

# Mapping access to services to estimate community resilience

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SRUC



NATIONAL  
CENTRE FOR  
RESILIENCE

BUILDING SCOTLAND'S RESILIENCE TO NATURAL HAZARDS

SEFARI

LEADING IDEAS  
FOR BETTER LIVES



Scottish Government  
Riaghaltas na h-Alba  
gov.scot



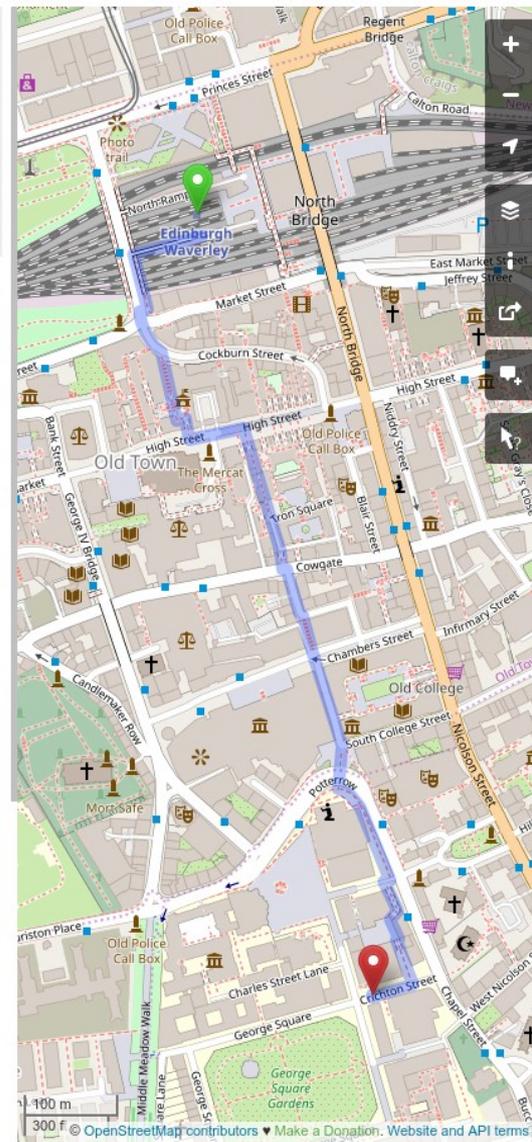
The James  
**Hutton**  
Institute

Edinburgh, Scotland, EH1 1BE, United Kingdom  
55.94452, -3.18743  
Foot (GraphHopper) Go  
Reverse Directions

### Directions

Distance: 1.1km. Time: 0:13.  
Ascend: 36m. Descend: 13m.

- 1. Continue onto South Ramp 70m
- 2. Turn left 60m
- 3. Turn right 10m
- 4. Turn left onto Waverley Bridge 10m
- 5. Turn slight left onto Cockburn Street 40m
- 6. Turn right onto Warriston's Close 90m
- 7. Turn right onto Mary King's Close 20m
- 8. Turn left onto High Street 60m
- 9. Turn right onto Borthwick's Close 100m
- 10. Turn slight right onto Tron Square 30m
- 11. Continue 20m
- 12. Turn left onto Cowgate
- 13. Turn right onto Guthrie Street 50m
- 14. Keep right 40m
- 15. Turn right onto Chambers Street
- 16. Turn left onto Chambers Street 10m
- 17. Continue onto West College Street 100m

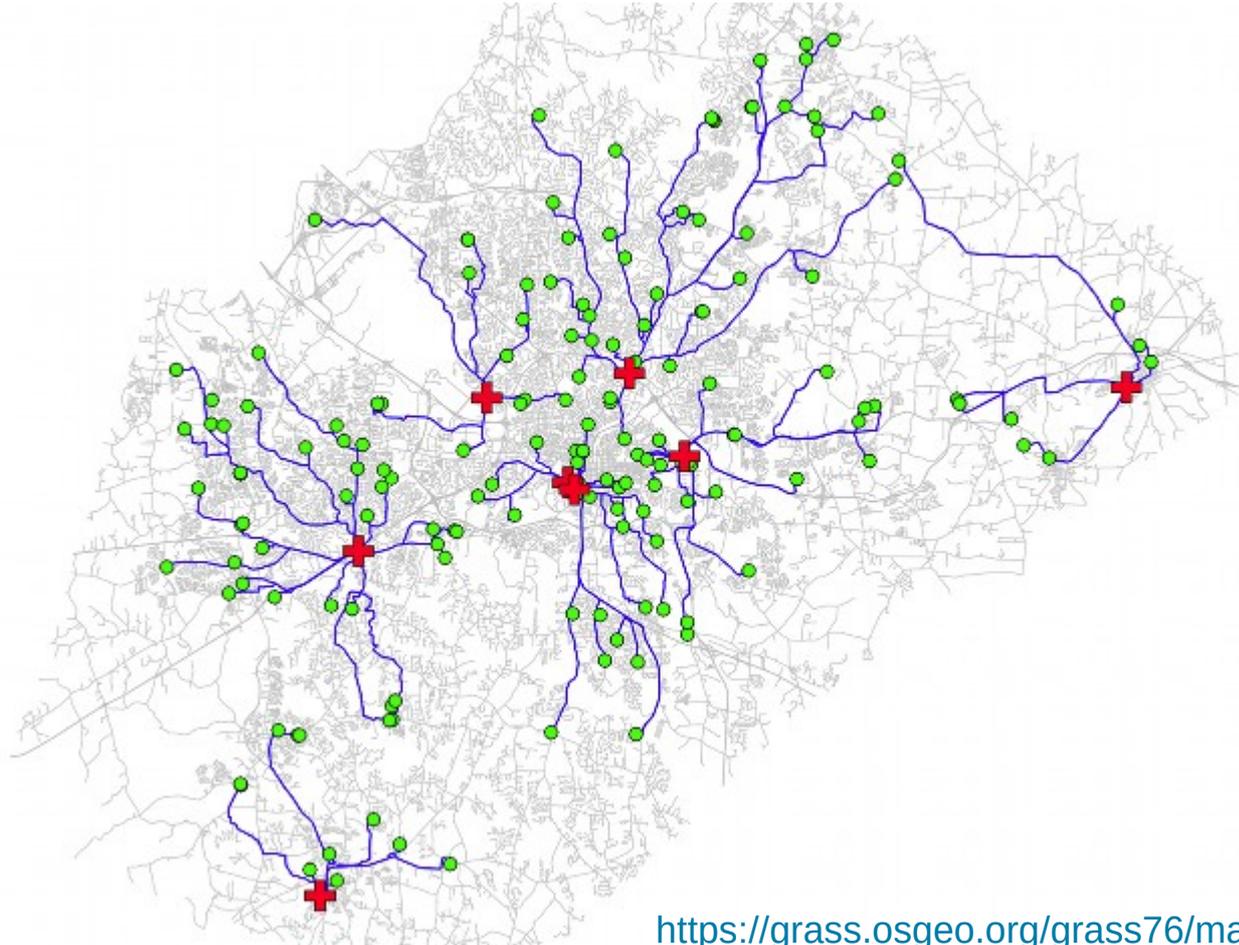


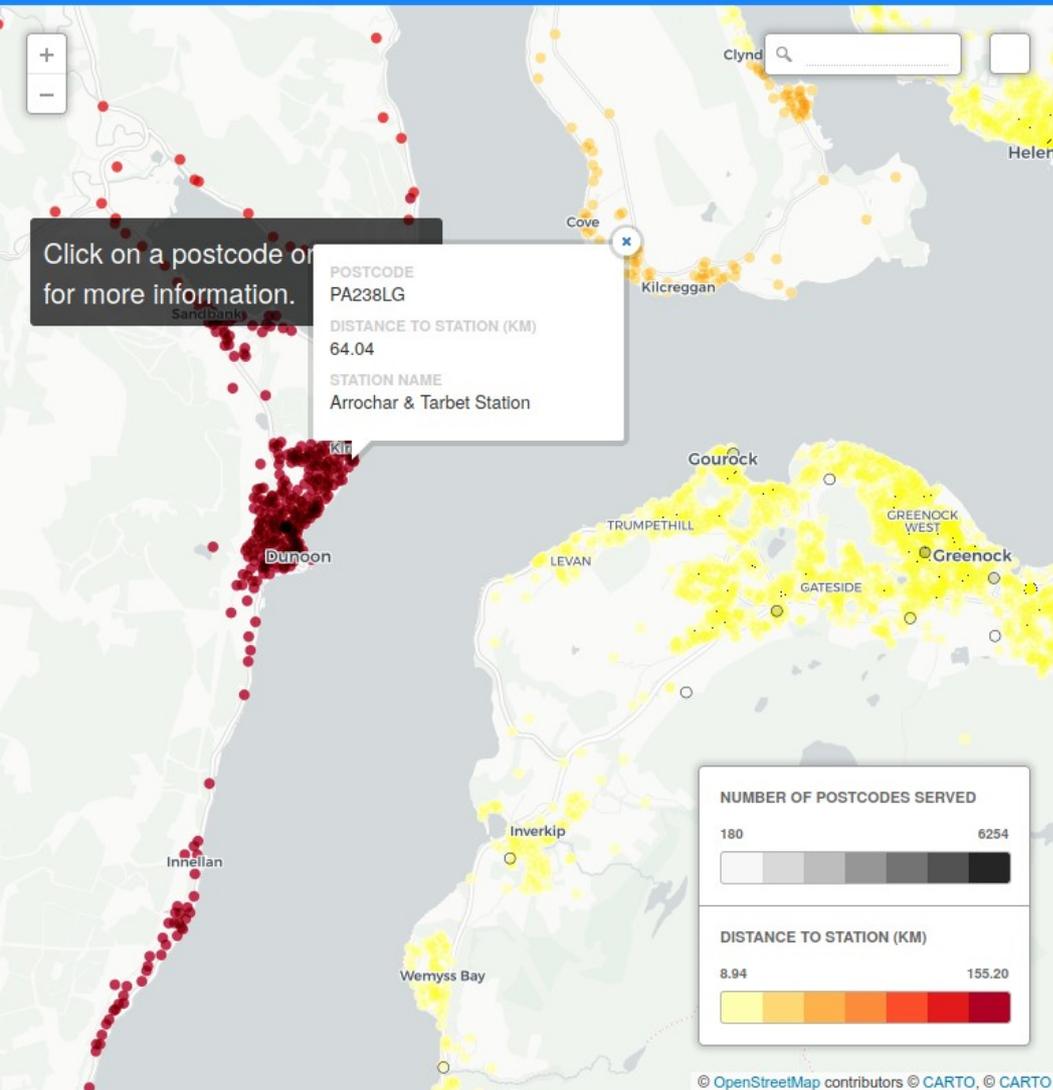
# Goal

- Where's my?
- Shortest path
- Scale to find all paths?



# Where's my nearest?





# Why not count services in area?

- Straight line limited
- People don't stop at administrative boundaries

# What is community resilience?

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Magis'(2010) definition of resilience is used to operationalise resilience as it relates to community sustainability. This includes identifying local infrastructure that can be used by communities in the event of an emergency and infrastructure that provides some clues about a community's resilience to threats that occur more slowly, like population decline, the out-migration of people with specific strengths and qualifications and the closure or loss of important community infrastructure like primary schools and GP offices.

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**Show me the data!**

# Data

- Where are the people?
- Where are the services?
- Which paths link these together?



# Where are the people?



- Use postcode
- People either work or live at postcodes

Code-Point Open

Get started with geographical analysis, simple route planning and asset management.

[https://digimap.edina.ac.uk/webhelp/os/osdigimaphelp.htm#data\\_information/os\\_products/code-point\\_open.htm](https://digimap.edina.ac.uk/webhelp/os/osdigimaphelp.htm#data_information/os_products/code-point_open.htm)

# Pathways

- Much easier to handle than MasterMap
- Doesn't include footpaths



## OS Open Roads

Get a high-level view of the road network, from motorways to country lanes.



# Where are the services?

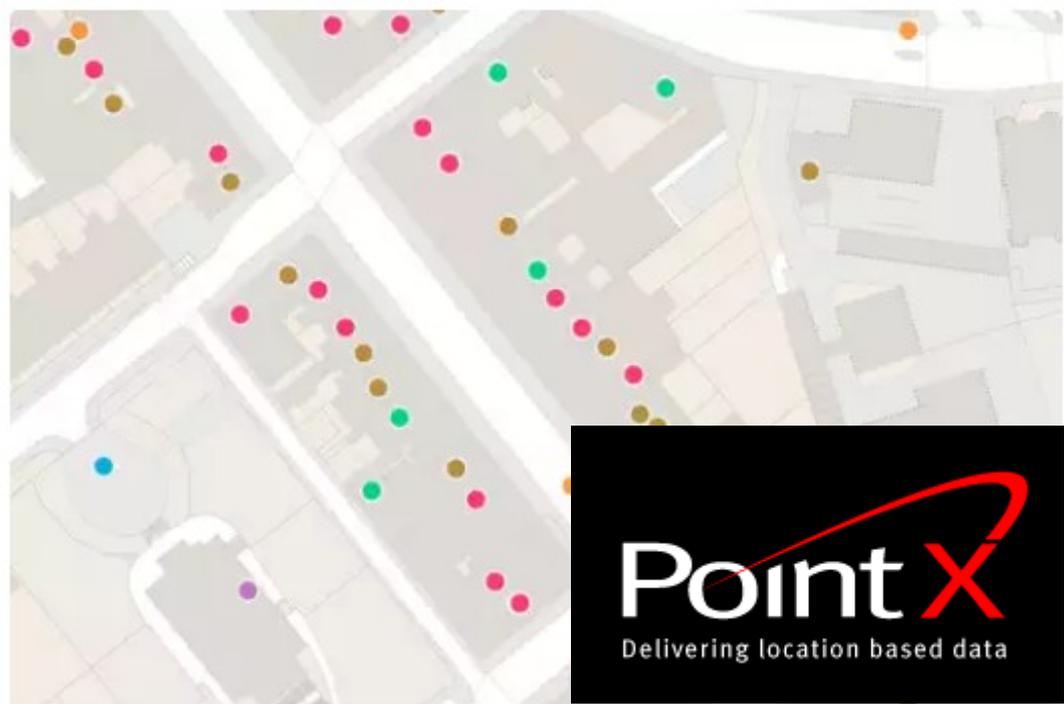


- POI data available
- Categorised by POI type (e.g. community)

## Points of Interest

Points of Interest® is the most comprehensive, location-based directory of all public and privately-owned businesses, education and leisure services in Britain.

[https://digimap.edina.ac.uk/webhelp/os/osdigimaphelp.htm#data\\_information/os\\_products/points\\_of\\_interest.htm](https://digimap.edina.ac.uk/webhelp/os/osdigimaphelp.htm#data_information/os_products/points_of_interest.htm)



<http://www.pointx.co.uk/>

## Points of Interest

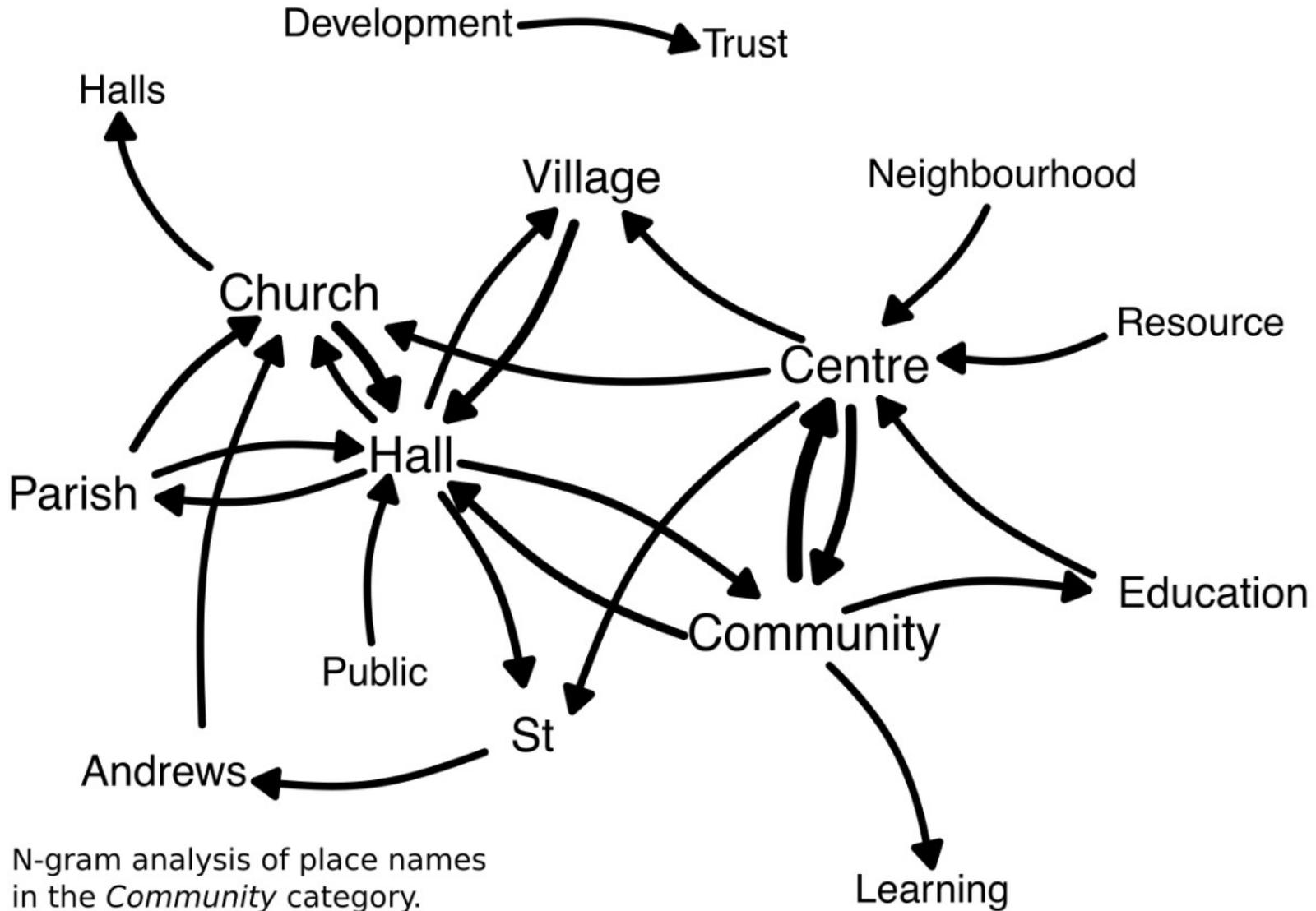
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# Where are the services?



- POI data available
- Categorised by POI type (e.g. community)
- **!!COMMERCIAL!!**



N-gram analysis of place names  
in the *Community* category.

# Tools



- Open source
- Open science
- Participation available to all
- Cost is not a barrier
- Local user groups



ubuntu®

# Workflow

- GRASS
  - Data management
  - Network analysis
- R
  - Control structure
  - Data analysis



Michael Spencer. (2019, October 25). Identifying Hot Spots in Rural Community Resilience in Scotland - data generation code (Version v1.02). Zenodo.  
<http://doi.org/10.5281/zenodo.3519006>

The Zenodo logo is centered in the lower half of the slide. It features the word "zenodo" in a white, lowercase, rounded sans-serif font, set against a solid blue rectangular background.

Postcode	Local authority	datazone	dist_km	POI_type	Resilience type
AB101AB	S12000033	S01006646	0.336655	gymnasiums, sports halls and leisure centres	Everyday
AB101AF	S12000033	S01006646	0.384941	gymnasiums, sports halls and leisure centres	Everyday
AB101AG	S12000033	S01006646	0.31936	gymnasiums, sports halls and leisure centres	Everyday
AB101AH	S12000033	S01006586	0.320448	gymnasiums, sports halls and leisure centres	Everyday
AB101AL	S12000033	S01006646	0.070802	gymnasiums, sports halls and leisure centres	Everyday
AB101AN	S12000033	S01006646	0.02013	gymnasiums, sports halls and leisure centres	Everyday
AB101AP	S12000033	S01006646	0.143959	gymnasiums, sports halls and leisure centres	Everyday
AB101AQ	S12000033	S01006586	0.320448	gymnasiums, sports halls and leisure centres	Everyday

Plus 2.5 million more rows...

Michael Spencer, Elliot Meador, & Ruth Wilson. (2019). Identifying Hot Spots in Rural Community Resilience in Scotland - database [Data set]. Zenodo.  
<http://doi.org/10.5281/zenodo.3386198>

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# Community centre distances

- Postcode level data
- Aggregated to datazones
- Urban areas well served
- Around Ullapool is not
- Jura and Bute without

Distance to community centre (km)

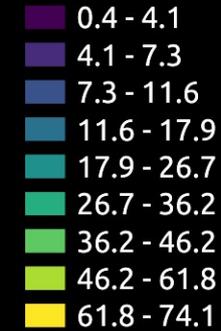
/// missing

- 0 - 4
- 4 - 9
- 9 - 15
- 15 - 21
- 21 - 28
- 28 - 36
- 36 - 44
- 44 - 65
- 65 - 77

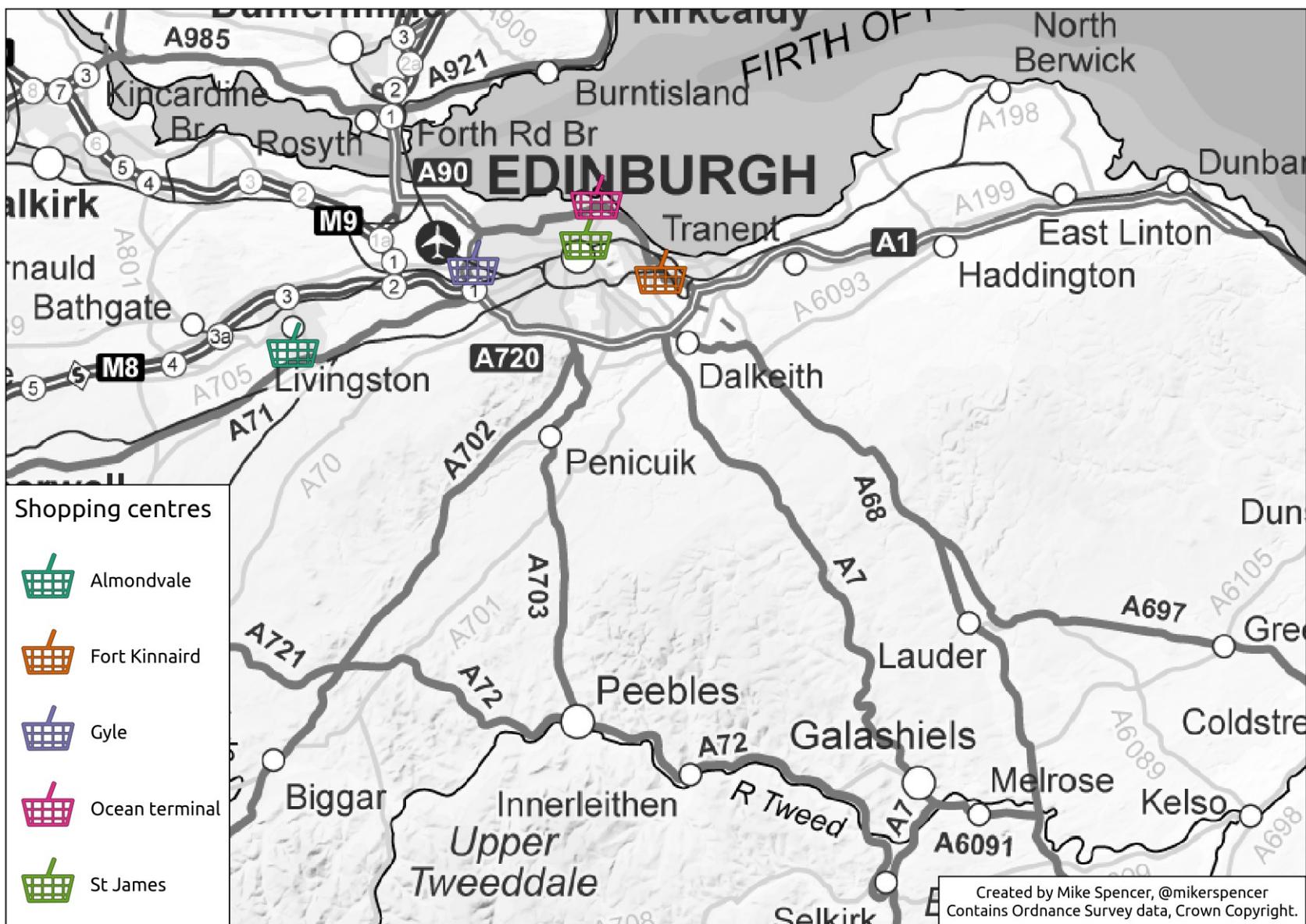
# How far for medical services?

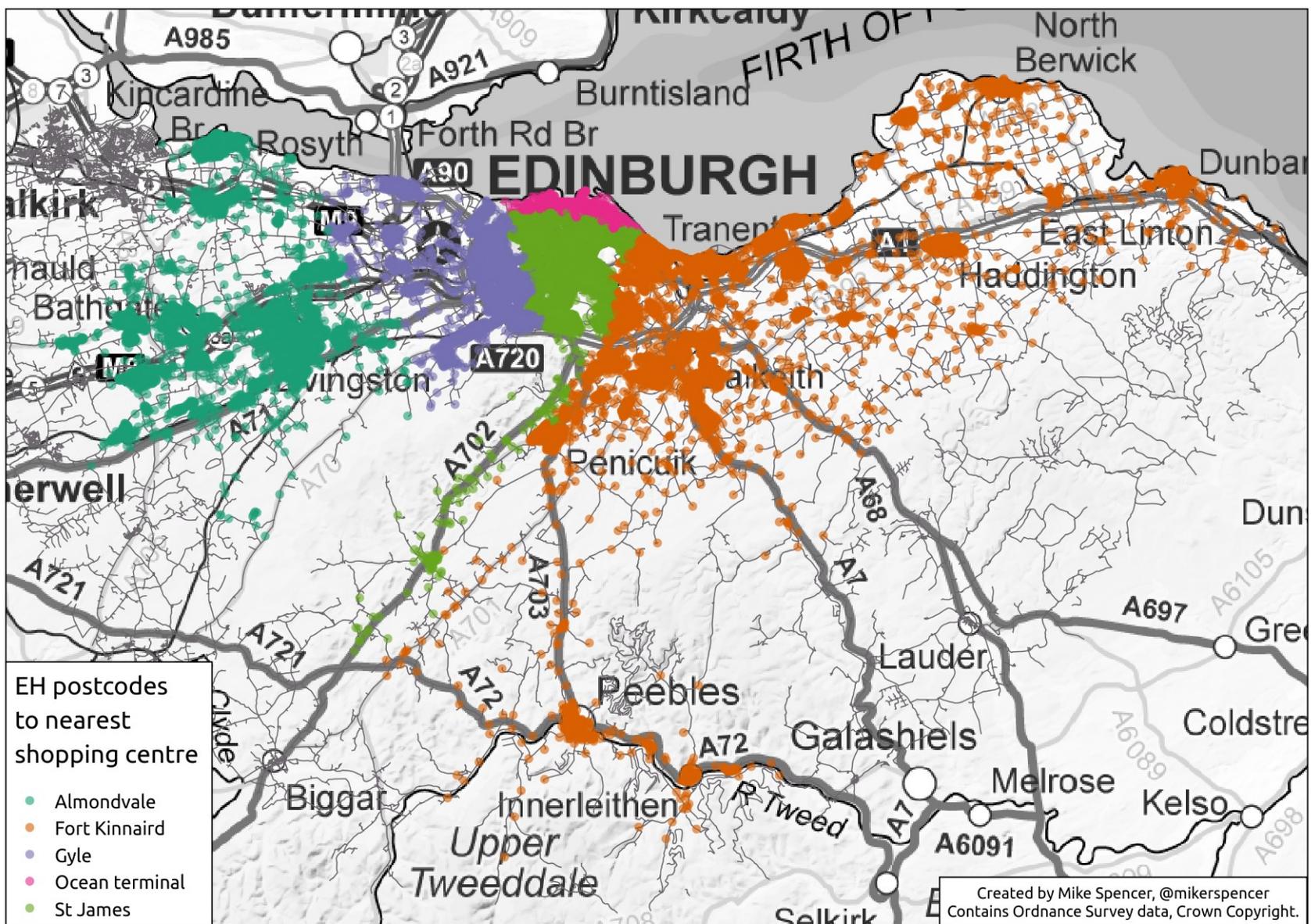
- NW Scotland poorly served
- Tool for place-based policy
- How does this compare to census?

Distance to emergency resilience (km)

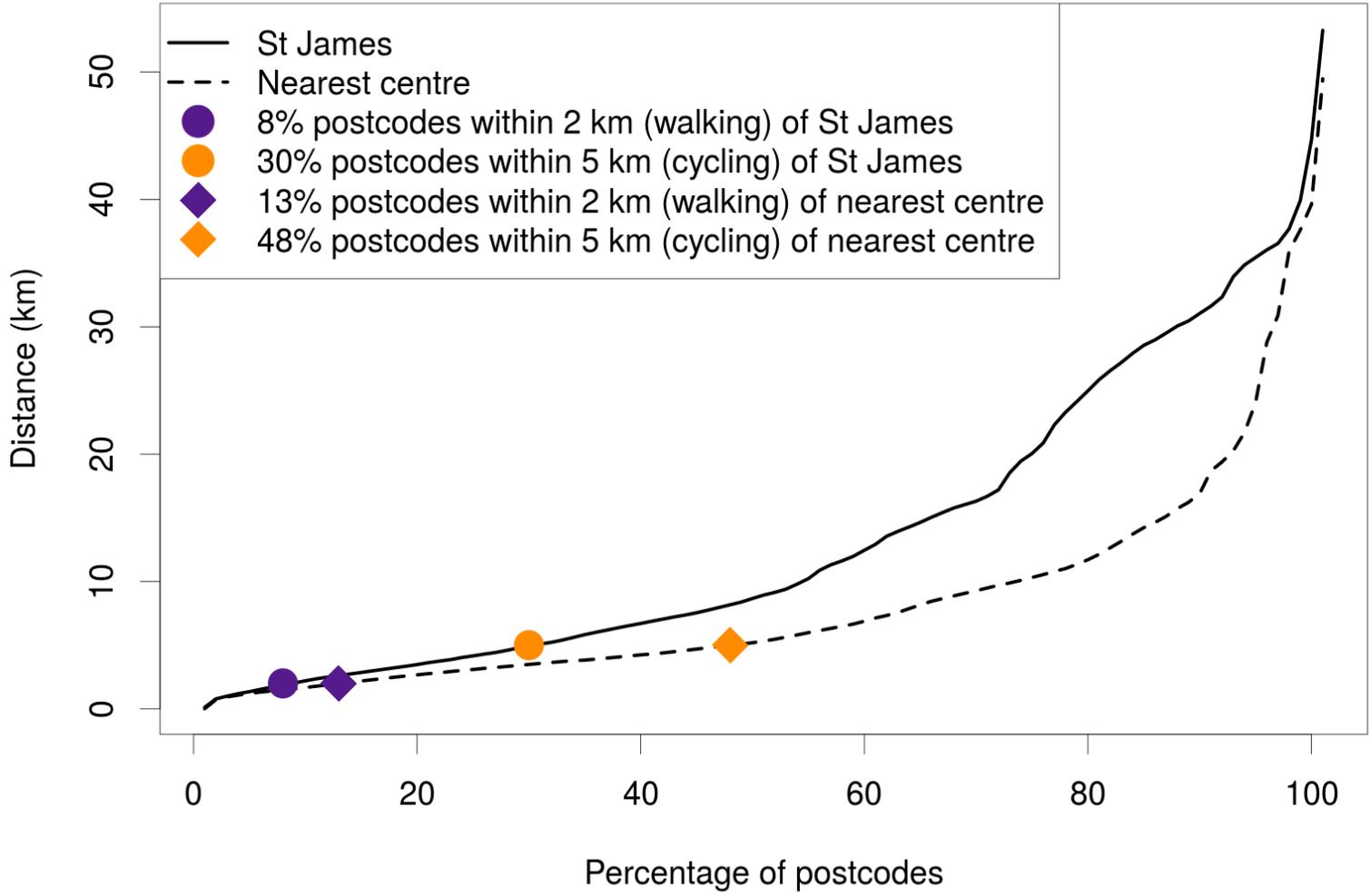


What other things can we do?

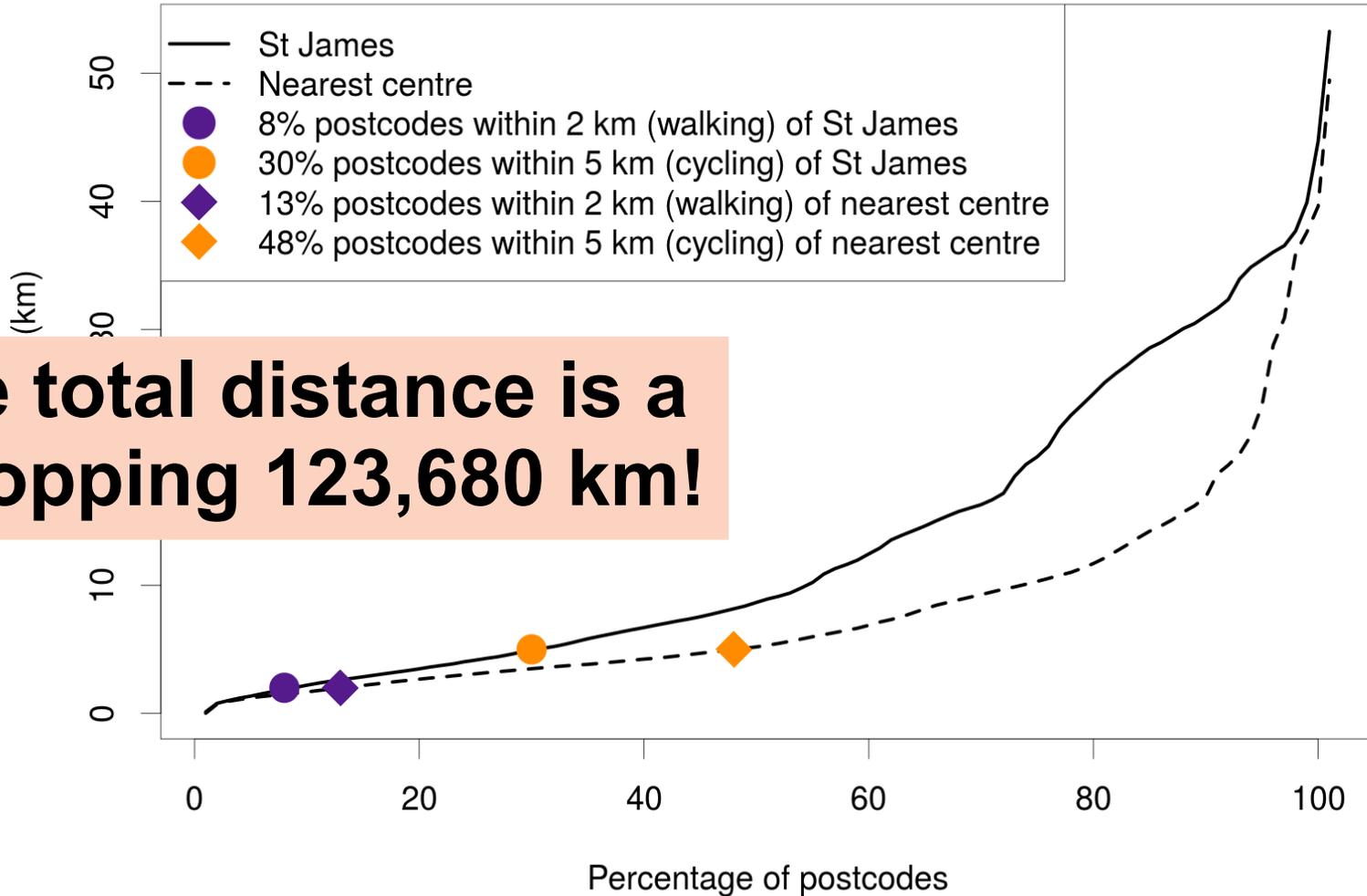




# EH postcode: shortest road distances to EH shopping centres



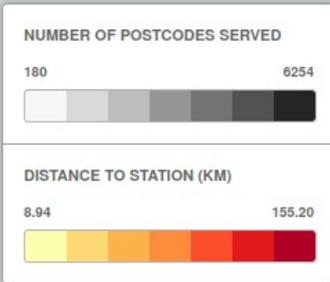
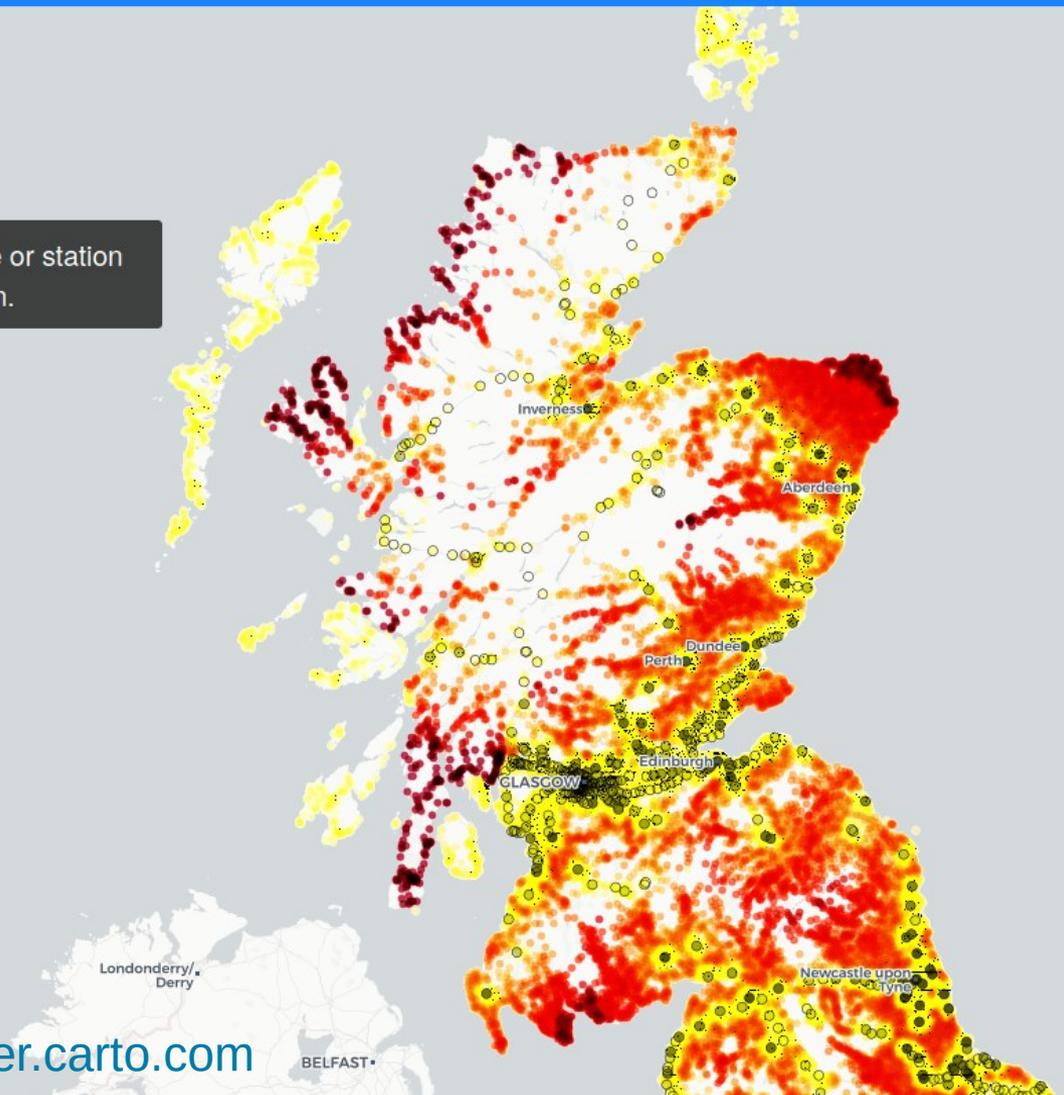
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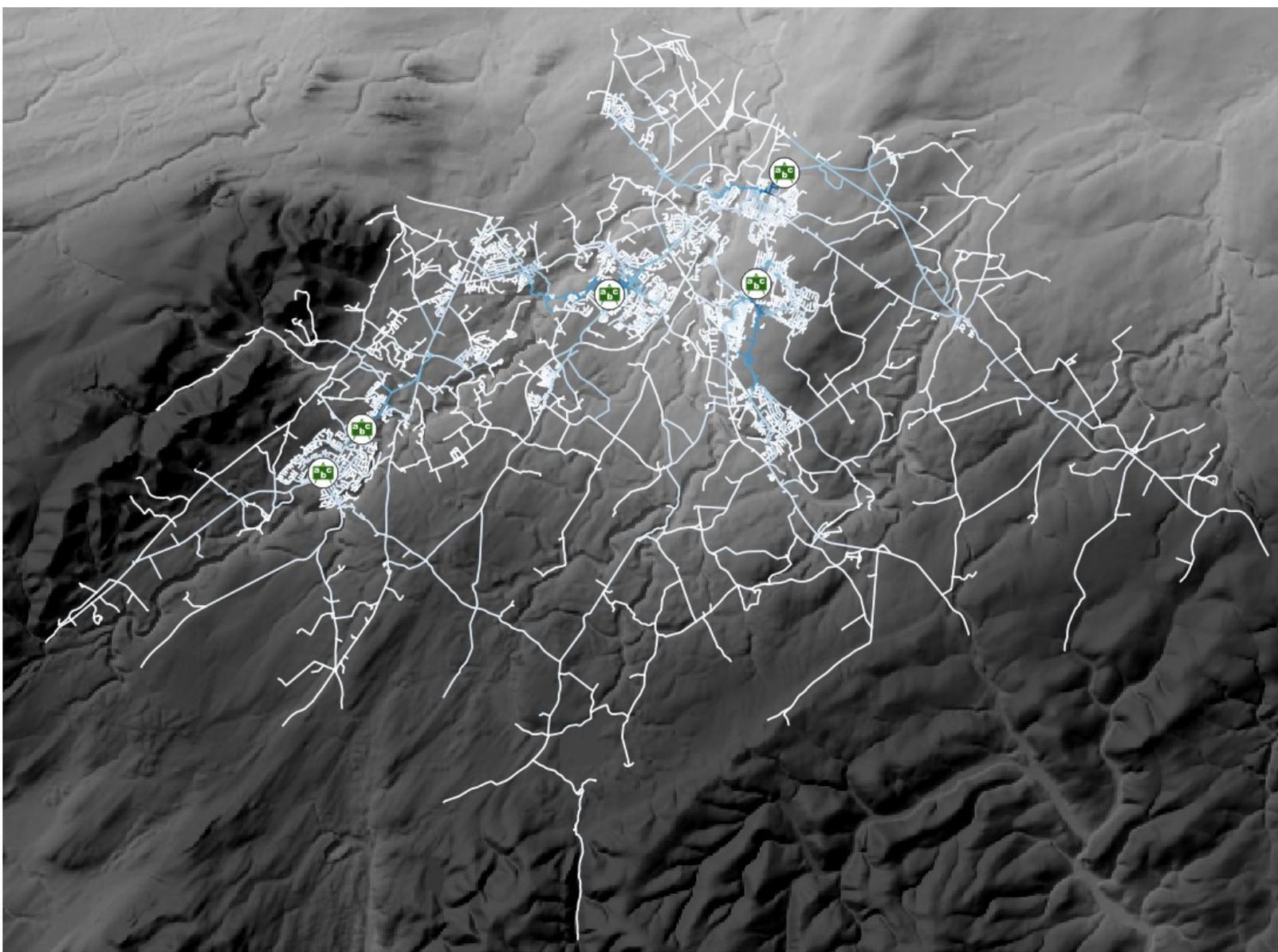


**The total distance is a whopping 123,680 km!**



Click on a postcode or station for more information.





# Limitations

- Road distance only
- No constraints from adverse weather
- Mountain rescue posts missing

# Summary

- A method for data rich places
- Much more information than area counts
- OpenStreetMap potentially valuable
- Many possibilities



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