Government of Canada | Gouvernement du Canada

CCMEO Basemap Update and Demo

GeoDiscovery Canada

Canada Centre for Mapping and Earth Observation

Natural Resources Canada

Canada

Overview

Overview:

CCMEO has significantly enhanced its national basemap offerings by transitioning to vector tile technology, integrating richer and more up-to-date data (including OpenStreetMap and official place names), and improving user flexibility in styling and application—all while supporting Government of Canada priorities in mapping, accessibility, and open data.

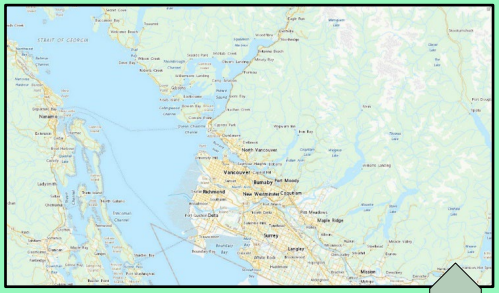
Table of Contents:

- Background, present scenario and future
- Users and stakeholders
- Geographical names integration
- Vector Tile vs Raster Tiles
- Data Research Results
- Basemap update
- Demo Video

CCMEO'S CURRENT BASEMAP OFFERING

Most Complex & focus of renewal

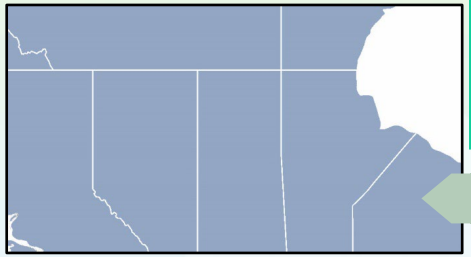
Most Commonly Used



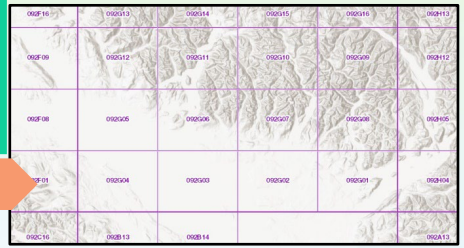
Transportation CBMT

Simple Grey

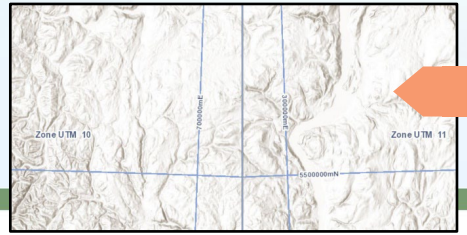
Digital Elevation Model



Provincial Boundary



NTS Grid



UTM Grid

Latitude / Longitude Grid

WHY ARE CCMEO BASEMAPS IMPORTANT TO THE GOVERNMENT OF CANADA?

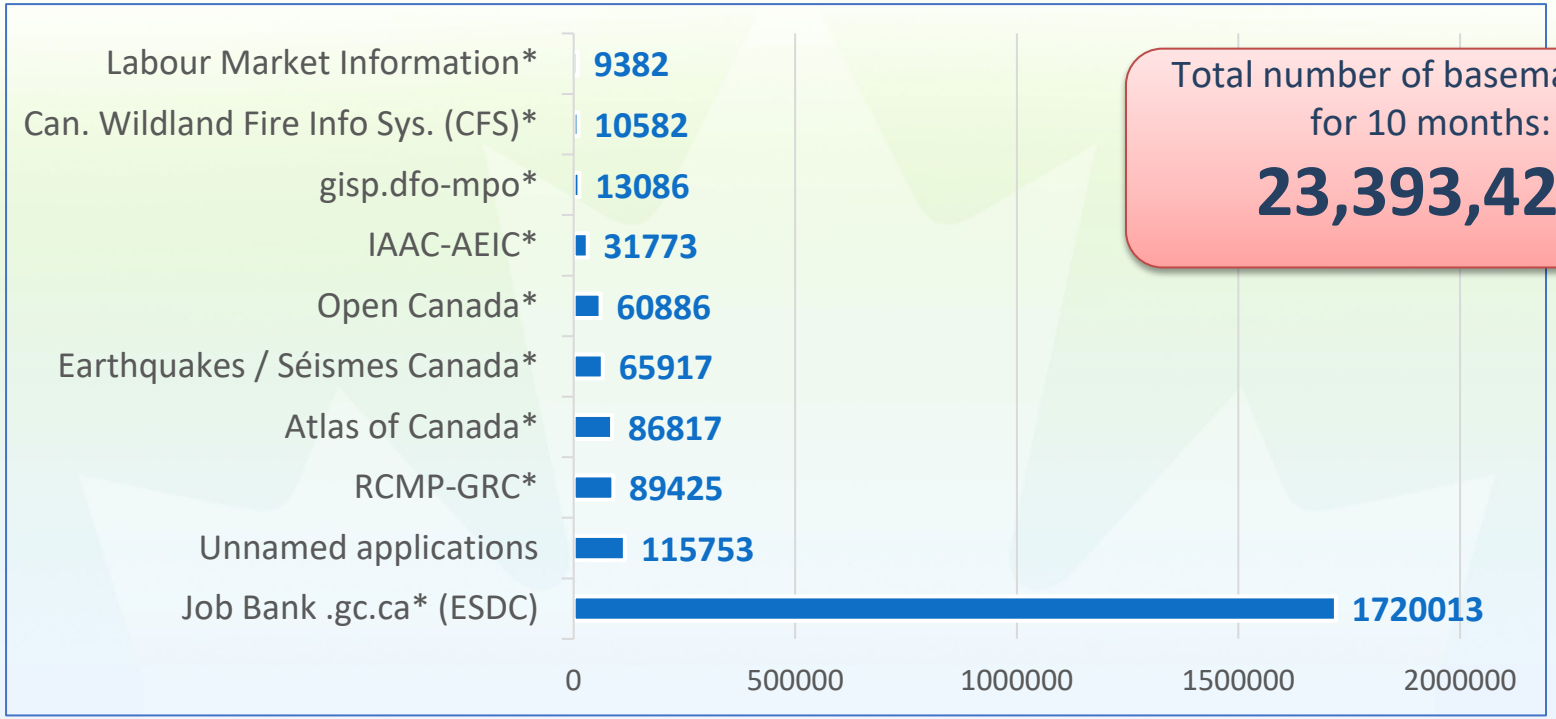
- Official Canadian **place names, Indigenous** placenames
- Authoritative administrative **boundaries**
- Support for both official **languages**
- Provides **better coverage** in rural, remote and northern areas of Canada than most Basemap offerings
- Plays a significant role in **Open Government** by being openly accessible for use by the public, academia, industry, to support innovation and informed decision-making.
- Supports location-based decision-making and policy and program development by helping to address complex issues.
- Provides **detailed coverage** of the entire Canadian landmass, including topographic features such as roads, elevation, hydro, etc.

- Fundamental for mapping GoC priorities:
  - **Emergency Preparedness, Awareness and Response:** Wildfires; Earthquakes; Floods
  - **Weather Awareness:** Weather RADAR website (ECCC)
  - **Open Government:** (Open Data, Open Maps)
  - **Environment:** CE (OSDP); IAAC; CEAA; CESI (ECCC)
  - **Economy / Labour:** Job Bank.gc.ca; Labour Market Information; ESDC supporting CERB and other programs
  - **Other Departments:** RCMP, AAFC, DFO, TC, ISC
  - Support industry / businesses

WHY CCMEO BASEMAP RENEWAL IS REQUIRED: DATA, DESIGN AND RESOURCES

- CCMEO's existing CBMT raster tile basemap offering provides outdated data layers.
  - Not leveraging best available data i.e. Canvec Buildings ~20 years old
- Raster tile updates are resource intensive for GeoName updates and maintenance.
- Raster tiles take weeks to do a full update.
- Detail not sufficient for some applications (scale / zoom levels) and user needs.

Users and Stakeholders



Total number of basemap visits for 10 months:

23,393,428

Note - some super-clients such as ECCC Weather Radar Website are not included since they serve a copy of the basemap(s) from their own servers.

Users and Stakeholders

User survey and stakeholder analysis stated the following needs for a renewed basemap:

Up-to-date geographical names including Indigenous names	Vector Tiles (80% of survey asking for this)	More recent data	More scale levels at the larger scales/more levels of detail

We are working in line with the needs of our users and ensuring these items are addressed in the basemap.

Background

June 2022

- Basemap task team recommends working on the following:
  - Data Research
  - Technology renewal

May 2023

Basemap Renewal Team presents first deep dive on Basemap progress to Director table.

Outcomes:

- Data Research concludes that Open Street Maps (OSM) is the best option for larger scales.
- ESRI technology is selected as the best way forward to create the Vector Tiles outputs over Open Technology:
  - Technology already known
  - Existing Infrastructure
  - Faster delivery and less risk for delay

September 2022

Basemap renewal work begins.

September 2024

Basemap public release.

Geographic Names Integration

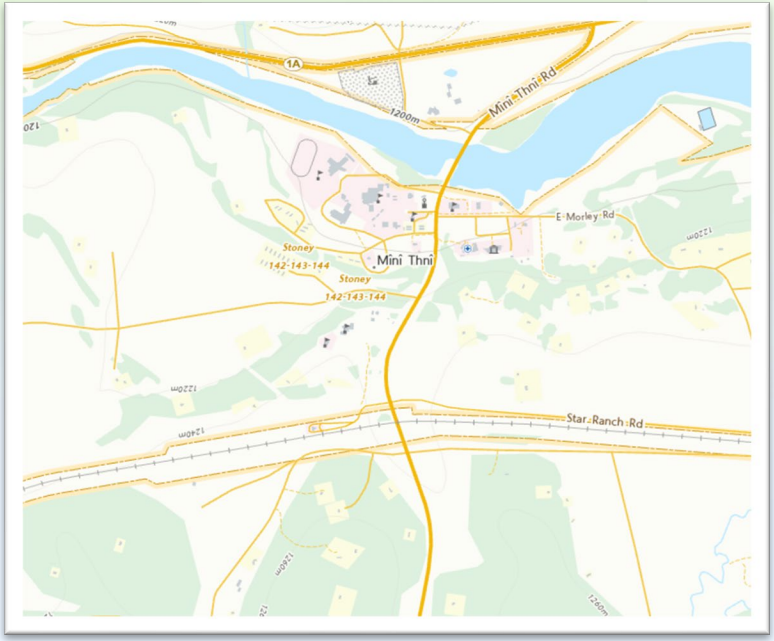
Work closely with Geographical Names Board of Canada Secretariat.

Basemap updated monthly (with the geonames).

Basemap workflow directly pulls place names from the GNBC database and updates the basemap labels.

Geographic Names Integration

Mînî Thnî
(approved in July 2024)



Bobbys Pond
(approved by NF in August 2024)

Why Vector Tiles? Comparing Strengths with Raster

Vector tiles offer design flexibility and performance gains, but raster is still needed for compatibility.

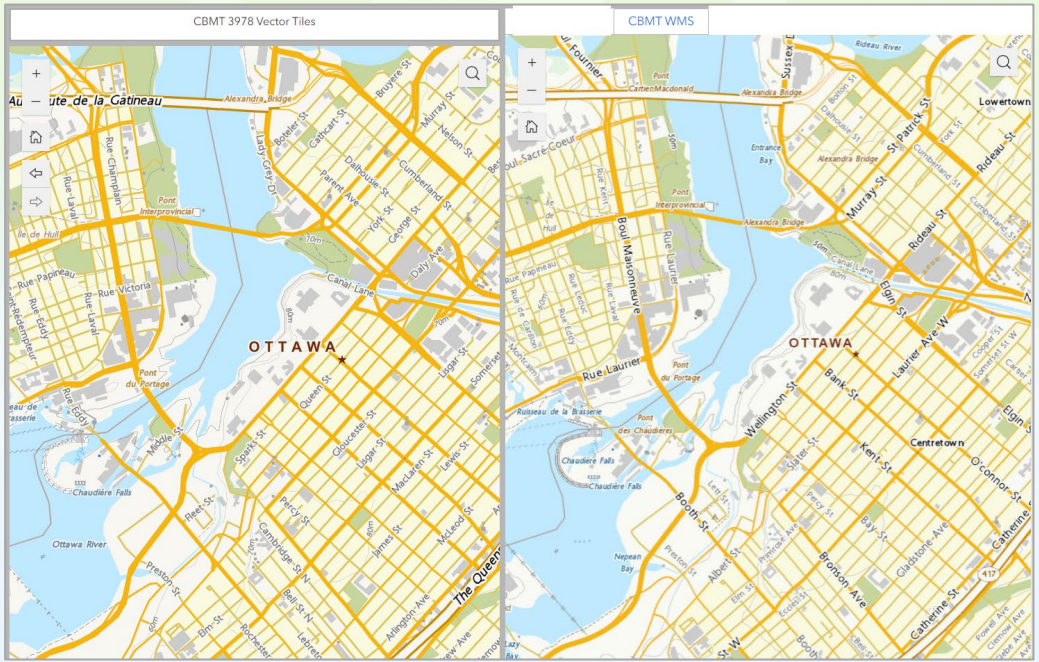
Vector Tile

PROS

- **Faster to create and much less space to store vector tiles.**
- **Cache once and symbolize unlimited times**
- **Ability to edit layers: turn them on and off, edit symbology and scaling.**

CONS

- More limited in terms text placement.
- Can't update small area for small updates, have to cache every time (however only takes 17h to update)



Raster Tile

PROS

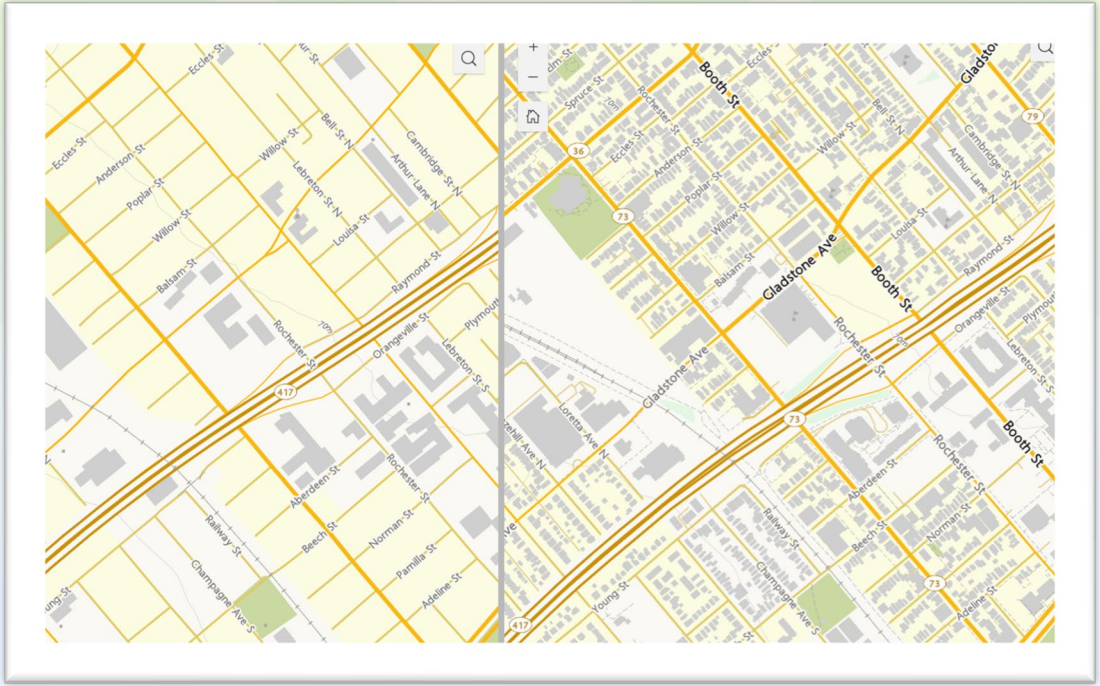
- **Symbology and label styles easier to covert to raster tile.**
- **Faster to do little updates in the cache ie a name change.**

CONS

- Takes a long time to create the raster tile.
- Need a lot of server room to store it
- Always the same view and cannot be edited/changed

OSM Drives Significant Coverage Gains

Previous Basemap Data Coverage
(CBMT Raster Tile Data)



Open Street Map data at the same scale (with GeoBase Auto Extracted Building)

Both Raster And Vector Tile Services Are Needed

Raster Tile Service

- Tiles served as images
- Traditional tile service; some applications can only take raster tile services
- E.O. imagery can only be served as raster
- Fast rendering on user side, but longer build time on server side
- Can be more accurate than vector (features not generalized)
- Can't be re-projected

Vector Tile Service

- Tiles served as vector features
- Flexibility in design / cartography even on client side (also easier to generate multiple themes from one service)
- Ability for apps to extract features and attributes from vector tiles
- Rendering can be optimized at certain zoom levels (preventing pixel blur)
- Faster rendering on server side, but may take more computation on user side
- Tiles have smaller file size so should consume less bandwidth when loaded
- Can be re-projected on the fly
- Raster tiles can be made from vector tiles

2022 Data Research - Roads

OSM had superior coverage and completeness across most AOIs, especially in remote areas.
NRN and NGD often aligned with older NRCan roads, limiting improvement potential.

National Geographic Database Road Network 2022 (StatsCan)

- NGD more complete than the NRN.
- NGD shifted in some areas by 1.5-30m and not in a consistent direction.
- The NRN or NGD seem limited in what they can offer compared to OSM.

NRCan roads

- NRCan roads are the road network dataset currently in use in the CBMT.
- It was published in 2019. Testing shows, it is in need of updating.
- NRN and NGD were often highly correlated with the NRCan roads despite being many years more recent.

National Road Network (StatsCan)

- NRN varies widely between provinces.
- The least current are MB and NL, last updated in 2013.
- Provinces that were updated in 2022, OSM data was more up to date.
- NRN had the best coverage of Nunavut.
- High correlation between NRN and NRCan roads, suggesting it may be limited in the amount of improvement it can provide to the basemap.
- NRN was found to be spatially accurate, however not as complete as OSM.

OSM

- **Good coverage in urban areas and residential roads.**
- **Positional accuracy and shape excellent.**
- **In remote areas it provided additional data not seen in the other sources.**
- **Additional roads from OSM can be seen in urban area.**
- **OSM often references NRCan CanVec or GeoBase as a source.**

Data Research - Buildings

StatsCan LODE

- Positional accuracy and shape excellent for larger municipalities.
- Mix of rooftops and footprints
- Many open data sources not included ie. City of Campbell River, Town of Gibsons.
- No attribute information.
- Poor coverage outside major urban centers.

Microsoft

- Good coverage province-wide.
- Rotation of buildings not correct by ~10 degrees.
- Existing Canvec often better shape/location.

CCMEO GeoBase Auto Extracted

- **Delineates building footprints automatically extracted from airborne Lidar data, high-resolution optical imagery or other sources.**
- **Not complete for all of Canada yet.**
- **Used to fill gaps in OSM rural/northern areas with less coverage.**
- **5,156,775 buildings used.**

OSM

- **Good coverage in urban areas.**
- **Positional accuracy and shape excellent.**
- **6,858,582 buildings used.**

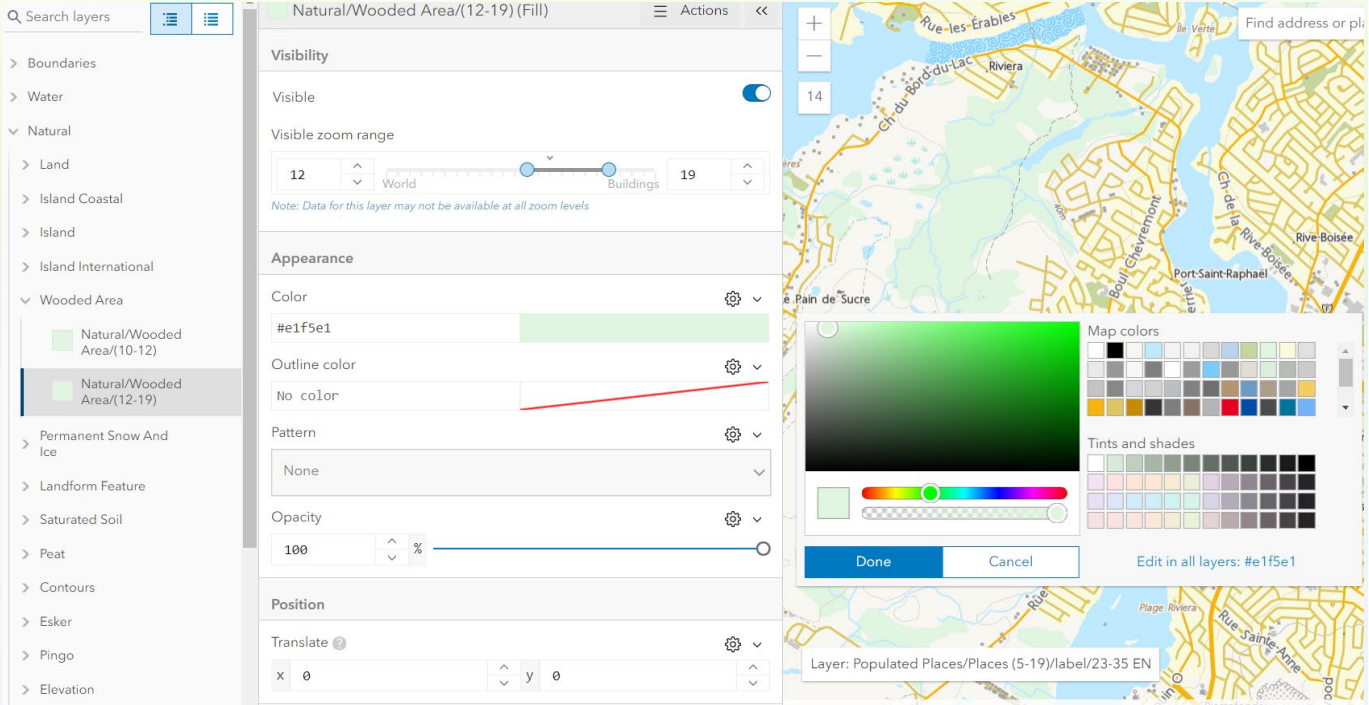
Vector Style Editor

Empowers clients to customize their own maps.

Users of the Vector Tiles can:

- Turn on/off layers
- Change symbology
- Change colour/size of text/symbols
- Turn off labels
- Change the scale of each layer

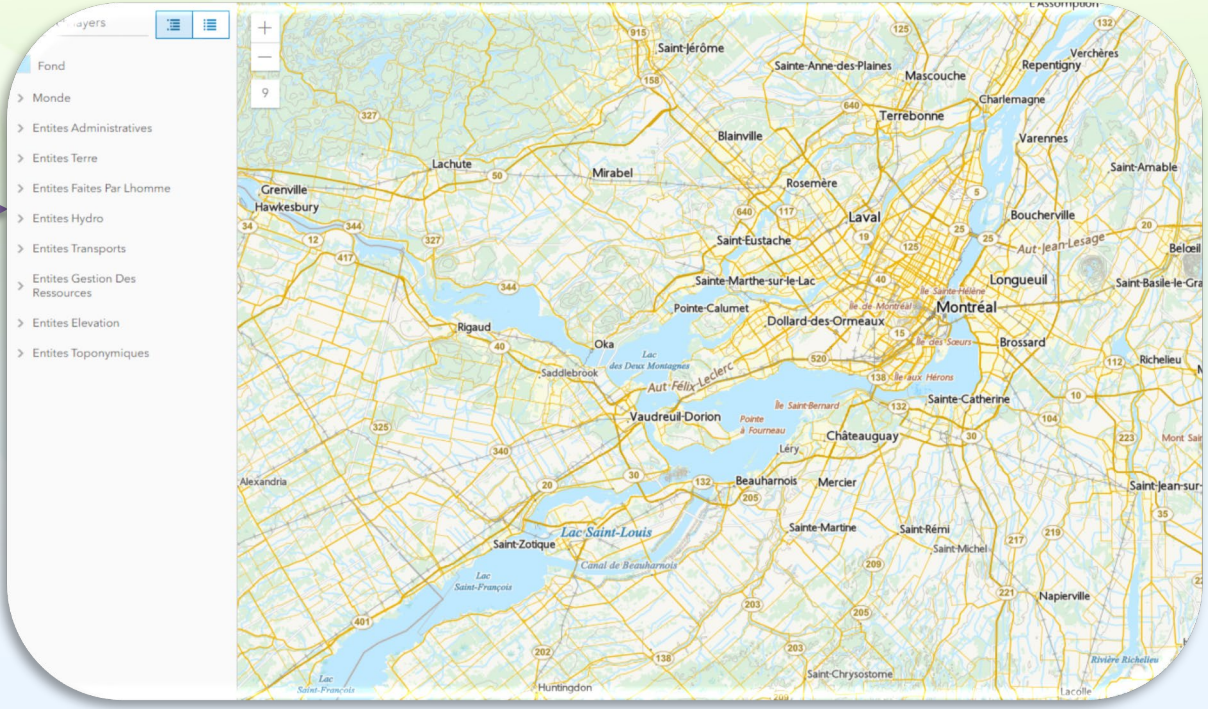
Note: to change the vector tile styles, users need to have an **AGOL account.**



Supporting Bilingualism with French Tiles

Web Mercator/
LCC vector basemaps in French

Legend in French



Basemap Hillshade

- Multidirectional to match the current basemap hillshade.
- Higher resolution 30 meter
- Medium Resolution Digital Elevation Model (MRDEM) product is a multi-source product that integrates elevation data from the Copernicus DEM (TanDEM-X Mission, 2022), and the High Resolution Digital Elevation Model data derived from airborne lidar.
- Released by CCMEO GeoBase, Sept 2024.

Product to be released end of 2025

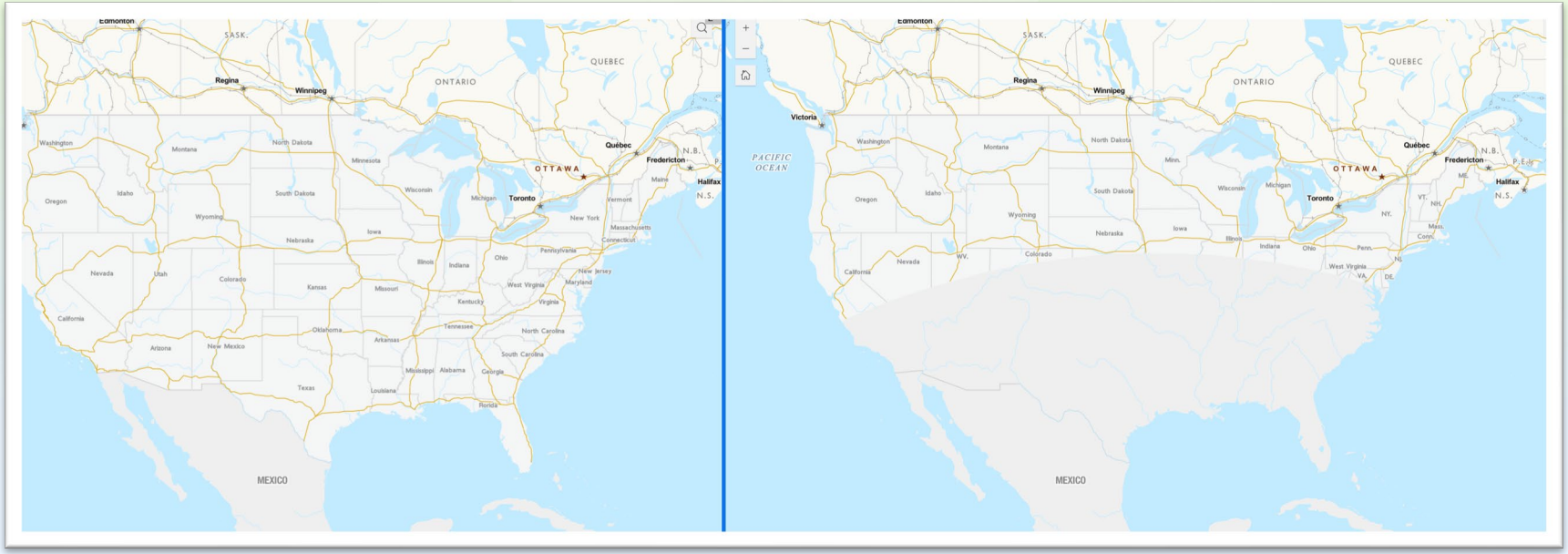
World Web Mercator

- Boundaries:
  - World boundaries updated as of Sept 2023, using The Atlas of Canada - The World map.
  - Boundaries from Natural Earth and verified by Global Affairs.
  - Addition of disputed boundaries that were verified by Global Affairs regional offices.
- Names:
  - Country and city names shown, no hydrographic names
  - World names verified from The World Map:
    - National Geospatial Intelligence Agency GeoNames
    - Geographical Names Board of Canada, Canadian Geographical Names Database.
    - United Nations. United Nations Group of Experts on Geographical Names.
    - United States Geological Survey. United States Board on Geographic Names.
- US Data:
  - Addition of the full US with more levels of detail
  - Layers include roads, railways, vegetation and built-up areas.
  - Data layers from USGS and Overture (open data).
- World Data:
  - Addition of world layers from Natural Earth.
  - Hydrographic layers, population polygon.

World Web Mercator

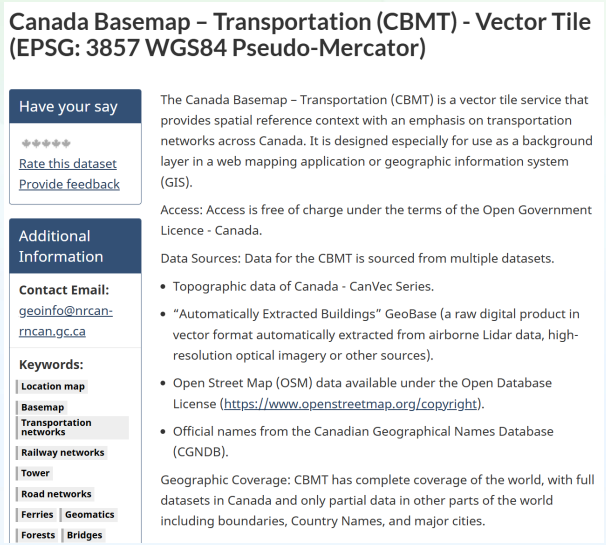
Vector Tile - Full US coverage
(USGS and Overture)

Previous Basemap Data
Coverage (CBMT Raster Tile Data)



Dissemination Strategy

Metadata records discoverable on Open Government Portal and GEO.CA to enable access of the new vector basemap.



Canada Basemap – Transportation (CBMT) - Vector Tile (EPSG: 3857 WGS84 Pseudo-Mercator)

Have your say

Rate this dataset
Provide feedback

Additional Information

Contact Email: geoinfo@nrcan-rncan.gc.ca

Keywords: Location map, Basemap, Transportation networks, Railway networks, Tower, Road networks, Ferries, Geomatics, Forests, Bridges

The Canada Basemap – Transportation (CBMT) is a vector tile service that provides spatial reference context with an emphasis on transportation networks across Canada. It is designed especially for use as a background layer in a web mapping application or geographic information system (GIS).

Access: Access is free of charge under the terms of the Open Government Licence - Canada.

Data Sources: Data for the CBMT is sourced from multiple datasets.

- Topographic data of Canada - CanVec Series.
- "Automatically Extracted Buildings" GeoBase (a raw digital product in vector format automatically extracted from airborne Lidar data, high-resolution optical imagery or other sources).
- Open Street Map (OSM) data available under the Open Database License (https://www.openstreetmap.org/copyright).
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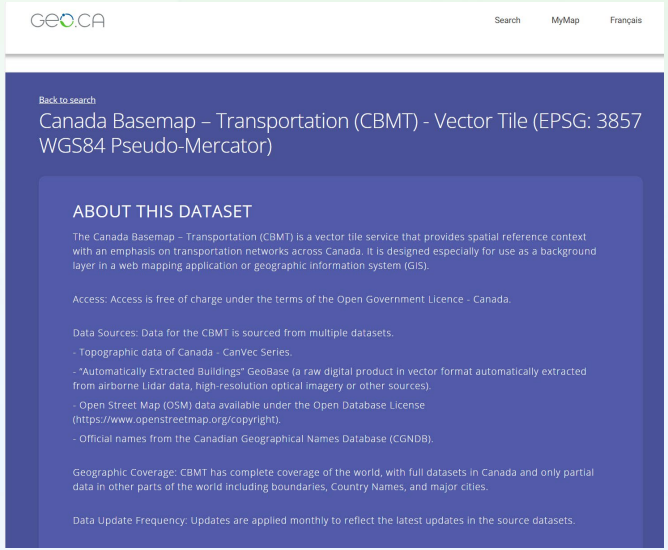
Geographic Coverage: CBMT has complete coverage of the world, with full datasets in Canada and only partial data in other parts of the world including boundaries, Country Names, and major cities.



GEO.CA Search MyMap Français

Back to search

Canada Basemap – Transportation (CBMT) - Vector Tile (EPSG: 3857 WGS84 Pseudo-Mercator)

ABOUT THIS DATASET

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Data Update Frequency: Updates are applied monthly to reflect the latest updates in the source datasets.

🗺️ Key Takeaways

- **Modernized Basemaps**: Transition to vector tile services improves performance, styling flexibility, and integration across platforms, while maintaining raster for essential use cases.
- **Data-Driven Improvements**: Enhanced content from OpenStreetMap and GeoBase ensures more complete coverage—especially in rural and northern areas.
- **Authoritative & Inclusive**: Incorporation of official and Indigenous place names reinforces accuracy and cultural relevance in national cartography.
- **User-Centric Tools**: New capabilities like style editing and bilingual support empower users to tailor maps to their specific needs.
- **Supporting GoC Priorities**: Foundational for emergency response, policy development, and open government initiatives across departments and sectors.

Demo Video

Here we'll explore how users can interact with and customize our vector tile basemaps in real time.

Link to Video: https://ftp.maps.canada.ca/pub/cbmt/CMBT3978_V_demo_EN.mp4

Links

[Carte de base du Canada - Transport_3857_V]
- [Carte de base du Canada - Transport_3857_GEOM_V]
- [Carte de base du Canada - Transport_3857_TXT_V]

[Carte de base du Canada - Transport_3978_V]
- [Carte de base du Canada - Transport_3978_GEOM_V]
- [Carte de base du Canada - Transport_3978_TXT_V]

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