CanVec

Product Specifications

2017-10-18

Canada

Copyright notice

RELEASES HISTORY

Date	Description
2017-10-18	Deletion of Aboriginal Lands and Municipal Boundaries in the Administrative Entities theme at the scale 1:50 000. Deletion of Man-made Features and Toponymic Features at the scale 1:1M. Modify GeoGratis website by Open Government website to access the CanVec product. Adding of the projection Mercator for the Spatial Reference System in the Geospatial extraction tool.
2017-01-04	Add clarification about the generalization – page 3 and 11
2016-03-14	Original version

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1 OVERVIEW

1.1 TITLE

CanVec Data Specifications.

1.2 REFERENCE DATE

2016-03-14

1.3 RESPONSIBLE PARTY

Natural Resources Canada
Earth Sciences Sector
Canada Centre for Mapping and Earth Observation
Client Services

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1.4 LANGUAGE

eng – English

fra - French

1.5 TERMS AND DEFINITIONS

CCMEO   Canada Centre for Mapping and Earth Observation

CGNDB   Canadian Geographical Name Data Base

CSRS   Canadian Spatial Reference System

CVGD28   Canadian Vertical Geodetic Datum of 1928

ESS   Earth Sciences Sector

FGDB   ESRI File GeoDataBase

GIS   Geographic Information System

GML   Geographic Markup Language

NAD83   North American Datum of 1983

NHN   National Hydro Network

NRCan   Natural Resources Canada

NRN   National Road Network

NRWN   National Railway Network

NTDB   National Topographic Data Base

NTS   National Topographic System

1.6 INFORMAL DESCRIPTION OF THE DATA PRODUCT

CanVec is a digital cartographical reference product produced by Natural Resources Canada. It originates from the best available data sources covering Canadian territory, offers quality topographical information in vector format and complies with international geomatics standards.

CanVec is a multi-source product coming mainly from the National Topographic Data Base (NTDB), the Mapping the North process conducted by the Canada Center for Mapping and Earth Observation (CCMEO), the Atlas of Canada data, the GeoBase initiative, and the data update using satellite imagery coverage (e.g. Landsat 7, Spot, Radarsat, etc.).

CanVec contains more than 60 topographical features organized into 8 themes: Transport Features, Administrative Features, Hydro Features, Land Features, Man-Made Features, Elevation Features, Resource Management Features and Toponymic Features.

CanVec aims to update and standardize the representation of topographic features for the entire Canadian territory. The long term objective is to maintain data with the highest possible resolution and then automatically generate other scales.
Topographic features coming from the NTDB are not up to date. These features are included in the CanVec product for cartographic reference purpose only.

CanVec can be used in Web Mapping Services (WMS), Geographical Information Systems (GIS) applications, and used to produce thematic maps. Because of its many attributes, CanVec allows for extensive spatial analysis.

This product is the result of improved data model with the goal of providing seamless data layer coverage across Canada. Currently, only Transportation theme data sourced from the National Road Network (NRN) and the National Railway Network (NRWN) and Atlas data are available seamlessly. Future releases will include additional seamless layers of data.

CanVec is maintained in partnership with the data providing organizations.

CanVec data is available at no cost on the Open Government of Canada website (http://open.canada.ca/en)

The table below presents the tiling available for the several combinations of theme and scale. It also shows the data sources used for each scale.

Sources	Best available data -GeoBase - NHN - NRN - NRWN - Administrative boundaries - Toponymy - NTDB at scale 1:50 000	NTDB at scale 1:250 000 GeoBase -NRN (generalized***) -NRWN (generalized***)	Atlas of Canada Data		
Themes	**1:50 000**	**1:250 000**	**1:1 000 000**	**1:5 000 000**	**1:15 000 000**
Transport Features	Province/Territory	Province/Territory	Canada	Canada	Canada
Administrative Features	Province/Territory and Canada	Province/Territory and Canada	Canada	Canada	Canada
Hydro features	Province/Territory	Province/Territory	Canada	Canada	Canada
Land Features	Province/Territory	Province/Territory	Canada	Canada	Canada
Man-Made Features	Province/Territory and Canada	Province/Territory and Canada	N/A	N/A	N/A
Elevation Features	Province/Territory*	Province/Territory*	Canada**	Canada**	Canada**
Resource Management Features	Province/Territory and Canada	Province/Territory and Canada	N/A	N/A	N/A
Toponymic Features	Province/Territory and Canada	N/A	N/A	N/A	N/A

* Only terrestrial elevations are offered
** Only bathymetric elevations are offered
*** The generalization was based on a snapshot of our January 2014 geospatial database.

There are 2 methods to access CanVec data:

- Prepackaged files (Static files): A selection of prepackaged files is offered according to themes and scales shown in the above table. These prepackaged files are published at least once a year or when significant changes occur.   They are available in Shapefile (ESRI™) and File Geodatabase (ESRI™) formats.

- Customized area (Dynamic files): The Geospatial Data Extraction tool allows user to define a customized area no longer limited to the National Topographic System (NTS) nor the area of a Province or Territory. Data updates are offered according to a 2 month cycle. They are available in GML (Geography Markup Language), Shapefile (ESRI™) and File Geodatabase (ESRI™) formats. Only 1:50 000 and 1:250 000 scales are offered with the Geospatial Data Extraction tool.

Note: The feature occurrences contained in a Customized area come from datasets covering a wider territory. An option allows to segment or not the feature occurrences at the limit of the required area. However, the segmentation does not change the attribute values. Thus, the values of the attribute address range of a road segment instance that was segmented by the Customized area neatline will remain unchanged and will most likely be inaccurate.

2   SPECIFICATION SCOPE

2.1   SCOPE IDENTIFICATION

Main

2.2   LEVEL

006 - Series

2.3   LEVEL NAME

Main scope of CanVec

2.4   EXTENT

2.4.1   Description

Canadian territory

2.4.2   Vertical extent

2.4.2.1   Minimum value

0

2.4.2.2   Maximum value

5959

2.4.2.3   Unit of measure

Meter

2.4.2.4   Vertical datum

Elevations are orthometric and expressed in reference to Mean Sea Level (Canadian Vertical Geodetic Datum of 1928 (CVGD28)).

2.4.3   Horizontal extent

2.4.3.1   West bounding longitude

-141.0

2.4.3.2   East bounding longitude

-52.0

2.4.3.3   South bounding latitude

+41.0

2.4.3.4   North bounding latitude

+84.0

2.4.4   Temporal extent

2.4.4.1   Beginning date

1945

2.4.4.2   Ending date

Today

3   DATA PRODUCT IDENTIFICATION

3.1   TITLE

CanVec

3.2   ABSTRACT

CanVec is a digital cartographic reference product produced by Natural Resources Canada (NRCan). It originates from the best available data sources covering the Canadian territory, offers quality topographic information in vector format and complies with international geomatics standards.

CanVec is a multi-source product coming mainly from the National Topographic Data Base (NTDB), the Mapping the North process conducted by the Canada Center for Mapping and Earth Observation (CCMEO), the Atlas of Canada data, the GeoBase initiative and the data update using satellite imagery coverage. CanVec contains more than 60 topographic features thematically organized into 8 themes: Transport Features, Administrative Features, Hydro Features, Land Features, Man-Made Features, Elevation Features, Resource Management Features and Toponymic Features.

3.3   OBJECTIVE

CanVec aims to update and standardize the representation of topographic features for the entire Canadian territory.

3.4   TOPIC CATEGORY

006 - elevation

010 - imageryBaseMapsEarthCover

012 - inlandWater

013 - location

017 - structure (man-made construction)

018 - transportation

019 - utilitiesCommunication

3.5 SPATIAL REPRESENTATION TYPE

001 - vector

3.6 SPATIAL RESOLUTION

Spatial resolution varies according to the scale selected. For instance, 1:50 000 data have a resolution between 1:10 000 and 1:50 000.

3.7 GEOGRAPHIC DESCRIPTION

3.7.1 Authority

3.7.1.1 Title

ISO 3166-1:1997 Codes for the representation of names of countries and their subdivisions – Part 1 Country codes

3.7.1.2 Date

1997-10-01

3.7.1.3 Date type

002 - Publication

3.7.2 Code

CA - Canada

3.7.3 Code Type

1 - Inclusion (polygon delineation is inclusive)

3.8 REFERENCE TO SPECIFICATION SCOPE

Main

4 DATA CONTENT AND STRUCTURE

4.1 DESCRIPTION

CanVec contains more than 60 topographic features thematically organized into 8 themes: Transport Features, Administrative Features, Hydro Features, Land Features, Man-Made Features, Elevation Features, Resource Management Features and Toponymic Features.

Each topographic feature is described with a name, a definition, a list of topologic relationships, a list of attributes and a geometric representation.

4.2 DATA MODELLING SCHEMA

4.2.1 Application schema

The application schema for the CanVec product has not been modeled because of the high quantity of features and the complexity of the numerous relationships and associations that exist between those features. However, for some of the CanVec product features that are issued from the GeoBase initiative, an application sub-schema might exist (ex.: Segmented Conceptual Data Model of National Road Network).

The CanVec Feature Catalogue contains the pertinent information about the data structure and the content of the product.

The geometric representation of the CanVec spatial components is in conformance with the ISO 19107 standard document "Geographic Information – Spatial schema" which defines the geometric primitives.

4.2.2 Feature catalogue

The complete description of the CanVec Feature Catalogue can be found on the Open Government of Canada website (http://open.canada.ca/en).

4.3 REFERENCE TO SPECIFICATION SCOPE

Main

5 REFERENCE SYSTEMS

5.1 SPATIAL REFERENCE SYSTEM

Spatial data are expressed in geographic coordinates of latitude (φ) and longitude (λ) according to the NAD83CSRS (EPSG:4617) (North American Datum of 1983 in Canadian Spatial Reference System). The longitude is expressed with a negative number to represent a position to the west of the central meridian (0°).

Note: Spatial data is also available according to the WGS84/Pseudo-Mercator (EPSG:3857) and NAD83/Canada Atlas Lambert (EPSG:3979) projections while issued from the Geospatial data extraction tool.

5.1.1 Authority

5.1.1.1 Title

EPSG Geodetic Parameter Registry

URL: http://www.epsg-registry.org

5.1.1.2 Date

2011-08-17

5.1.1.3 Date type code

002 - Publication

5.1.1.4 Responsible party

OGP - International Association of Oil and Gas Producers

URL : http://www.epsg.org (en anglais seulement)

5.1.2 Code

4617

Note: Spatial data is also available according to the WGS84/Pseudo-Mercator (EPSG:3857) and NAD83/Canada Atlas Lambert (EPSG:3979) projections while issued from the Geospatial data extraction tool.

5.1.3 Code space

EPSG - European Petroleum Survey Group

5.1.4 Version

6.18

5.2 REFERENCE TO SPECIFICATION SCOPE

Main

6 DATA QUALITY

6.1 COMPLETENESS

6.1.1 Commission

The data quality assessment (including completeness and thematic accuracy) is directly performed during data production process. The validation method applied depends on the data source used. CanVec data comes from 3 different sources: GeoBase initiative (ex.: National Road Network (NRN) data), digital topographic data production of the Canadian Centre for Mapping and Earth Observation (CCMEO) and the Atlas of Canada Series.

For data coming from the GeoBase initiative, data quality is ensured by the producer (and partner). The validation mechanism used may vary from one partner to another.

For topographic data produced by CCMEO, data quality is ensured by a systematic inspection process. Each dataset content is validated against the originated source or against an independent source. All detected errors are corrected.

For data coming from the Atlas of Canada Series, the data quality depends on data source availability, the map scale, the map feature selection by the cartographer and the quality control of the content.

6.1.2 Omission

Methodology described to evaluate the "Commissions" is also applied to verify the omissions in the CanVec product.

Note: Some of CanVec datasets located in the North of the country that have been acquired by stereo-digitizing and updated with satellite imagery contains only topographic features that can be extracted from that type of imagery. The majority of features that are hardly or completely undetectable on the image (Building, Cross, Tank, etc.) are excluded from the dataset. Furthermore, the project of data production in the North (Mapping the North of CCMEO) doesn't generate systematically the contours and Toponym delineation. These features are added by other processes.

For data coming from a partnership agreement, the partner may have not picked one or more features specified in the data catalog therefore causing an omission. The partner is aware about this possibility and encouraged to take appropriate precautions.

6.2 LOGICAL CONSISTENCY

6.2.1 Conceptual Consistency

The rules of the CanVec conceptual schema are validated in the source database containing the CanVec product. This approach ensures the conceptual consistency between the conceptual schema and the CanVec product.

6.2.2 Domain Consistency

The domain of values included in the Feature catalogue is validated in the source database containing the CanVec product. This approach ensures the domain consistency between the Feature catalogue and the CanVec product.

6.2.3 Format Consistency

The use of well-established commercial software to generate distribution formats ensures format consistency for CanVec product distribution.

6.2.4 Topological Consistency

Topological relationships between (and within) features are all recorded and validated in the source database for each CanVec dataset. This approach ensures topological consistency between the Feature catalogue and the CanVec product.

6.3 POSITIONAL ACCURACY

6.3.1 Absolute or external accuracy

Each CanVec dataset feature occurrence has a positional accuracy attribute that indicates the accuracy of the occurrence expressed as the Circular Map Accuracy Standard (CMAS).

For a dataset coming from the Geospatial Data Extraction Tool, the overall dataset planimetric accuracy is shown in its associated metadata file. This accuracy is expressed by an interval made of the minimum and maximum planimetric accuracy values. This interval is determined from the accuracy of each source file used to produce the dataset and not from each feature occurrence accuracy value contained in the dataset. Since data sources generally cover a larger area than the resulting CanVec dataset, it is highly possible that the overall planimetric accuracy of a dataset does not correspond to the smallest and/or the greatest accuracy value attached to each instance of the dataset.

The same also applies for validity dates written in the metadata file.

For prepackaged datasets, there is no information on overall planimetric accuracy and validity dates in the metadata files.

6.3.2   Relative or internal accuracy

Unknown

6.4   TEMPORAL ACCURACY

6.4.1   Accuracy of a Time Measurement

Not applicable

6.4.2   Temporal Consistency

Not applicable

6.4.3   Temporal Validity

Not applicable

Note: See section 6.3.1 (Absolute and or external accuracy) for information on validity dates.

6.5   THEMATIC ACCURACY

6.5.1   Classification Correctness

The methodology described to evaluate the "Commissions" is also applied to verify the classification correctness in the CanVec product.

6.5.2   Non Quantitative Attribute Correctness

The methodology described to evaluate the "Commissions" is also applied to verify the non-quantitative attribute correctness in the CanVec product.

6.5.3   Quantitative Attribute Accuracy

The methodology described to evaluate the "Commissions" is also applied to verify the quantitative attribute correctness in the CanVec product.

6.6   REFERENCE TO SPECIFICATION SCOPE

Main

7   DATA CAPTURE

7.1   DESCRIPTION

The 1:50 000 CanVec product was created by integrating mainly data managed and maintained by CCMEO. This data includes the National Road Network (NRN), the National Railway Network (NRWN) and the National Hydrographic Network (NHN) coming from GeoBase initiative. It also includes the Wooded area layer of GeoBase Land Cover, the 1:50 000 National Topographic Data Base (NTDB)

features that have not been updated and CGNDB toponymy as well as toponomy integrated in the NHN (National Hydro Network).

The 1:250 000 CanVec product was created by integrating 1:250 000 NTDB data and the generalized data from NRN and NRWN (The generalization was based on a snapshot of our January 2014 geospatial database).

For 1:1 000 000, 1:5 000 000 and 1:15 000 000 datasets, data comes from the Atlas of Canada Series and includes data on boundaries, shores, place names, railways, rivers, roads, ferries and waterbodies that have been compiled to be used for each of these scales.

7.2 TO THE SPECIFICATION SCOPE

Main

8 DATA MAINTENANCE

8.1 DESCRIPTION

The maintenance of the features composing the CanVec product comes mainly from 2 sources: the GeoBase agreements and the production activities of the CCMEO.

GeoBase agreements affecting features mainly grouped in Transport Features and Hydro Features themes include a data update component.

The data production activities within the ESS of NRCan are determined based on current government priorities such as the development of the North and sustainable development of natural resources. These priorities resulted mainly by acquisition and update activities in the North and the creation of the National Hydro Network (NHN).

The static CanVec product is published at least once a year or when data significant changes occur. Each new publication includes updates gathered since the previous release.

For CanVec data coming out of the Geospatial Data Extraction Tool, it is expected to make updates available every two months. However, the update frequency for CanVec features or group of features varies a lot and depends directly on the data producer agency (source). For NRN data, the update frequency usually varies between 1 and 3 years.

8.2 REFERENCE TO SPECIFICATION SCOPE

Main

9 DATA PRODUCT DELIVERY

9.1 DELIVERY FORMAT INFORMATION: GML

9.1.1 Format Name

GML - Geography Markup Language

9.1.2 Version

3.1.1

9.1.3 Specification

Geography Markup Language – GML –3.1.1, OpenGIS® Implementation Specifications, OGC Recommendation Paper, 2004-02-07, OGC Document Number 03-105r1 (http://portal.opengeospatial.org/files/?artifact_id=4700).

Note: GML format is only available from the Geospatial Data Extraction Tool (see Section 1.6)

9.1.4 Language

eng – English

fra - French

9.1.5 Character Set

004 - UTF8

9.2 DELIVERY FORMAT INFORMATION: SHAPE

9.2.1 Format Name

Shapefile - ESRI™

9.2.2 Version

01 (July 1998)

9.2.3 Specification

ESRI Shapefile Technical Description, an ESRI White Paper, July 1998 (http://www.esri.com/library/whitepapers/pdfs/shapefile.pdf)

9.2.4 Language

eng - English

fra – French

9.3 DELIVERY FORMAT INFORMATION: FGDB

9.3.1 Format Name

File Geodatabase - ESRI™

9.3.2 Version

Unknown (Outside the public domain)

9.3.3   Specification

Not available. This format was launched with the ArcGIS (ESRI™) software, version 9.2.

9.3.4   Language

eng - English

fra – French

9.4   DELIVERY MEDIUM INFORMATION FOR STATIC FILES

9.4.1   Units of delivery

Canada or Province/Territory as shown in the table of section 1.6

9.4.2   Transfer Size

Size of files changes depending on the themes and scale selected.

The following tables give an estimation of the uncompressed file sizes by province or territory for FGDB and Shapefile formats as they were produced on December 22, 2015:

Province/ Territory	FGDB format at the scale 1:50 000 (Mega-bytes - Mb)								
	Transport	Administrative	Elevation	Hydro	Land	Man-Made	Resource Management	Toponymic	All themes
BC	191	50.8	1,400	2,990	3,590	46.9	5.08	7.43	8,281
AB	276	5.77	489	623	2,000	49.1	12.2	3.19	3,458
SK	178	11.8	519	666	2,380	53.2	7.56	4.37	3,820
MB	91	14.1	323	983	2,500	33.9	4.3	5.7	3,955
ON	513	17	668	2,090	5,250	172	6.67	33.4	8,750
QC	358	39.2	1,925	5,900	8,790	129	6.32	7.99	17,156
NB	72	7	87.3	81.7	393	31.2	3.96	3.07	679
PE	32.7	4.76	15.65	10.8	25	12.6	3.15	2.13	107
NS	103	9.26	36.9	68	309	35.6	3.73	4.07	570
NL	50.1	25.4	575	1,180	2,750	20.4	3.74	4.51	4,610
YK	27.4	14.1	722	447	2,050	7.84	3.34	2.59	3,274
NT	28	19.9	1,310	2,360	5,310	7.83	3.35	4.32	9,043
NU	24.5	105	2,200	5,170	3,030	7.8	3.49	5.08	10,546
CA	1,945	243	10,271	22,569	38,377	492	25.8	61	**74,000 Mb**

Province/ Territory	Shapefile format at the scale 1:50 000 (Mega-bytes - Mb)								
	Transport	Administrative	Elevation	Hydro	Land	Man-Made	Resource Management	Toponymic	All themes
BC	1,510	138	4,070	20,100	9,620	175	6.22	25.2	35,644
AB	2,230	8.82	1,420	4,850	5,410	188	23	7.02	14,137
SK	1,700	30.7	1,650	5,730	6,520	206	12.1	10	15,859
MB	700	35.3	1,030	8,770	6,980	120	4.46	12.5	17,652
ON	3,830	44.9	2,130	14,000	14,400	703	10.7	98.9	35,218
QC	2,820	110	6,170	49,600	24,900	528	9.92	26.2	84,164
NB	435	11.7	260	551	1,000	111	3.92	6.65	2,380
PE	115	4.95	10.4	44.4	59	30	2.08	2.06	268
NS	675	17.7	106	473	814	131	3.28	11.6	2,232
NL	270	64	1,770	11,500	7 830	63	3.3	13.1	21,513
YK	60.2	35.2	2,020	3,540	5,400	8.74	2.34	3.77	11,070
NT	63.6	48.7	4,040	22,200	14,700	7.91	2.22	8.25	41,071
NU	49.9	286	6,650	49,900	9,860	7.7	2.03	15.3	66,770
CA	14,459	707	31,326	191,258	107,493	2,040	58	240	**348 000 Mb**

9.4.3   Medium Name

Open Government of Canada website (http://open.canada.ca/en)

9.4.4   Other Delivery Information

The document *CanVec_Distribution_Shapefile.xls* contains a lookup table that shows the links between the attribute names in the catalogue and the attribute names in the Shapefile format since this format limits the names to a maximum of 10 characters.

9.5   DELIVERY MEDIUM INFORMATION ACCORDING TO A CUSTOMIZED AREA FROM THE GEOSPATIAL DATA EXTRACTION TOOL

9.5.1   Units of delivery

Depend on the user preference.

9.5.2   Transfer size

Variable

9.5.3   Medium Name

Open Government of Canada website (http://open.canada.ca/en)

9.5.4 Other Delivery Information

The document *CanVec_Distribution_Shapefile.xls* contains a lookup table that shows the links between the attribute names in the catalogue and the attribute names in the Shapefile format since this format limits the names to a maximum of 10 characters.

The *CanVec_en_Transition* document ensures the correlation between former and new CanVec coding.

The *CanVec_Code* document contains the list of entities and the scales at which they are available.

The file *CanVec_en_symbol* contains all map symbols but can only be used with FGDB file format.

9.6 REFERENCE TO SPECIFICATION SCOPE

Main

10 METADATA

Not applicable