FIG WORKING WEEK 2025
AND Locate25 THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience: Championing a Digital Generation
FIG Geospatial Council of Australia
Brisbane, Australia 6–10 April

Using GIS To Map Noise Levels Along King Street and St Machar Drive, Aberdeen, UK

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Note: *Project originally carried out in March 2016 during MSc. GIS programme at the University of Aberdeen, UK.*

9th April, 2025

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The Growing Problem of Noise Pollution

- **Noise:** Unwanted, unpleasant, or loud sound (Cambridge Dictionary, 2023).
  - Significant environmental and health problem in urban areas.
  - Millions in Europe affected by traffic noise (Rich & Nielsen, 2004 citing EC, 1996).
  - EU directive for noise mapping across Europe (EC, 2005).
  - Local authorities established noise management policies (EC, 2002).

Excessive noise is poison to the soul, breeding stress, anxiety and diseases.

A New and Cost-Effective Approach

This project aimed at:

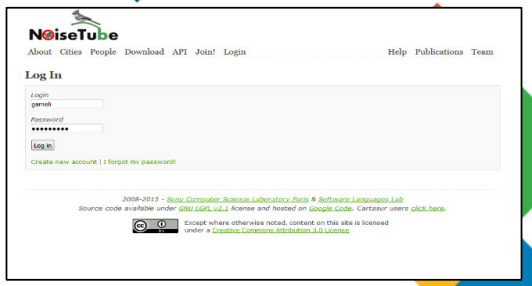
- Leveraging smartphones as sound level meters (Maisonneuve et al., No Date).
- Utilizing the NoiseTube mobile App for sound data recording and GPS tracking.
  - Cost-effective alternative to traditional devices.
  - Flexibility for data collection across urban environments.

Traditional Method

vs

New Approach

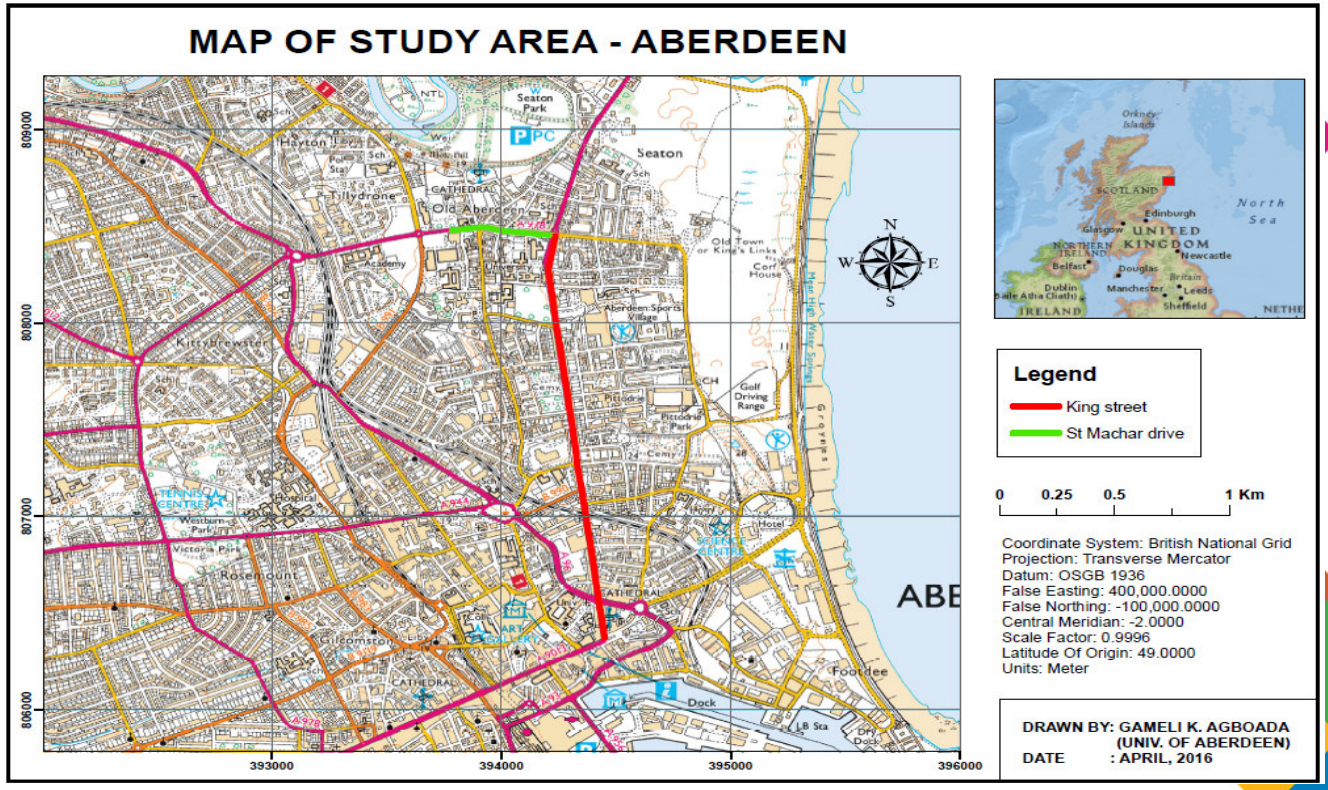
+



Mapping Noise Along King Street and St Machar Drive

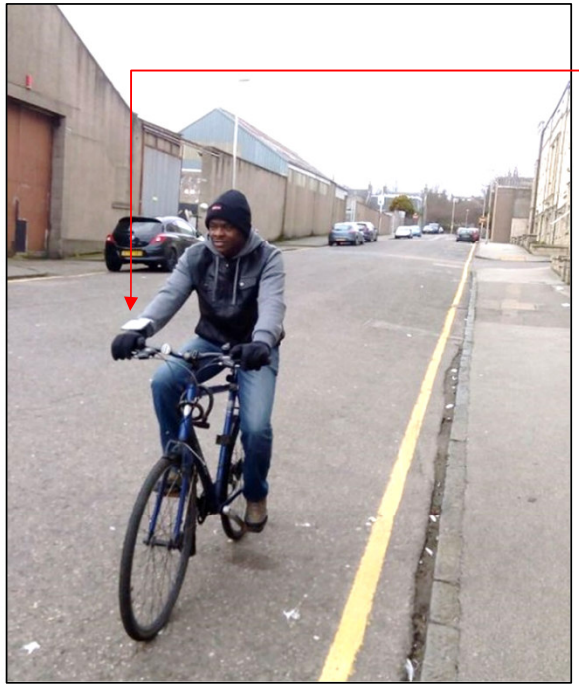
Study Area:

King Street and St Machar Drive, Aberdeen (~2.6km).

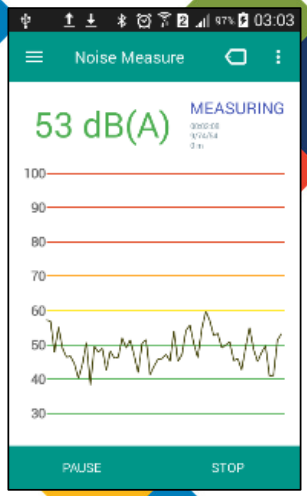


Mapping Noise Along King Street and St Machar Drive

- Data Collection: Bicycle was used as transportation – access, minimal noise, sustainability.



The smart phone was secured to the wrist of the data collector



- The study area was covered 25 times
- Within 5 days (from 4th to 8th March, 2016)
- Data was collected in the Mornings, Afternoons & Evenings.

Mapping Noise Along King Street and St Machar Drive

- Data Validation: Addressing bicycle noise and validating smartphone data against a calibrated sound level meter (Regression Analysis).
  1. **Taking out the bicycle noise.** Mean difference of **3dB(A)** was subtracted.
  2. **Regression Analysis** (used regress module in Iddrisi Terset)

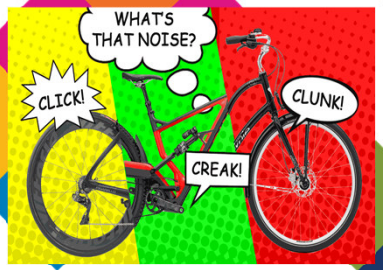


Table 1: Results from pink noise measurement

Sound Level Meter [dB(A)]	Samsung Galaxy Core Prime [dB(A)]
54	48
59	54
69	66
74	70
78	78
85	78
87	80
93	86

Y= 3.037969 + 1.029922X

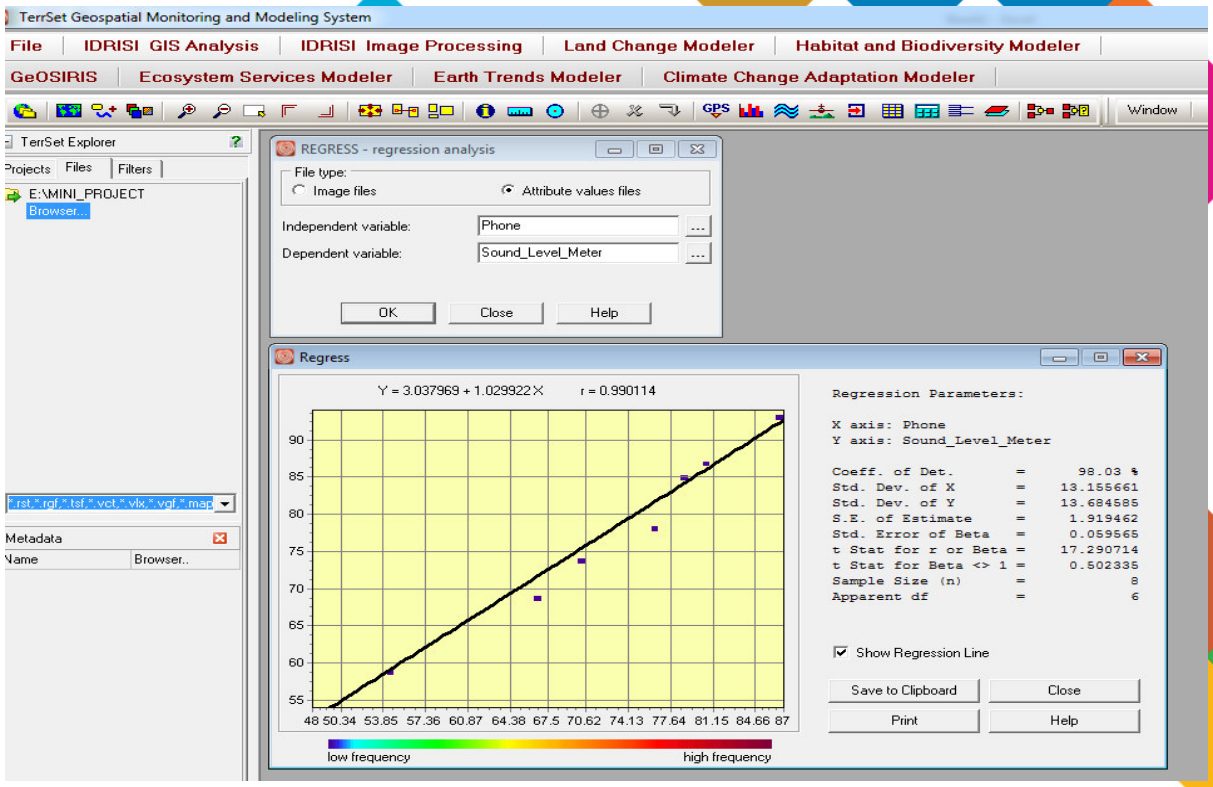
Where Y = Sound Level Meter Reading
X = Phone Reading

Correlation Coefficient = **0.990114** (a strong positive correlation)

Mapping Noise Along King Street and St Machar Drive

- Data Validation:

  Regression Analysis Con't)



Mapping Noise Along King Street and St Machar Drive

- Data Validation:

3. Checking positional accuracy

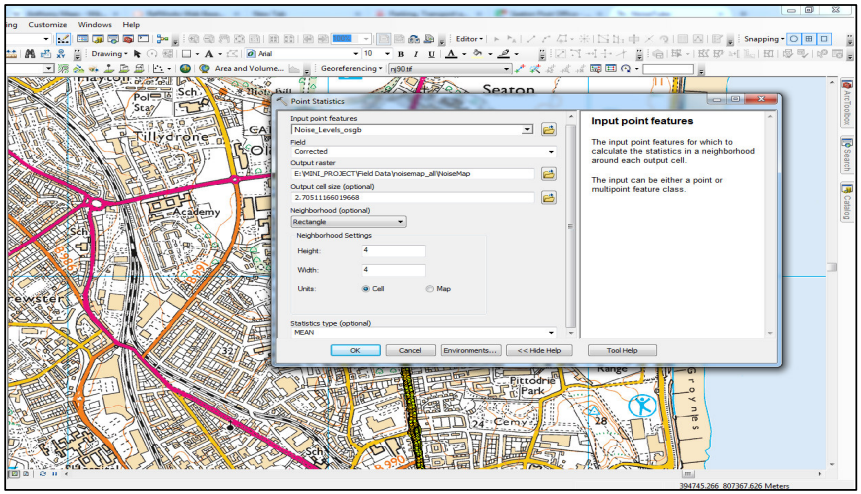
✓The accuracy radius is rarely larger than 20m.

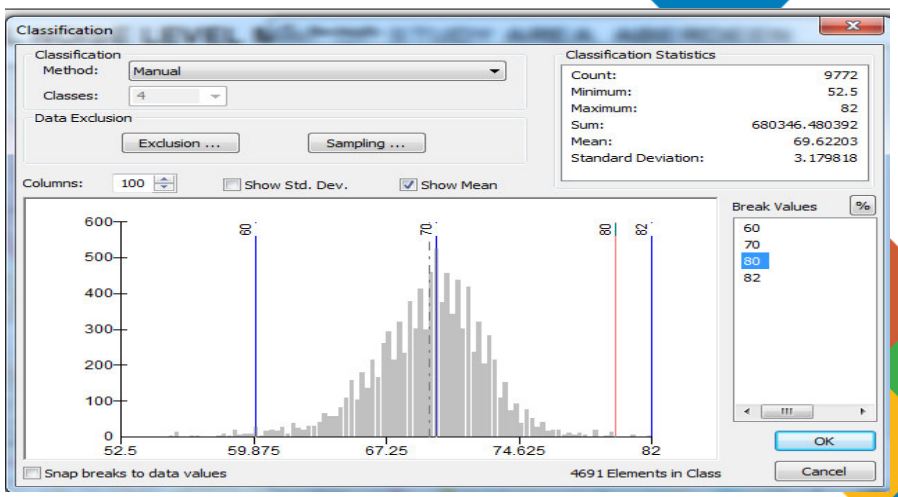
✓All the points fell within the street corridor.

✓The accuracy associated with open spaces were better than areas with high rising structures.

Mapping Noise Along King Street and St Machar Drive

- Spatial Analysis:
  - ArcToolbox was used to generate mean noise levels of neighbouring point.
  - Noise map was generated and categorized into 4 classes.



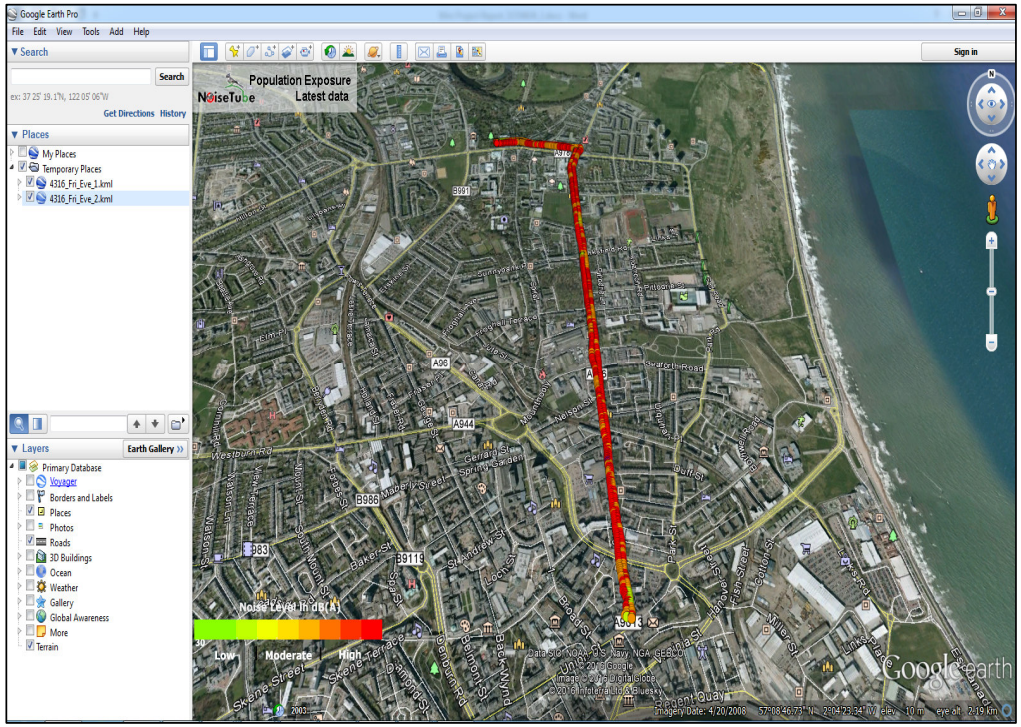


Results

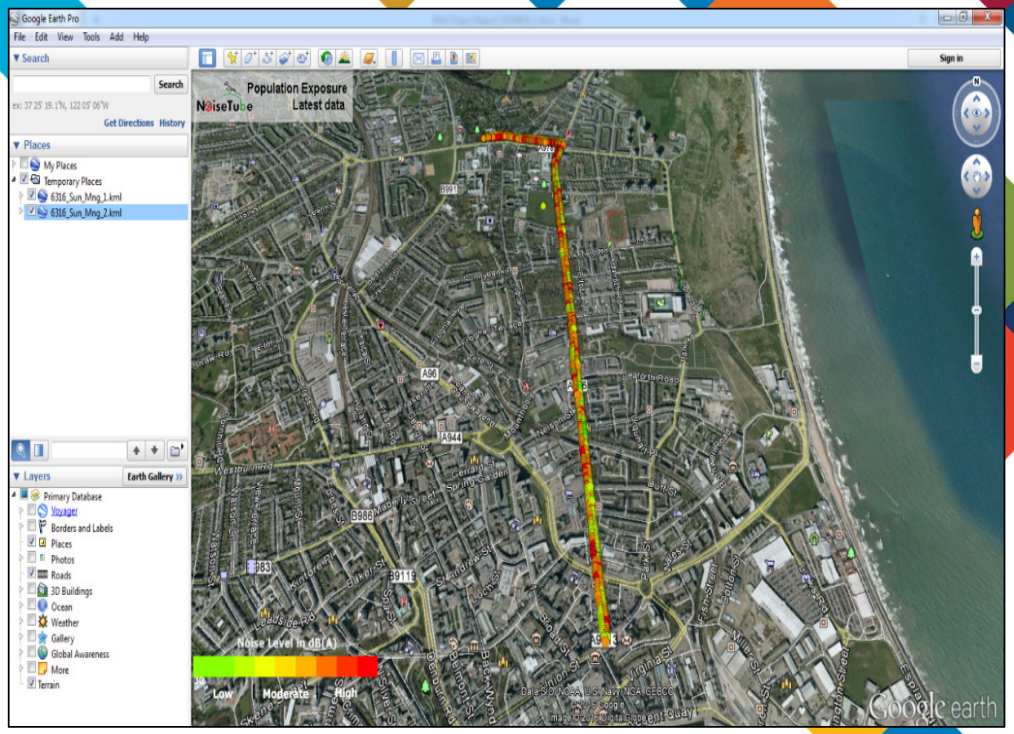
- Noise maps were generated in Google Earth and ArcGIS.
- Obtained visual representation of relative noise levels across the study area.
- Potential noise hotspots were identified (e.g. junctions).
- Variations in noise levels based on time of day were observed.

Results

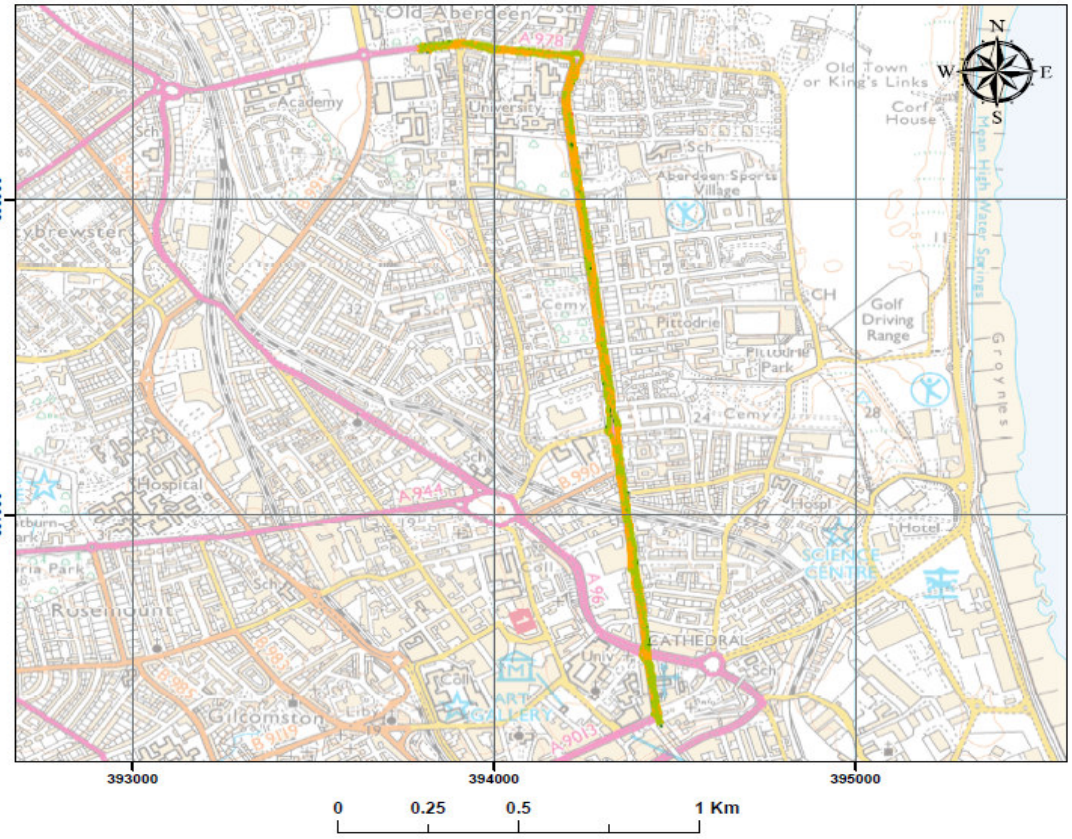
Noise map – Friday Evening (4-3-2016)



Noise map - Sunday Morning (6-3-2016)



FINAL NOISE LEVEL MAP OF STUDY AREA, ABERDEEN



Legend

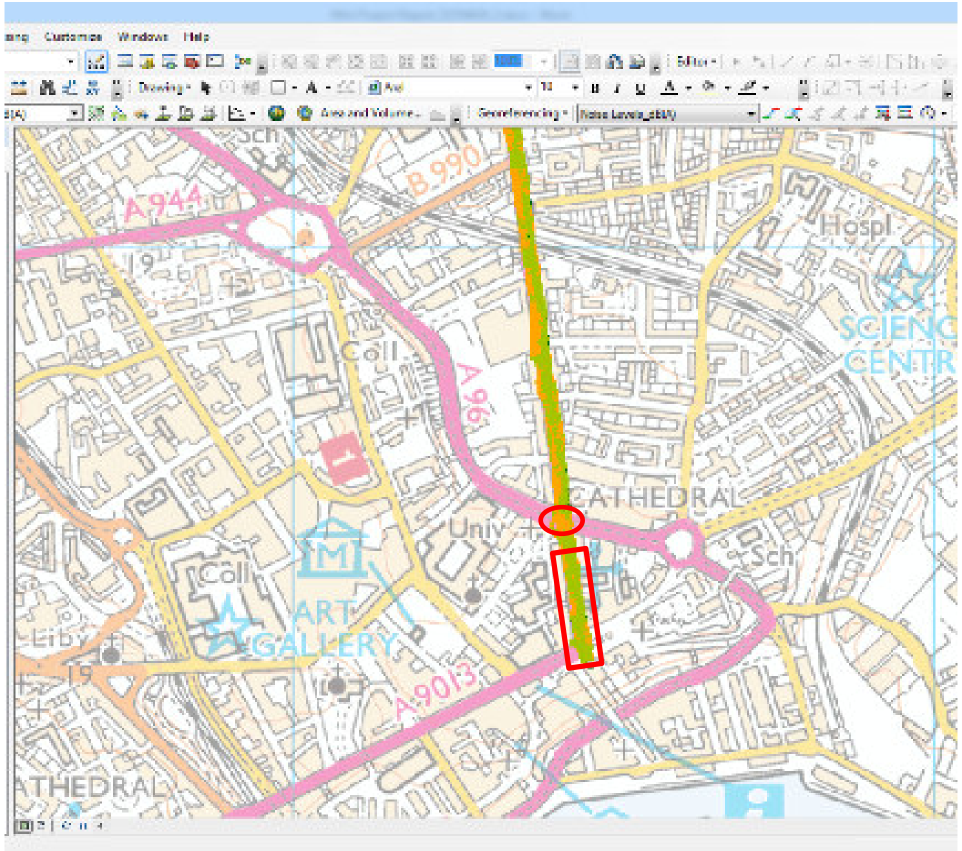
Noise Levels_dB(A)

<VALUE>

- 52.5 - 60
- 60 - 70
- 70 - 80
- 80 - 82

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
False Easting: 400,000.0000
False Northing: -100,000.0000
Central Meridian: -2.0000
Scale Factor: 0.9996
Latitude Of Origin: 49.0000
Units: Meter

DRAWN BY: GAMELI K. AGBOADA
(UNIV. OF ABERDEEN)
DATE : APRIL, 2016


B990
A944
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A96
SCIENC
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CATHEDRAL
Univ
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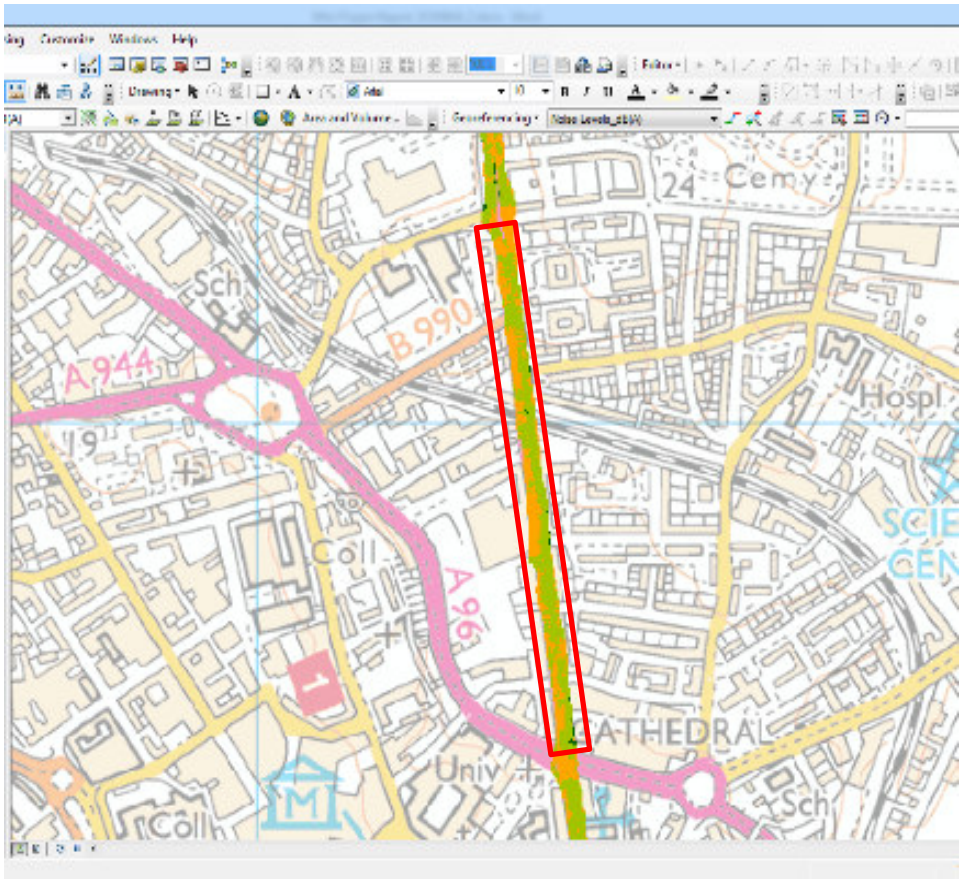
ART
GALLERY
A9013
THEDRAL


Google earth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Univ
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Coll


BUS
STOP
Google earth

Conclusions

- The project offers a valuable contribution to urban noise assessment.
- It demonstrates the feasibility of smartphone-based noise mapping.
- It provides reliable data for informed planning decisions to:
  - ✓ Control noise pollution.
  - ✓ Improve public health.
  - ✓ Enhance urban livability.

Recommendation

- **Replicate this approach a larger scale for a cost-effective and sustainable city-wide noise management.**

Sustainability is everybody's business!

Try your hands on one of the available noise level measuring mobile Apps to contribute to global sustainability.

NoiseTube

etc

Thank you

SDGs Relevant to this Research

1st relevant SDG

2nd relevant SDG

3rd relevant SDG

References

- Cambridge Dictionary. (2023). NOISE | meaning in the Cambridge English Dictionary. Dictionary.cambridge.org. https://dictionary.cambridge.org/dictionary/english/noise [Accessed 25 March 2025]
- D'Hondt, E., Stevens, M. and Jacobs, A. 2012. Participatory noise mapping works! An evaluation of participatory sensing as an alternative to standard techniques for environmental monitoring. *Pervasive and Mobile Computing. pp. 1-14*
- Eastman, J.R. 2015. *TerrSet Tutorial*. Clark University
- European Commission. 2005. European Noise Thresholds Put in Question. *Science for Environment Policy: DG Environment News Alert Services.* [Online] no. 3, pp. 28 February 2016. Available from: http://ec.europa.eu/environment/integration/research/newsalert/pdf/3na1_en.pdf. [Accessed 21 February 2016]
- European Commission. 2002. *Directive 2002/49/EC: Assessment and management of environmental noise.* [Online] Available from: https://www.epa.ie/pubs/advice/noisemapping/EPA_Noise_Tullamore.pdf [Accessed 20 February 2016]
- Leao, S., Ong, K. and Krezel, A. 2014. 2Loud?: Community mapping of exposure to traffic noise with mobile phones. *Environmental Monitoring and Assessment.* [Online] pp. 28 February 2016. Available from: https://www.google.co.uk/#q=2Loud%3F:+Community++mapping+of+exposure+to++traffic+noise+with+mobile++phones.++Environmental++Monitoring+and++Assessment. [Accessed 14 March 2016]
- Leao, S. and Zhou, W. 2014. Monitoring Exposure to Traffic Noise with Mobile Phones in China: A Review of Context. *International Journal of Information and Computer Science (IJICS).* vol. 3, pp. 52-63
- Maisonneuve, N., Stevens, M., Niessen, M.E., Hanappe, P. and Steels, L. No Date. Citizen Noise Pollution Monitoring. *The Proceedings of the 10th International Digital Government Research Conference.* [Online] pp. 2 February 2016. Available from: ftp://prog.vub.ac.be/tech_report/2009/vub-prog-tr-09-10.pdf.[Accessed 20 February 2016]
- NoiseTube. 2015. *Turn your mobile phone into an environmental sensor and participate in the monitoring of noise pollution* [Homepage of Sony Computer Science Laboratory Paris & Software Languages Lab], [Online]. Available from: http://noisetube.net/#&panel1-1[Accessed 20 February 2016]
- Rich, J.H. and Nielsen, O.A. 2004. Assessment of Traffic Noise Impacts. *International Journal of Environmental Studies.* vol. 61, no. 1, pp. 19-29.
- Photo Credit: Researcher and Stock photos.

STEP 1: SELECT HERE THE THREE MOST RELEVANT SDGs
STEP 2: COPY THE SDG INTO PREVIOUS SLIDE