



# Research Experience Placement (REP) Scheme 2026

## Supervisor Project Proforma

<b>Project title:</b>	Urban pollinators and habitat fragmentation: exploring biodiversity patterns in cities
<b>Host Institution:</b>	Cranfield University
<b>Project supervisor (name, department):</b>	Alice Johnston, Cranfield Environment Centre
<b>Project enquiries (supervisor email):</b>	<a href="mailto:a.s.johnston@cranfield.ac.uk">a.s.johnston@cranfield.ac.uk</a>
<b>Co-Supervisor, if any (name, department):</b>	
<b>Proposed start date and weekly hours:</b> (please note project must be of 6 weeks duration)	June-Sep 2026 (flexible 6 week block, ~35 hrs per week)
<b>Please provide a short paragraph or couple of sentences summarising the project to encourage potential applicants to apply (max 75 words):</b>	
<p>Cities are among the most fragmented ecosystems on Earth but play an increasingly important role in supporting biodiversity. This project will investigate how habitat size, connectivity and environmental conditions shape urban pollinator biodiversity. The student will combine a structured literature synthesis with exploratory spatial analysis of biodiversity, air pollution and soil moisture datasets to examine how fragmentation theory from forests and agricultural landscapes applies to urban ecosystems.</p>	
<b>Project description (max 700 words, 1-2 figures may be included):</b>	
<p>Proposed projects must:</p> <ul style="list-style-type: none"> <li>• Have a clearly defined objective</li> <li>• Be within the science remit of NERC</li> <li>• Be feasible for a student to complete within the timescale of the placement</li> <li>• Include more than purely a computer/modelling component i.e., some element of fieldwork, data collection, activity to give an understanding of the wider context including participation in lab/team meetings, networking, and training etc.</li> <li>• Give scope for thought and initiative on the part of the student and should not use the student as a general assistant</li> <li>• Be based at an eligible UK research organisation (remote placements from within the UK are also an option for enabling inclusivity)</li> </ul>	
<p>Urbanisation is one of the most pervasive drivers of ecological change, transforming landscapes into highly fragmented mosaics of grey, green and blue spaces. Despite this fragmentation, towns and cities can support diverse pollinator communities that provide essential ecosystem services. Understanding how habitat size, connectivity and environmental conditions influence pollinator biodiversity is therefore an important challenge for urban ecology.</p> <p>The objective of this project is to explore how habitat fragmentation and environmental conditions influence urban pollinator biodiversity, and to assess how fragmentation concepts developed in forests and agricultural systems translate to urban landscapes. This work contributes to the NERC-funded DEFrag research programme investigating how landscape fragmentation influences ecological processes and biodiversity across landscapes. The placement will combine</p>	

literature synthesis, spatial data analysis and exposure to wider research activities within the DEFrag project.

The student will first undertake a structured review of the ecological literature on habitat fragmentation, focusing on key concepts such as patch size, connectivity, edge effects and landscape configuration. The review will examine how these principles have been applied in forests and agricultural systems and assess how they may translate to urban ecosystems. The student will then work with spatial datasets to explore potential relationships between fragmentation and biodiversity patterns in cities. This will involve assembling and pre-processing spatial data layers across urban green spaces in Milton Keynes, Luton and Bedford, including urban pollinator (e.g. bee and pollinator occurrence records), air pollution, soil moisture and plant observations and land cover maps.

Using GIS and simple spatial analysis techniques, the student will help prepare harmonised datasets that can be used for exploratory analysis. This will include tasks such as aligning spatial projections, generating grid-based summaries, and calculating simple landscape metrics such as habitat patch size and connectivity. The student will then conduct exploratory analysis and mapping to investigate how biodiversity observations relate to landscape configuration and environmental gradients. This will help generate initial insights into how fragmentation and environmental stressors may interact to shape biodiversity patterns in urban landscapes. The student will also have scope to develop their own questions and exploratory analyses based on the spatial datasets.

Although the project includes computational analysis, the placement will also provide broader research exposure through participation in research group meetings, discussions with project collaborators, and training in spatial ecology methods. Where feasible, the student will also participate in urban greenspace visits to observe how landscape structure influences habitat availability and connectivity in practice.

By the end of the placement the student will have developed skills in spatial ecological analysis, data synthesis and scientific communication. The outputs will include a short written report, visualisations of spatial data and documented workflows. The analyses developed during the placement will contribute to the preparation of datasets and exploratory analyses for ongoing research examining how fragmentation and environmental stressors shape urban pollinator communities.

**Project timeline:**

**Week 1: Project introduction and literature review** – Introduction to urban fragmentation and biodiversity; Structured literature review; Introduction to GIS datasets and tools

**Weeks 2-3: Dataset assembly and preprocessing** – Assemble biodiversity and environmental datasets; Harmonise spatial layers and projections; Generate grid-based summaries of environmental variables.

**Week 4: Landscape metrics and mapping** – Calculate simple fragmentation metrics (patch size, connectivity), Produce exploratory maps of pollinator biodiversity and environmental gradients

**Week 5: Exploratory analysis** – Examine relationships between biodiversity observations and landscape metrics; Generate visualisations and summary statistics.

**Week 6: Synthesis and outputs** – Produce short report and figures; Document GIS workflow; Present findings to the research group.

**Candidate requirements:**

This project would suit an undergraduate student with an interest in ecology, environmental science, geography or data science. Desirable skills include an interest in biodiversity and urban ecology, basic quantitative skills or experience with data analysis, familiarity with GIS (or

willingness to learn spatial analysis tools) and an ability to work independently and communicate findings clearly. No prior advanced programming experience is required, as training and guidance will be provided during the placement. Flexible and remote working arrangements will be considered.

**Background reading and references:**

- Fahrig, L. Effects of Habitat Fragmentation on Biodiversity. *Annu. Rev. Ecol. Evol. Syst.* **34**, 487–515 (2003).
- Grimm, N. B. *et al.* Global Change and the Ecology of Cities. *Science* **319**, 756–760 (2008).
- Haddad, N. M. *et al.* Habitat fragmentation and its lasting impact on Earth’s ecosystems. *Sci. Adv.* **1**, e1500052 (2015).
- Aronson, M. F. *et al.* Biodiversity in the city: key challenges for urban green space management. *Front. Ecol. Environ.* **15**, 189–196 (2017).
- McDonald, R. I. *et al.* Research gaps in knowledge of the impact of urban growth on biodiversity. *Nat. Sustain.* **3**, 16–24 (2020).
- Tscharntke, T. *et al.* Landscape moderation of biodiversity patterns and processes - eight hypotheses. *Biol. Rev.* **87**, 661–685 (2012).
- Wang, R., Zhu, Q.-C., Zhang, Y.-Y. & Chen, X.-Y. Biodiversity at disequilibrium: updating conservation strategies in cities. *Trends Ecol. Evol.* **37**, 193–196 (2022).

## To be completed by institutional CENTA PoC

I confirm that:

- The host institution takes responsibility for selecting a suitable undergraduate student and ensuring and confirming their eligibility under the NERC REP student eligibility criteria.
- This REP project falls within the NERC remit, is of suitable quality and meets the REP research project criteria.
- Appropriate supervisory arrangements are in place.
- The application processes used will be inclusive and accessible.
- Reasonable adjustments will be made for students that need them whilst undertaking placements.
- The placement will be carried out in accordance with all applicable ethical, legal and regulatory requirements including but not limited to relevant provisions of the General Data Protection Regulation, the Data Protection Act 2018, the Bribery Act 2010, the Fraud Act 2006, the Equality Act 2010 and the Modern Slavery Act 2015.
- The host organisation takes responsibility for identification, protection and exploitation of any intellectual property rights arising from the work.
- All facilities, agreements about access and collaborations necessary for the work will be obtained before the work commences and can be ensured through the period of the work.
- All costs awarded by NERC for the REPs will be used and accounted for appropriately.
- A report of the project by the student will be submitted no later than one week after the end date of the placement or Friday 25<sup>th</sup> September 2026, whichever falls first.
- A PhD interview (where possible) will be offered to all students who have completed a REP within the CENTA Doctoral Landscape Award.

Signed: 

Date: 13-03-2026

Position: Lecturer in Remote Sensing – Cranfield’s PoC