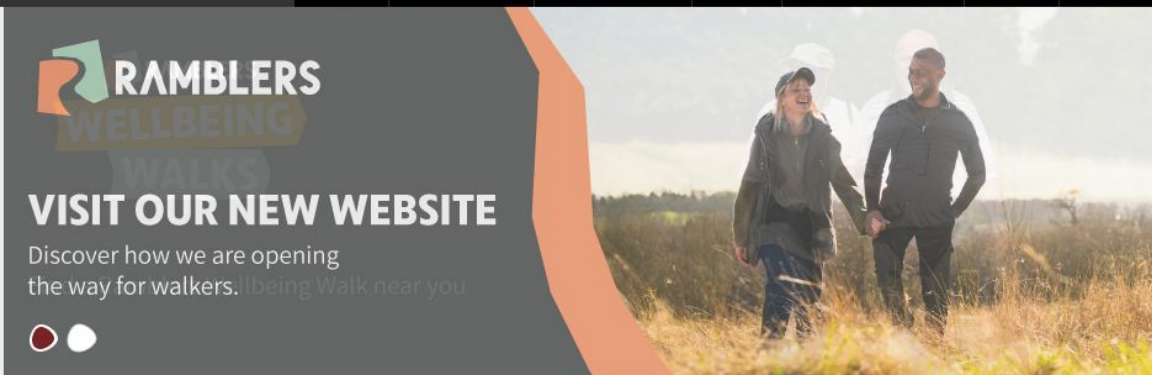




# **Ant Scott** **Analysing access to UK public rights of way with the QGIS Graphical Modeler**

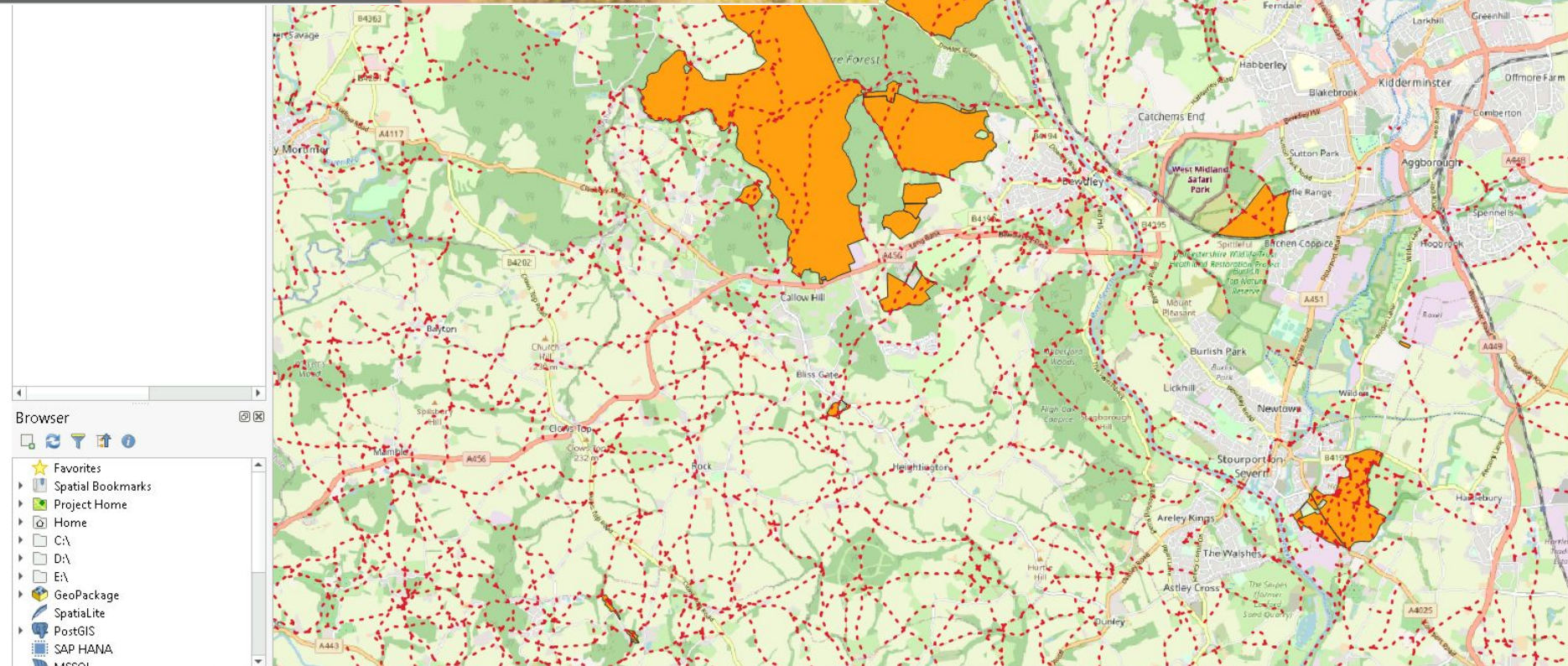
FOSS4G:UK Local 2022 Bristol  
November 17th 2022



net\_astun — QGIS

Processing Toolbox

- Recently used
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Network analysis**
  - Plots
  - Raster analysis
  - Raster creation
  - Raster terrain analysis
  - Raster tools
  - Vector analysis
  - Vector creation
  - Vector general
  - Vector geometry
  - Vector overlay
  - Vector selection
  - Vector table
  - Vector tiles
  - GDAL
  - GRASS
- FOSSAG 2022
  - RoW Analysis with QGIS GM
    - 0 Prep codepoint
    - 1 RoW lengths in Centroid buffer
    - 2 Continuous RoW
    - 3 Wild RoW lengths inside Codepoint buffer
    - 4 RoW Greenness
    - 5 Continuous RoW analysis
    - 6 RoW Greenness Length over 80pc
    - 7 Merge additional RoW
    - 8 Landscape type RoW analysis
    - 9 Open Access Connection
    - 9 Open Access Connection: all outputs
- SAGA



**Layers**

- Wales
  - open\_access\_woodland\_row\_c
  - open\_access\_woodland\_ew [4...
  - pro\_w\_full [529132]**
  - nrw\_open\_access [7108]
  - national\_forest\_inventory [7...
- Open Access
  - crow\_2020\_section\_15
  - open\_access\_ew [1]**
  - codepoint\_llsoa\_en\_wa
- Landscapes
- DS OpenData
- OSM Standard**

**Browser**

- Favorites
- Spatial Bookmarks
- Project Home
- Home
- C:\
- D:\
- E:\
- GeoPackage
- SpatiaLite
- PostGIS
- SAP HANA
- MSSQL

**Model Designer - RoW Analysis with QGIS GM**

Model Edit View

**Algorithms**

Search...

- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Modeler tools
- Network analysis
- Plots
- Raster analysis
- Raster creation
- Raster terrain analysis

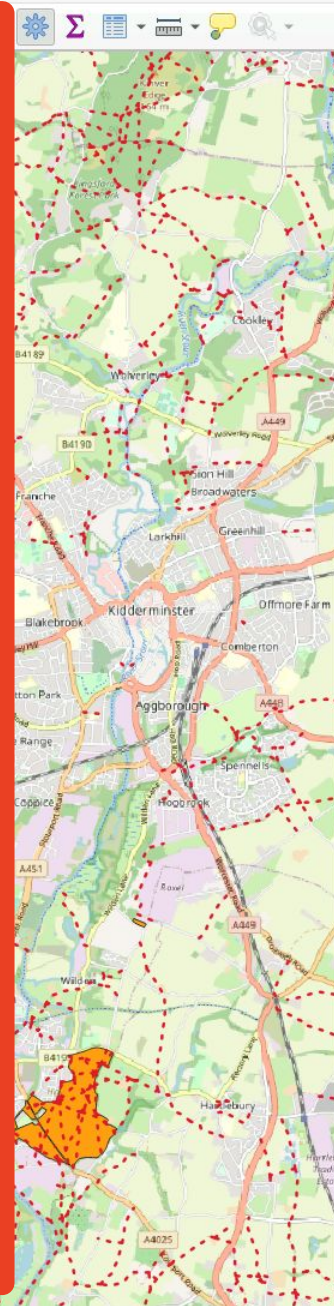
**Model Properties**

Name: RoW Analysis with QGIS GM

Group: FOSS4G 2022

**Variables** | Model Properties

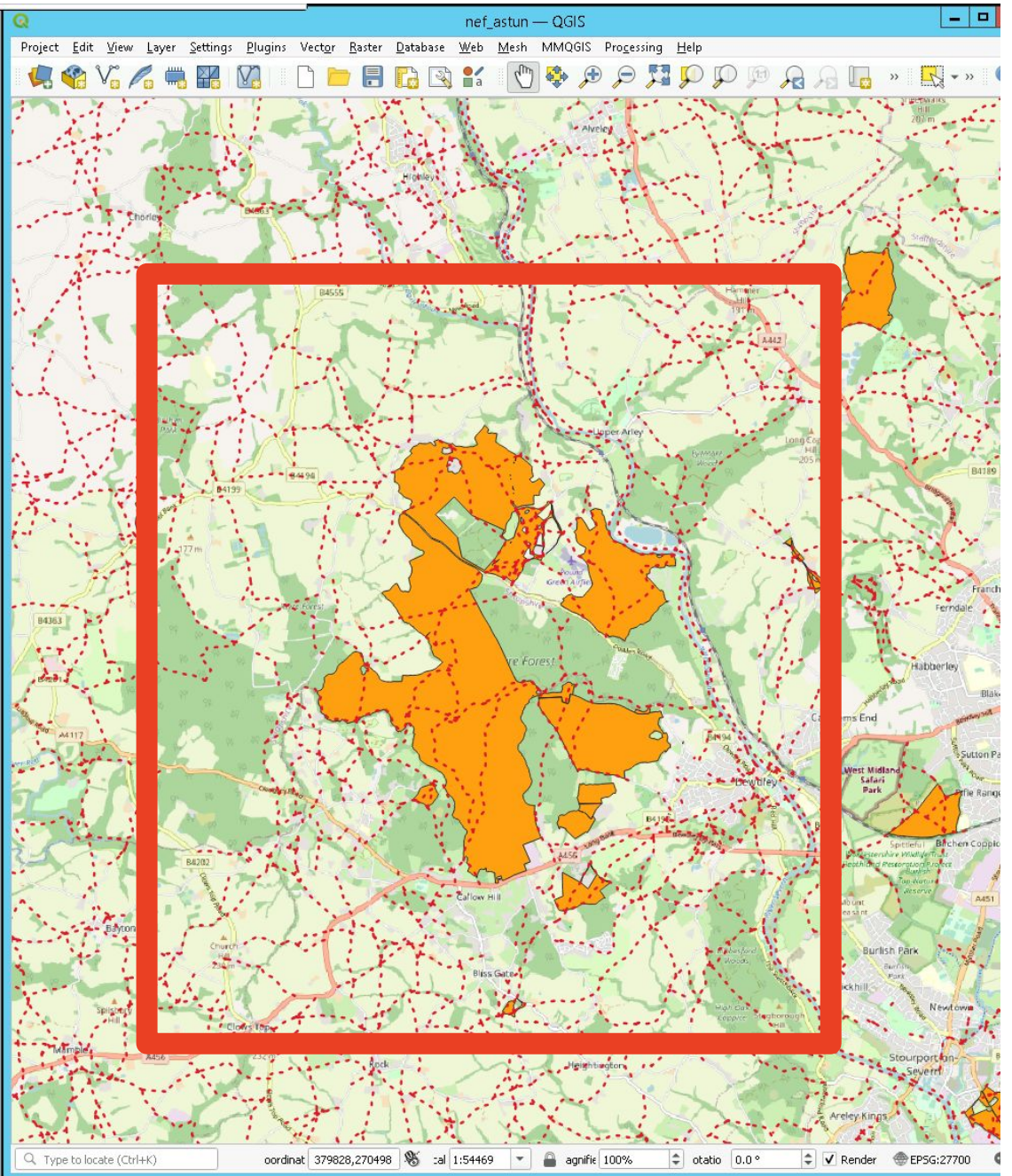
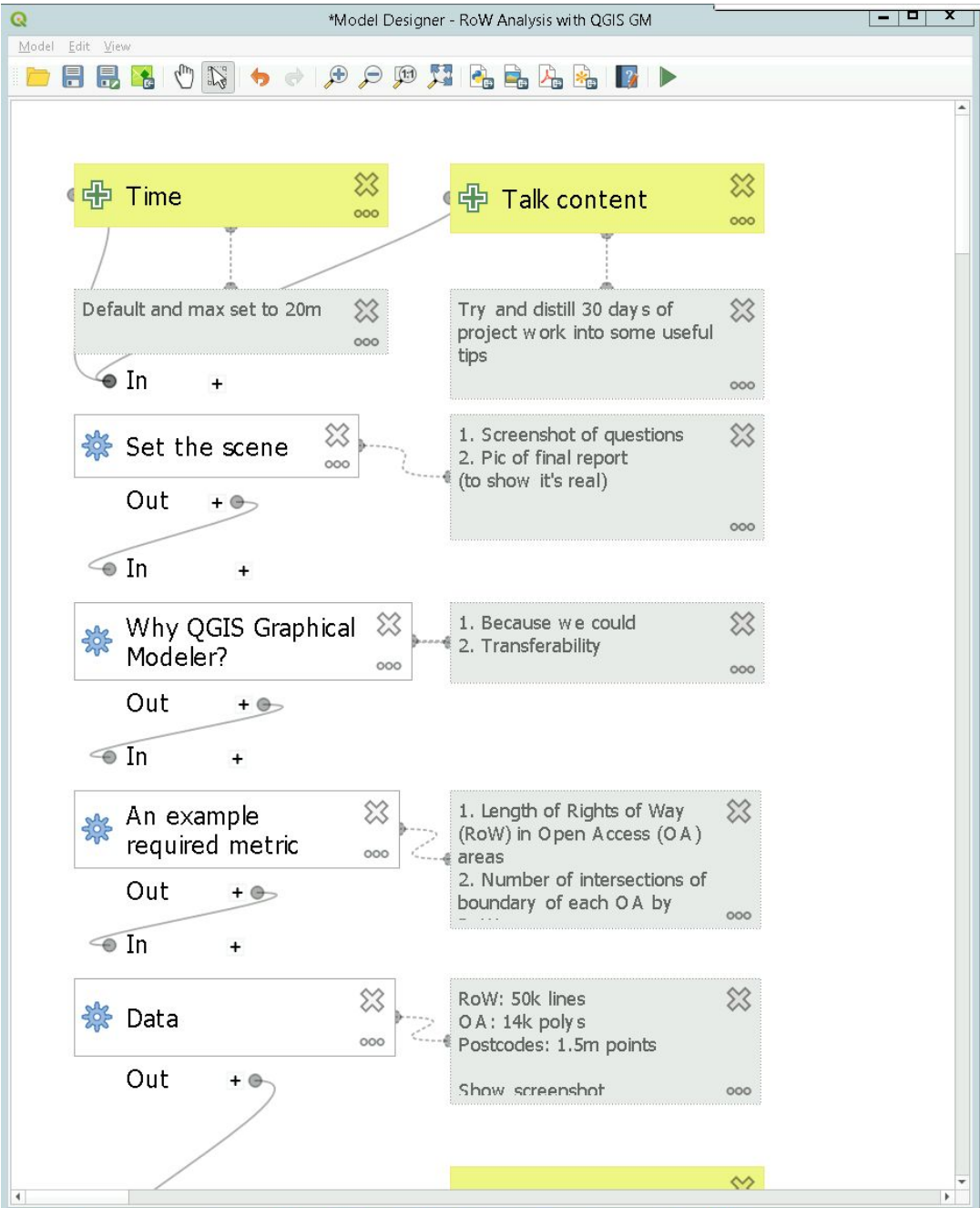
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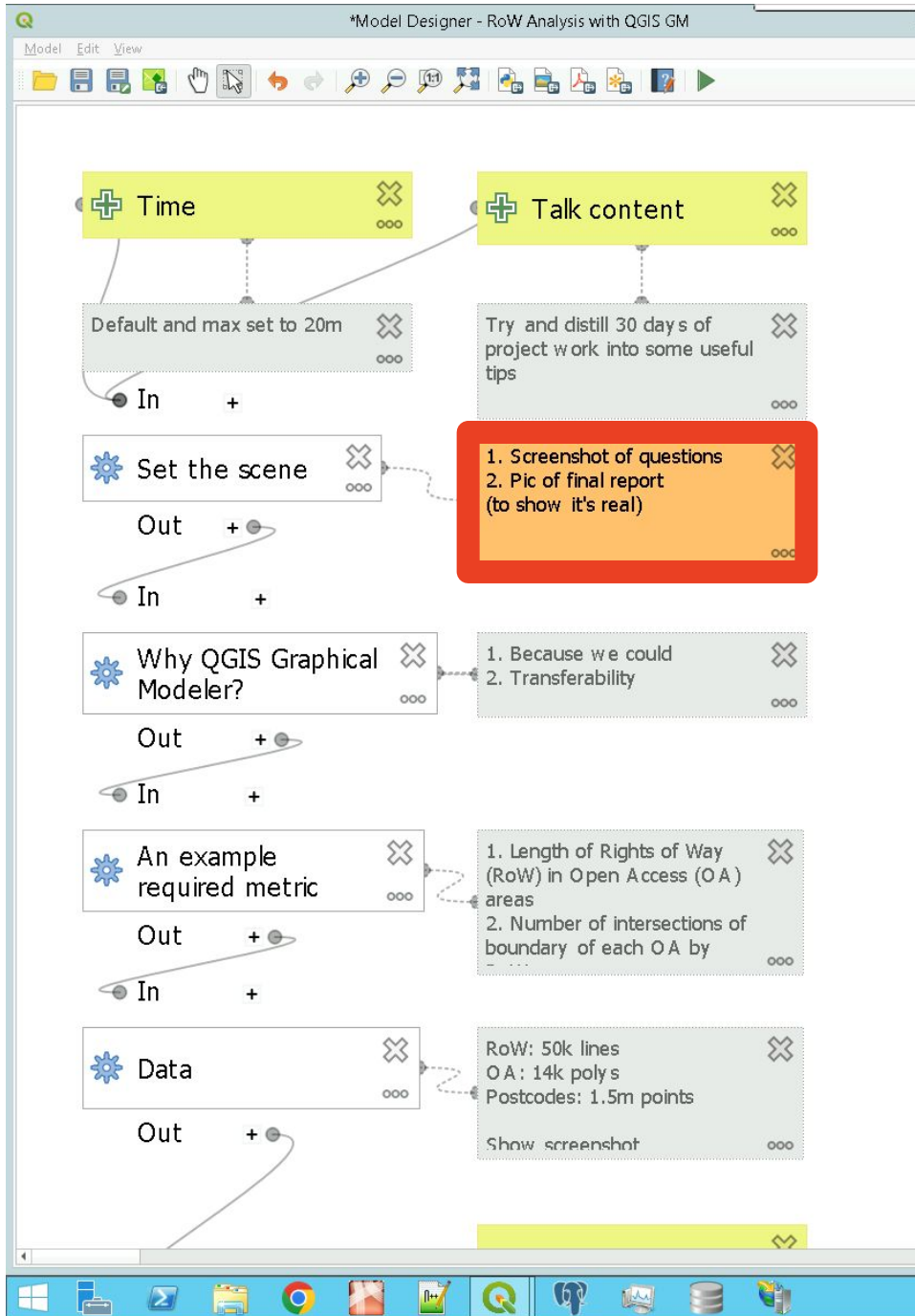


**Processing Toolbox**

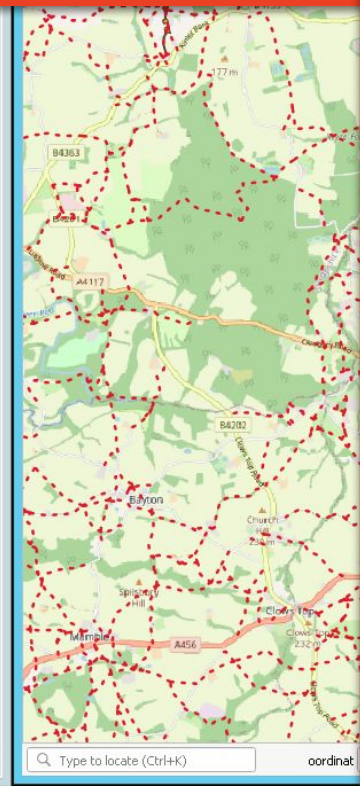
Search...

- Recently used
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Network analysis
- Plots
- Raster analysis
- Raster creation
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation
- Vector general
- Vector geometry
- Vector overlay
- Vector selection
- Vector table
- Vector tiles
- GDAL
- GRASS
- Project models
  - FOSS4G 2022
    - RoW Analysis with QGIS GM**
    - NEF
      - 0 Prep codepoint
      - 1 RoW lengths in Centroid buffer
      - 2 Continuous RoW
      - 3 Wild RoW lengths inside Codepoint buffer
      - 4 RoW Greenness
      - 5 Continuous RoW analysis
      - 6 RoW Greenness Length over 80pc
      - 7 Merge additional RoW
      - 8 Landscape type RoW analysis
      - 9 Open Access Connection
      - 9 Open Access Connection: all outputs
- SAGA





- Length of ROW within Nkm radius of postcode centroid
- Number of ROW of over Nkm (3km?) continuous length within Nkm of postcode centroid assuming X/Y/Z buffer size
- Distance from postcode centroid to nearest ROW of 3km or more
- Average greenness of ROW within Nkm radius of postcode centroid
- Length of ROW within Nkm radius of postcode centroid at minimum greenness level of X
- Length of ROW within/near to wild areas within Nkm of postcode centroid, assuming a buffer around 'wild areas' of Nm (20m?) is also included
- Proximity of RoW to specific features
- Distance from postcode to nearest access land of at least a hectare in size
- Length of RoW in open access, and number of intersections of boundary by RoW
- Distance from postcode to nearest access land
- Length of DLYW paths within 800m of postcode centre
- Proximity of RoW to specific classes of features
- Access to RoW from specific features

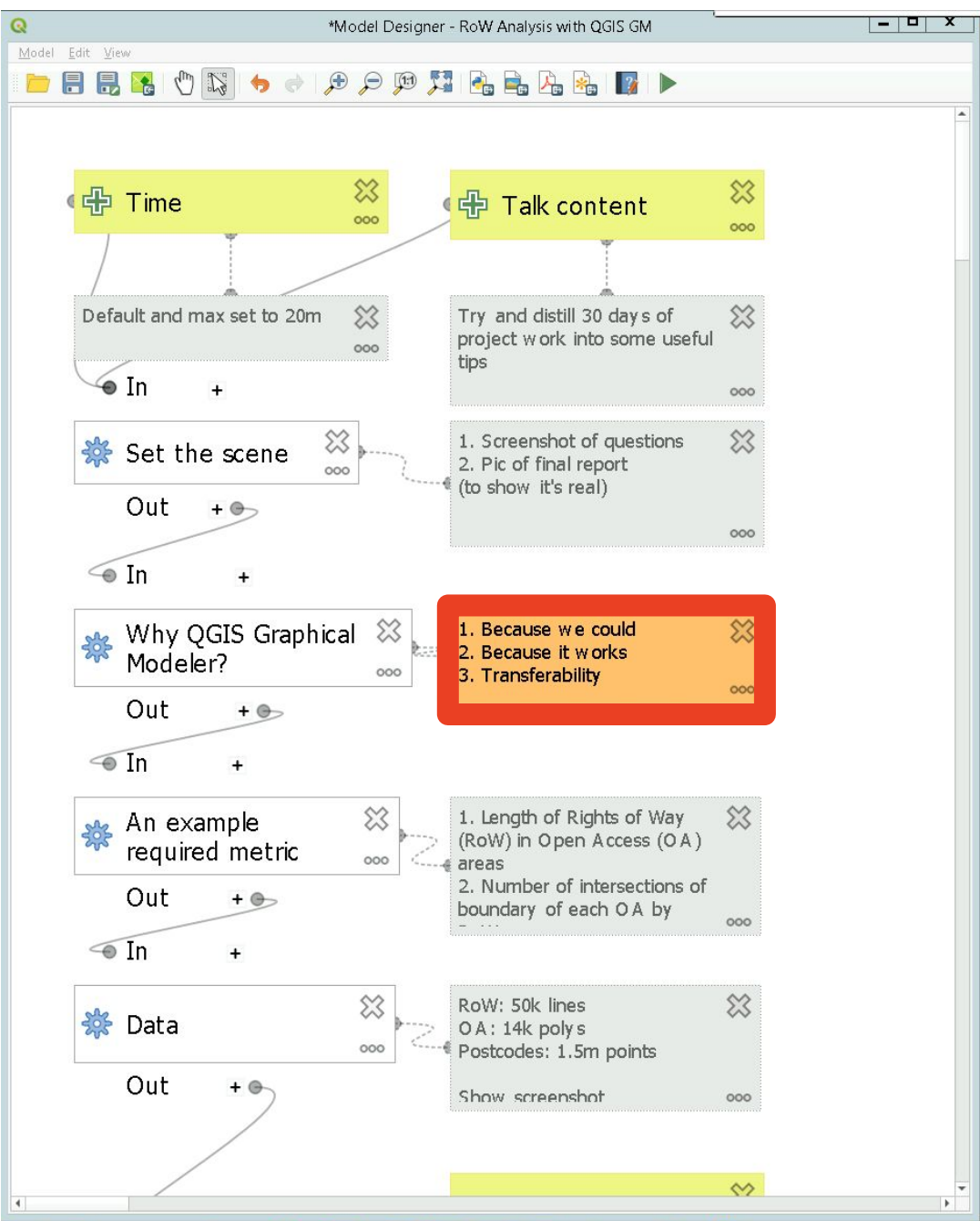


**NEW ECONOMICS FOUNDATION**

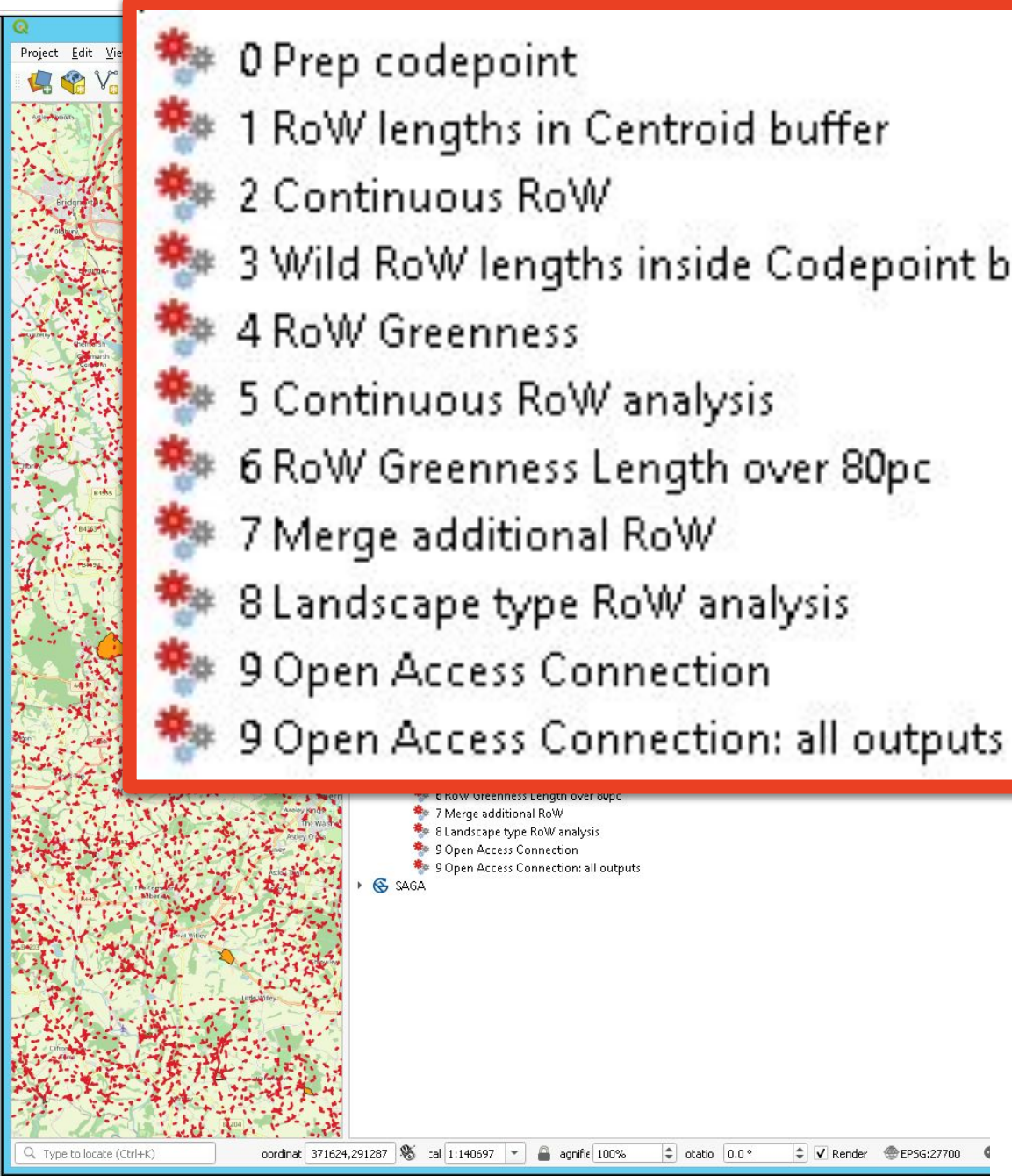
# PATHS AND ACCESS

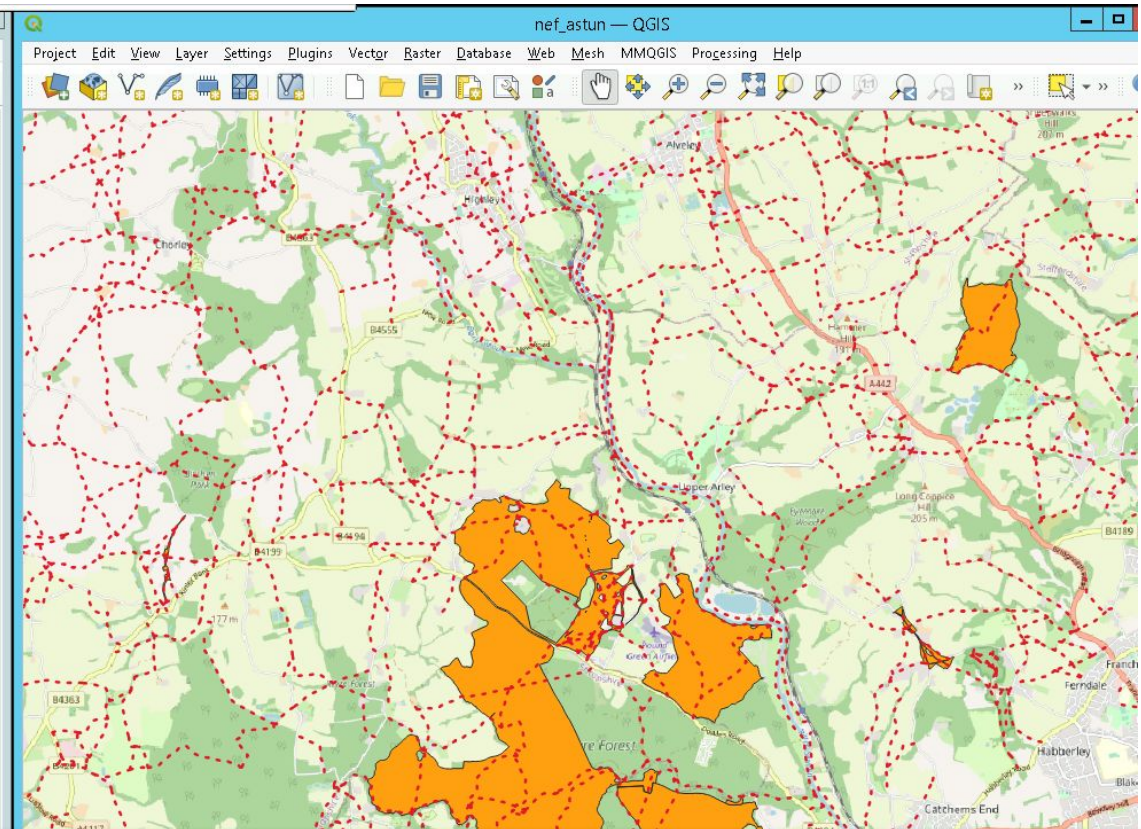
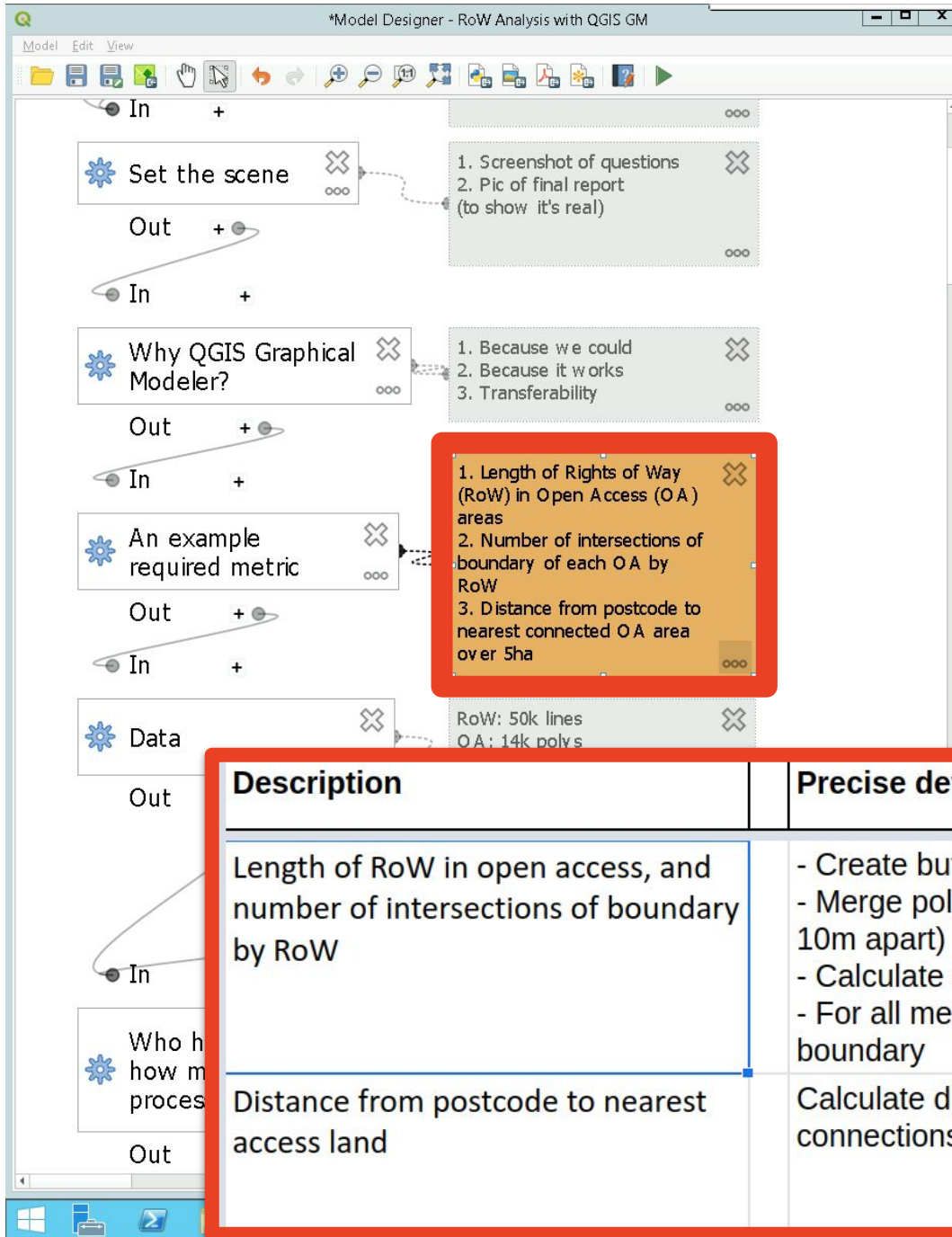
## AN ANALYSIS OF PROVISION AND INEQUITY IN ENGLAND AND WALES

**Written by:** Dr Alex Chapman (NEF), Poorva Prabhu (NEF), and Antony Scott (ASTUN Technology)  
**Published:** August 2022

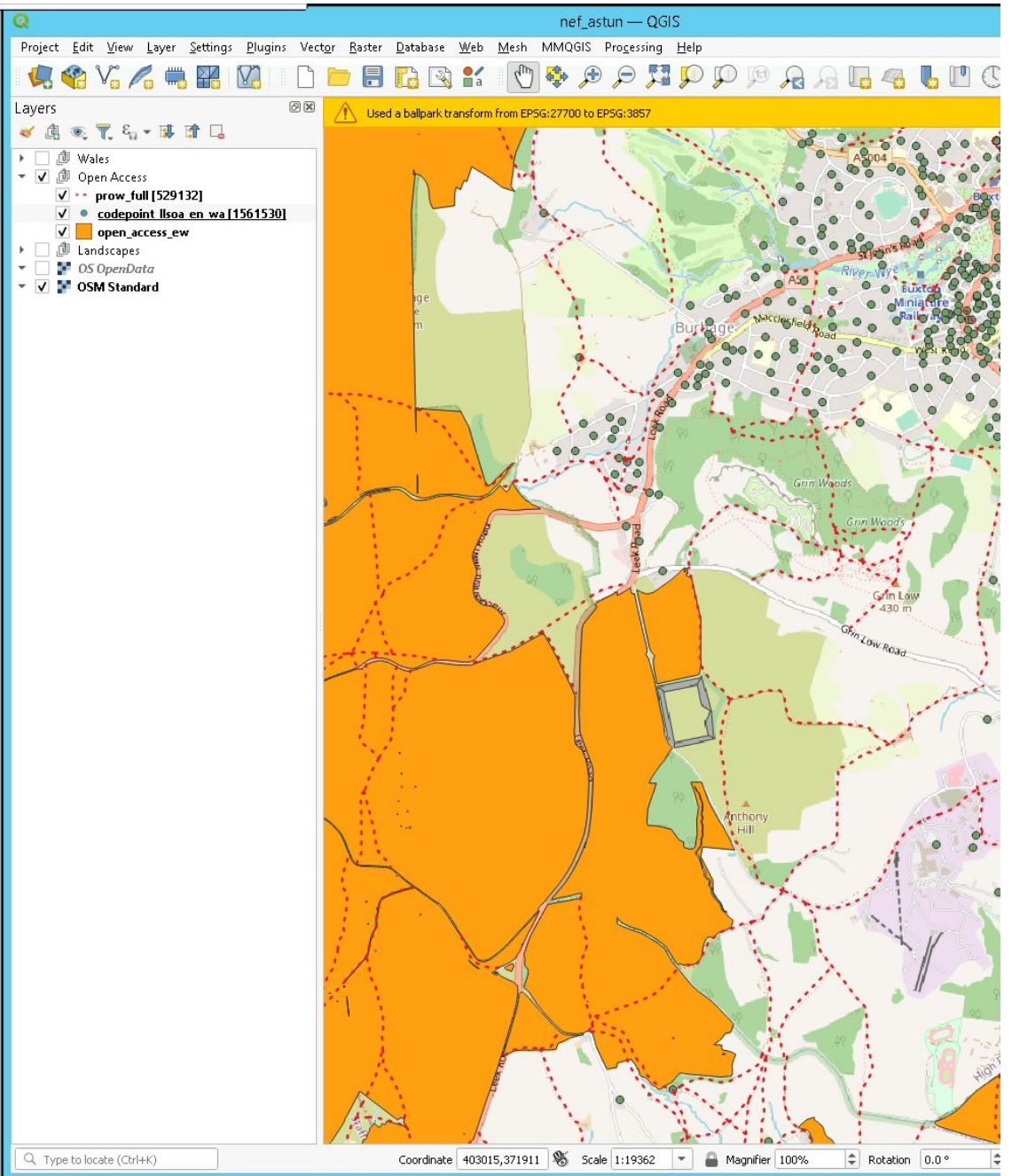
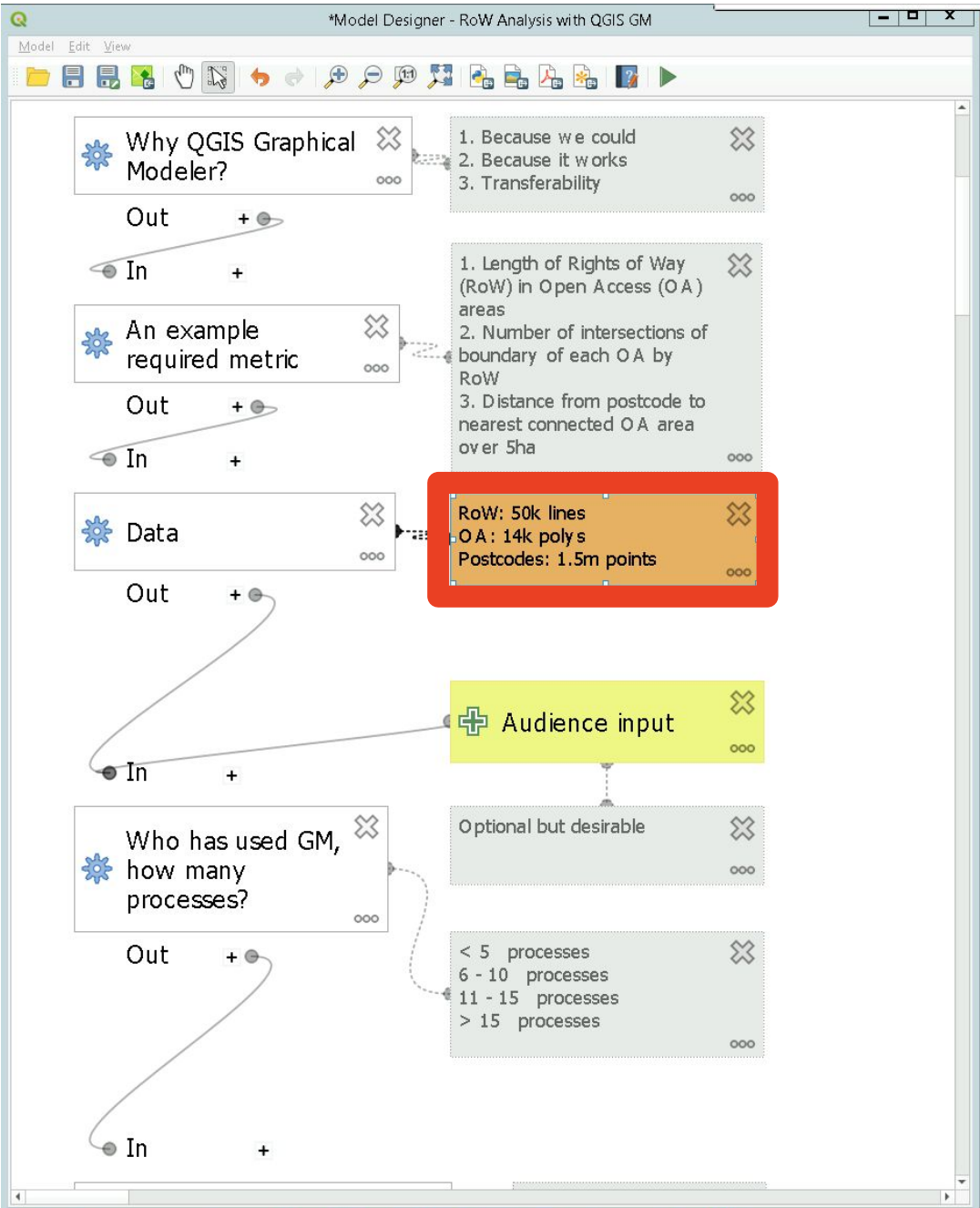


- 0 Prep codepoint
- 1 RoW lengths in Centroid buffer
- 2 Continuous RoW
- 3 Wild RoW lengths inside Codepoint buffer
- 4 RoW Greenness
- 5 Continuous RoW analysis
- 6 RoW Greenness Length over 80pc
- 7 Merge additional RoW
- 8 Landscape type RoW analysis
- 9 Open Access Connection
- 9 Open Access Connection: all outputs





Description	Precise definition
Length of RoW in open access, and number of intersections of boundary by RoW	<ul style="list-style-type: none"> <li>- Create buffer of 5m round all access land, with overlapping buffers joined</li> <li>- Merge polygons which fall inside a single buffer polygon (note that this will merge polygons 10m apart)</li> <li>- Calculate the area of the each merged polygon</li> <li>- For all merged polygons, count no and length of RoW inside, and no of RoW intersections of boundary</li> </ul>
Distance from postcode to nearest access land	Calculate distance from postcode centroid to nearest open access land polygon over 5ha with connections to RoW network, using buffered/merged polygons from output 11





**\*Model Designer - RoW Analysis with QGIS GM**

Model Edit View

Data OA: 14k polys  
Postcodes: 1.5m points

Out +

In +

**Audience input**

Who has used GM, how many processes?

Out +

In +

Quick run through of the process

Out +

In +

What we learned

Out +

In +

In +

Optional but desirable

- < 5 processes
- 6 - 10 processes
- 11 - 15 processes
- > 15 processes

Milk it if audience was wrong, otherwise move swiftly on

Show a screenshot and walk through

Highlight unanticipated processes

Run through learnings

**nef\_astun — QGIS**

Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh MMQGIS Processing Help

Type to locate (Ctrl+K)

coordinat 402371,369925

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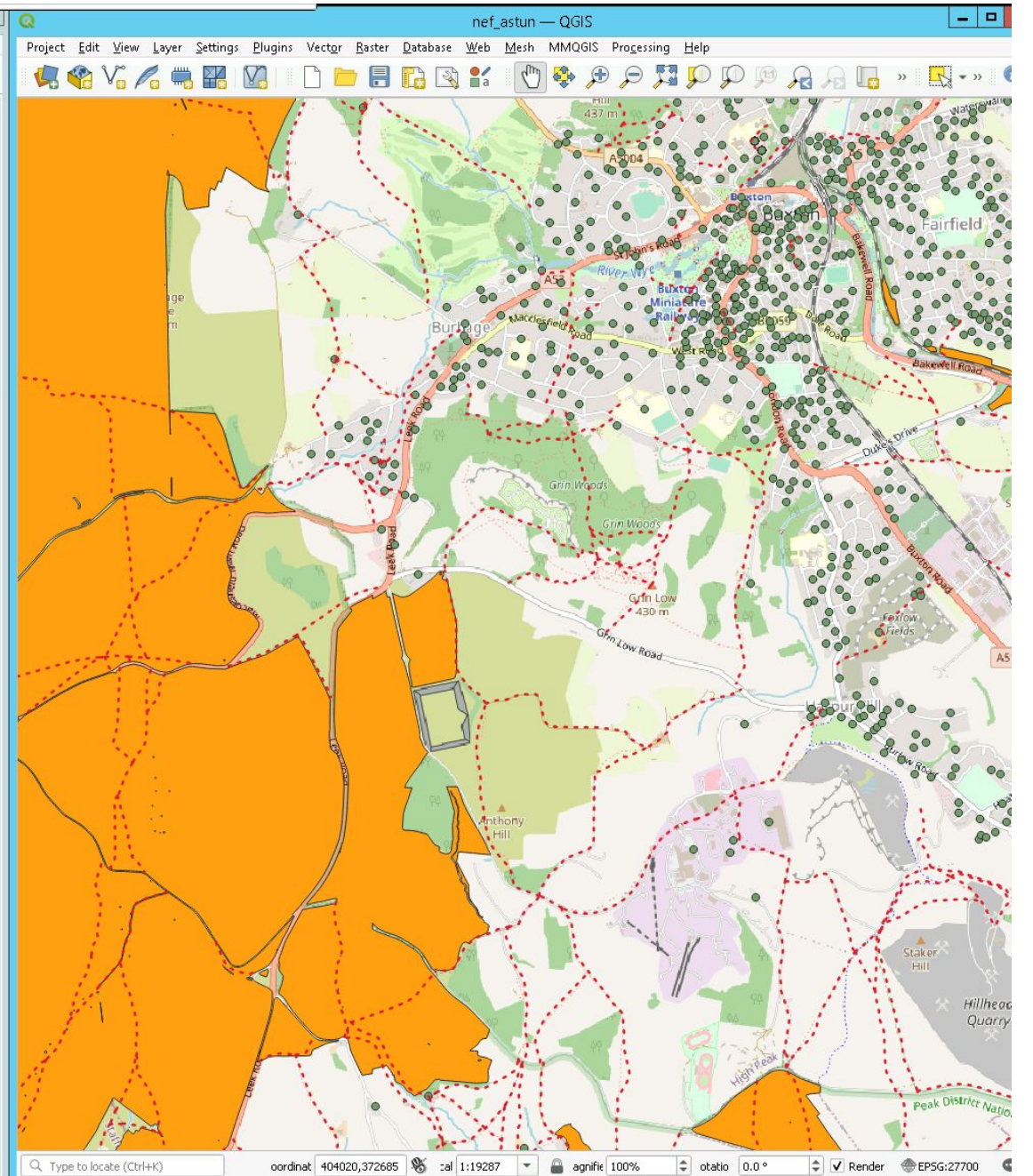
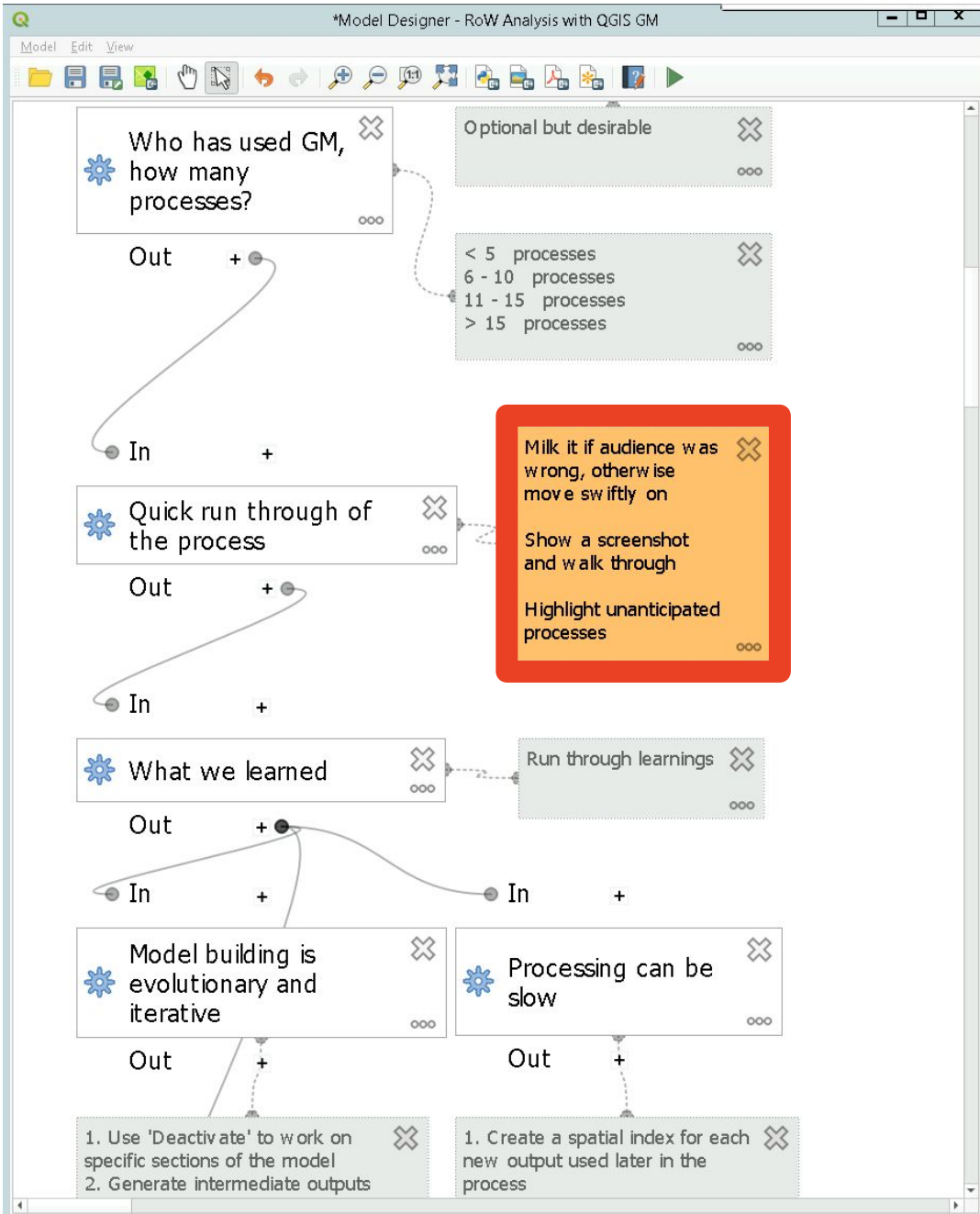
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otatio 0.0°

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15:58  
19/08/2022





Algorithms

- Search...
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Modeler tools
- Network analysis
- Plots
- Raster analysis
- Raster creation
- Raster terrain analysis
- Raster tools
- Vector analysis
- Vector creation

Inputs Algorithms

Model Properties

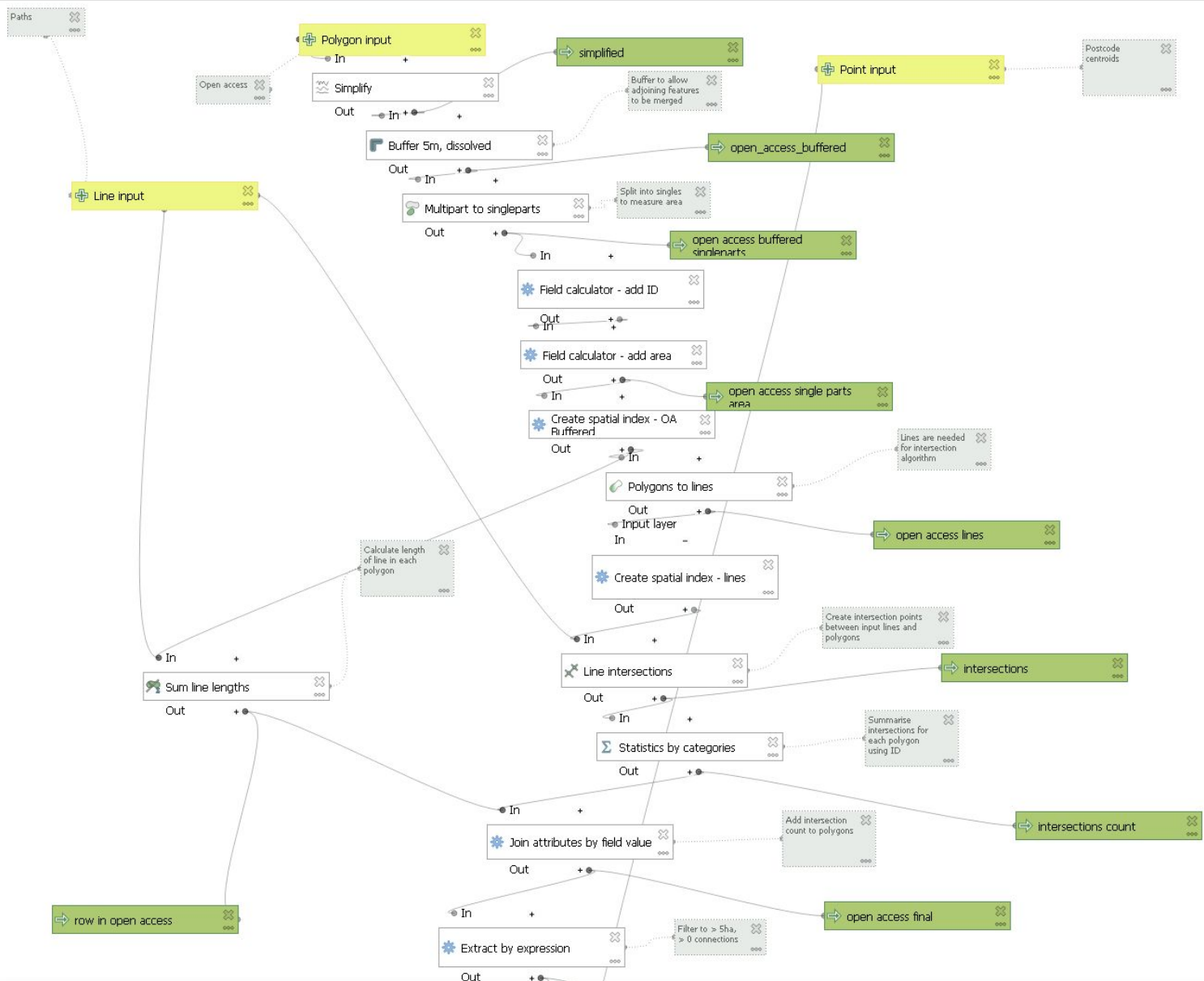
Name: 9 Open Access Connection: all outputs

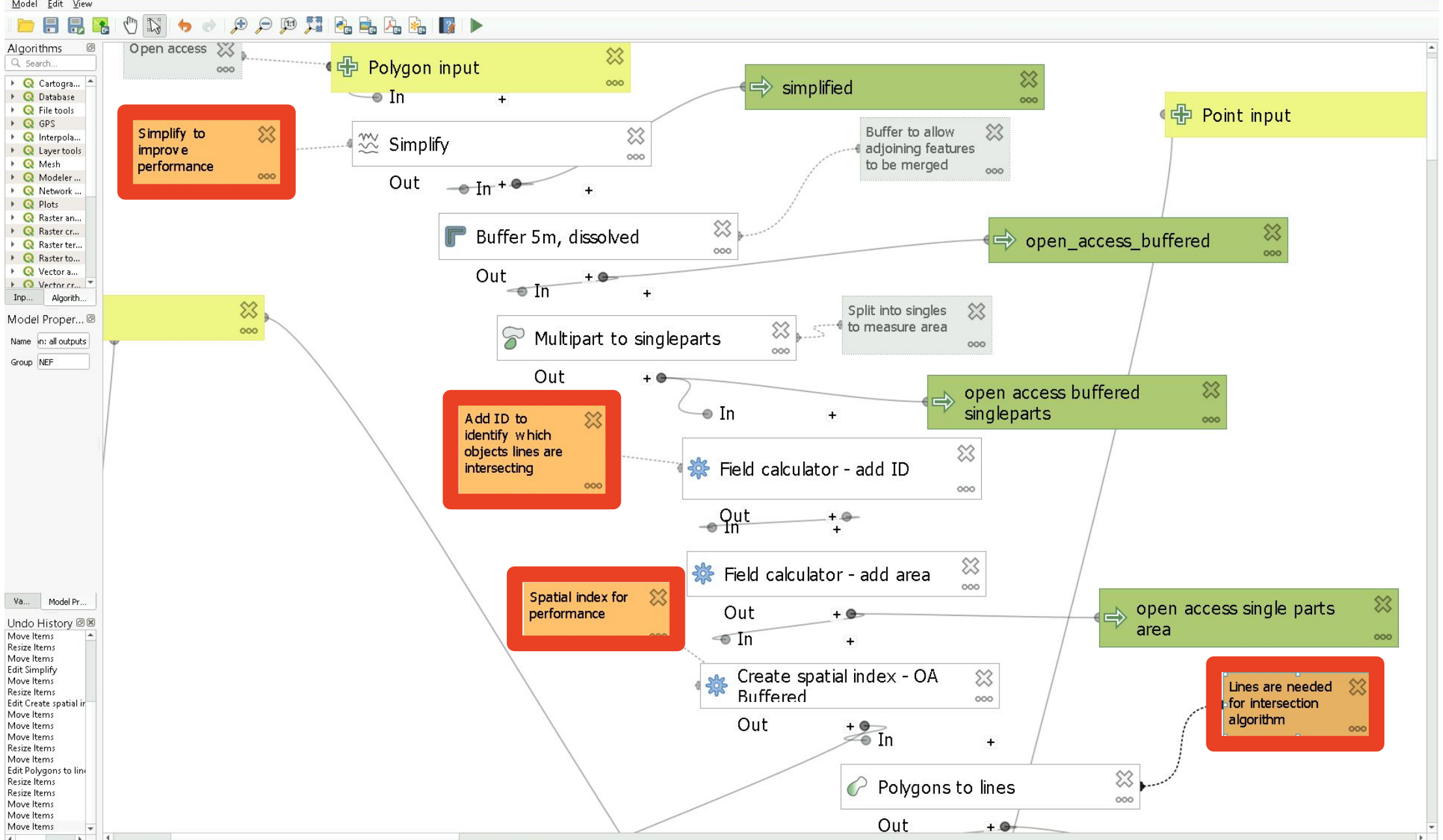
Group: NEF

Variables Model Properties

Undo History

<empty>





- Undo History
- Move Items
- Resize Items
- Move Items
- Edit Simplify
- Move Items
- Resize Items
- Edit Create spatial in
- Move Items
- Move Items
- Move Items
- Move Items
- Move Items
- Move Items
- Edit Polygons to lin
- Resize Items
- Resize Items
- Move Items
- Move Items
- Move Items

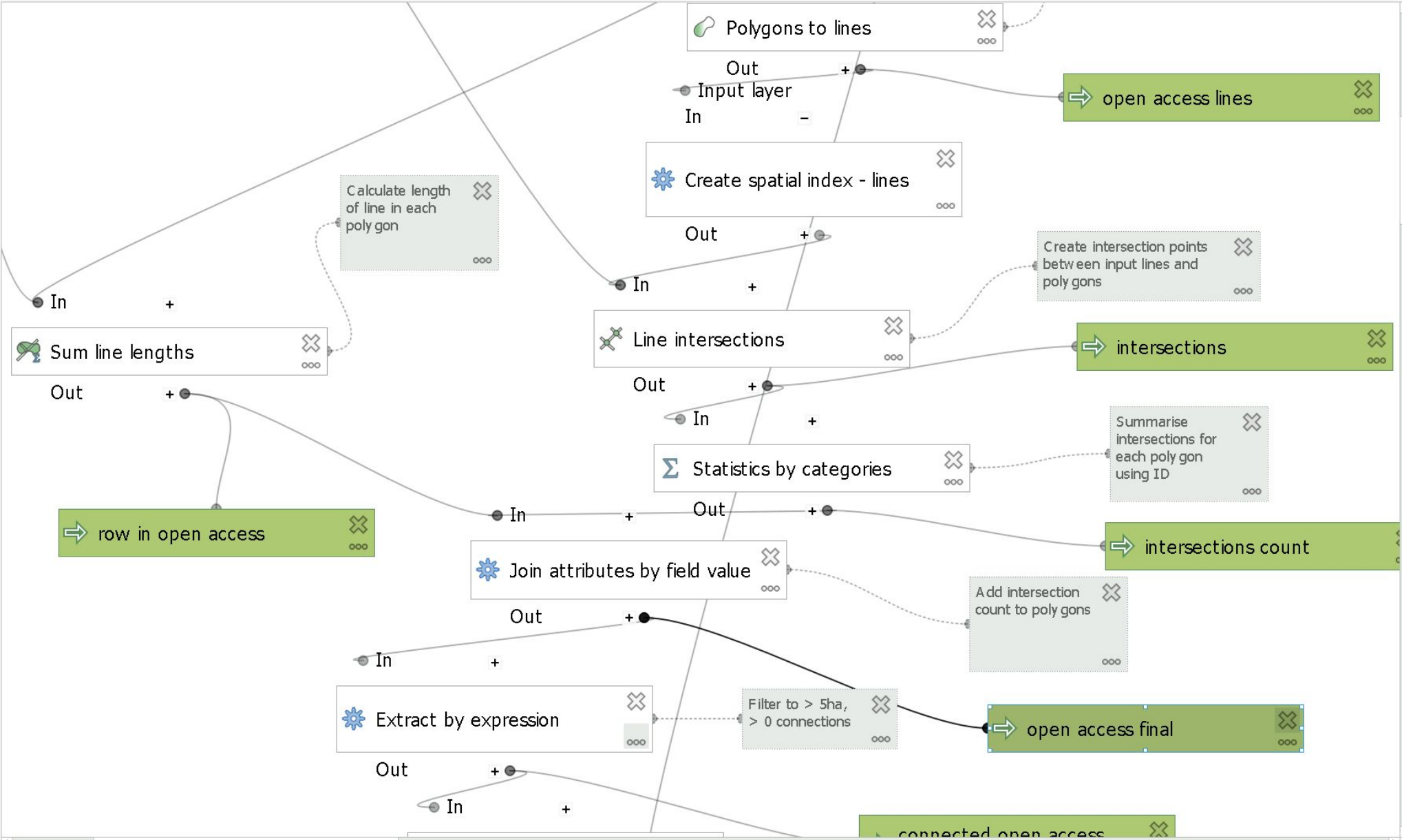


- Search...
- Cartogra...
- Database
- File tools
- GPS
- Interpola...
- Layer tools
- Mesh
- Modeler ...
- Network ...
- Plots
- Raster an...
- Raster cr...
- Raster ter...
- Raster to...
- Vector a...
- Vector cr...

Name: in: all outputs

Group: NEF

- Move Items
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- Move Items
- Move Items
- Move Items



\*Model Designer - RoW Analysis with QGIS GM

Highlight unanticipated processes

In +  
What we learned  
Out +  
Run through learnings  
In +  
Model building is evolutionary and iterative  
Out +  
Processing can be slow  
Out +  
What we wished we'd done  
Out +  
1. More of the things I just mentioned  
2. Saved models as files, not models in the project  
3. Found the 'Modeler tools' algorithms before anyone else after the project

1. Use 'Deactivate' to work on specific sections of the model
2. Generate intermediate outputs until the model is stable
3. Add comments so you remember what each process or input is for
4. Save outputs which might have value, but document them so you know what and why
5. Use the graphic to sanity-check logic and dependencies

1. Create a spatial index for each new output used later in the process
2. Don't keep generating outputs that won't change - process once and save
3. During development, work on smaller datasets
4. Retain only fields you need
5. Migrate to SQL (eg in Postgres) if you need to
6. Trust the progress bar no more than you would any other

\*Model Designer - 9 Open Access Connection: all outputs

Algorithms

- Cartograph...
- Database
- File tools
- GPS
- Interpolat...
- Layer tools
- Mesh
- Modeler...

Model Proper...

Name: in: all outputs  
Group: NEF

Undo History

- Move Items
- Move Items
- Move Items
- Resize Items
- Move Items
- Move Items
- Move Items
- Move Items
- Move Items
- Move Items
- Move Items
- Move Items

\*Model Designer - RoW Analysis with QGIS GM

Model Edit View

Highlight unanticipated processes

In +

What we learned

Run through learnings

Out +

In +

Model building is evolutionary and iterative

Processing can be slow

Out +

Out +

1. Use 'Deactivate' to work on specific sections of the model

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In +

What we wished we'd done

Out +

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\*Model Designer - 9 Open Access Connection: all outputs

Model Edit View

Algorithms

Cartogra... Database File tools GPS Interpola... Layer tools Mesh Modeler...

Model Proper...

Name: in: all outputs

Group: NEF

Undo History

Move Items Move Items Move Items Move Items Move Items Move Items Move Items Move Items Move Items Move Items

Coordinate: 349815,152427 Scale: 1:38574 Accuracy: 100% Orientation: 0.0°

Model Designer - RoW Analysis with QGIS GM

Model Edit View

4. Save outputs which might have value, but document them so you know what and why  
 5. Use the graphic to sanity-check logic and dependencies

smaller datasets  
 4. Retain only fields you need  
 5. Migrate to SQL (eg in Postgres) if you need to  
 6. Trust the progress bar no more than you would any other

In +

What we wished we'd done

Out +

1. More of the things I just mentioned  
 2. Saved models as files, not models in the project  
 3. Found the 'Modeler tools' algorithms before rather than after the project  
 4. Built some models where I didn't bother  
 5. Not built some models where I did bother  
 6. Documented at model level as well as at process level  
 7. Saved the logs more often and read them more closely

In +

Outcomes

Out +

The 'Graphical Modeler' is robust, well-built and incredibly useful (though not necessarily the right tool for presentations....)

It allowed us to develop, finesse, document and pass on the models which analysed the data used to support the work of this report

Including these conclusions

Any questions?

nef\_astun — QGIS

Edit View Layer Settings Plugins Vector Raster Database Web Mesh MMQGIS Processing Help

Algorithms

Search...

- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Modeler tools
  - Conditional branch
  - Create directory
  - Feature filter
  - Filter by geometry type
  - Filter layers by type
  - Load layer into project
  - Raise exception
  - Raise warning
  - Rename layer
  - Save log to file
  - Set project variable
  - String concatenation
- Network analysis
- Plots
- Raster analysis
- Raster creation

Inputs

- Map Layer
- Map Theme
- Matrix
- Mesh Dataset Groups
- Mesh Dataset Time
- Mesh Layer
- Multiple Input
- Number
- Point
- Point Cloud Layer
- Print Layout
- Print Layout Item
- Range
- Raster Band
- Raster Layer
- Scale
- String
- TIN Creation Layers
- Vector Features

Help Editor

The UK national walking organisation, Ramblers, are working to improve the public rights of way network, and in particular improve access to it for people who are less advantaged, and may not have access to vehicles. The research project described in this talk undertook an analysis of the national paths network using publicly available data supplied by hundreds of individual local authorities across the UK. This was done by setting up a series of models in the QGIS Graphical Modeler to generate six key indicators aggregated to census area level, including distance to nearest continuous path from each small area unit of population, length of available path within a series of buffers, and access to paths of specific types – for example those passing through protected or designated areas. The talk will look at some of the challenges of the project, including scaling the modeller to work with millions of path features and tens of thousands of point locations, and building processes to combine path segments and then disaggregate them to an appropriate level.

The main goal of the project was to inform and support specific policy proposals, but it is also intended that the QGIS models should be passed on to Ramblers and used in the longer term, to monitor the impact of changes to the paths network and of population patterns over time, and also to support analysis of how additions to the network, for example the new sections of the Great Ouse Valley Greenway, will affect the network.

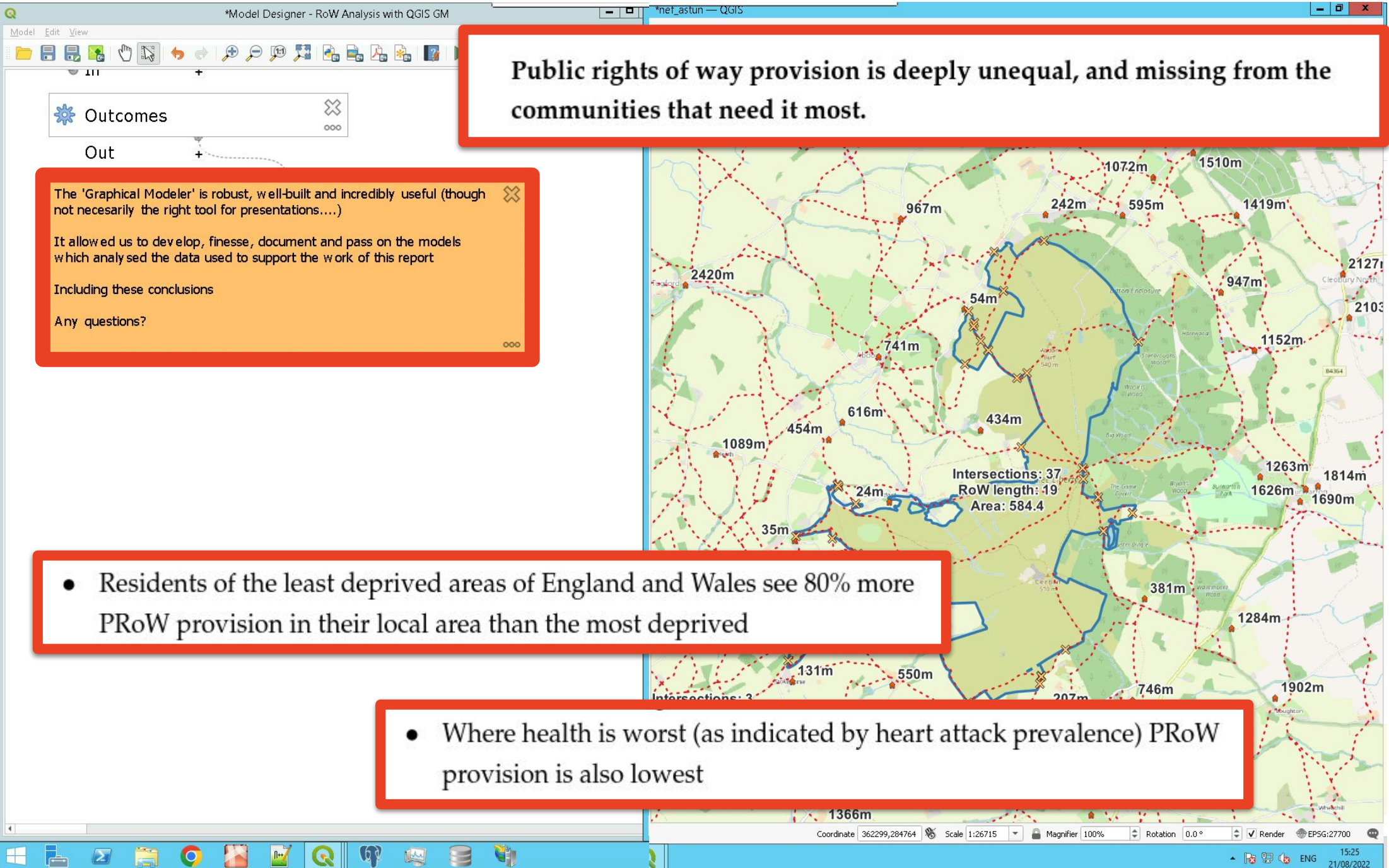
Select element to edit	Element description
Algorithm description	The UK national walking organisation, Ramblers, are working to improve the public rights of way network, and in particular improve access to it for people who are less advantaged, and may not have access to vehicles. The research project described in this talk undertook an analysis of the national paths network using publicly available data supplied by hundreds of individual local authorities across the UK. This was done by setting up a series of models in the QGIS Graphical Modeler to generate six key indicators aggregated to census area level, including distance to nearest continuous path from each small area unit of population, length of available path within a series of buffers, and access to paths of specific types – for example those passing through protected or
Short description	
Input parameters	
Outputs	
Algorithm author	
Help author	
Algorithm version	
Documentation help URL (for help button)	

OK Cancel

Coordinate: 343967,162664 Scale: 1:38574 Magnification: 100% Rotation: 0.0° Render EPSG:27700

16:29 19/08/2022





Public rights of way provision is deeply unequal, and missing from the communities that need it most.

The 'Graphical Modeler' is robust, well-built and incredibly useful (though not necessarily the right tool for presentations....)

It allowed us to develop, refine, document and pass on the models which analysed the data used to support the work of this report

Including these conclusions

Any questions?

- Residents of the least deprived areas of England and Wales see 80% more PRoW provision in their local area than the most deprived

- Where health is worst (as indicated by heart attack prevalence) PRoW provision is also lowest



Thanks and questions...

Ant Scott  
@antscott