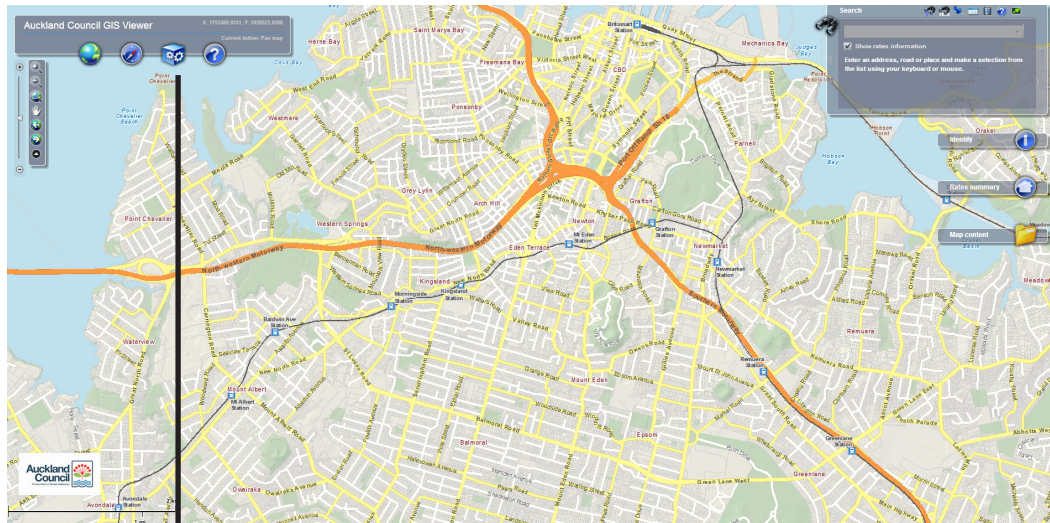


# \_Tutorials

## Arcmap

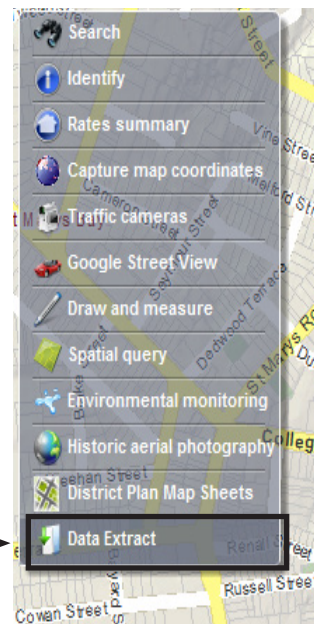
Linking additional files outside from Geodata

2016



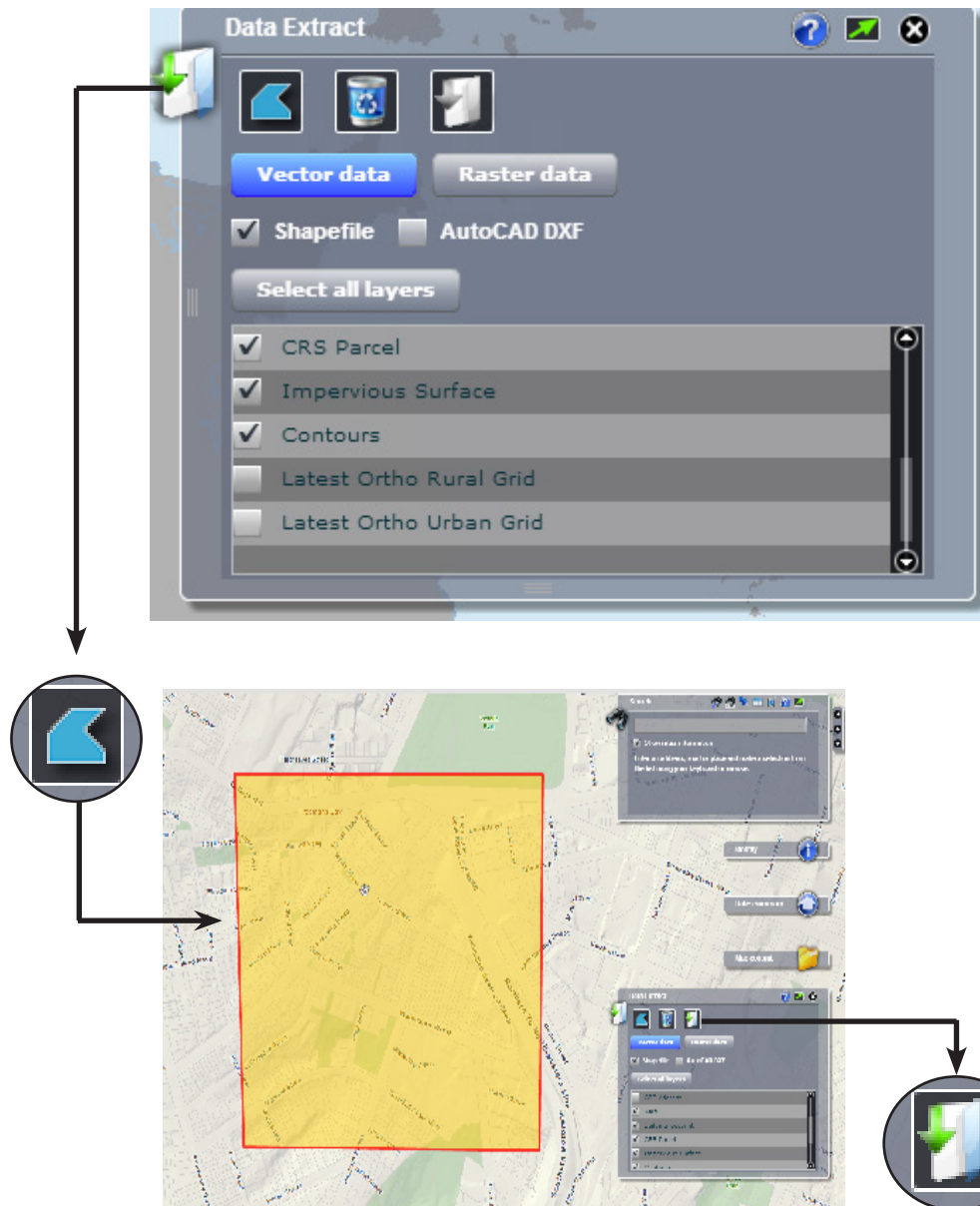
First you want to get onto the Auckland Council GIS website <http://maps.aucklandcouncil.govt.nz/aucklandcouncilviewer/>

A disclaimer will appear and you will need to click **Agree** in order to access the map. Next, you will want to find your study area.



Then go to the **Tools** icon.

A list of options should appear and you will want to select the **Data Extra** tool.



Once you have clicked on **Data Extract**, another licence disclaimer will appear, and again you will need to click **Agree**.

**Before you extract data you must:**

- (1) Check that you have the **Shapefile** option ticked
- (2) Select the data layers you would like to extract. We recommend that for any general mapping activities you select:

- Kerb
- Building footprint
- CRS Parcel
- Impervious Surface
- Contours

Each of these files will be downloaded as a separate Shapefile.

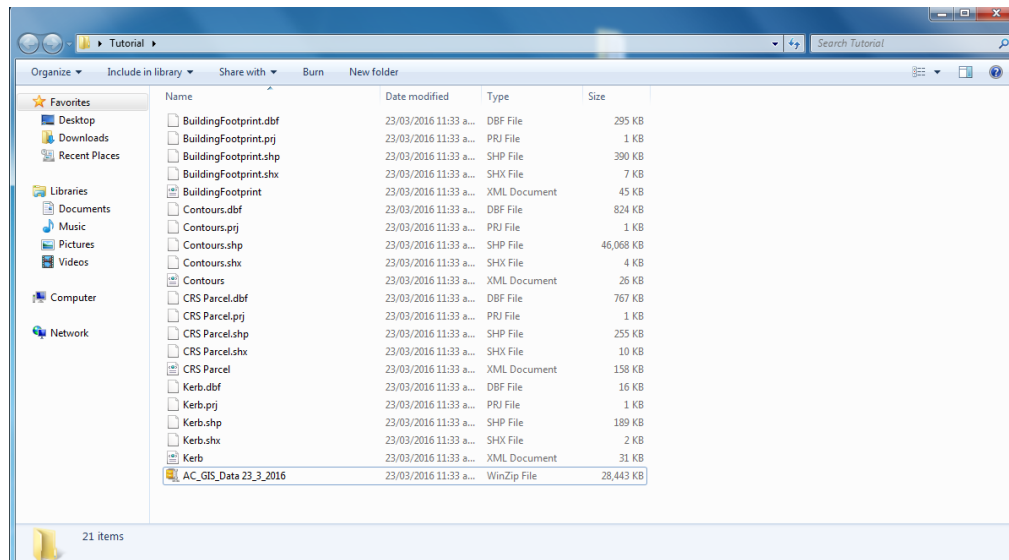
Next, you will need to select the **Polygon** icon. This will allow you to draw a polygon around the area you would like to download data for.

Once you have finished drawing your polygon over your selected area, you will need to double click to close it and stop it from continuing to draw a shape.

#### IMPORTANT NOTE:

Always choose an area larger than what you want to show in order to provide context around the study area.

Next, you will need to select the download icon. This will begin the data extract download.  
When prompted select **Yes**



The data will be downloaded as a zipped folder, you will first need to choose where you want this file to be saved. We recommend saving to your USB or your files.creative folder.

Once you've downloaded the zipped folder you will then need to extract the data from it so that it may be used.

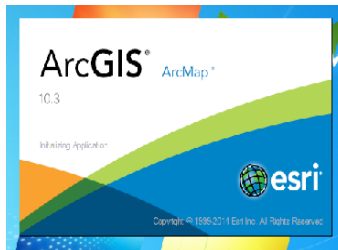
You will need to:

**Right click** on the zipped folder >> Click **Extract All... >> Browse >>** Find where you want to save all the unzipped files  
**(Note: we recommend that you make a folder, before you do this, to keep all of this data together and well-organized)**  
Then you may click >> **Extract**

You will find that there will be a lot of different file types within the folder that you will have just unzipped.

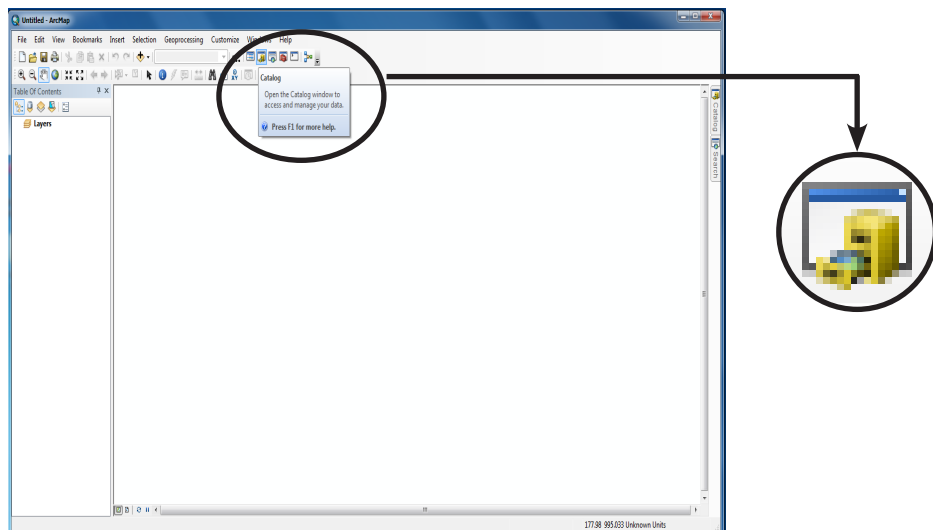
Don't be concerned with this, ArcMap will make it easy for you to find the relevant files

The extracted zip file data should look something like the screenshot to the left.

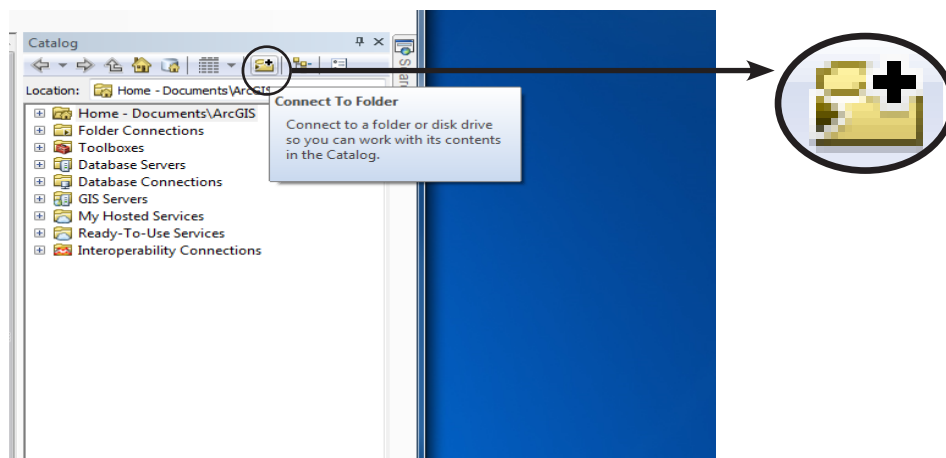


To begin mapping, you will first need to open **ArcMap**.

Select **Blank Map** as a template



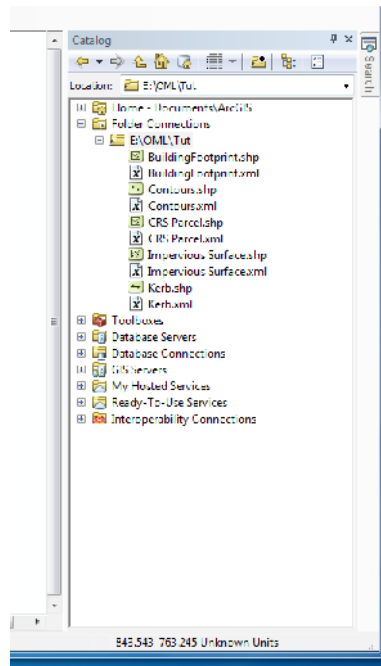
Next, you will need to connect to the files that you have just downloaded from the (now) unzipped folder. You will need to open by first, clicking on the **ArcCatalog** icon.



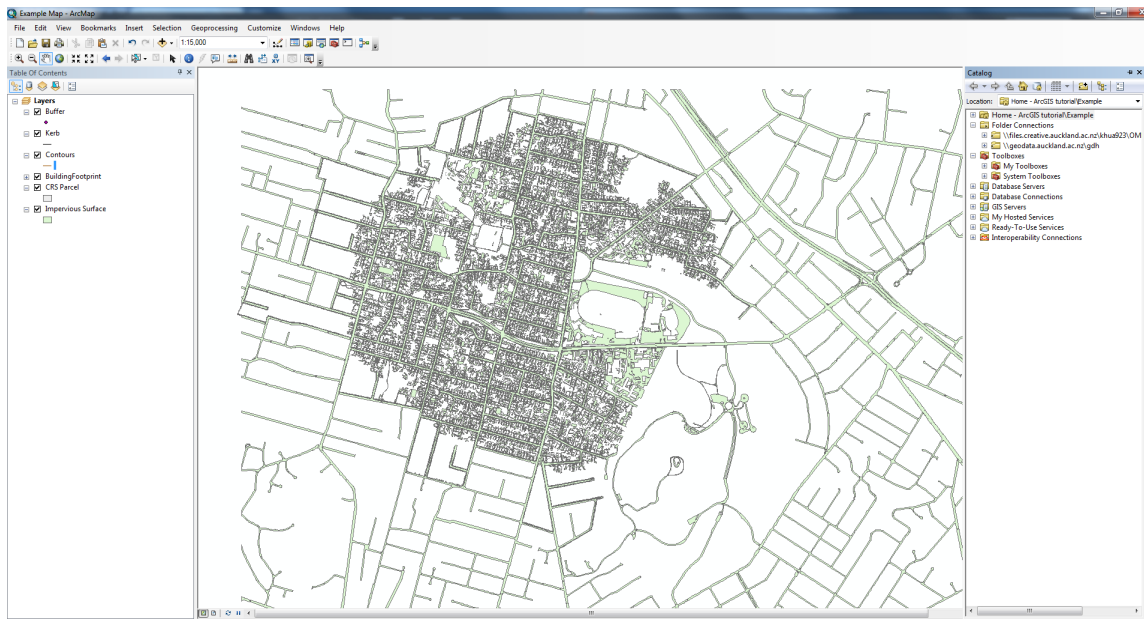
>> This window should open. You will then need to:  
Select the **Connect To Folder** icon.

Next, you will need to browse through your files until you find the folder that you've saved all of your data to. This will create a permanent link to your folder for THIS ArcMap document.

You will see why this is important in later tutorials when it comes to creating and saving your own Shapefiles.

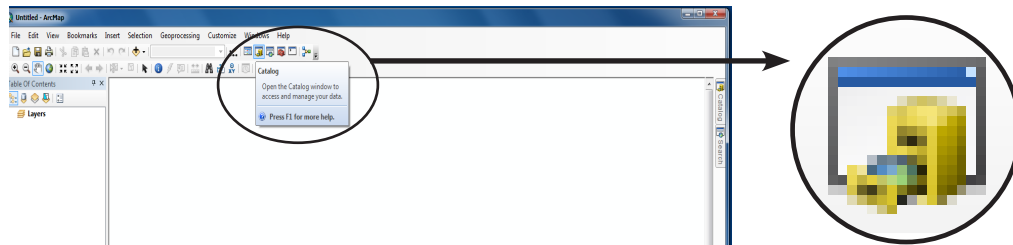


Your file should now be visible in the **Catalog** window >> Expand this window and you should now be able to see the Shapefiles (Shp.) that you downloaded.



Drag these into the main menu and they'll appear as layers and a map of your selected area within the data frame, as shown on the left.

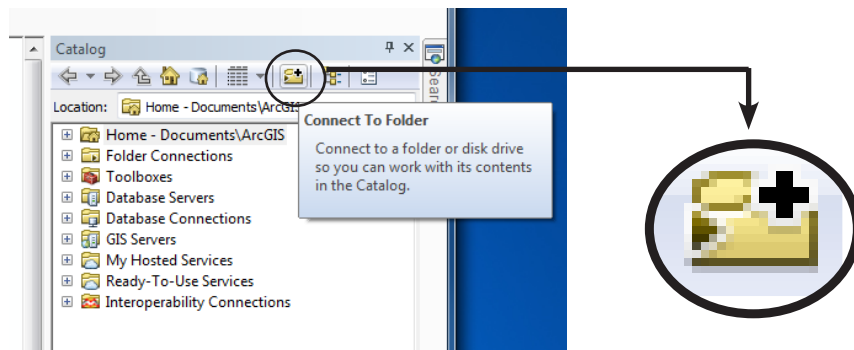




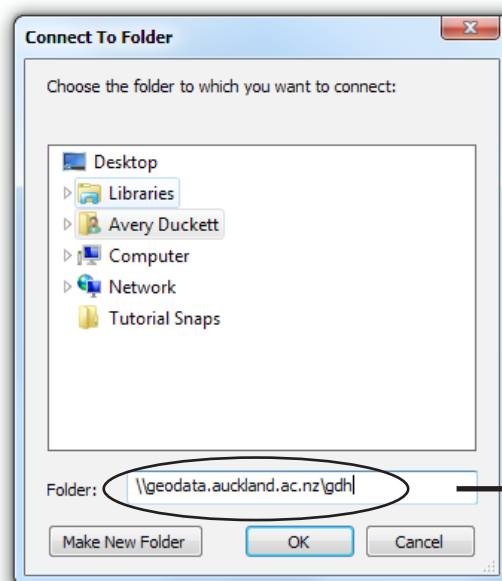
To begin mapping, you will first need to open **ArcMap**.

Select **Blank Map** as a template (as on Pg 4)

Then we need to use ArcCatalog to connect to the Geo-Database. Any data which you want to display with ArcMap has to be sourced by connecting to a folder through ArcCatalog.



When the window opens, select Connect to Folder in the same way. Except this time instead of browsing to find your folder you need to use a DIRECT LINK to map to the Geo-Database in the university's network.

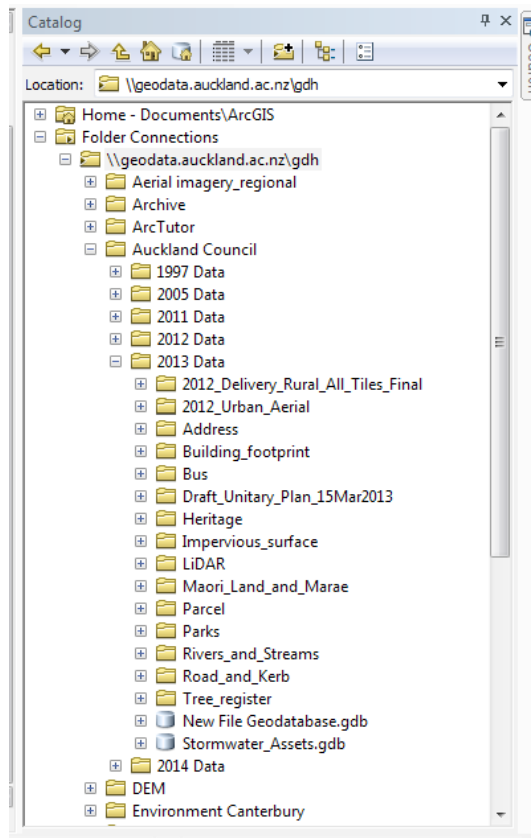


The link is:

<\\geodata.auckland.ac.nz\gdh>

Geo-Database is a UoA network that contains all of Auckland Council's mapping data. It is updated annually, however not every type of information available is surveyed annually. This means that you may have to go back in time to find the files you need.

Included is all of the Unitary Plan mapping data.



You should now be able to see all the Geo-Data available to you, in the ArcCatalog.

We recommend you that you expand the Auckland Council folder and use the 2013 Data, as it is easier to follow, and will provide all the data you will need for basic mapping.

Next you have to select the folders and drag the Shapfiles that you're going to need into the window.

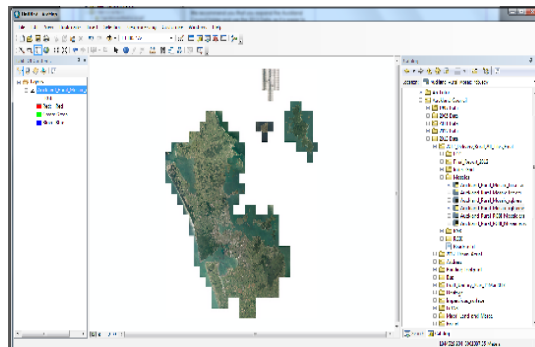
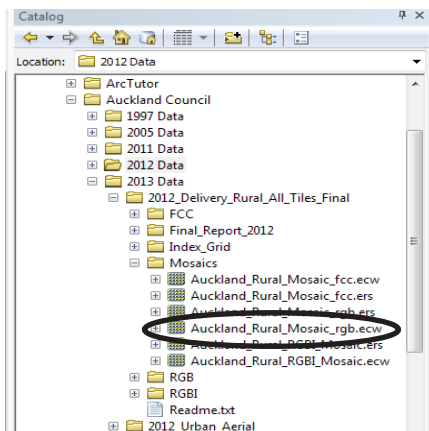
We suggest that you choose:

- Building footprint,
- Bus,
- Impervious\_surface
- Parcel
- Road and Kerb

Note: 2013 LiDAR, should provide the contour lines but it doesn't. Therefore you will need to access the 2012 Data Contours.

[However, the 2014 Data provides a broader, more detailed and more up to date range of Geo-Data, such as the current Proposed Unitary Plan zonings]

One issue that you may have whilst attempting to open these files is lag. This is happening because of the file size - ArcMap is attempting to display every piece of this information for the entire city! But there are ways around this - such as cropping the map to only cover your site (the steps to do this will be outlined later).



#### SIDE NOTE:

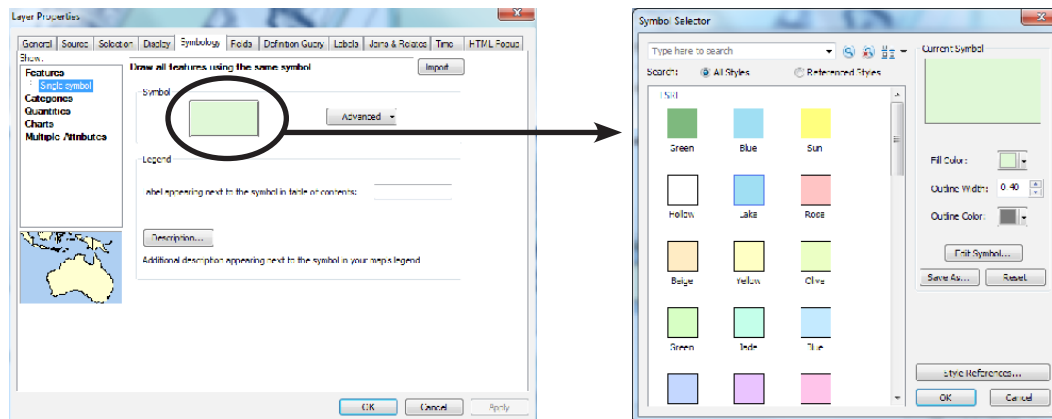
When searching for aerial photos, you will need to access the **2012\_Delivery\_Rural\_All\_Tiles\_Final >> Mosaics** and then select the fourth option.

It will provide you with the agglomeration of aerial photos for the entire Auckland Region (refer to picture below).

This provides a far better alternative to taking screen-shots of Google Earth to provide aerial photography in assignments.

In some circumstances, aerial photography can better help you to communicate information as a background to your own maps.



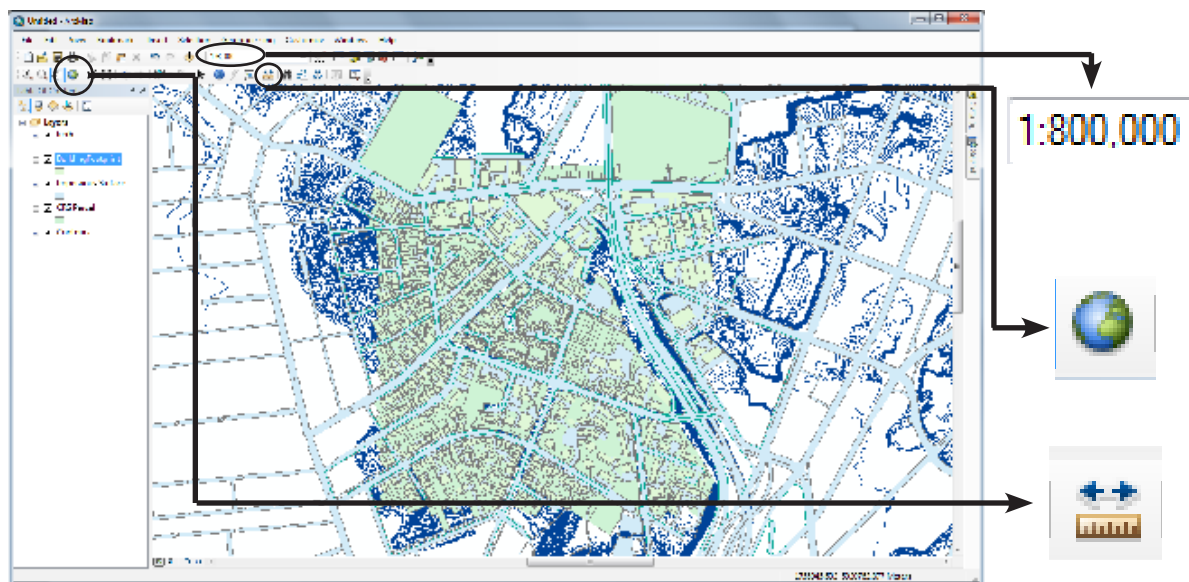


To change the layer colour:

Right click on layer >> **Properties** >> **Symbol** tab >> Under the heading '**Symbol**' left click on the coloured box.

The full options for layer colour should appear.

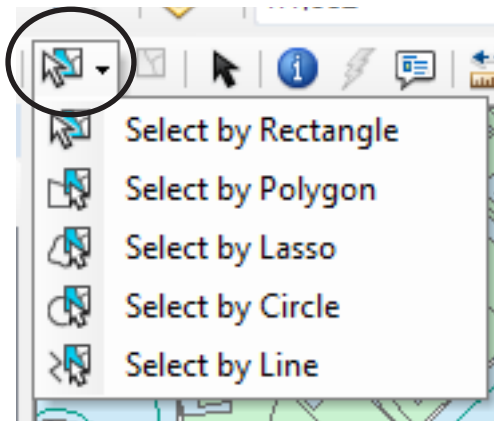
The different colours presented are only a small number of the total shades and textures that are available. Select '**Style References...**' to experiment with some of the others



The 'Measure' tool can help you to accurately measure distances and areas from your map.

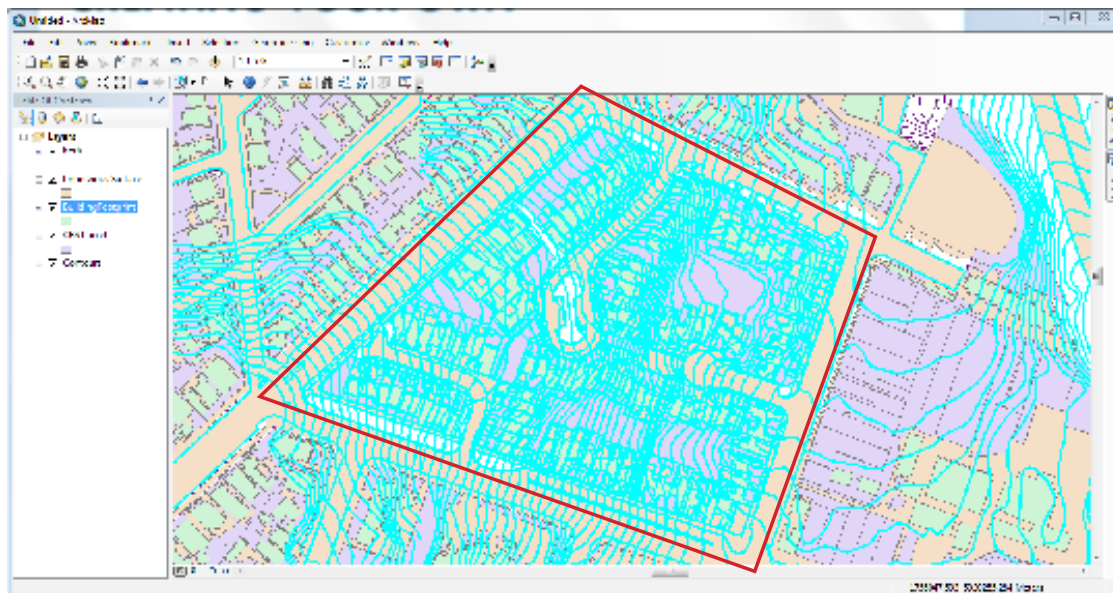
The 'Full Extent' tool will size your map and arrange it so that the window shows the full extent of all of the open Shapefiles. This is useful if you want to zoom out quickly or if you've accidentally zoomed out too far and need to find your map again.

To change the zoom level, either scroll the mouse or select the scale at which you would like your map to be set at. This is most useful for laying out your finished product at the correct scale.



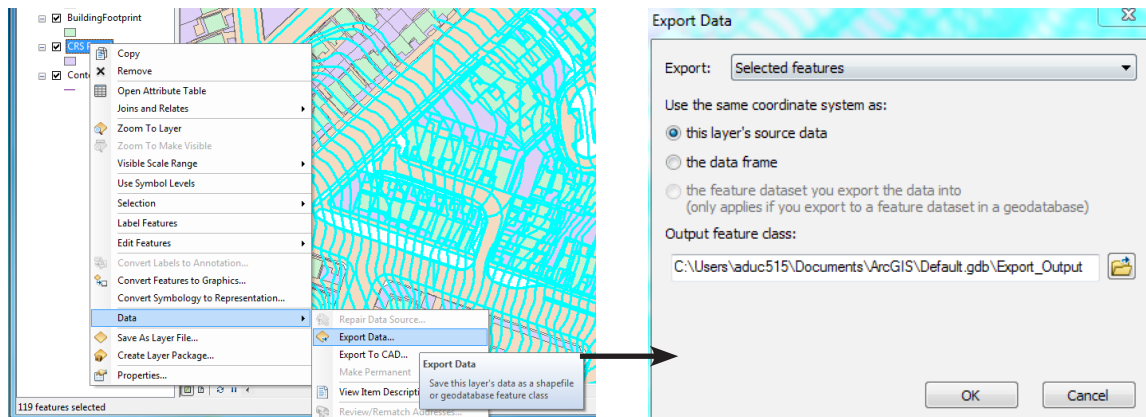
First, you want to select the objects that you would like to export as a separate Shapefile. Choose the appropriate selecting tool as shown on the left - in this case, 'Select by Polygon'.

As in the image on the bottom left, a Polygon (in red) has been drawn around this street block and all Objects that have been intersected have been highlighted.



To avoid selecting more than you need to, you can hide all other layers other than that which you want to export (here, we only want 'CRS Parcel'). Otherwise you don't have to worry about it too much - at the end of the process we can choose exactly which layer we want to export from.

**TIP: Hold the shift key to select multiple times**

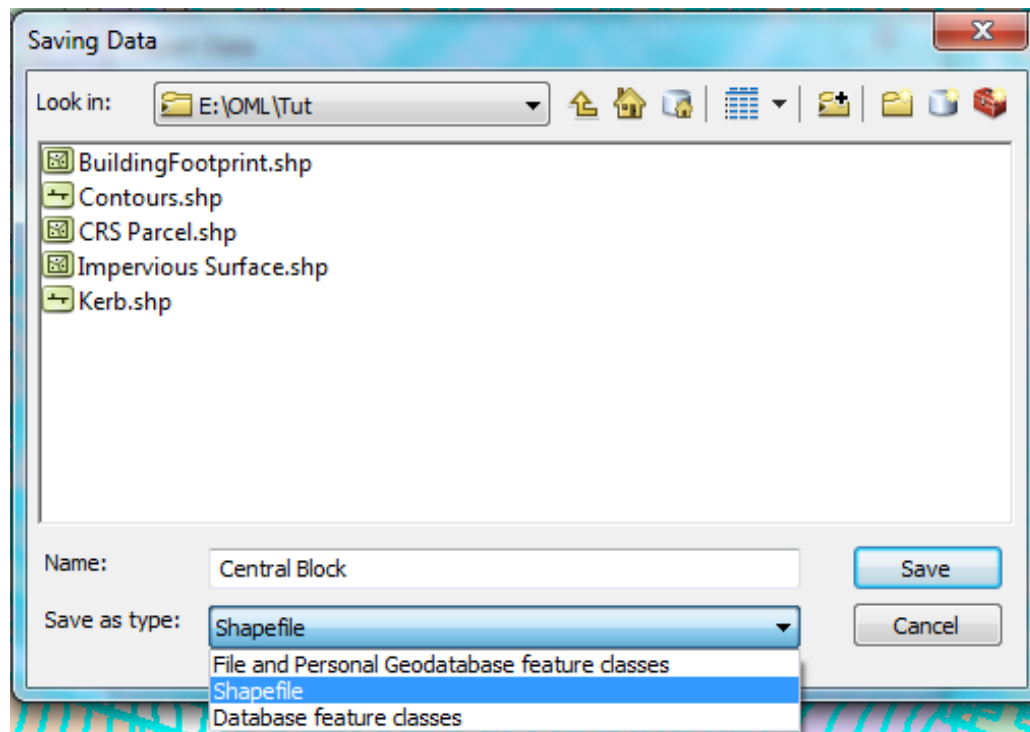


Now, select which layer you want to create your new Shapefile from - in this case, 'CRS Parcel'

Right click >> Data >> Export Data

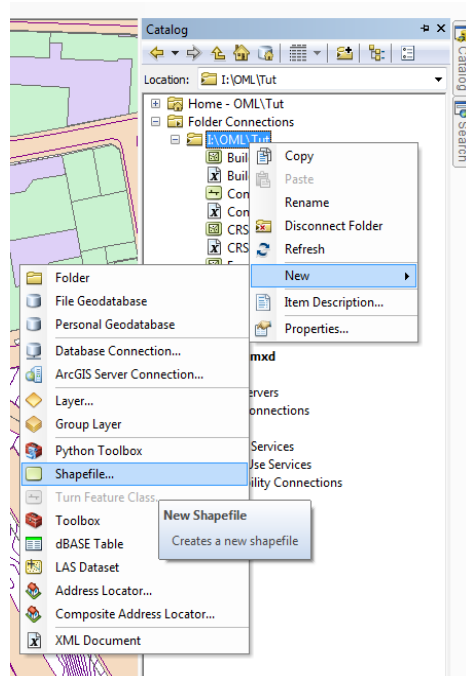
A pop up should appear as shown on the left. Make sure that 'Selected Features' is chosen from the 'Export:' drop-down menu and that 'this layer's source data' is ticked.

Browse to find where you would like the new file to be saved (the same folder as the rest of your data).



**Make sure that the file type being saved is a 'shapefile' - this is easy to forget**

Your selected objects will now be visible as a new layer that can be edited and viewed separately



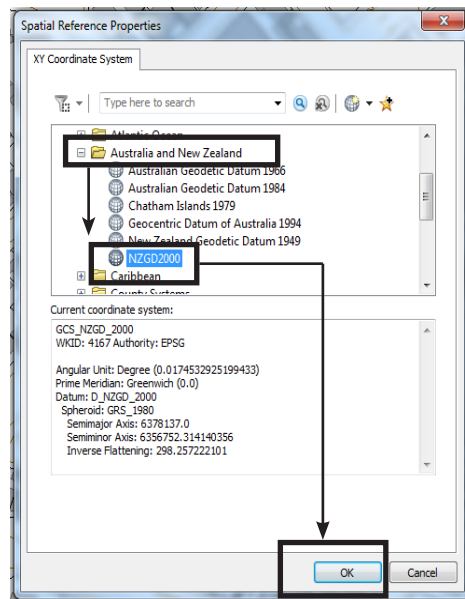
**Purpose** - adding material to your map is always a useful tool. In this case, we will be creating a Point that we can use for further analysis and display functions.

First, Open **ArcCatalogue**

Find the folder connection that you have been using.

**Right Click (On the Folder) >> New >> Shapefile**

A window will open like on the left. Chose the name of your new Shapefile - in this case, we can name it **Centre Point**.



Next we have to choose a Spatial Reference - this is a coordinate system that links all of the Shapefiles on your map so that the distances between them are kept relative. In NZ cartography we use NZGD2000 which is the most up-to-date.

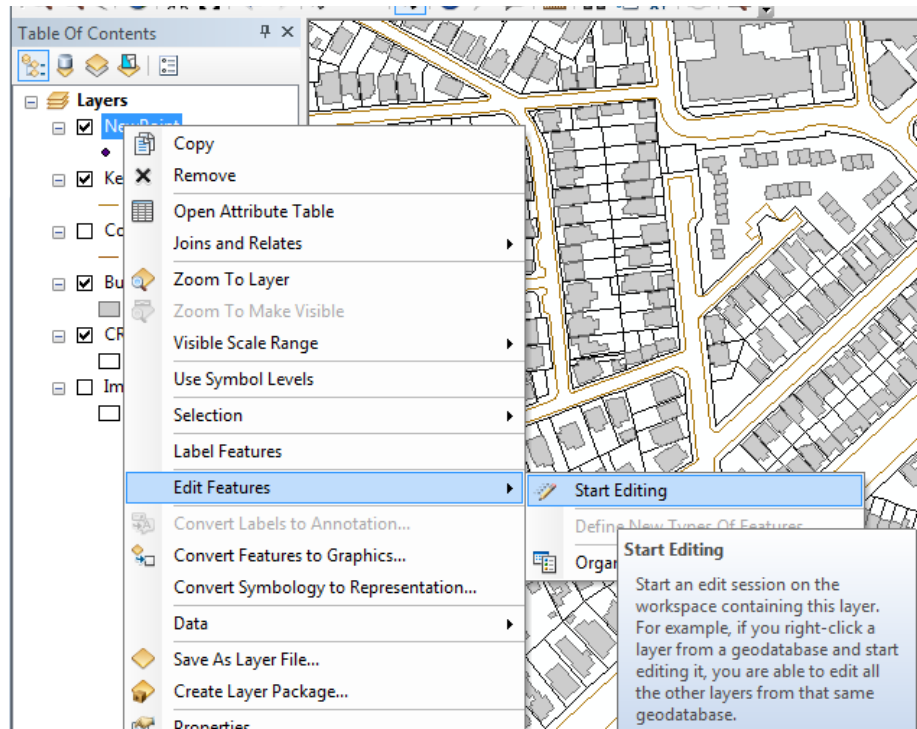
Click **Edit** - a new window will appear then follow the path below;

**Geographic Coordinate Systems >> Australia and New Zealand >> NZGD2000**

Now that the reference has been added, click **OK**

In the Table of Contents Panel you should now see a new layer created of the point you just made.

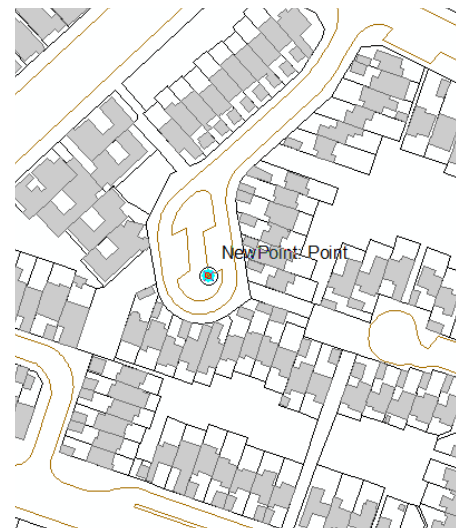
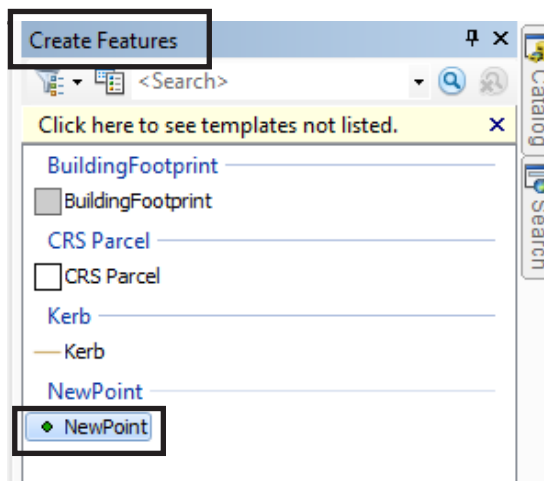
However, the point won't exist on the map itself yet. You need to position the point where you would want it (eg. the centre of the study area)



In order to position the point,  
First, right click on the layer you made for the point (in this case the 'NewPoint' layer).

Then scroll down to Edit Features followed by Start Editing

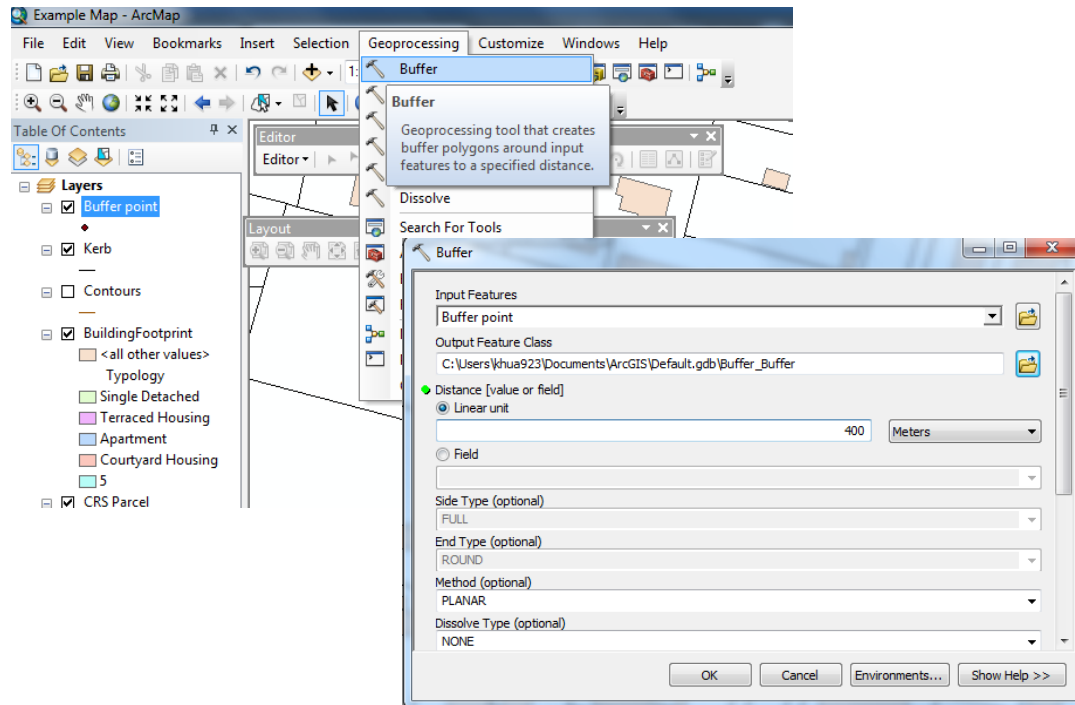
You will now be in **Editing Mode**



On the right hand side, a panel titled **Create Features** will appear. Click on the layer you made for the point (i.e. **New Point**). Then on your map place the point where you want it to go.

Once you've placed your point in the right location click **Stop editing** in the editor toolbar





An easy method to visualize a certain distance from a certain point is to use a “**Buffer**”. Buffers give an area and boundary which are within a certain distance. Buffers are a very useful tool in planning to illustrate the walkability of an area. The distance that is suggested to be walkable in 5 minutes is 400 minutes.

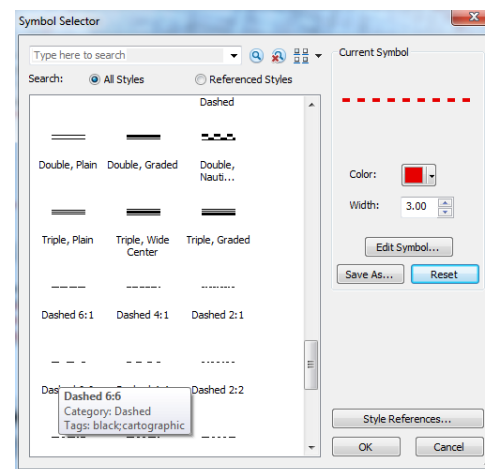
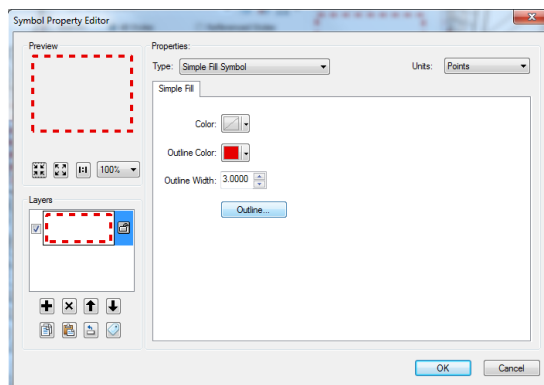
To make the buffer, go to the top toolbar and click the geoprocessing tab. Then Click **Buffer**.

In this input window, enter the shapefile that you want to be at the centre of the buffer, in this case it is **Buffer Point**.

Configure the output of the feature class and choose your connected folder.

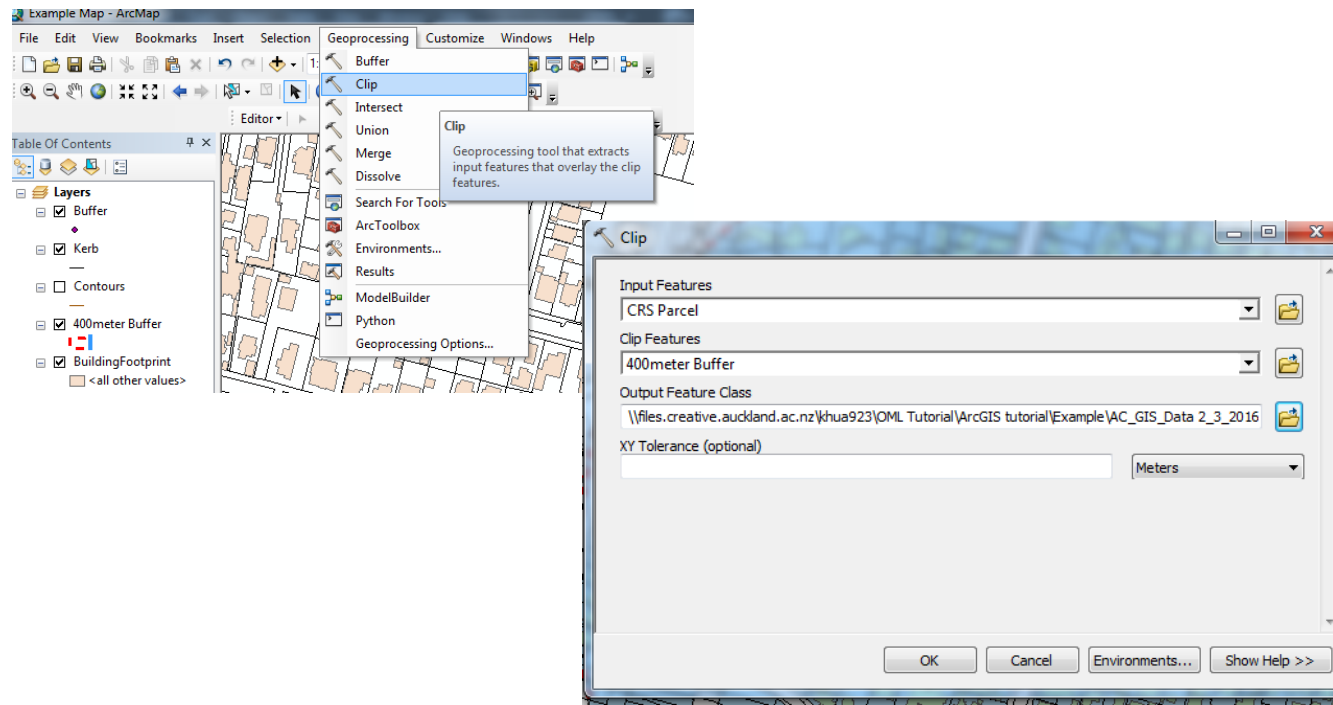
In the linear window, enter the desired distance. In this case it will be **400m**. **Clipping:**

**The clip tool is used to cut out a piece of data from a layer using another feature as a cookie cutter. This is very use-**





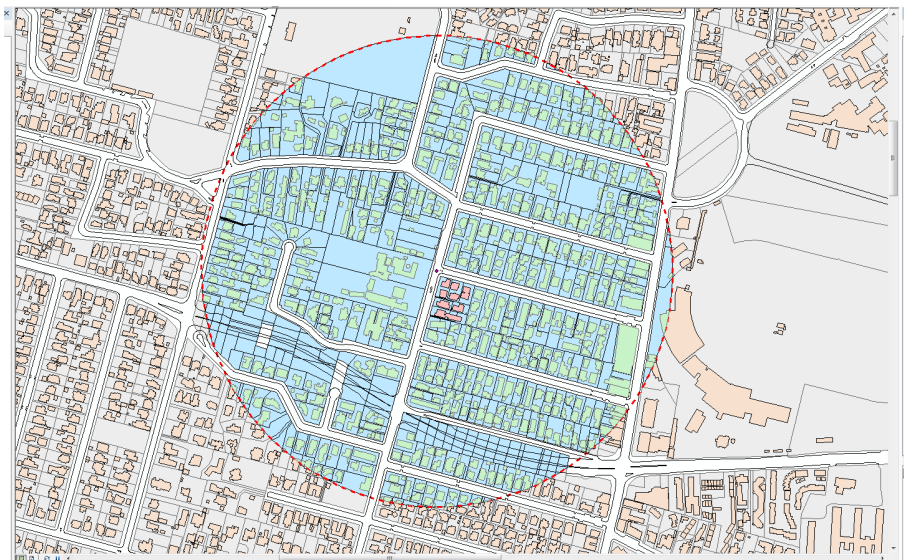
## Geoprocessing: Clipping data



The clip tool is used to cut out a piece of data from a layer using another feature as a cookie cutter. This is very useful in creating new feature classes or referring to a certain study area within the layer. In order to clip, navigate to the Geoprocessing tab and click on “clip”

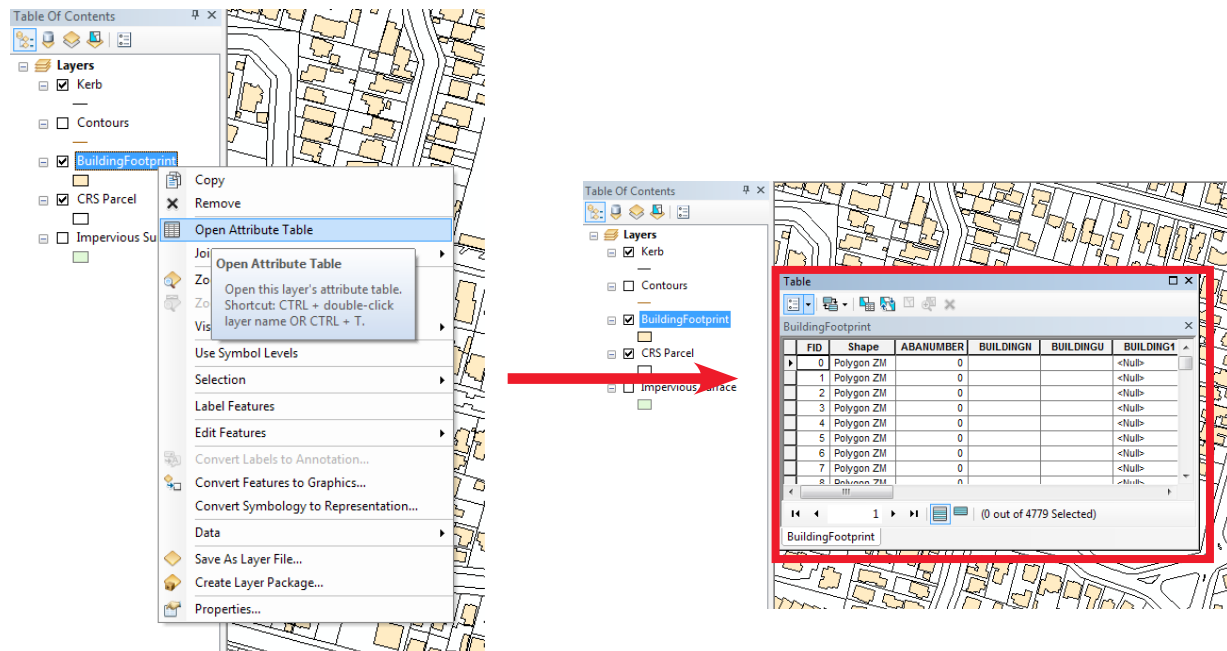
In this window, the **input feature** is the layer you want to clip from, and the **clip feature** is the shapefile you want to use as a cookie cutter. For this example, we want to identify study area with an 800m radius inside of the buffer. We will use the “parcel” layer as the input and “400meter buffer” as the clip feature. Make sure to save your output to your working folder.

Click “OK”



You can repeat this process for other layers. Note that only one layer can be clipped at a time. You can see that a new shapefile has been cut out and layered on top.

You can change the colours to emphasise the study area. On the left is an example of this. The study area is emphasized with blue. The footprints inside the study area also have been clipped in this example.



**Application** -The attribute table can be manipulated to show different types of information on a map where data for the existing layer already exists. It is useful for showing categories such as Building Typology or Building Use.

#### Building Footprint Layer

##### Building Typology

- Single Detached
- Courtyard Housing
- Terraced Housing etc..

##### Land Use Activity

- Travel/Movement
- Residential
- Shopping, Business, Trade
- Industrial, manufacturing
- Social infrastructure etc.

In the table of contents, right-click the desired shape file to create more categories. In this case it is Building Footprint

Click on **Attribute table** and the table should appear.

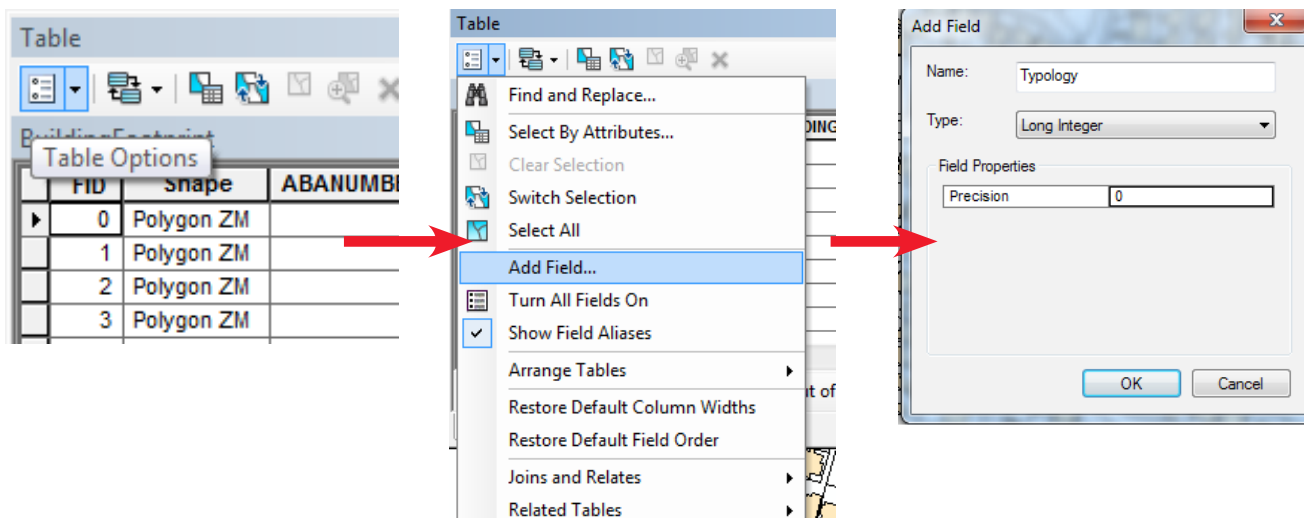
In the top left hand corner, click the Table Options icon. A drop down menu should appear with a range of options. Click on **Add Field**

The add field window should pop up. In the '**Name**' field, type in the desired name for the category you are wanting to add. E.g Typology.

In Type choose **Long Integer**

In Field Properties leave everything as it is

Then click **OK**



## Creating New Categories in the Attribute Table (Continued)

Table

BuildingFootprint

Creating New Categories in the Attribute Table

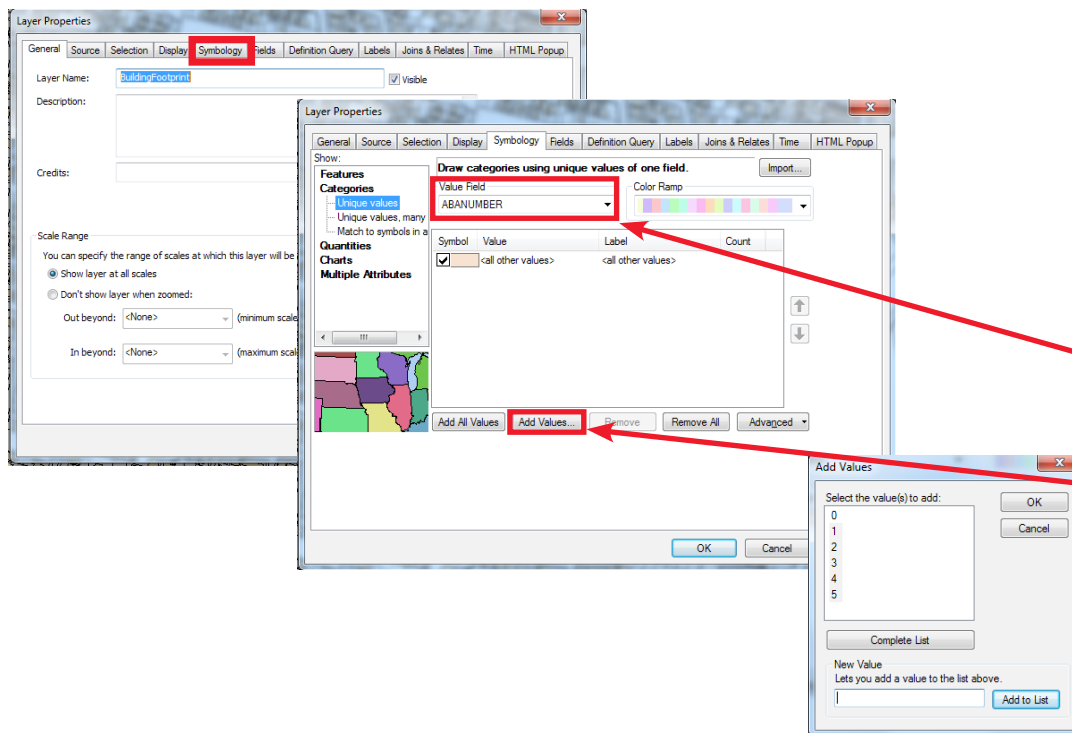
	MODIFYBY	MODIFYDATE	ShapeLen	ShapeArea	Typology
		<Null>	66.590929	205.607238	0
		<Null>	30.519652	34.914689	0
		<Null>	67.024428	232.470014	0
		<Null>	70.098937	234.08149	0
		<Null>	81.438915	257.610252	0
		<Null>	92.265676	364.872292	0
		<Null>	32.037854	53.691883	0
		<Null>	197.554201	844.598997	0
		<Null>	63.175529	211.785029	0

(0 out of 4779 Selected)

BuildingFootprint

Go back to the attribute table that should be open. Scroll down to the right hand side of the table and you should find your newly created category/column.

Once you've confirmed that it is there, close the window.



Go back to the attribute table that should be open. Scroll down to the right hand side of the table and you should find your newly created category/column.

Go back to the contents page and right click the layer you have been working with. In this case, Building Footprint. Scroll down and click to the 'properties' option. This should open up the layer properties window.

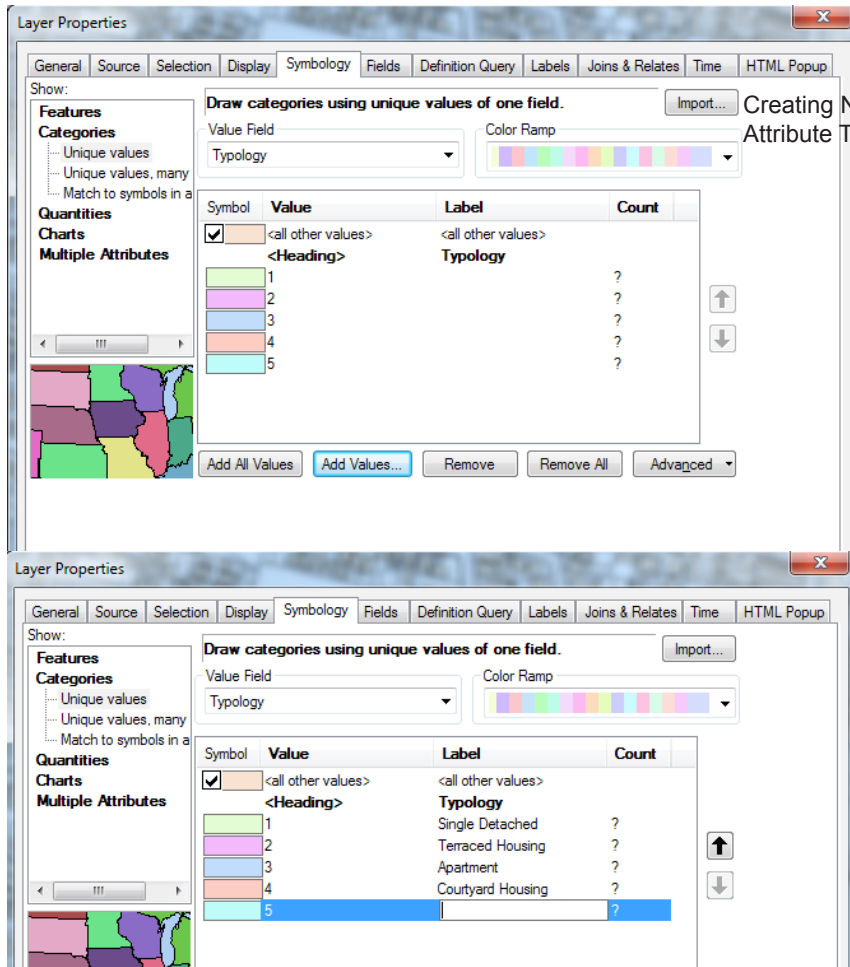
A new pop window should appear with a range of tabs.

Find the tab '**Symbolization**' and on the left hand side you'll find another little box with options. Click on '**Categories**'

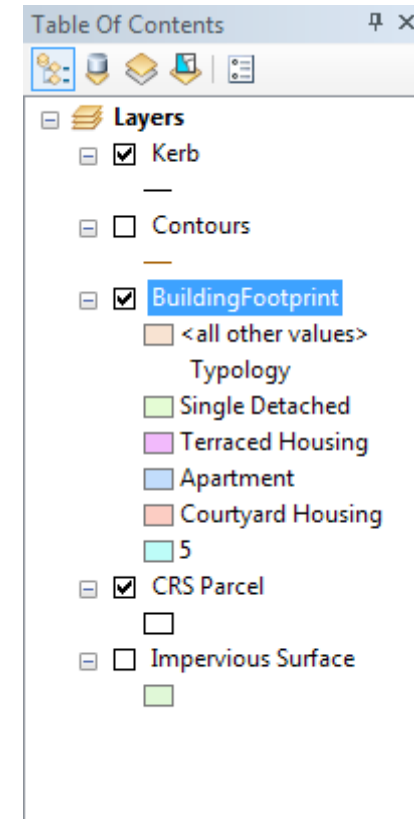
Once on the 'categories' section, scroll over to 'value field' and another drop down menu should appear. Scroll down and select the option you created earlier. In this case '**Typology**'.

Then Click on the '**Add Values**' button at the bottom of the window. A window as shown on the right should appear. Add the number of sub categories you need by putting them into the bar under 'new value' and clicking 'add to list' i.e if you have 5 building typologies you would add 1, 2,3,4,5. Click OK

# Creating New Categories in the Attribute Table (Continued)



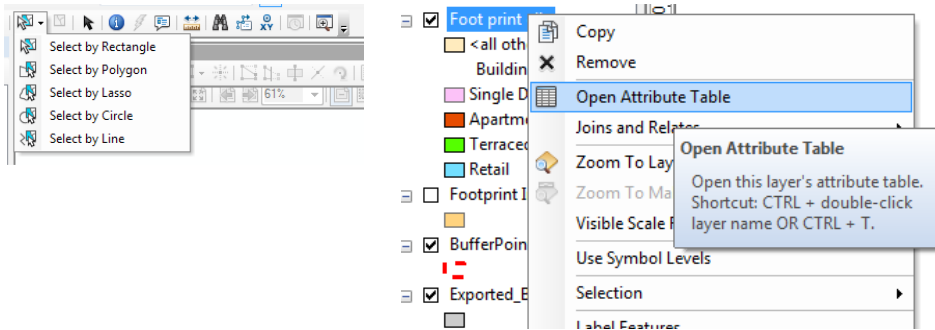
Creating New Categories in the Attribute Table (Continued) process you should come up with a window where you should be able to see your new categories



Your contents page should look something like this.

Each of your intended categories are represented by a value in this case (1-5). You want to assign these categories with a label as shown. Click **apply** once you are done.

## Creating New Categories in the Attribute Table (Continued)



Using the 'select features' tool like 'select by lasso' or 'select by rectangle', select the buildings you want to be part of a certain sub category (e.g single-detached). Remember to hold shift while selecting.

Once you have selected what you want, right click on the building in the table of contents side panel.

Click **"Attribute table"**

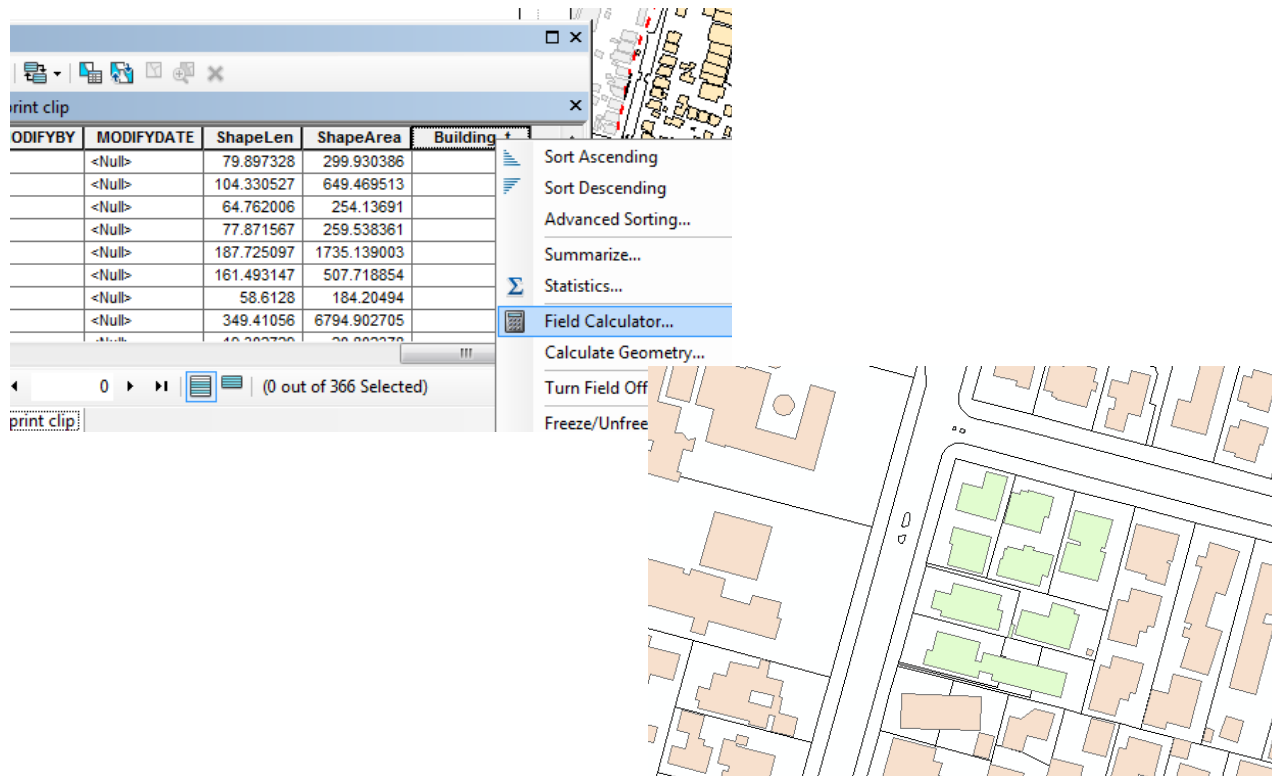
You should be able to see some cells highlighted- this indicates what you have selected using the selection tool. Scroll right to the new column that was made, in this case 'Typology' and then right click its name. Another drop down menu should appear. Select **"Field Calculator"**.

Click **Yes**

Another popup window should appear. Type in the value that corresponds to the correct typology that you want to make the shape. If you want to make Single-detached, you would type in 1.

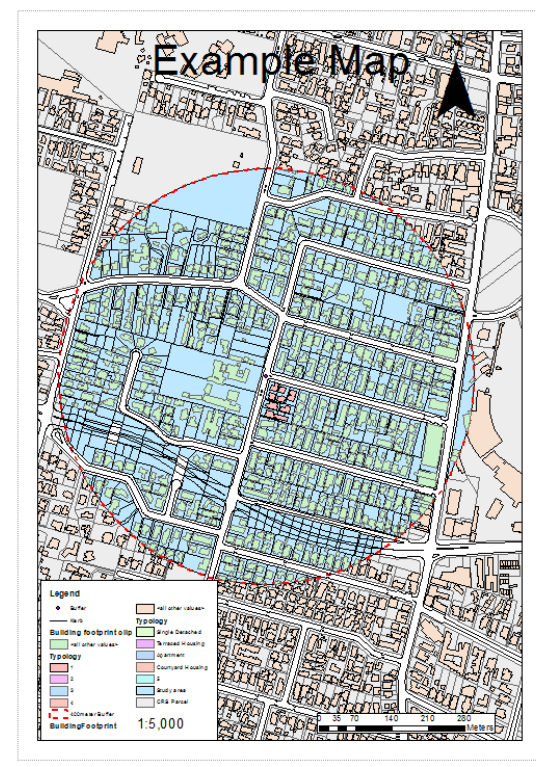
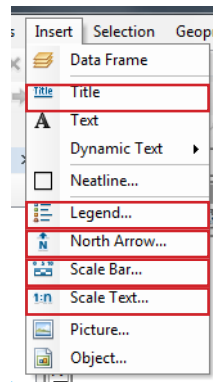
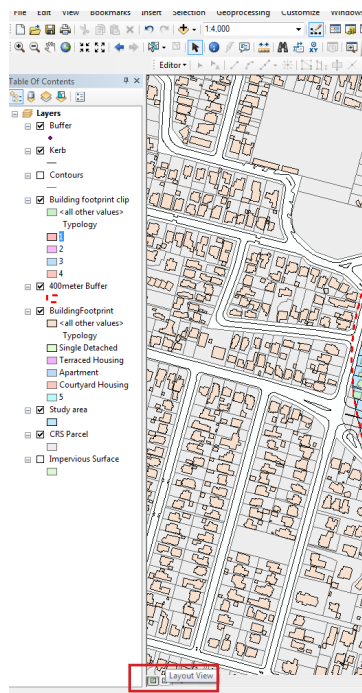
Click **Ok**.

You will be able to see the shapes you selected change colour to its respective number you just keyed in. You can repeat this whole process for other land typologies you have mapped in.





## Layout: Making the map



Click on the layout view on the bottom left hand corner of the screen.

Maps must have certain components for it to be a valid map. These include the north arrow, scale bar, title, scale text and legend. All of these components can be found in the insert tab.

When inserting the scale bar, make sure to change the properties of the division units into kilometres or meters as they will be set to miles by default.

When making a legend, follow the prompts of the window. Legends should always have a border and have a background that allows it to be clearly read. Most of the time the background is white.

To ready the map for printing, you need to export the map as a pdf. Click **file --> export map** and select pdf as the file type. You can now print from this file. Remember to save your ArcMap document using **file--> save as**. Save this into the folder you saved all of your data and shape files into.