

## GIS Data Formats and Access

### Introduction

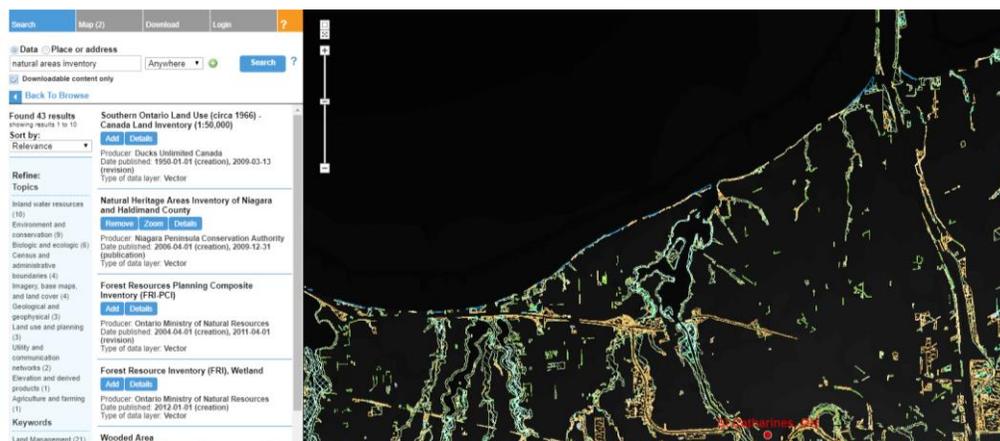
This tutorial aims to introduce the user to a sample of GIS data formats and the required processing to use these data. A reading selection is advised before proceeding with this tutorial: *Mastering ArcGIS MapBk G 70.212 P74 2016, pp.43-45*.

The accompanying appendix describes common data formats and processes, as well as recommended data sources.

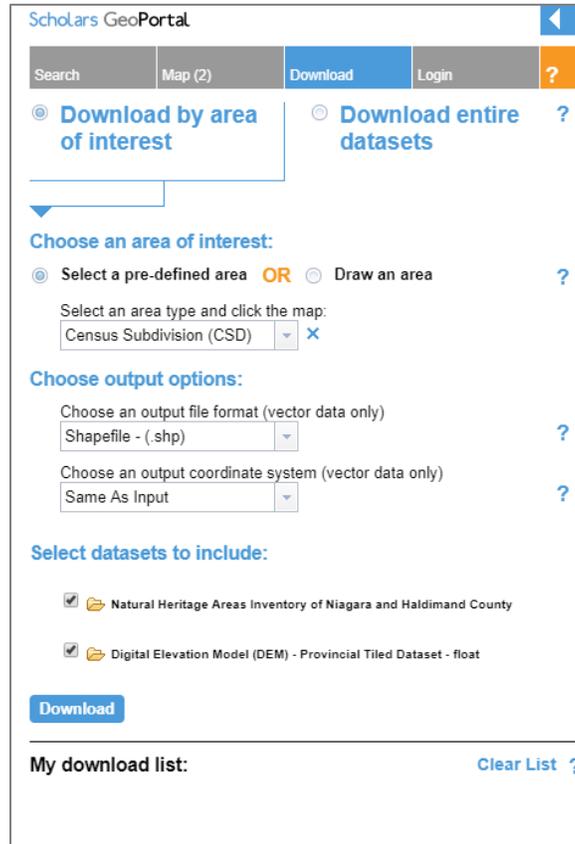
### PART ONE: Finding data

The Brock University Maps, Data & GIS **Geodata listing** includes a variety of data sources with a basic data fact sheet describing the resource as well as how to access the data. Data licensed to Brock for research and teaching must be requested from the MDGL and a license agreement must be signed before data will be delivered. This tutorial uses resources that are readily accessible to a valid Ontario University user.

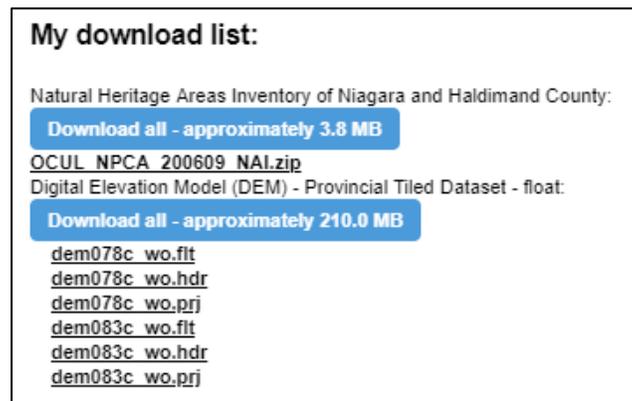
1. Access the **Geodata Listing** <https://brockdsl.github.io/geodata-listing/>
2. Enter the search term **Scholars GeoPortal**. Click **Access Data**. This portal offers access to many data sets that are licensed to Ontario Universities.
3. From the search options, click the radial selection button beside *Place or address*. Enter **St. Catharines** and hit enter.
4. Click **Zoom** for the appropriate result.
5. From the search options, click the radial selection button beside **Data**.
6. Keyword search “digital elevation model”. The first entry in the listing should be “Digital Elevation Model – Provincial Tiled Dataset”.
7. Click **Add**. When prompted with the *Conditions of use agreement*, click *I agree*. You are confirming your affiliation with an Ontario university.
8. Do another data search for “natural heritage areas inventory”.
9. Add “Natural Heritage Areas Inventory of Niagara and Haldimand County”.



10. Click the Download tab then select **Download by area of interest > Choose an area of interest > Select a pre-defined area > Census Subdivision (CSD)**. Click on St. Catharines on the map to select the city's boundary. Your entries should match the image below:



11. Click the blue **Download** button. The data you require has been packaged and is ready for download.



12. For the **Natural Heritage Areas Inventory**, click the link to **OCUL\_NPC\_A\_200609\_NAI.zip**

13. The file is automatically downloaded and File Explorer opens. Notice the files associated with the data.

14. For the **Digital Elevation Model (DEM)**, click the blue **Download All** button (there are a number of files required for the DEM data and it is easiest to download them all at once). The approximate file size of the zip file is 210 MB. The data is saved to your “My Downloads” directory.
15. Using **File Explorer** (aka My Computer or My Documents), access the “My Downloads” directory.
16. Copy and paste the zip files to your local student storage space (USB, X:, W:, other)

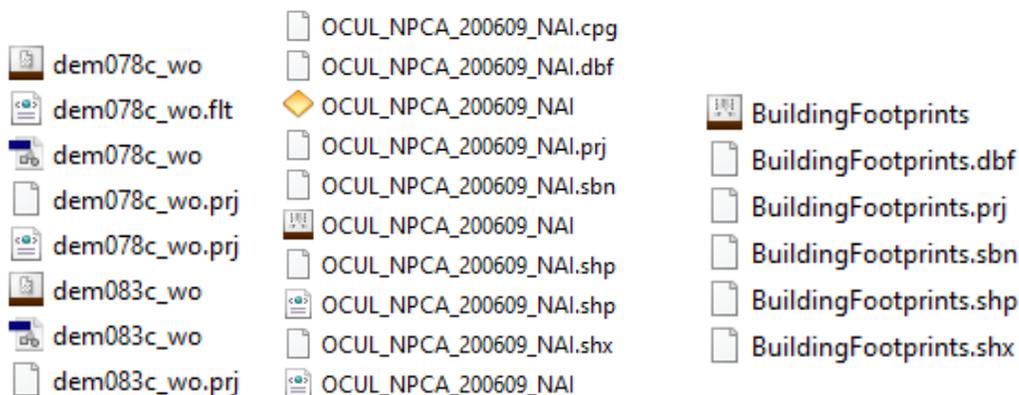
We will unzip the files once we’ve finished downloading all the data sets.

17. Go back to the GeoData listing on the Maps & Geodata webpage.
18. Click the entry for *Open Data Niagara Region*. This site is a portal designed to provide open data specific to the Niagara Region.
19. Enter a keyword search for “buildings”.
20. Click **Building footprints > SHP > Explore > Go to resource** (download zip file). This data is a shapefile packaged in .zip format.

**PART TWO: Extracting Zipped Data Files**

1. Open **File Explorer** and navigate to the folder holding the files downloaded in the previous steps. Depending on your choice, the data will either be stored on a memory stick, on the X: or W: drive.
2. Right-click the .zip file. Select *Extract all*.
3. Define the location for the unzipped files.
4. Repeat for the other .zip files.

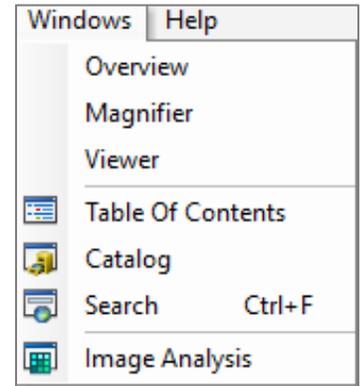
View unzipped files (.flt, .shp, .hdr, .shx, .prj, etc.). Geospatial data should be viewed using ArcGIS ArcCatalog, NOT WINDOWS FILE EXPLORER.



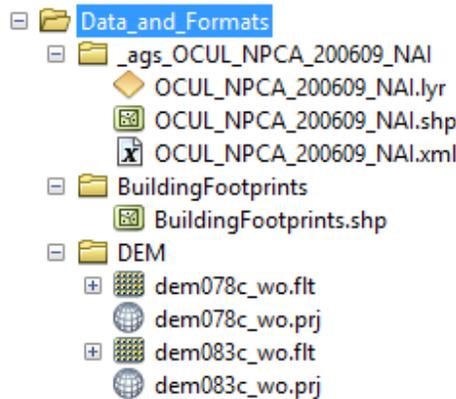
SIDE NOTE: Files that have been zipped using specialized formats (such as .tar, .gz, .7z) must be extracted using a program such as **7 Zip**. Computers at Brock should be equipped with this utility.

5. Run ArcMap and open the ArcCatalog window if necessary (HINT: In ArcMap, go to Windows > Catalog).
6. Before continuing we must make a connection to the folder holding the data files.

Click the Connect to Folder button  and navigate to the folder holding the data files. NOTE: THIS IS ONLY A CONNECTION TO THE FOLDER, NOT THE INDIVIDUAL FILES!



7. From the Catalog tree, expand the new connection to view the geospatial data files we unzipped in a previous step. NOTE: You may need to refresh the FOLDER where the files were extracted to.



### PART THREE: Exploring Metadata

It is a valuable practice to include metadata (.xml) with your data files. Metadata can be described as 'data about data'. It might include such things as resolution, coverage, origin, history, description, etc. We will explore the metadata records for the downloaded files using Catalog.

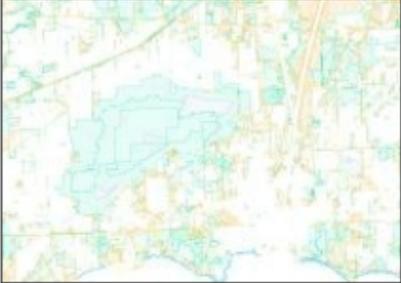
In Catalog, right-click **OCUL\_NPCA\_200609\_NAI.shp** and select **Item Description**. Read down through some of the metadata available for this dataset.

Description
Preview

Print
 Edit
 Validate
 Export
 Import

## OCUL\_NPCA\_200609\_NAI

### Shapefile



### Tags

Canada, watershed, land use, cover, areas, Ontario, heritage, Niagara, inventory, natural

**Summary**  
 To provide a representation of the natural cover/features of the Niagara watershed.

**Description**  
 The Natural Heritage Areas Inventory of Niagara and Haldimand is a project conducted between April 2006 and December 2009 for the purpose of identifying, classifying and mapping natural heritage areas in our watershed (NPCA's jurisdiction). The goal of the project was to use industry standard, scientifically-defensible protocols to inventory all of the natural areas in our community. Those who have spent time in the natural areas in and around Niagara know that this part of the province, with its Carolinian heritage and proximity to the Great Lakes, is a treasure trove of natural wonders. These areas support a rich diversity of natural features including rare plants and animals, significant habitats and geological formations, and important wildlife corridors. A comprehensive biological inventory to document the vegetative communities of our watershed and their inhabitants has never been completed. As data was collected, the project built on existing information ultimately confirming the significance of known sites and filling information gaps. The result is a solid resource of information, which includes accurate natural heritage mapping, a list of local rarity, and site-specific species information that will be of tremendous benefit to all watershed residents. The data collected through the project has helped to foster the development of greater environmental awareness within the community, prioritize restoration opportunities and, will serve as baseline for planning decisions and policy development. Taken from "NAI-Vol-1.pdf".

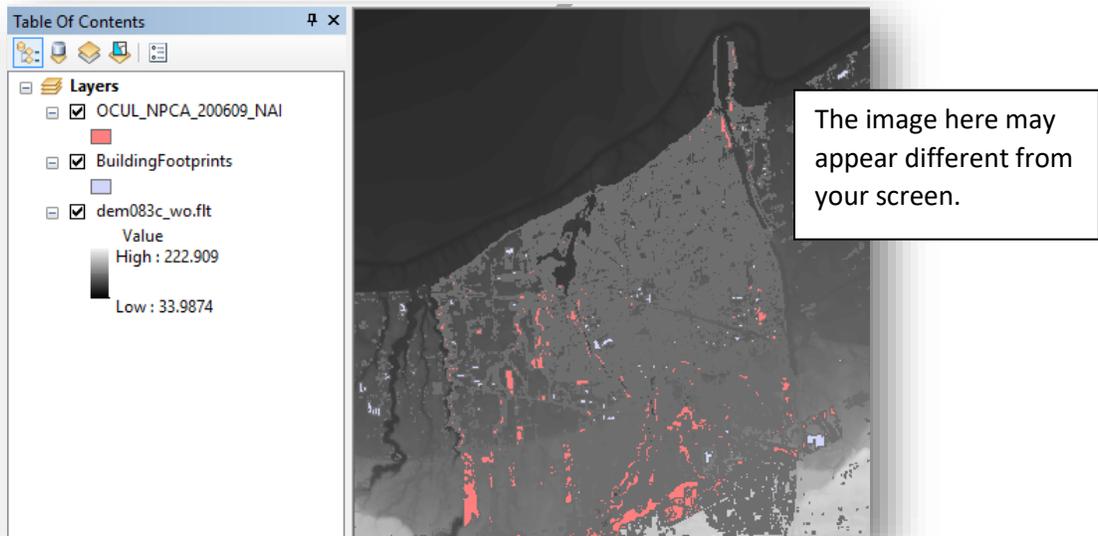
Close the Item Description window by clicking the X in the upper right corner of the catalog window.

Unfortunately, many data sources don't include metadata. In such cases, it is important to note the source when the data is accessed for citation purposes.

**PART FOUR: Viewing Data in ArcMap**

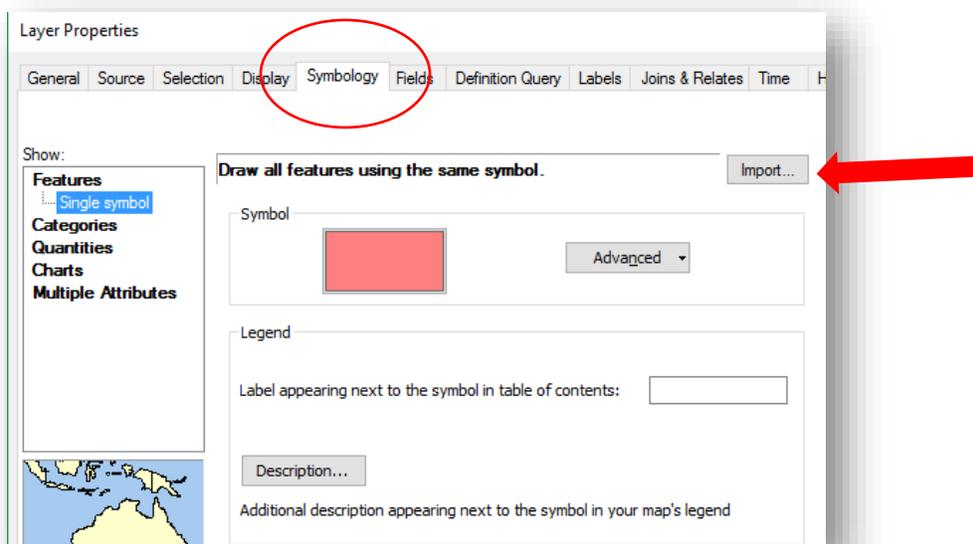
There are a few ways to add data to a map in ArcGIS. With the Catalog window open, simply drag and drop the GIS files to the map window.

1. Click **OCUL\_NPCA\_200609\_NAI.shp** and drag the shapefile to the map window.
2. Add the building footprint shapefile the same way. When prompted with the Geographic Coordinates System warning, click Close.
3. Click **dem083c\_wo.flt** and drag it to the map view. When prompted to build pyramids, click yes. Pyramids help the software draw the data faster.

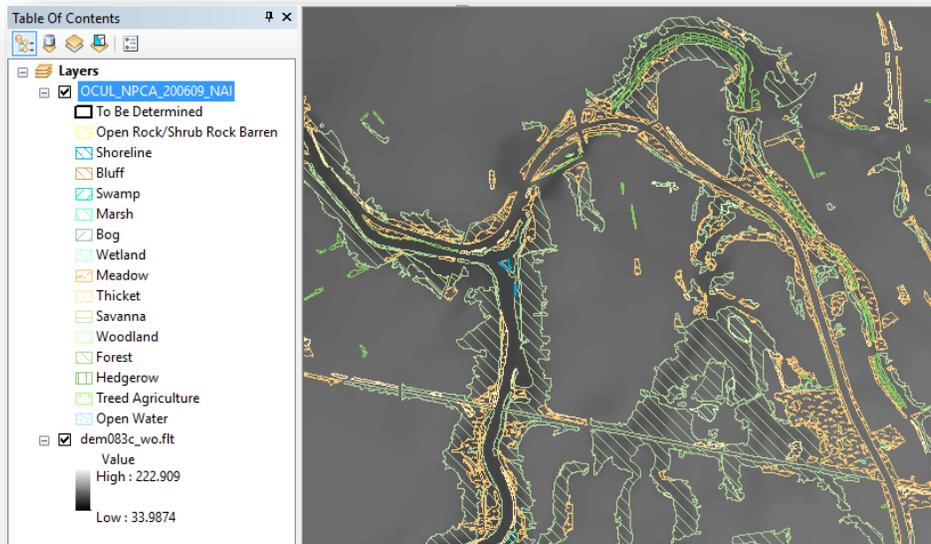


The natural heritage areas inventory data includes a layer file (.lyr). We will use this file to symbolize the data.

4. Double-click the layer **OCUL\_NPCA\_200609\_NAI** and click the **Symbology** tab in the Layer Properties dialogue box.
5. Click Import...



6. Click the browse button  and navigate to the location of the .lyr file. It will be saved in the same folder as the shapefile. Select it and click Add.
7. Click OK twice to the Import Symbology dialogue and OK again to apply the layer file to the natural heritage areas inventory layer.
8. Zoom and pan to explore the new symbology and notice the Table of Contents is also updated.



### **PART FIVE: Adding a Basemap**

ArcGIS offers ready-made basemaps that provide context to your mapping project. We will add a basemap with the Natural Heritage Areas Inventory data.

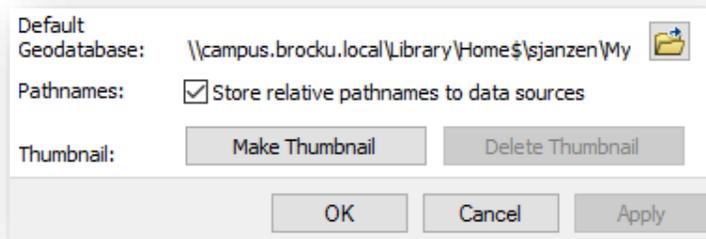
1. Turn off the DEM and building footprints layers.
2. Click the little black down arrow beside the Add Data button .
3. Select Add Basemap.
4. Select the Light Gray Canvas option and wait patiently for the map to load. If prompted to run Hardware Acceleration, click No.



**PART SIX: Saving, Printing, Exporting**

When saving a map document, it is a good practice to save in the same location as the data files are located. It is also a good practice to set the pathnames to relative path. This technique tells the software to look for the data files *relative* to the map document.

1. In ArcMap, go to File > Document Properties.
2. At the bottom of the dialogue box, check the box beside Store relative pathnames to data sources.



3. Click OK.
4. Go to **File > Save as** and navigate to a storage location on your local USB or student storage space. Provide a useful name (do not include spaces or special characters) and click Save.
5. To share the map, click **File > Export Map**.
6. From the export map dialogue box, navigate to your storage space, provide a useful name and select the save as type: **JPEG or PDF**.

NOTE: When choosing PDF, ensure that the **Output Image Quality** is set to **Best**.

This tutorial has introduced you to a variety of data sources, methods for unzipping and visualizing these resources and how to add a basemap to provide context to your mapping project. If you have any questions or require further instruction, please contact [maplib@brocku.ca](mailto:maplib@brocku.ca) in the Brock University Map, Data & GIS Library.