



+
Dynamic
Earth Solutions

HATCH

Planning, designing, and building sustainable earth science solutions for your projects.



Turning challenges into opportunities



Your existing and prospective projects are bigger, more complex, and more strictly regulated than ever before. To plan and execute them the right way, you need an experienced partner who can provide a full range of state-of-the-art engineering solutions.

When your project has multiple stakeholders with competing requirements, you need experts who can design and build assets that meet your expectations and develop strategies to manage the entire process. With a focus on the earliest stages of a project, we will work with you to assess the ground and site conditions, and the environment in which the development will occur. The process starts with our earth science disciplines looking at the geotechnical conditions, hydrogeology impacts, surface water, lay of the land, and environmental surroundings. Our action plans and designs consider all related earth science matters that can impact project costs including geotechnical risk, uncertainty, climate change, land use, water impacts, and the environment to ensure a cost-effective approach and infrastructure resiliency.

Taking a project from concept to operation is a partnership between your organization and Hatch. Together we deliver success. You can count on a team of multi-disciplinary engineers and scientists operating in the earth science space with a shared commitment to the environment. We offer engineering, procurement, and construction management expertise combined with geotechnical, hydrotechnical, civil, environmental and social impact services and implementable technology solutions.

As your partner, we will provide you with knowledgeable, sound advice and our full support with:

- project strategies—from selecting the best sites, obtaining permits, and meeting all safety standards
- understanding and defining the ground and site conditions
- providing cost-efficient design for facilities and structures from concept through to commissioning and operations
- managing risks, cutting capital costs, and reducing operating expenditures

Variable and diverse ground conditions mean innovative solutions to ensure cost, schedule, and operational success. By setting the right course for your project, risks are identified early and viable cost-effective solutions are implemented to achieve predictable outcomes and realize project benefits. Whether brownfield or greenfield, there are going to be challenges—we will help you overcome them.

Dynamic Earth Solutions

Geospatial

Flood mapping

Hydrotechnical

Creek diversion/
flood levees/
reservoir design

Flood inundation and
hazard estimation

Bridge
hydraulics

Hydrology

Dambreak
analysis

Dam classification

Civil Site
Development

Reservoir design
earthworks

Construction QA

Geo -
Environmental

Liner design

Hydrogeology

Geotechnical

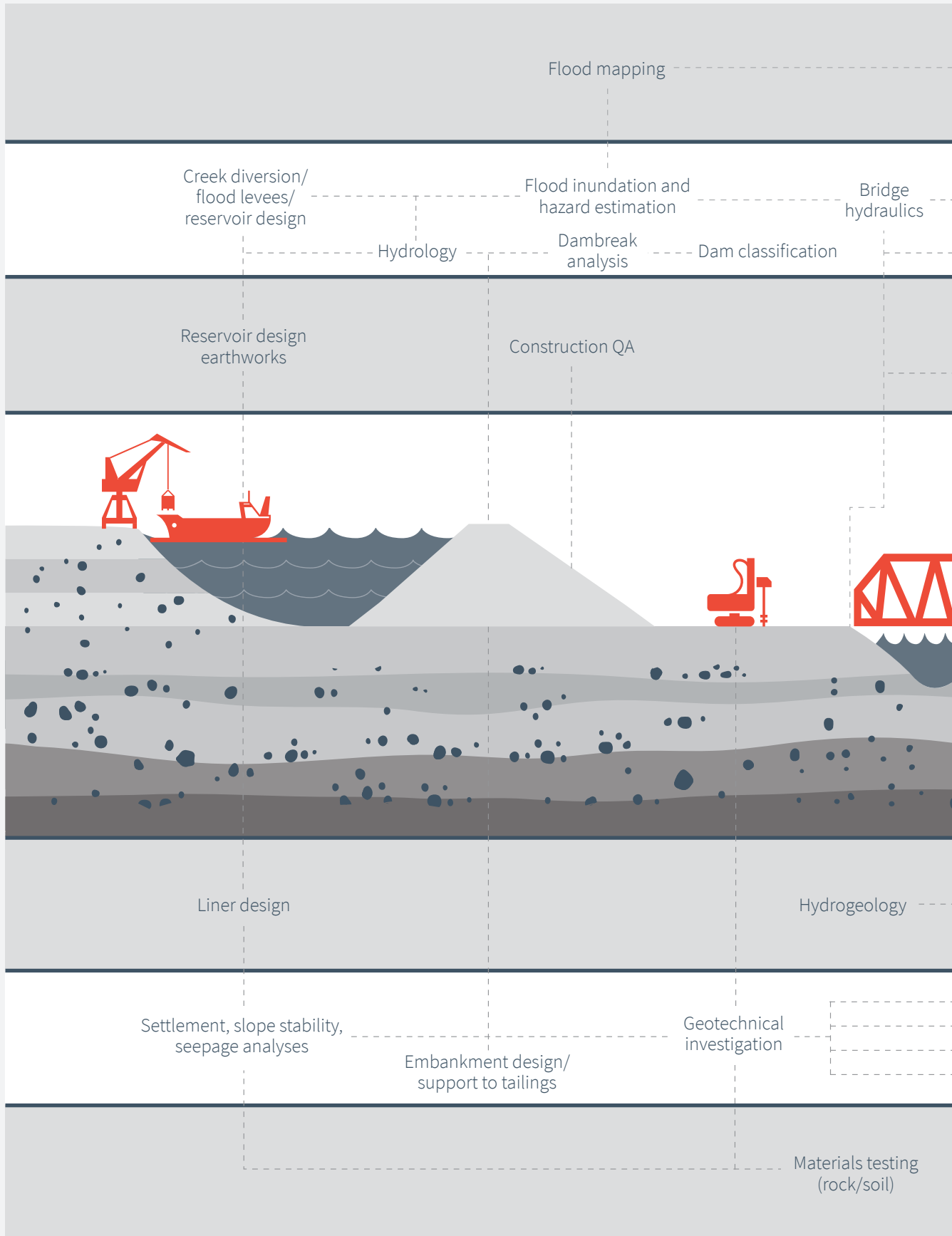
Settlement, slope stability,
seepage analyses

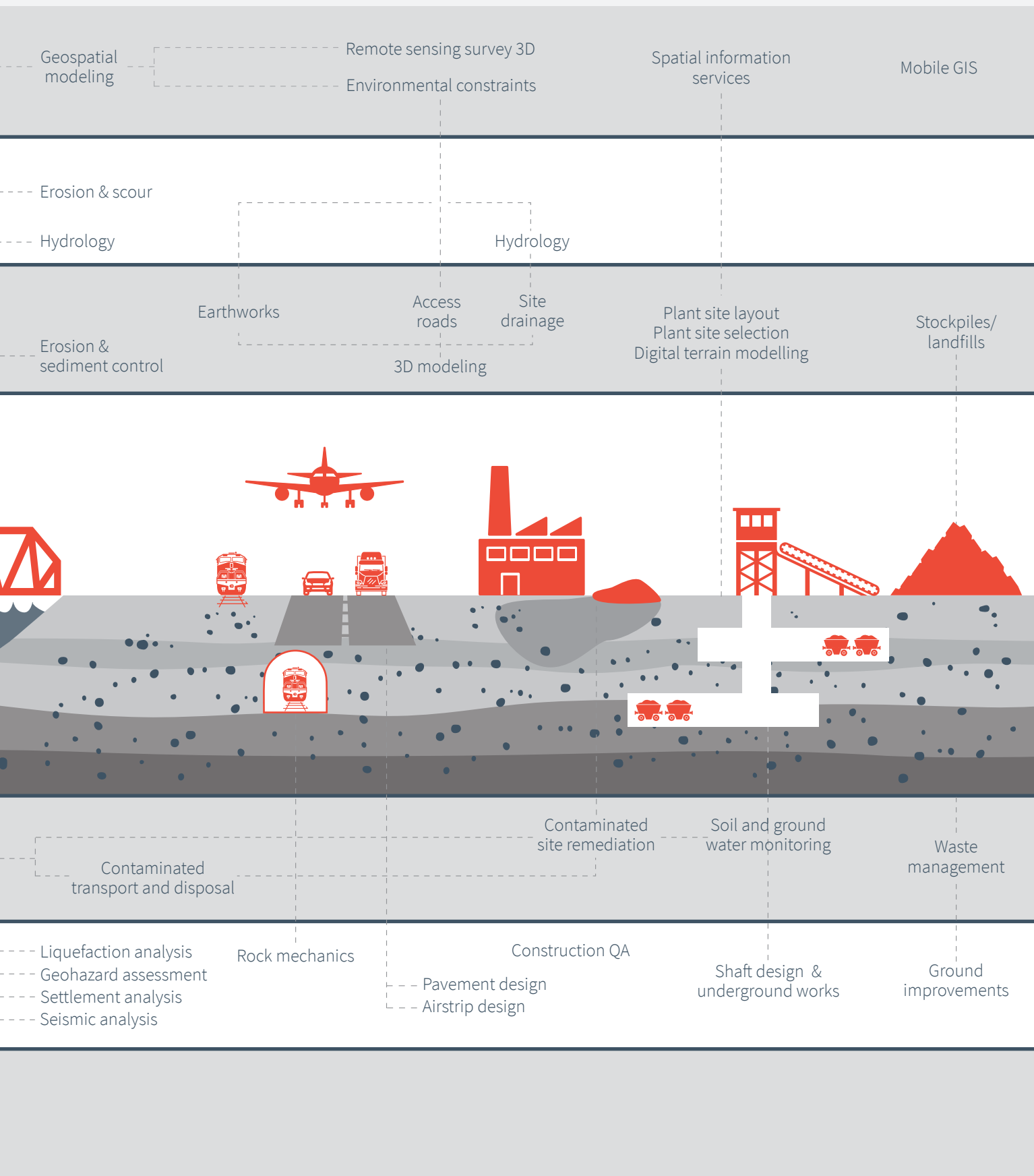
Embankment design/
support to tailings

Geotechnical
investigation

In-house
Geotechnical
Lab

Materials testing
(rock/soil)





Designing with the land and water in mind

From upgrading established operations to planning and implementing new integrated developments on all surface or sub-surface terrains, we ensure solutions that are reliable and sustainable.



Civil site development

To maximize the use of your site's features and local construction materials, your projects deserve a team of experts in the design of roads, earthworks, landfills, and drainage for commercial, industrial, and public developments. You can be assured that you will get an expert team from Hatch, because our civil site development group is internationally known as leaders in the field.

We will work with you to develop your operating site and its facilities by designing structures that drain or divert potential storms. By using the latest computer modeling systems and software packages, our design engineers and CAD specialists deliver state-of-the-art design using data-centric architecture. Such computer programs include OpenRoads Designer and Civil 3D.

We can help you with:

- site investigations (planning and scoping of site and geo-environmental investigations, material sourcing studies, and land use planning)
- site planning (site selection, site master plan)
- spatial information and digital terrain modeling
- transportation studies (prefeasibility and feasibility studies, route selection, and alignment)
- roads and rail (plant, access and haul roads, plant and site access rail, traffic engineering design)
- earthworks (site grading, bulk, and structural-related earthworks)
- site drainage (plant site drainage, storm water ponds, culverts and bridges, open channels, and flood control design)
- residue disposal (investigation, design, and construction of residue disposal systems for mineral processing operations)
- civil engineering for mines and plant buildings, plant services and utilities, construction camps and townships, pavement design and site drainage, area fence, stockpiles and dumps, air strips, storage areas, ramps, and site decommissioning



Water resources and hydrotechnical

From site drainage to complex river and civil structure conveyance hydraulics to basin-wide water-management planning, your projects are our priority. While their scope may vary significantly, our team has been actively involved in water resource development, planning, and management for a wide range of projects around the world. We have built a global team of hydrotechnical engineering specialists focused on municipal hydraulics, riverine and lake hydraulics and hydrology. We will work with you on:

- hydrologic assessment including extreme event estimation
- hydraulic analysis and design including energy dissipation structures
- dam safety assessments
- dam break analysis
- flood modeling and prevention
- sedimentation analysis including transport, accretion, and erosion
- river and coastal shoreline erosion analysis and scour protection design
- river ice mechanics and regime analysis
- municipal hydraulics and stormwater management/drainage
- floodplain management planning (forecasting, inundation modeling, consequence/hazard estimation)



Hydrogeology

If your project requires management of the movement and distribution of underground water in the rocks and soils below the earth's surface, our hydrogeology specialists can provide expert assessment and solutions. You can rely on our team's strong construction experience and technical skills in geotechnical and geologic site characterization, design, and numerical modeling.

For hydrogeological challenges for developments, including complex hydrogeological situations on land and in marine settings, permafrost and soft ground engineering, groundwater capture and cut-off, underground and surface rock mechanics, ports and marine offshore geotechnics, or ground improvement requirements, our wide range of experience will help determine the best path forward.

Our services include:

- hydrogeologic site investigations
- hydrogeologic modeling for complex systems
- geophysical and non-destructive investigation methods
- analysis of underground, steep challenging terrain, and marine environments



Waba Dam
Rehabilitation Project

Geotechnical



You can count on the deep construction experience and core technical skills of our staff in site characterization, design, and numerical modeling. We ensure and prioritize a safe and sustainable design for the entire life cycle of your project.

Through geotechnical investigations, geological mapping, interpretation of aerial photographs, and satellite imagery, our experts provide geotechnical support for commercial and industrial developments such as process plants, open pits, mines, rail and road, dams, power facilities, and pipelines. The effectiveness of ground investigations are maximized, and you get the best possible results as we work side-by-side with our multidisciplinary teams to meet project development goals. Our services include:

- complex geotechnical investigations on land and in marine settings
- soil mechanics and foundation engineering
- ground and groundwater investigations
- surface and underground rock mechanics
- seismic assessment and earthquake geotechnical engineering
- tailings geotechnical engineering
- embankment dam engineering
- liners and cover systems
- ports and marine geotechnics
- permafrost and soft ground engineering
- geotechnical risk assessment and risk management, analysis, and design
- construction supervision and geotechnical monitoring
- geotechnical laboratory services

Geotechnical laboratory services



Our fully equipped geotechnical laboratory is certified by the Canadian Council of Independent Laboratories (CCIL) and provides a complete testing facility for both soil and rock mechanics. This facility has been developed over the past fifty years to provide advanced testing for use in the geotechnical design process. Whether your project needs standard materials testing or more sophisticated analyses, such as aggregate alkali reaction (AAR) and aggregate silica reaction (ASR), our laboratory is fully equipped to do the job.

All routine rock mechanics tests, including unconfined and triaxial compressive strength, shear strength, and modulus of elasticity are carried out. Specialized testing, including swell index and various alkali reactivity tests, are regularly performed and can be tailored to meet the unique needs of each project.



Grand Falls, Beechwood, and Tobique Developments Flood Study and Dam Safety Review

Geospatial

Our geospatial services team designs and builds geographic information systems to support effective and timely decisions based on intelligent location and object data. GIS and proprietary technologies, like HatchMAP, can help you manage and access your project, facility, or portfolio information and is accessible from apps, desktop software, or web-based maps, ensuring you can locate your information where and when you need it. Our services include:

Analysis and desktop mapping solutions

- multi-criteria site analysis

- transportation modeling/routing
- environmental constraints
- thematic/floodplain mapping
- asset management and modeling

Spatial data services and information management

- image processing
- 3D modeling, lidar, remote sensing

Mobile and integrated services

- Mobile GIS
- Web mapping



Geo-environmental

Our geo-environmental specialists provide you with reliable solutions for contaminated sites, waste management and disposal, sediment management, and erosion. This interdisciplinary field encompasses concepts and inputs from environmental, geotechnical, hydrotechnical, and water resources engineers and scientists. We can help you with:

- site environmental investigation
- geotechnical/hydrogeological investigations
- contaminant fate and transport modeling
- contaminated site remediation
- waste characterization
- solid waste: strategic planning and recycling programs
- solid, industrial, and hazardous waste management and disposal

- waste containment systems design
- liner and cover systems design
- leachate collection and management
- landfill gas management including landfill-gas-to-energy systems
- groundwater assessment, monitoring, and remediation
- hydrogeological modeling
- closure/post-closure monitoring
- wetland remediation
- harbor and riverbed investigation
- sediment assessment and remediation
- erosion assessment, control, and slope stabilization



Project experience

To meet the world's growing concerns for surface and subsurface sustainability, your facilities must be designed and built with solutions that incorporate economic, scientific, regulatory, and health and safety measures. We partner with you from the ground up.

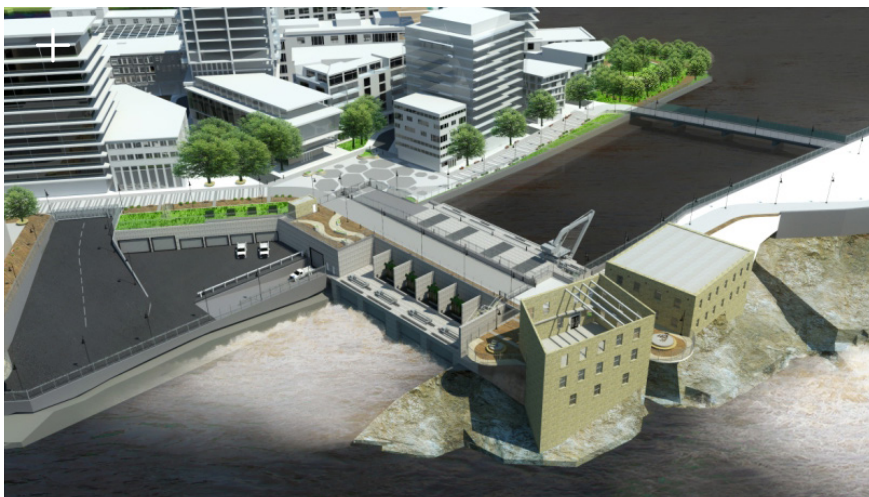
Successful projects mean working with a multi-disciplinary engineering firm that provides complete design services from concept through to detailed design, construction management, commissioning, and operations. Our earth sciences practice is a key contributor to our global teams, providing the foundation upon which our designs are based. A list of our earth science contributions to some of our key projects are listed below.

Chaudière Falls Hydroelectric Project Chaudière Hydro LP

Ontario, Canada

Hatch provided EPCM services, including engineering design and hydrologic study work to support design, intake, and tailrace hydraulics.

Chaudière Falls
Hydroelectric Project



Kelso Dam – Emergency Repairs and Rehabilitation

Ontario, Canada

In response to an observed boil in an embankment dam, geotechnical site investigations and engineering evaluations were undertaken including a diving survey and a risk assessment to assist in evaluating dam failure risk. The studies looked at the risk of dam failure based on a number of aspects, design and construction information, historical performance, etc. A stilling basin was designed as a necessary remedial feature and leakage was addressed through grouting and engineered filters.

Shikwamkwa Dam Replacement Brookfield Power Corporation

Ontario, Canada

Hatch, working with Kiewit contractors, designed a 32-m earth-filled embankment dam. Hatch's scope included dam and foundation assessments, geotechnical foundation and borrow material investigations, instrument installation, monitoring and data assessment, reservoir sonar bathymetric surveys, sinkhole infilling and impervious blanket remediation, detailed engineering design and detailed geotechnical baseline reports.

Niagara Tunnel Project Ontario Power Generation

Ontario, Canada

Hatch provided Owner's Representative services, including technical and management oversight for concept design, to procurement phase, to the construction and commissioning phase on this multiple award-winning project. Responsibilities included geotechnical investigations and design development engineering to refine the design of the relocated ice accelerating wall.

Waba Dam Rehabilitation Confidential client

Ontario, Canada

Hatch conducted geotechnical investigations and assessment of the soft clay foundation to define material properties including in-house laboratory testing and 2D finite element hydrodynamic modeling to predict the complex consolidation, spreading, and settlement behavior of the soil in order to inform the rehabilitation design of the dam.

Mary River Baffinland Iron Mines Corporation

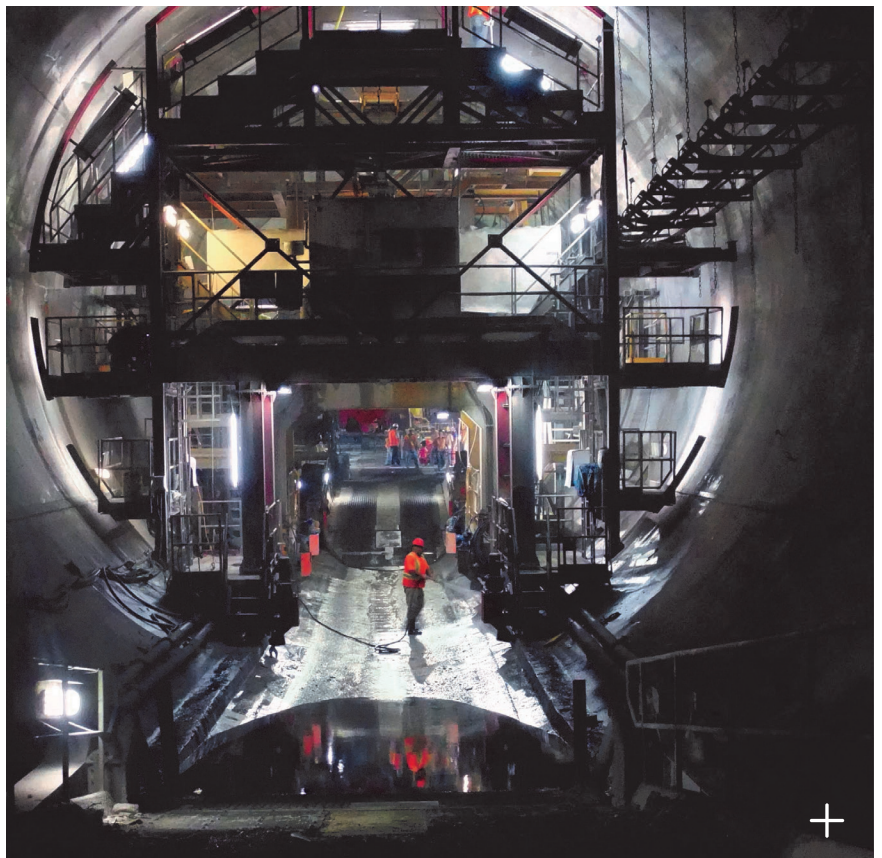
Nunavut, Canada

Hatch services included geotechnical site investigations (ore dock, rail alignment, bridges, arch-plate culverts, ore stockpile, buildings, and mine process structures) in a permafrost environment. Assessments of ice-poor and ice-rich soils and thermal analyses were carried out for foundation design, waste rock stockpile design, and design of geomembrane lined embankment dams at the mine site. Hatch also provided a cost estimate and support for the mine expansion construction.

Cross River Rail Queensland Government

Brisbane, Australia

Hatch was responsible for the design of all civil and rail scope including tunnel alignment, cross passages, underground drainage, trackwork and overhead line, and station civil and utilities. BIM models were developed to integrate all disciplines into the design, plan construction, and deliver of the project.



Niagara Tunnel Project

Grand Falls, Beechwood, and Tobique Developments Flood Study and Dam Safety Review

New Brunswick, Canada

Hatch was retained by NB Power to observe and review, in accordance with current CDA Dam Safety Guidelines and Technical Bulletins, all aspects of dam design, operation and maintenance, condition, and performance to confirm the safety of the dams, and identify any deficiencies and nonconformances. The DSRs and flood studies cover all water retaining structures associated with the Beechwood, Grand Falls, and Tobique Developments.

Tasiast Expansion Project Tasiast Mauritanie Ltd. SA

Mauritania, West Africa

Hatch provided initial studies and then EPCM services to design and construct facilities to support existing operations and a potential future expansion. The civil site development team was involved in the design of earthworks, grading, drainage, stormwater management, firewater ponds, sanitary sewers, roads, water supply pipeline, landfill design, bid evaluation and design build contractor's work review. The project received the Kinross Safety Award.



About Hatch

Whatever our clients envision, our engineers can design and build. With over six decades of business and technical experience in the mining, energy, and infrastructure sectors, we know your business and understand that your challenges are changing rapidly.

We respond quickly with solutions that are smarter, more efficient, and innovative. We draw upon our 9,000 staff with experience in over 150 countries to challenge the status quo and create positive change for our clients, our employees, and the communities we serve.

hatch.com