Natural Resources
Canada

Ressources naturelles
Canada

CanVec

Data Product Specifications

Edition 1.1

2012-11-13

**Government of Canada
Natural Resources Canada
Canada Centre for Mapping and Earth Observation**

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RELEASES HISTORY

Date	Version	Description
2012-11-13		Addition of a note under section *1.6 Informal description of the data product.*
		Minor typographical correction.
		Addition of a note under section *5.1 Spatial reference system.*
		Addition of a note under section *5.1.2 Code.*
		Addition of a note under section *8.1 Description.*
		New delivery medium information format:
		9.7 Delivery Medium Information according to an arbitrary coverage from the dynamic extraction tool
		Version 1.2 has been removed.
2011-11-18		Modification of section 5 Reference systems:
		Modification EPSG code of Spatial Reference systems.
2010-04-14	1.1	New version distribution formats:
		9.1 Delivery Format Information: GML: version 3.1.1
		New FGDB distribution format. Adding sections:
		9.3 Delivery Format Information: FGDB
		9.5 Delivery Medium Information according to the provincial/territorial coverage.
		9.6 Delivery Medium Information according to the Canadian coverage.
		Restructuring of some document sections:
		Modification of section 5 Reference systems.
		Minor typographical corrections.
2007-03-01	1.0	Initial version

TABLE OF CONTENTS

1   OVERVIEW

1.1   TITLE

CanVec: Data Product Specifications, Edition 1.1

1.2   REFERENCE DATE

2010-04-14

1.3   RESPONSIBLE PARTY

GeoGratis
Government of Canada
Natural Resources Canada
Canada Centre for Mapping and Earth Observation

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1.4   LANGUAGE

eng – English

fra - French

1.5   TERMS AND DEFINITIONS

CSRS	Canadian Spatial Reference System
CTI	Centre for Topographic Information
CVGD28	Canadian Vertical Geodetic Datum of 1928
ESS	Earth Sciences Sector
GIS	Geographic Information System
NAD83	North American Datum of 1983
NHN	National Hydro Network
NRCan	Natural Resources Canada
NRN	National Road 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. CanVec originates from the best available data sources covering Canadian territory and offers quality topographical information in vector format that comply with international geomatics standards.

CanVec is a multi-source product coming mainly from the National Topographic Data Base (NTDB), the GeoBase initiative and the data update using Landsat 7 or Spot imagery coverage. CanVec product contains more than 90 topographical entities thematically organized into 11 distribution themes: Administrative Boundaries, Buildings and Structures, Energy, Hydrography, Industrial and Commercial Areas, Places of Interest, Relief and Landforms, Toponymy, Transportation, Vegetation and Water Saturated Soils.

CanVec aims to standardized and actualized representation of topographical phenomenon for the entire Canadian territory. Various topographical entities coming mainly from the NTDB are not up to date. These entities are included in CanVec product only to answer topographical reference needs. CanVec can be used to produce thematic maps, for web mapping as well as GIS applications. CanVec many attributes allow for extensive spatial analysis.

The CanVec product will be maintained in partnership with the organizations providing the data.

CanVec is scheduled to be published by edition (or release) twice a year. The CanVec product is free and is distributed via GeoGratis portal (www.GeoGratis.gc.ca) in output file formats GML (Geography Markup Language), SHAPE (ESRI™) and File Geodatabase (ESRI™).

Note

Canvec data distributed throught the GeoGratis dynamic extraction tool is not release on the same frequency. In that case, the datasets are updated on a continual basis.

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

CanVec is a multi-source product coming mainly from the National Topographic Data Base (NTDB), the GeoBase initiative and the data update using Landsat 7 or Spot imagery coverage. CanVec product contains more than 90 topographical entities thematically organized into 11 distribution themes: Administrative Boundaries, Buildings and Structures, Energy, Hydrography, Industrial and Commercial Areas, Places of Interest, Relief and Landforms, Toponymy, Transportation, Vegetation and Water Saturated Soils.

3.3   PURPOSE

CanVec aims to standardized and actualized representation of topographical phenomenon for the entire Canadian territory.

CanVec can be used to produce thematic maps, for web mapping as well as GIS applications. CanVec many attributes allow for extensive spatial analysis.

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

10000 - 50000 (CanVec data product has a spatial resolution between 1:10000 and 1:50000).

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 product contains more than 90 topographical entities thematically organized into 11 distribution themes: Administrative Boundaries, Buildings and Structures, Energy, Hydrography, Industrial and Commercial Areas, Places of Interest, Relief and Landforms, Toponymy, Transportation, Vegetation and Water Saturated Soils.

Each topographical entity is described by a name, a definition, a list of topological relationships, a list of attributes and a spatial component that could be a point, a line or an area (polygon).

4.2   DATA MODELLING SCHEMA

4.2.1   Application schema

The application schema for CanVec product has not been modeled because of the high quantity of entities and the complexity of the numerous relationships and associations that exist between those entities. However, for some of CanVec product entities that are issued from GeoBase initiative an application sub-schema might exists (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 document *CanVec: Product Distribution Formats* also shows the way the conceptual model of the Feature Catalogue is materialized in the physical data model of CanVec product according to the distribution formats GML, Shape and FGDB (www.GeoGratis.gc.ca).

4.2.2   Feature catalogue

The complete description of the CanVec Feature Catalogue is located at GeoGratis Web site (www.GeoGratis.gc.ca).

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 (North American Datum of 1983 in Canadian Spatial Reference System). The longitude is expressed with a negative number to represent a west position of the central meridian (0°).

Note

Spatial data may be offer in other spatial coordinate systems when obtained from the GeoGratis dynamic extraction tool. Definition for the spatial coordinate system can be obtained from the metadata.

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

The spatial coordinate system may be different if specified by the user in the GeoGratis dynamic 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 come from 2 different sources: GeoBase initiative (ex.: National Road Network (NRN) data) and Natural Resources Canada digital topographic data.

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

For Natural Resources Canada data, during data inspection, datasets produced are grouped into distinct batches. A few datasets are selected from each batch and inspected in order to check their contents and compare them to a data source used in production or to another independent source. If the percentage of error detected is less than 5%, then all datasets in the batch are normally considered acceptable.

6.1.2   Omission

The 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 Landsat 7 or Spot imagery contains only topographical entities that can be extracted from that type of satellite images. The majority of entities 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 that area (Mapping of the North) doesn't generate systematically Contour entity and entity of representation Toponym.

6.2   LOGICAL CONSISTENCY

6.2.1   Conceptual Consistency

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

Note

At the hydrography level, waterbodies (entity Waterbody) of CanVec product come from various sources and are not captured the same way:

- Waterbodies produced by Mapping of the North project (data acquisition by stereo-digitizing followed by an update with Landsat 7 or Spot imagery) allows the distinction between coastal water (oceans) and other types of inland waterbodies (lake, river, etc.),

- Waterbodies from National Topographic Data Base (NTDB) can't be differentiated and are all consequently classified indefinite,

- Hydrography generated in the National Hydro Network (NHN) provides various types of inland waterbodies (lake, river, etc.) but doesn't support coastal water (oceans).

At the hypsography level, Contour and Elevation point entities have an attribute Hypsometric value that contains elevation in meter while Contour imperial and Elevation point imperial entities unit of measurement for the same attribute is feet.

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) entities 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

The CanVec product comes from multiple data sources. The dataset horizontal positional accuracy assessment is related to these data sources. However, the overall dataset horizontal positional accuracy cannot be assessed. The maximum and the minimum horizontal accuracy values extracted from all sources in the dataset are provided when available.

It is important to note that each entity occurrence of CanVec product contains a Planimetric accuracy attribute indicating the data accuracy expressed as the Circular Map Accuracy Standard (CMAS).

The CanVec data product comes from various sources (ex.: GPS tracking, imagery, aerial photography). By consequence, it is essential that they meet a planimetric accuracy criterion to facilitate (ease) their integration and utilization.

The Landsat 7 Orthorectified Imagery product [Landsat 7 Orthorectified Imagery over Canada, Product Specifications] is the reference for topographical objects of CanVec product. The CanVec topographical entities planimetric accuracy is equal or better than the accuracy of the Landsat 7 Orthorectified Imagery within which they are located spatially. The accuracy of Landsat 7 Orthorectified Imagery product is mainly between 15 and 30 metres.

The methodology described to evaluate the "Commissions" is also applied to verify the absolute or external accuracy.

6.3.2   Relative or internal accuracy

Unknown

6.3.3   Gridded Data Position Accuracy

Not applicable

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

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 initial version of CanVec product was created by integrating mainly datasets from the National Topographic data Base (NTDB) and the National Road Network, (NRN) and the National Hydrographic Network (NHN) produced within GeoBase agreements.

The NTDB data are transformed to comply with CanVec product specifications. The major operations applied are: adjustment of entities at National Topographic System (NTS) border, recoding of entities, renaming of some entities, merging (fusion) of some entities, removal of linear components for surface entities, modification of some spatial relationships of some entities and rounding off co-ordinates to the nearest meter.

NTDB datasets that are integrated to the CanVec product must meet planimetric accuracy of Landsat 7 orthoimages (15-30 metres) which are one of the components of the GeoBase Data Alignment Layer (GDAL).

The linear entities of the NRN captured by provincial/territorial coverage are segmented at the NTS border.

7.2 REFERENCE TO THE SPECIFICATION SCOPE

Main

8 DATA MAINTENANCE

8.1 DESCRIPTION

The maintenance of the entities composing the CanVec product comes mainly from 2 different sources: the GeoBase agreements and the production activities from Earth Sciences Sector (ESS) of Natural Resources Canada (NRCan).

GeoBase agreements affecting entities grouped mainly in the areas of Transport and Hydrography CanVec product. Various partnerships were signed with many provinces and the updates of these entities of the NRN are provided essentially by these GeoBase partners.

The data production activities from the ESS of NRCan are prioritized around some governmental issues that are presently: development of the North and sustainable development of natural resources. These issues are materialized mainly by acquisition and update activities in the North and the creation of the National Hydro Network (NHN).

The CanVec product is scheduled to be published by edition (or release) twice a year. Each new release contains updates applied to the data over the last 6 months prior to the publication of the new edition. The update frequency for CanVec entities or group of entities varies a lot and depends directly on the data producer agency (source). For NRN data, the update frequency varies between 1 and 3 years.

Note

Canvec data distributed throught the GeoGratis dynamic extraction tool is not release at the same frequency. In that case, the datasets are updated on a continual basis.

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).

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

Shape - 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^{TM}

9.3.2   Version

Unknown (Outside the public domain)

9.3.3   Specification

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

9.3.4   Language

eng - English

fra – French

9.4   DELIVERY MEDIUM INFORMATION ACCORDING TO THE NTS COVERAGE

9.4.1   Units of delivery

Tiles of the National Topographic System (NTS)

9.4.2   Transfer Size

The estimated average size of a compressed dataset is 6 megabytes.

9.4.3   Medium Name

GeoGratis Web site (www.GeoGratis.gc.ca)

9.4.4   Other Delivery Information

The document *CanVec: Product Distribution Formats* describes the name of the files, the entities and the attributes according to available distribution formats (www.GeoGratis.gc.ca).

9.5   DELIVERY MEDIUM INFORMATION ACCORDING TO THE PROVINCIAL / TERRITORIAL COVERAGE

9.5.1   Units of delivery

Provincial and territorial coverage

9.5.2   Transfer Size

The average size of a data set is about 200 megabytes and 150 megabytes when compressed with the ZIP algorithm. The size of a data set can vary significantly depending on the spatial extent of the province/territory (from 20 megabytes to 6 gigabytes).

9.5.3   Medium Name

GeoGratis Web site (www.GeoGratis.gc.ca)

9.5.4   Other Delivery Information

The CanVec document: *Product Distribution Formats* describes the files name, entities and attributes according to the available distribution formats (www.GeoGratis.gc.ca).

NOTE: It is important to know that this product is an assembly of NTS file where entities are not merged if they originate from more than one NTS file. The data is segmented at the NTS border (not seamless). All NTS files straddling more than one province or territory are duplicated in provincial and territorial for the FGDB and GML format.

9.6   DELIVERY MEDIUM INFORMATION ACCORDING TO THE CANADIAN COVERAGE

9.6.1   Units of delivery

Canada coverage

9.6.2   Transfer Size

The average size of a data set is about 3 GB and 2 GB when compressed with the ZIP algorithm. The size of a data set can vary significantly depending on the topic CanVec (5 megabytes to 15 gigabytes).

9.6.3   Medium Name

GeoGratis Web site (www.GeoGratis.gc.ca)

9.6.4   Other Delivery Information

The CanVec document: *Product Distribution Formats* describes the files name, entities and attributes according to the available distribution formats (www.GeoGratis.gc.ca).

9.7   DELIVERY MEDIUM INFORMATION ACCORDING TO AN ARBITRARY COVERAGE FROM THE DYNAMIC EXTRACTION TOOL

9.7.1   Units of delivery

Depends on the user preference.

9.7.2 Transfer size

Variable

9.7.3 Medium Name

GeoGratis Web site (www.GeoGratis.gc.ca)

9.7.4 Other Delivery Information

The CanVec document: *Product Distribution Formats* describes the files name, entities and attributes according to the available distribution formats (www.GeoGratis.gc.ca).

9.8 REFERENCE TO SPECIFICATION SCOPE

Main

10 METADATA

Not applicable