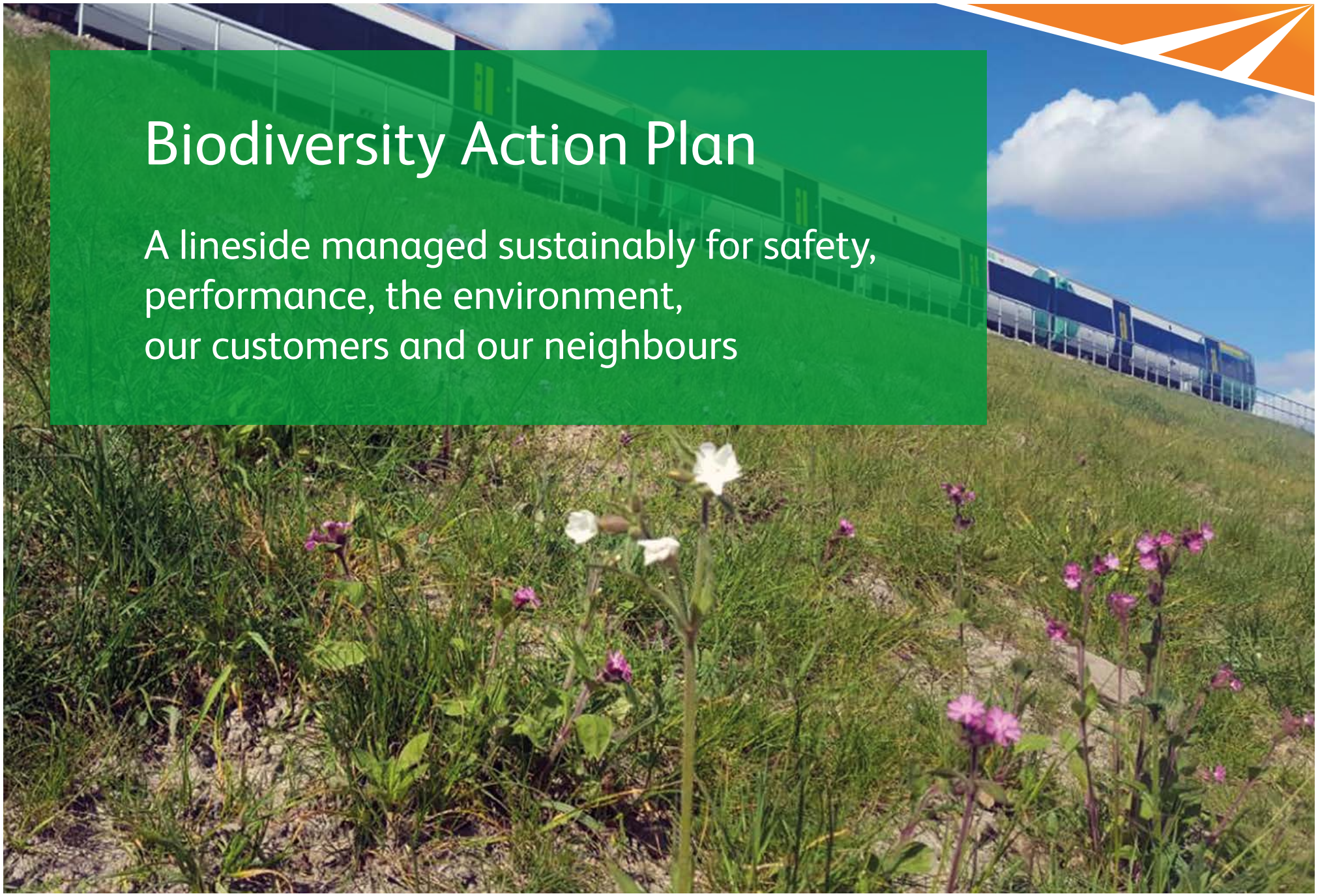
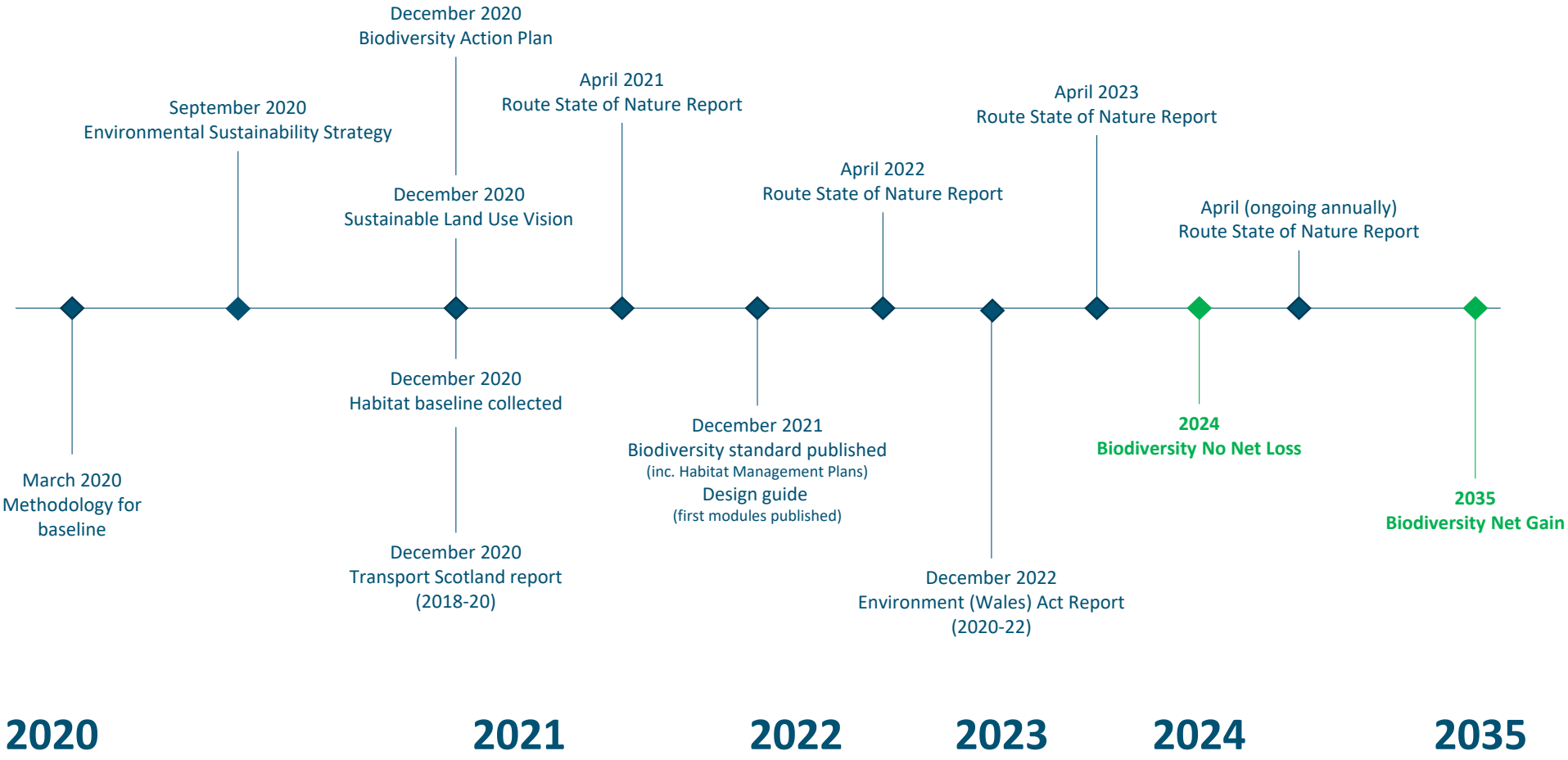
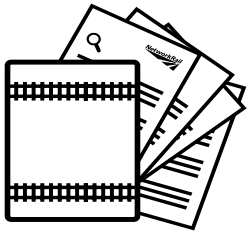


Biodiversity Action Plan

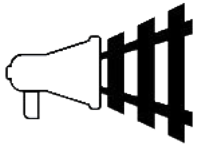
A lineside managed sustainably for safety, performance, the environment, our customers and our neighbours

Timeline for Biodiversity Action Plan





Contents



1 | Foreword

Britain's rail network is one of the oldest and safest in the world. Every day it transports millions of people and around 200,000 tonnes of freight, making a vital contribution to our economic prosperity. Britain's lineside estate provides a rich mosaic of habitats, including woodlands and grasslands, for a wide variety of plants and animals.

Network Rail is an arm's length public body of the Department for Transport, responsible for the safe and efficient running of this busy and extensive transport infrastructure. Managing the habitats alongside our 32,000 km of track is vital for the safety of the passengers, train crew, our employees and contractors. Every year we spend around £40 million achieving this. It's a balancing act for us to maintain and improve the railway to keep it running safely and smoothly, while being mindful of the land that surrounds it, the natural capital we are responsible for, the public benefits it offers, and the wildlife that lives on it. This network, dating back almost 200 years, can play a vitally important role in connecting fragmented wildlife habitats across our countryside, creating visual amenity benefits for commuters, reducing disturbance to our neighbours and much needed carbon capture through the network's stock of over six million trees.

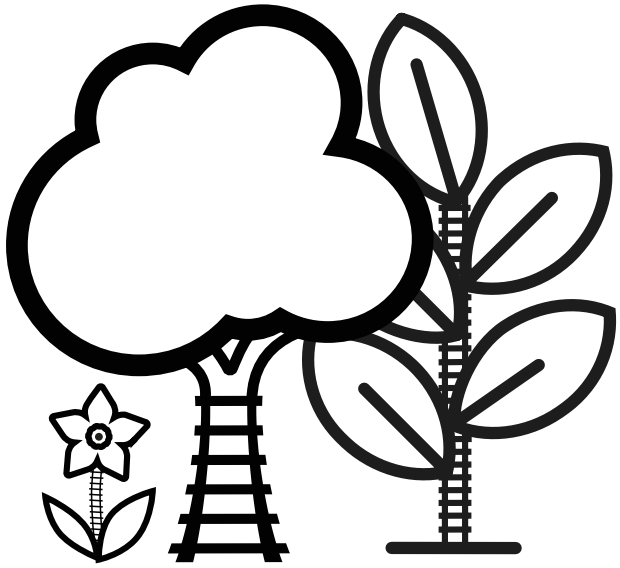
"I want to confirm our commitment to valuing and enhancing nature alongside Britain's railways."

– Andrew Haines, Varley Review

In 2018 the Department for Transport commissioned an independent review of our approach to vegetation management. It concluded that we correctly focus our management objectives on safety and performance. However, in future we need to consider the need to benefit biodiversity and the wider environment, bringing about a culture change within our organisation to view lineside vegetation as an asset, not a liability. The review recognised that as one of the country's largest public landowners, we have a leading role to play in delivering the targets stated in the UK Government's 25 Year Environment Plan, along with similar policies in Wales and Scotland. As a result, we have worked closely with the Department for Transport to turn the recommendations of John Varley's review into a new and ambitious strategy for enhancing biodiversity and wildlife on the lineside.

This Biodiversity Action Plan is the first step in achieving our vision of a lineside managed sustainably for safety, performance, the environment, our customers and our neighbours. In this document, we outline our ambitions for our biodiversity assets, and how we intend to protect, manage and enhance their condition over the current five-year Network Rail funding cycle and beyond. This will require us to develop new skills and competencies in ecology and vegetation management, and apply these to decision-making at all levels of our organisation. It will also involve forming and maintaining partnerships with our stakeholders and neighbours to maximise the benefits a well-managed transport infrastructure can bring for biodiversity. It commits us to the key goal of no net loss in biodiversity on our lineside estate by 2024, moving to biodiversity net gain by 2035. Where it is not safe or practical to mitigate biodiversity loss associated with management actions, we will create appropriate habitats elsewhere on, or beyond, our estate to offset any impacts. Finally, we make a commitment to improve communication with our stakeholders, and to publish annual biodiversity performance results at a regional level.

The next five years will be an incredibly exciting time for Network Rail and the rail industry as we transform our approach to vegetation management to deliver a safe, efficient and biodiverse railway fit for the future.



2 Managing vegetation on the rail network

Striking a balance between safety, performance and environmental outcomes

- The rail network dates back to 1833 and is one of the oldest and safest in the world. Today it is one of the busiest railways in Europe, enabling over 1.7 billion passenger journeys a year.
- Network Rail's estate is extensive - comprising 52,000 hectares of land and 32,000 kilometres of track, making Network Rail one of the largest land owners in the country. It is estimated there are over six million trees on the estate, most of which have grown since the 1960s, but there are some much older and notable trees.
- Britain's rail corridors support a rich mosaic of habitats for a wide variety of native and non-native plants and animals.

Image: Network Rail

2.1 The history of lineside vegetation management

- The railways have been part of our culture and landscape for almost 200 years. During this time the characteristics of the lineside vegetation have changed considerably.
- **The age of steam:** During the great phase of railway construction in the 19th and early 20th centuries, new railway cuttings and embankments were allowed to vegetate naturally. Up to the 1960s, lineside vegetation was managed by cutting, scrub clearance and controlled burning to reduce the risk of fire from passing steam trains. Railway ownership also protected this vegetation from the damaging impacts of intensive agriculture, including ploughing and applications of chemical fertilisers and pesticides.
- **Unique and valuable wildlife habitats:** This combination of management and protection enabled diverse plant and insect communities to flourish on the embankments and cuttings. The value and diversity of these unique habitats was noted in the scientific literature of the day.

Image by Ian Lindsay from Pixabay

Bee orchid

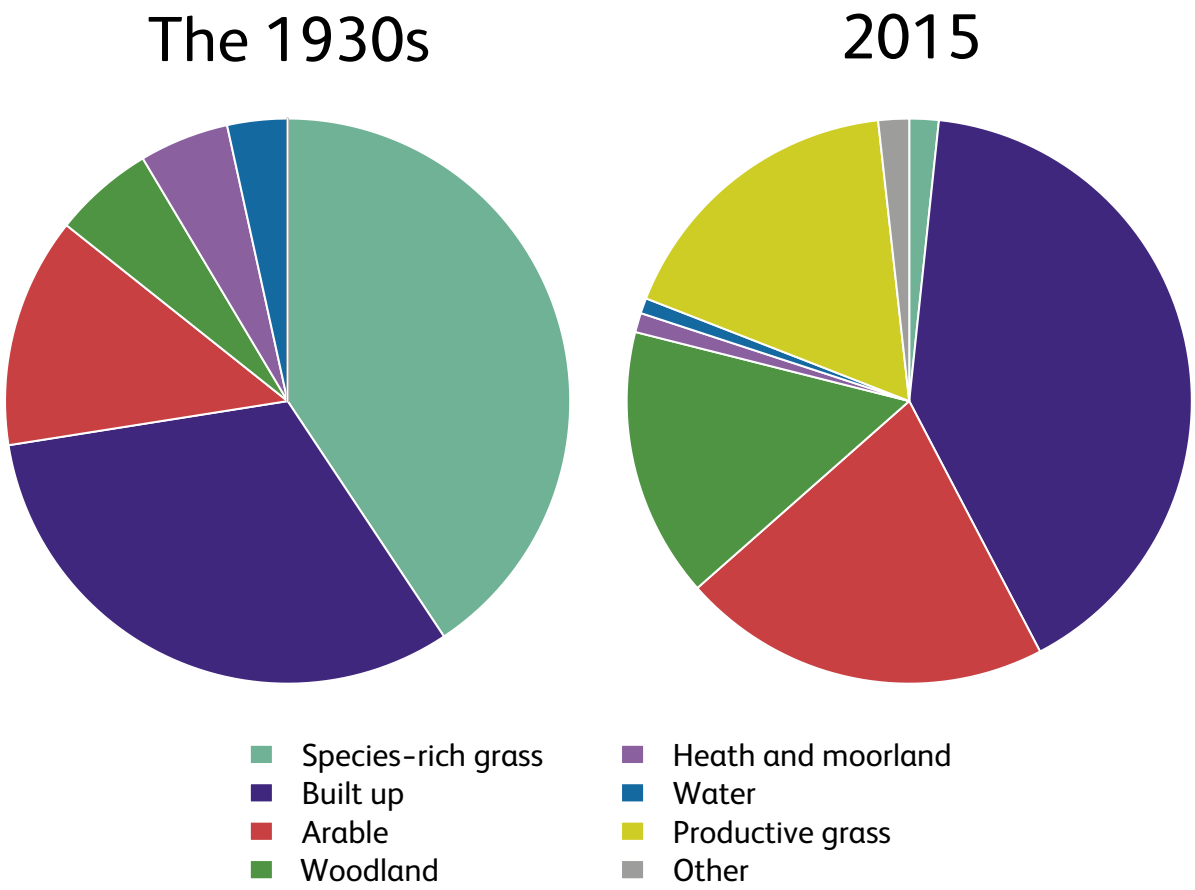
From The Spectator, 10th October 1914, The Flora of the Railway:

"Sometimes, indeed, a railway embankment is a veritable flower garden… what renders the wild garden so remarkable is the profusion of the bee orchids on the slope. The seed had, of course, come from the downs above, where, however, the species cannot be regarded as plentiful. But here on the railway embankment it was abundant."

From A Railway Flora of Rutland, 1968[1]:

"Railway property embraces a considerable diversity of plant habitats… in some respects, railway grassland resembles old pasture controlled by cutting and grazing, or moorland which is regularly burnt."

Figure 1: Changes in the habitats present on the trackside estate between the 1930s and 2015[2]



1. *K. G. Messenger, A. (1968) Railway Flora of Rutland, Proc. bot. Soc. Br. Isl. Vol. 7, (3)*
2. *Data from the First Land Untilisation (Stamp 1937) and the UKCEH Land Cover map 2015, www.ceh.ac.uk/services/land-cover-map-2015*

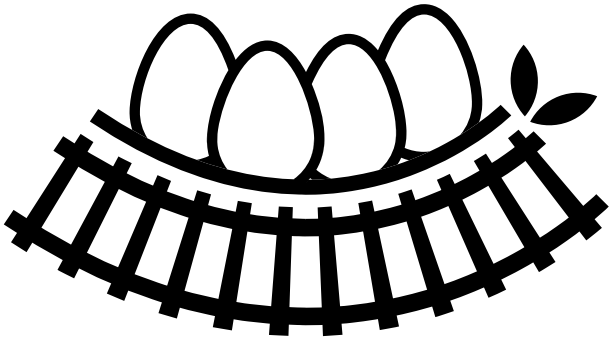
- **Neglect:** the widespread introduction of diesel and electric trains in the 1960s reduced the need for regular management of the lineside vegetation because of the reduced risk of fire. This coincided with nationalisation of the railway, together with rationalisation and cutbacks in funding. This lack of regular vegetation management resulted in the growth of trees and scrub over much of the once open lineside vegetation.
- **Loss of species-rich grassland:** the lack of management is highlighted by the loss of flower-rich grassland on the lineside between the 1930s and 2015, and its replacement by arable land, productive grassland, urban development and woodland (Figure 1).
- **Concern** over the lack of appropriate management was first raised following a systematic survey of railway vegetation in 1984[3].

3. *C. Sargent (1984). Britain's Railway Vegetation, Institute of Terrestrial Ecology, NERC*

- **Criticisms:** In recent years, Network Rail's approach to vegetation management has been criticised for often being reactive and focussed on minimising risks to safety and performance, such as management of 'leaves on the line', at the expense of biodiversity, like nesting birds.
- **Independent review:** In 2018, these criticisms prompted the Rail Minister to commission an independent review of how Network Rail manages vegetation on its estate.

Image by Sabine Löwer from Pixabay

Blackbird and young



3 | Valuing nature – a railway for people and wildlife

"An ambitious vision for the management of the lineside estate"

– John Varley

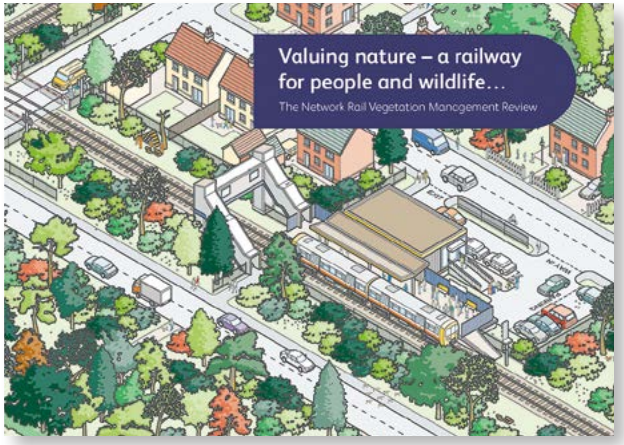
- John Varley's independent report to the Department for Transport on Network Rail's approach to vegetation management was published in November 2018 – **Valuing nature – a railway for people and wildlife: Network Rail Vegetation Management Review.**
- This landmark review made six key recommendations, summarised below, to change the way vegetation is managed for biodiversity and the environment across the rail network.

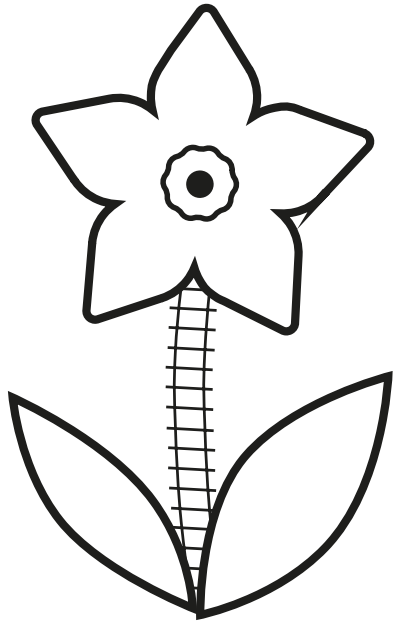
1. **Delivering for the Environment:** the UK Government must define how Network Rail should contribute to its wider vision for the environment, published in the 25 Year Environment Plan, including landscape-scale benefits, habitat creation and restoration, and the provision of wildlife corridors;
2. **Mainstreaming biodiversity in decision making:** appropriate governance must be embedded at the Board, route and project levels to ensure environmental outcomes are considered alongside safety and performance;
3. **An ambitious vision:** a high level strategy and plan for management of the lineside estate should be published. This should identify key outcomes and how these will be achieved through partnership working;
4. **Valuing and managing lineside estate assets:** Network Rail should

undertake a comprehensive baseline asset check of habitats and biodiversity across its estate. This will form the basis of future route-specific habitat management plans;

5. **Improved communication:** Network Rail should ensure they are open and transparent in their plans for vegetation management. They must ensure they communicate effectively with stakeholders and neighbours;
6. **Culture change:** the organisation should lead a cultural change for valuing nature and the environment at all levels within the rail industry. This should be coupled with training and recruitment to ensure that specialist skills and competencies are present in the organisation. Innovative approaches to managing biodiversity should be developed , and best practices showcased through demonstration projects.

- The review's findings were accepted by Network Rail and time-bound actions put in place to address all the recommendations.





4 Biodiversity and the rail network

4.1 Biodiversity and natural capital

- Biodiversity is the diversity of living organisms, including plant, fungal and animal species. These live together in ecosystems comprising different habitats. The rail estate provides a rich mosaic of habitats for biodiversity, supported by embankments and cuttings, the ballasted rail bed, and numerous structures, such as buildings, bridges, tunnels and walls.
- The railway corridor is a natural refuge of many species because it is usually protected from general human interference. Many rare* and iconic species live in these habitats, including large blue butterflies, natterjack toads, great crested newts, turtle doves and otter.
- Network Rail owns and manages around 200 sites that are considered important for wildlife and are legally protected as sites of special scientific interest (SSSIs). These include priority wildlife habitats such as lowland heathlands, calcareous grasslands, wetlands and coastal sand dunes. There are also other statutory and locally important sites directly adjacent to the lineside which we must take care not to damage. Similarly, in the case of woodland management, we must also be compliant with tree preservation orders and work in consultation with local planning authorities.

Image by Alexas_Fotos from Pixabay

Otter

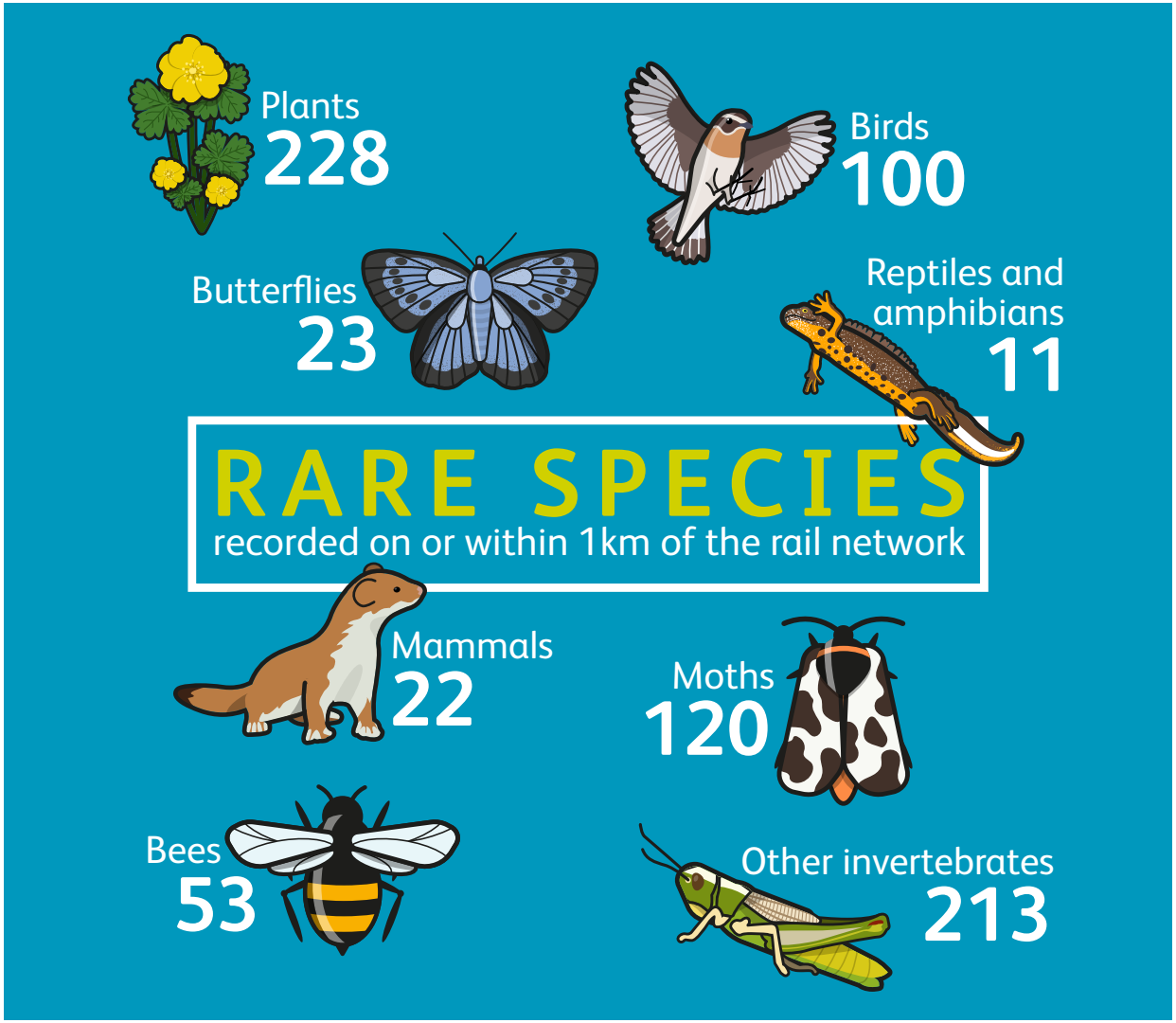
* *Rare species are those considered to be a conservation priority in England, Scotland, Wales and Northern Ireland according to the Joint Nature Conservation Committee priority species indicator (C4b): https://hub.jncc.gov.uk/assets/c4169253-54bb-4250-919b-a0942dea2bad.*

- These species, habitats and ecosystems are known as natural capital assets - quantifiable resources in the environment that may provide social, environmental and/or economic benefits (and in some cases costs) to people, including clean air and water, food, energy and aesthetic value.
- However, like any major transport infrastructure, the rail network is also home to some less welcome species, such as Japanese knotweed - a fast growing and invasive plant.

Image by Dr Neil Strong, Network Rail

Japanese knotweed

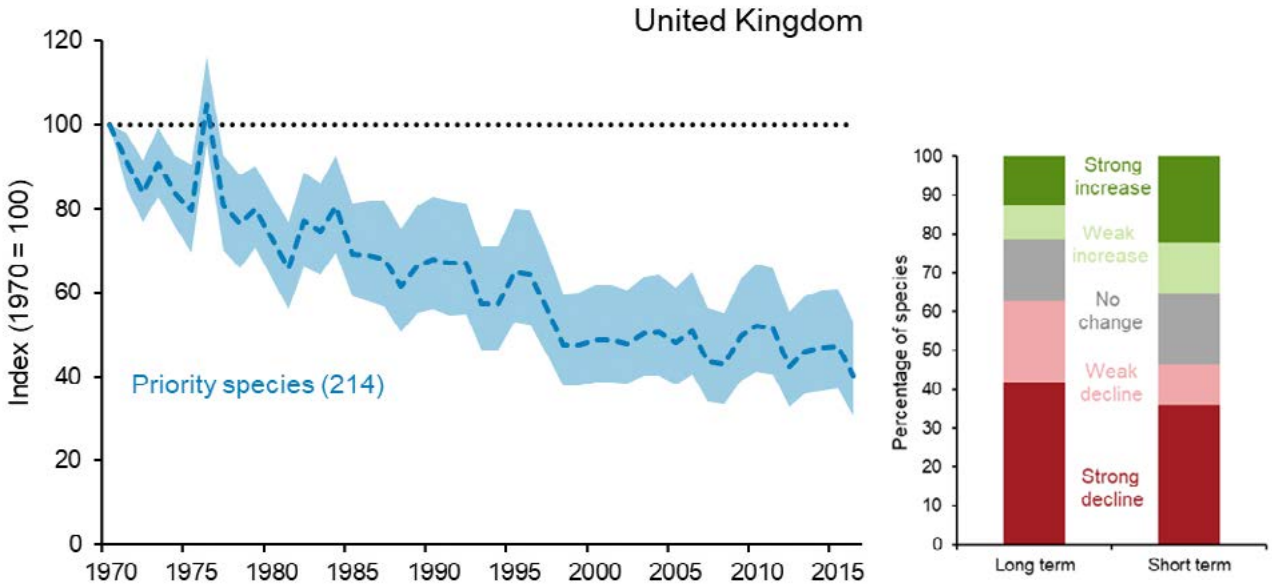
Table 1: The rail network is home to a large number of rare and threatened species:



4.2 Biodiversity under threat

- Many of our native plant and animal species are declining in abundance and diversity. The 2019 State of Nature Report showed that since 1970, 41 % of the plant and animal species studied have declined by some measure (see Figure 2).
- For some groups, such as insect pollinators, these declines have been more marked. For example, since 1850, 23 bee and flower-visiting wasp species have become extinct in the UK.
- The reasons for the decline of these species are complex, but most experts agree it has resulted from a combination of human induced stresses. These range from habitat degradation and loss due to land use change, to pesticide and fertiliser use, pollution, the spread of non-native species and the impacts of climate change.

Figure 2: UK Biodiversity Indicator: Change in the relative abundance of UK priority species, 1970 to 2016[4].



[4] *Source: Defra (2019) UK Biodiversity Indicators 2019. C4a. Status of UK priority species – Relative abundance*

Image by Kathy Büscher from Pixabay

Whinchat

Image by Lucy Hulmes, UKCEH

Garden bumblebee

Image: Network Rail

Peacock butterfly

Image by Alexas_Fotos from Pixabay

Hedgehog

4.3 Legislation

- The UK Government and the devolved administrations have each put in place policies and legislation that focus on the maintenance, protection and enhancement of our environment. They share the common goal of requiring public bodies, including those responsible for transport infrastructure, to protect and enhance biodiversity through habitat creation and management. Network Rail recognises the key role that the rail network and other transport infrastructure will play in maintaining and producing resilient ecological networks of habitats across the countryside that are resilient to future change.
- Further details of some of the legislation and policies affecting biodiversity management on the rail network in England, Scotland and Wales are provided in Appendix 2.

5 The role of the rail network in delivering the government's ambitions for biodiversity

In 2019, the Department for Transport (DfT) set out a clear policy for how it expects Network Rail to protect and enhance the railway environment, while ensuring the safety of passengers and reliable services. This recognises the key role management of the rail network has in delivering the environmental policies and legislation of England, Scotland and Wales.

5.1 Biodiversity key performance measures

Specifically, this defines a number of biodiversity performance measures we are expected to achieve in the period 2019-2024 (see Figure 3, page 17):

- No net loss in biodiversity on our lineside estate by 2024, and to achieve biodiversity net gain on each route by 2035.
- Integration of biodiversity requirements into our objectives, culture, and decision-making and management processes, alongside our existing responsibilities for safety, performance and value for money.

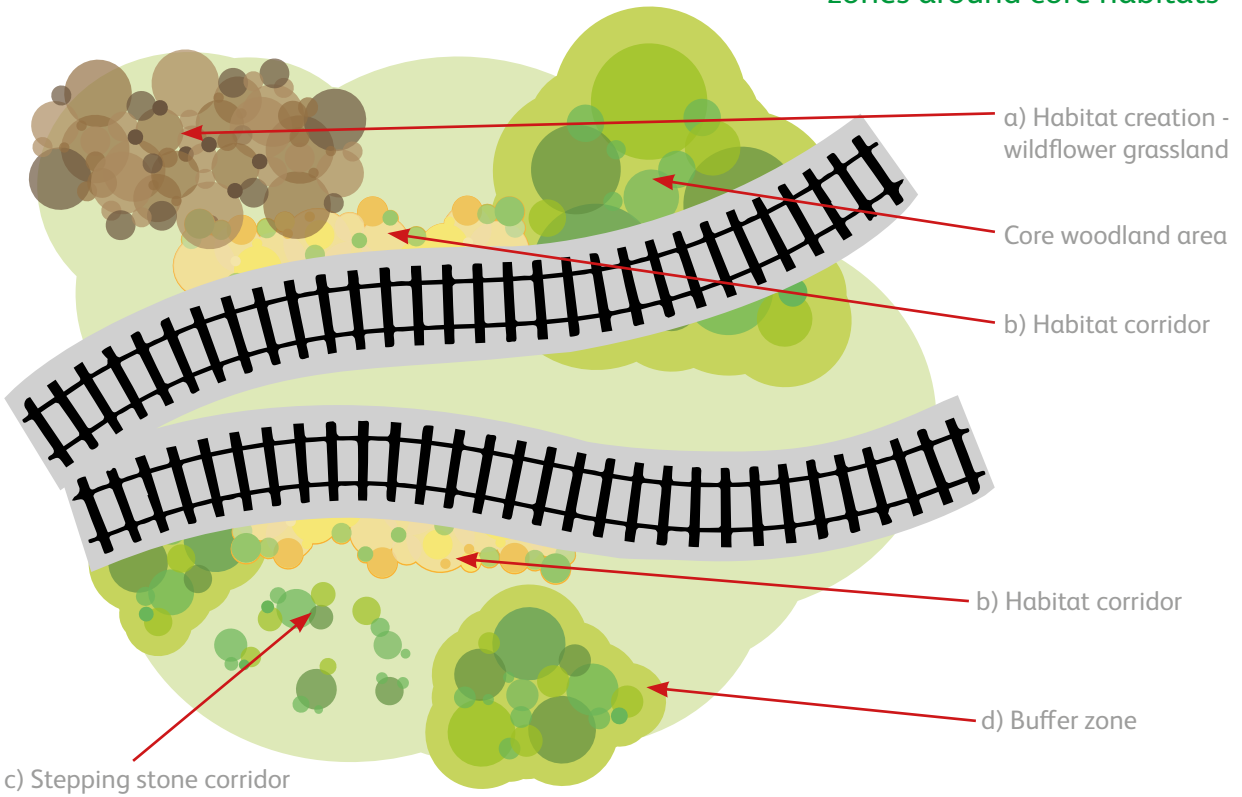
- Improve biodiversity elsewhere on our estate where it is not practical or safe to mitigate habitat loss on the lineside (biodiversity offsetting).
- Follow best practice in habitat management, including the restoration and creation of priority habitats that would benefit rare or threatened species in the context of the local area or region.
- Work in partnership with our neighbours and stakeholders to ensure that the lineside estate contributes to improving the biodiversity of the local area, and also maximises the value and connectivity of its routes as wildlife corridors.
- Publish annual reports on our activities and progress towards meeting these goals.

The DfT is to working towards biodiversity being embedded into all interventions planned for the national road and rail corridors.

- The Office of Rail and Road (ORR), as the regulator of Britain's railways, will monitor our performance against these targets, which will be captured annually in the ORR's Network Rail Monitor.

- In addition, the Government expects us to support the objectives of Biodiversity 2020 (the Government's strategy for biodiversity and ecosystem services), the National Pollinator Strategy, and wider environmental and ecological policies.

Figure 3: Examples of protecting and enhancing the lineside environment: a) habitat creation (biodiversity off-setting), b) managing habitat corridors to link core habitats, c) creating stepping stone corridors, d) creating buffer zones around core habitats



6 How we will achieve it - our approach to managing biodiversity

The role of the network in protecting and enhancing biodiversity

Clear principles to manage rail assets to ensure safety and performance are already embedded within the Network Rail strategy. Biodiversity and sustainability objectives will be integrated into these requirements.

6.1 A stocktake of environmental assets

- The first step to embedding biodiversity into asset management decision making will be to conduct a comprehensive assessment of the type and condition of biodiversity assets across the rail network – including species and habitats. This is fundamental to producing detailed route level habitat management plans, defining outcomes and measuring progress towards them. This will include the following elements:

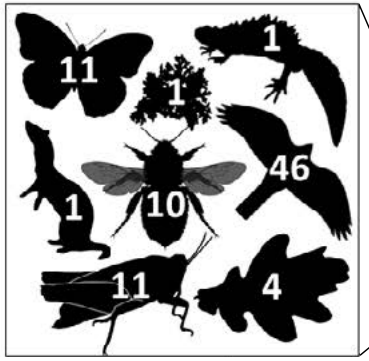
- **Wildlife associated with the railway**: Britain is fortunate to have an incredible wealth of information on biodiversity. For hundreds of years, citizen scientists have recorded where species live. Today there are over 225 million records of more than 70,000 species (e.g. National Biodiversity Network Atlas). Working with our civil society partners, we will gather together and analyse these data to identify which species are associated with the railway and where they are most diverse (Figure 4).

- **Non-native invasive species**: as well as mapping native species, we will also collate information on the occurrence of non-native, invasive species, such as Japanese knotweed and Himalayan balsam. This will underpin Network Rail's contribution to wider landscape-scale control strategies for these problematic species.
- **Predicting biodiversity**: we will use our knowledge of the requirements of species to model where they are likely to occur on the trackside, both now and under future climate change. This information will be augmented by detailed ground surveys for protected species where major development work or management actions are planned. Together, this will inform local conservation management plans to ensure our land is managed optimally to conserve these species.

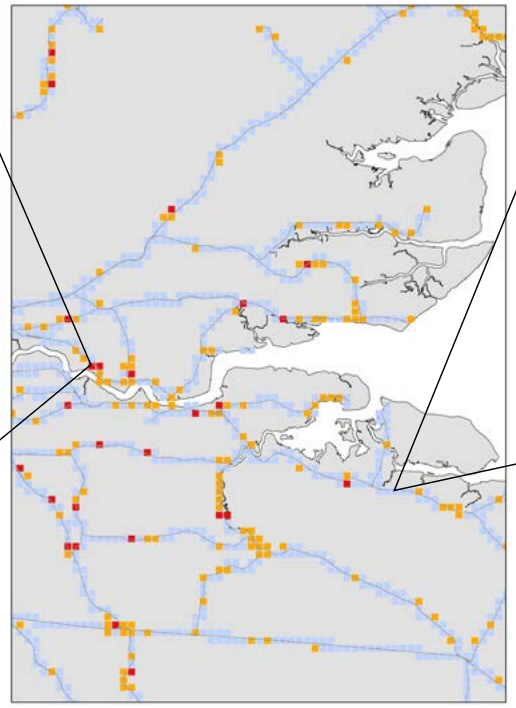
Figure 4: Diversity of rare species found within 1km of the rail network in Essex

Priority species richness per 1km² map grid square

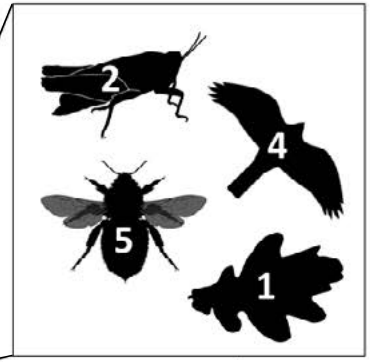
Map grid square: TQ5479: 85 Priority species recorded



Group	Richness
Plants	4
Lichens	1
Butterflies & moths	11
Bees	10
Other invertebrates	11
Birds	46
Mammals	1
Reptiles and amphibians	1



Map grid square: TQ9263: 12 Priority species recorded

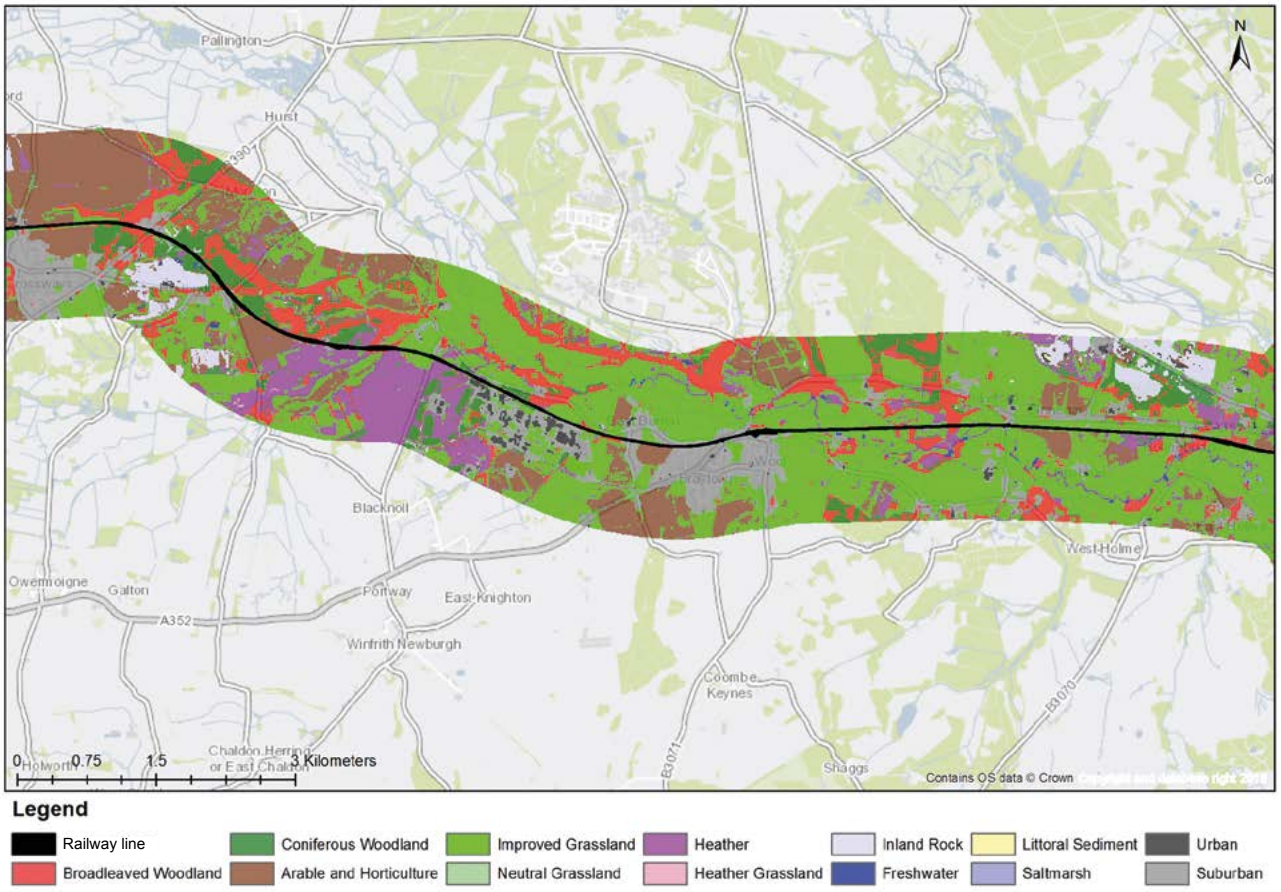


Group	Richness
Plants	1
Bees	5
Other invertebrates	2
Birds	4

- **Habitat type and condition**: we will map the type and extent of habitats across the rail network using up-to-date satellite imagery, such as the European Space Agency's Sentinel 2 satellite - capable of providing 10m resolution multi-spectral images of the land surface every five days. An example of the high resolution mapping of habitats adjacent to the rail network is provided in Figure 5. To this we will add precise three-dimensional information on the shape of the land surface and vegetation height using LiDAR - Light Detection and Ranging, a remote sensing method that uses light in the form of a pulsed laser on an aircraft to measure heights of features on the earth's surface. We will link these to the records of species to understand which species live where.

Figure 5: High resolution map of habitats adjacent to the rail network in Dorset derived from satellite imagery.

(Demonstrator Land Cover Map courtesy of Dan Morton and Lucy Ridding, UKCEH.)



- **How the rail network connects the landscape**: we will analyse national maps of wildlife habitats to understand how to best manage the lineside estate and work with other partners on neighbouring land to re-connect habitat fragments across the landscape, creating a resilient, green infrastructure (Figure 6) and contributing to a nature recovery network.
- **Data integration**: this new information on the status of habitats and species present on or close by the rail network will be integrated with existing lineside asset management data. This integration will support joined up decision making to ensure delivery of safety, performance and biodiversity outcomes.

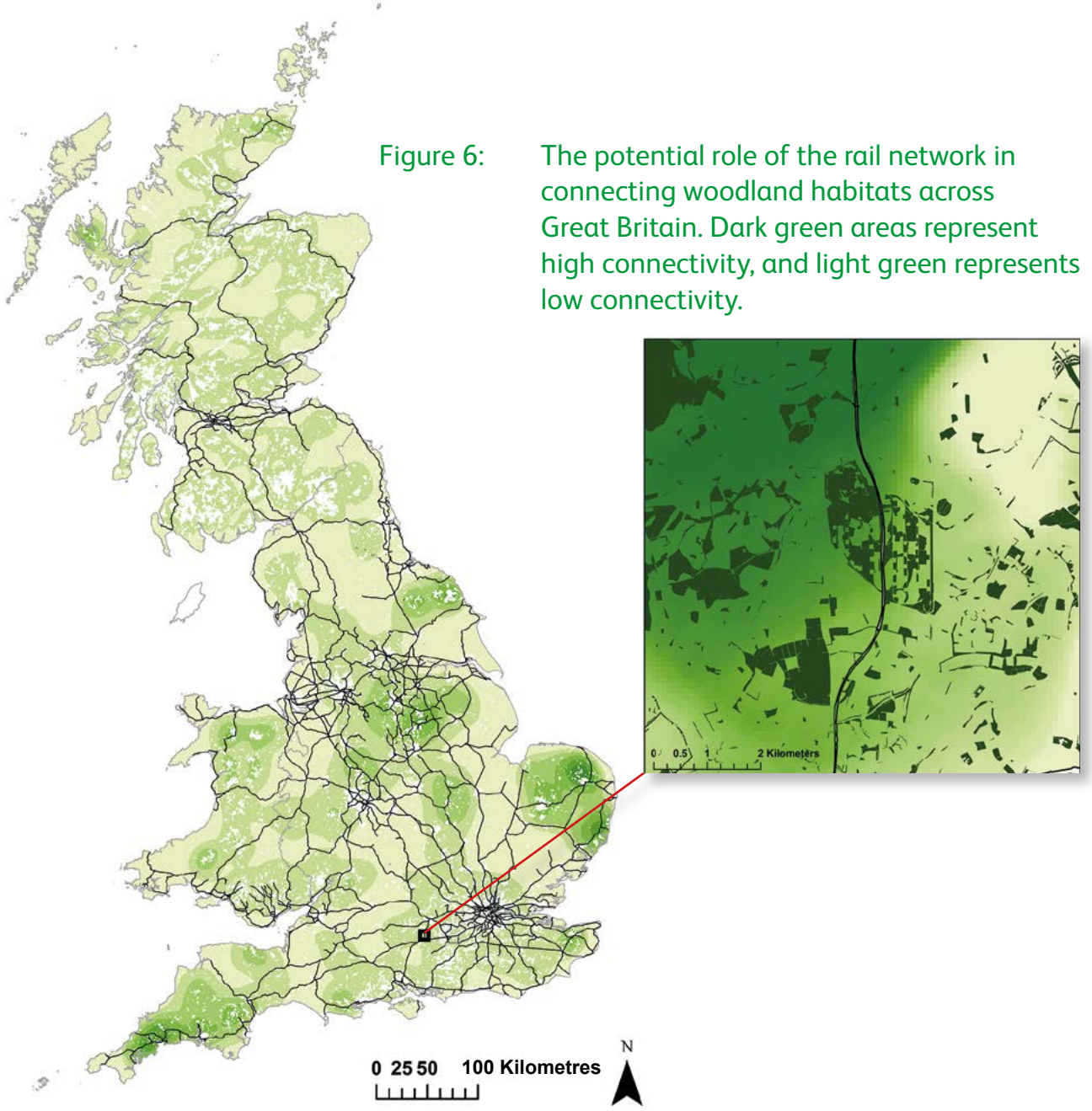


Figure 6: The potential role of the rail network in connecting woodland habitats across Great Britain. Dark green areas represent high connectivity, and light green represents low connectivity.

6.2 Measuring the impacts of our management on biodiversity

- **A robust and repeatable monitoring methodology**: measuring the impacts of management on biodiversity on such an extensive, complex and difficult to access lineside estate presents a number of challenges. We will utilise frequent satellite remote sensing to detect changes in habitat composition, together with targeted ground survey to assess the diversity of species living on the lineside.
- **Detailed monitoring**: we will establish a network of sites for each route where the impacts of vegetation management on biodiversity are monitored in detail. These will serve to:
  - Demonstrate best practice vegetation management of biodiversity assets, including the control of non-native species, such as Japanese knotweed.
  - Trial new approaches to management and habitat creation prior to wider implementation across the estate.
  - Train Network Rail staff in best practice approaches to managing biodiversity.
- **Biodiversity accounting:** we will develop a consistent way of measuring and accounting for biodiversity losses and gains resulting from development or land management change. Numerical values will be assigned to different areas of ecological habitat based on habitat type, condition, distinctiveness, and difficulty to recreate. This enables the creation of a balanced scorecard to compare the pre-work numerical score with a post-work score. This overall score is based on habitat areas retained, lost or degraded by development, plus areas enhanced or created through mitigation, compensation, or offsetting across our estate or elsewhere. We will incorporate this information into our lineside asset management database.
- **Opportunities to increase biodiversity:** in order to achieve our target of net biodiversity benefit, we will look across our estate for opportunities to create new, and restore and manage existing habitats to improve biodiversity and the resilience of ecosystems. This work will be appropriate to the local Region and landscape, and will consider factors such as the proximity of rare species and important biodiversity habitats.
- **A lineside management toolkit:** we will collate information on best practice management into a database available to all managers responsible for the lineside. This will support increased competence in biodiversity management at all levels of the organisation.
- **Keeping up to date:** we will also explore ways to improve our biodiversity monitoring using the latest technologies. Possible approaches include:
  - Use of high resolution satellite imagery and drones for detailed mapping of vegetation.
  - Image recognition to record invasive species, such as Japanese knotweed, and serious plant diseases, such as ash dieback.
  - Automated acoustic monitoring of bats and other species.

This new integrated and data-driven approach to managing vegetation assets will enable the cost-effective targeting of funds to ensure maximum benefits to biodiversity.

Case study

Engaging with regulators to protect rare species

Southern region

During the winter of 2019/20, Network Rail rebuilt the Cookspond (Sussex) and Edenbridge (Kent) embankments that had failed following a period of adverse weather. Detailed ecological surveys revealed the presence of protected species at each site: Great crested newts at Edenbridge, and dormice and bats at Cookspond. The environmental specialists at Network Rail worked closely with Natural England and local authorities to ensure the engineering work caused minimal disturbance to the protected species and allowed the re-location of newts found at Edenbridge. The full visibility and transparency Network Rail maintained with these stakeholders ensured the successful delivery of both programmes. As a result Network Rail reopened the rail lines in a timely way, whilst protecting rare animal species.

Images: Network Rail

Main image: Landslip at Edenbridge. Inset: Great crested newt. (Great crested newts are a protected species and can only be handled under licence.)

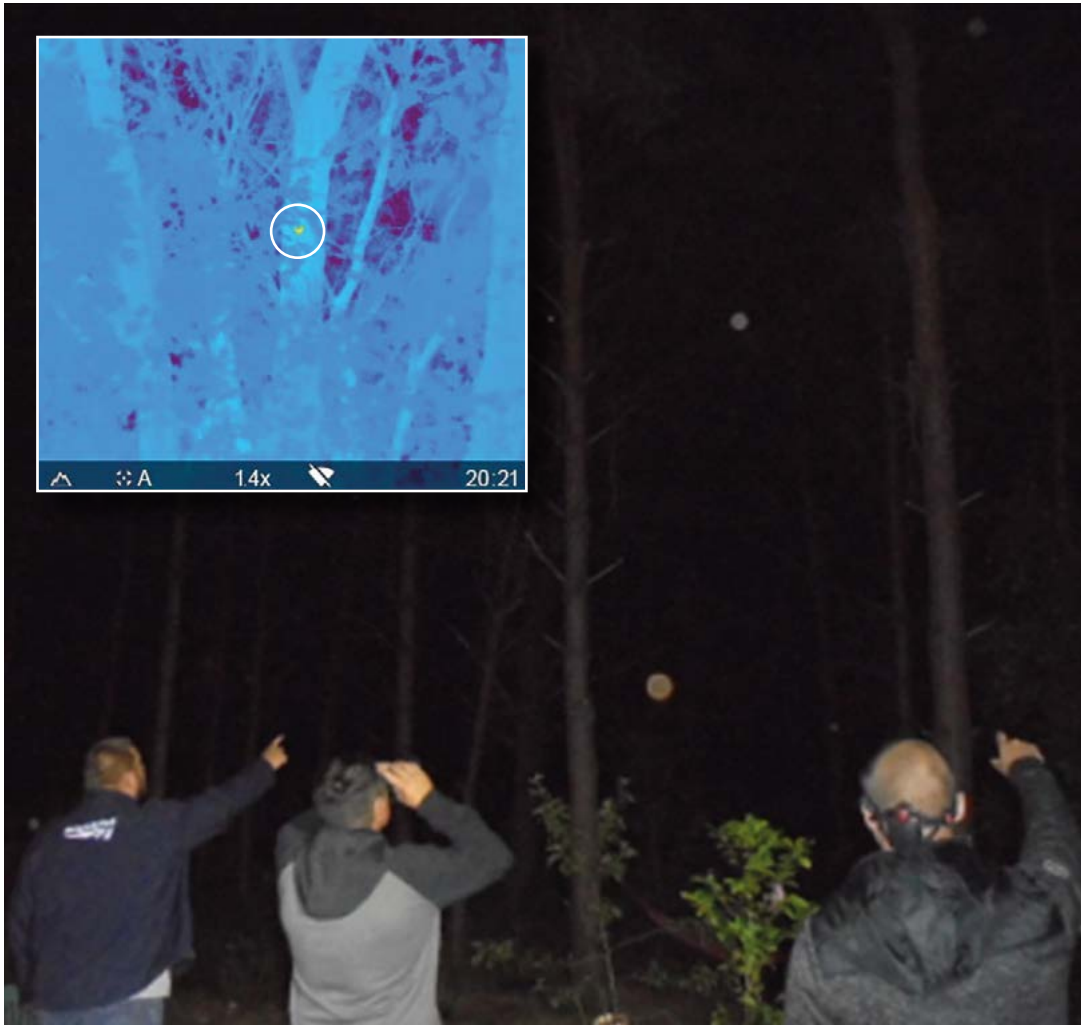
Image: Network Rail

Case study

Improving nesting bird training

North West and Central region

In order to minimise disruption to the rail network, Network Rail sometimes undertakes vegetation management work at night. This has required improvements in our standard nesting bird procedure. In spring 2020, National Rail trained staff in a woodland in Shropshire during the early evening and night. This simulated the type of habitats that workers may encounter on the railway lineside. The training refreshed delegates' knowledge on the Network Rail nesting bird procedure and how to use it. The training also enhanced skills in the use of thermal imaging scopes to locate nesting birds at night. The trainees identified several species, including a great spotted woodpecker nesting within a tree hollow (see inset photograph). Network Rail has scheduled further training sessions, and the use of thermal imaging will lead to less disturbance of nesting birds on the network.



Images: Network Rail

Main image: The trainees identified several species, including a great spotted woodpecker nesting within a tree hollow (see inset photograph)

6.3 Turning our vision into practice - route level action plans

- Network Rail is run as five regions, comprising 14 routes (as seen in Figure 7), each with responsibility for safety, performance and the environment.
- The Biodiversity Action Plan is an overarching statement of intent that fits within a defined hierarchy of documents (Figure 8, page 27). The hierarchy will exist under the high-level Sustainability Strategy, which will outline the direction that Network Rail wants to move with respect to its estate management. The Biodiversity Action Plan, alongside the data collection methodology and processes, will describe what actions are to take place within the business to enable us to achieve our objectives.

Figure 7: Routes and Regions

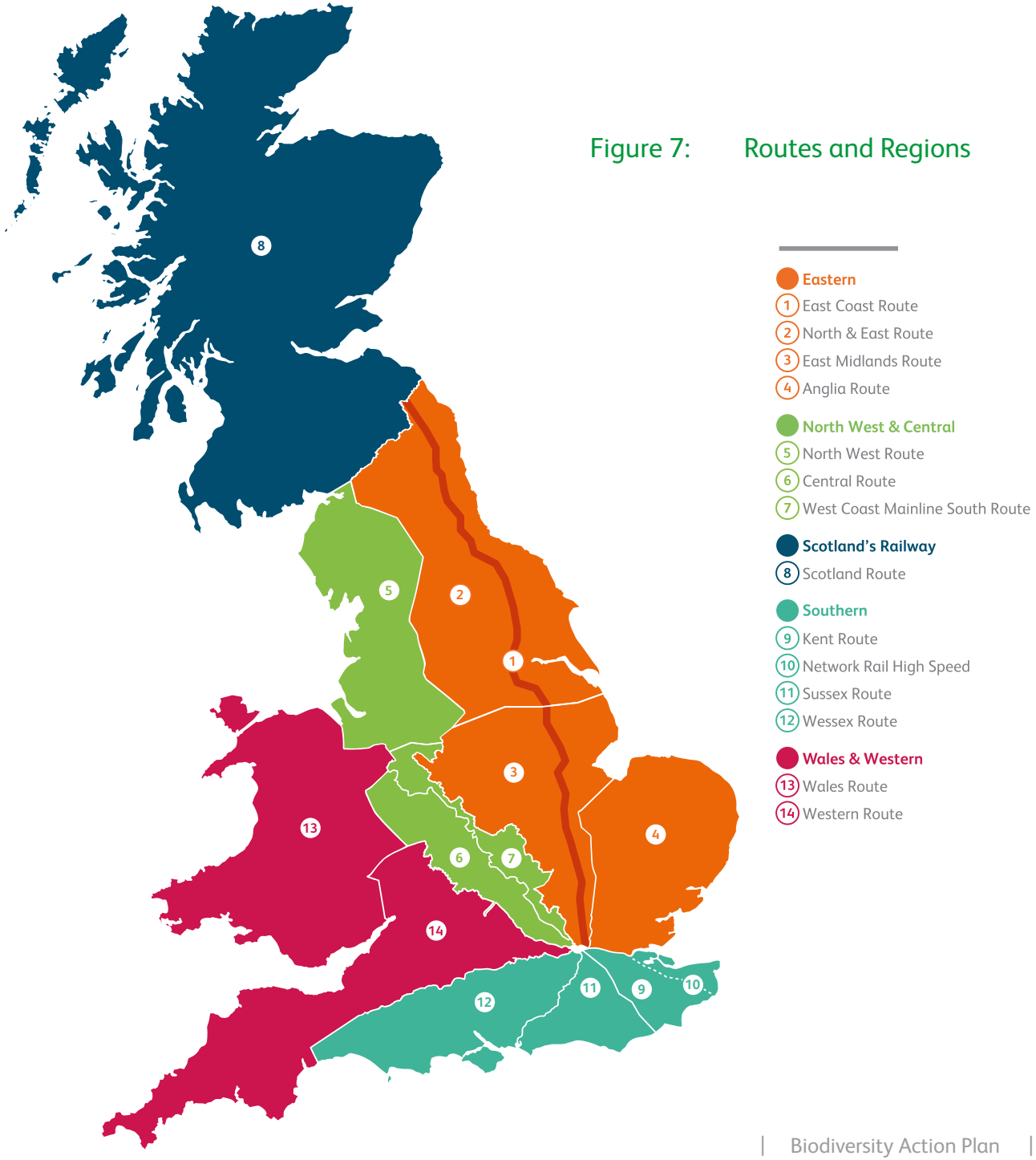
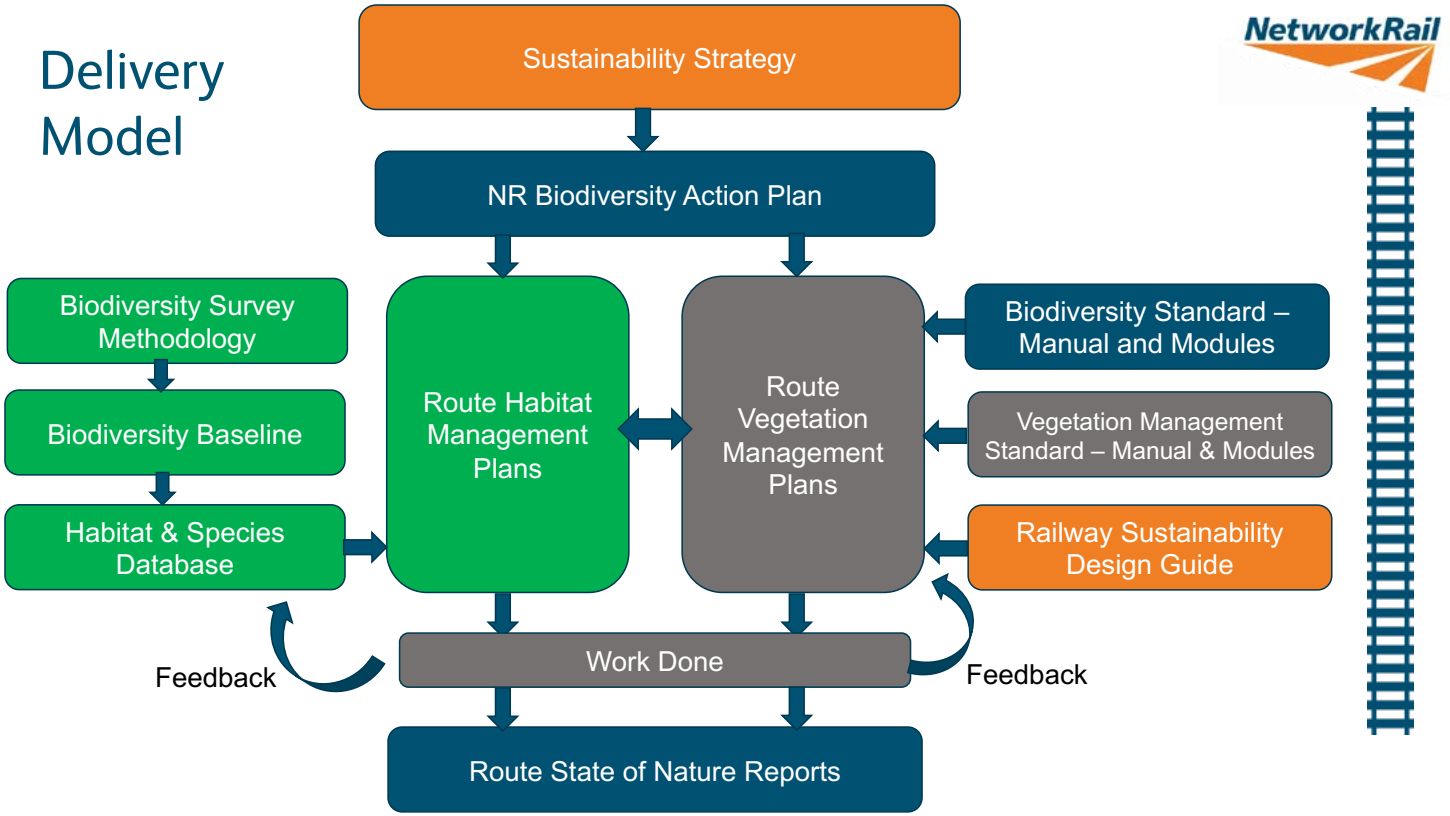


Figure 8: Biodiversity planning within Network Rail



Notes:

Biodiversity standard manual & modules
NR/L2/ENV/122

The **WHAT**: data collection & interpretation; habitat identification; biodiversity calculation; legal obligation & permission requirements; habitat management plans.

Vegetation management standard manual & modules
NR/L2/OTK/5201

The **WHAT**: inspection & survey; data interpretation, legal obligation, vegetation management plans, sectional plans.

Railway sustainability design guide

The **HOW**: guidance; templates; habitat specifications; identification aids; toolbox talks; case studies.

- New and updated standards and procedures, developed by Network Rail's subject matter experts and practitioners, will define what work will be carried out according to the activities described in the Biodiversity Action Plan.
- The route level action plans will be drawn up in close consultation with stakeholders, neighbours and local communities (see 6.4).
- Each plan, incorporating habitat management plans, vegetation management plans and sectional asset plans, will identify a series of biodiversity and environmental goals or outcomes which will be met through the completion of a number of time bound actions, and reported on annually.
- These actions and goals will indicate how railway management is contributing to wider conservation initiatives, such as the National Pollinator Strategy and Nature Recovery Network.
- Each plan will be supported by additional technical guidance to ensure consistent and effective delivery of biodiversity actions across all routes and regions.
- We will establish a Network Rail Biodiversity Steering Group to support route level planning, ensure consistency, enhance synergies among route level plans, share best practice and collate annual progress reports. The steering group will be responsible for reporting overall biodiversity performance annually to the Office of Rail and Road (ORR).

Image: Network Rail

Habitat creation

Case study

Woodland management for biodiversity

Eastern region

Network Rail has had some negative publicity for its vegetation management, as stated in the Varley Review of 2018. With that in mind, our team in the Eastern region were keen to approach vegetation management beyond the technical and safety perspective. They wanted to gain a thorough understanding of lineside ecology and seek the views of local stakeholders. At the same time, they still needed to provide clear sight lines for train drivers and reduce the risk of tree and leaf litter falls. The team took a sympathetic approach to the management of woodland on the lineside. They used crown reduction, pollarding and coppicing of large trees instead of clear felling. Through the creation of habitat log piles, planting new hedgerows, and retaining understory vegetation, their work enhanced biodiversity. The team also organised a comprehensive programme of public information events that allowed Network Rail to explain the importance of vegetation works, and our goals for protecting biodiversity.

Images: Network Rail

Main image: A sympathetic approach to the management of woodland on the lineside. Inset: Creation of habitat log piles to enhance biodiversity

6.4 Engagement and communication

As the operator of a major national transport infrastructure, we will engage with a large and diverse list of stakeholders who have an interest in the way we manage our biodiversity assets both nationally and at region and route level. In this respect, we will be able to work on a landscape scale approach. The plan for stakeholder engagement is summarised below in Table 2.

Table 2: The plan for stakeholder engagement:

Stakeholder	Opportunities & outcomes
The Office of Rail and Road (our regulator), Department for Transport, Transport Scotland, Transport for Wales	Overseeing Network Rail's operations; setting and measuring progress towards our biodiversity targets
Governments: UK, Scotland and Wales	Setting national biodiversity policies and targets
Government bodies: Department for Environment, Food and Rural Affairs, Natural England, Scottish Natural Heritage, Natural Resources Wales	Implementing national biodiversity policies
Road transport infrastructure (Highways England, Transport Scotland, Welsh Government, local Highways Authorities)	Opportunities for joint working to deliver a green transport infrastructure, sharing best practice
Nature conservation organisations and land owners with conservation interests	Opportunities for joint working, sharing best practice, building on landscape scale restoration schemes and creating resilient ecological networks
Biological Recording Schemes and local Environmental Record Centres	Monitoring the status and trends in biodiversity associated with the rail network
Rail users, Train Operating Companies (TOCs), Freight Operating Companies (FOCs), Freight and National Passenger Operators (FNPO)	Ensuring our biodiversity management actions meet their needs of safety and performance
Local community neighbours	Ensuring our biodiversity management actions meet their needs and are appropriate for their area
The general public	To raise awareness of our management of biodiversity

Case study

The large blue butterfly: a conservation success story

Wales & Western region

Despite over 50 years of effort to halt its decline, the large blue butterfly was pronounced extinct in Britain in 1979. In the late 1980s, Natural England and the UK Centre for Ecology & Hydrology (UKCEH) joined forces to undertake a successful programme of reintroduction onto former sites on Dartmoor. In the late 1990s, large blues spread onto land owned by Network Rail. UKCEH worked closely with Network Rail to create optimum habitats for large blues on sites undergoing engineering work. On one site, the design included variations in slope and soil depths. This provided additional mitigation against the effects of future climate change on the butterfly's habitat. A third Network Rail site now supports one of the largest colonies of large blues in northern Europe.

Main image: Creation of large blue butterfly habitat on the lineside.
Inset: Large blue butterfly

Main images: Network Rail. Inset image: David Simcox

7 Objectives

In this Biodiversity Action Plan, we define six specific objectives for the way we manage biodiversity across our estate, together with actions to achieve these. These objectives will provide the most cost-effective benefits to our biodiversity assets and will enable us to meet the requirements of the Department for Transport policy: Enhancing Biodiversity and Wildlife on the Lineside.

Table 3: Objectives and actions for the way we manage biodiversity across our estate:

Objective	Action
1. **Achieve no net loss in biodiversity on our lineside estate by 2024, and achieve biodiversity net gain of 10% in each Region by 2035**	We will use our biodiversity baseline assessment and monitoring methodology to assess our ability to deliver change in each Region
2. **Mitigate unavoidable loss of biodiversity at the Route level through habitat creation and restoration**	We will use a tool based on the Defra Biodiversity Metric calculator and knowledge from our demonstration and trial sites
3. **Mainstream biodiversity requirements into our planning and decision making at all levels**	We will undertake training of Network Rail staff and employ ecologists to increase ecological competence and awareness
4. **Deliver a Network Rail estate that connects and supports biodiversity across Britain**	We will better understand the role of the network in connecting habitats and work in partnership with our neighbours and stakeholders
5. **Increase awareness and understanding of our work managing biodiversity**	We will openly report our performance on biodiversity and consult and engage with stakeholders at Region and Route level
6. **Provide open and transparent annual reports on performance on biodiversity through the Route level action plans**	The Biodiversity Steering Group will ensure consistency and excellence in reporting of meaningful benefits to biodiversity. This will be underpinned by our detailed monitoring of biodiversity management actions

Case study

Timber harvesting to create biodiversity habitats

Scotland region

It is normal practice in the forestry sector to chip trees on the lineside if they are not harvested for timber. This is due to the cost of removing woody material from a site. The chipped arisings are then spread on the cleared ground, but this tends to smother the re-growing vegetation and is not great for biodiversity. Following consultation with lineside neighbours and other stakeholders, our team in Scotland decided to store arisings as habitat piles. Habitat piles look more natural and support a greater number of species as they slowly break down. They make great refuges and hibernation habitats for invertebrates, amphibians and reptiles. Red squirrels can use them for storing food, and birds can forage and nest on them. This has been a big step change for our vegetation management supply chain, but it is also a big positive change for biodiversity.

Images: Network Rail

Main image: Habitat piles make great refuges and hibernation habitats for invertebrates, amphibians and reptiles. Inset: Chipped arisings spread on cleared ground

8 Appendices

8.1 Appendix 1: Stakeholder organisations engaged

Bat Conservation Trust
Botanical Society of the British Isles
British Trust for Ornithology
Buglife
Bumblebee Conservation Trust
Butterfly Conservation
Department for Environment, Food and Rural Affairs
Department for Transport
Office for Rail and Road
Environment Agency
Forest Enterprise
Freshwater Habitats Trust
Highways England
Mammal Society
Natural Capital Committee
Natural England
Natural Resources Wales
Plantlife
Royal Society for the Protection of Birds
Scottish Natural Heritage
The Tree Council
The Wildlife Trusts
The Woodland Trust
Transport for Wales
Transport Scotland
Welsh Government

8.2 Appendix 2: Key legislation and policy relevant to managing biodiversity

Summary of some of the UK legislation and policy focused on biodiversity conservation:

Legislation/Policy	Goals
Scotland	
Nature Conservation (Scotland) Act 2004	To make provision for the conservation of biodiversity and Scotland's natural heritage. All public bodies in Scotland are required 'to further the conservation of biodiversity' when carrying out their responsibilities.
The Wildlife and Natural Environment (Scotland) Act 2011	To enhance and protect natural heritage with the enhancement of biodiversity through the creation and management of new habitats and networks. The Act requires public bodies to report every 3 years on management actions to support these objectives.
Wales	
Well-being of Future Generations (Wales) Act 2015	To improve the social, economic, environmental and cultural well-being of Wales. The Act requires public bodies consider long-term goals and take a more joined-up approach in their activities.
The Environment (Wales) Act 2016	To plan and manage natural resources in Wales in a more proactive, sustainable and joined-up way. The Act requires public bodies to seek to maintain and enhance biodiversity and promote the resilience of ecosystems in the exercise of their functions.
UK & England	
The Wildlife & Countryside Act 1981	The primary legislation which protects animals, plants and habitats in the UK. The Act has been a foundation for later biodiversity legislation to build upon.
Natural Environment and Rural Communities (NERC) Act 2006	To help achieve a rich and diverse natural environment and thriving rural communities. The NERC Act established Natural England as the independent body responsible for conserving, enhancing, and managing England's natural environment for the benefit of current and future generations. The NERC Act also places a duty to conserve biodiversity on all public authorities in England.
The Town and Country Planning (Environmental Impact Assessment) Regulations 2017	Requires the preparation of an Environmental Impact Assessment (EIA) that identifies, describes and assesses the effects of a proposed development on biodiversity, land, soil, water, air, climate, cultural heritage and the landscape.
The 25 Year Environment Plan 2018	Sets out the UK government's ambitions to protect and enhance the environment (to be enacted through the Environment Bill 2019–20). The plan sets goals for the way land is managed in England including targets for: creating better habitats for wildlife, improving air and water quality and reducing pollution; protecting and growing our 'natural capital'; establishing the principle of 'biodiversity net gain' for infrastructure development; and the creation of 'Green infrastructure' across the landscape.

8.3 Acknowledgements

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Richard Pywell, Gary Powney, James Bullock, Colin Harrower, Jo Chamberlain, Lucy Ridding, Dan Morton & John Redhead.

UK Centre for Ecology & Hydrology

We are grateful to the following organisations for supplying data included within this report:

Amphibian and Reptile Groups of the UK; Aquatic Heteroptera Recording Scheme; Bees, Wasps and Ants Recording Society; Botanical Society of Britain and Ireland; British Arachnological Society – Spider Recording Scheme; British Bryological Society; British Dragonfly Society – Dragonfly Recording Network; British Lichen Society; British Myriapod and Isopod Group – Centipede and Millipede Recording Schemes; Chrysomelidae Recording Scheme; British Trust for Ornithology; Butterfly Conservation; Conchological Society of Great Britain and Ireland; Cranefly Recording Scheme; Empididae, Hybotidae & Dolichopodidae Recording Scheme; Fungus Gnat Recording Scheme; Gelechiid Recording Scheme; Grasshopper Recording Scheme; Ground Beetle Recording Scheme; Hoverfly Recording Scheme; Lacewings and Allies Recording Scheme; Mammal Society; National Moth Recording Scheme; Riverfly Recording Schemes: Ephemeroptera, Plecoptera and Trichoptera; Soldier Beetles, Jewel Beetles and Glow-worms Recording Scheme; Soldierflies and Allies Recording Scheme; Staphylinidae Recording Scheme; Terrestrial Heteroptera Recording Schemes; UK Ladybird Survey; Weevil and Bark Beetle Recording Scheme.

We thank the scheme organisers and participants who supplied data, and we are indebted to the dedicated volunteers who collected the species' records used within this report.

Design and layout: Heather Harris, UKCEH

Image: Tree Council

Image: Network Rail

Image: Network Rail

Network Rail volunteers helping create a new habitat for the Duke of Burgundy butterfly

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