling
› Cumulative effects analyses
› Instrumentation and monitoring
› Real-time remote data acquisition and management
› Closure options and design – cover systems, reclamation, monitoring programs and landform design
› Laboratory testing – soil, rock, tailings, concrete, asphalt and geochemistry

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# GEOTECHNICAL SERVICES

## MINE GEOTECHNICS
- Site selection and development
- Soil, rock, tailings and waste investigation
- Geohazard risk management
- EIA and permitting
- Dam/dike design
- Foundation design
- Hydrology, hydrogeology and water resource management
- Construction inspection and QC
- Ground-based LiDAR and surveys
- Advanced numerical modelling
- Cumulative effects analysis
- Instrumentation and monitoring
- Real-time remote data acquisition and management
- Closure options and design
- Laboratory testing – soil, rock, tailings, concrete, asphalt and geochemistry

## GEOTECHNICAL
- Site selection/conceptual design
- Soil, rock and tailings investigations
- Industrial waste rock management and storage
- Earthwork design
- Foundation design
- Site development
- Construction drawings and specifications
- Contract administration
- Project management
- Inspection and QA/QC services
- Advanced survey
- Cost and schedule control
- Visual inspection/condition assessment of dams/dikes/water control structure
- Instrumentation/monitoring of embankments
- Laboratory testing
- Closure planning

## MINE WASTE MANAGEMENT
- Waste containment system design optimization, cost estimations and construction management
- Tailings characterization, containment and consolidation
- Waste rock characterization and testing
- Geochemical source term and reactive transport studies
- Advanced rock, soil, tailings and geochemical testing
- Liner and cover system design
- Site decommissioning and remediation
- Tailings and waste rock slope stability
- Tailings facility optimization
- Environmental impact assessments and permitting
- Advanced instrumentation and monitoring

## LINERS AND SUBSURFACE BARRIERS
- Cement-bentonite slurry walls
- Soil-bentonite slurry walls
- Compacted soil liners
- Composite liners incorporating geosynthetics such as HDPE
- Leak detection
- Subsurface (including French) drains
- Geosynthetic applications
- Reactive barriers
- Grout curtains
- Diaphragm walls
- Pump back systems

## SOLID WASTE LANDFILLS
- Site investigation and characterization
- Constraints mapping, and site optimization and selection
- Water management
- Hydrology and hydrogeology
- EA and permitting
- Waste containment system/cover design
- Construction drawings and specifications
- Survey and quantity calculations
- Inspection and quality control
- Instrumentation and monitoring
- Visual inspection/assessment of dikes
- Closure options and design

## SLOPE STABILITY
- Visual inspection/assessment of dams, dikes, water control structures
- Site investigation
- Numerical modelling and analysis
- Seepage, stress and slope stability modelling
- Design of embankments/constructed slopes
- Mitigation measures
- Site characterization and sample collection
- Instrumentation installation/monitoring
- Geohazard risk assessment
- Remote real-time data acquisition and data management

## FOUNDATION DESIGN
- Site investigation and characterization
- Geotechnical borehole and test pit logging
- CPT and SCPTu cone penetration testing
- Pile installation documentation
- Pile load testing coordination/supervision
- Resistivity testing
- Instrumentation and monitoring
- Construction inspection/QC
- Project management/reporting
- Advanced laboratory testing
- Survey services
- Groundwater assessments

## CONSTRUCTION MANAGEMENT AND QA/QC
- Construction drawings
- Tender document and contract preparation
- Contractor management
- Field engineering activities
- QA/QC services
- Recording “as constructed” information
- On-site laboratory services
- Management of health, safety and environment issues related to construction activities
- Site survey/quantity measurement
- Material sourcing investigations

## LOW GROUND PRESSURE DRILLING
- All-terrain vehicle used for shallow site investigations
- Alternative to traditional drilling equipment
- Used for drilling and sampling soft/wet soils and mine tailings
- Can be used in harsh terrain
- Can be used in environmentally sensitive areas
- Light and easy to transport
- Standard and Cone Penetration Testing
- Borehole geophysics
- Instrumentation installations

## INDUSTRIAL WASTE AND TAILINGS RESEARCH GROUP
- Over 30 years’ experience in providing research and specialty consulting for industrial waste and tailings management, storage and reclamation