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Population Ecumene Census Division Cartographic Boundary File, Reference Guide, 2016 Census

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. not available for any reference period
.. not available for a specific reference period
... not applicable
0 true zero or a value rounded to zero
0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p} preliminary
^{r} revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F too unreliable to be published
* significantly different from reference category ($p < 0.05$)

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Population Ecumene Census Division Cartographic Boundary File, Reference Guide, 2016 Census

This reference guide is intended for users of the 2016 Population Ecumene Census Division Cartographic Boundary File. The guide provides an overview of these files, the general methodology used to create them, and important technical information for users.

What's new?

- All 2016 Census files are portrayed in Lambert conformal conic projection (North American Datum of 1983 [NAD83]).
- All 2016 Census spatial files are available as national files.

1. About this guide

This reference guide is intended for users of the *2016 Census Population Ecumene Census Division Cartographic Boundary Files*. The guide provides an overview of the files, the general methodology used to create them, and important technical information for users.

This reference guide does not provide details on specific software packages that are available for use with the *2016 Census Population Ecumene Census Division Cartographic Boundary Files*. Users are advised to contact the appropriate software vendor for information.

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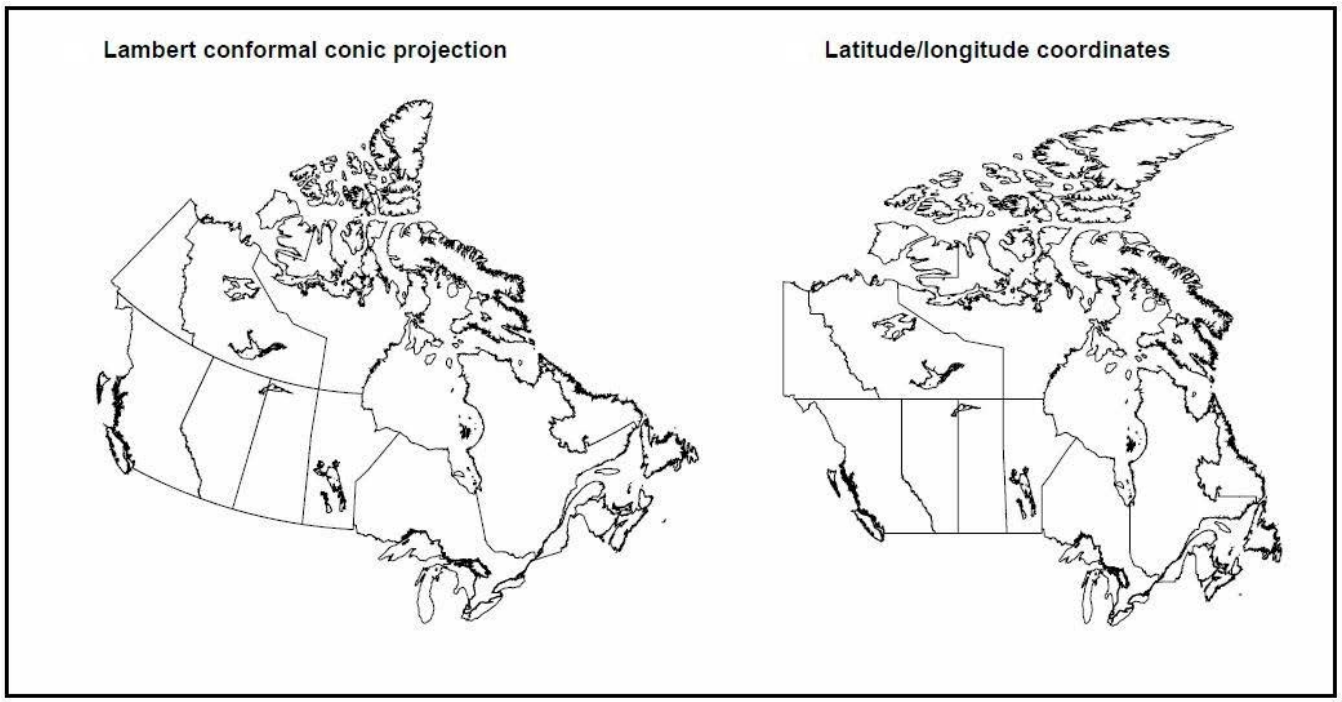
2. Overview

The *2016 Census Population Ecumene Census Division Cartographic Boundary Files* represent Canada's population ecumene. Ecumene, is a term used by geographers to indicate inhabited land. Statistics Canada applies the definition of the population ecumene as land where people have made their permanent home.

The *2016 Census Population Ecumene Census Division Cartographic Boundary Files* are portrayed in Lambert conformal conic projection (North American Datum of 1983 [NAD83]). Figure 2.1 illustrates an example of a Lambert conformal conic projected cartographic boundary file and an unprojected file in latitude and longitude coordinates.

Figure 2.1
Example of a map projection and unprojected coordinates



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3. About this product

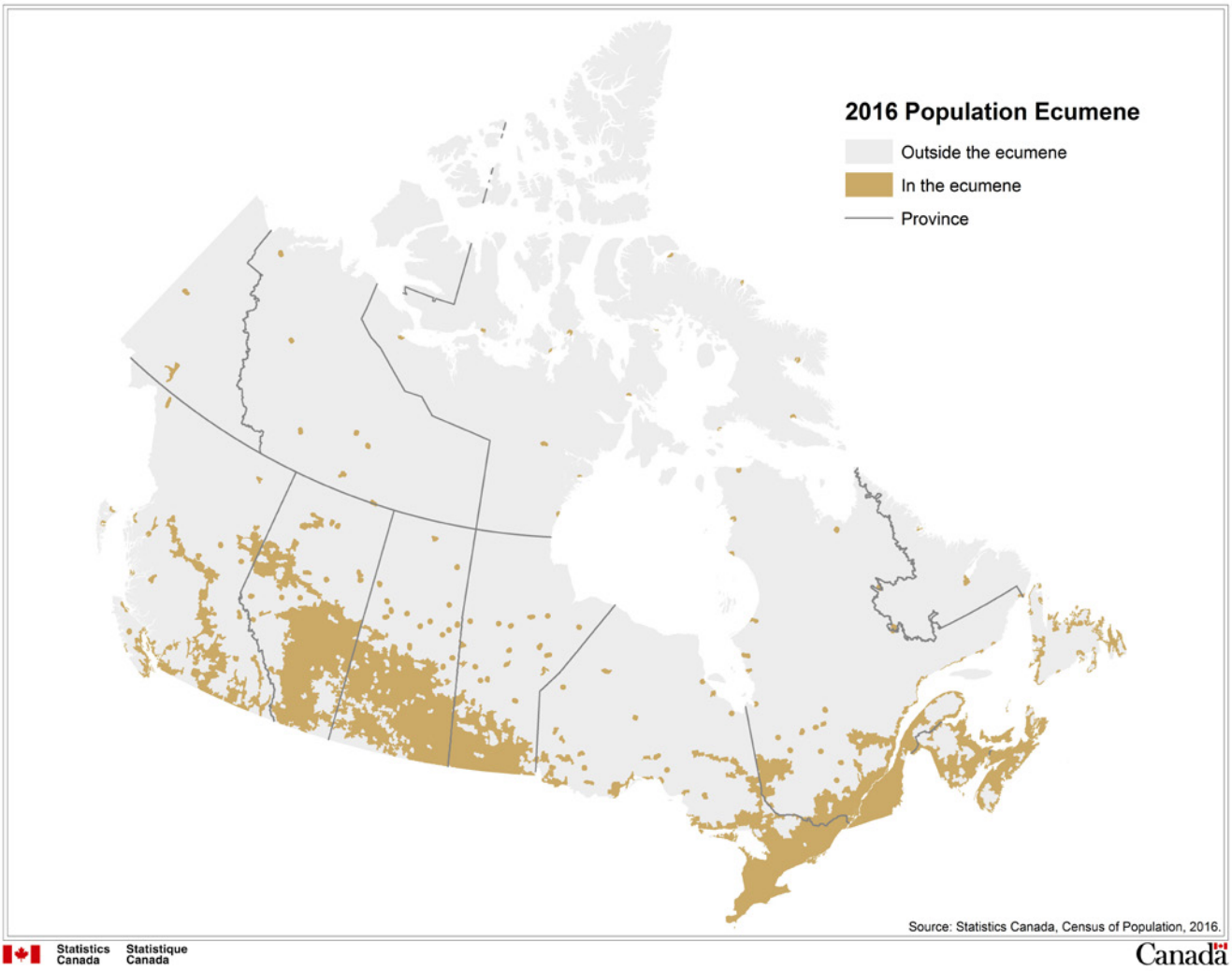
Purpose of the product

The population ecumene is designed to assist users in thematically mapping data. By effectively masking ecumene areas of Canada, it enables users to display data in areas where population is concentrated.

An ecumene mask is useful for dot and choropleth thematic mapping. In dot map applications, if an ecumene is not applied, the dots may be spread over the spatial extent of a geographic area. This approach defeats the main attributes of dot mapping (i.e., showing correct location, extent and density of various characteristics).

In choropleth map applications, one of the inherent limitations is that the statistical distribution is assumed to be homogeneous or uniformly spread over each geographic area, and is consequently represented by a single tone or colour covering the entire area. Using an ecumene limits the display to only those areas where population is found and results in a more accurate representation of the spatial distribution of data.

Figure 3.1
Example of an ecumene mask with the provinces and territories generalized cartographic boundary file



Definitions and concepts

More details can be found in the Dictionary, Census of Population, 2016 (http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/index-eng.cfm) (Catalogue no. 98-301-X).

Content

The 2016 Census Population Ecumene Census Division Cartographic Boundary Files product consists of four spatial files:

1. Ecumene mask file

The ecumene mask consists of polygons flagged with a value: 1, being in the ecumene; 0, outside the ecumene. There is at least one ecumene polygon in every census division in Canada.

2. Census division boundary file

The census division boundary file contains census division boundaries. Related attribute information is available for each census division polygon, including a unique identifier, name, type and provincial unique identifier and name.

3. Province and territory boundary file

The province and territory boundary file contains the boundaries of the provinces and territories. Related attribute information is available for each province and territory polygon, including a unique identifier, province or territory name, English name, French name, English abbreviation and French abbreviation.

4. Hydrographic reference file

The hydrographic reference file contains a selection of interior lakes, the Great Lakes, and a portion of the St. Lawrence River. Each hydrographic feature contains a unique identifier.

All spatial files are available in English and in French, in three formats: ArcGIS® (.shp), Geography Markup Language (.gml) and MapInfo® (.tab).

General methodology

The National Geographic Database (NGD) is a joint Statistics Canada-Elections Canada initiative to develop and maintain a spatial database which serves the needs of both organizations. The focus of the NGD is the continual improvement of quality and currency of spatial coverage using updates from provinces, territories and local sources. The native files used for the creation of the 2016 Census population ecumene spatial files reside on Statistics Canada's Spatial Data Infrastructure which was derived directly from data stored on the NGD environment.

To produce the files, the following processes were applied:

Creation of the 2016 Census population ecumene census division spatial files

(A) Ecumene mask file

The ecumene mask file was created by using the land area and the 2016 Census population count to calculate the population density of each dissemination block. Every dissemination block was then classified as either being an ecumene block (meeting the population density criteria of 0.4 or more persons per square kilometre) or being a non-ecumene block (those with a population density below 0.4 persons per square kilometre). These ecumene blocks were aggregated, buffered and retained if they had a minimum population of 1,000 persons or were associated to a population centre. Each census division contains an ecumene part to allow for national mapping of data. If a census division did not have an ecumene part after the above criteria was imposed, the ecumene part with the largest population was added back into the ecumene for that census division. The resulting ecumene outline was smoothed and buffered to facilitate small scale mapping.

(B) Creation of the generalized cartographic boundary files

To create the generalized cartographic boundary files, a subset of the full hydrography was created using the coastal layer as a starting point. The coastal hydrographic features were then used to erase the portions of census divisions that are covered by coastal waters. Subsequently, the province and territory file was derived from the census division file.

(C) Creation of the hydrographic reference file

The hydrographic reference file contains a selection of water features from the National Geographic Database's hydrographic reference layer. These reference data were sourced from the National Topographic Database (1:50,000 and 1:250,000 maps) and the Digital Chart of the World. In selected areas, information was supplemented with data from the National Hydro Network. All small islands were transformed into water polygons.

Final data processing consisted of the conversion from the file geodatabase format, using FME® (Safe Software), into the following Geographic Information System (GIS) file formats: ArcGIS® (.shp), Geography Markup Language (.gml) and MapInfo® (.tab).

The ArcGIS®, Geography Markup Language and MapInfo® files were compressed into WinZip® files (file extension .zip) and made available for download from the Internet.

Limitations

The positional accuracy of these files does not support cadastral, surveying, digitizing or engineering applications.

The input data used to create the files were obtained from several sources having a wide range of scales. The files will not be precise if plotted at a larger scale than the scale of the source material used in its creation. Maps created from the files included in the *2016 Census Population Ecumene Census Division Cartographic Boundary File* should not be used to determine the precise location of boundaries. They are not intended to serve as a legal or cadastral representation of the geographic areas.

Comparisons to other products/versions

The 2016 Census population ecumene mask file is generalized to render it suitable for cartographic display at a small scale (i.e., 1:20,000,000 to 1:25,000,000). Due to this generalization, the position of the shoreline is not necessarily consistent with the suite of census cartographic boundary files.

The files included in the *2016 Census Population Ecumene Census Division Cartographic Boundary File* are similar but not necessarily consistent with ecumene boundary files released prior to the 2016 Census.

Using with other products

The files included in the *2016 Census Population Ecumene Census Division Cartographic Boundary File* can be linked to other 2016 Census statistical data products using the unique identifier (UID) for each geographic area.

The files included in the *2016 Census Population Ecumene Census Division Cartographic File* are generalized to render them suitable for cartographic display at a small scale. Due to this generalization, the position of the shorelines are not necessarily consistent with the suite of 2016 Census cartographic boundary files or 2016 Census *Road Network File*.

When considering using the files included in the *2016 Census Population Ecumene Census Division Cartographic Boundary File,* users should be aware of the compatibility of these files with those that are available from other sources; however, they may not be consistent with Statistics Canada files.

Reference date

The geographic reference date is a date determined by Statistics Canada to finalize the geographic framework for which 2016 Census statistical data are collected, tabulated and reported. The reference date for 2016 Census standard geographic areas is January 1, 2016.

4. Technical specifications

Record layouts and data descriptions

Population ecumene mask file

The population ecumene mask file contains polygons for each ecumene and non-ecumene pocket, which combined, cover all of Canada.

Table 4.1
Population ecumene mask file record layout

Attribute name	Data type	Description
FID	Object ID (4)	Specific to ArcGIS®
Shape	Geometry	Specific to ArcGIS®
CartographicBoundary	MultiPolygon PropertyType	Shape geometry; specific to Geography Markup Language
ECUID	Character (10)	Uniquely identifies an ecumene polygon
ECUMENE	Character (1)	A one-digit code indicating whether the polygon is part of the ecumene: 1 = in the ecumene; 0 = outside the ecumene

Census division generalized cartographic boundary file

The census division generalized cartographic boundary file portrays the census division boundaries for which 2016 Census statistical data are disseminated. Census division (CD) is the general term for provincially legislated areas (such as county, *municipalité régionale de comté* and regional district) or their equivalents. In other provinces and the territories where laws do not provide for such areas, Statistics Canada defines equivalent areas for statistical reporting purposes in cooperation with these provinces and territories. The file contains the boundaries of all census divisions, which combined, cover all of Canada.

Table 4.2
Census division generalized cartographic boundary file record layout

Attribute name	Data type	Description
FID	Object ID (4)	Specific to ArcGIS®
Shape	Geometry	Specific to ArcGIS®
CartographicBoundary	MultiPolygon PropertyType	Shape geometry; specific to Geography Markup Language
CDUID	Character (4)	Uniquely identifies a census division (composed of the two-digit province/territory unique identifier followed by the two-digit census division code)
CDNAME	Character (100)	Census division name
CDTYPE	Character (3)	Census division type
PRUID	Character (2)	Uniquely identifies a province or territory
PRNAME	Character (100)	Province or territory name

Table 4.3
Census division types by province and territory, 2016 Census

Census division type		Canada	Newfoundland and Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories	Nunavut
CDR	Census division / Division de recensement	85	11	…	…	…	5	9	23	18	19	…	…	…	…
CT	County / Comté	15	…	…	…	15	…	…	…	…	…	…	…	…	…
CTY	County	41	…	3	18	…	…	20	…	…	…	…	…	…	…
DIS	District	10	…	…	…	…	…	10	…	…	…	…	…	…	…
DM	District municipality	1	…	…	…	…	…	1	…	…	…	…	…	…	…
MRC	Municipalité régionale de comté	81	…	…	…	…	81	…	…	…	…	…	…	…	…
RD	Regional district	28	…	…	…	…	…	…	…	…	…	28	…	…	…
REG	Region	10	…	…	…	…	…	…	…	…	…	1	…	6	3
RM	Regional municipality	6	…	…	…	…	…	6	…	…	…	…	…	…	…
TÉ	Territoire équivalent	12	…	…	…	…	12	…	…	…	…	…	…	…	…
TER	Territory / Territoire	1	…	…	…	…	…	…	…	…	…	…	1	…	…
UC	United counties	3	…	…	…	…	…	3	…	…	…	…	…	…	…
Total		**293**	**11**	**3**	**18**	**15**	**98**	**49**	**23**	**18**	**19**	**29**	**1**	**6**	**3**

… not applicable
Source: Statistics Canada, 2016 Census of Population.

Province and territory generalized cartographic boundary file

The province and territory generalized cartographic boundary file portrays the boundaries of the 10 provinces and 3 territories for which 2016 Census statistical data are disseminated. Provinces and territories are the major political (legislated) areas of Canada. The file contains the boundaries of all provinces and territories, which combined, cover all of Canada.

Table 4.4
Province and territory generalized cartographic boundary file record layout

Attribute name	Data type	Description
FID	Object ID (4)	Specific to ArcGIS®
Shape	Geometry	Specific to ArcGIS®
CartographicBoundary	MultiPolygon PropertyType	Shape geometry; specific to Geography Markup Language
PRUID	Character (2)	Uniquely identifies a province or territory
PRNAME	Character (100)	Province or territory name
PRENAME	Character (100)	Province or territory name in English
PRFNAME	Character (100)	Province or territory name in French
PREABBR	Character (10)	English abbreviation of the province or territory name
PRFABBR	Character (10)	French abbreviation of the province or territory name

Hydrographic reference file

The supplementary hydrographic file is provided for the mapping of inland water. This file was created to be used as spatial reference in conjunction with the ecumene file to enable thematic mapping.

Table 4.5
Hydrographic reference file record layout

Attribute name	Data type	Description
FID	Object ID (4)	Specific to ArcGIS®
Shape	Geometry	Specific to ArcGIS®
CartographicBoundary	MultiPolygon PropertyType	Shape geometry; specific to Geography Markup Language
HYDROUID	Character (7)	Uniquely identifies a water feature

Attribute domain values

CDTYPE

CDTYPE	CD description
CDR	Census division / Division de recensement
CT	County / Comté
CTY	County
DIS	District
DM	District municipality
MRC	Municipalité régionale de comté
RD	Regional district
REG	Region
RM	Regional municipality
TÉ	Territoire équivalent
TER	Territory / Territoire
UC	United counties

File specifications

Not applicable

Software formats

The *2016 Census Population Ecumene Census Division Cartographic Boundary Files* are available for download from the Statistics Canada website in the following formats:

- ArcGIS® format
  File extension: .shp
- Geography Markup Language version 3.1.1
  File extension: .gml
- MapInfo® format
  File extension: .tab

This reference guide does not provide details on specific software packages that are available for use with the *2016 Census Population Ecumene Census Division Cartographic Boundary Files*. Users are advised to contact the appropriate software vendor for information.

System requirements

Not applicable

File extension and accented character information

The ArcGIS®, Geography Markup Language and MapInfo® files are compressed into WinZip® files (file extension .zip).

An XML schema file (.xsd) is included to describe and validate the structure and content of the .gml files.

Some *2016 Census Population Ecumene Census Division Cartographic Boundary Files* contain attributes with accented characters. They were successfully tested on desktop versions of ArcGIS® 10.2.2, MapInfo® 12.0 and FME Data Inspector 2015.1.

Geographic representation

The *2016 Population Ecumene Census Division Cartographic Boundary Files* are available on the Statistics Canada website in the following geographic representation:

- Projection: Lambert conformal conic
- False easting: 6200000.000000
- False northing: 3000000.000000
- Central meridian: -91.866667
- Standard parallel 1: 49.000000
- Standard parallel 2: 77.000000
- Latitude of origin: 63.390675
- Linear unit: metre (1.000000)
- Datum: North American 1983 (NAD83)
- Prime meridian: Greenwich
- Angular unit: degree
- Spheroid: GRS 1980

The North American Datum of 1983 (NAD83) is an adjustment of the 1927 datum (NAD27) that reflects the higher accuracy of geodetic surveying.

Users of the *2016 Census Population Ecumene Census Division Cartographic Boundary Files* can transform the files into the representation that best satisfies their needs, knowing the effects these representations have on angles, areas, distances and direction. Users have the option to choose the best projection in concert with mapping objectives.

File naming convention

Spatial product file names follow a file naming convention. The standard geographic area and code, file type, geographic reference date, software type and language are embedded within the file name. Standardizing the names of the files facilitates the storage of compressed files, all having the extension .zip.

Each file name is 13 characters in length. All alphabetic characters are in lower case to maintain consistency.

First character: projection of file

- l projection in Lambert conformal conic

Next three characters: primary geographic level of file

- pr_ province and territory
- cd_ census division
- ecu ecumene
- hy_ supporting hydrography (Great Lakes, St. Lawrence River and a selection of inland lakes)

Next three numbers: geographic code of coverage

- 000 Canada

Next character: file type

- e ecumene

Next two numbers: geographic reference date

The geographic reference date is a date determined by Statistics Canada for the purpose of finalizing the geographic framework for which 2016 Census statistical data are collected, tabulated and reported. For 2016 Census products, the geographic reference date is January 1, 2016.

- 16 - geographic reference date is 2016

Next character: file format

- a ArcGIS® (.shp)
- g Geography Markup Language (.gml)
- m MapInfo® (.tab)

Final two characters: language

- _e English
- _f French

5. Data quality

Spatial data quality elements provide information on the fitness-for-use of a spatial database by describing why, when and how the data are created, and how accurate the data are. The elements include information on the lineage, positional accuracy, attribute accuracy, logical consistency and completeness. This information is provided to users for all spatial data products disseminated for the census.

Lineage

Lineage describes the history of the spatial data, including descriptions of the source material from which the data were derived, and the methods of derivation. It also contains the dates of the source material, and all transformations involved in producing the final digital files.

The 2016 Census standard geographic area unique identifier, name, type, and the relationships among the various geographic levels are found on Statistics Canada's Spatial Data Infrastructure (SDI). The data for administrative areas are updated using information from provincial and territorial sources.

Positional accuracy

Positional accuracy refers to the absolute and relative accuracy of the positions of geographic features. Absolute accuracy is the closeness of the coordinate values in a dataset to values accepted as or being true. Relative accuracy is the closeness of the relative positions of features to their respective relative positions accepted as or being true. Descriptions of positional accuracy include the quality of the final file or product after all transformations.

The Spatial Data Infrastructure is not fully Global Positioning Systems (GPS)-compliant. However, every possible attempt is made to ensure that the standard geographic area boundaries maintained in the Spatial Data Infrastructure respect the limits of the administrative entities that they represent (e.g., census division and census subdivision) or on which they are based (e.g., census metropolitan area or census agglomeration). The positional accuracy of these limits is dependent upon source materials used by Statistics Canada to identify the location of limits. In addition, due to the importance placed on relative positional accuracy, the positional accuracy of other geographic data (e.g., road network data and hydrographic data) that are stored within the Spatial Data Infrastructure is considered when positioning the limits of the geographic areas.

Attribute accuracy

Attribute accuracy refers to the accuracy of the quantitative and qualitative information attached to each feature (e.g., census division name, unique identifier).

As noted under Lineage, the attributes (names, types and unique identifiers) for all geographic areas are sourced from the Spatial Data Infrastructure. The names and types for administrative areas have been updated for the 2016 Census using source materials from provincial, territorial and municipal authorities.

The attribute data associated with the polygons in the boundary files were independently verified against the data in the Spatial Data Infrastructure and found to be accurate.

Logical consistency

Logical consistency describes the fidelity of relationships encoded in the data structure of the digital spatial data.

All geographic areas contained in the four files have been verified to have a unique identifier that is valid for the 2016 Census.

The ecumene mask boundary file was verified to ensure that every census division contains an ecumene pocket.

Consistency with other products

As a result of the generalization of the shoreline, the boundaries in the province and territory and census division files of this product are not necessarily consistent with the shoreline of the 2016 Census Cartographic Province and Territory and Census Division Boundary files.

Topology checks were performed with the *Road Network File* and boundary files to measure the degree of integration amongst these products. The results indicated the degree of integration was within the default tolerance parameters as defined below.

XY Resolution: 0.000005 metres
XY Tolerance: 0.00001 metres

Completeness

Completeness refers to the degree to which geographic features, their attributes and their relationships are included or omitted in a dataset. It also includes information on selection criteria, definitions used and other relevant mapping rules.

The ecumene mask covers over 98.5% of the population of Canada, based on the buffered dissemination block.

The *2016 Census Population Ecumene Census Division Cartographic Boundary File* contains two standard geographic area boundary files that are generalized: census division; province and territory. The census division generalized boundary file contains all 293 census divisions which cover all of Canada. The province and territory generalized boundary file contains the 10 provinces and 3 territories covering all of Canada.

Appendices

See definitions of the geography universe from the *Dictionary, Census of Population, 2016*.
http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/index-eng.cfm

See Figure 1.1, Hierarchy of standard geographic areas for dissemination, 2016 Census from the *Dictionary, Census of Population, 2016.*
http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/figures/f1_1-eng.cfm

See Table 1.1, Geographic areas by province and territory, 2016 Census from the *Dictionary, Census of Population, 2016.* http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/tab/t1_1-eng.cfm

See Table 1.5, Census subdivision types by province and territory, 2016 Census from the *Dictionary, Census of Population, 2016.* http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/tab/t1_5-eng.cfm