Highways & Habitats: An Innovative Approach to Biodiversity Monitoring

UK

National Highways, Strategic Road Network, United Kingdom (UK)

BIG Biodiversity Challenge Award Category: Innovation Award

Project overview (50 words max)

- Through the Intelligent Environmental Estate (IEE) project, Ramboll employed satellite imagery and machine learning to map land cover and habitats, aiming to support their commitment to achieve biodiversity net gain.

What were the biodiversity conditions on site prior to the enhancement? (100 words max)

National Highways has committed to deliver biodiversity net gain across 30,000 hectares of verges and land (soft estate) that runs adjacent to their motorways and trunk roads by 2040. Ensuring a comprehensive understanding of the habitats present across the soft estate and the varying condition of these habitats is a complex challenge. With the need to understand this on an annual basis it becomes impractical to determine this through traditional means.

What were the reasons behind this project? (100 words max)

National Highways has committed to deliver biodiversity net gain across 30,000 hectares of verges and land that runs adjacent to their motorways and trunk roads by 2040. They will soon also have to adhere to required government regulations where all nationally significant infrastructure projects will need to deliver 10% biodiversity net gain.
To successfully meet these commitments and regulations, it is critical to under-stand and track any changes in biodiversity across their land holdings. This is where Ramboll came in to help through the Intelligent Environmental Estate (IEE) project.

Landscape view showing the scale of habitat classification used to monitor biodiversity

Section of UK Highways showcasing potential for soft estate surrounding public road infrastructure

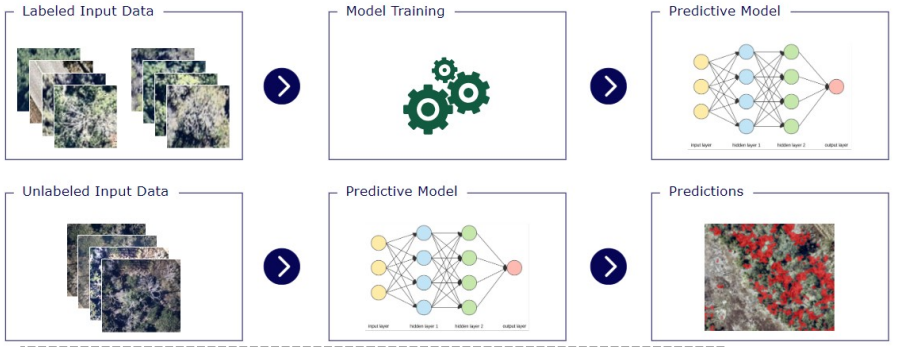
What were the biodiversity measures taken? (300 words max)

Ramboll's prototype was able to map the 14 most common landcover types across the Strategic Road Network, this represents a significant leap forward in providing National Highways with the means to periodically track their biodiversity performance over time. By establishing this biodiversity baseline, National Highways can begin to understand their current performance and then plan to build a strategy that will look to protect and enhance biodiversity across their estate.

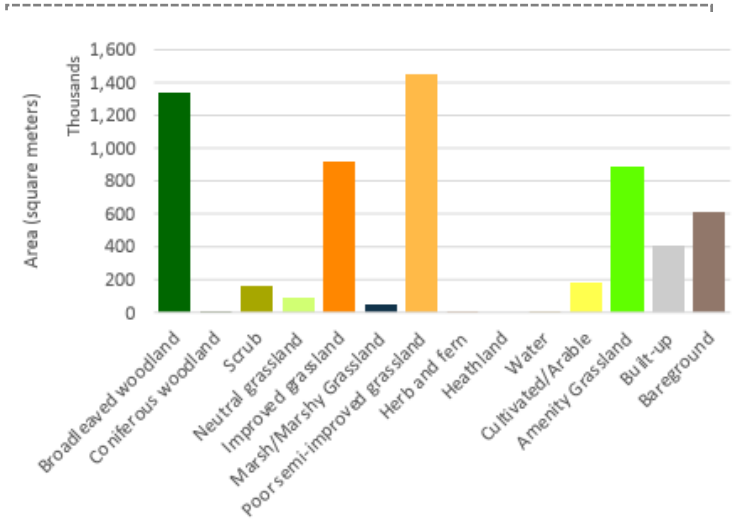
This also provides them with the means to transparently report their year-on-year performance to Government and their stakeholders in an efficient, quantifiable manner that could not be repeated through traditional survey techniques.

By having this information available, National Highways is also able to identify those hotspots of high biodiversity value, allowing them to look to for opportunities to enhance, restore and reconnect those valuable areas.

This tool also provides the means to assess the impacts of development projects, where multiple routes have been identified for a scheme. IEE is able to establish what impact each route will have on biodiversity at an early stage, informing the route selection process long before boots would conventionally be on the ground.



Deep learning workflow used in habitat classification



Classified land area for a stretch of highway

Further information (250 words max)

Ramboll created a prototype system that produces network-wide digital maps of landcover and habitats using satellite imagery and machine learning.

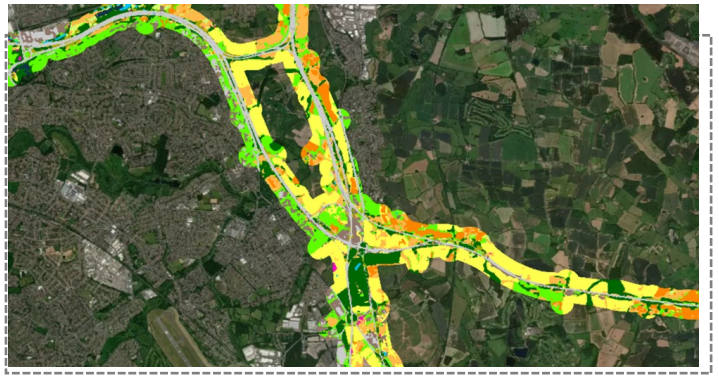
The data produced enables monitoring of biodiversity across the Strategic Road Network in an accurate, defensible, repeatable, and cost-effective manner. To produce network-wide habitat maps, Ramboll created a cloud-optimized data processing and modelling pipeline using multitemporal satellite images and collated training data to produce well-performing machine learning models for habitat prediction. The success of the project is in its repeatability for annual monitoring purposes. National Highways are now able establish any change-over-time of landcover types across the entire road network, identify locations of biodiversity improvement or decline, and strategically allocate resources to ensure biodiversity net gain can be delivered in the short, medium, and long term.

Project Team

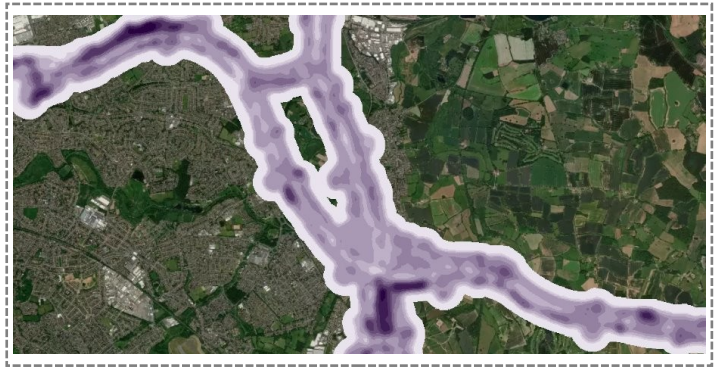
- Client(s)/funder(s): National Highways
- Other design team members: Innovate UK monitored the project.

What was the motivation for carrying out the enhancement? (100 words max)

With BNG rolling out over the UK, Nationals Highways sought to proactively establish a methodology to improve land surrounding public infrastructure, leading by example and ensuring that the Uks remaining soft estate is intact for the benefit of all, present and future.



Habitat cover map of the land surrounding UK Highways Network



Heat map highlighting hotspots of biodiversity across the SRN offering the client the opportunity to think strategically about biodiversity opportunities