Georeferencing Soil Maps in ArcMap 9.x: *Basic procedures to download, open, manipulate and print spatial data*

These procedures outline:
    A. Obtaining soil maps.
    B. Downloading boundary files.
    C. Uncompressing the downloaded file.
    D. Opening the boundary file and soil map in ArcMap 9.x.
    E. Georeferencing the soil map.
    F. Saving.
    G. Preparing the layout for printing and exporting the map into various file formats.

In order to use these instructions, you must have ArcMap 9.x. In this example, we are going to use a soil map of Peel County obtained from The National Land and Water Information Service via the library catalogue. In addition, a Toronto CMA boundary file will be downloaded from the Ryerson University Library website.


A.   Obtaining the Soil Map

The soil map used in this procedure will be obtained from The National Land and Water Information Service. The Ryerson University Library has various soil survey maps in the Geospatial Map and Data Centre map cabinets as well as on reserve. The soil maps that are catalogued are searchable through the use of the Ryerson Library website. Some of the records within the catalogue have a direct link to The National Land and Water Information Service where users can view online versions of soil reports or download digital versions of soil maps. This procedure will outline the latter.

1. Browse to the Ryerson University Library website (www.ryerson.ca/library) and *click* **Catalogue**. This will take you to the catalogue search page.

2. In the search box type in **soil survey of Peel County**. **Note:** Soil maps in Ontario are published by county, if you would like to select another area type in **soil survey of (desired region) County**. *Click* **Soil survey of Peel County / by D.W. Hoffman and N.R. Richards**.

3. In the Connect to Internet Resources table *click* **View map online**. Scroll down below the map and *click* **Download**.

4. **Save** the file in an appropriate location on your hard drive that is easily accessible.
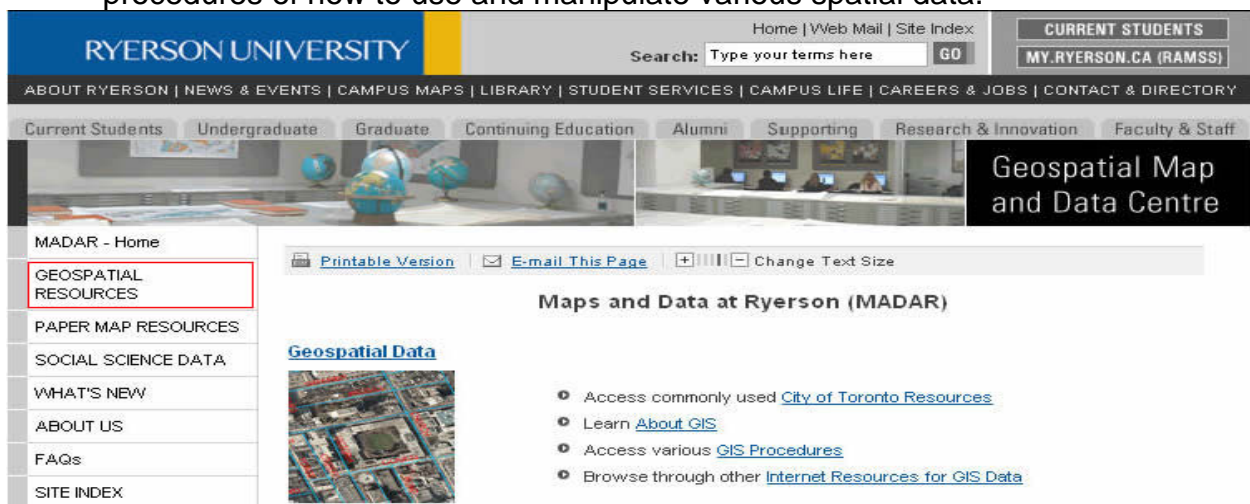

B.   Downloading Boundary Files

The boundary file that will be used in this example is found on Ryerson University's Geospatial Map and Data Centre website. This particular Toronto CMA boundary file is part of a series of boundary files created from Statistics Canada census of 2001 cartographic files.

1. Browse to the Ryerson University Library website (www.ryerson.ca/library) and *click* **Map & Data Resources**. This will take you to the Geospatial, Map & Data Centre page.
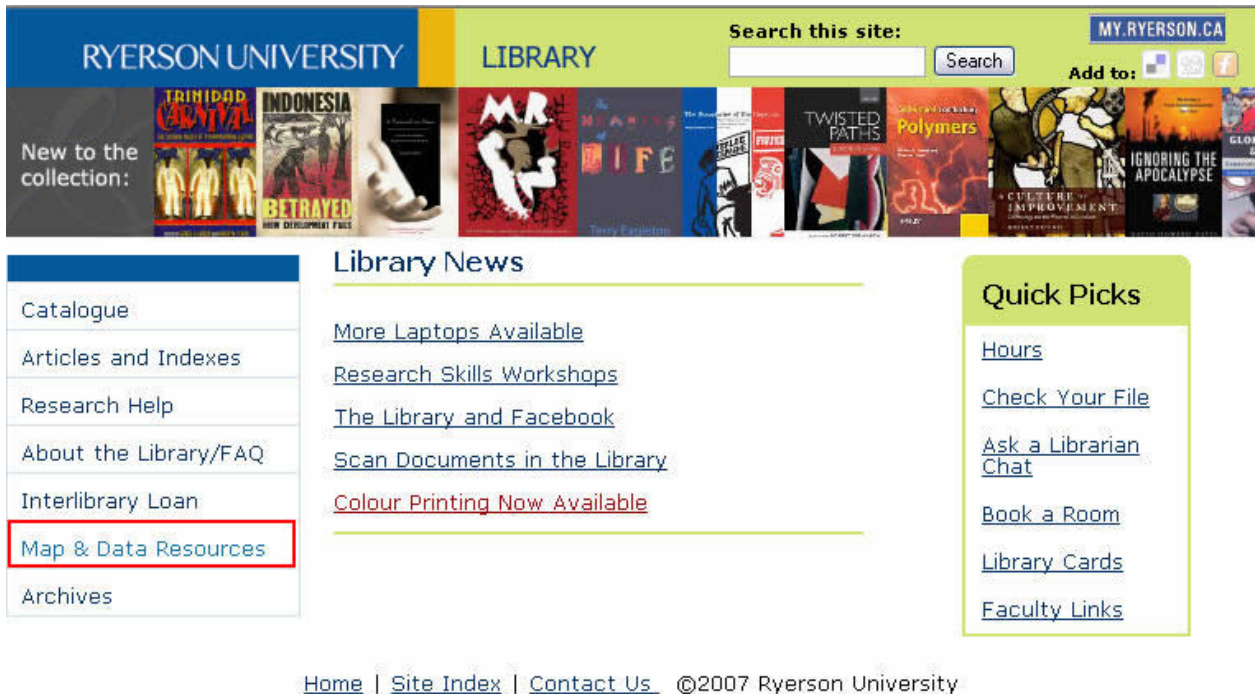
2. *Click* on **Geospatial Data**. This will take you to the Geospatial Data page where you can read about and link to tutorials such as this one that give step by step procedures of how to use and manipulate various spatial data.

3a. In the search textbox, type in **Boundary**. *Click* **Search**.

b. Scroll to and *click* the record titled **Toronto CMA and GTA Boundary Files.**

4. This is the record information page that gives detailed information about the data that you are about to download. *Click* **Link to Index Map**. *Click* **CMA COUNTY.**

5. You will then be asked for your Matrix user name and password (the same as your Ryerson e-mail and password), fill this information out then *click* **Login**.
   a. Read the DMTI Data Release Agreement then *click* **I Agree**.

   b. In the view data page *click* **CMA_county.zip**.

6. Once the file is *clicked*, you will be prompted to Open or Save each file. **Save** the file to an appropriate location on your hard drive.

C.   Uncompressing the Downloaded Files

As you may have noticed while downloading the boundary file and the soil image, the extension for the file was .**zip**. This is a Zip file or compressed file. Files are stored in this format on the server to save space. The following section outlines the procedure for uncompressing these files. The extraction process varies depending on whether or not WinZip is loaded on your computer. Select one of the following options:
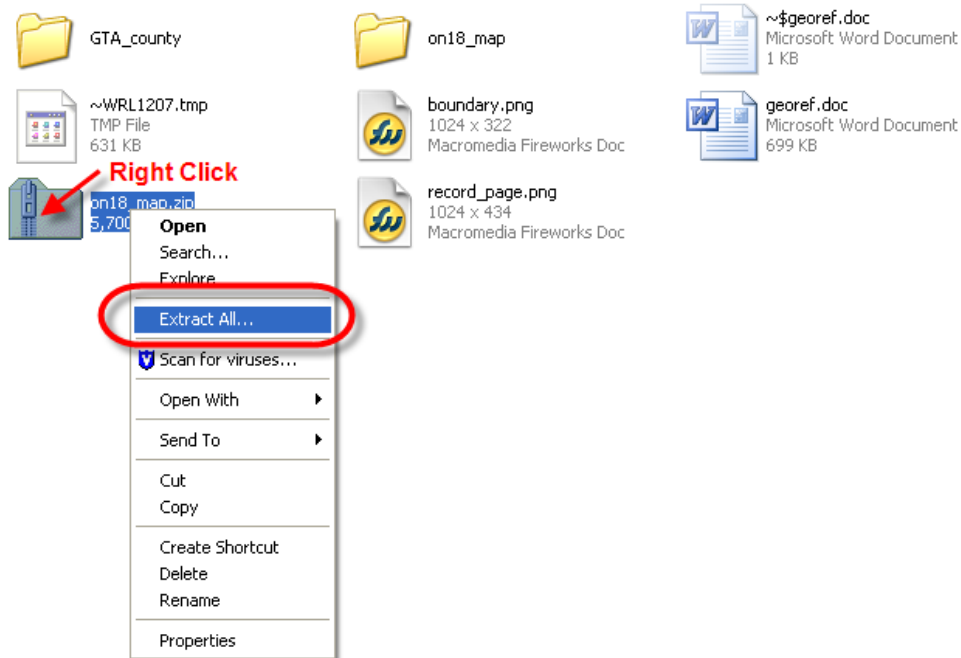
With WinZip

1. Browse to the location of the downloaded file.
2. *Right click* the desired file.
3. Scroll down to **WinZip** then *click* **Extract to folder…**

<u>Without WinZip</u>
1. Browse to the location of the downloaded file.
2. *Right click* the desired file.
3. In the drop down menu, *click* **Extract All** and then follow the instructions in the **Extraction Wizard** for each file downloaded.


D.   Opening the Boundary file and Soil Map in ArcMap 9.x

ArcMap 9.x is software that allows the user to view, manipulate or create spatial data. ArcMap is part of the ArcGIS software package created by ESRI. This section will demonstrate how to open files in ArcMap 9.x.

1. The first step is to open ArcMap. *Double-Click* on the **ArcMap 9.x** icon or *Select* **Start > Programs > ArcGIS > ArcMap**. ArcMap should automatically prompt the option to **Add Data**. Otherwise, *Click* the **Add Data** button .

2. In the **Add data** window, browse to the shape file that you wish to add (in this example it is CMA_county.shp).
**Note**: If there were more than one file in this folder, you can hold down the **CTRL** or **Shift** key to select multiple files and open them at the same time.
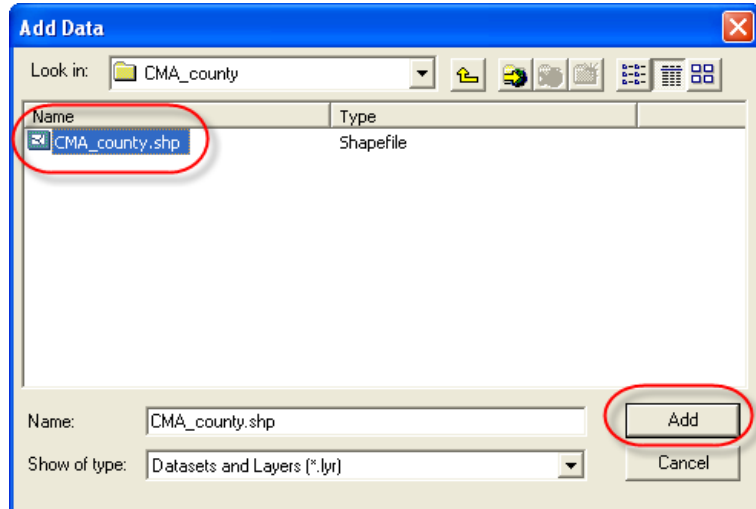
3. *Click* **Add**.

Your data view (main viewing window) should show a file similar to the one below. **Note:** Your colours may be slightly different as ArcMap 9.x chooses the colours at random when the files are initially opened. Zoom in to Peel County.
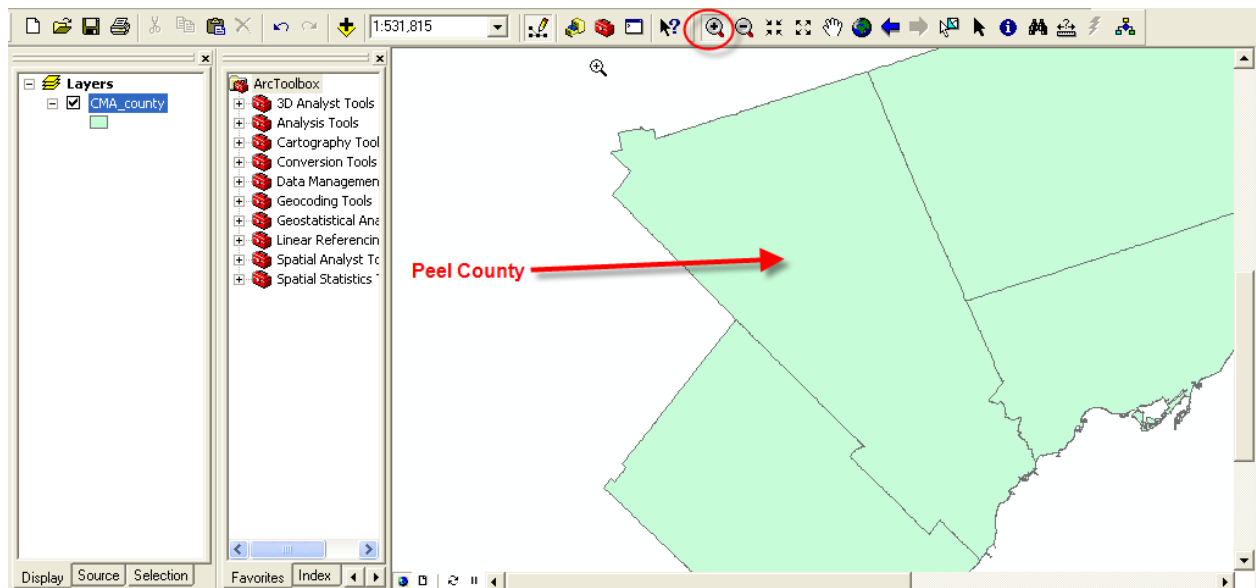

4. Repeat steps 2 and 3 to open the soil image (on18_map.jpg). **Note:** Initially, the soil image will not appear in the data view. When adding the soil image, if asked to build pyramids, select **Yes**.

E.   Georeferencing the Soil Map

1. From the main menu *select* **View > Toolbars > Georeferencing** (repeat this step to select the **Effects** toolbar as well)**.**
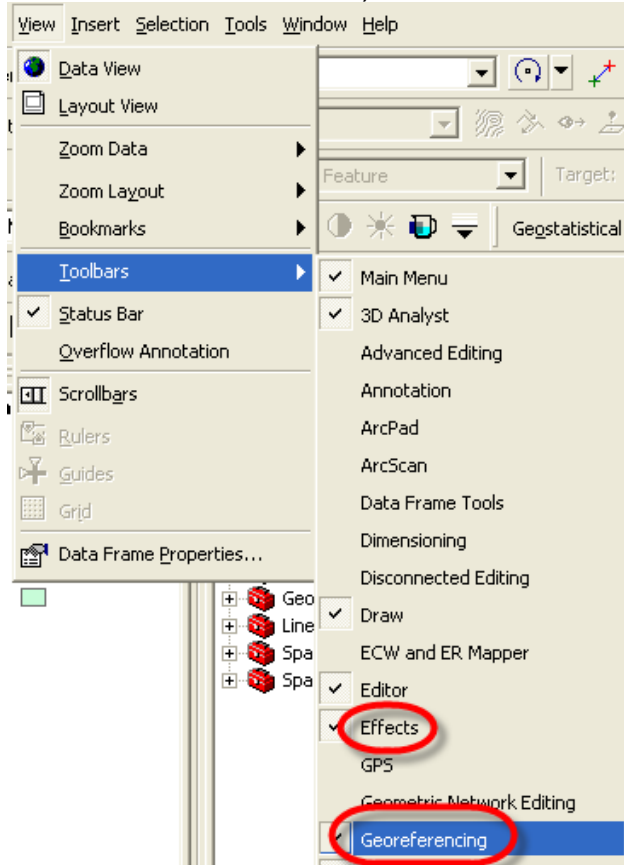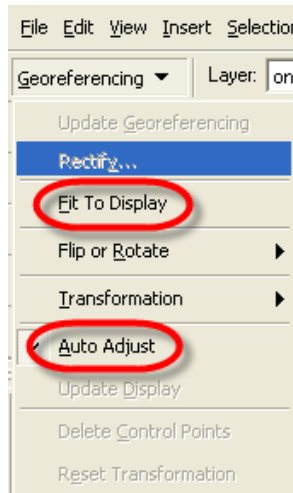

2. Using the **Georeferencing** task bar, select the image to be georeferenced in the **Layer** drop-down window.
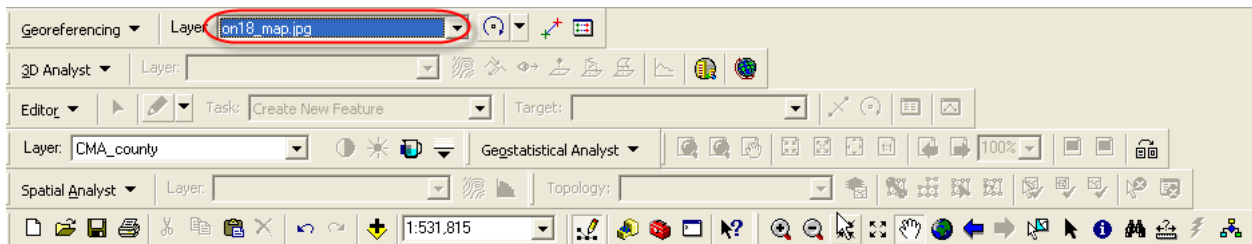

3. Drag the soil image in the Layers window so that it appears above CMA_County.

4. In the **Georeferencing** drop down menu, *click* **Auto Adjust** and **Fit to Display.** The soil image should now appear in the data view.

5. In the **Effects** toolbar select the soil image (on18_map.jpg) in the drop down menu. Using the **Adjust Transparency** button located in the **Effects** toolbar, select a transparency percent that will allow you to adequately view the boundary file underneath your soil image (40% works well).
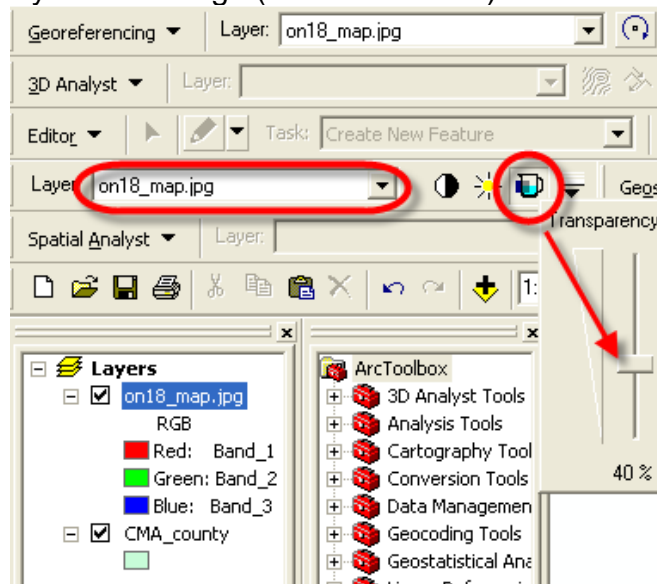
6. *Click* the **Add Control Points** button. *Click* a point on the soil map image (a green cross will appear) then *click* a known point on the Toronto CMA boundary file (a red cross will appear). Repeat this step four times using the corners of Peel Region as reference points. **Note:** ArcGIS needs at least 3 control points. Eventually, your image will warp into place.
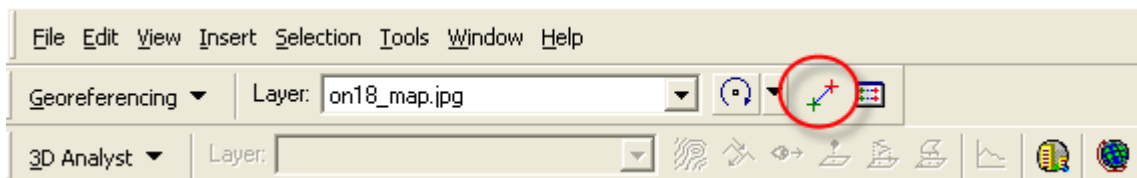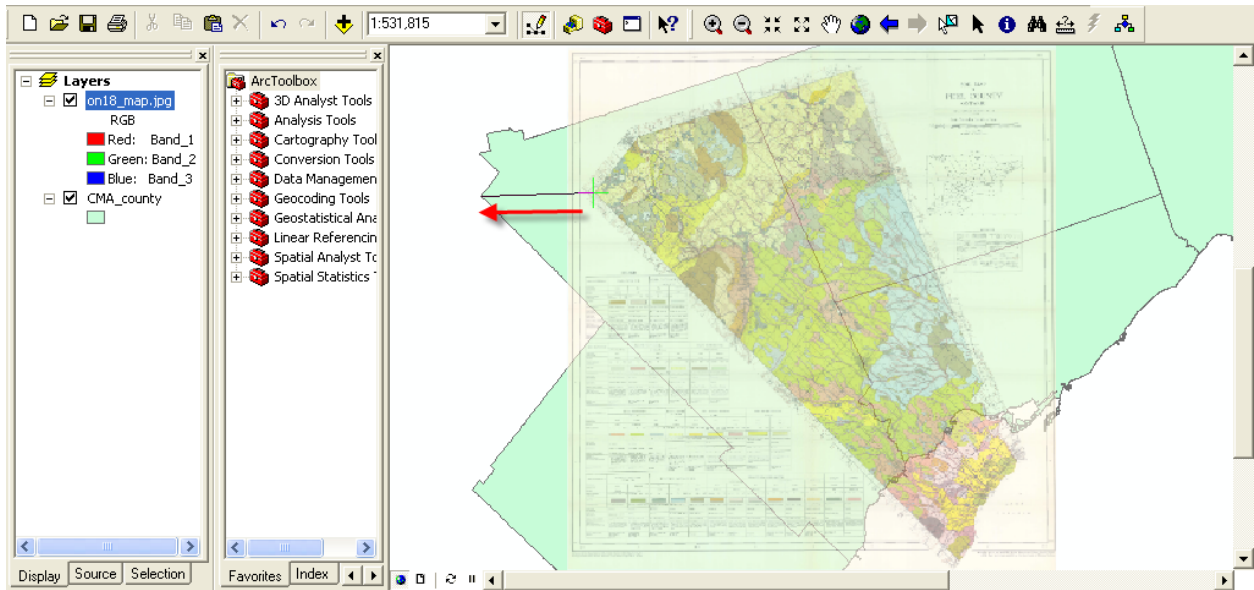
You may want to zoom in order to align the corners more accurately.
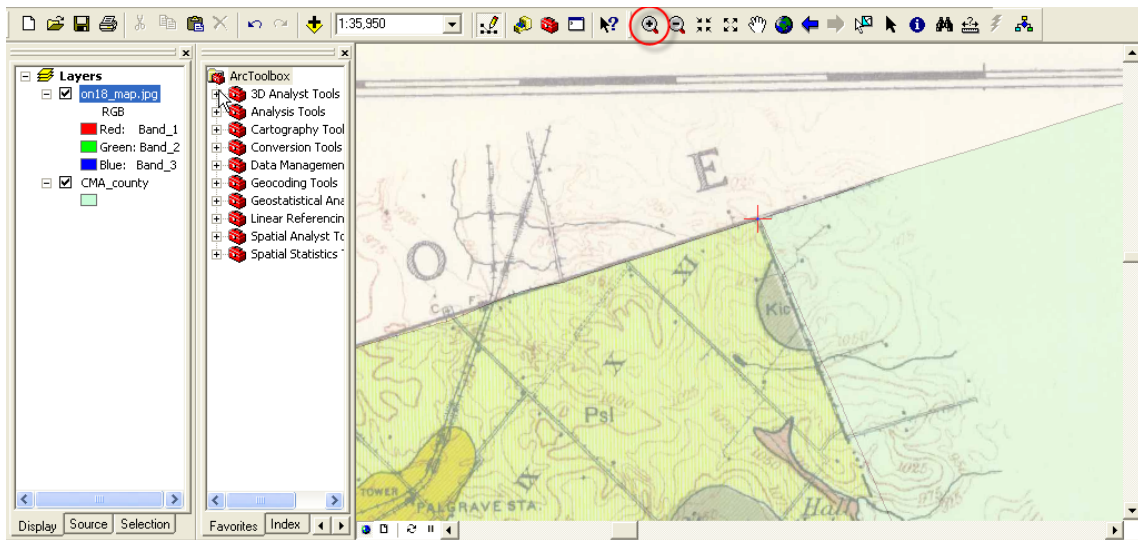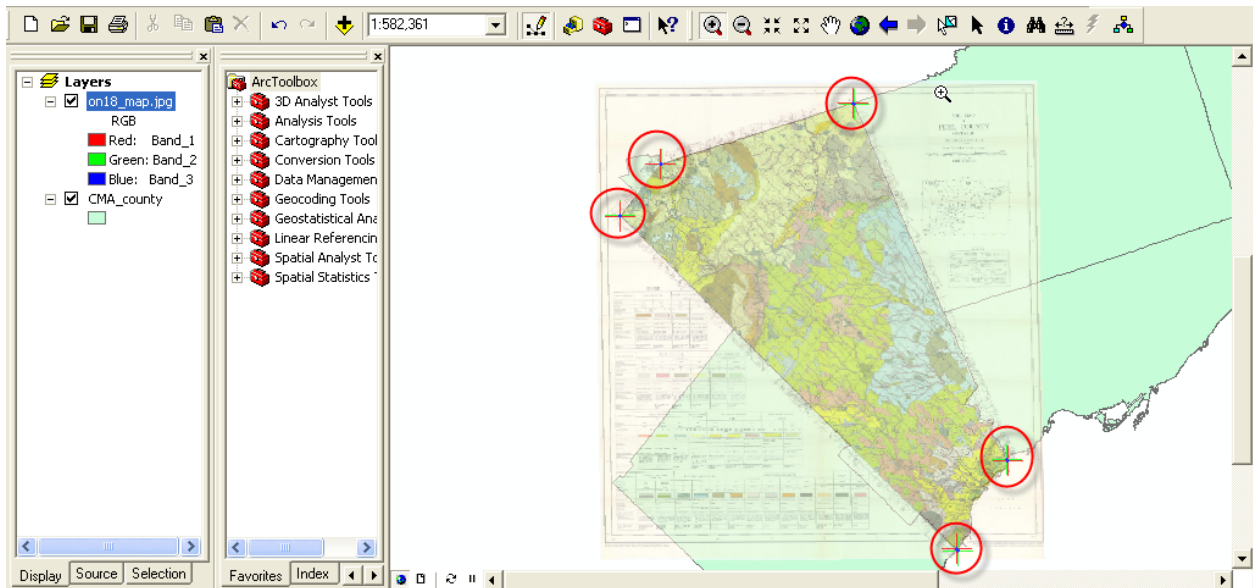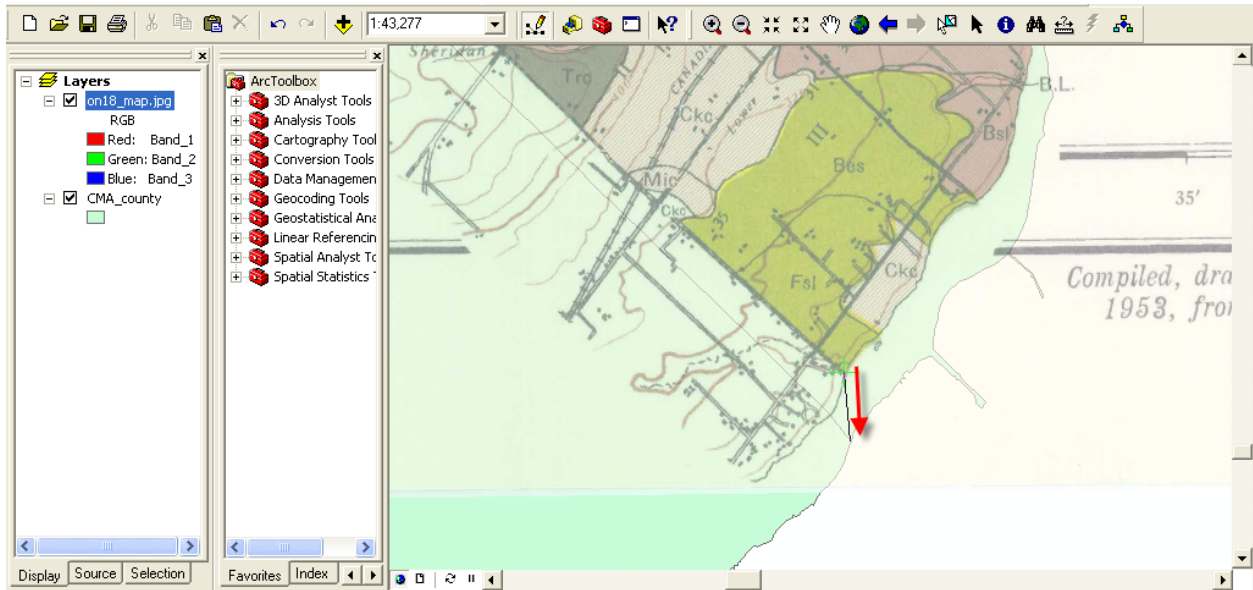
Note: In order to edit, delete or save your control points, *click* the **View Link Table** button on the georeferencing task bar.

F.   Saving

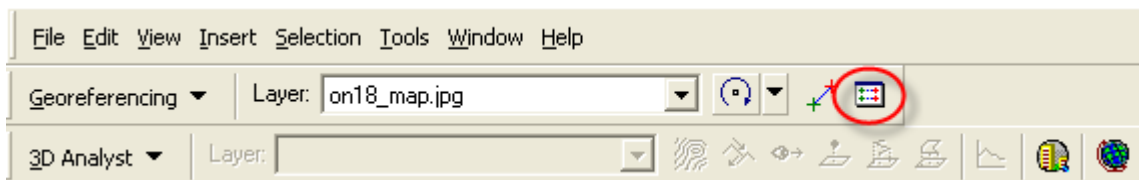1. In the **Georeferencing** drop down menu, click **Update Georeferencing** to save the transformation information with the raster dataset. This creates a new file with the same name as the raster dataset, but with an .aux file extension. It also creates a world file for .tif and .img files.

G.   Preparing the Layout for Printing and Exporting the Map into Various File Formats

Compared to other GIS software, creating a layout in ArcMap is a simple task. The following section describes how to create a basic layout including the fundamental map elements**.**

1. To change the View from **Data View** to **Layout View**. *Click* **View** from the main menu and *Select* **Layout View** from the drop down menu.
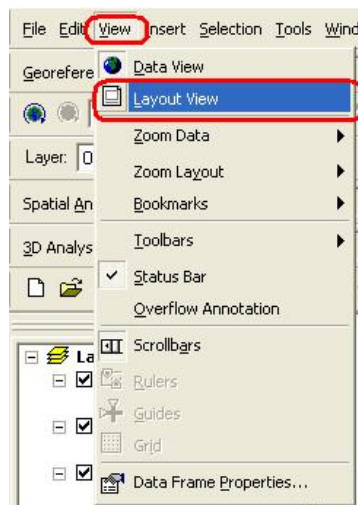
2. **Note:** If your layout view is already in **portrait** view then skip to **step 3**. The Peel County image is elongated vertically, thus it would be more appropriate to

display the map on a portrait image. From the main menu, *click* **File** then *click* **Page and Print Setup**.
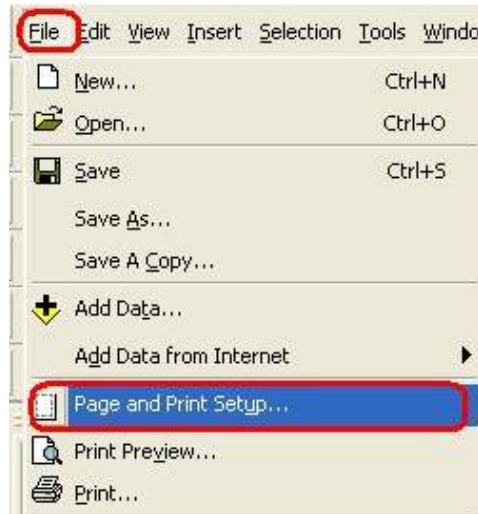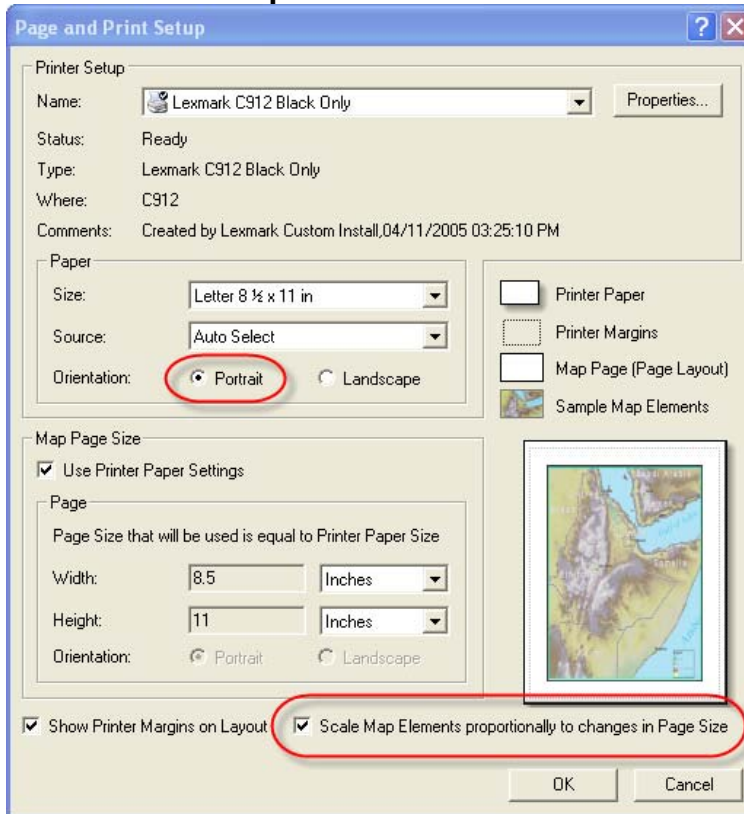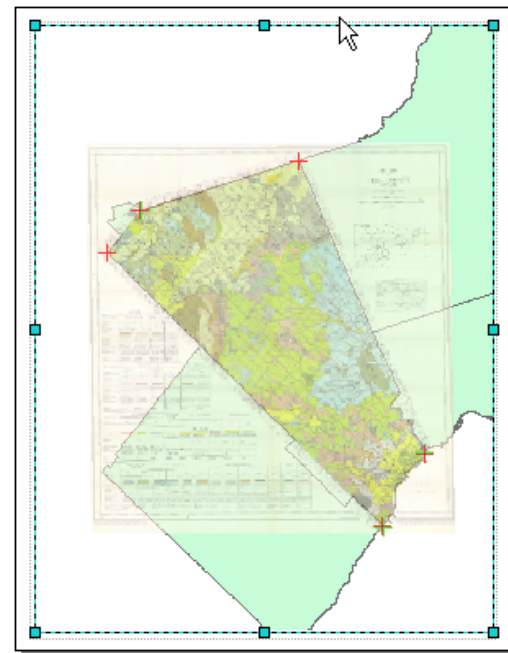

a. In the **Page and Print Setup** window *click on* the **Portrait** radio button and *check on* the **Scale Map Elements** … button. Then *click* **OK**.


You should notice that your layout view has changed to portrait.

3. <u>Neatline</u> – A neatline is automatically added to the layout view, however, in the previous step we changed

the layout to portrait and now the neatline must be adjusted to fit the print layout. In order to do this, grab one of the corners of the neatline and drag it to the corresponding corner of the page layout (**Do not** pull the corner farther than the dotted lines because anything outside of that region will not be printed). Example below.
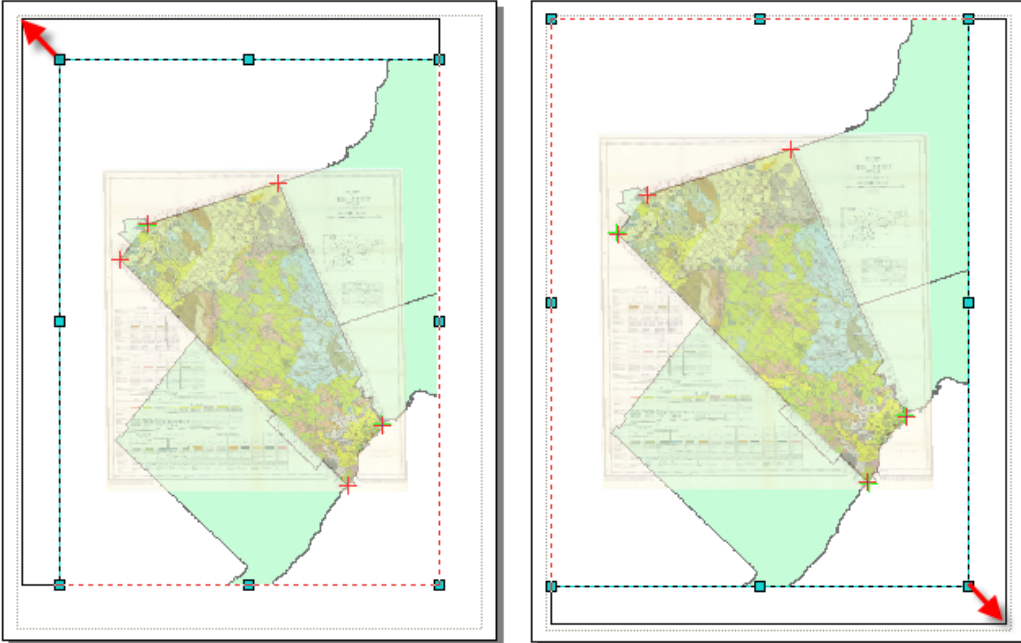

Note: if you would like to add a neatline to other objects in the layout, *click* the object, *click* **Insert** from the main menu, then *click* **Neatline**. The **Neatline** window will appear allowing you to change the properties of the neatline. *Click* **OK**, when you are satisfied with the neatline.

4. *Click* **Insert** from the main menu. In the ensuing drop down menu, you can add a Title, Legend, North Arrow, and Scale Bar. Once inserted into the layout view, each item can be manipulated by *Double-Clicking* on it. Examples are listed below:
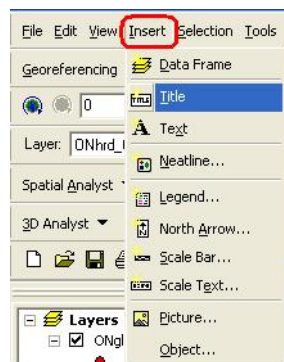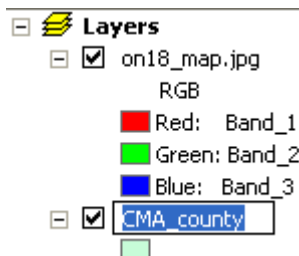

5. <u>Title</u> – *Click* **Insert** from the main menu. Select **Title**. In the **Text** textbox type in the title *Major Roads, Highways and Golf Courses in the City of Toronto (2005)* then push **Enter** on your keyboard. *Double-Click* the Title to open the **Properties** window.
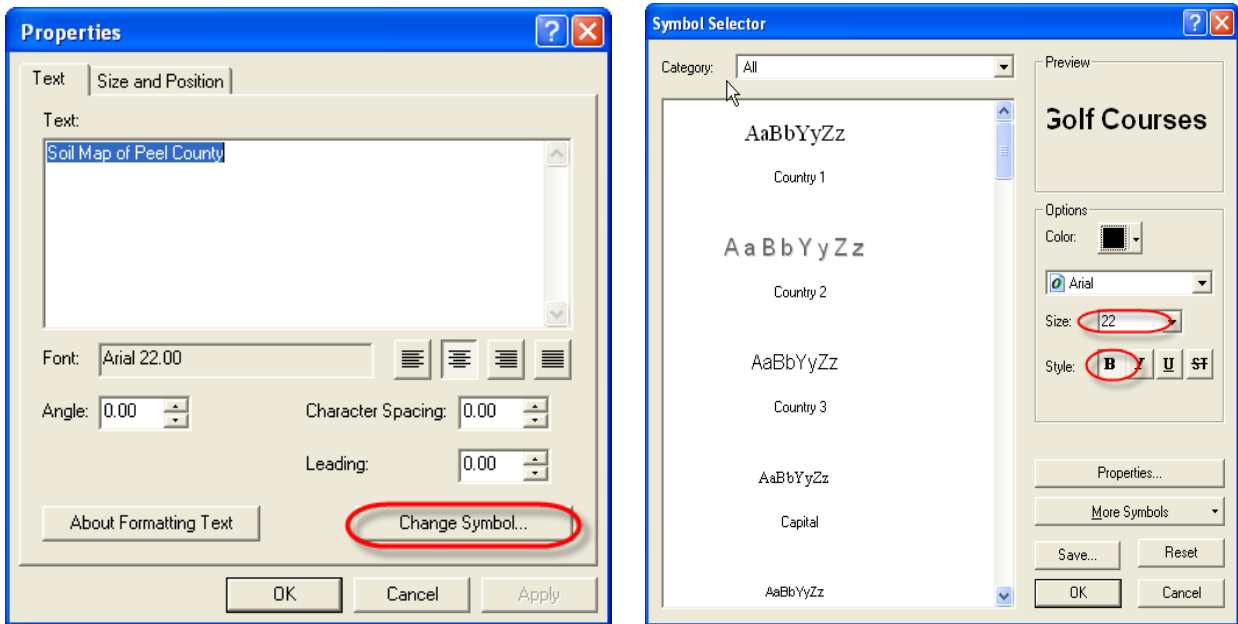
Click **Change Symbol**. In the **Symbol Selector** window, you can change the properties of the text. *Click* the bolded **B** in order to make the text bold. Change the font size to **22**. *Click* **OK**, then *click* **OK** again.

6. <u>Legend</u> - *Click* **Insert** from the main menu. Select **Legend.** The **Legend Wizard** window will appear. Remove on18_map.jpg from the legend items by highlighting it and selecting the left arrow. *Click* **Next.** Change the legend title if you wish, otherwise *click* **Next**. *Click* **Next** two more times, then *click* **Finish**. *Click* and *drag* the legend from the centre of the layout and move it to the bottom right corner.

To customize the legend labels, *left click* the appropriate layer in the **Layer** window then wait two seconds and click it again, you should now be able to change the name.


7. <u>North Arrow</u> - *Click* **Insert** from the main menu. Select **North Arrow.** In the **North Arrow Selector** window, chose an appropriate north arrow then *click* **OK**. *Click* and *drag* the north arrow from the centre of the layout and move it to the bottom left corner.

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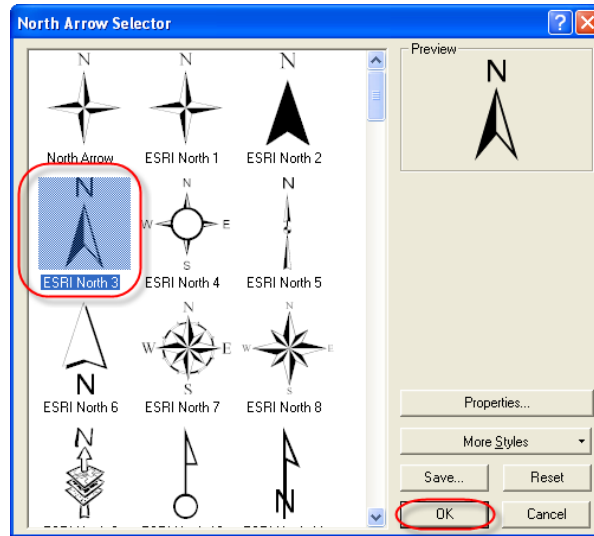
8. Scale Bar - *Click* **Insert** from the main menu. Select **Scale Bar.** *Click* **Properties** to open the **Scale Bar** window**.** In the **Division Units** textbox, select **kilometers**. *Click* **OK**. *Click* **OK.** *Click* and *drag* the scale bar from the centre of the layout and move it to an appropriate position below the map.
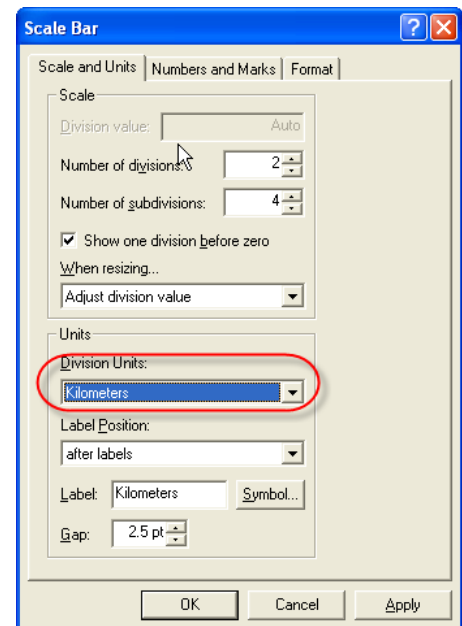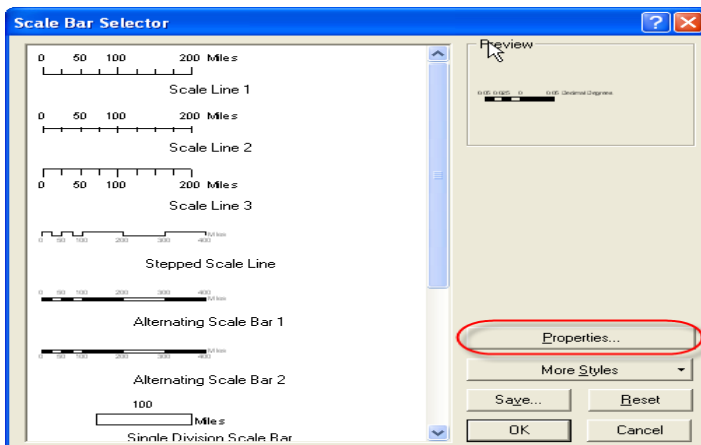
If done correctly, your map should look like the image below.

Soil Map of Peel County

Legend

Toronto CMA

N

10 5 0 10 Kilometers
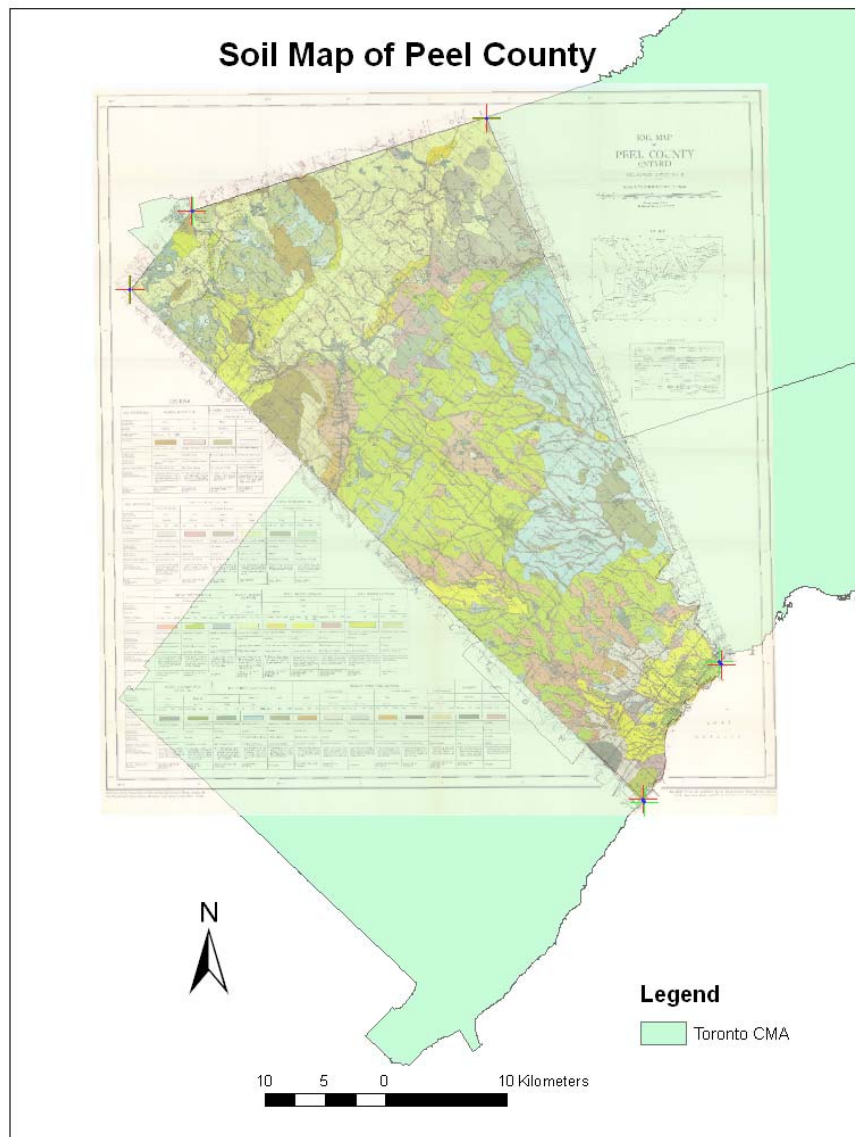
9. To print the map, *Click* **File** from the main menu and *Select* **Print** from the drop down menu. After selecting the appropriate printer and print specifications, *Click* **OK**.

Exporting to PDF or Other Formats

Alternatively, you may opt to export your map and save it for later use rather than printing your map. ArcMap offers a variety of file types that you can save your map as. The following procedure will show you how to export your map, using one of the various file types.

1. Once you have completed S*teps 1* through 8 above or you are satisfied with your map, you may begin the export procedure. *Click* **File** from the main menu and *Select* **Export Map**.
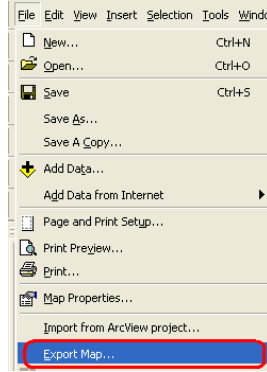
2. The **Export Map** window will open. In the **Save In** window, *browse* to the location that you wish to save your map. In the **File Name** text box, chose an appropriate name for your map. In the **Save as Type** textbox *select* the format that you would like to save your map in.
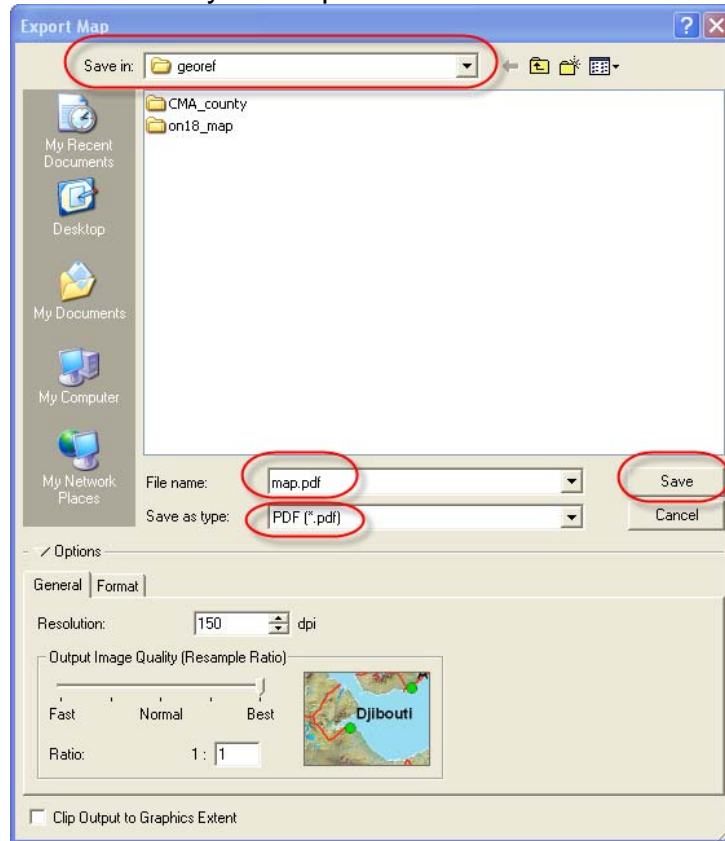
3. *Click* **Save**.

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