

# Critical Minerals

Manitoba is home to world-class deposits and high mineral potential in extensive underexplored terrains.  
Learn more at [manitoba.ca/minerals](https://manitoba.ca/minerals)



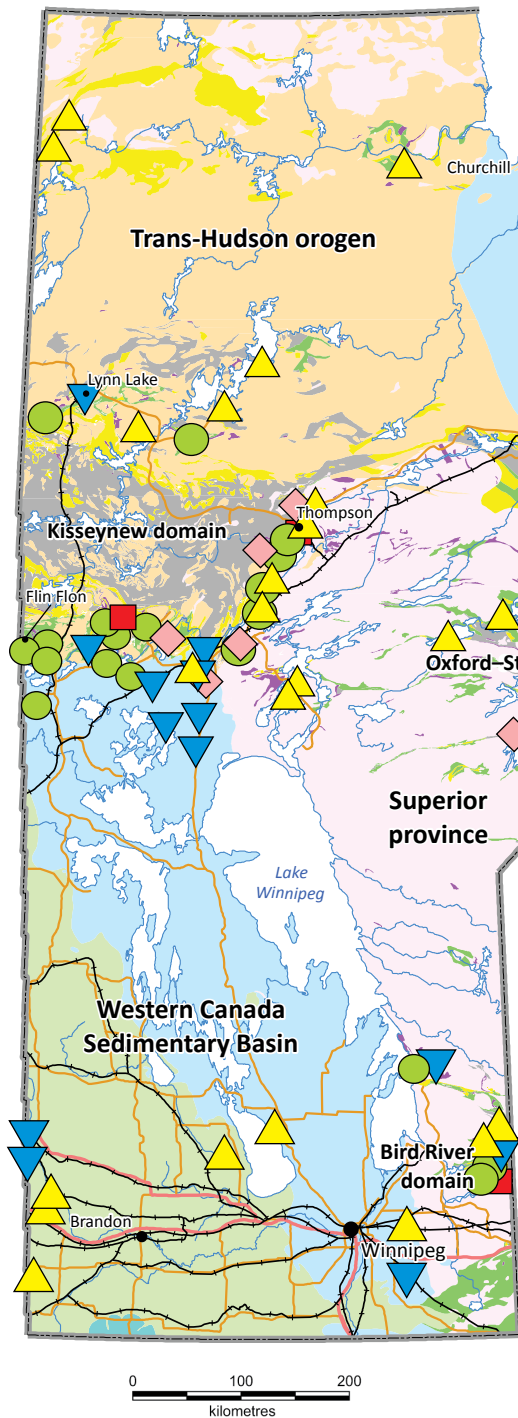
# Critical Minerals in Manitoba

**CRITICAL MINERALS** are crucial to Manitoba's economy and security. They fuel our society and have a variety of uses in industry, manufacturing, modern technology, and clean or low carbon technologies (e.g., solar panels, wind turbines, electric vehicles).

Critical minerals are mineral commodities in strong demand with important uses and no readily available substitutes, and can face potential disruption in supply. Graphite, nickel, vanadium, cobalt, lithium, rare-earth elements (REE) and tantalum are a few examples.

Critical minerals occur in a variety of deposits, geological settings and mineral associations. Manitoba is well endowed in these commodities and well positioned to offer a competitive supply.

The **MANITOBA GEOLOGICAL SURVEY** is committed through thematic geoscience studies and mapping at regional scale to improve the understanding of critical minerals in the province.



### LEGEND

#### Phanerozoic

- Cenozoic sedimentary rocks
- Mesozoic sedimentary rocks
- Paleozoic sedimentary rocks

#### Precambrian

- Mafic-ultramafic intrusive rocks
- Proterozoic granite and gneiss
- Archean granite and gneiss
- Metagreywacke
- Metasedimentary rocks
- Mafic-felsic metavolcanic rocks

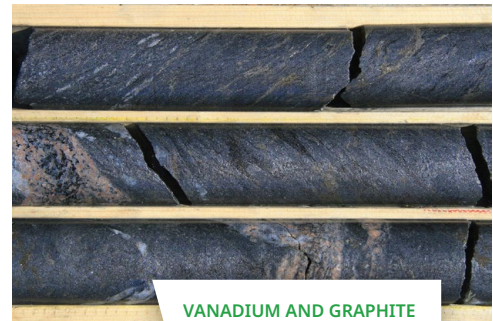
- ◆ Exploration project
- ▲ Deposit/occurrence
- ▼ Advanced project
- Current producer
- Past producer



**SURFACE SHOWING, MAYVILLE Cu-PGE**



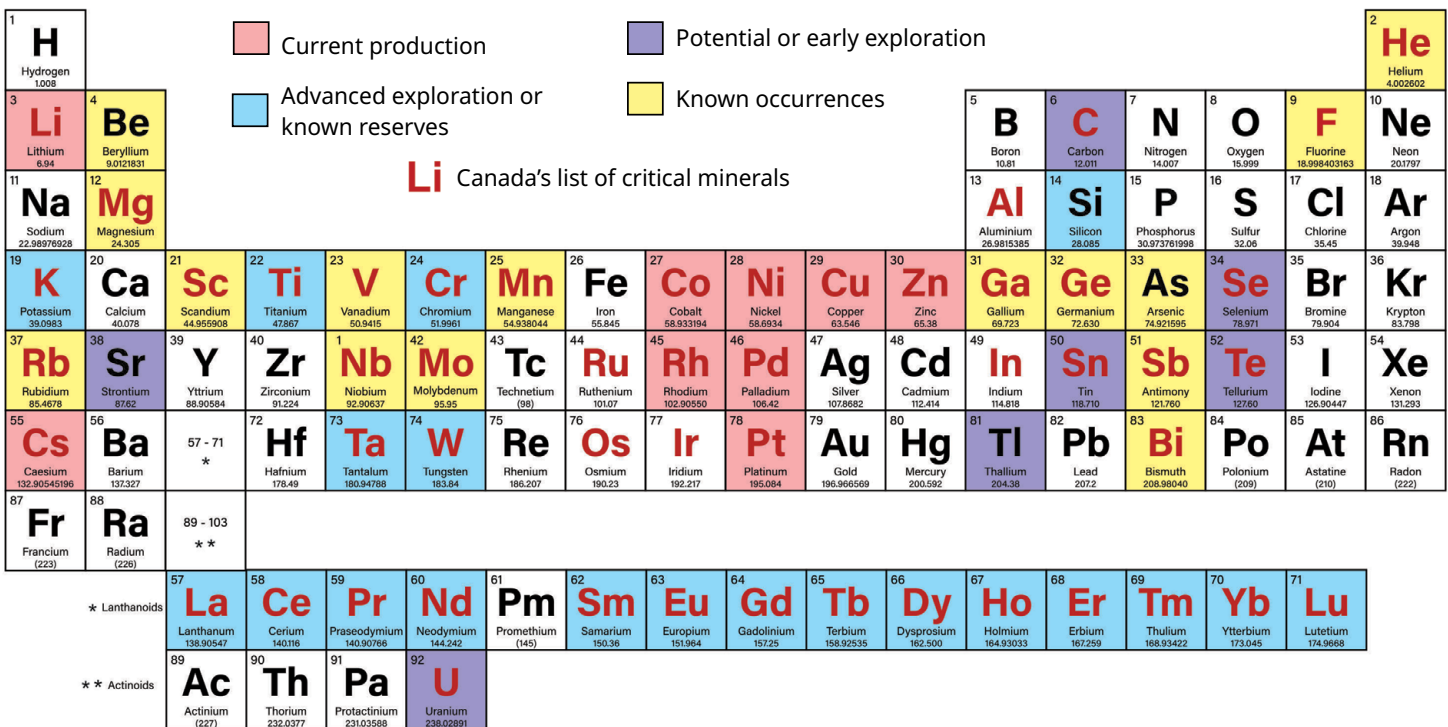
**SHEELITE MINERALIZATION, MONUMENT BAY DEPOSIT**



**VANADIUM AND GRAPHITE MINERALIZATION, HUZYK CREEK PROPERTY**

**Figure 1:** Geological map of Manitoba highlighting areas with critical mineral occurrences

# Manitoba's Critical Minerals Geological Advantage



**Figure 2:** Periodic table showing the elements considered critical minerals for Canada (in red), and considering resources, exploration and mineral production in Manitoba

## Superior Province

Critical mineral deposits and occurrences in the Superior province of Manitoba are distributed within or adjacent to laterally extensive Archean greenstone belts, typically in proximity to major faults.

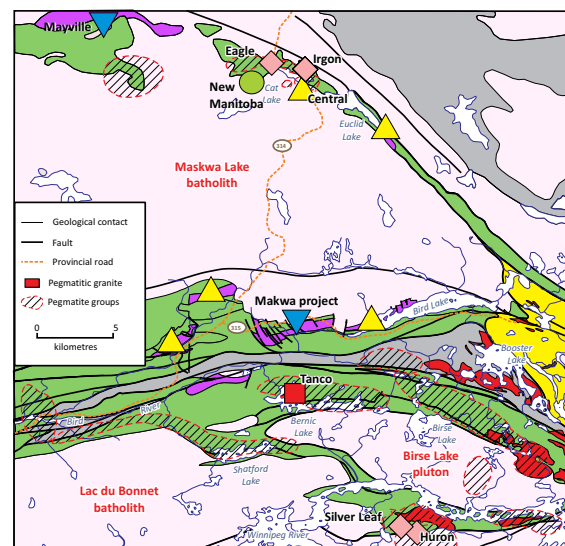
The Bird River domain in southeastern Manitoba includes the extensive Cat Lake–Winnipeg River pegmatite field, within which granitic pegmatites are endowed with various critical minerals. The world-class Tanco pegmatite, located at Bernic Lake, is the most significant critical mineral deposit in Manitoba. This highly fractionated lithium-cesium-tantalum (LCT)-type pegmatite contains several distinct mineralogical zones that have historically been mined for Li, Ta, Cs, Rb and Be ores.

The Bird River domain also has several significant deposits and occurrences of magmatic Ni-Cu-platinum-group elements (PGE) and stratiform Cr-PGE. Major deposits are hosted by the Bird River sill and associated mafic-ultramafic intrusions. The Bird River sill includes the past-producing Dumbarton and Maskwa West mines (Ni), as well as the Maskwa and Mayville projects (Ni, Cu, Cr).

Critical mineral occurrences in the Oxford–Stull domain in northeastern Manitoba are associated with granitic pegmatite dikes. LCT-type pegmatite intrusions at Gods Lake, Red Cross Lake and Red Sucker Lake may constitute a single regionally extensive pegmatite field. Potential for additional critical minerals is provided by the Cinder Lake alkaline complex, and minor carbonatite dikes at Oxford and Knee lakes. The Cinder Lake complex, located near Knee Lake, is Manitoba's only known occurrence of feldspathoid syenite with associated carbonatite.

The Monument Bay deposit near Stull Lake is most known by its gold resource of 3.6 Moz, but it also holds 248,000 tonnes of WO<sub>3</sub>.

Elsewhere in the Superior province, the Pipestone Lake property (located close to Cross Lake and approximately 150 km south of Thompson) presents a significant non-compliant NI 43-101 resource of TiO<sub>2</sub>, Fe<sub>2</sub>O<sub>3</sub> and V<sub>2</sub>O<sub>5</sub>. The komatiite-hosted Nickel Island Ni-Cu-PGE occurrence in the Island Lake greenstone belt has yielded significant drill intercepts.



**Figure 3:** Geological map of Bird River belt and Cat Lake–Winnipeg River pegmatite field

## Trans-Hudson Orogen

Critical mineral deposits and occurrences in the Paleoproterozoic Trans-Hudson orogen are distributed throughout and occur in a variety of geological and tectonic settings.

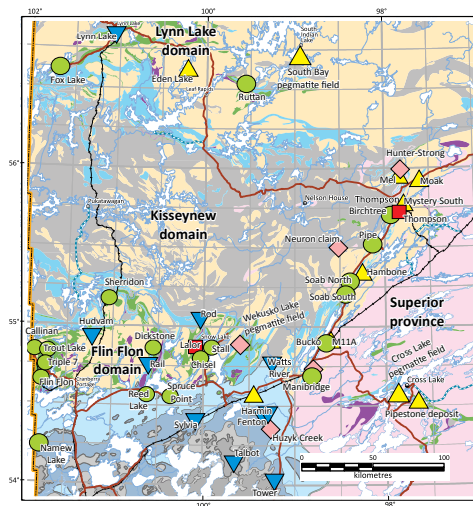
The Paleoproterozoic Flin Flon-Snow Lake belt contains world-class volcanogenic massive sulphide (VMS) deposits, from which high-grade mineralization of Zn-Cu-Au are common. This area also contains several mafic-ultramafic intrusions, with significant amounts of Ni-Cu-Co-PGE mineralization.

Juvenile volcanic-arc assemblages found in the Paleoproterozoic Lynn Lake belt host major VMS and Ni-Cu deposits. Historical mining in this district accounts for 22.2 Mt of ore while still leaving major reserves of Ni, Cu and Co.

The Thompson nickel belt contains several major Ni sulphide deposits, most notably the world-class Thompson deposit. Throughout many decades of production, this deposit has produced more than 2.5 Mt of refined Ni.

The Eden Lake complex, situated east of Lynn Lake, includes the most significant known REE occurrence in Manitoba. The REE-Th mineralization occurs in hydrothermal veins associated with carbonatite dikes in a syenitic magmatic breccia.

Elsewhere in the Trans-Hudson orogen, syenite complexes with local strong REE enrichment have been identified at Brezden and Burntwood lakes in the Kiseynew domain, and LCT-type



**Figure 4:** Geological map of the circum-Kiseynew region

pegmatite dikes of the Wekusko Lake pegmatite field in the Flin Flon domain contain significant Li mineralization.

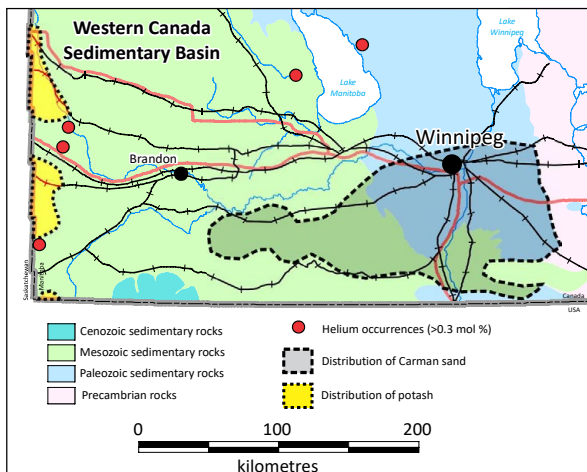
The Kiseynew domain is host to several graphite deposits and occurrences. The Neuron Graphite property is approximately 60 km southwest of Thompson, and has several significant intercepts of fine- to coarse-flake graphite. Vanadium and graphite mineralization are found at the Huzyk Creek property located south of Ponton.

## Phanerozoic: Silicon and Potash

Potash deposits occur locally in the Devonian-aged Prairie Evaporite of the Williston Basin in southwestern Manitoba. The Russell-McAuley deposits are the eastern extension of the prolific deposits mined in Saskatchewan and have an extensive exploration history. The Russell deposit has an average grade of 22.5 K<sub>2</sub>O wt. % and a resource estimate of 392 Mt, and the

St. Lazare deposit has an average grade of 20.9 K<sub>2</sub>O wt. % and a resource estimate of 650 Mt.

Southern Manitoba is home to the largest and purest silica sand deposits in North America, with silica values exceeding 99.5 per cent. The Ordovician-aged Winnipeg Formation of the Williston Basin consists of two distinct silica sand units, the basal sandstone unit and the Carman sand unit. The Carman sand unit is a single, continuous and uniform sand body with an area of over 16,000 km<sup>2</sup>, which is largely unexplored. Manitoba's high quality silica sand deposits meet or exceed the specifications for high purity glass making and silicon production.



**Figure 5:** Geological map of selected critical minerals in the Phanerozoic in southwestern Manitoba

## Mining, Oil and Gas Industry Overview

- \$3.4 billion in estimated value of production, a 45% increase since 2021
- \$1.7 billion in real value added, accounting for approximately 2.6 per cent of the province's real GDP and 4.3 per cent of all domestic merchandise exports
- Direct employment of approximately 3480 people, with an additional 2035 individuals employed by sector support activities
- 2023 estimated mineral exploration and deposit appraisal spending intentions at \$163.8 million
- 225 new wells drilled in 2022

Source: Natural Resources Canada

## Contact us

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