

Further Work – Creating and Editing Layers

Objectives: The purpose of this exercise is to discover how datasets are created from scratch. We will be capturing some of the roads, car parks and buildings at the Highfield campus here at the University of Southampton.

If you are digitising either from a paper or scanned map you will need to create a new layer to store your data.

Part 1

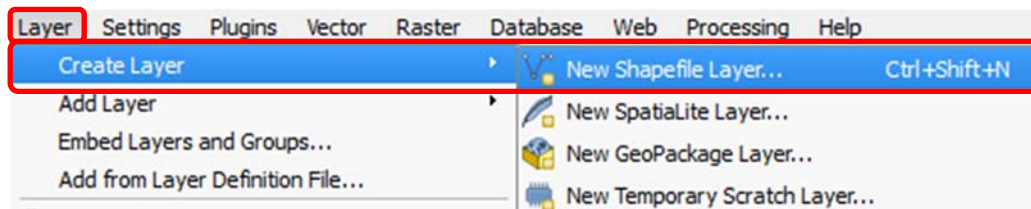
First we must consider which spatial data we need to capture. Next we must decide what type of map object is suitable to represent each new layer and which attributes should be recorded.

1. Open **FW_Editing.qgs** from the location that you saved **Further Work** directory to.
 - You will see a map of Southampton University Highfield Campus.
2. Rename the Highfield campus dataset.
 - Right click on the dataset in the Layers panel and select **Properties**.
 - Click on the **General** tab.
 - In the **Layer name** field, change the name to **Highfield Campus**.

You will use **Points** to capture car park locations, **Lines** to capture roads and **Polygons** to capture buildings.

Part 2 – Creating a new point dataset and capturing points

1. *Layer > Create Layer > New Shapefile Layer*



- Select **Point** as the data type.
- Under the CRS dropdown menu, select **British National Grid**
- Within the **New field** window, add the following fields to the dataset:

Name	Type	Length
CPark_Name	Text data	50
Capacity	Whole number	3
Category	Text data	50

- Remember to click on the **Add to fields list** button after you enter the information for each new field.

New Shapefile Layer

Type

☒ Point ☐ Line ☐ Polygon

File encoding: System

CRS: EPSG:27700 - OSGB 1936 / British National Grid

New field



Name:

Type: Text data

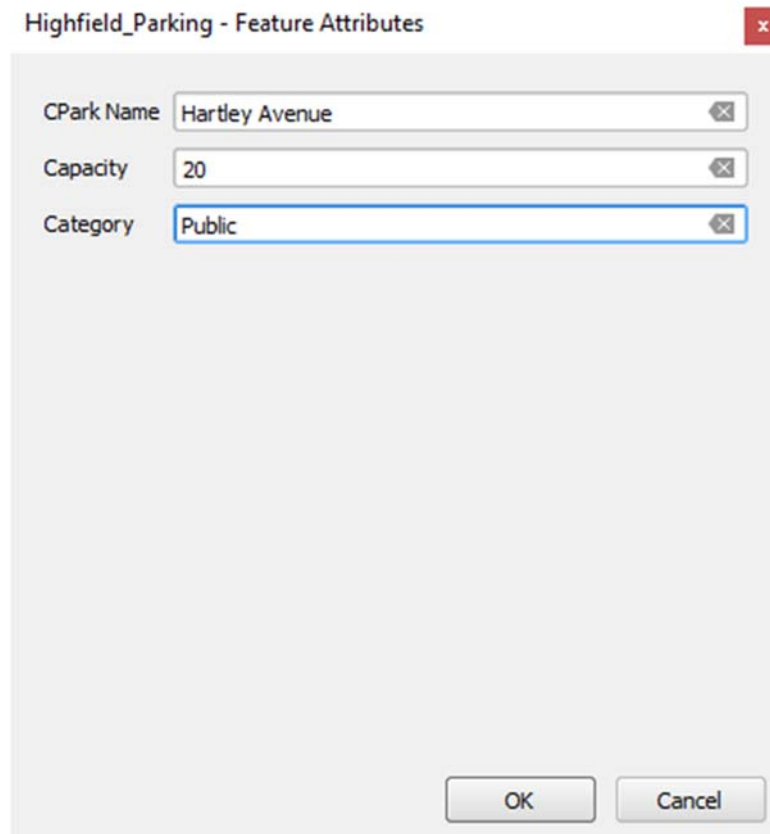
Length: 50 Precision:

Fields list

Name	Type	Length	Precision
CPark Name	String	50	
Capacity	Integer	3	
Category	String	50	

- Remove the **id** attribute added by default by QGIS
 - Click **OK**.
 - Save this new shapefile to "*C:\Intro_Quantum_GIS\Exercises\Data\Vector\General*"
 - Name this file "*Highfield_Parking*".
 - You will now see this new point dataset in your Layers window.
2. Make the Highfield_Parking dataset editable.
- In the Layers panel, highlight the Highfield_Parking dataset.
 - On the main QGIS window, click on the **Toggle editing** button. 
3. Capture 5 or 6 car parks.
- Zoom or pan around on the Highfield Campus map to one of the car parks.
 - Select the **Add Feature** tool  from the main QGIS toolbar.

- Single click on a car park.
- A window will pop up asking you to fill the attributes.
- Give the car park the name of its closest building.
- Make up the number of spaces.
- For the **Category**, if it's a circular sign write **Public**. If it's a diamond sign write **Restricted**.



Highfield_Parking - Feature Attributes


CPark Name: Hartley Avenue

Capacity: 20

Category: Public

OK Cancel

4. Save your edits.

- Click on the **Save Edits** button on the Digitizing toolbar. 
- Disable editing for the layer by clicking on the toggle editing button again

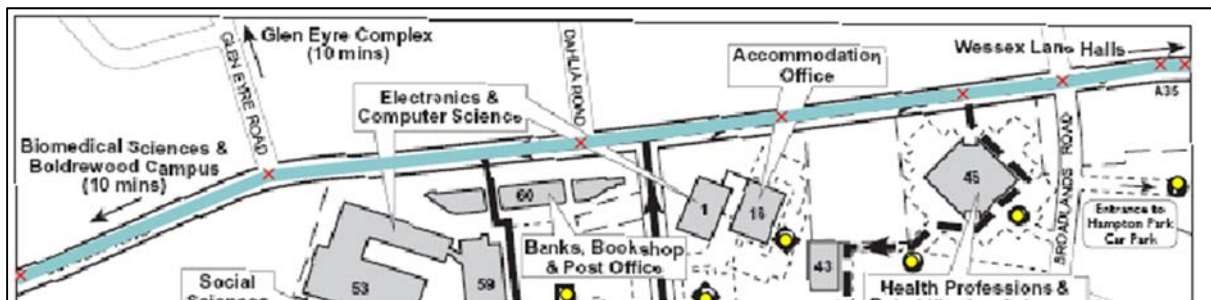
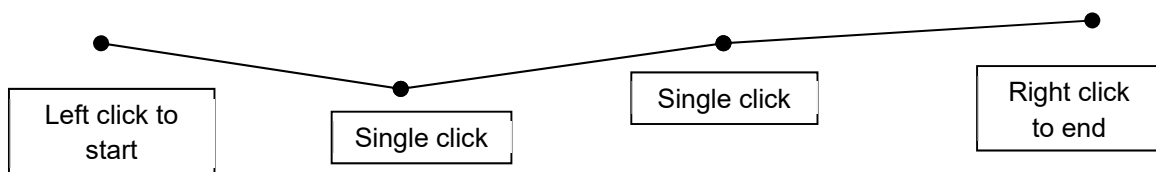
5. Symbolise your car park layer

- Right click on it in the Layers window and select **Properties**.
- From the **Style** tab, you can change its transparency, colour, size and shape.

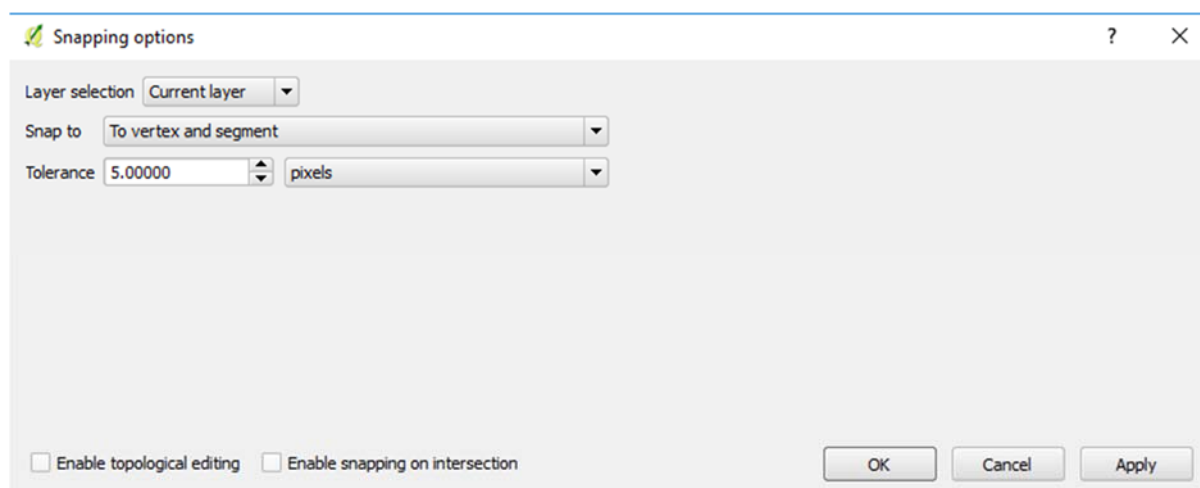
Part 3 – Creating a new line dataset and capturing lines.

1. Create a new Line dataset
 - Follow the same procedure you used to create a point dataset.
 - Do not add any fields to it, accept the default **ID** attribute.
 - Save the dataset in the same location as your car parks dataset.
 - Name the dataset **Highfield_Roads**.
2. Make the roads dataset you have just created editable.
 - Follow the same steps you followed for the car park dataset.
3. Capture Burgess Road as a single line.

- Use the **Add Feature** button from the digitizing toolbar.

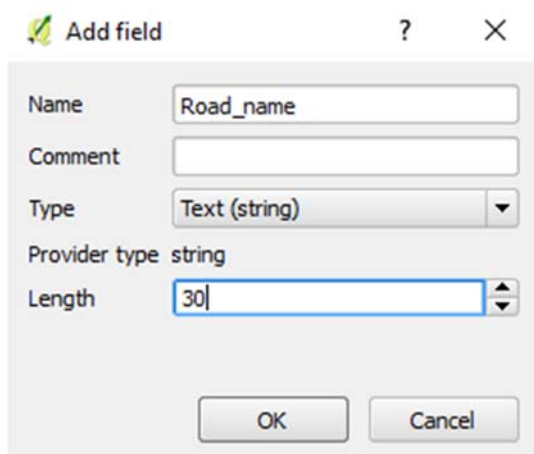


- Upon right-clicking you will be prompted to enter a value in the id field which will only accept numbers, make one up.
4. Turn on snapping
 - Make sure that **Highfield_Roads** is selected in the layers window
 - *Settings > Snapping Options*
 - Under **Snapping mode** select **Current layer**
 - Under **Snap to** select **To vertex and segment**
 - Under **Tolerance** select **5.0** and **pixels**
 - Click **OK**



5. Capture Glen Eyre Road
 - Single click on the northern-most part of Glen Eyre road. This will start drawing a new road.
 - If you then hover the mouse cursor over the section of Burgess Road (which you have already captured) at the end of Glen Eyre Road, you will notice that your mouse sticks.
 - Single right click with your mouse stuck to Burgess Road to finish drawing Glen Eyre Road.
 - Use the **Zoom In** tool to zoom in to the junction between Glen Eyre Road and Burgess Road. You will see that these roads have snapped to each other.
6. Capture some more roads until you are happy with digitising lines and snapping.
7. Symbolise your roads layer.
 - The process for this is the same as when you symbolised the car parks earlier in this exercise.
8. Save your edits.
9. Add a “**Road_Name**” field to the **Highfield_Roads** attribute table.
 - Right click on **Highfield_Roads** in the Layers window and select **Open attribute table**.
 - Make sure you are currently editing this layer.
 - Click on the **New field** button in the table toolbar.





Add field

Name:

Comment:

Type:

Provider type: string

Length:

OK Cancel

- Fill in the “Add field” window as above.
- Press **OK**.

10. Fill in the road names for all the roads you have captured.

- Make sure that you are in editing mode for the **Highfield_Roads** layer.
- Highlight a row in the attribute table. The feature you have selected will become highlighted on the map canvas. Now you know the road name for that feature.
- Double click in the road name field and type in the road name.


	id	Road_Name
0	1	Burgess Road
1	2	Glen Eyre Road
2	3	Dahlia Road
	5	Hawthorn Road

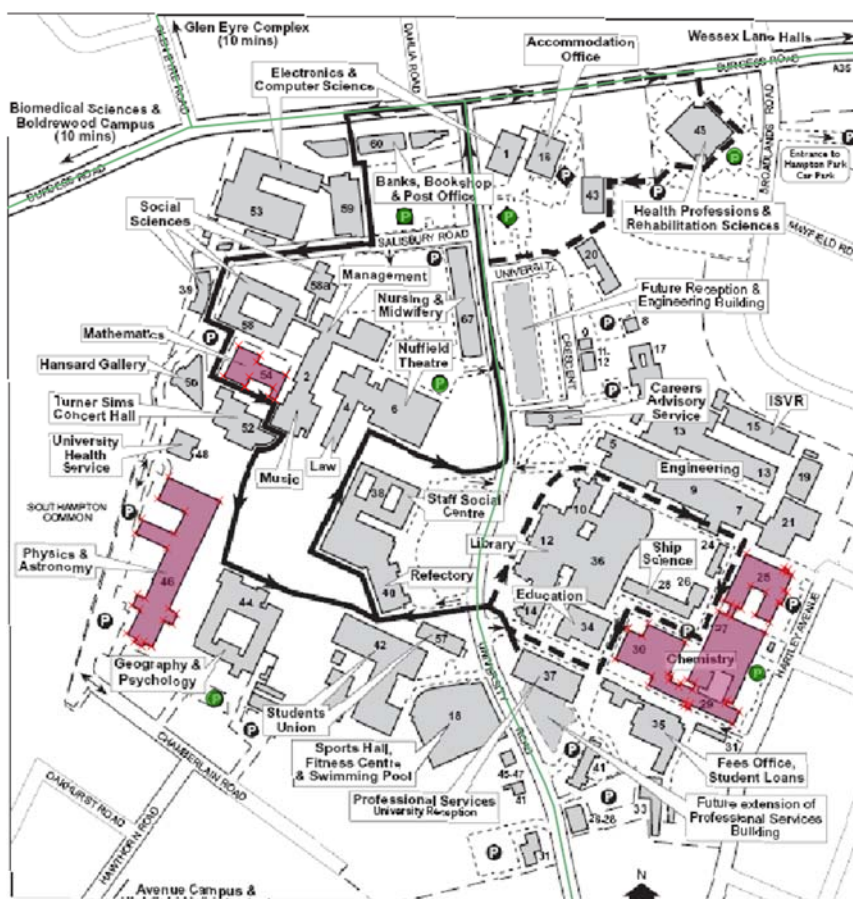
- Do this for all the roads you have captured.
- Save your edits and stop editing.

Part 4 – Creating a new polygon dataset and capturing polygons.

1. Create a new Polygon dataset
 - Follow the same procedure you used to create the point and line datasets.
 - Save the dataset in the same location.
 - Name the dataset **Highfield_Buildings**.
 - Add one field to it.

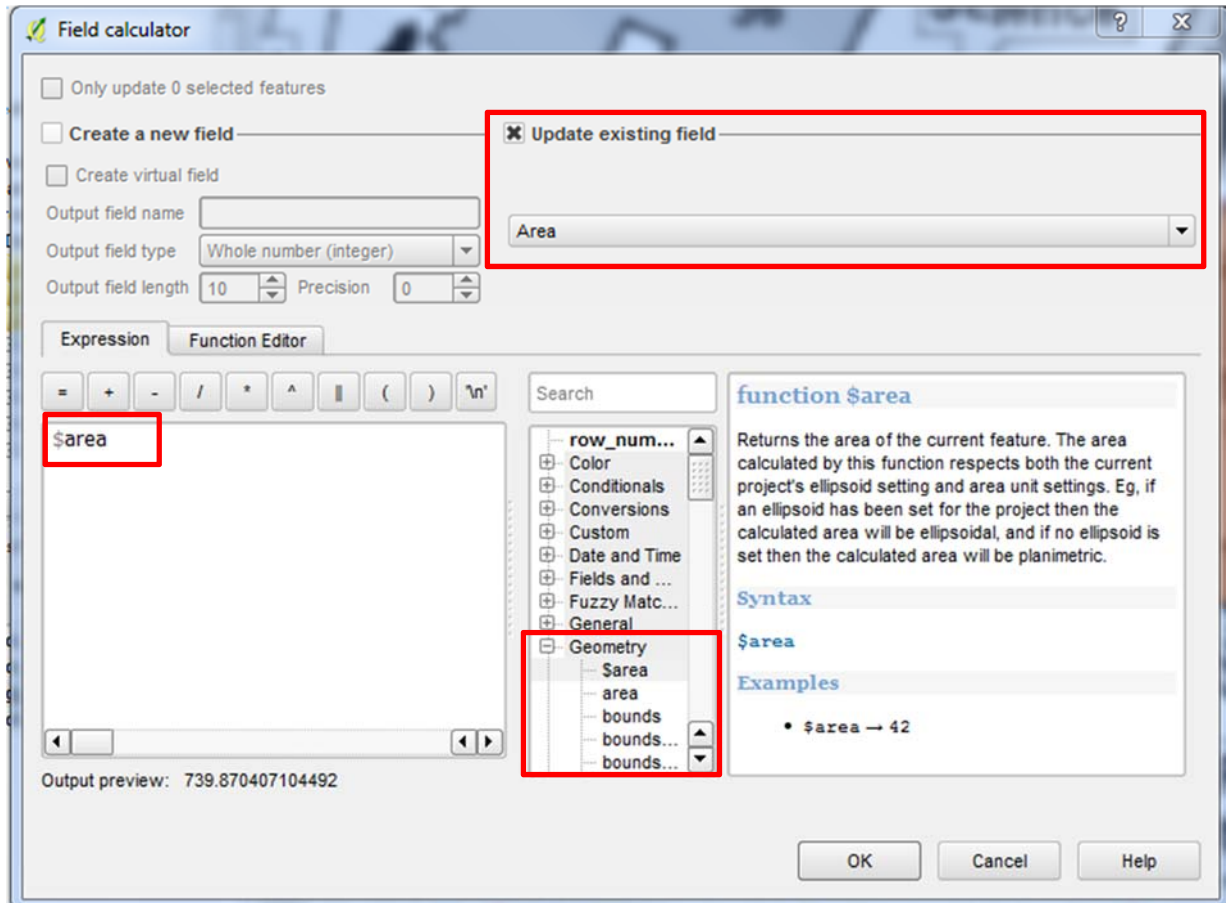
Name	Type	Width
Name	Text data	50

2. Digitise the Physics, Chemistry and Maths buildings.
 - Ignore the hole in the Chemistry building.
 - Use the **Add Feature** tool. 
 - Single left click to start digitising and single right click to finish.
 - If you add a vertex which you are not happy with, press the backspace key on the keyboard. This will delete it.
 - Add the building name to each polygon.
 - Save your edits



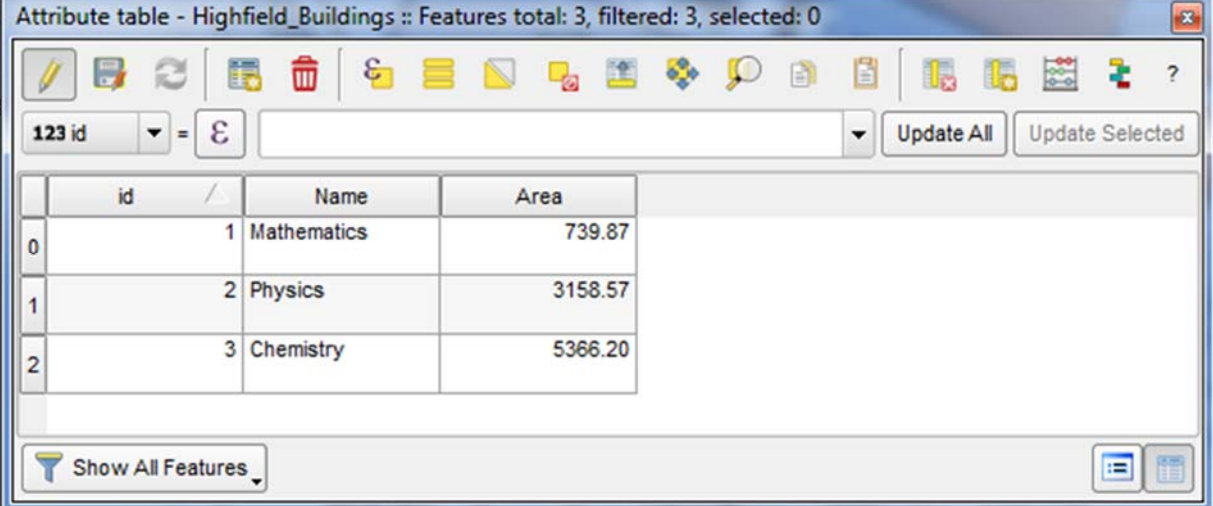
3. Symbolise your buildings layer.
 - It may be useful to make the buildings semi-transparent so that the underlying map is visible.

4. Calculate the area for each building
 - Add a new column to the **Highfield_Buildings** attribute table.
 - Call it **Area**.
 - Make it of type **Decimal number (real)**.
 - Give it a length of 6.
 - Give it a precision of 2.
 - Use field calculator to add the area values to this column.



- You will find **\$Area** under the Geometry group of the **Function List**
- Take a moment to explore some of the other Geometry functions
- Double-click **\$Area** and click **OK**
- You will see that the area column in the attribute table has now been updated.

Attribute table - Highfield_Buildings :: Features total: 3, filtered: 3, selected: 0




	id	Name	Area
0	1	Mathematics	739.87
1	2	Physics	3158.57
2	3	Chemistry	5366.20

Show All Features

- **Save** your edits and stop editing.
5. What is the total area of all the buildings you have captured? _____
- **Hint:** *Vector > Analysis tools > Basic statistics.*

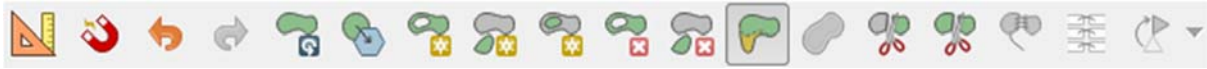
Part 5 – Changing polygons by adding and removing nodes


1. Change the shape of the physics building.
 - Make the **Highfield_Buildings** layer editable. 
 - Select the **Node tool** from the digitizing toolbar.
 - Note that the nodes are the red crosses.
 - Click on the physics building.
 - You will notice that all the red crosses are now red squares.
 - Click and hold on one of these to drag it.
 - To add a new node, double click on the edge of the polygon where you want to add the node.
 - Try adding a few new nodes to the physics building.
 - To delete a node, select it by single clicking on it with the **Node tool**. It will turn blue. You can then press the **delete** key on the keyboard.
 - Extend the physics building so it looks like this:

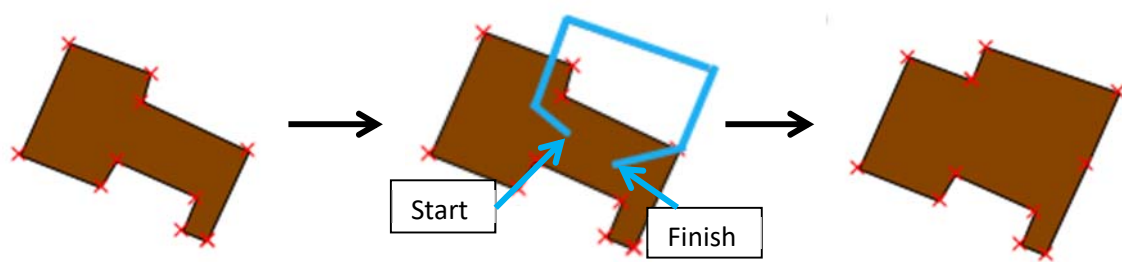


Part 6 – Changing polygons using the Reshape features tool.

1. Change the shape of the maths building using the **Reshape features** tool.
 - If it is not already visible, bring up the **Advanced Digitizing** toolbar.
 - **View > Toolbars > Advanced Digitizing**



- Select the **Reshape features** tool. 
- This tool allows you to add or remove sections from polygons.
- Zoom to the maths building on the map.
- Make sure that the **Highfield Buildings** layer is editable and selected in the Layers window.
- Create an extension to the building so it looks like the picture below.
- To create an extension with the **Reshape features** tool you must start digitising with the tool **inside** the current maths building polygon. To finish the reshape, you must right-click

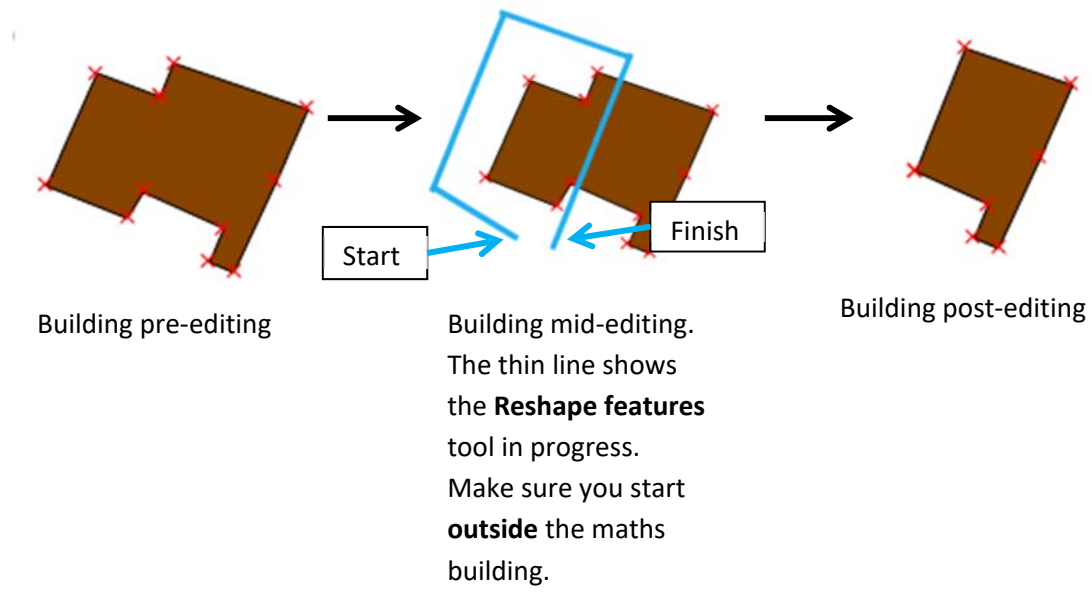


Building pre-editing

Building mid-editing.
The thin line shows
the **Reshape features**
tool in progress.
Make sure you start
inside the maths
building.

Building post-editing


2. Use the **Reshape features** tool to remove a section of the maths building.
 - To remove a section of the building with the **Reshape features** tool you must start digitising **outside** the maths building.

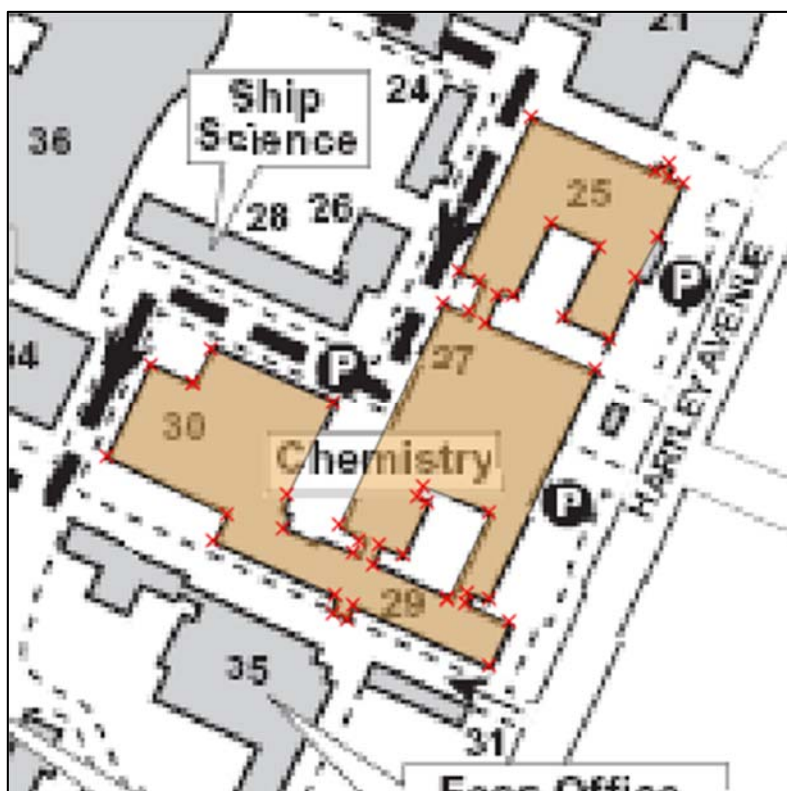


Part 7 – Adding holes to polygons

1. Add a hole to the Chemistry building
 - If it is not already visible, display the **Advanced Digitizing** toolbar.
 - *View > Toolbars > Advanced Digitizing*



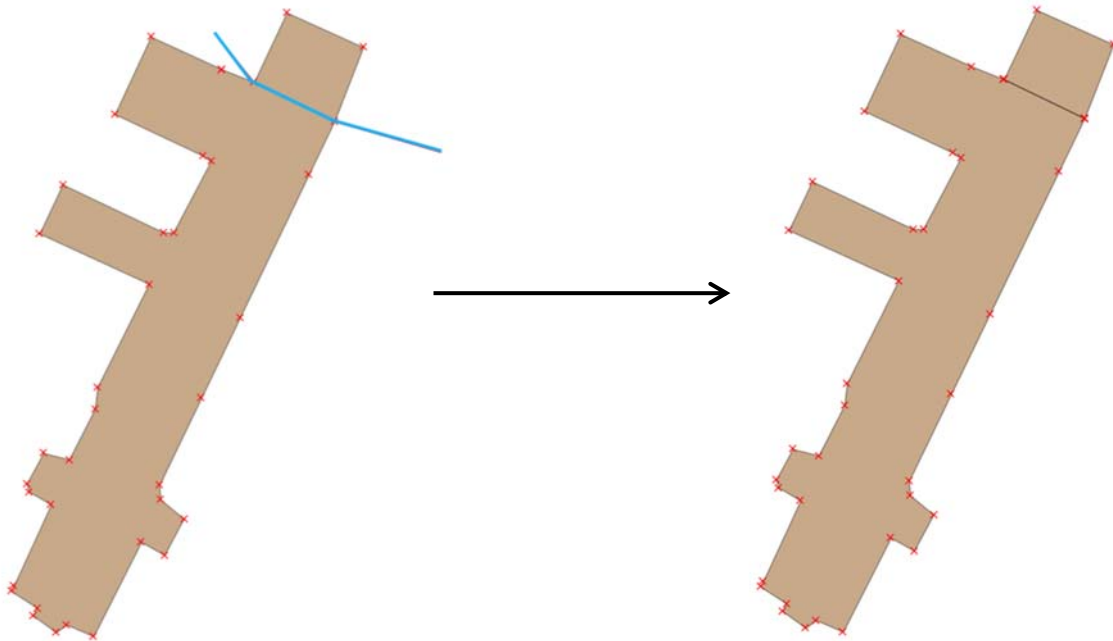
- Pan to the chemistry building and find the inner courtyard.
- Select the **Add Ring** tool from the **Advanced Digitizing** toolbar. 
- Now draw a polygon with the **Add Ring** tool where the inner courtyard is. Draw this in the same way as any other polygon.
- When you right click to finish the drawing you will see that the courtyard has now been cut out of the building.






- Save your edits

Part 8 – Splitting polygons

1. Split the physics building into 2 sections
 - Zoom to the physics building.
 - Select the **Split features** tool from the **Advanced Digitizing** toolbar.
 - Draw a line between the building and the extension you added.



- You will see that the building has now been split into 2.
 - You can verify this by using the **Select single feature** tool.
 - Open the attribute table and note that the split section is now a new record
- 
2. Delete the extension you have split from the Physics building.
 - Select the extension using the **Select single feature** tool.
 - Click on the **Delete Selected** tool on the **Digitizing toolbar**.
 - Note that if you make a mistake you can undo editing actions using Undo from the **Advanced Digitizing** toolbar.
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3. Save your edits, stop editing and save your QGIS project.

Further Work

Load the following plugins to see the additional functionality that they offer:

1. Rectangles, ovals digitizing tools – this requires a layer that is currently being edited to be active.
2. Numerical Vertex Edit – Adds a new button to the Digitising toolbar. Make a layer editable, and with the tool button, click on a vertex of an object in the currently edited layer.