The Digital Divide and the Government: Developing a Tool for the Analysis of Government Data

by

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# Abstract

The digital divide is defined as the gap between groups, demographics, or regions that have access to information communication technologies and those who do not, or who have restricted access[[1](#Jan061)]. The digital divide impacts smaller cities within British Columbia in terms of their ability to represent local infrastructure, provincial, and federal datasets spatially. As a result these municipalities are unable to use spatial data to its fullest extent in their decision-making processes. In partnership with LandInfo Technologies an interactive, online analysis tool that allows local government officials to make use of municipal, provincial, and federal spatial data while engaging in decision-making process has been developed. The goal of this tool is to enable local government to store, maintain, and view infrastructure data. Thus supporting more informed decisions and as a result reducing the overall cost of developing and maintaining municipal infrastructure.

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# Acknowledgements

# Introduction

## Motivation

Cities throughout British Columbia vary greatly in size and by their availability of resources to spend on Geographic Information Systems (GIS).

# Background

## Terms

**Census Subdivision** – “Area that is a municipality or an area that is deemed to be equivalent to a municipality for statistical reporting purposes” [[2](#Sta15)]

**CRS** – Coordinate Reference System, defines how georeferenced spatial data relates to real locations on the Earth’s surface [[3](#Geo15)]

**Dissemination Area (DA)** – “Small area composed of one or more neighbouring dissemination blocks, with a population of 400 to 700 persons.” [[4](#Sta151)]

**GET Request** – Hyper Text Transfer Protocol that requests data from a specified resource over the Internet [[5](#w3s16)]

**GIS** – Geographical Information System, designed for the manipulation, analysis, and display of spatial data

**IntelliJ** – Java integrated development environment used by this project to write source code and compile the projected into a WAR file for deployment

**Java** – Widely used programming language with emphasis on concurrent, class based, and object oriented design. [[6](#Gos15)]

**JSON** – JavaScript Object Notation, syntax used for storing and exchanging data in a human readable format. [[7](#w3s161)]

**Orthophoto** – geometrically corrected aerial photo

**Parcel** – single unit of land

**POST Request** – Hyper Text Transfer Protocol that submits data to be processed by a specified resource over the Internet [[5](#w3s16)]

**PostGIS** – spatial database extender for PostgreSQL adding support for the storage and querying of spatial objects [[8](#Pos16)]

**PostgreSQL** – open source relational database management

**Shapefile** – geospatial vector file format used to store points, lines, and polygons along with their associated attributes

**WAR file** – Web application archive file used to distribute a collection of Java Servlets, Java Classes, XML files, static webpages, and related files [[9](#Hun93)]

**WMS** – Web map service, Hyper Text Transfer Protocol used to request geospatial map images from a GIS database [[10](#OGC16)].

## Study Region

The data used and analysis performed in this project focus exclusively on the Village of Lumby. Lumby is a small community located in southwestern British Columbia with a population of approximately 1,700 people [[11](#Des15)]. Although Lumby is small it maintains autonomy from larger, neighboring cities with its own Mayor and City Council. Main sources of industry for the village include tourism, manufacturing, and logging [[11](#Des15)].

## Data Sources & Limitations

The data used in this project was obtained from four sources: the 2011 Canadian Census, the 2011 National Household Survey (NHS), the Village of Lumby, and BC Assessment.

Data from the 2011 Census and NHS are availably freely to the public and can be obtained from Statistics Canada. This project was interested specifically in the 2011 Census and NHS as they related to Lumby. However, the response rates by Lumby residents to both the census and NHS were flagged by Statistics Canada as being below the average response rate for the province of British Columbia. A response rate is defined by Statistics Canada to be “the number of private and collective dwellings that returned a completed questionnaire divided by the number of private and collective dwellings classified as occupied on the Census database” [[12](#Sta152)]. Although Canadian citizens are required by law to complete the Canadian Census between 5-10% of all residents of Lumby did not complete in the 2011 Census questionnaire [[13](#Sta12)]. The average response rate for all residents of British Columbia was 96.5% [[12](#Sta152)]. In 2011 in addition to the Census Canadians were asked to complete voluntary NHS. The NHS response rate for Lumby residents was 65.2% whereas the provincial average was 77.1% [[14](#Sta153)]. Due to the Lumby’s small population size, low response rates, and issues with data confidentiality data from both the 2011 Census and NHS data is not available per Dissemination Area (DA) only per Census Subdivision, thus limiting the resolution of the data used in this project.

The Village of Lumby provided the locations of parcels within Lumby in Shapefile format. In addition to parcel locations the Shapefile included attributes describing the parcel’s street address, total area, and GISlkp that acts a unique parcel identifier for all parcels within British Columbia. The coordinate reference system associated with the geographic coordinates of the parcels in the Shapefile is NAD 83 UTM Zone 11N/EPSG:26911. This projection is appropriate for large and medium scale mapping topographic mapping for regions located within the highlighted area in Figure 1 [[15](#Spa)].

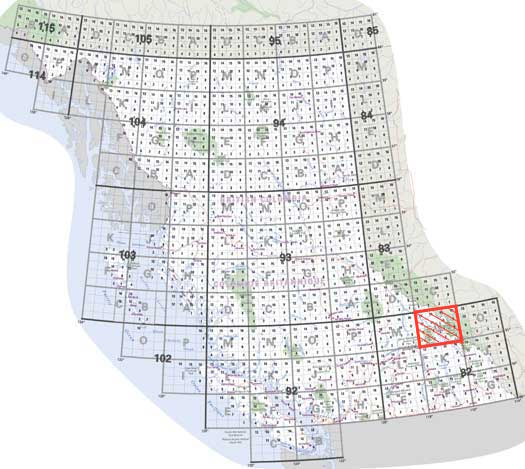


Figure : British Columbia NAD 83 Zones

TODO: projection issues

Parcel assessment values were obtained from the 2015 assessment of parcels within the Village of Lumby completed by BC Assessment. This data included unique parcel identifiers that could be matched to parcel identifiers in the Lumby parcels Shapefile to obtain assessed property values for the land and building(s) located within each parcel.

Additional geographic data was used when displaying land parcels to give users a frame of reference for parcel locations. These data sets included parcel labels, orthophotos, roads, road labels, and a municipal boundary. All of these data sets were in the NAD 83 UTM Zone 11N CRS and obtained via WMS from LandInfo Technologies.

## Usability Measures

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