Optimising Ecological Connectivity along Linear Transportation Infrastructure

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Contextual Background

Habitat loss and fragmentation has led to declines in the abundance of 41% of UK species since 1970s (NBN State of nature report 2019)

20,000 miles of track and 250,000 miles of roads in UK, often naturally seeded and biodiverse vegetation

2018 Varley Review concluded “Network Rail’s lines can be linear routes for wildlife as well as trains”

Vegetation cover alongside transportation networks presents challenges to operations, safety and cost which require careful consideration

Exponential growth of capabilities to support machine learning and complex GIS analysis for decision making

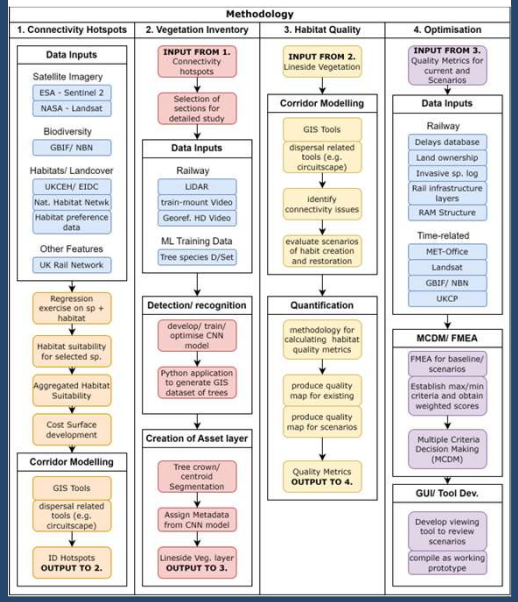
Aims and Objectives

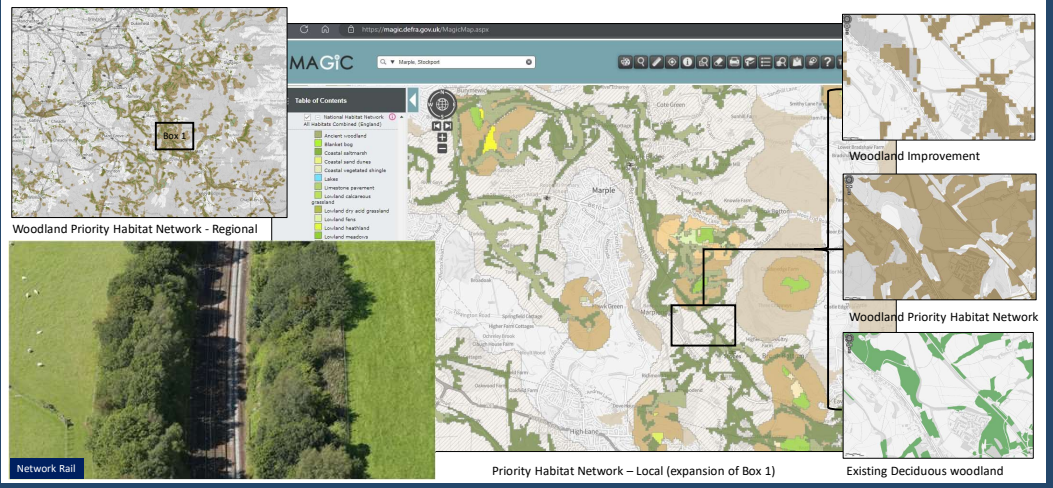
Develop method and tools to optimise the railway corridor for ecological connectivity:

- Identify habitat connectivity hotspots along the railway corridor
- Determine habitat connectivity “quality” within hotspot areas
- Develop a method to efficiently create an inventory of natural assets along the rail corridor
- Develop risk-based approach using Multiple Criteria Decision Making (MCDM) to optimise the habitat connectivity of natural assets against other railway systems

Method

- Encompass National level habitat connectivity initiatives such as Natural England’s Nature Networks mapping
- Review and execution of corridor modelling software to identify connectivity hotspots along the rail corridor
- Individual Tree segmentation and centroid development to develop a rail corridor tree inventory for Natural Asset Management
- Convolutional Neural Networks (CNN) to identify vegetation types along rail corridor
- Develop in ARCGIS and Python environments towards tools for users





Anticipated/ Expected Results

Our hypothesis is that linear rail corridors can provide an important component to landscape scale nature recovery networks by connecting areas of primary habitat, associated habitat and habit creation and restoration.

It seems that for smaller taxa the potential exists for verges to provide refuge, habitat and/ or dispersal, but what about larger taxa?

It is envisaged that this research will identify sections of high connectivity potential and develop tools to assess habitat interventions against operational, safety and cost risks to obtain maximum benefits from investments.

It is hoped that species level tree identification and geolocation can be performed to generate an initial inventory of trackside vegetation for subsequent Asset Management tasks.

Conclusion

It is hoped that by identifying sections of railway which are valuable for habitat connectivity, investment can be apportioned effectively towards a landscape scale strategy for habitat restoration and biodiversity net gain.

By employing tools which model the impact of vegetation interventions on connectivity and risk to other railway assets, decisions based on multiple criteria can be optimised.

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