# Critical Minerals

## FRAMEWORK DISCUSSION PAPER

Ontario

# Contents

# Developing an Ontario critical minerals strategy

This discussion paper outlines Ontario's proposal for developing a critical minerals strategy and solicits feedback from stakeholders and Indigenous communities. All information gathered through public comment and consultation sessions will inform the development of a critical minerals strategy for Ontario. The discussion paper is focused on five areas:

1. Supporting partnership opportunities with Indigenous peoples
2. Finalizing an Ontario critical minerals list
3. Enhancing investment in mineral exploration and development
4. Regulatory and policy reform
5. Supply chain and manufacturing opportunities

The Ontario government is interested in your input. There will be questions throughout the discussion paper that cover:

- The proposed objectives and key long-term outcomes for Ontario's critical minerals strategy.
- The minerals identified as critical here in Ontario, and which minerals could be developed to supply global markets.
- Where government should prioritize investments to best support critical minerals projects.
- Proposals for policy, regulatory and strategic initiatives that would support the development of critical minerals in Ontario.
- How Ontario should attract investment in its critical minerals projects.
- How Ontario can supply emerging sectors and industries with responsibly sourced raw materials needed to meet regional, national and international demands.
- How to unlock new opportunities for Indigenous communities to participate in and benefit from critical minerals projects.
- Identifying new supply chain and manufacturing opportunities to build emerging technologies in Ontario.

# Introduction

Over the last 20 years, the global economy has been shifting. New technologies and high-growth sectors, like renewable energy, electric vehicles, high-end consumer electronics and information and communications technologies, have transformed our everyday lives. From smartphones and laptops, to drones and battery electric cars, demand is rising – so is the need for the raw materials used to build these products.

This section will explain:

- What critical minerals are and how they are used.
- The global trends driving demand for critical minerals.
- How Ontario is well-positioned to be a leading global supplier of responsibly sourced critical minerals.

"Responsible sourcing" prioritizes efforts to address environmental, economic and social sustainability risks in supply chains. Companies, governments and consumers are increasingly carrying out supply chain due diligence to ensure social, environmental and economic principles and best practices are followed by those producing raw materials and end-use products for global consumption.[1]

## What are critical minerals?

Critical minerals are a subset of the raw materials needed to produce many products and specialized technologies. The minerals that a jurisdiction deems "critical" depends on its geology, as well as its own domestic and economic priorities. This section will discuss the common applications of various critical minerals, while highlighting those that Ontario either produces or has the potential to produce.

There is no universal definition of critical minerals and various jurisdictions define them differently. The term generally applies to **minerals that have specific industrial, technological and strategic applications for which there are few viable substitutions**. These minerals are also at higher supply risk due to geopolitical considerations and market demand.

[1] Susan van den Brink, et al, "Approaches to responsible sourcing in mineral supply chains," Resources, Conservation and Recycling 145 (2019); 389-398.

## Why is demand for critical minerals increasing?

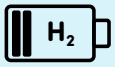
**Changing economic and environmental priorities**

The global shift to a knowledge-based, low-carbon economy is increasing demand for raw materials. Rapidly changing information and communications technologies (ICT) are transforming the way we live and work, while the environmental impacts of a changing climate are accelerating the adoption of technologies that can help address environmental concerns.

The demand for critical minerals is impacted by these shifts. For example, uses of battery technology have increased dramatically and are only expected to grow in the coming years. Battery technology will be especially important in the electric vehicles market as graphite, lithium, nickel, cobalt and other critical minerals are needed to produce them. By 2040, it is projected that over half of all passenger vehicles sold will be electric.[2] This could result in a corresponding increase in demand for nickel, cobalt, copper, graphite and lithium.

### Critical minerals can be found in


**Batteries**
electric vehicles, energy storage systems, mining equipment use **cobalt, lithium, manganese, nickel** and **graphite** as well as **copper** for related infrastructure



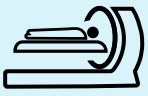

**Hydrogen Fuel Cells**
use **platinum group elements**

**Electronics**
laptops, LED monitors and smartphones use **indium** and **rare earth elements**

**Aerospace and Defence**
military defence systems, steel, super-alloys use **beryllium, chromium, cobalt, nickel, titanium** and **aluminum**

**Agricultural Technologies**
fertilizer and livestock feed use **cobalt, copper, phosphate, selenium** and **zinc**

**Renewable Energy**
solar cells and panels use **copper, indium** and **tellurium**



**Medical Equipment and Technologies**
cardiac implants, Magnetic Resonance Imaging (MRI) machines, monitoring devices, fibres for prosthetic devices use **zinc, platinum group elements, rare earth elements, titanium** and **nickel**

[2] BloombergNEF: Electric Vehicle Outlook 2020.

### Graphite, lithium and nickel demand is increasing

Production of graphite and lithium would need to increase almost 500 per cent by 2050 to meet potential demand,[3] while a January 2021 report commissioned by the European Union indicates that demand for nickel used for automotive electrification is expected to grow globally from the 92 kilotonnes used in 2020 to 2.6 megatonnes in 2040.[4] Ontario produces some of the lowest carbon nickel in the world. According to the Ontario Mining Association, nickel not mined in Ontario contributes to increased carbon emissions.[5]

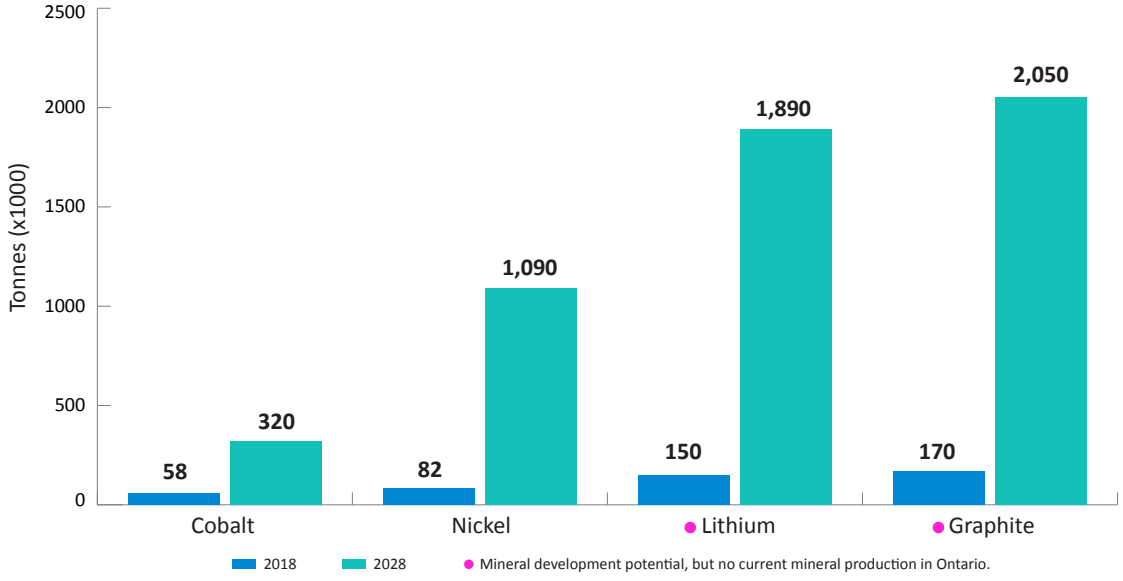
### Governments want a stable, reliable supply of raw materials

As global demand for critical minerals increases, many countries are examining their supply chain dependencies. Over-reliance on a select few countries for certain critical minerals has led to supply chain disruptions, particularly when export limits are imposed by jurisdictions supplying critical minerals or when geopolitical instability threatens the supply of raw materials.

To stabilize and secure critical minerals supply chains, many countries have developed critical minerals strategies and lists to guide strategic investments and priorities. While some countries have the natural geology that enables them to produce various critical minerals for domestic and international markets, others do not and are reliant on other countries to meet their critical minerals needs.

For several jurisdictions, including the United States, bilateral and multilateral co-operation agreements have helped secure critical minerals supply chains. Many countries have explored partnerships and other types of market agreements to meet domestic demand. Closer to home, Ontario is working with provinces and territories and the Government of Canada, to advance critical minerals opportunities. These efforts highlight Ontario's considerable strengths in supplying responsibly sourced minerals to international markets.

**Global demand for battery raw materials**
**Source:** Statista




[3] Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition, World Bank Group, 2020.
[4] Study on Future Demand of and Supply Security of Nickel for Electric Vehicle Batteries, JRC Science Hub, European Union, 2021.
[5] Ontario Mining Association.

**Companies want raw materials that are responsibly and sustainably sourced**

Increasingly, companies are looking for critical minerals sourced from countries with a commitment to sustainable approaches to mineral exploration and development. Investors, asset managers, financial institutions and other stakeholders are also relying on Environmental, Social and Governance (ESG) ratings to assess company performance over time and as compared to peers. Ontario has established itself as a jurisdiction that promotes social and environmental responsibility, making it an attractive jurisdiction for mining companies and investors with a commitment to favourable ESG practices.

**Environmental, Social, and Governance (ESG) Ratings**

Also referred to as Sustainable Investing, the Environmental, Social and Governance (ESG) criteria are a set of standards of a company's operations that socially conscious investors use to screen potential investments.[6]

- Environmental criteria consider a company's performance as a steward of the natural environment where the company operates.
- Social criteria look at how a company manages relationships with employees, suppliers, customers and the community, including Indigenous communities.
- Governance criteria looks at a company's leadership, executive pay, audits and internal controls.

While not formally adopted at the national level, ESG is becoming an increasingly important factor for where potential investors pool their funds. In an RBC Global Asset Management Survey, 75 per cent of respondents globally integrate ESG principles into their investment approach and decision-making, up five per cent in 2019.[7]

[6] Witold Henisz, Tim Koller and Robin Nuttall, "Five Ways that ESG Creates Value," McKinsey Quarterly, McKinsey & Company, 2019.
[7] RBC Global Asset Management 14/10/20, ESG Adoption Increases Globally, While COVID-19 Impacts How Investors Look at Social Factors, RBC Global Asset Management Survey Finds.

## Meeting the demand for critical minerals

**Ontario is already a producer of several critical minerals identified by other jurisdictions as being in high demand**
Ontario is a world-class mineral producer of nickel, gold, copper, zinc and platinum group elements. In 2019, Ontario produced over $10 billion worth of minerals, accounting for 22 per cent of Canada's total mineral production. Minerals mined in the province are part of a globally integrated supply chain and Ontario minerals are used in products worldwide.

Of the top six minerals produced in Ontario, four meet the definition of a critical mineral.

| Commodity | World Ranking of Mineral Production |
|---|---|
| **Top 10** | |
| Platinum Group Elements* | 4th |
| Nickel* | 8th |
| **Top 20** | |
| Cobalt* | 13th |
| Gold | 14th |
| Copper* | 18th |
| Silver | 20th |

*Critical minerals on Ontario's proposed list

**Mining in Ontario: facts and figures**

**$10.7 billion** total mineral production in 2019

**40** mines operating in Ontario; critical minerals are produced at 10 of Ontario's 40 mines

**900** mining supply and services companies support Ontario's mineral sector

**200+** active mineral exploration projects underway in Ontario

**71,000** people employed by the sector (2018) – two-thirds in the north (2018)

**$25.7 billion** of Ontario's mineral exports (2019) represents 10.2 per cent of total Ontario exports

**$2.1 billion** spent on Ontario capital expenditures, which includes the construction or expansion of buildings, mine workings (shafts, ramps, etc.) and equipment (trucks, major mill components, etc.) (2019)

**$497 million** exploration spending (2019); critical minerals accounted for $170 million (34 per cent) of Ontario's exploration spending in 2019

**Ontario is well-positioned for additional critical minerals projects**

As noted above, Ontario is already a producer of several critical minerals including nickel and copper, as well as zinc, platinum group elements, cobalt, selenium, tellurium and indium. Other critical minerals have been produced in the past or occur in deposits that are currently being developed for possible future production, including barite, chromite, fluorspar, graphite, lithium, magnesium, niobium, phosphate and uranium.

Ontario's varied geology also provides tremendous critical mineral exploration opportunities. Besides the commodities already mentioned, which all have demonstrated exploration and development potential, several other critical minerals are currently being actively explored for in Ontario. These critical minerals include tantalum, cesium, rare earth elements, titanium, vanadium, molybdenum and tungsten. Additional exploration potential exists for antimony, beryllium, bismuth, manganese and zirconium, known to occur in Ontario.

**What are rare earth elements?**

According to Natural Resources Canada,[8] rare earth elements (REEs) can be found in a variety of consumer and industrial products, including hybrid and electric vehicle motors and batteries, alloys, glasses and electronic devices, such as smartphones, televisions and computers.

There are 17 rare-earth elements (REEs), which are categorized as "light" or "heavy."

**Light REEs** (lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium and scandium) are abundantly available and accessible through global supply chains.

**Heavy REEs** (terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium and yttrium) are "critical REEs" because they are scarce, and supply comes almost exclusively from China. Ontario can potentially play a role in supplying heavy REEs to the global marketplace.

**Ontario's mining innovation sector is advancing mining sector competitiveness**

Cutting-edge research and development in universities, colleges and research institutes contributes to making mineral exploration and mining more efficient, technologically advanced, safer and better for the environment.

Ontario's world-class mining supply and services sector is constantly bringing new technologies to market. Over the years, these technologies have included battery-electric underground mining vehicles, drones, mining equipment outfitted with smart technologies and remote-controlled equipment. Many mining companies have adopted these technologies, increasing their overall productivity and efficiency while reducing their environmental footprint.

**Ontario's processing capacity for critical minerals is increasing**

Mineral processing is part of an inter-provincial and international flow of raw materials that are treated, smelted and refined for use in a number of sectors and products. Ontario's mining and processing capacity is vital in contributing to much-needed global supply, as is the province's refining capacity to produce intermediate and pure products of nickel, cobalt, copper, platinum group elements and refined uranium. In 2018, Ontario had the largest share of refined nickel production in Canada, totalling almost 50 per cent.[9]

More recently, the Ontario government has made strategic investments in supporting the processing of cobalt in Ontario, which will contribute to a supply of refined product to western markets. First Cobalt Refinery, located several hundred kilometres north of the U.S. border, could potentially serve some of North America's automotive and electric vehicle manufacturing, aerospace and other industrial hubs. According to the company's projections, the First Cobalt Refinery is projected to be operational by late 2022 and would be the only North American producer of battery-suitable cobalt for North America's electric vehicle markets.[10]

In 2019, Noront Resources Limited selected the Algoma Steel Inc. site in Sault Ste. Marie for its potential future ferrochrome processing facility for its chromite. Chromite, one of the resources found in Ontario, can be processed into ferrochrome, a key ingredient in the production of stainless steel.

[8] https://web.archive.org/web/20200304180135/https://www.nrcan.gc.ca/our-natural-resources/minerals-mining/minerals-metals-facts/nickel-facts/20519
[9] https://www.firstcobalt.com/news/news/first-cobalt-achieves-key-milestone-with-refinery-feedstock-arrangements
[10] https://www.firstcobalt.com/about-us/about/

Thunder Bay could also become the site for a northwestern lithium mineral processing hub. Canadian-based mineral exploration and development companies, Avalon Advanced Materials and Rock Tech Lithium, are examining the potential for the first facility of this kind in North America.[11]

Junior exploration and senior mining companies continue to invest in exploration and development of critical minerals in Northern Ontario. Investments being made by Vale and Glencore in Sudbury are expected to play an important role in serving the growing critical minerals needs of North America. Additionally, the Canada Nickel Company has been advancing the Crawford Nickel-Cobalt-Platinum Group Elements Project near Timmins and has entered into an agreement with Glencore to examine the potential for processing the ores at the Kidd Creek Metallurgical site.

**Ontario Smelters & Refineries for Metal Mines**
(Asterisks indicate critical minerals on Ontario's draft critical minerals list)

| Operation | Operator/Owner | Facility | Commodity |
|---|---|---|---|
| Blind River | Cameco Corp. | Refinery | Uranium* Trioxide |
| Brampton | Asahi Refining Canada Ltd. | Refinery | Gold, Silver |
| Copper Cliff | Vale Canada Ltd. | Smelter, Refinery, Plant | Nickel* (Oxide Sinter, Pellets, Powder, Sulphate), Copper* Cathodes, Gold, Silver, Selenium* Cake, Tellurium* Dioxide Cake, Platinum Group Elements* (in Residues), Sulphur Dioxide, Sulphuric Acid |
| Ottawa | Royal Canadian Mint | Refinery | Gold, Silver |
| Port Colborne | Vale Canada Ltd. | Refinery | Electrolytic Cobalt*, Platinum Group Elements* (in Residues), Cobalt* Oxide |
| Port Hope | Cameco Corp. | Conversion Facility | Uranium* (Hexafluoride, Dioxide, Metals, Alloys) |
| Sudbury | Glencore Canada Corp. | Smelter, Plant | Nickel* Copper* Matte Containing Cobalt*, Gold, Silver, Platinum Group Elements*, Sulphur Dioxide, Sulphuric Acid |

[11] https://www.avalonadvancedmaterials.com/news_media/news_releases/index.php?content_id=912

# Objectives for developing Ontario's critical minerals strategy

Ontario's framework for developing a critical minerals strategy sets out a vision – one where the Province can generate investment and increase Ontario's competitiveness in the global market, while supporting the transition to a cleaner, sustainable global economy. For this reason, Ontario is considering the following objectives to help guide the development of this strategy:

**Enhancing economic development and job creation in Ontario and supporting partnership opportunities for Indigenous communities**
Ontario is focused on facilitating economic development and job creation, including long-term economic recovery, by supplying provincial, national and international markets with critical minerals. The Province is also focused on unlocking opportunities to promote further participation by Indigenous communities in Ontario's critical minerals industry.

**Reducing regulatory barriers while maintaining public health and safety and respecting the environment and Aboriginal and treaty rights**
Attracting investment in mineral exploration and development projects requires a regulatory framework that reduces barriers and streamlines business processes while respecting Aboriginal and treaty rights, and minimizing the impact of mineral development on health, safety and the environment.

**Advancing Ontario's potential to become the supplier of choice for critical minerals on the international stage**
Mineral commodities are part of a dynamic global supply chain, which creates opportunities for Ontario to supply responsibly produced minerals to the global marketplace.

**Increasing local supply chain opportunities**
Ontario can further diversify its manufacturing base by supporting broader provincial economic initiatives aimed at accelerating the production and adoption of various technologies that use critical minerals.

**Accelerating the transition to a low-carbon economy**
Critical minerals are used in the production of low-carbon technologies, such as electric vehicles and renewable energy applications. Ontario can play a leading role in supplying these industries and supporting the low-carbon transition through its critical minerals.

**Discussion questions:**

1. Will these objectives support achieving Ontario's vision?
2. Are there any other elements that need to be considered in the objectives?
3. What are some actions Ontario could consider to achieve these objectives?

# Key areas of focus for a critical minerals strategy

## 1 Supporting partnership opportunities with Indigenous communities

Ontario believes that the responsible development of natural resources will continue to build stronger, healthier, and more prosperous communities across Ontario. Collaborating on resource development projects can advance reconciliation and can support Indigenous communities, industry and other partners to work together towards a shared understanding of local projects, and broader initiatives that support skills training, capacity-building and improved economic development opportunities.

Ontario believes that local communities should benefit from resource development activity and is committed to working with First Nations and Métis organizations to make that happen. An Ontario critical minerals strategy would support Indigenous communities in proximity to resource development to further participate and share in the various benefits of responsible resource development, helping to build stronger, healthier and more prosperous communities across Ontario.

The development of the strategy will consider, in conversation and partnership with Indigenous communities, how communities can:

- Meaningfully participate in and benefit from the economic opportunities and jobs provided by sustainable resource development.
- Be part of collaborative relationships with the private sector to optimize those benefits.

**Discussion questions:**

1. What opportunities do you see for Indigenous communities participating in resource development?
2. What are the barriers that Indigenous communities face in participating in resource development?
3. What supports might assist Indigenous communities with taking advantage of the many opportunities of a critical minerals strategy?
4. What kinds of initiatives or partnerships could create more opportunities for participation in critical minerals projects and the supply chain?

Across Ontario, ministries continue to work on initiatives towards reconciliation and are committed to creating real and positive change, working together with Indigenous communities.

## 2 Developing an Ontario critical minerals list

**Proposal:**
Ontario will finalize a list of critical minerals the Province will use to drive economic growth and identify trade opportunities.

Ontario is uniquely positioned to meet rising global demand for critical minerals and can attract potential investment opportunities by creating a provincial critical minerals list to guide mineral exploration and development. An Ontario critical minerals list will be of interest to jurisdictions that are seeking to secure a reliable supply of raw material for their own domestic markets, such as the United States, the European Union, Japan and South Korea.

Ontario has created a draft critical minerals list. It includes four categories:

1. **Exploration potential:** Critical minerals that have demonstrated exploration potential in Ontario.
2. **Advanced mineral projects:** Critical minerals that have a reasonable prospect of being developed in Ontario in the near-term (within five years).
3. **Producing:** Critical minerals that are currently being commercially produced by operating mines in Ontario.
4. **Processing:** Smelting and refining of ores, concentrates and other intermediate critical mineral/metal products that were not originally mined in Ontario.

**What are critical minerals?**

While there is no universal definition of critical minerals and various jurisdictions define them differently, the term generally applies to **minerals that have specific industrial, technological and strategic applications for which there are few viable substitutions.** These minerals are also at higher supply risk due to geopolitical considerations and market demand.

**Ontario's draft critical minerals list**

| Exploration Potential | Advanced Mineral Projects | Producing | Currently Processing Only |
|---|---|---|---|
| Antimony | Barite | Cobalt ● | Uranium |
| Beryllium | Chromite | Copper ● | |
| Bismuth | Graphite | Indium | |
| Cesium | Lithium | Nickel ● | |
| Fluorspar | Magnesium | Platinum Group Elements ● | |
| Manganese | Niobium | Selenium ● | |
| Molybdenum | | Tellurium ● | |
| Phosphate | | Zinc | |
| Rare Earth Elements | | | |
| Tantalum | | | |
| Tin | | | |
| Titanium | | | |
| Tungsten | | | |
| Vanadium | | | |
| Zirconium | | | |

● = also processed in Ontario

**How the list was developed**

The draft critical minerals list for Ontario was developed by using geoscience data and publicly available information. Gold and iron are absent from Ontario's list because their supply chains are not at risk of disruption, which is one of the key factors in defining a mineral as critical.

Three principles guided the development of this list:

- **Flexibility:** Maintaining the ability to modify or update the list as economic and market demands shift or as strategic priorities change.
- **Evidence-based:** Avoiding "interest-based" approaches to defining the list to ensure fairness for all mineral exploration and development companies involved in critical minerals.
- **Alignment:** Ensuring Ontario's proposed critical minerals list aligns with the lists of other jurisdictions. This will better position the Province to collaborate with businesses and other levels of government to capitalize on the growing global demand for critical minerals.

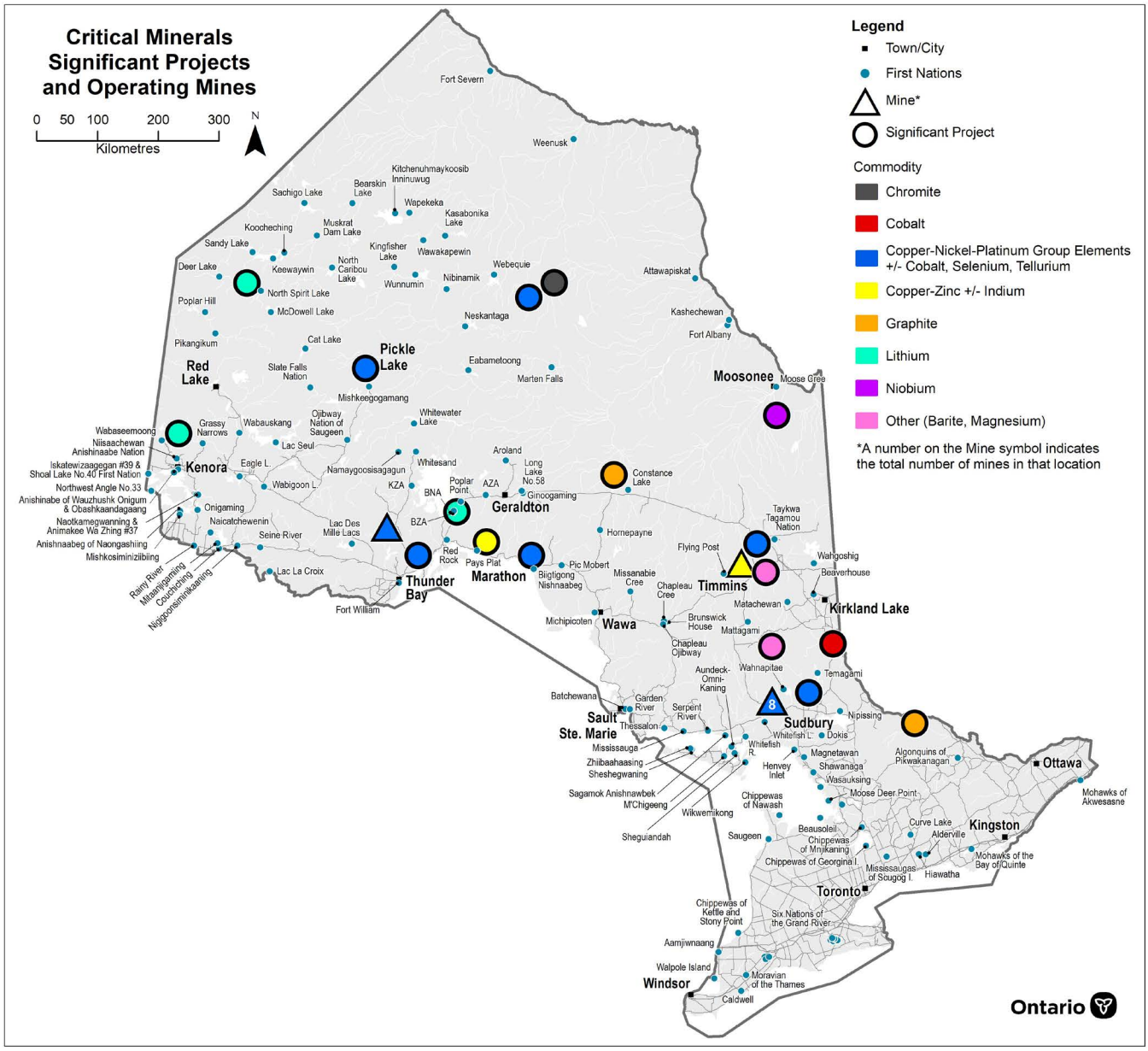
**Discussion questions:**

1. Are there other considerations or factors that Ontario should take into account when developing a critical minerals list for Ontario?

2. Are there any other minerals in Ontario that should be added to the list because they are considered “critical,” or that should be removed from the list?

3. How can Ontario leverage its critical minerals list to demonstrate to the global investing community that the province is ready to supply the world with critical minerals?

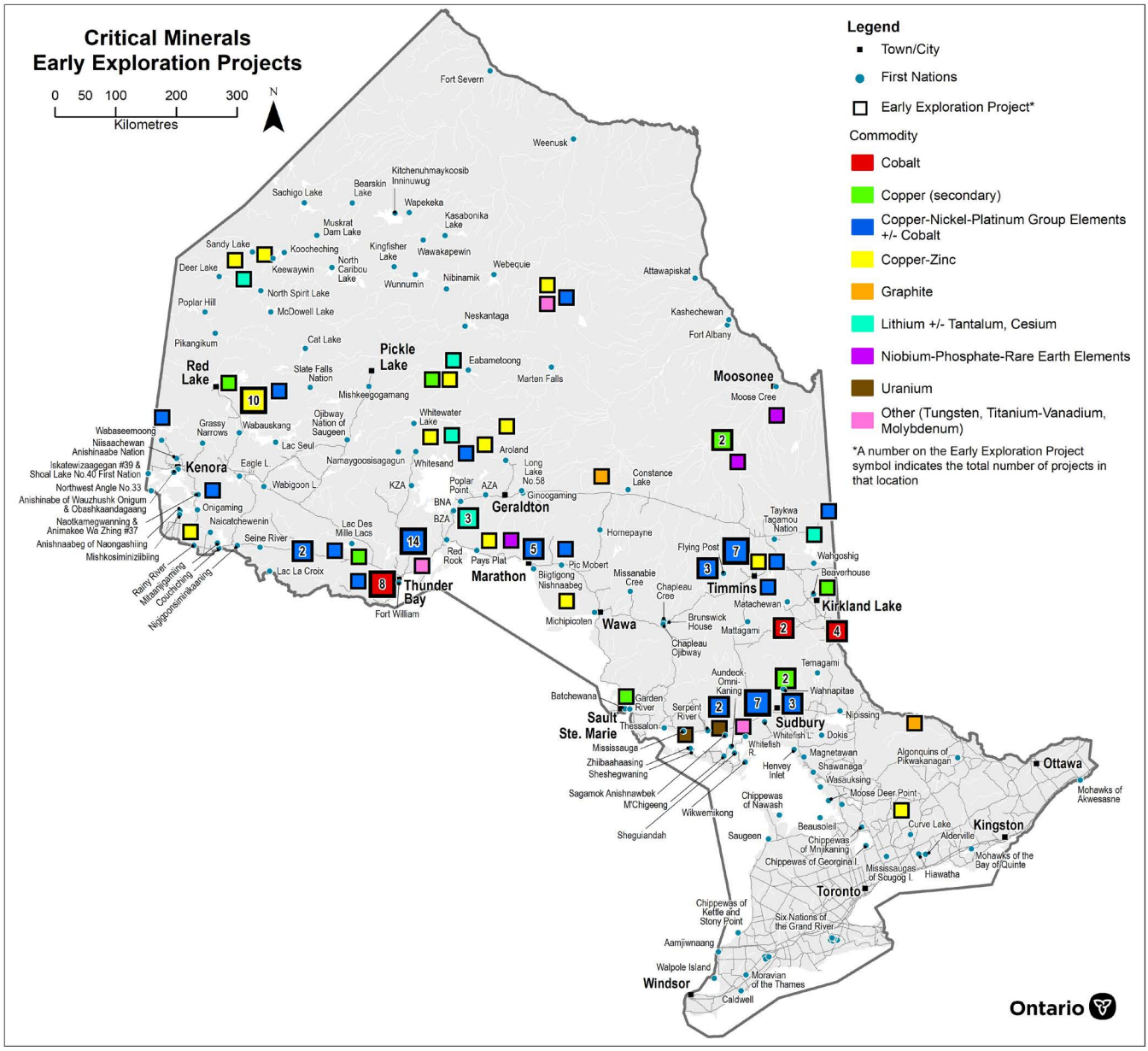
**Figure 1. Locations of significant projects and operating mines for critical minerals across Ontario.[12]**




The Ring of Fire is a mineral development opportunity located in Northern Ontario that has multi-generational potential for chromite production and significant production of nickel, gold, copper and platinum. The Ring of Fire is located approximately 500 kilometres northeast of Thunder Bay.

[12] **Significant Projects** refer to projects where the proponent has reached the stage where they have at least commenced a Preliminary Economic Assessment of the deposit.

**Figure 2. Locations of early exploration projects for critical minerals across Ontario.**



## 3 Enhancing investment in mineral exploration and development

**Proposal:**
Ontario will support the exploration for and development of critical minerals through efforts to attract new investment and showcase Ontario's high mineral development potential, both within and outside the province.

The Ontario government, through the Ministry of Energy, Northern Development and Mines (ENDM), promotes sustainable mineral exploration and development. As part of the commitment to grow a strong minerals sector, the Province supports individuals, companies and communities at all stages of the mining sequence – from grassroots prospecting through to mine development.

Some of the ways Ontario is supporting mineral exploration and development include:

**Helping prospectors and junior exploration companies discover new mineral deposits and access the capital they need to advance exploration projects**

Exploration is a high-risk activity that depends on capital from investors in Ontario, Canada and abroad. In order to be successful in raising capital, junior exploration and development companies rely on access to accurate geoscience information to help meet their needs, as well as tax incentives to help fund promising early exploration projects.

The Ontario Focused Flow-Through Share Tax Credit helps stimulate mineral exploration in Ontario by improving access to capital for small mining exploration companies. Flow-through shares provide shareholders with a refundable tax credit of five per cent of eligible Ontario mineral exploration expenses. Many Ontario mineral exploration companies rely on this tax credit, which has made several exciting discoveries in Ontario possible.

Ontario is also a leader in innovative geoscience information. The **Ontario Geological Survey (OGS)** has invested over $2.25 million in 48 projects related to critical minerals, such as nickel, chromite and lithium, over the last five years. Investments have included geological research in the Ring of Fire, lake sediment geochemistry and geophysical surveys, updating geoscience databases, developing recommendations for exploration and new tools to access existing data.

- Geology Ontario: An online portal housing Ontario Geological Survey publications and maps, drill hole data, assessment files and mineral deposit inventory data.
- OGSEarth: Provides access to a wide range of geoscience data in a format that can be viewed using user-friendly geographic information programs such as Google Earth.
- OGS (Ontario Geological Survey) Focus: A free, publicly accessible tool that allows anyone to find historical mineral exploration data from areas available for mineral exploration and claim registration.
- Ontario's Mining Lands Administration System (MLAS): An online management system that allows users to view crown land available for new claim registration, as well as active unpatented mining claims and related land information, register and manage mining claims, and buy or renew prospector's licences.
- Resident Geologist Program (RGP): Serves mineral sector clients across the province through a network of eight field offices. Services include collecting and maintaining geological data, conducting property visits, monitoring exploration activity, providing expert geological knowledge and developing recommendations for exploration.

**Supporting the participation of Indigenous communities in economic development activities resulting from mineral exploration and development**

Ontario supports the development of new relationships between Indigenous communities, industry and government, and supports the capacity of Indigenous communities to participate in the mineral exploration and development sequence through funding initiatives that are responsive to community priorities and enable Indigenous communities to fully participate in and benefit from related activities.

**The Aboriginal Participation Fund**

The Aboriginal Participation Fund (APF), a $4.7-million fund, supports the capacity of communities to participate in Aboriginal consultation, as well as education and relationship-building activities related to mineral exploration and development. The APF is creating new opportunities to build and strengthen relationships among Indigenous communities, government and industry.

In Ontario, it is estimated that 11 per cent of the direct mining workforce is Indigenous. These jobs range from early exploration through mine closure. Many Indigenous peoples and communities are participating in the mining sector through local mineral exploration and development projects. Additionally, numerous Indigenous businesses provide various services to the mining sector in Ontario, including environmental consulting, camp services and logistics.

Resource revenue sharing supports economic development in Northern Ontario and advances reconciliation with Indigenous peoples. It increases business certainty in the resource sector and allows all partners to benefit from local project development while also supporting job creation in the north.

Ontario entered into three resource revenue sharing agreements for mining and forestry with First Nations organizations representing 35 communities in Northern Ontario. The agreements have shared over $48 million from mining tax and royalties and forestry stumpage revenues with First Nations. Under these agreements, the communities can use this funding to enhance education and health care services in their communities, create economic development opportunities that bring good-paying jobs to the region or support community and cultural priorities that help strengthen local planning and decision making.

Ontario is committed to engaging with Indigenous peoples living in Ontario to advance reconciliation and create opportunities for participation in mineral exploration and development.

**Helping mining companies manage energy costs associated with mineral production and processing**

While mine production is highly capital and energy intensive, Ontario helps mining companies manage some of these costs through programs such as the Northern Industrial Electricity Rate (NIER) Program. The program helps Northern Ontario's largest industrial electricity consumers, including mining companies, reduce energy costs, sustain jobs and maintain global competitiveness.

Further, Ontario has a plan to **reduce electricity costs** on average for medium and larger industrial commercial employers through a **Comprehensive Electricity Plan**. On January 1, 2021, the province removed certain costs from industrial electricity bills, resulting in average savings of 14 per cent for qualifying metal ore mining employers. This initiative is in addition to the benefits of other programs to provide electricity cost relief to eligible companies.

**Helping to build a cutting-edge mining innovation sector**

The development of resilient supply chains starts with support for research and development (R&D) and innovation. Ontario actively works to bring industry, different levels of government, academic institutions, researchers and commercialization entities together to build collaboration opportunities and partnerships. Ontario's mining innovation sector is recognized for supplying leading-edge technology and services that are vital in helping mining companies stay competitive in the global economy. The Province has helped build a culture of innovation through targeted initiatives and investments, such as industry roundtables and working groups, marketing and investment attraction supports, and targeted funding in mining innovation. Ontario is committed to monitoring global activities related to critical minerals and helping companies protect the mineral sector intellectual property developed in the province.

On February 11, 2021, the Ontario government launched the new and improved Northern Ontario Heritage Fund Corporation (NOHFC). NOHFC programs help to build strong and resilient local economies by making targeted investments in northern businesses, community organizations and municipalities that will bring good jobs and prosperity to every corner of Northern Ontario.

The NOHFC, a board-governed agency of the Province, was established in 1988 with a mandate to promote and stimulate economic development initiatives in Northern Ontario. It provides financial assistance to projects that stabilize, diversify and foster the economic growth and diversification of the region. Historically, the NOHFC has supported a wide range of initiatives and sectors of Northern Ontario's economy, including Northern Ontario's mining innovation sector. The Northern Ontario innovation sector is made up of post-secondary and research institutions, as well as mining supply and services companies. NOHFC has consistently provided support to Northern Ontario companies in the mining supply and services sector to help drive innovations from initial concept through to commercialization.

**Discussion questions:**

1. What else could Ontario do to promote the exploration for and development of critical minerals in order to enhance investment?

2. What else could Ontario do to prepare communities to be ready for, and actively participate in, exploration and development of critical minerals?

3. How could the Ontario Geological Survey play a greater role in supporting critical minerals exploration and development in the province?

## 4 Regulatory and policy reform

**Proposal:**
Ontario will explore policy, regulatory and legislative approaches to reduce regulatory burden and improve regulatory certainty to advance critical minerals exploration and development in the province, while respecting Aboriginal and treaty rights.

Ontario's legislative and regulatory framework for mineral exploration and development takes a balanced approach to promoting a competitive minerals sector, while addressing environmental considerations and recognizing and affirming Aboriginal and treaty rights.

The *Mining Act* regime is graduated and scalable, with regulatory requirements that are proportionate to the potential impacts of a project. For example:

- Beginning with early exploration, proponents are required to apply for specific approvals based on the activities contemplated and the potential for disturbance.
- At stages where closure plans are required, rehabilitation requirements are proportional to the nature and type of the hazard, considering the potential impacts to public health and safety.
- The amount of financial assurance that is required is based on the costs of rehabilitation for the specific proposed project.

Ontario recognizes that to be truly competitive, our regulatory framework must keep pace with the changing demands of the exploration and mining industry as well as constitutional obligations. Rigorous review, due diligence, Aboriginal consultation, and protection of public health, safety and the environment will remain paramount. The Province knows that supplying a dynamic critical minerals market requires the right regulatory tools and policies to ensure an effective and efficient approach.

The Ontario government has already taken significant steps to cut red tape, bring clarity to its regulatory framework and improve processes. For example, the Ministry of Energy, Northern Development and Mines (ENDM) has:

**Established an easy-to-navigate digital system for proponents to register and manage mining lands**

- Replaced the inefficient and outdated process to register and manage mining claims with a one-stop online system known as the Mining Lands Administration System (MLAS), where proponents have access to one centralized source to more efficiently register mining claims and manage mineral tenure.

**Clarified and streamlined the regulatory process for mining projects requiring multiple permits or approvals from more than one Ontario ministry or the federal government**

- ENDM is the lead ministry for the One Window Co-ordination Protocol, a framework between multiple ministries working to co-ordinate regulatory processes for issuing all provincial mineral development permits related to major mineral exploration and development projects in Ontario.

**Updating the *Mining Act* to establish timeline requirements to create business certainty around closure plan amendments (subject to proclamation)**

- Ensure the same timeline requirements for the ministry to respond to proponents that are already in place for closure plans are also in place for closure plan amendments.

## Regulatory and policy reform - what is next?

Ontario has heard from stakeholders about the importance of continuing to improve regulatory processes to achieve better results for critical minerals exploration and development projects in Ontario. Ontario is proposing to focus on a few key areas, specifically:

**Guidance:**

- Provide proponents clear guidance on the requirements under the *Mining Act* with a focus on developing public-facing policy guidance related to bulk sampling, advanced exploration closure planning and mine production closure planning.

**Streamlining:**

- Identifying opportunities to streamline processes and authorizations under the *Mining Act,* including a "permit by rule"[13] model for retaining proceeds from minerals extracted for the purpose of testing from unpatented mining claims.
- Strengthening and clarifying the graduated and scalable approach in the *Mining Act* for closure planning, particularly for advanced exploration closure planning.

**Thresholds:**

- Review bulk sample thresholds to ensure they meet the balance of a competitive mining sector with environmental protection and sustainability.

As these priority areas are examined, Ontario will consider benefits for the mineral sector and the exploration and development of critical minerals. Any changes will consider potential impacts to Aboriginal and treaty rights.

**Discussion questions:**

1. Are there any additional areas of the regulatory system that are creating barriers for critical minerals projects?
2. Are there specific areas of policy guidance that industry and partners would find beneficial?
3. What key considerations would you want looked at in a review of bulk sample thresholds?
4. What are some of the challenges related to advanced exploration and mine closure planning with respect to the development of critical minerals?

[13] Permits by Rule (PBR) are mechanisms whereby an authorization is not required for an activity as long as the rules set up for the activity are followed. Activities covered under a PBR system tend to have predictable outcomes that are minimal in impact and therefore lend themselves to straightforward rules. In this case, the potential sale of the end product of a bulk sample is not expected to give rise to any environmental or public safety impacts and in our view these types of activities would be appropriately regulated under a PBR approach.

## 5 Supply chain and manufacturing opportunities

**Proposal:**
Ontario will explore opportunities to advance Ontario's competitive advantage for critical minerals and its supply chain on the national and international stages.

**Supplying other jurisdictions and key trading partners**

Building upon initiatives such as the Canada-U.S. Joint Action Plan on Critical Minerals will be integral to advancing Ontario, Canada and the U.S.'s mutual interest in securing supply chains for the critical minerals needed in important manufacturing sectors, including information and communications technology, aerospace and defence, and clean technology. In addition, continued engagement opportunities through trade agreements, such as the Comprehensive Economic and Trade Agreement (CETA) Raw Materials Dialogue between Canada and the European Union (EU), may offer opportunities to link Canadian critical minerals producers with end-users of critical raw materials in the EU.

An Ontario critical minerals strategy would also advance Ontario's competitive advantage on the national and international stages by highlighting the potential to create supply chains within the province. Ontario's geography, resource development expertise, mineral processing capacity and manufacturing ability could be leveraged to keep large sections of supply chains right here in Ontario. This includes extracting and processing minerals to create components for electric vehicle batteries that could be manufactured in Ontario. Linking the mineral sector with innovation and manufacturing sectors is an essential part of a successful critical minerals strategy. Ontario's critical minerals strategy will also help inform other key government initiatives that promote economic development in the province.

To date, clean technology is one area the Ontario government has focused investment, including a recent $295 million matching investment with the Government of Canada to retool Ford Canada's Oakville Assembly Complex. Coupled with other announcements, like General Motors Co's nearly $800-million investment to bring production of the BrightDrop EV600 electric vehicle to its CAMI manufacturing plant in Ontario, these and other steps are crucial to securing future investments across the battery electric vehicle (BEV) supply chain.

Growing Ontario's critical mineral advantage will also provide Indigenous communities, municipalities and businesses with opportunities to actively participate in and benefit from supply chain opportunities, particularly in the north. On the ground, the ministry's Northern Development Advisors are continually working with stakeholders, Indigenous communities, municipalities and businesses to identify economic development opportunities and various support programs across government.

**General Motors moving to all-electric vehicles by 2035**

In January 2021, General Motors announced plans to cease production of gasoline and diesel-engine vehicles by 2035. This will help the company achieve carbon neutrality in its global products and operations by 2040.[14]

[14] https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2021/jan/0128-carbon.html

**Competing on the global stage through mining research and innovation**

Ontario is home to globally recognized research centres developing leading-edge technology and offering solutions to industry across supply chains, including processes for refining raw materials required for battery components and extended-range battery storage systems.

Ontario's mining supply and services sector has established itself as a pioneer in the research, development and commercialization of BEV technology for use in underground mines. MineConnect, Ontario's Mining Supply and Services Association, is connecting end-users to Ontario suppliers of battery-powered underground equipment. This technology has revolutionized the mining industry by removing diesel particulates, reducing heat and noise, offering increased productivity and lowering overall operating costs.

**Increasing processing and refining capacity**

Increasing Ontario's capacity to process and refine critical minerals is another component of supply chain opportunities where Ontario has focused support. A recent example of this is the Province's $5 million matching contribution along with the federal government for First Cobalt to accelerate the development of its cobalt refinery. This investment positions First Cobalt to be the only source of battery-suitable refined cobalt for the North American EV market.

Ontario's processing and refining capacity is further facilitated through the efforts of Invest in Ontario and ENDM's Trade and Investment Specialists who are working to promote Northern Ontario internationally and attract foreign direct investment to the region. This is expected to grow as Ontario further harnesses its critical minerals potential.

**Making strategic investments in Ontario-based partnerships and businesses with global reach**

Looking ahead, the government will continue to help stakeholders and partners identify opportunities that will leverage existing innovation capacity, and drive private sector R&D investment and collaboration across the mining innovation sector to commercialize new technologies. Ontario also recognizes the need to help companies protect their intellectual property in innovative ideas and research developed locally.

The Province continues to support innovative technologies and solutions for Ontario's mining supply and services sector through programs like the NOHFC's Invest North – Innovation Stream, which supports the research, development and commercialization of new and innovative technologies in Northern Ontario. Continued collaboration with the federal government will also be necessary to better understand cross-sector linkages and opportunities to strengthen Ontario's competitive position on a global stage, including securing the supply chain of critical minerals to Ontario's clean technology and ICT sectors.

**Discussion questions:**

1. What are the barriers and opportunities facing the development of an Ontario-based critical minerals supply chain outside of mineral exploration and development?

2. How can Ontario attract investment in new processing capacity needs in Ontario?

3. What key industry partners should be engaged to best position Ontario in securing new supply chain developments?

4. Are there any missing linkages in critical minerals supply chain processes that should be included in an Ontario critical minerals strategy?

5. Are there any best practices from other jurisdictions that could be implemented in Ontario to better attract critical minerals supply chain investments?

# We want to hear from you

## Next steps

The Ontario government is seeking feedback on this discussion paper for 60 days. All comments will be considered and used to help develop Ontario's first critical minerals strategy.

Please submit your comments on the Environmental Registry or email us at criticalminerals@ontario.ca. You may attach your submission as a PDF or Word document. While we encourage electronic submissions at this time, we recognize the need to accept comments in writing where electronic submissions are not possible. If you are sending a letter, please include the name of your organization as applicable, and address it to:

Director's Office- Strategic Services Branch, Mines and Minerals Division
Ministry of Energy, Northern Development and Mines
933 Ramsey Lake Road, 2nd Floor
Sudbury, ON P3E 6B5

# Glossary

**Bulk sample:** As part of mineral exploration and development activities, bulk sampling is an extractive process to test a large ore body for mineral content. Section 52 of the *Mining Act* requires that proponents get permission to mine, mill or refine more than the prescribed quantity of mineral bearing substance from a mining claim for the purpose of testing mineral content; the threshold is prescribed in O. Reg 45/11, General.

**Closure plan:** A plan to rehabilitate a site or mine hazard in accordance with Part VII of the *Mining Act*. This plan includes the submission of financial assurance to assure that the rehabilitation measures in the closure plan will be carried out.

**Early exploration:** Prospecting and mineral exploration, including those activities prescribed in regulation. A full list of prescribed activities can be found in section 1 of Schedule 2 and section 1 of Schedule 3 of O. Reg. 308/12, Exploration Plans and Permits. Some examples of early exploration activities could include, but are not limited to, geophysical surveys, mechanized drilling, line cutting, mechanized surface stripping and pitting or trenching.

**Financial assurance:** Cash, a letter of credit, a performance bond, a corporate financial test or other forms of security, guarantee or protection, as set out in subsection 145(1) of the *Mining Act*.

**Mining claim:** The registration or deemed registration of a mining claim grants its owner the exclusive rights to explore for minerals on a designated piece of land. The owner of a mining claim is not granted title or ownership to the land and cannot extract or sell any resources removed from the land (except if permission is given to obtain a bulk sample). The owner of a claim must also perform yearly assessment work or, where eligible, make payments in lieu of such work.

# Discussion questions

**Objectives for developing Ontario's critical minerals strategy**

1. Will these objectives support achieving Ontario's vision?
2. Are there any other elements that need to be considered in the objectives?
3. What are some actions Ontario could consider to achieve these objectives?

**Key areas of focus for a critical minerals strategy**

1. What opportunities do you see for Indigenous communities participating in resource development?
2. What are the barriers that Indigenous communities face in participating in resource development?
3. What supports might assist Indigenous communities with taking advantage of the many opportunities of a critical minerals strategy?
4. What kinds of initiatives or partnerships could create more opportunities for participation in critical minerals projects and the supply chain?

**Developing an Ontario critical minerals list**

1. Are there other considerations or factors that Ontario should take into account when developing a critical minerals list for Ontario?
2. Are there any other minerals in Ontario that should be added to the list because they are considered "critical," or that should be removed from the list?
3. How can Ontario leverage its critical minerals list to demonstrate to the global investing community that the province is ready to supply the world with critical minerals?

**Enhancing investment in mineral exploration and development**

1. What else could Ontario do to promote the exploration for and development of critical minerals in order to enhance investment?
2. What else could Ontario do to prepare communities to be ready for, and actively participate in, exploration and development of critical minerals?
3. How could the Ontario Geological Survey play a greater role in supporting critical minerals exploration and development in the province?

**Regulatory and policy reform**

1. Are there any additional areas of the regulatory system that are creating barriers for critical minerals projects?
2. Are there specific areas of policy guidance that industry and partners would find beneficial?
3. What key considerations would you want looked at in a review of bulk sample thresholds?
4. What are some of the challenges related to advanced exploration and mine closure planning with respect to the development of critical minerals?

**Supply chain and manufacturing opportunities**

1. What are the barriers and opportunities facing the development of an Ontario-based critical minerals supply chain outside of mineral exploration and development?
2. How can Ontario attract investment in new processing capacity needs in Ontario?
3. What key industry partners should be engaged to best position Ontario in securing new supply chain developments?
4. Are there any missing linkages in critical minerals supply chain processes that should be included in an Ontario critical minerals strategy?
5. Are there any best practices from other jurisdictions that could be implemented in Ontario to better attract critical minerals supply chain investments?

# Appendix

**The mining sequence**