

Diamonds

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



Diamonds in Manitoba

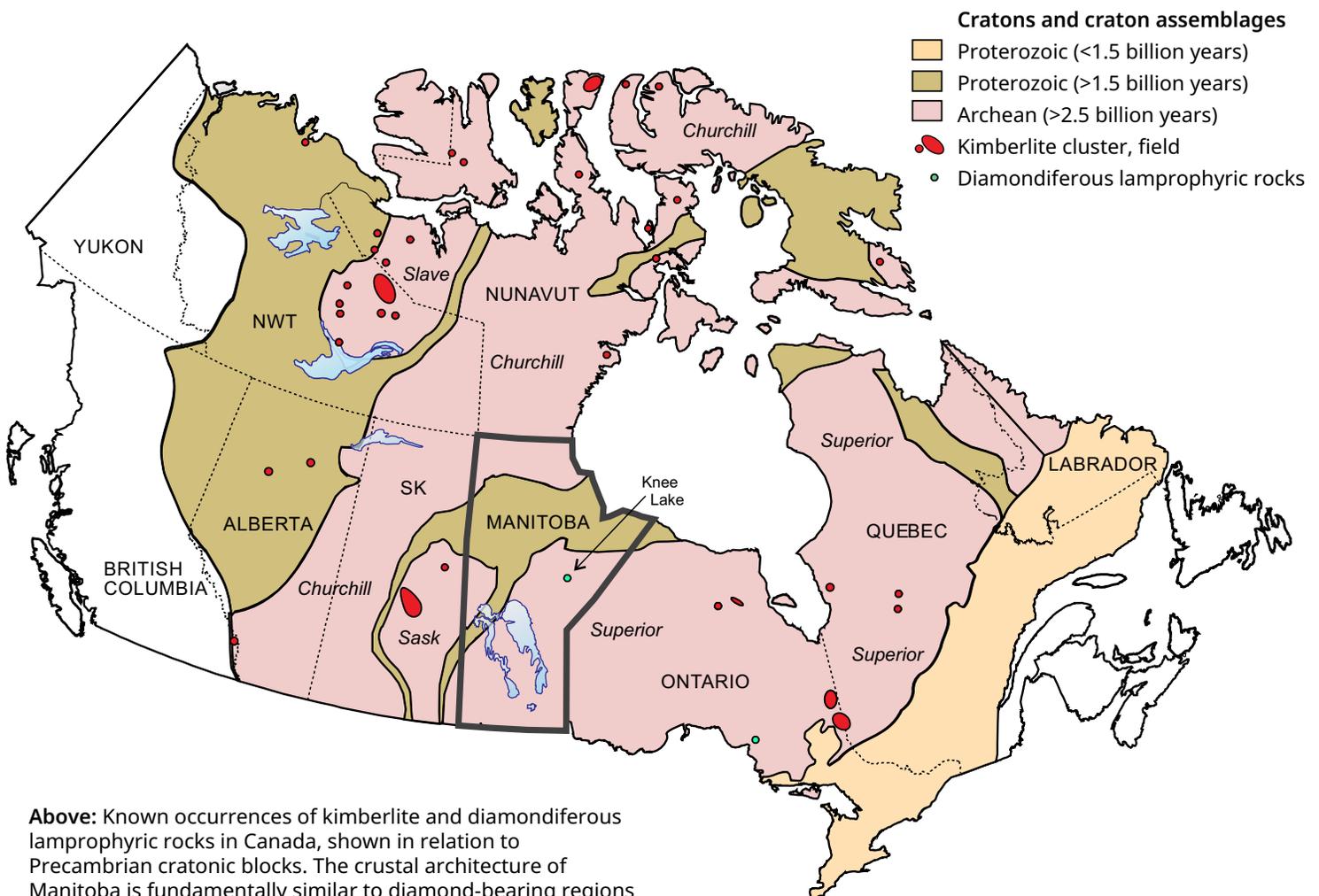
The first **DIAMOND-BEARING KIMBERLITES** in Canada were discovered in the late 1980s, and the first diamond mine, Ekati, went into production by 1998. In 2019, Canada produced 18.6 million carats of rough diamonds at a value of \$2.25 billion, placing it among the world leaders in both volume and value of production. Today, Canada has seven producing and past-producing diamond mines and several projects at various stages of exploration or development.

Primary **DIAMOND DEPOSITS** are hosted by kimberlite or lamproite intrusions and volcanogenic rocks, although calcalkaline and ultramafic lamprophyre are also 'unconventional' hosts for diamonds. These mantle-derived magmatic rocks transport diamonds to the surface from great depths (>140 km) in the Earth. Relatively thick and cool lithospheric roots of Archean cratons create conditions amenable to diamond stability and typically underlie regions with the greatest potential for diamond deposits.

Manitoba is underlain by extensive areas of Archean crust, namely the Superior, Hearne and Sask cratons, and there are documented occurrences of kimberlite in each of these cratons in adjacent jurisdictions.

In 2016, bedrock mapping and sampling by the Manitoba Geological Survey resulted in the **DISCOVERY OF DIAMONDS** in the Oxford Lake–Knee Lake greenstone belt of the Superior craton, representing the first confirmed occurrence of diamonds in Manitoba. The diamonds are hosted by Archean sedimentary rocks that may have been derived from coeval lamprophyric volcanism.

Through its surficial geology program, the **MANITOBA GEOLOGICAL SURVEY** continues to support diamond exploration by providing practical guides to drift prospecting. Results of this work are available at manitoba.ca/iem/geo/surficial/



Above: Known occurrences of kimberlite and diamondiferous lamprophyric rocks in Canada, shown in relation to Precambrian cratonic blocks. The crustal architecture of Manitoba is fundamentally similar to diamond-bearing regions throughout Canada, with known kimberlites west, east and north of the province. Modified after Kjarsgaard (2007).

Reference

Kjarsgaard, B.A. 2007: Kimberlite diamond deposits; *in* Mineral deposits of Canada: a synthesis of major deposit-types, district metallogeny, the evolution of geological provinces, and exploration methods, W.D. Goodfellow (ed.), Geological Association of Canada, Mineral Deposits Division, Special Publication no. 5, p. 245–272.

Kimberlite-indicator Minerals

Sampling of surficial sediments in parts of Manitoba has revealed a wide range of kimberlite-indicator mineral (KIM) suites, with promising results in the Hudson Bay Lowland, the northern Superior province, and at Southern Indian Lake in the Trans-Hudson orogen. Among the indicator minerals are garnets of G10 composition (low Ca, high Cr; potentially derived from diamond-forming regions in the mantle), which were found in till samples from the northern Superior province and from areas underlain by Mesozoic bedrock in the south. KIM sampling programs are ongoing in several parts of the province to expand and improve the data coverage.

More detailed information, including public domain KIM data and an integrated anomaly map designed for kimberlite exploration, is available at manitoba.ca/iem/geo/diamonds/

Carbonatite Occurrences

Carbonatite dikes have now been identified in several parts of Manitoba indicating crustal-scale ascent of mantle-derived magmas, some of which may be spatially associated with kimberlite. Dikes containing dolomite and phlogopite in the area south of Wekusko Lake, for example, have compositional similarities to both carbonatite and kimberlite.

Lamprophyre Occurrences

The discovery of diamondiferous volcanogenic sedimentary rocks at southern Knee Lake (Superior province) has renewed exploration activity in a region long identified as having strong potential for diamonds. Diamondiferous conglomerates at Knee Lake were deposited in shallow-marine settings and contain distinctive cored clasts similar to 'pelletal lapilli' formed in the root zones of kimberlite pipes, suggesting an association with diatreme volcanism. Interbeds of primary pyroclastic material are characterized by primitive alkaline compositions, comparable to ultramafic lamprophyre dikes in the region. More detailed information is available at manitoba.ca/iem/info/libmin/OF2017-3.zip

Microdiamond



Pelletal lapilli



LEGEND

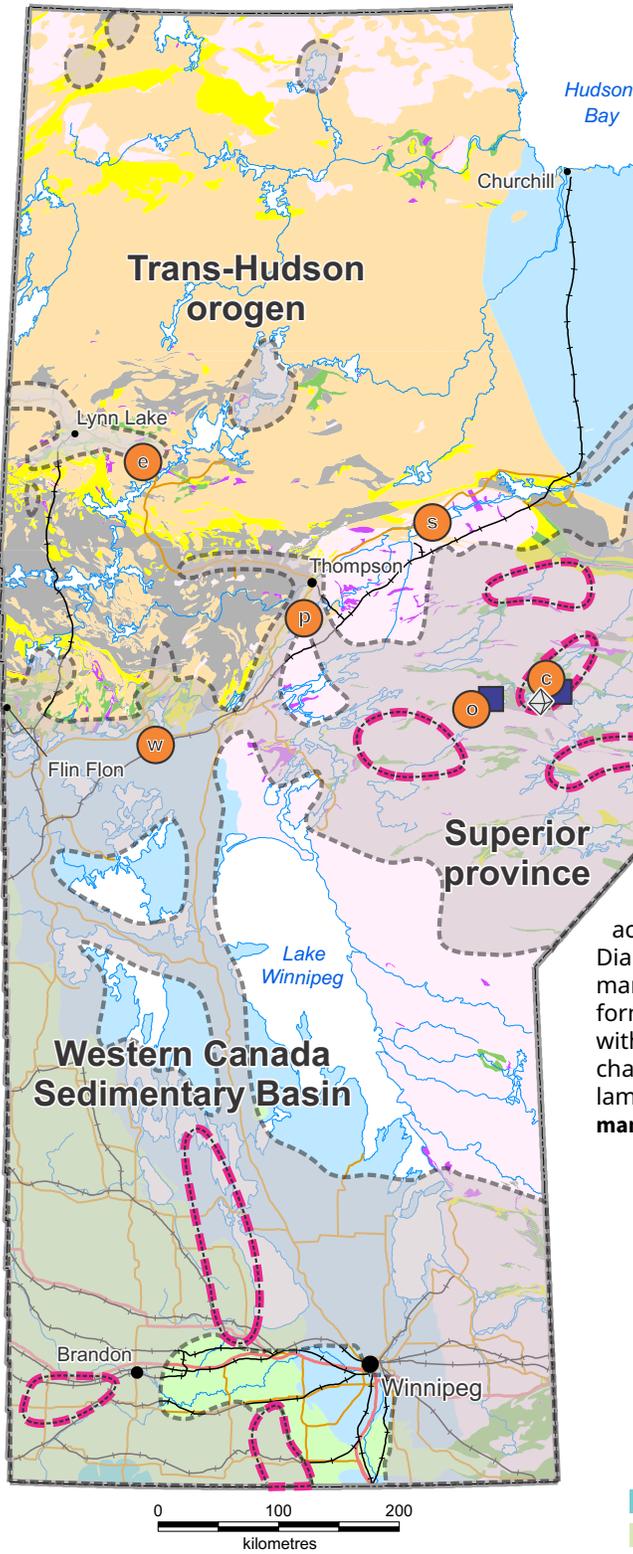
Phanerozoic

- 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

- KIM sample area (approx.)
- G10 mantle garnets (in till)
- Carbonatite dikes
c, Cinder Lake; e, Eden Lake;
o, Oxford Lake; p, Paint Lake;
s, Split Lake; w, Wekusko Lake
- Lamprophyre dikes
- Microdiamonds (bedrock)



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



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