

QGIS_Ch2: Visualise and describe point data



☰ Set up and create new QGIS project

☰ Calculate holding density

☰ Spatial buffers

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Set up and create new QGIS project



“This exercise uses data from the 1967 - 1968 outbreak of foot-and-mouth disease (FMD) in Great Britain. For the county of Cheshire, we have the grid coordinates of all cattle holdings and an estimated FMD infection date (for those affected). We are interested in visualising the location of FMD-positive and negative herds in this county. By the end of this exercise, you should be able to:

- **Display a map of the region under investigation (Cheshire).**
- **Plot the location of cattle holdings in Cheshire.**
- **Identify FMD-positive and FMD-negative holdings.**

ⓘ The data for this exercise can be found in the "UK_Cheshire" folder. Copy the contents to the working folder on your computer.

File name	Description
UK_Cheshire_parish-BNG.SHP, .SHX, .DBF	ESRI shapefile set of Cheshire parish boundaries
UK_Cheshire_FMD-BNG.SHP, .SHX, .DBF	ESRI shapefile set with location and FMD details for Cheshire cattle farms

CONTINUE



“Create a new project. Select **LAYER → ADD LAYER → Add VECTOR LAYER** and browse to find the shapefile set for Cheshire, UK_Cheshire_parish-BNG.SHP. Add UK_Cheshire_FMD-BNG as a layer. This is a point theme listing the centroid coordinate of holdings in Cheshire. Inspect the attribute data for this shapefile by clicking on **LAYER → OPEN ATTRIBUTE TABLE**. In the column called STATUS, FMD-positive holdings are coded with a `1' and FMD-negative holdings are coded with a `0'. In the column called DATE, FMD-positive holdings have the estimated date of FMD infection recorded. Use the expression builder to select FMD-positive farms. Return to the view (Figure 2.1). ”

i Note that we are using a new coordinate reference system
British National Grid (EPSG:27700) for this exercise

Click  to zoom the image

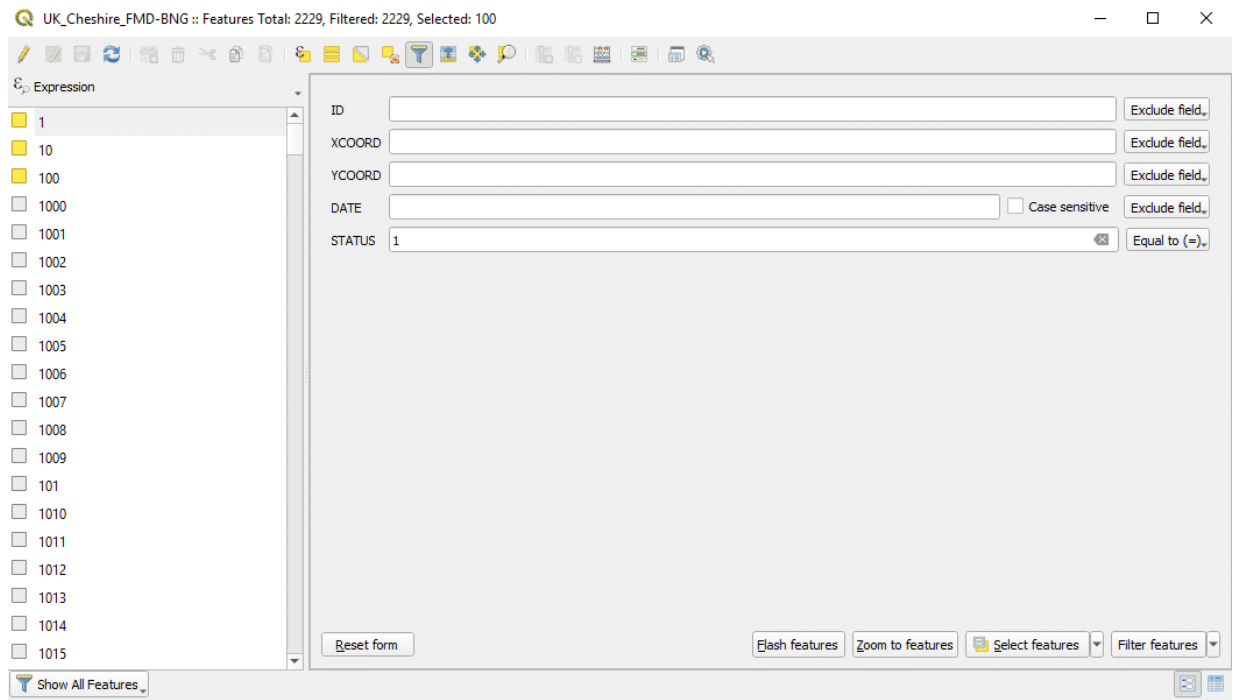


Figure 2.1a: Settings used for the expression builder to select FMD-positive farms

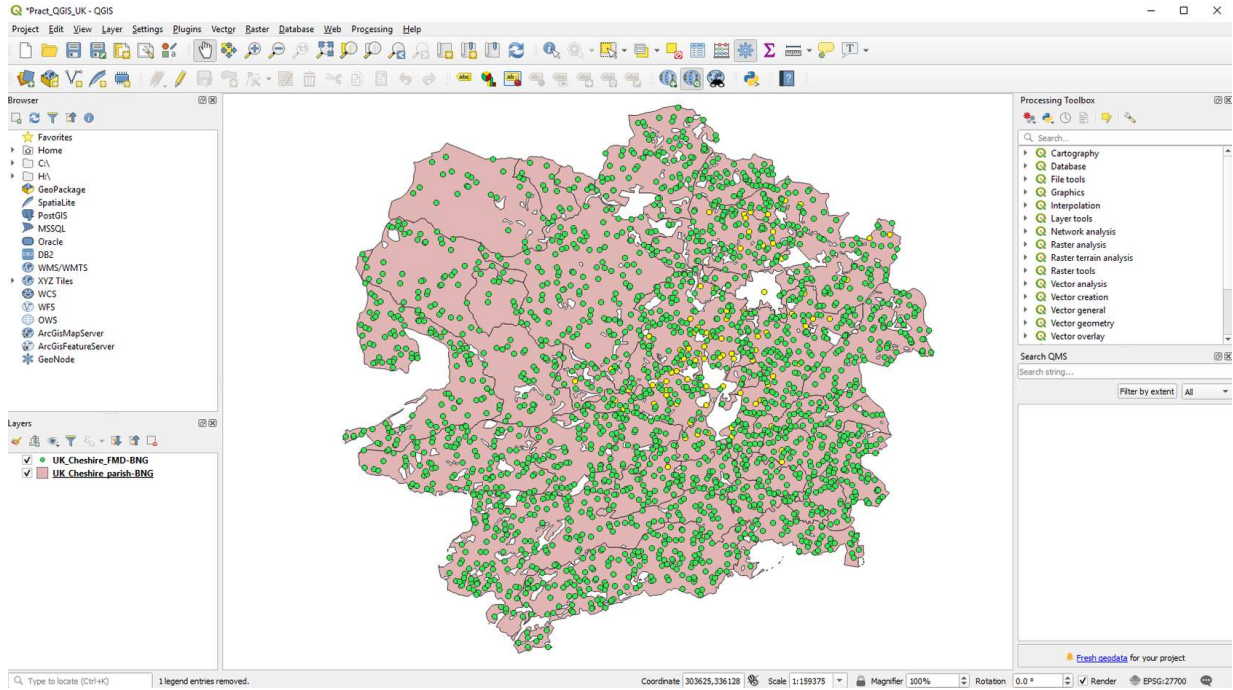
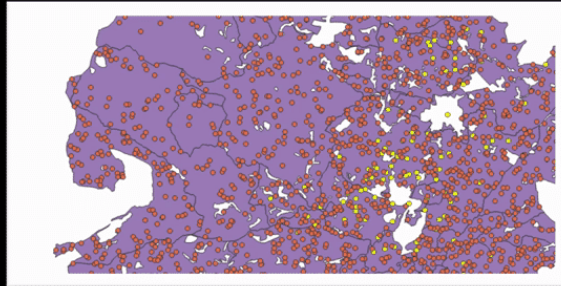


Figure 2.1b: Map of the county of Cheshire showing the location of FMD-positive (yellow dot) and FMD-negative farm (green dot).

Click ► to play the video

Create new QGIS project 2



CONTINUE

Quizzes (pause and think)

Click  to reveal answers

What do you notice

FMD-positive holdings
appear to be

about the spatial distribution of FMD-positive holdings in Cheshire?

concentrated in the centre of the county and to the northeast.

1 of 3

We have dates associated with each FMD-positive holding. What was the date of the first infection in this

The date the first holding was infected was 21 October 1967. The date the last holding was infected was 13 November 1967. To work this out, the map attributes table for

2 of 3

How would you use Quantum GIS to visualise the Spatio-temporal 'evolution' of infection among

A very simple way to visualise the Spatio-temporal evolution of infection would be to: (a) select those holdings infected during a 7 day period (say from 21

farm holdings in this

October to 27 October).

3 of 3

CONTINUE

Calculate holding density



“We would like to work out the number of holdings per square kilometre by parish as this might be of interest (disease risk might be greater in areas where the density of holdings is high).

Firstly, set the distance units for the view. Click SETTINGS → OPTIONS. Under the Map Tools tab, set the Preferred distance units to `Kilometers' and the Preferred area units to `Square kilometres'. Click 'OK' (Figure 2.2).”

Click  to zoom the image

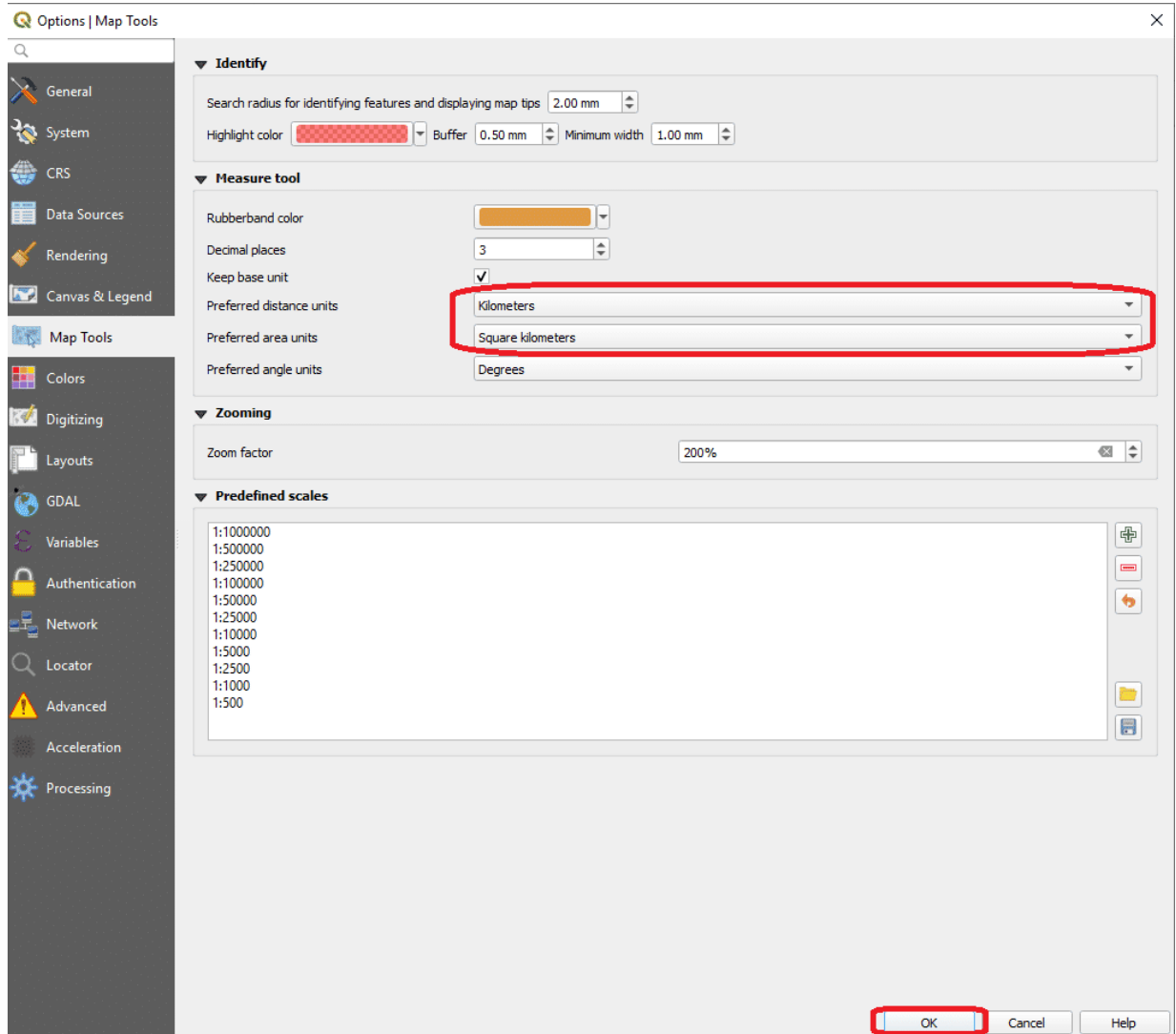
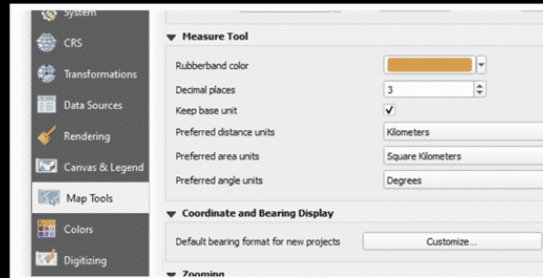


Figure 2.2: Settings for preferred distance units in map tools.

Click ► to play the video

Setting preferred distance



“With the UK_Cheshire_parish-BNG layer active, click LAYER → TOGGLE EDITING and then LAYER → OPEN ATTRIBUTE TABLE. We'll now add a new column to the attribute table defining the area of each parish. Click on the Open Field Calculator icon at the top of the Attribute table. Tick Create a new field box, then enter `AREA' as the name of the Output field name. In operators section of the form under Geometry, double click `\$area'. Click OK to process the calculation. Here you will see that the

area of each polygon (expressed in square kilometres) has been added to the map attributes table (Figure 2.3).

Turn the attribute table editor off by clicking on the Toggle editing mode button at the top of the Attribute table”

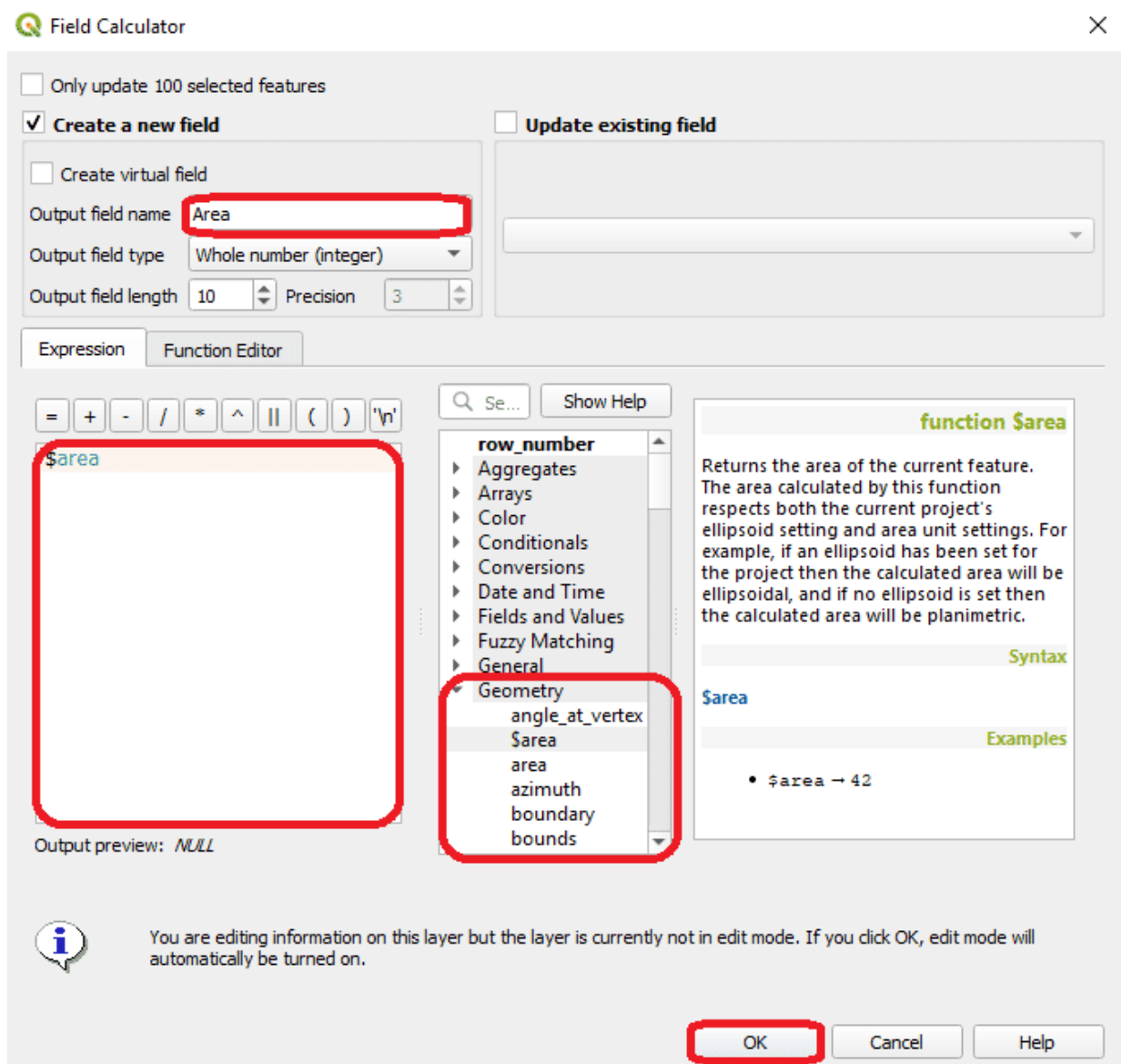


Figure 2.3a: Settings used in Field calculator

UK_Cheshire_parish-BNG :: Features Total: 29, Filtered: 29, Selected: 0

abc PARISHN = [] Update All Update Selected

	PARISHN	Area
1	WEST FELTON	23
2	LLANYBLODWEL	16
3	OSWESTRY UR...	4
4	LLANARMON ...	9
5	OSWESTRY RU...	57
6	LLANRHAIADR...	36
7	LLANSANTFFR...	11
8	LLANDYSILIO	13
9	LLANYMYNECH	4
10	LLANFYLLIN	30
11	LLANFECHAIN	17
12	CARREGHOFA	4
13	KINNERLEY	25
14	KNOCKIN	6
15	GUILSFIELD WI...	41

Show All Features

Figure 2.3b: Attributes table of the UK_Cheshire_parish-BNG.SHP file.

Click ► to play the video

Adding Area



“Then, count up the number of holdings in each parish and add this as a new variable in the UK_Cheshire_parish-BNG layer. Click **PROCESSING** → **TOOLBOX**. Search for ‘count points in polygon’ in the Processing Toolbox. Set UK_Cheshire_parish-BNG as the input polygon vector layer, UK_Cheshire_FMD-BNG as the input point vector layer and ‘NUMPOINTS’ as the output count field name. Set the output shapefile as UK_Cheshire_parish_NEW-BNG (Figure 2.4).”

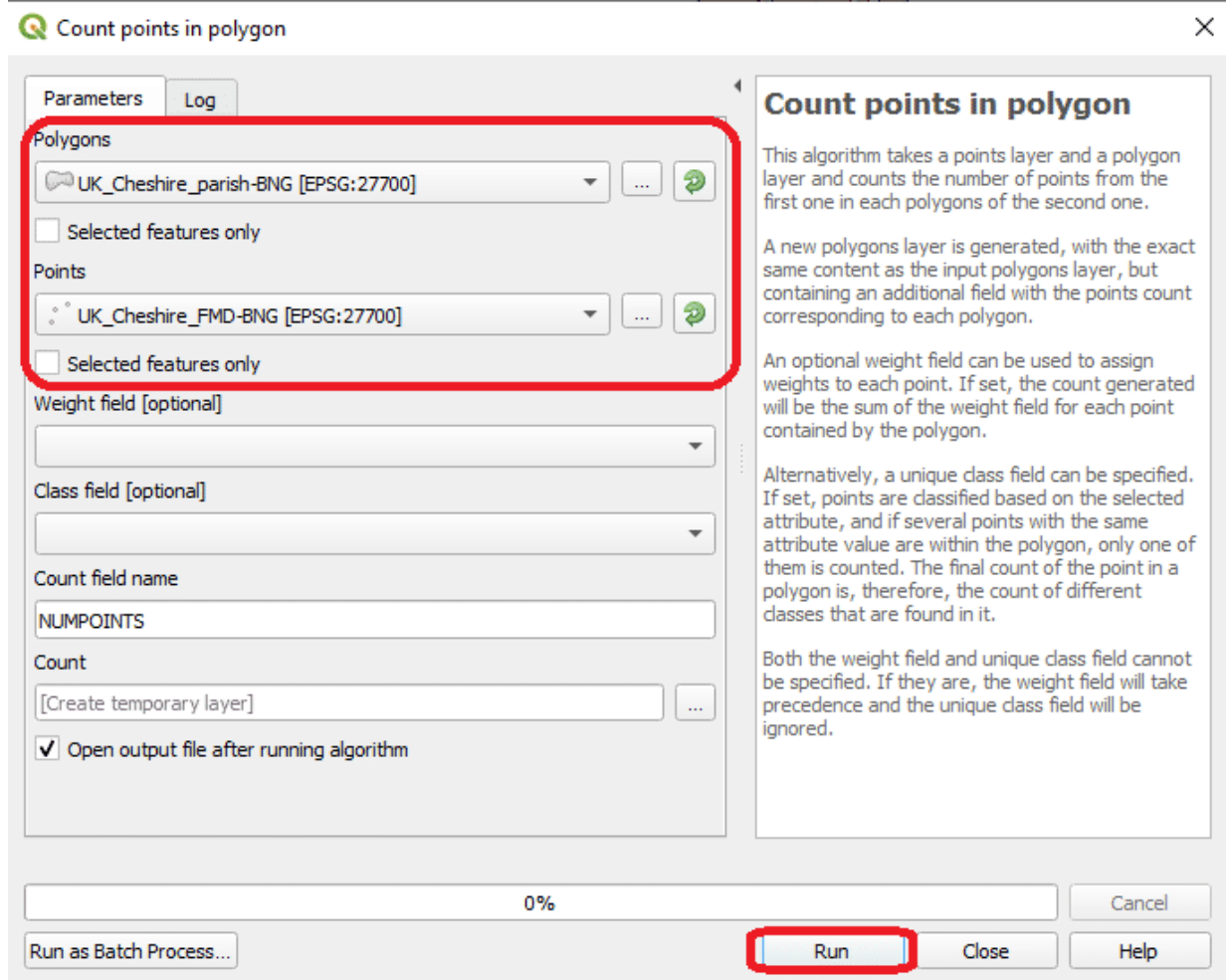
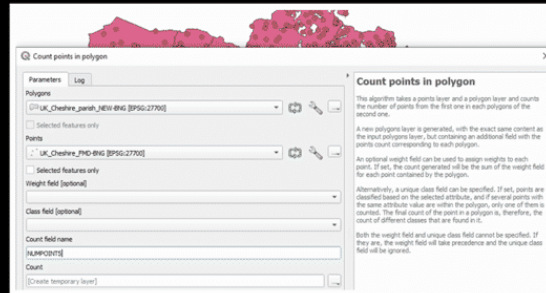


Figure 2.4: Settings used in Count points in polygon function.

Click ► to play the video

Adding Numpoints



“ Open the attribute table of UK_Cheshire_parish_NEW-BNG to inspect the results. Use the Field calculator to add another column to the UK_Cheshire_parish_NEW-BNG attribute table called `HOLDDEN'. Make the new variable a decimal number with a width of 10 and a precision of 4. Calculate holding density as "NUMPOINTS" / "AREA" (Figure 2.5).”

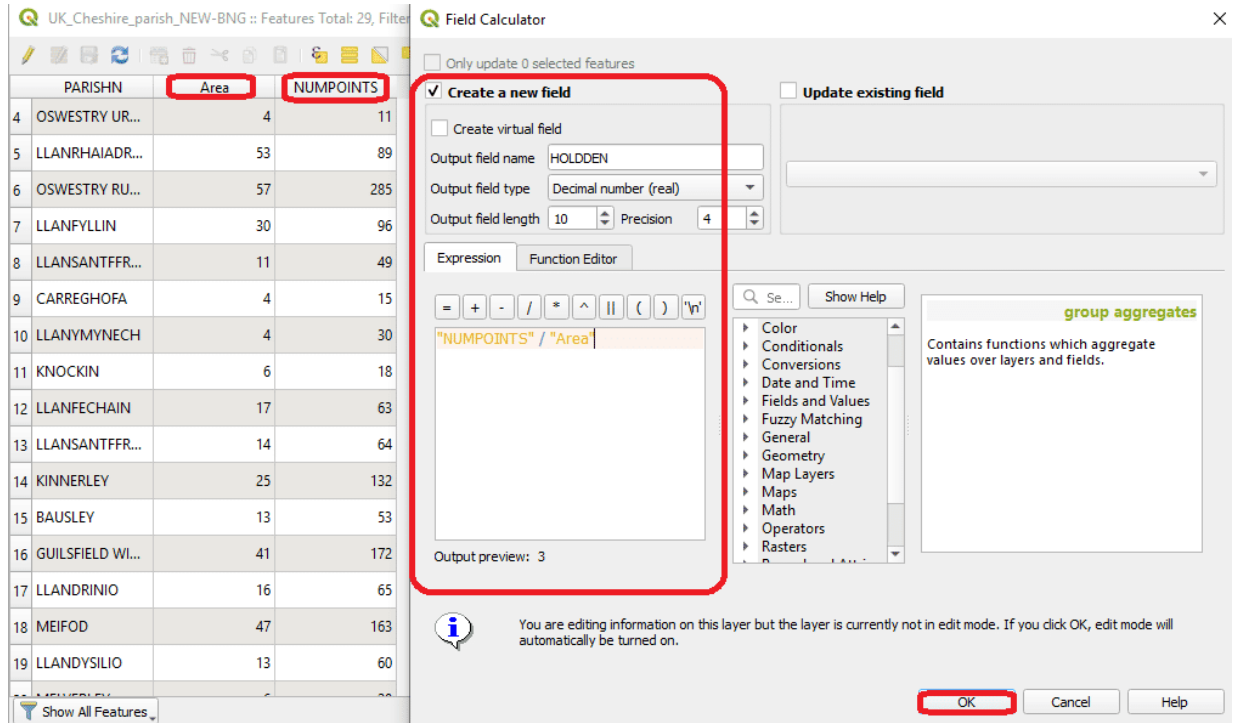
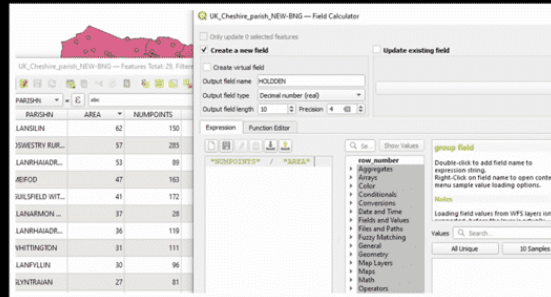


Figure 2.5: Settings used to calculate holding density in Field calculator.

Click ► to play the video

Adding HoldDen



CONTINUE

Quizzes

Match the correct answer.



Parish that has the highest holding density

LLANYMYNECH



Parish that has the lowest holding density

LLANARMON DYFFRYN CEIROG

SUBMIT

What is the average holding density



3.75



3.66



7.50



0.75

SUBMIT

CONTINUE



Spatial buffers



“The ability to define ‘buffer zones’ around infected premises is a typical requirement in the management of infectious disease outbreaks and is a straightforward job using QGIS. Here we will create a 5-kilometre buffer zone around the FMD-positive holding holdings in the Cheshire data set. Open the attributes table of the UK_Cheshire_FMD-BNG layer and use the filter function to select only those holdings with a status variable equal to 1, as shown earlier in Figure 2.1. Select VECTOR → GEOPROCESSING TOOLS → BUFFER. Set UK_Cheshire_FMD-BNG as the Input vector layer (using only the selected features), 5000 (metres) as the dissolved buffer distance, and set the output shapefile as UK_Cheshire_FMD_05km_buffer-BNG.

Adjust the opacity of buffer to match the Figure below (Figure 2.6b)”

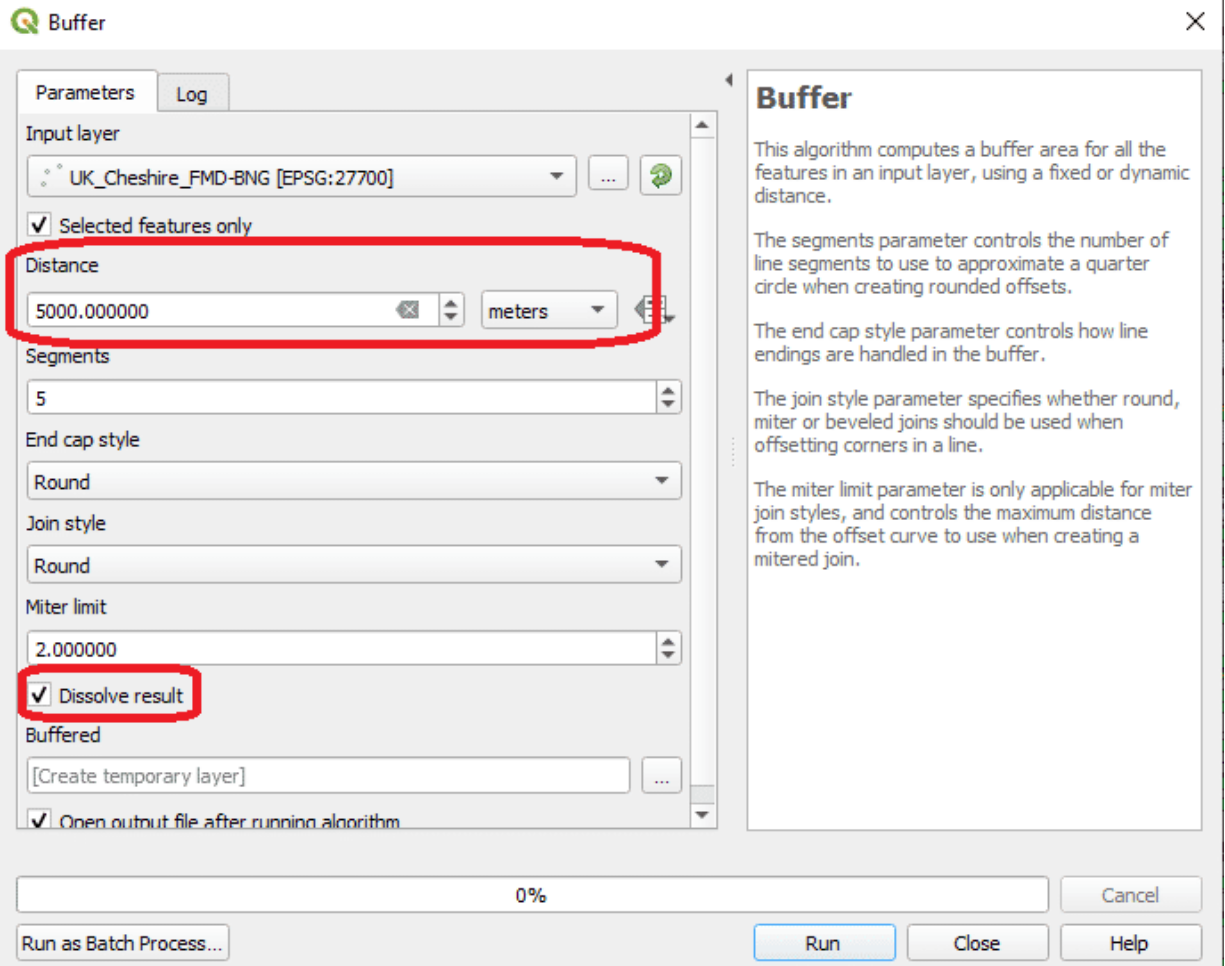


Figure 2.6a: Settings used for Buffer tool

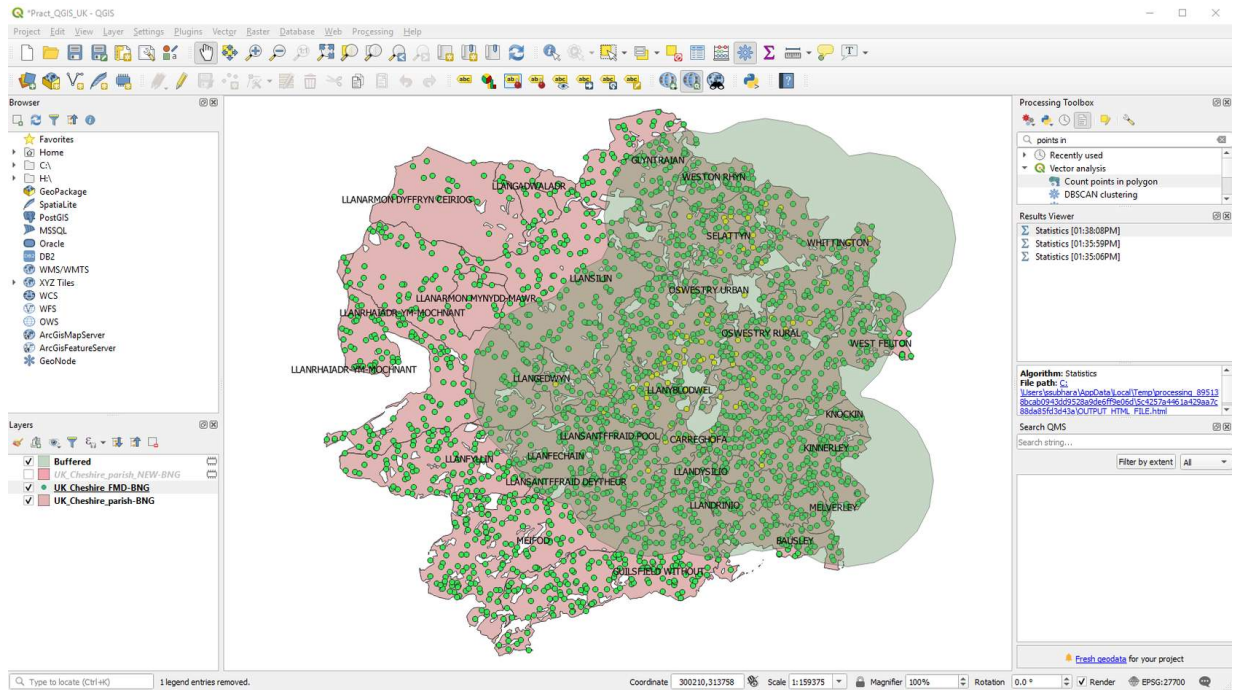


Figure 2.6b: Map of Cheshire showing the location of FMD-positive holdings with 5km buffer



“Imagine you are involved in managing the control of FMD in Cheshire. Make a list of holdings that should be put on surveillance that is the FMD-negative holdings that lie within the buffer area you have just defined. This is a two-step process. Firstly, we select all holdings that are inside the buffer. See [VECTOR](#) → [RESEARCH TOOLS](#) → [SELECT BY LOCATION](#). Select UK_Cheshire_FMD-BNG FMD as the Layer to select from, UK_Cheshire_FMD_05km_buffer-BNG as the intersection layer and `within` as the Geometric predicate as settings in figure below. The second step is to select only the

FMD negative holdings. Use the Select by expression tool, set "STATUS" = 0 as the select expression.

Click on the drop-down arrow on the button titled Select (on the bottom right of the dialogue box) and click on `filter current selection. There are 1414 FMD-negative holdings in the buffer area (Figure 2.6c)."

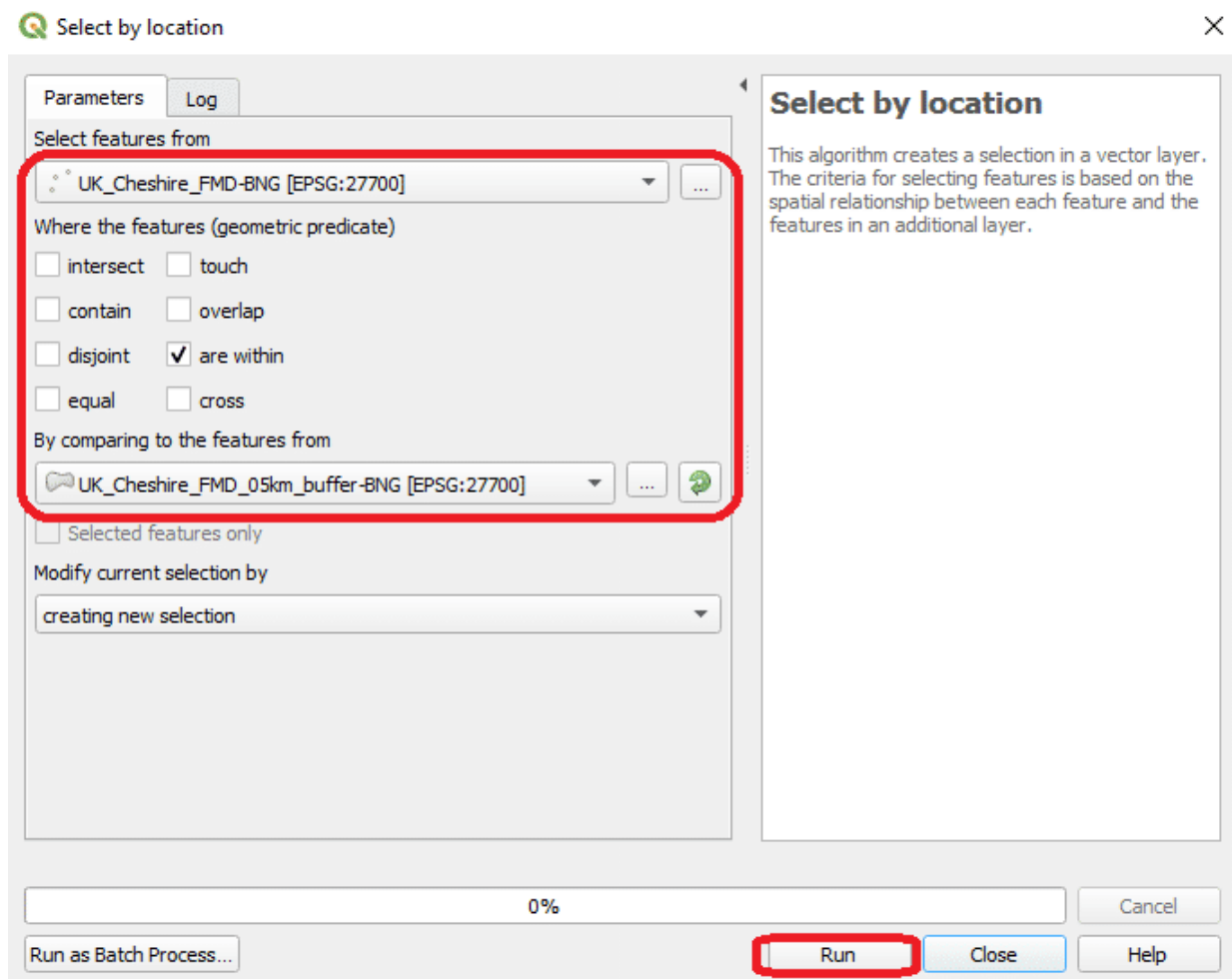
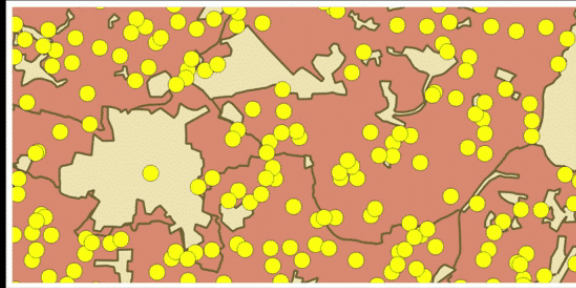


Figure 2.6c: Settings to select point by location.

Click ► to play the video

Adding Buffer and Negative Holdings



CONTINUE

Quiz

Pause and think

Click  to reveal answer

What other factors might need to be taken into account when defining a buffer around disease-positive holdings in the event of an infectious disease outbreak?

It might be more useful to create the buffer around the holding boundaries rather than the holding centroid. Also, one should consider major roadways or other physical features of the

1 of 1

CONTINUE

Congratulations - end of lesson reached

