West Coast mainline, North West and Central region

Network Rail State of Nature Summary Report 2022

Contents

1 Personnel & Document Control

All ecologists should state their membership level of a recognised professional body (e.g. CIEEM, IEMA) alongside their name.

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1.1 Document Control

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1.0			Neil Strong	Jo Lewington	
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Foreword

Biodiversity on the railway estate continues to be a major focus for Network Rail as we work towards the end of a Control Period. The Office of Rail and Road will be using biodiversity units as a Tier 1 reporting measure for Control Period 7 starting in April 2024. The data that are to be used for that reporting are those used in these state of nature reports. Not only will this allow a consistent set of data to be reported – one version – but these reports will also be able to provide vital context and additional supporting material. The case studies used in the regional state of nature reports also demonstrate the good biodiversity management that is taking place across the network.

The 2022 habitat data collected by satellite do show an overall reduction in the units calculated when compared with those from 2020 and 2021. This reduction is consistent across all regions and appears largely due to the remote habitat assessment identifying larger areas of grassland and ruderal habitats and reductions in woodland. Whilst publishing the data as it has been assessed in this report, we are also undertaking further statistical analysis to understand the variation.

Notwithstanding these biodiversity data results, the work taking place across the network continues to be at the forefront of good biodiversity management. Innovative methods of working are being used by teams on the ground to support biodiversity whilst at the same time improving safety and performance of the operational railway. As we learn more about the data we are collecting, we shall continue to carry out this important work across our estate recognising the value it brings to nature's recovery across Britain.

Jo Lewington
Chief environment and sustainability officer
September 2024

2 Introduction

This report, for Network Rail, covers activities that took place in 2022.

It is the third annual state of nature report produced by Network Rail. In this document we provide the latest satellite assessment of the habitats found across the railway estate. There is narrative about the data and assessment techniques, together with proposals for further analysis. In addition to the executive summary, there are appendices containing individual reports from each of the five regions of Network Rail (figure 1). These reports outline the state of nature on the regions' estates and the ambitions and plans we have to protect and maintain habitats and associated biodiversity. They also highlight key examples of the actions we have undertaken to improve these habitats, and where we have carried out work with our stakeholders.

Figure 1: *Network Rail regions and routes*

The innovative nature of the data collection and habitat assessment techniques means we are still learning. The technology and analysis methods have changed, even in the relatively short time since our first report. These methods are still the most efficient available to us and we are continuing to work with our partners to improve accuracy.

We have been able to update the interpretation methods for the habitat analysis. This has resulted in a need to re-baseline our biodiversity unit calculations. However, the values are of the same magnitude.

3 Executive Summary

3.1 Overview

Network Rail's biodiversity units for the network for this report are 228,496.70. The distribution of those units by the five regions are given in Table 1.

Table 1: *Network Rail biodiversity units 2022*

	Units	Area (ha)
Network Rail	**228,496.70**	**51,792.52**
Eastern	58,317.90	15,793.65
North West & Central	46,690.42	11,336.17
Scotland's Railway	35,294.26	7,506.22
Southern	44,471.40	7,831.93
Wales & Western	43,722.72	9,140.37

The proportion of the significant habitat types found across the estate can be seen in Figure 2.

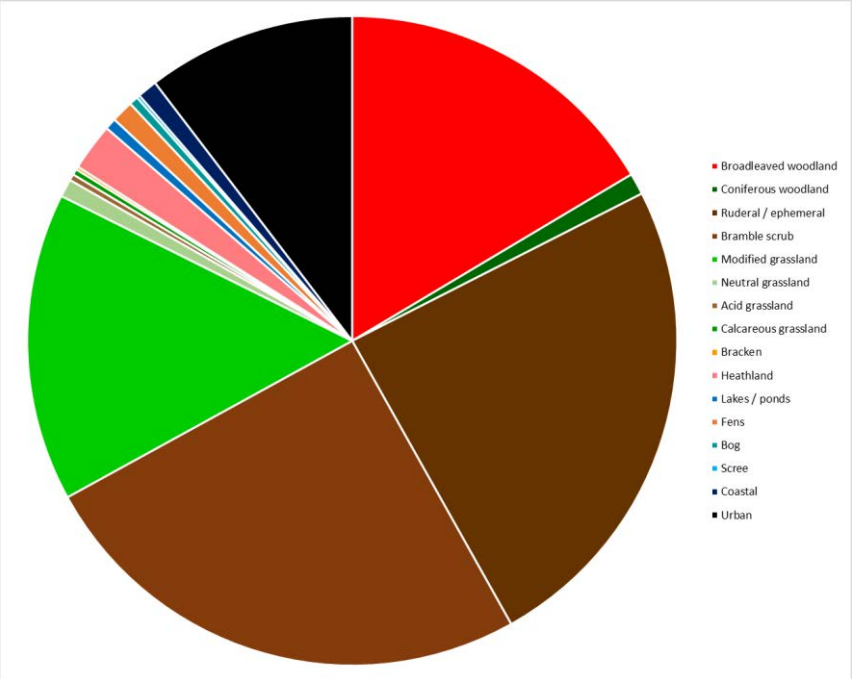

Figure 2: *Proportion of habitat across the rail estate in Britain 2021/22*

3.2 Three years' data

Table 2 shows that the data show a decrease in the number of biodiversity units over the period of measurement 2020 to 2022.

Table 1: *Network Rail biodiversity units 2020 to 2022*

	2020 (baseline)	2021	2022
Network Rail	**255,524.20**	**251,870.19**	**228,496.70**
Eastern	63,160.54	62,419.06	58,317.90
North West & Central	51,340.22	49,896.63	46,690.42
Scotland's Railway	43,348.18	42,192.68	35,294.26
Southern	47,151.44	49,991.60	44,471.40
Wales & Western	50,523.82	47,370.22	43,722.72

There is an apparent ~11 % decrease in the number of units between the baseline year of 2020 and the latest dataset. These values have been challenged and are to be subjected to some rigorous statistical analysis to help with the interpretation.

In the 2021 state of nature report, we did highlight that regardless of variation between the data from different years there will be approximately 20 % annual error. Because this expected error is greater than that seen in the data in Table 1, it is likely that any real changes are masked. This is a key reason why this consistent methodology needs to continue so that we are able to build up the time series and ultimately achieve reliable trends.

3.3 Additional supporting measures

The railway estate in Britain is too extensive and too 'busy' to have any other methodology for assessing the impact operations across that landholding have on biodiversity. The explanatory detail in the first state of nature report is still valid – estate size, train movements, cost and consistency amongst others.

The methodology itself is not flawed. There is no, other, published method on how to assess biodiversity on a linear infrastructure safely and efficiently. In addition, the biodiversity metric methodology was produced primarily for use on development projects – rather than collecting a baseline and then deriving an increase / decrease in units from known changes on the ground, we are effectively re-baselining each year and looking at

the differences. Nevertheless, based on the best available data we have access to, our technique has been able to quantify the amount of biodiversity on and about the railway network in Britain for three consecutive years. Recognising the almost experimental nature of this work is potentially key to its future success – after all, we only have three years of data which is the bare minimum for any trend analysis. In fact some authorities, including parts of NHS England, suggest seven data points may be needed.

An area of development for assisting with data interpretation and biodiversity unit calculations is to understand the type of work actually taking place on the network each year. Not only can an understanding of where this work is taking place help with ground truthing of the satellite data, but the type of work may also enable the metric calculations to be adjusted. Importantly, this knowledge may also give a measure of the good biodiversity management that is taking place – the work we carry out on the network may not always provide measurable differences in the biodiversity units, but may still be good for species (Box 1)

Box 1: *Do the protected species know which habitat is best?*

Figure 3 below shows representatives of the Office of Rail and Road, Network Rail's non-executive directors and Technical Authority viewing a location in Southern region originally identified to habitat work to create new, high-quality habitat thereby increasing the number of units. The existing ground ivy and other plant species were to be removed to enable establishment of a more distinctive habitat which would achieve a higher unit value. During pre-work many protected species of reptile were identified using the habitat which, due to being located on a south facing slope provide ideal basking habitat for reptiles and other cover for many other species. This was an ideal location to demonstrate that management 'chasing units' is not always the right approach.

Figure 3: *Site visit to Kent Pilot site, Southern region*

Biodiversity unit reporting is to be a Tier 1 measure monitored by the Office of Rail and Road. In order to support this monitoring a number of other additional measures are being proposed and a process worked out to enable this to happen in the next Control Period. The measures may include:

- Percentage of network (region/route) with plans for managing vegetation or habitats in place,
- Percentage of recorded invasive species area under active treatment,
- Area of woodland managed.

Each of these measures can help to demonstrate not only that active management is taking place, but also that the work can have a positive impact on biodiversity on the ground and through the metric calculation.

3.4 Summary of ambition for biodiversity management

3.4.1 Regional ambition

- Eastern
    - We want to be in the position where we understand the biodiversity on our estate. We want to know what it is, where it is, what health it is in, and we want to have a plan for it. We then want to have systems and processes in place to allow us to make informed decisions and plans for our biodiversity that will lead to meaningful gains.
- North West and Central
    - We want our natural green infrastructure to be viewed as an asset not a hindrance. We want to manage our land considering operational needs, safety and biodiversity net gain equally. We want the plans in place that will mean lineside habitat and vegetation management is sympathetic to ecological features and addresses ecological risks, while ensuring operational performance can be maintained or improved using processes such as nature-based solutions to adverse weather and climate change risk.
- Scotland's Railway
    - We have a strategic commitment is to enhance biodiversity across the region and it was one of 10 key priorities within the CP6 Scotland's Railway Sustainability Strategy. We have biodiversity delivery plan milestones that

will help us increase viable survey data, deliver training & learning events. We want to establish a long-term sustainable lineside strategy for Scotland's Railway.

- Southern
    - We have a regional sustainability plan and are committed to managing our lineside sustainably. We want to recruit ecologists to improve management of our mitigation plans. We want to deliver initiatives with partners and stakeholders to protect biodiversity and give back to local communities. We want to establish processes to measure the value, condition and benefits generated by wildlife and, through improved reporting, communicate these benefits and value delivered.
- Wales and Western
    - We have committed to engage with stakeholders in relation to biodiversity. We want to have sufficient ecology resource and improve our internal knowledge base to support programme management and identification of opportunities. We want to continue to identify innovations to lower our impact and retain vegetation where practicable.

3.4.2 National ambition

- We will manage our land responsibly for the benefit of nature, safety and performance

3.5 Summary of achievements for biodiversity management

3.5.1 Regional achievements

- Eastern
    - We have secured funding for the remainder of the control period to bring in a team of Wildlife Trust ecologists and Engagement Managers. A programme of works is agreed, and will start with a comprehensive and strategic approach to stakeholder engagement and data collection that will lead to opportunity mapping that the Region can capitalise upon. Feasibility studies have been undertaken to understand what plots of land within our estate that are available for us to deliver biodiversity net gain on, along with approximations of costs of delivery biodiversity net gain.
- North West and Central

    - We have carried out work to conserve desirable species, create and restore habitat creation for biodiversity net gain. We have also started field trials of new management approaches. Support within the region has been further enhanced through publication of case studies and creation of demonstration sites.
- Scotland's Railway
    - We have been able to take learnings from a vegetation management pilot and successfully incorporate them into other sites across Scotland. This not only includes actual publication of a tree and vegetation management specification, but having biodiversity features, such as habitat piles and raptor poles included in the document. Our stakeholder engagement events have been very successful at explaining the challenges we face, but the opportunities there are for collaboration.
- Southern
    - We have identified more than 100 locations on Southern that have value to be protected for biodiversity and nature conservation; 25 of these have been established as railway nature sites. We are not only improving the understanding of biodiversity through better data access but have also delivered a programme to empower our workforce through improved basic knowledge. We continue to work on partnership schemes across all routes and are raising the profile of biodiversity working alongside colleagues managing engineering blockades.
- Wales and Western
    - We are continuing to fund pilot sites to understand interaction between biodiversity and railway management operations. We have been able to obtain protected species licences to allow vegetation and enhancement work to proceed. These licence applications are supported by continued work to improve knowledge of our biodiversity asset through surveys.

3.5.2 National achievements

- We were Highly Commended at both the National Rail Awards 2022 and the ciria BIG Biodiversity Awards 2022 for our work on remote sensing of habitats alongside the railway. We continue to liaise with government departments and regulators and have held site visits to help them recognise the issues faced by teams on the ground. We have also engaged with thousands of students at the

Big Bang STEM event at the NEC taking the opportunity to showcase the nature-based activities that Network Rail is involved with alongside our partners at The Tree Council

Figure 4 (l-r): *ciria BIG Biodiversity Award; National Rail Award; Big Bang STEM event*

3.6 Further action

3.6.1 Regions

- Eastern
    - Work closer with capital projects and the supply chain to understand how best to work towards common biodiversity goals
    - Explore the creation of an Eastern Region Ecology Framework that will include suppliers from across the Region
    - Establish how to better support local teams implement the Network Rail Biodiversity Standard (NR/L2/ENV/122)
    - Identify and explore new technologies that will help deliver plans for biodiversity at scale
    - Identify new partnerships and stakeholders to help deliver biodiversity initiatives
    - Further work is required to record and treat invasive non-native species
- North West and Central
    - Future plans continue to focus on the implementation of HMPs to improve and increase biodiversity across the Region.
    - Monitor the successes or failures of our demonstration and pilot sites and share and implement learning across the region.
    - Quantify the benefits that biodiversity enhancements, or habitat creation can have on operational performance and resilience, as well as any wider societal benefits, such as flood risk alleviation, or the provision of recreational sites.

    - Further engagement with local stakeholders and organisations, such as the Environment Agency, Natural England, Rivers Trusts and other relevant non-governmental organisations and charities, to deliver biodiversity enhancements that deliver benefits at a landscape scale.
- Scotland's Railway
    - In partnership with Forestry and Land Scotland (FLS), we will deliver an ambitious biodiversity enhancement project which aims to protect, enhance, and expand.
    - Mitigate any unavoidable loss of biodiversity across the region and deliver improved biodiversity through habitat creation and restoration on our estate where possible.
    - Continue to partner with groups such as The Tree Council to deliver community planting schemes.
    - Establish an effective and efficient methodology to produce Vegetation and Habitat Management Plans, as well as developing the Scotland's Railway Climate Action Plan in which Biodiversity is one of five key priorities for the next Control Period.
- Southern
    - Create and publish a wider Land Management Strategy for Southern, to commence from the start of the new Control Period (2024).
    - Establish strategies and organisational arrangements between the Region and Natural England that will permit our workforce to deliver vital maintenance, refurbishment and enhancement of the rail network.
    - Create and start to introduce new, standardised ways of working for Infrastructure Maintenance colleagues where Protected Species are likely to be present.
    - Complete our work on establishing a series of 50 Railway Nature Sites around the Region, high value sites for nature which will be ring-fenced and safeguarded for the benefit of the railway and the communities we serve.
    - Complete our Control Period tree planting programme, in partnership with the Tree Council. Our planting plan for 2023 aims to deliver a further 30,000 trees, to be planted working with local communities, taking us past 100,000 planted trees in total since the partnership began.
- Wales and Western

- Deliver the demonstration projects to inform future biodiversity and habitat management across the Region, with a focus on a pragmatic approach to sympathetically work with the existing habitats present on site – with the right habitat in the right place.
- Continue to progress with delivering the ELR ecology surveys on the Wales & Borders route, managed with direct input from the Ecologists in the Delivery Units.
- Embed requirements to positively manage our assets to 'maintain and enhance' biodiversity and be complaint with external legislation with regard to ecology, including Cultural Change for positive management for biodiversity and ecology.
- In January 2023, the 'intelligent client' model will be launched in Wales & Western region, with Ecological services being contracted out to six long-term supply chain partnerships for renewal projects. This model aims to support buildings, civils, electrification, and plant project in CP7.
- Work on procurement of a new Wales & Western Ecology Framework of Suppliers to provide support to the teams on delivery of work.
- Consult with Natural Resources Wales and Welsh Government to resolve the question around using biodiversity metrics in Wales and meeting the requirements under Net Benefit for Biodiversity on the Railway.

3.6.2 National

- Finish work on a sustainable land use strategic framework – to support creation of a national nature network with the railway at its heart.
- Continue the excellent working relationships with the environmental regulators and use this liaison to improve the processes to enable colleagues to carry out essential work on the infrastructure.
- Build on the work started with the Forestry Commission in 2021 to establish ideal locations for planting trees within one kilometre of the railway.

4 Appendix


Hadley Wood, Eastern region

Network Rail

Biodiversity data capture and calculations

2022

Contents

1 Personnel & Document Control

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Report author	Neil Strong
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1.1 Document Control

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1.0			Neil Strong	Regional Heads of and report authors	Jo Lewington

2 Introduction

This report on biodiversity data capture and calculations accompanies the third annual state of nature report produced by Network Rail for 2022.

Network Rail has again worked with the UK Centre for Ecology and Hydrology (UKCEH) to produce data from a remote sensing survey of the rail network in order to produce a 10m pixel land cover map showing habitat types across the rail network. The map was produced using similar methods to the most recent UKCEH land cover maps with a conversion to align the land cover classes with the UK-Habitats Classification System (UKHab). The UKHab system aligns with the Department for Environment, Food and Rural Affairs (DEFRA) and Natural England's Biodiversity Metric

Network Rail used the outputs of this piece of work to calculate a baseline using the Biodiversity Metric tool v3. Version 3 of the metric was the version in place when the original calculations were made. We continue to use this version, despite updates, in order to maintain a consistent approach for the data analysis.

The methodology used to calculate the national biodiversity units has not changed since the first annual report. As such it is not described in this document, but reference can be made to Appendix 5.1 of the first report[1].

The technique for interpretation of the satellite data continues to improve. To that end and to maintain consistency, we have recalculate the data collected in previous years.

This paper details the biodiversity units present in each region, and an aggregated table of the national data. The paper also continues to discuss the challenges associated with data comparison between reports of different years. We reiterate key points made in previous reports about the data and propose some statistical analysis of the data.

[1] https://www.networkrail.co.uk/wp-content/uploads/2022/10/Network-Rail-State-of-Nature-report-plus-six-appendices.pdf

3 Results

3.1 Eastern

Table derived from Network Rail Eastern Biodiversity Metric Baseline 2022.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	2139.66	Medium	Moderate	17117.28
Wet woodland	22.52	High	Moderate	270.24
Lowland mixed deciduous woodland	22.52	High	Moderate	270.24
Upland oakwood	22.52	High	Moderate	270.24
Lowland beech and yew woodland	22.52	High	Moderate	270.24
Upland mixed ashwoods	22.52	High	Moderate	270.24
Other coniferous woodland	64.72	Low	Moderate	258.88
Ruderal/Ephemeral	4896.73	Low	Poor	9793.46
Bramble scrub	3087.16	Medium	Poor	12348.64
Modified grassland	2834.6	Low	Moderate	11338.4
Other neutral grassland	52.19	Medium	Moderate	417.52
Upland acid grassland	12.59	Medium	Moderate	100.72
Lowland calcareous grassland	13.46	High	Moderate	161.52
Bracken	0	0	0	
Upland Heathland	113.01	High	Moderate	1356.12
Ponds (Non- Priority Habitat)	130.84	Medium	Moderate	1046.72
Fens (upland and lowland)	135.33	V.High	Moderate	2165.28
Blanket bog	14.2	V.High	Moderate	227.2
Inland rock outcrop and scree habitats	28.22	High	Moderate	338.64
Other inland rock and scree	0.29	Medium	Moderate	2.32
Coastal lagoons	4.35	High	Moderate	52.2
Features of littoral rock	0	High	Moderate	0
Features of littoral sediment	2.57	High	Moderate	30.84
Features of littoral rock	6.41	High	Moderate	76.92
Features of littoral sediment	4.92	High	Moderate	59.04
Saltmarshes and saline reedbeds	6.25	High	Moderate	75
Built linear features	2133.54	V.Low	N/A - Other	0

3.2 North, West & Central

Table derived from Network Rail North West & Central Biodiversity Metric Baseline 2022.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	1831.26	Medium	Moderate	14650.08
Wet woodland	18.88	High	Moderate	226.56
Upland oakwood	18.88	High	Moderate	226.56
Upland mixed ashwoods	18.88	High	Moderate	226.56
Other coniferous woodland	88.86	Low	Moderate	355.44
Ruderal/Ephemeral	3309.39	Low	Poor	6618.78
Bramble scrub	2723.28	Medium	Poor	10893.12
Modified grassland	1270.34	Low	Moderate	5081.36
Other neutral grassland	312.87	Medium	Moderate	2502.96
Upland acid grassland	70.31	Medium	Moderate	562.48
Upland calcareous grassland	20.78	High	Moderate	249.36
Bracken	0	0	0	
Upland Heathland	173.85	High	Moderate	2086.2
Ponds (Non- Priority Habitat)	47.93	Medium	Moderate	383.44
Fens (upland and lowland)	5.62	V.High	Moderate	89.92
Blanket bog	72.2	V.High	Moderate	1155.2
Inland rock outcrop and scree habitats	0.22	High	Moderate	2.64
Other inland rock and scree	21.66	Medium	Moderate	173.28
Coastal lagoons	0.62	High	Moderate	7.44
Features of littoral rock	0	High	Moderate	0
Features of littoral sediment	38.56	High	Moderate	462.72
Features of littoral rock	4.7	High	Moderate	56.4
Features of littoral sediment	4.07	High	Moderate	48.84
Saltmarshes and saline reedbeds	52.59	High	Moderate	631.08
Built linear features	1230.42	V.Low	N/A - Other	0

3.3 Scotland's Railway

Table derived from Network Rail Scotland Biodiversity Metric Baseline 2022.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	1521.46	Medium	Moderate	12171.68
Upland oakwood	15.85	High	Moderate	190.2
Upland birchwoods	15.85	High	Moderate	190.2
Upland mixed ashwoods	15.85	High	Moderate	190.2
Wet woodland	15.85	High	Moderate	190.2
Other Scot's Pine woodland	23.74	Medium	Moderate	189.92
Other coniferous woodland	47.49	Low	Moderate	189.96
Ruderal/Ephemeral	2230.49	Low	Poor	4460.98
Bramble scrub	1271.02	Medium	Poor	5084.08
Modified grassland	1033.51	Low	Moderate	4134.04
Other neutral grassland	1	Medium	Moderate	8
Upland acid grassland	75.62	Medium	Moderate	604.96
Calcareous grassland		High	Moderate	
Bracken	78.22	Low	Poor	156.44
Upland Heathland	312.87	High	Moderate	3754.44
Ponds (Non- Priority Habitat)	5.45	Medium	Moderate	43.6
Fens (upland and lowland)	30.5	V.High	Moderate	488
Blanket bog	141.11	V.High	Moderate	2257.76
Inland rock outcrop and scree habitats	0.13	Medium	Moderate	1.04
Other inland rock and scree	13.35	High	Moderate	160.2
Coastal lagoons	0.61	High	Moderate	7.32
Features of littoral rock	5.65	High	Moderate	67.8
Littoral mixed sediments	15.3	High	Moderate	183.6
Features of littoral rock	27.18	High	Moderate	326.16
Features of littoral sediment	10.39	High	Moderate	124.68
Saltmarshes and saline reedbeds	9.9	High	Moderate	118.8
Built linear features	588.83	V.Low	N/A - Other	0

3.4 Southern

Table derived from Network Rail Southern Biodiversity Metric Baseline 2022.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Lowland mixed deciduous woodland	1165.78	High	Moderate	13989.36
Other coniferous woodland	248.34	Low	Moderate	993.36
Ruderal/Ephemeral			0	
Bramble scrub	4012.7	Medium	Poor	16050.8
Modified grassland	1266.7	Low	Moderate	5066.8
Other neutral grassland	5.79	Medium	Moderate	46.32
Other lowland acid grassland	1.34	Medium	Moderate	10.72
Lowland calcareous grassland	115.44	High	Moderate	1385.28
Bracken		0	0	
Lowland Heathland	356.9	High	Moderate	4282.8
Lowland Heathland	78.83	High	Moderate	630.64
Ponds (Non- Priority Habitat)	103.44	Medium	Moderate	1655.04
Fens (upland and lowland)	0	V.High	Moderate	0
Blanket bog	2.39	V.High	Moderate	19.12
Other inland rock and scree	0.66	Medium	Moderate	7.92
Coastal lagoons	0	High	Moderate	0
Features of littoral rock	11.25	High	Moderate	135
Features of littoral sediment	0	High	Moderate	0
Features of littoral rock	5.96	High	Moderate	71.52
Features of littoral sediment	10.56	High	Moderate	126.72
Saltmarshes and saline reedbeds	445.86	High	Moderate	0
Built linear features	1165.78	V.Low	N/A - Other	13989.36

3.5 Wales and Western

Table derived from Network Rail Wales and Western Biodiversity Metric Baseline 2022.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	1528.18	Medium	Moderate	12225.44
Wet woodland	15.92	High	Moderate	191.04
Lowland mixed deciduous woodland	15.92	High	Moderate	191.04
Upland oakwood	15.92	High	Moderate	191.04
Lowland beech and yew woodland	15.92	High	Moderate	191.04
Other Scot's Pine woodland	39.55	Medium	Moderate	316.4
Other coniferous woodland	39.55	Low	Moderate	158.2
Ruderal/Ephemeral	2134.54	Low	Poor	4269.08
Bramble scrub	1878.77	Medium	Poor	7515.08
Modified grassland	1520.94	Low	Moderate	6083.76
Other neutral grassland	87.83	Medium	Moderate	702.64
Upland acid grassland	2.07	Medium	Moderate	16.56
Lowland calcareous grassland	1.93	High	Moderate	23.16
Bracken		0	0	
Upland Heathland	261.33	High	Moderate	3135.96
Lowland Heathland	29.5	High	Moderate	236
Ponds (Non- Priority Habitat)	292.06	Medium	Moderate	4672.96
Fens (upland and lowland)	3.89	V.High	Moderate	62.24
Lowland raised bog	0.13	V.High	Moderate	1.56
Inland rock outcrop and scree habitats	13.32	High	Moderate	106.56
Other inland rock and scree	11.77	Medium	Moderate	141.24
Coastal lagoons	75.56	High	Moderate	906.72
Features of littoral rock	43.61	High	Moderate	523.32
Features of littoral sediment	26.57	High	Moderate	318.84
Features of littoral rock	18.79	High	Moderate	225.48
Features of littoral sediment	109.78	High	Moderate	1317.36
Saltmarshes and saline reedbeds	957.03	High	Moderate	0
Built linear features	1528.18	V.Low	N/A - Other	12225.44

4 Data interpretation

4.1 Previous commentary on data variation

[Excerpt from Network Rail State of Nature Summary Report 2021/22][2].

Model predictions for UK-Habitat maps compiled for Network Rail have been validated. This involved a random sampling of regions within 250m of the track bed. Habitat values were assigned by experts, and these were compared to model predictions. There is a slight interannual variation, but accuracy has always been close to 80 %; therefore, we expect approximately ~20 % annual error.

Estimates have been completed for 2020 and 2021. Some interannual variation will be due to real changes in habitat distribution. However, the amount of habitat that changes from one class to another on an annual basis will be small and is estimated to be less than 5 %. This is much lower than the expected error, ~20 %. Because expected error is significantly higher than real change the majority of interannual fluctuation will be error, and the signal of real change will be 'lost in the noise'.

Errors are random in time and space, so the same errors are very unlikely to occur in the same location year-after-year (they are spatially and temporally transient). Real-world changes on the other hand will persist in space and time. Therefore, as the time series of NR UK-Habitat maps matures the overall volume of change will eventually overtake the expected error and reliable trends in habitat dynamics will begin to appear.

4.2 Further data variation commentary

Our data suppliers, UK CEH, operate a programme of continual improvement for production of land cover maps. As a result, implementation and classification algorithms differ each year.

When calculating this new dataset, they have switched the sources of training data for certain classes to more reliable sources. This is particularly pertinent arable and improved grassland which can operate on an agricultural rotation cycle that was not well represented in training data – training data are selected from consistent land cover classes. Because the pixels for the lineside often contain a mix of bare track bed, trees,

[2] https://www.networkrail.co.uk/wp-content/uploads/2024/04/Network-Rail-State-of-Nature-report-2021_22.pdf

shrubs etc., there is a potential for classification to be less stable than large areas (unless genuine change has occurred).

In the new dataset, these amendments appear to have had an impact on the amount of woodland classified, especially in woodland fringe pixels where the pixels comprise part trees part other classes such as grass or arable. This is also the case for urban areas which are by their nature a mix of buildings and vegetation in gardens.

As a result, some change between dates will be genuine, but some will be resulting from misclassification error in one or both of the classifications. This is one of the limitations of 10m resolution imagery for mapping heterogeneous and small-scale land cover features.

It may be that longer-term higher-resolution (3m or less) land cover maps offer improved identification of finer scale features and give a potential solution for the mixed pixel issue offering a better platform for lineside monitoring. However, as has previously been reported, unlike the Sentinel-2 satellite imagery, the higher resolution images are not free to access.

5 Appendix

Copies of the revised 2020 and 2021 biodiversity metric results are provided below.

5.1 Eastern

Table derived from Network Rail Eastern Biodiversity Metric Baseline 2020.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	2986.46	Medium	Moderate	23891.68
Wet woodland	31.44	High	Moderate	377.28
Lowland mixed deciduous woodland	31.44	High	Moderate	377.28
Upland oakwood	31.44	High	Moderate	377.28
Lowland beech and yew woodland	31.44	High	Moderate	377.28
Upland mixed ashwoods	31.44	High	Moderate	377.28
Other coniferous woodland	45.28	Low	Moderate	181.12
Ruderal/Ephemeral	4740.77	Low	Poor	9481.54
Bramble scrub	3708.59	Medium	Poor	14834.36
Modified grassland	1000.12	Low	Moderate	4000.48
Other neutral grassland	120.6	Medium	Moderate	964.8
Upland acid grassland	9.56	Medium	Moderate	76.48
Lowland calcareous grassland	6.39	High	Moderate	76.68
Bracken		0	0	
Upland Heathland	69.78	High	Moderate	837.36
Ponds (Non- Priority Habitat)	235.73	Medium	Moderate	1885.84
Fens (upland and lowland)	166.77	V.High	Moderate	2668.32
Blanket bog	13.38	V.High	Moderate	214.08
Inland rock outcrop and scree habitats	1.15	High	Moderate	13.8
Other inland rock and scree	0.01	Medium	Moderate	0.08
Coastal lagoons	4.69	High	Moderate	56.28
Features of littoral rock	0	High	Moderate	0
Features of littoral sediment	10.41	High	Moderate	124.92
Features of littoral rock	7.05	High	Moderate	84.6
Features of littoral sediment	7.93	High	Moderate	95.16
Saltmarshes and saline reedbeds	148.88	High	Moderate	1786.56
Built linear features	2352.92	V.Low	N/A - Other	0

Table derived from Network Rail Eastern Biodiversity Metric Baseline 2021.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	2639.7	Medium	Moderate	21117.6
Wet woodland	27.79	High	Moderate	333.48
Lowland mixed deciduous woodland	27.79	High	Moderate	333.48
Upland oakwood	27.79	High	Moderate	333.48
Lowland beech and yew woodland	27.79	High	Moderate	333.48
Upland mixed ashwoods	27.79	High	Moderate	333.48
Other coniferous woodland	27.84	Low	Moderate	111.36
Ruderal/Ephemeral	4750.61	Low	Poor	9501.22
Bramble scrub	3816.45	Medium	Poor	15265.8
Modified grassland	1221.93	Low	Moderate	4887.72
Other neutral grassland	116.04	Medium	Moderate	928.32
Upland acid grassland	44.9	Medium	Moderate	359.2
Lowland calcareous grassland	23.09	High	Moderate	277.08
Bracken		0	0	
Upland Heathland	125.38	High	Moderate	1504.56
Ponds (Non- Priority Habitat)	183.53	Medium	Moderate	1468.24
Fens (upland and lowland)	273.15	V.High	Moderate	4370.4
Blanket bog	33.03	V.High	Moderate	528.48
Inland rock outcrop and scree habitats	1.85	High	Moderate	22.2
Other inland rock and scree	0.02	Medium	Moderate	0.16
Coastal lagoons	8.02	High	Moderate	96.24
Features of littoral rock	0	High	Moderate	0
Features of littoral sediment	2.17	High	Moderate	26.04
Features of littoral rock	8.62	High	Moderate	103.44
Features of littoral sediment	0.44	High	Moderate	5.28
Saltmarshes and saline reedbeds	14.86	High	Moderate	178.32
Built linear features	2363.09	V.Low	N/A - Other	0

5.2 North, West & Central

Table derived from Network Rail North West & Central Biodiversity Metric Baseline 2020.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	2083.71	Medium	Moderate	16669.68
Wet woodland	21.48	High	Moderate	257.76
Upland oakwood	21.48	High	Moderate	257.76
Upland mixed ashwoods	21.48	High	Moderate	257.76
Other coniferous woodland	67.3	Low	Moderate	269.2
Ruderal/Ephemeral	2161.31	Low	Poor	4322.62
Bramble scrub	3493.04	Medium	Poor	13972.16
Modified grassland	743.24	Low	Moderate	2972.96
Other neutral grassland	467.31	Medium	Moderate	3738.48
Upland acid grassland	100.5	Medium	Moderate	804
Upland calcareous grassland	39.17	High	Moderate	470.04
Bracken		0	0	
Upland Heathland	158.34	High	Moderate	1900.08
Ponds (Non- Priority Habitat)	86.93	Medium	Moderate	695.44
Fens (upland and lowland)	1.4	V.High	Moderate	22.4
Blanket bog	5.35	V.High	Moderate	85.6
Inland rock outcrop and scree habitats	0.36	High	Moderate	4.32
Other inland rock and scree	36.11	Medium	Moderate	288.88
Coastal lagoons	0	High	Moderate	0
Features of littoral rock	0.39	High	Moderate	4.68
Features of littoral sediment	181.94	High	Moderate	2183.28
Features of littoral rock	15.2	High	Moderate	182.4
Features of littoral sediment	4.57	High	Moderate	54.84
Saltmarshes and saline reedbeds	160.49	High	Moderate	1925.88
Built linear features	1465.07	V.Low	N/A - Other	0

Table derived from Network Rail North West & Central Biodiversity Metric Baseline 2021.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	1798.98	Medium	Moderate	14391.84
Wet woodland	18.55	High	Moderate	222.6
Upland oakwood	18.55	High	Moderate	222.6
Upland mixed ashwoods	18.55	High	Moderate	222.6
Other coniferous woodland	43.71	Low	Moderate	174.84
Ruderal/Ephemeral	2399.9	Low	Poor	4799.8
Bramble scrub	3388.94	Medium	Poor	13555.76
Modified grassland	831.73	Low	Moderate	3326.92
Other neutral grassland	658.8	Medium	Moderate	5270.4
Upland acid grassland	64.56	Medium	Moderate	516.48
Upland calcareous grassland	41.01	High	Moderate	492.12
Bracken		0	0	
Upland Heathland	235.319	High	Moderate	2823.828
Ponds (Non- Priority Habitat)	68.13	Medium	Moderate	545.04
Fens (upland and lowland)	52.65	V.High	Moderate	842.4
Blanket bog	40.33	V.High	Moderate	645.28
Inland rock outcrop and scree habitats	0.37	High	Moderate	4.44
Other inland rock and scree	36.28	Medium	Moderate	290.24
Coastal lagoons	0	High	Moderate	0
Features of littoral rock	0.01	High	Moderate	0.12
Features of littoral sediment	67.6	High	Moderate	811.2
Features of littoral rock	14.77	High	Moderate	177.24
Features of littoral sediment	3.27	High	Moderate	39.24
Saltmarshes and saline reedbeds	43.47	High	Moderate	521.64
Built linear features	1490.7	V.Low	N/A - Other	0

5.3 Scotland's Railway

Table derived from Network Rail Scotland Biodiversity Metric Baseline 2020.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	2419.95	Medium	Moderate	19359.6
Upland oakwood	25.21	High	Moderate	302.52
Upland birchwoods	25.21	High	Moderate	302.52
Upland mixed ashwoods	25.21	High	Moderate	302.52
Wet woodland	25.21	High	Moderate	302.52
Other Scot's Pine woodland	24.07	Medium	Moderate	192.56
Other coniferous woodland	48.13	Low	Moderate	192.52
Ruderal/Ephemeral	990.21	Low	Poor	1980.42
Bramble scrub	1528.35	Medium	Poor	6113.4
Modified grassland	785.08	Low	Moderate	3140.32
Other neutral grassland	0	Medium	Moderate	0
Upland acid grassland	162.98	Medium	Moderate	1303.84
Calcareous grassland		0	0	
Bracken	79.16	Low	Poor	158.32
Upland Heathland	316.64	High	Moderate	3799.68
Ponds (Non- Priority Habitat)	5.51	Medium	Moderate	44.08
Fens (upland and lowland)	6.08	V.High	Moderate	97.28
Blanket bog	171.82	V.High	Moderate	2749.12
Inland rock outcrop and scree habitats	0.75	High	Moderate	6
Other inland rock and scree	74.5	Medium	Moderate	894
Coastal lagoons	0.46	High	Moderate	5.52
Features of littoral rock	2.15	High	Moderate	25.8
Littoral mixed sediments	72.14	High	Moderate	865.68
Features of littoral rock	17.1	High	Moderate	205.2
Features of littoral sediment	10.58	High	Moderate	126.96
Saltmarshes and saline reedbeds	73.15	High	Moderate	877.8
Built linear features	616.58	V.Low	N/A - Other	0

Table derived from Network Rail Scotland Biodiversity Metric Baseline 2021.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	1814.98	Medium	Moderate	14519.84
Upland oakwood	18.9	High	Moderate	226.8
Upland birchwoods	18.9	High	Moderate	226.8
Upland mixed ashwoods	18.9	High	Moderate	226.8
Wet woodland	18.9	High	Moderate	226.8
Other Scot's Pine woodland	14.47	Medium	Moderate	115.76
Other coniferous woodland	28.95	Low	Moderate	115.8
Ruderal/Ephemeral	1461.46	Low	Poor	2922.92
Bramble scrub	1599.18	Medium	Poor	6396.72
Modified grassland	583.48	Low	Moderate	2333.92
Other neutral grassland	6.56	Medium	Moderate	52.48
Upland acid grassland	136.81	Medium	Moderate	1094.48
Calcareous grassland	1.03	0	0	12.36
Bracken	97.4	Low	Poor	194.8
Upland Heathland	389.59	High	Moderate	4675.08
Ponds (Non- Priority Habitat)	7.44	Medium	Moderate	59.52
Fens (upland and lowland)	40.34	V.High	Moderate	645.44
Blanket bog	241.86	V.High	Moderate	3869.76
Inland rock outcrop and scree habitats	1.94	High	Moderate	15.52
Other inland rock and scree	192.58	Medium	Moderate	2310.96
Coastal lagoons	0.66	High	Moderate	7.92
Features of littoral rock	7.85	High	Moderate	94.2
Littoral mixed sediments	50.82	High	Moderate	609.84
Features of littoral rock	11.68	High	Moderate	140.16
Features of littoral sediment	9.88	High	Moderate	118.56
Saltmarshes and saline reedbeds	81.62	High	Moderate	979.44
Built linear features	651.05	V.Low	N/A - Other	0

5.4 Southern

Table derived from Network Rail Southern Biodiversity Metric Baseline 2020.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Lowland mixed deciduous woodland	1473.27	High	Moderate	17679.24
Other coniferous woodland	178.17	Low	Moderate	712.68
Ruderal/Ephemeral			0	
Bramble scrub	4069.06	Medium	Poor	16276.24
Modified grassland	876.04	Low	Moderate	3504.16
Other neutral grassland	0.07	Medium	Moderate	0.56
Other lowland acid grassland	0.85	Medium	Moderate	6.8
Lowland calcareous grassland	162.29	High	Moderate	1947.48
Bracken		0	0	
Lowland Heathland	261.67	High	Moderate	3140.04
Lowland Heathland	139.79	High	Moderate	1118.32
Ponds (Non- Priority Habitat)	35.81	Medium	Moderate	572.96
Fens (upland and lowland)	0	V.High	Moderate	0
Blanket bog	0.13	V.High	Moderate	1.04
Other inland rock and scree	0.5	Medium	Moderate	6
Coastal lagoons	0	High	Moderate	0
Features of littoral rock	22.19	High	Moderate	266.28
Features of littoral sediment	0	High	Moderate	0
Features of littoral rock	0.95	High	Moderate	11.4
Features of littoral sediment	159.02	High	Moderate	1908.24
Saltmarshes and saline reedbeds	452.12	High	Moderate	0
Built linear features	1473.27	V.Low	N/A - Other	17679.24

Table derived from Network Rail Southern Biodiversity Metric Baseline 2021.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Lowland mixed deciduous woodland	1465.48	High	Moderate	17585.76
Other coniferous woodland	100.16	Low	Moderate	400.64
Ruderal/Ephemeral			0	
Bramble scrub	4110.88	Medium	Poor	16443.52
Modified grassland	652.16	Low	Moderate	2608.64
Other neutral grassland	9.37	Medium	Moderate	74.96
Other lowland acid grassland	3.69	Medium	Moderate	29.52
Lowland calcareous grassland	226.55	High	Moderate	2718.6
Bracken		0	0	
Lowland Heathland	485.18	High	Moderate	5822.16
Lowland Heathland	79.93	High	Moderate	639.44
Ponds (Non- Priority Habitat)	193.21	Medium	Moderate	3091.36
Fens (upland and lowland)	0	V.High	Moderate	0
Blanket bog	1.43	V.High	Moderate	11.44
Other inland rock and scree	1.26	Medium	Moderate	15.12
Coastal lagoons	0	High	Moderate	0
Features of littoral rock	16.21	High	Moderate	194.52
Features of littoral sediment	0	High	Moderate	0
Features of littoral rock	1.02	High	Moderate	12.24
Features of littoral sediment	28.64	High	Moderate	343.68
Saltmarshes and saline reedbeds	456.76	High	Moderate	0
Built linear features	1465.48	V.Low	N/A - Other	17585.76

5.5 Wales and Western

Table derived from Network Rail Wales and Western Biodiversity Metric Baseline 2020.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	2164.62	Medium	Moderate	17316.96
Wet woodland	22.55	High	Moderate	270.6
Lowland mixed deciduous woodland	22.55	High	Moderate	270.6
Upland oakwood	22.55	High	Moderate	270.6
Lowland beech and yew woodland	22.55	High	Moderate	270.6
Other Scot's Pine woodland	15.44	Medium	Moderate	123.52
Other coniferous woodland	15.44	Low	Moderate	61.76
Ruderal/Ephemeral	1347.95	Low	Poor	2695.9
Bramble scrub	2281.16	Medium	Poor	9124.64
Modified grassland	845.75	Low	Moderate	3383
Other neutral grassland	111.96	Medium	Moderate	895.68
Upland acid grassland	19.24	Medium	Moderate	153.92
Lowland calcareous grassland	7	High	Moderate	84
Bracken		0	0	
Upland Heathland	67.86	High	Moderate	814.32
Lowland Heathland	129.46	High	Moderate	1035.68
Ponds (Non- Priority Habitat)	187.54	Medium	Moderate	3000.64
Fens (upland and lowland)	0.16	V.High	Moderate	2.56
Lowland raised bog	0.16	V.High	Moderate	1.92
Inland rock outcrop and scree habitats	15.52	High	Moderate	124.16
Other inland rock and scree	2.85	Medium	Moderate	34.2
Coastal lagoons	48.79	High	Moderate	585.48
Features of littoral rock	157.49	High	Moderate	1889.88
Features of littoral sediment	8.01	High	Moderate	96.12
Features of littoral rock	26.59	High	Moderate	319.08
Features of littoral sediment	641.5	High	Moderate	7698
Saltmarshes and saline reedbeds	955.69	High	Moderate	0
Built linear features	2164.62	V.Low	N/A - Other	17316.96

Table derived from Network Rail Wales and Western Biodiversity Metric Baseline 2021.

Habitat type	Area (hectares)	Distinctiveness	Condition	Total habitat units
Other woodland; broadleaved	1895.77	Medium	Moderate	15166.16
Wet woodland	19.75	High	Moderate	237
Lowland mixed deciduous woodland	19.75	High	Moderate	237
Upland oakwood	19.75	High	Moderate	237
Lowland beech and yew woodland	19.75	High	Moderate	237
Other Scot's Pine woodland	13.19	Medium	Moderate	105.52
Other coniferous woodland	13.19	Low	Moderate	52.76
Ruderal/Ephemeral	1273.73	Low	Poor	2547.46
Bramble scrub	2334.74	Medium	Poor	9338.96
Modified grassland	1300.48	Low	Moderate	5201.92
Other neutral grassland	152.63	Medium	Moderate	1221.04
Upland acid grassland	19.26	Medium	Moderate	154.08
Lowland calcareous grassland	21.99	High	Moderate	263.88
Bracken		0	0	
Upland Heathland	228	High	Moderate	2736
Lowland Heathland	65	High	Moderate	520
Ponds (Non- Priority Habitat)	288.53	Medium	Moderate	4616.48
Fens (upland and lowland)	2.96	V.High	Moderate	47.36
Lowland raised bog	0.61	V.High	Moderate	7.32
Inland rock outcrop and scree habitats	60.62	High	Moderate	484.96
Other inland rock and scree	2.73	Medium	Moderate	32.76
Coastal lagoons	60.4	High	Moderate	724.8
Features of littoral rock	60.48	High	Moderate	725.76
Features of littoral sediment	8.48	High	Moderate	101.76
Features of littoral rock	29.69	High	Moderate	356.28
Features of littoral sediment	168.08	High	Moderate	2016.96
Saltmarshes and saline reedbeds	1060.83	High	Moderate	0
Built linear features	1895.77	V.Low	N/A - Other	15166.16

Eastern Region State of Nature Report 2022

Contents

1 Personnel & Document Control

All ecologists should state their membership level of a recognised professional body (e.g., CIEEM, IEMA) alongside their name.

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Date	

1.1 Document Control

Version number	Approved by Date	Description	Prepared by	Reviewed by	Authorised by
1		Full report 08.08.2024	Alistair Huntly & Abbie Wood		

2 Foreword

This document is the third State of Nature report for the Eastern Region, covering activities that took place during 2022.

It also reviews the state of nature on the Region's estate and explores whether any insights can be made to determine the Region's trajectory to success.

Figure 1 – Eastern Region, broken down into the four different Routes.

This report will highlight achievements made in the Region to improve biodiversity. Examples range from work with habitats and species to improving processes and decision making, resulting in tangible benefits for biodiversity.

The Eastern Region is Network Rail's largest Region, with over 6,000 kilometres of track within 15,688 hectares of land. This extensive estate passes through national parks and areas of outstanding beauty amongst other environmentally protected sites; this includes over 60 sites of special scientific interest (SSSI).

The Region's size poses challenges, but also immense opportunity. The Region is taking steps towards understanding this opportunity and is positioning itself to maximise the benefits for biodiversity, not just within its estate, but across the landscape of which it forms a part.

3 Executive Summary

3.1 Overview

The Eastern Region is the largest region within Network Rail, passing through National Parks, Areas of Outstanding Beauty and environmentally protected sites, including 56 Sites of Special Scientific Interest. There are approximately 58,137.90 biodiversity units across the Region from which we aim to achieve no net loss from 2020 baseline (63,160.54) and then biodiversity net gain by 2035.

A total of 27 habitat types were recorded, two of which were of 'very high' value, including fen and blanket bog.

The most common habitat by area remains 'ruderal ephemeral' at 31 %, with 'Bramble Scrub' at 20 %.

Over the past year the Region has sought to protect and safeguard species including peregrines, willow tits, invertebrates, and hazel dormice; examples are presented in this report.

The Region is looking to collaborate with the Wildlife Trusts Consultancies and deliver ecological support through the partnership. A team structure is in place that will embed ecological expertise at both Region and Route levels. A programme of works has been agreed that starts with the Wildlife Trust delivering stakeholder engagement events, a biodiversity inventory, Route Biodiversity Action Plans, Habitat Management Plans and Sectional Asset Plans. These tools will form the Region's plan for its lineside habitats and will help the region in meeting its biodiversity net gain ambitions.

3.2 Summary of ambitions for biodiversity management

We want to be in the position where we understand the biodiversity on our estate. Like all our assets, we want to know what it is, where it is, what health it is in, and we want to have a plan for it. We will start this journey with the help of The Wildlife Trusts and bring in the resource and expertise to take stock of what we have on our estate and what is around us in the wider landscape. We then want to have systems and processes in place to allow us to make informed decisions and plans for our biodiversity that will lead to meaningful gains. We will have Route Biodiversity Action Plans and Habitat Management Plans created for all four Routes within Eastern Region. Ultimately, this will allow us to be responsible custodians of an important asset, upon which so much depends, at a critical point in time.

3.3 Summary of achievements for biodiversity management

The key to achieving 10 % biodiversity net gain will be in understanding what biodiversity net gain should look like. We have secured funding for the remainder of the control period to bring in a team of Wildlife Trust ecologists and Engagement Managers. A programme of works is agreed and will start with a comprehensive and strategic approach to stakeholder engagement and data collection that will lead to opportunity mapping that the Region can benefit from. Feasibility studies have been undertaken to understand what plots of land within our estate that are available for us to deliver biodiversity net gain on, along with approximations of costs of delivery biodiversity net gain.

3.4 What further action will we take?

In addition to furthering the development of the projects, plans and initiatives identified in this report, the Region is now looking ahead to:

- work closer with capital projects and the supply chain, including large programmes such as the TransPennine Route Upgrade (TRU), to understand how best to work, and track progress towards, common biodiversity goals
- explore the creation of an Eastern Region Ecology Framework that will include suppliers from across the Region and better serve the Routes with local, ecological advice and support, in a way that supports local communities and delivers better social value
- establish how to better support local teams implement the Network Rail Biodiversity Standard (NR/L2/ENV/122), establish processes to do this and support where needed
- identify and explore new technologies that will help deliver plans for biodiversity at scale
- identify new partnerships and stakeholders to help deliver their initiatives and ambitions for biodiversity, wherever possible
- further work is required to ensure infestations of INNS are recorded in our systems and appropriate treatment plans are agreed and actioned
- design an integrated approach for vegetation and habitat management that meets the needs of all Network Rail functions and other industry stakeholders through the development of Sectional Asset Plans

4 State of nature on Eastern Region

4.1 Biodiversity metric calculation for the region

Network Rail's national biodiversity baseline was captured by the Centre for Ecology and Hydrology (CEH) in 2019 and 2020, the methods and results of which were published in the first State of Nature Report 2020/21. This exercise was repeated in 2021 but with an improvement to the way satellite data were interpreted and habitat areas were calculated. There was also an improvement to the accuracy of Network Rail boundary data used in the assessment. These improvements have been retrospectively applied to the 2019 - 2023 datasets, since the publication of the first report and the baseline is thus recalibrated.

A summary of the datasets is presented below. Looking at the data in the table below and the data for priority habitats there is an 8% flux in biodiversity units and an 8% flux in priority habitats, which is reasonable to assume that this difference is accounted for by noise in the data/calculations.

Table 4.1: summary of biodiversity units and areas for the Eastern Region.

Year	Area (Ha)	Biodiversity Units (BU)	Average BU/Hectare
2020	15793.67	63160.54	3.99
2021	15793.67	62419.06	3.95
2022	15793.64	58317.90	3.69

The annual hectarage recorded for the Region each year has almost stayed the same, although the associated biodiversity units appear to have decreased year on year between 2020 and 2022, with a total loss in biodiversity of 4,842.64 BUs. The average biodiversity unit recorded per hectare also dropped year on year between 2020 and 2022 by 0.3. Datasets are too few and too close together to allow meaningful conclusions to be made with confidence, at scale, for regional biodiversity trajectories, against the background noise of an operational network.

4.2 Habitat types

Habitats are used as a proxy for biodiversity when biodiversity calculations are undertaken. The type of habitat, its condition and its distinctiveness are all considered, together with its significance in the landscape. Certain habitats are known to support more species than others, and it is a habitat's potential to support species (i.e., the biodiversity associated with

it) relative to other habitats, which is expressed numerically, as a 'biodiversity unit'. A biodiversity unit is therefore a relative unit of account for biodiversity and not a measure of biodiversity itself. Habitats are therefore very important to understand the amount of biodiversity likely to be present within a given area and a summary of habitats recorded for the Eastern Region and their associated biodiversity units are presented in Table, below.

Table 4.2: A table to show the 27 habitat types recorded within the Eastern Region.

Habitat type	**Distinctiveness**
Other woodland; broadleaved	Medium
Wet woodland	High
Lowland mixed deciduous woodland	High
Upland oakwood	High
Lowland beech and yew woodland	High
Upland mixed Ashwood's	High
Other coniferous woodland	Low
Ruderal/Ephemeral	Low
Modified grassland	Low
Other neutral grassland	Medium
Lowland calcareous grassland	High
Upland acid grassland	Medium
Fens (upland and lowland)	V.High
Upland Heathland	High
Blanket bog	V.High
Inland rock outcrop and scree habitats	High
Other inland rock and scree	Medium
Coastal lagoons	High
Ponds (Non- Priority Habitat)	Medium
Features of littoral rock	High
Features of littoral sediment	High
Features of littoral rock	High
Features of littoral sediment	High
Saltmarshes and saline reedbeds	High
Built linear features	V.Low
Bramble scrub	Medium
Upland Heathland	High

Two habitats of 'Very High' distinctiveness, Fens (upland and lowland) and Blanket bog were recorded. In 2020 they had a combined area of 180.15Ha, which has decreased to 149.53Ha in 2022. Further data points over time are needed to track genereal trends and trajectories at such resolution and scale, however this flux of 17% change in a year is evidence of noise in the data as there have not been activities undertaken that would account for such a reduction in hectarage.

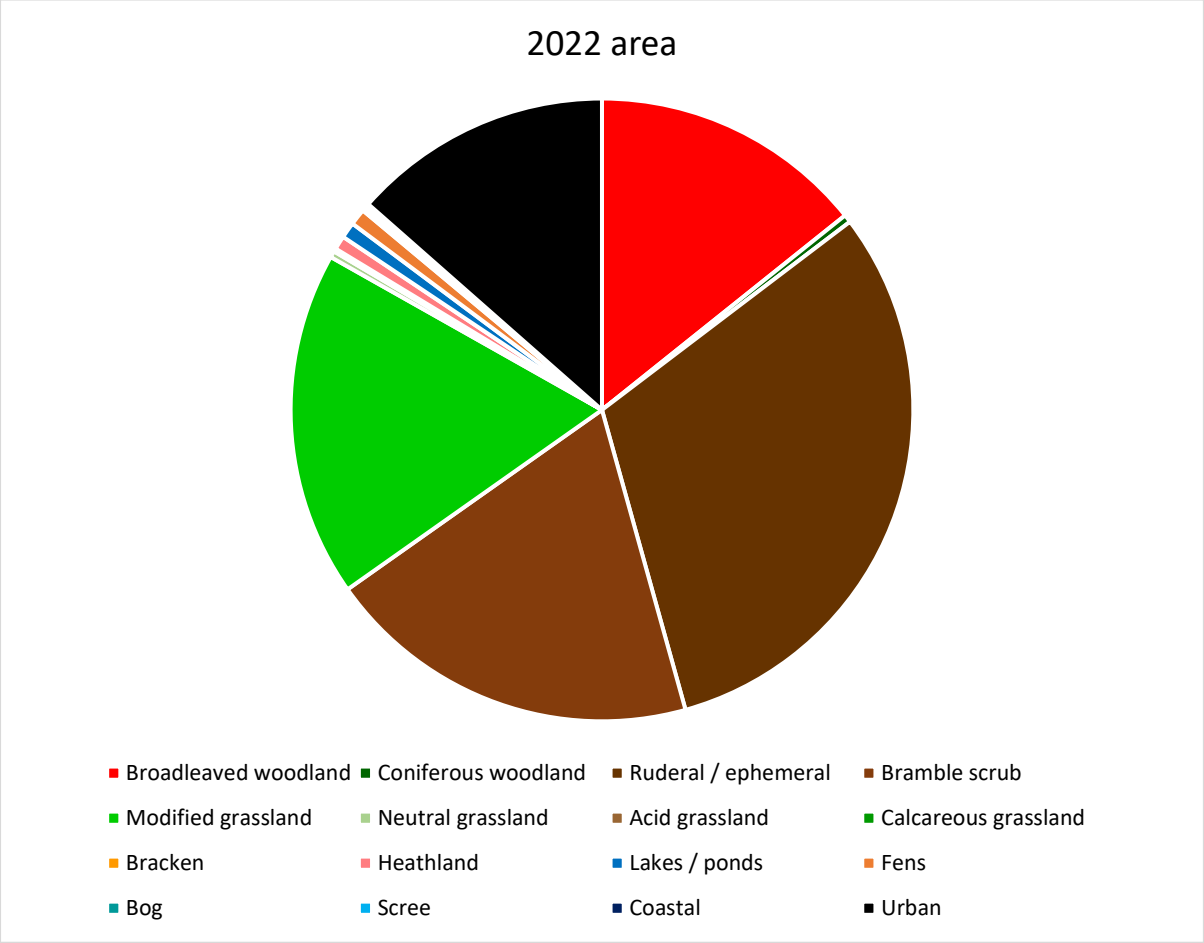


Figure 4.1: Pie chart to show the proportions of different habitats recorded.

From the chart above shows 'Ruderal / ephemeral' and 'Bramble scrub' form the largest proportion of habitats recorded within Eastern Region. Modified grassland with low species diversity and is characterised by few, fast-growing grass species on fertile neutral soils is also increasing. However, much like 'Ruderal / ephemeral' and 'Bramble scrub', this habitat can be crucial in providing connectivity between areas of higher distinctiveness. There is much potential to improve this habitat and, where appropriate, change it to a higher-value habitat to improve biodiversity.

'Bramble Scrub' is the second-largest natural habitat, representing 20% of lineside habitats. 'Bramble scrub' is of 'Medium' distinctiveness. This suggests this habitat presents one of an opportunity to improve biodiversity in the Region. However, in urban areas, they can form part of priority habitats and can be crucial in providing connectivity between areas of higher distinctiveness. Altering these habitats will need a considered, informed approach, sympathetic to the wider landscape and in concert with wider initiatives.

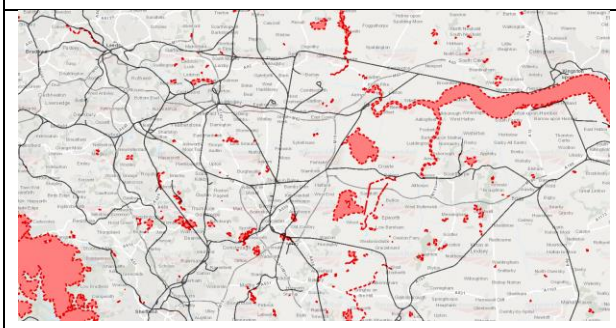
Broadleaved woodland has decreased by 6% since 2020 and now accounts for 14%. Woodland habitats are those most frequently managed to safeguard the operational network and is where our impacts on biodiversity are most likely to be felt, although not always in a negative way. A proportion of the loss in biodiversity through the removal of woodland would be recovered by the resulting habitat, most likely grassland, or scrub. Vegetation management practices have in the past left these areas, allowing successional habitats to develop that would eventually see a return to woodland, completing the cycle over several years. Biodiversity calculations only provide a snapshot within that cycle, and it is only when data are captured over the lifespan of this cyclical management that the true picture of biodiversity losses and gains will begin to emerge.

The Remaining habitats are made up of high-value habitats, such as 'Bog', 'Fen', 'Lakes & Ponds', 'Heathland', species-rich grasslands, 'Scree', 'Bracken' and 'Coastal'. These habitats account for around 15% of our lineside. Having a plan to safeguard, improve and connect these habitats will be key to meeting the Region's biodiversity targets.

4.3 Priority species/habitats on the region

The Eastern Region is vast and contains many important species and habitats. Below are some of the important species, species groups and habitats we seek to protect.

	Peregrine (Falco peregrinus) The world's fastest animal calls some of our most iconic structures 'home'. We worked with our supply chain, ornithological specialists, statutory agencies, and conservation groups to safeguard these birds, whilst undertaking critical works to maintain our structures.

	**Invertebrates** Many of our old sidings have developed into Priority Habitats that support National Priority species, such as the dingy skipper (*Erynnis tages*) and small heath (*Coenonympha pamphilus*). We met with Yorkshire Butterfly Conservation to understand how some of the substrates we use for access roads is perfect for rare butterflies, such as the Duke of Burgundy (*Hamearis lucina*), south of York.
	**Hazel dormice** The Region continues to work with the Nottinghamshire dormouse group, by facilitating access for surveys to keep track of breeding success and population numbers. This year recorded use of nest boxes by dormice installed in a hedgerow by the group.
	**SSSIs** The Eastern Region Environment Team continue to work with Natural England to ensure all 56 SSSIs that exist within our estate have up-to date Site Management Statements. We continue to communicate their importance to the wider business.

4.4 Invasive species on the region

The presence of invasive non-native invasive species (INNS) can only be recorded where identified, most commonly through lineside inspection or survey. This means the true extent of areas infested within our estate and their impact on biodiversity is unknown.

Traditional methods of detection and treatment are currently underway, until better alternatives become available. In the Eastern Region, treatment of INNS is currently focussed on Japanese knotweed (*Reynoutria japonica*) and giant hogweed (Heracleum mantegazzianum). Both plants impact biodiversity negatively and giant hogweed presents a particular risk to people because of its blistering effects on skin. Across the region we continue to manage invasive species and record any occurrences.

4.5 Demonstration sites or projects

4.5.1 Biodiversity Systems

The Region has been looking into different systems with the ability to host and analyse biodiversity data.

One example from our Works Delivery team, is the collaboration with ESRI to develop a tool (ESMapp) designed for Network Rail. Esmapp aims to create simpler, greener environmental management for projects. It is an automated, centralised and standardised web-based application that screens site activities within a defined area to identify environmental risks and opportunities. It then generates a tailored action plan, drafts required documentation and stores evidence of risk management and mitigation. It also

holds biodiversity data, management plans and ecology surveys allowing the integration of risks and opportunities into output documentation.

Works Delivery Eastern have successfully trialled the use of Esmapp to automate the creation of standard project documentation. Eastern Region have also successfully hosted BNG data, including stakeholder mapping.

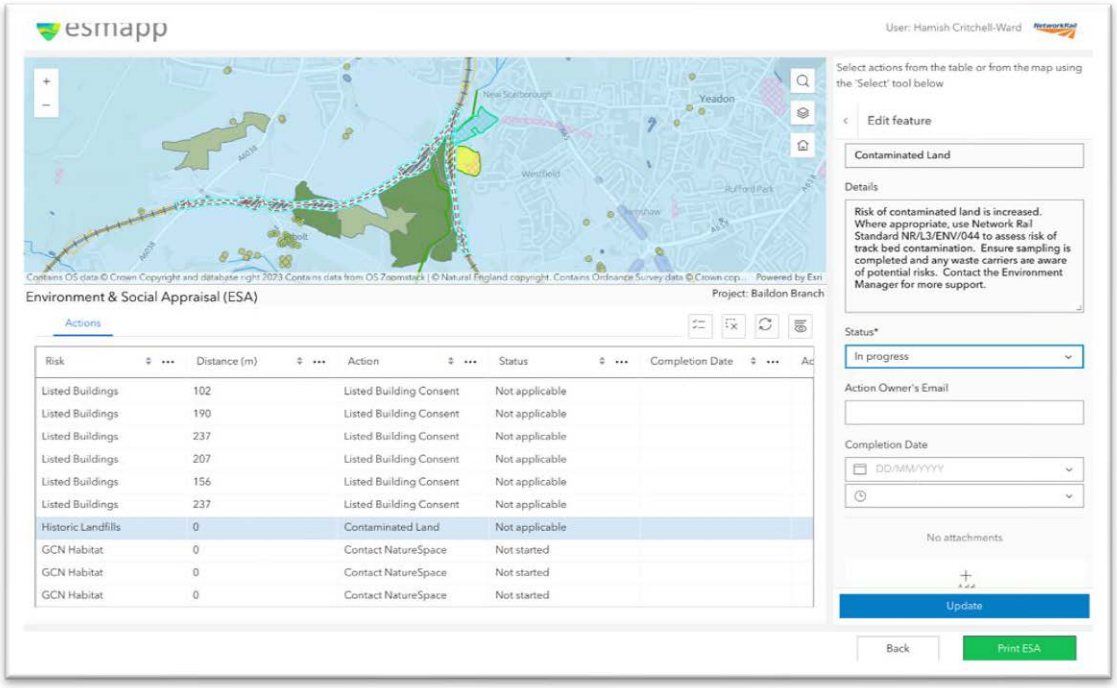


Figure 4.3: A screenshot of Esmapp.

5 Priorities for biodiversity management

The Environmental Sustainability Strategy and Eastern Region Biodiversity Plan support the national, network-wide delivery of the Network Rail Environmental Sustainability Strategy 2020-2050. In support of the ongoing commitment to be fitting and responsible custodians of the land we own, we are focussed on achieving the target of no net loss in biodiversity, which included progressing the following priorities:

5.1 Habitat Management Plans

The Wildlife Trust will be onboarded in 2023. They will work closely with Eastern Region's Environment Team to determine the best approach to producing meaningful plans for our habitats, across the Region. Habitat Management Plans define the management required for a given habitat type, and where necessary, outlines changes required to existing habitats. They will also establish accountability for the habitat within the Route or Region and support asset management requirements.

5.2 Compliance with standard NR/L2/ENV/122 Biodiversity

Improving biodiversity must start with safeguarding what we already have, including when we carry out routine maintenance and improvements works. One of the most difficult challenges we face, is helping our teams understand when this might be needed. This year, we have been working with maintenance teams and asset management to develop processes that will help detect when impacts might occur, so we can upskill teams and provide ecological expertise when needed.

5.3 Pilot areas

Over the past year we have explored the best way to identify unused plots of land and establish whether they can be used to deliver biodiversity gains. We undertook a feasibility assessment using GIS to identify the best areas to deliver biodiversity gains and screen out the areas that were not appropriate. This is a repeatable assessment that can be done periodically to keep the business up to date with were biodiversity improvement can be delivered. These areas will help the business plan to meet its no net loss and biodiversity net gain requirements.

5.4 No Net Loss by 2024 and Biodiversity Net Gain by 2035

Maintenance Teams and Asset Management teams have worked alongside their supply chains and local conservation groups to embrace new technologies and approaches to vegetation management (examples of which are contained in this report).

The teams have improved their approach to management of our lineside to attain No Net Loss. As a Region, we are undertaking feasibility assessments to determine where the best places to deliver biodiversity net gain are, and how we can continue to work with other business areas and conservation organisations to help us achieve this.

5.5 Increase in ecological capability

A Key recommendation made in John Varley's independent report[1] to the Department for Transport for Network Rail was to "*have the right specialist capabilities and competencies in place*" to manage our lineside estate as an asset. To deliver this work, the Eastern Region will onboard ecological expertise and resource from the Wildlife Trust Consultancies in 2023. An ambitious programme of works will be developed in partnership with the Trusts that will increase the Region's ecological capability to a team of up to ten people. This work will be fully funded for three years (up to August 25) to help the Region position itself to meet its biodiversity targets and ambitions.

[1] Varley, J. (2018) *Valuing Nature – A railway for people and wildlife… The Network Rail Vegetation Management Review*. Crown Copy right 2018. Available at [Valuing nature – a railway for people and wildlife… The Network Rail Vegetation Management Review (publishing.service.gov.uk)]

6 Case studies

6.1 Anglia Route – Hedgerow establishment

In the winter of 2021/22, passenger, and freight services in parts of Anglia experienced significant delay and cancellations caused by snow drifting across the lines. This resulted in over 15,000 minutes of delay and line closures between Colchester and Clacton, Ipswich and Lowestoft, and, the Felixstowe line. These lines were exposed to snow drifts because of the area's flat topography and lack of natural boundaries.

Working in collaboration with Anglia's Route Engineer team for Drainage and Off Track, Railscape and the Anglia Performance Team, funding was granted from the National Performance Innovation Fund, allowing the team to plant over one kilometre of mature, native-species hedgerows in locations at risk of snow drifts. Hedgerows act as a structural barrier, preventing snow from drifting across the railway. As well as the performance benefit and network resilience hedgerows provide, they are a nature-based solution delivering significant biodiversity gains.

Translocating a mature, native hedgerow provides instant shelter and food wildlife and offers far more biodiversity benefits to wildlife than introduced plants. It supports pollinators which attract a greater variety and number of birds, invertebrates, and small mammals by providing diverse habitats and food sources. They also provide wildlife corridors, allowing wildlife to move between habitats improving connectivity throughout the landscape. This nature-based solution also help with carbon capture and pollution control, filtering particulates and storing them.

The current hedgerow establishment to date has increased the Anglia Routes' biodiversity units and assists in offsetting other vegetation management operations. The mature hedging planted in this project comprised of Hawthorn, Blackthorn, Hornbeam, Hazel, Dogwood, Guelder Rose and Field Maple.

Figure 5.1: Images showing mature hedgerows that were translocated to areas with a high risk of snow drift.

6.1.1 Anglia Route – Norfolk Reedbed

An area of reedbed near Haddiscoe station will be left to rewild after Anglia's Route Engineer Team for Drainage and Off Track pledged it to the WildEast movement. The area will be allowed to thrive for wildlife, but will also provide a nature-based solution for drainage issues, reducing the risk of flooding on the railway. Animals and insects that live on the area of reedbed pledged by Network Rail include water voles, water shrews, grey herons, great bitterns, marsh harriers, reed warblers and reed leopard moths.

The Anglia team have gone further by signing up all 56 of its station gardens to the WildEast movement. At the launch in November 2023, the sign at Haddiscoe station was unveiled by WildEast alongside Greater Anglia and the Wherry Lines Community Rail Partnership, other signatories to the movement

Anglia's senior engineers visited a nearby Primary School to explain more about the pledge. They discussed how the railway works and the importance of protecting biodiversity in the local area, explaining how both can exist and benefit from each other. The children had been specially chosen for the talk after winning a competition to create posters inspired by the Network Rail and WildEast partnership.

6.1.2 East Coast – Harringay ECM1

Capital Delivery in Eastern Region worked with Amco-Griffin on works to replace a retaining wall.. The original designs backfilled with topsoil and oversewed with a wildflower mix, but after engaging the London Wildlife Trust, a new plan was designed to create 'open mosaic' habitat that would adopt suggestions made by the charity. Capital Delivery Eastern and Amco-Griffin worked with the London Wildlife Trust to create the habitat to meet the

specification required by the project. This resulted in a better-suited habitat that complemented local ambitions for biodiversity and increased the biodiversity value of the site by 22%.

Figure 5.2: Original design for bank stabilisation and retaining wall prior to engaging with the London Wildlife Trust.

Figure 5.3: Examples of Open Mosaic habitat designed for the project.

7 Working in partnership

7.1 Nottinghamshire Dormouse Group

Network Rail continue to work in partnership with the Nottinghamshire dormouse group, by facilitating access for surveys to keep track of breeding success and population numbers.

A total of 23 dormice was recorded across the best total to date. The table below shows the total number of dormice recorded within each of the two woodlands since the reintroductions.

Table 7.1: A table to show dormice records facilitated by Network Rail.

Year	Gamston Wood	Eaton Wood
2015	N/A	1
2016	0	1
2017	8	0
2018	4	2
2019	0	0
(No Survey)		
2021	1	0
2022	3	1

Network Rail continues to work the group to help monitor the species.

7.2 Needham Market Hedgerow Scheme

Network Rail planted a 100m hedgerow in a local park, improving biodiversity by providing a new habitat for animals, birds, and insects. Needham Market Town Council provided the land for the hedgerow, which was sourced and planted by a specialist contractor.

A joint event was held at the site in Crowley Park, with the council being represented by the town mayor and Council officials.

Network Rail pledged to plant the hedgerow after carrying out essential vegetation works near to the railway running through Needham Market last year. Crowley Park's hedgerow is made up of four native plant species: hawthorn, blackthorn, hazel, and dogwood. These offer an improved habitat for wildlife, and local people can enjoy the nature which it is hoped to attract, such as bees, butterflies, birds and dormice.

Representatives from Network Rail, Needham Town Council and Railscape at the launch event. From left to right: railway engineer Liam Allen; Councillor Amanda Reardon; town mayor; Andrew Hood from Railscape; railway engineer Stewart Cowan; town clerk Kevin Hunter

The newly planted hedgerow

A new sign with information about the hedgerow and hints for spotting wildlife

Close up on the information board.

7.3 York Groundsel Blooms

York groundsel was a yellow flower that decreased into global extinction in 1991 but has been bought back in the first de-extinction in Britain and is flowering again in York.

York groundsel, *Senecio eboracensis*, was discovered growing in the car park of York railway station in 1979 and was the first new species to have evolved in Britain for 50 years, thriving on railway sidings and derelict land. It was last seen in the wild in 1991. Researchers kept three small plants in pots on a windowsill in the University of York. These short-lived annual plants soon died, but they produced a precarious pinch of seed, which was lodged at Kew's Millennium Seed Bank.

Natural England authorised a de-extinction attempt via its species recovery programme. 100 of the tiny seeds were planted with 98 of the seeds germinated successfully.

In February six grams of seed – potentially thousands of plants – were sown into plots around York on council and Network Rail land.

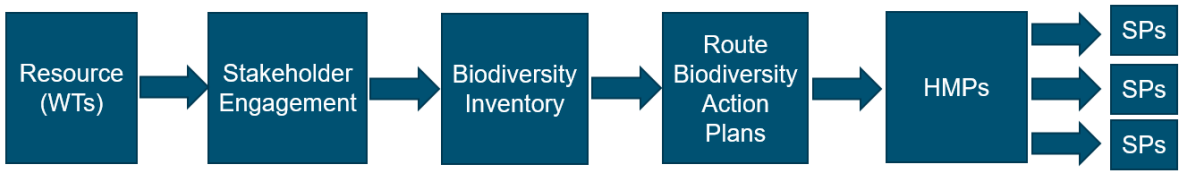
The first plants in the wild for 32 years began to flower. This de-extinction is likely to be a one-off in this country because York groundsel is the only globally extinct British plant that still persists in seed form and so could be revived.

8 Future plans

8.1 Habitat management plans

Habitat Management Plans (HMPs) will be the end product of a process the Region will establish. Producing a plan for habitats, with a view to improving biodiversity, will require an understanding of what habitats and biodiversity already exist. It is also necessary to understand local ambitions for biodiversity and wider strategical efforts at a landscape level (e.g., Local Biodiversity Action Plans, Nature Improvement Areas, Ecosystem Services etc.). This information will be captured through stakeholder engagement and collated into a Biodiversity Inventory that can be used to inform the production of a Route Biodiversity Action Plan (RBAP). The RBAP will be the Route's vision for biodiversity net gain, to be achieved by 2035. HMPs will then be produced supporting this vision, focusing the business' efforts towards realising it, in a way that links in with local and national efforts, and maximises biodiversity benefits at a landscape level. Individual projects can then produce detailed Sectional Plans (SPs) using HMPs and the RBAP, that will capture the project's contribution to biodiversity in detail (e.g., biodiversity calculations, costs, establishment, maintenance). In this way, SPs can be a cohesive way towards achieving a singular vision. SPs can also be used to produced anywhere they are needed but will always reference the same materials and pull together in measure and evaluate the Region's trajectory to biodiversity net gain at ground level and can be the mechanism by which plans are agreed by Asset Management and handed over to the maintainer.

A flowchart of this process can be seen below



The Eastern Region's process to produce HMPs and SPs.

8.2 Stakeholder engagement plans for the next reporting period.

Stakeholder Engagement is at the heart of the Region's plans for biodiversity. The Wildlife Trusts will lead this process for the Region, as their charitable position, leading successful conservation efforts for over 100 years means they are uniquely placed to act as biodiversity 'broker' for the business. Their brand allows them to engage with the grassroots

of the conservation movement and link into opportunity mapping that would otherwise be out of reach to the business. The Region's focus over the next reporting period will be to bring in the Wildlife Trusts resource that will facilitate this engagement for the business, whilst continuing to build upon existing stakeholder engagement through the work it undertakes.

Cumbrian coast, North West & Central

North West & Central State of Nature Report 2022

Contents

1 Personnel & Document Control

All ecologists should state their membership level of a recognised professional body (e.g. CIEEM, IEMA) alongside their name.

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1.1 Document Control

Version number	Approved by Date	Description	Prepared by	Reviewed by	Authorised by

2 Foreword

This report, for North West and Central (NW&C) region (Figure 1), covers activities that took place in 2022.

It outlines the state of nature on the region's estate and the ambitions and plans we have to protect and maintain its habitats and associated biodiversity. It also highlights key examples of the actions we have undertaken to improve these habitats, and where necessary control undesirable species. The report details how we track this performance and how we are currently performing. Also contained within the report are several case studies and workstreams which demonstrate alignment to our national objectives of achieving no net loss in biodiversity by 2024, and achieve biodiversity net gain of 10 % in each Region by 2035, along with a number of projects planned for the coming years.

Figure 1: Map of NW&C Region

3 Executive Summary

3.1 Overview

NW&C is the Backbone of Britain, the low-carbon spine linking London, Birmingham, Manchester, Liverpool and Glasgow. Through our three devolved routes (North West, Central, West Coast South) supported by Capital Delivery we aim to increase our biodiversity alongside delivering a great service to our passengers, customers and neighbours.

In the previous year, 2021, the total area of habitat recorded in NW&C was 11336.17 which equated to 49896.628 habitat units. In 2022 the habitat area remains the same but the biodiversity units drop to 46690.42. Therefore biodiversity in NW&C has decreased by 6.42 % dropping from 49896.628 to 46690.42.

The most notable changes affect the following habitats: bramble scrub has declined, equating to a loss of 2662.64 biodiversity units from bramble scrub between 2021 and 2022. This 2662.64 decline in bramble scrub is largely responsible for the overall reduction in biodiversity units in NW&C Region over the last 12 months. While conversely, ruderal/ephemeral and modified grassland saw notable increases, increasing by 1818.98 and 438.61 respectively. A full representation of this, and all other habitat types can be seen in Figure 2, below.

This decline in biodiversity units can likely be attributed to the loss of around 665 Ha of bramble scrub, removed or managed by maintenance teams across the region and the increase in around 909 Ha of ruderal/ephemeral habitat.

This apparent loss of bramble scrub and gain in lower quality ruderal/ephemeral habitat needs further investigation. In reality maintenance teams, via our Internal Delivery Lineside Team, should be undertaking minimal work on scrab habitat due to its low risk to operational assets. As ruderal/ephemeral habitat is increasing within the region, further work should be undertaken to assess the biodiversity value of this habitat and the likely loss/ gain from interventions specified in works delivery Vegetation Management Specifications (VMS).

Historically deciduous woodland has been lost each year since the baseline however 2022 experienced a 33 ha increase which could be due to the process of succession in some areas of the estate.

3.2 Summary of ambitions for biodiversity management

The NW&C Region covers 4,500 miles of track, linking our main cities of London, Birmingham, Manchester and Liverpool. This region carries over 246.5m passengers a year and is one of the busiest on the rail network. It passes through some of the most picturesque and biodiverse landscapes in Britain.

In 2021 we published our Regional Sustainability Delivery Plan which outlines our ambitions for a lineside managed sustainably for safety, performance, the environment, our customers and our neighbours.

To support the achievement of these ambitions, NW&C is committed to the Key Performance Indicators (KPIs) of:

- Achieving no net loss in biodiversity on our lineside estate by 2024, and achieve biodiversity net gain of 10 % in each Region by 2035 which we will monitor and quantify annually, using remote sensing data, and report findings to the Department for Transport (DfT) in an Annual State of Nature (ASoN) reports, such as this.
- Our natural green infrastructure is viewed as an asset not a hindrance managing our land equally considering operation needs, safety and biodiversity net gain- which we will influence by placing sections of lineside estate under habitat management plans (HMPs), when they are scheduled to undergo vegetation management, to keep them compliant with operational standards and requirements. HMPs will ensure lineside habitat and vegetation management is sympathetic to ecological features and addresses ecological risks, while ensuring operational performance can be maintained or improved using processes such as nature-based solutions to adverse weather and climate change risk.

3.3 Summary of achievements for biodiversity management

There are a number of case studies and demonstration sites that have been undertaken showcasing positive biodiverse improvements that have been made within the Region. This has involved actions to conserve desirable species, habitat creation and restoration for biodiversity net gain and field trials of new management approaches.

3.4 What further action will we take?

Future plans continue to focus on the implementation of HMPs to improve and increase biodiversity across the Region. In addition, we will continue to monitor the successes or failures of our demonstration and pilot sites and share and implement learning across the region. We will continue to quantify the benefits that biodiversity enhancements, or habitat creation can have on operational performance and resilience, as well as any wider societal benefits, such as flood risk alleviation, or the provision of recreational sites. We will also continue to engage with local stakeholders and organisations, such as the Environment Agency, Natural England, Rivers Trusts and other relevant non-governmental organisations and charities, to deliver biodiversity enhancements that deliver benefits at a landscape scale.

4 State of nature on NW&C region

4.1 Biodiversity metric calculation for the region

Table 1 below shows the NW&C Regions habitat data and corresponding biodiversity unit calculations this provides. Within NW&C Region the habitat along the estate is 11,194 hectares in area and equates to 43,474.9 biodiversity units. Full details of how this was calculated can be found within the 'Network Rail Biodiversity Metric Calculations 2021 Report'.

Table 1: Regional habitat and biodiversity unit data for 2019, 2020, 2021and 2022.

Habitat type	Distinctiveness	2019		2020		2021		2022	
		Area (hectares)	Total habitat units	Area (hectares)	Total habitat units	Area (hectares)	Total habitat units	Area (hectares)	Area (hectares)
Other woodland; broadleaved	Medium	2328.97	18631.76	2083.71	16669.68	1798.98	14391.84	1831.26	14650.08
Wet woodland	High	24.01	288.12	21.48	257.76	18.55	222.6	18.88	226.56
Upland oakwood	High	24.01	288.12	21.48	257.76	18.55	222.6	18.88	226.56
Upland mixed ashwoods	High	24.01	288.12	21.48	257.76	18.55	222.6	18.88	226.56
Other coniferous woodland	Low	40.12	160.48	67.3	269.2	43.71	174.84	88.86	355.44
Ruderal/Ephemeral	Low	1865.38	3730.76	2161.31	4322.62	2399.9	4799.8	3309.39	6618.78
Bramble scrub	Medium	3032.76	12131.04	3493.04	13972.16	3388.94	13555.76	2723.28	10893.12
Modified grassland	Low	907.8	3631.2	743.24	2972.96	831.73	3326.92	1270.34	5081.36
Other neutral grassland	Medium	420.05	3360.4	467.31	3738.48	658.8	5270.4	312.87	2502.96
Upland acid grassland	Medium	110.9	887.2	100.5	804	64.56	516.48	70.31	562.48
Upland calcareous grassland	High	29.34	352.08	39.17	470.04	41.01	492.12	20.78	249.36
Bracken									
Upland Heathland	High	161.51	1938.12	158.34	1900.08	235.319	2823.828	173.85	2086.2
Ponds (Non- Priority Habitat)	Medium	109.46	875.68	86.93	695.44	68.13	545.04	47.93	383.44
Fens (upland and lowland)	V.High	1.39	22.24	1.4	22.4	52.65	842.4	5.62	89.92
Blanket bog	V.High	5.13	82.08	5.35	85.6	40.33	645.28	72.2	1155.2
Inland rock outcrop and scree habitats	High	0.41	4.92	0.36	4.32	0.37	4.44	0.22	2.64
Other inland rock and scree	Medium	41.05	328.4	36.11	288.88	36.28	290.24	21.66	173.28
Coastal lagoons	High	0	0	0	0	0	0	0.62	7.44

Features of littoral rock	High	0.16	1.92	0.39	4.68	0.01	0.12	0	0
Features of littoral sediment	High	175.64	2107.68	181.94	2183.28	67.6	811.2	38.56	462.72
Features of littoral rock	High	11.81	141.72	15.2	182.4	14.77	177.24	4.7	56.4
Features of littoral sediment	High	4.5	54	4.57	54.84	3.27	39.24	4.07	48.84
Saltmarshes and saline reedbeds	High	111.32	1335.84	160.49	1925.88	43.47	521.64	52.59	631.08
Built linear features	V.Low	1906.56	0	1465.07	0	1490.7	0	1230.42	0

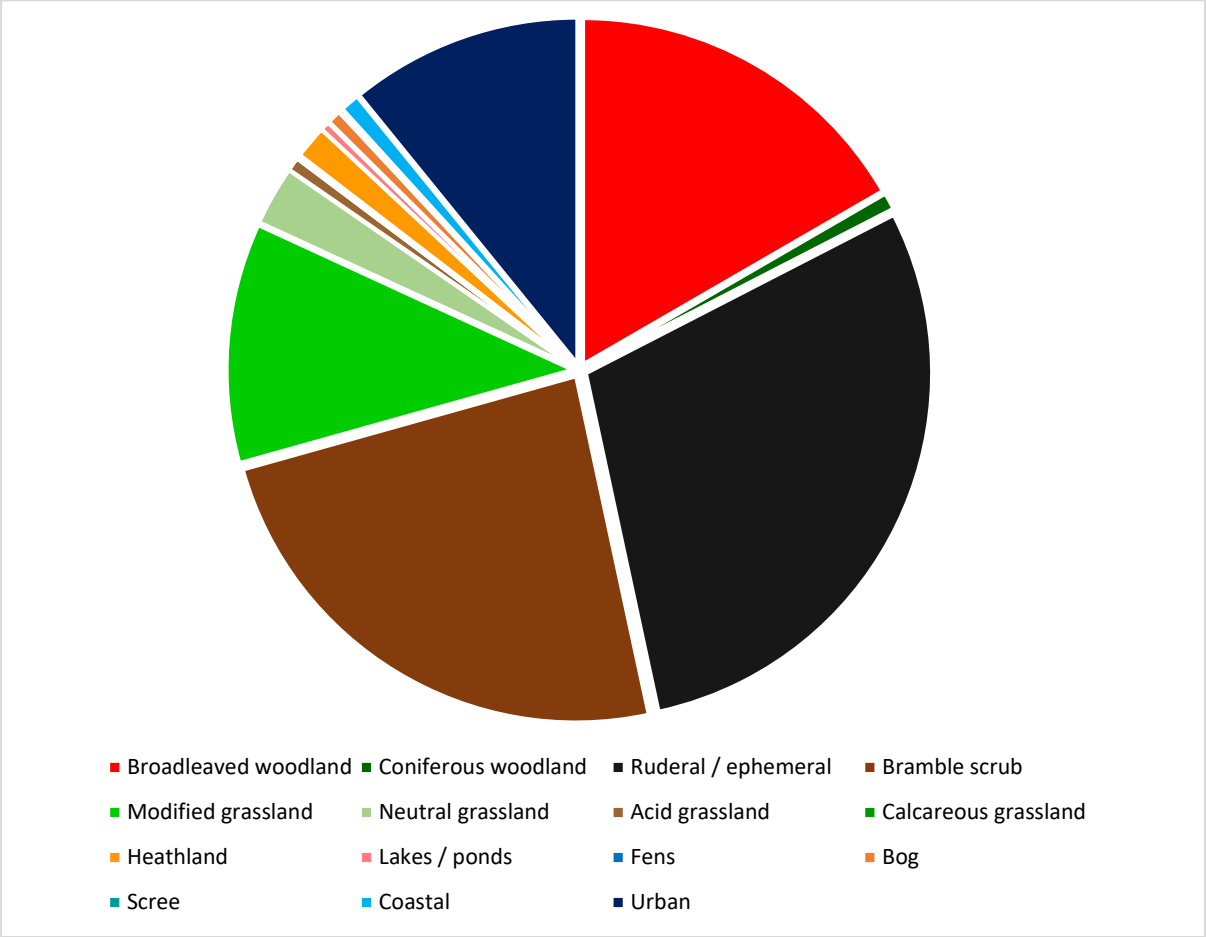

Figure 2: piechart showing 2022 habitat proportions

4.2 Region habitat types

Figure 2 presents the composition of habitats on the NW&C estate and shows how the habitat types have changed from 2021 to 2022. It is also supplemented with data from the preceding years to the 2019 baseline as a further point of reference. The built up areas, gardens and urban types are not a priority for NW&C as they are not habitats that we can improve on and provide low biodiversity units.

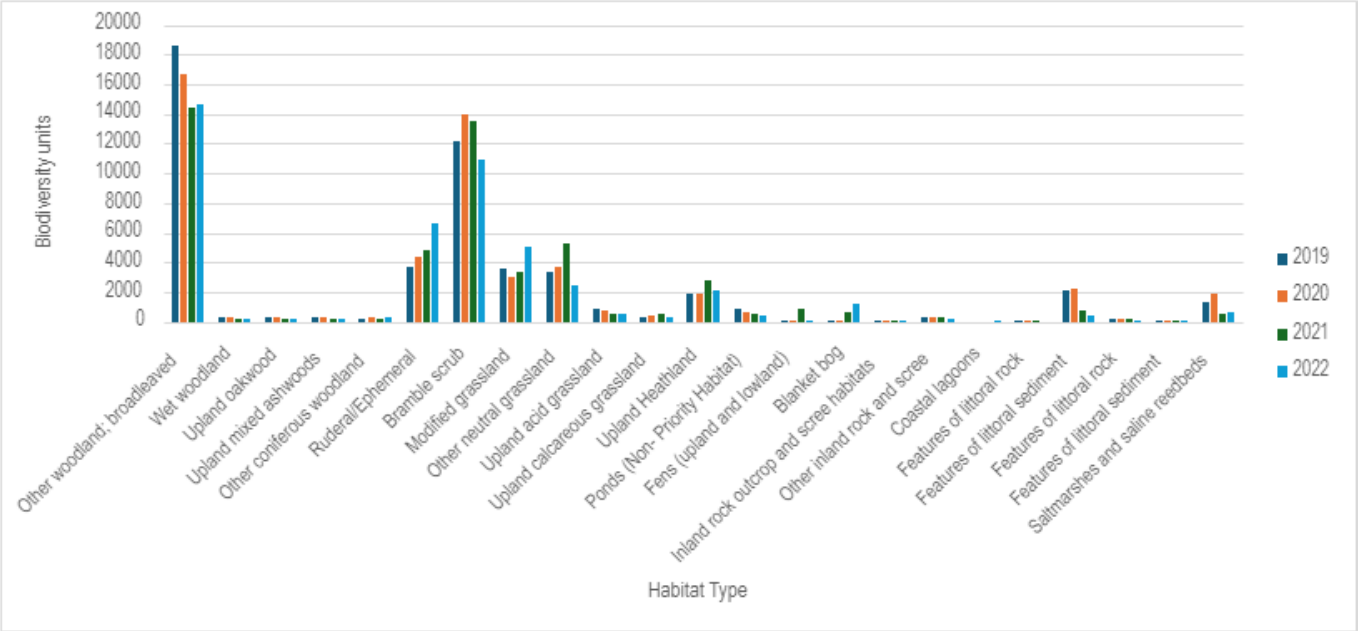

Figure 3: Comparison of 2019-2022 data

This year's habitat data shows that the most dominant habitats on the NW&C estate comprised broadleaved woodland, ruderal (tall herb vegetation such as nettles), bramble scrub and modified and neutral grasslands. Much smaller areas of a further seventeen habitat types make up the overall habitat composition. Our priorities focus on effectively managing broadleaved woodland, which comprises 16 % of the regional habitat, while enhancing bramble scrub (24 %), ruderal (29 %) and grassland habitats (combined 14 %). We aim to manage the operational risk presented by woodland habitat and create a lineside vegetation structure, containing a more diverse structure of habitats, such as bramble, ruderal and grassland, to increase the resiliency of the infrastructure while increasing biodiversity.

Broadleaved woodland is one of the most dominant, biodiverse, but also operationally problematic habitats on the estate, often striking trains or infrastructure in severe weather or contacting overhead line equipment where it has grown unmanaged. Broadleaved tree species such as sycamore also cause adhesion issues when leaves fall upon the rails, which can result in further adverse operational impacts. For these reasons, broadleaved woodland often requires the most frequent and labour-intensive maintenance. Despite these problems, where broadleaved woodland is allowed to grow in suitable locations, and is suitably managed, it can connect habitats and allow biodiversity to thrive while mitigating other environmental risks such as flooding and landslips. Where woodland is growing in unsuitable locations, often in locations immediately adjacent to

the track or infrastructure, we will often look to replace it, creating larger, improved, and better-connected species rich grasslands or scrub vegetation.

Ruderal has become increasingly dominant since 2019. This likely reflects operational tree felling and the subsequent successional ruderal species establishing. More work is required to understand the biodiversity value of this habitat. Opportunities for post work interventions should be explored with the goal to improve this habitats condition or allow it to transition into a more distinctive habitat quicker.

In line with the regional approach of conserving and enhancing biodiversity, whilst maintaining or improving operational resilience, through adoption of nature-based solutions, we will adopt a successional approach to the lineside estate, allowing or creating species rich grassland and scrub close to the railway with hedgerows and trees further away. The implementation of this approach, however, will always remain considerate of other sensitive receptors priority habitats and species, designated nature conservation sites such as SSSIs and invasive non-native species (INNS), discussed in sections 4.3 and 4.4, respectively this will help the region work towards the biodiversity net gain agenda increasing the biodiversity of our estate and improving this in the future.

4.3 Priority species/habitats on the region

NW&C Region contains a wealth of priority habitat types which reflect the wealth of habitats through which the regions rail network intersects. The regional estate therefore contains or runs immediately adjacent to a patchwork of marine, coastal, woodland, grassland, and heathland priority habitats. Figure 4, below, displays a representative example of this.

Figure 4: Representative distribution of designated nature conservation sites and priority habitats within NW&C Region

Historically, NW&C Region has had 40 SSSIs, across 7 Delivery Units (DU), which intersect or are located adjacent to the railway estate (Figure 4, above). SSSIs on or adjacent to the NW&C estate are designated for a variety of terrestrial, aquatic, and marine habitats and species, of which the condition varies. We hold site management statements (SMSs) for these SSSIs, which detail arrangements between ourselves and the regulator, Natural England, regarding routine works which can be undertaken without prior assent.

4.4 Invasive species on the region

The region has numerous locations where the lineside is affected by INNS, such as Japanese knotweed, Himalayan balsam, and giant hogweed – see Figure 5 for a representative example of INNS distribution. The presence of INNS present difficulties to internal delivery teams and our supply chain during the undertaking of maintenance and capital works within the region.

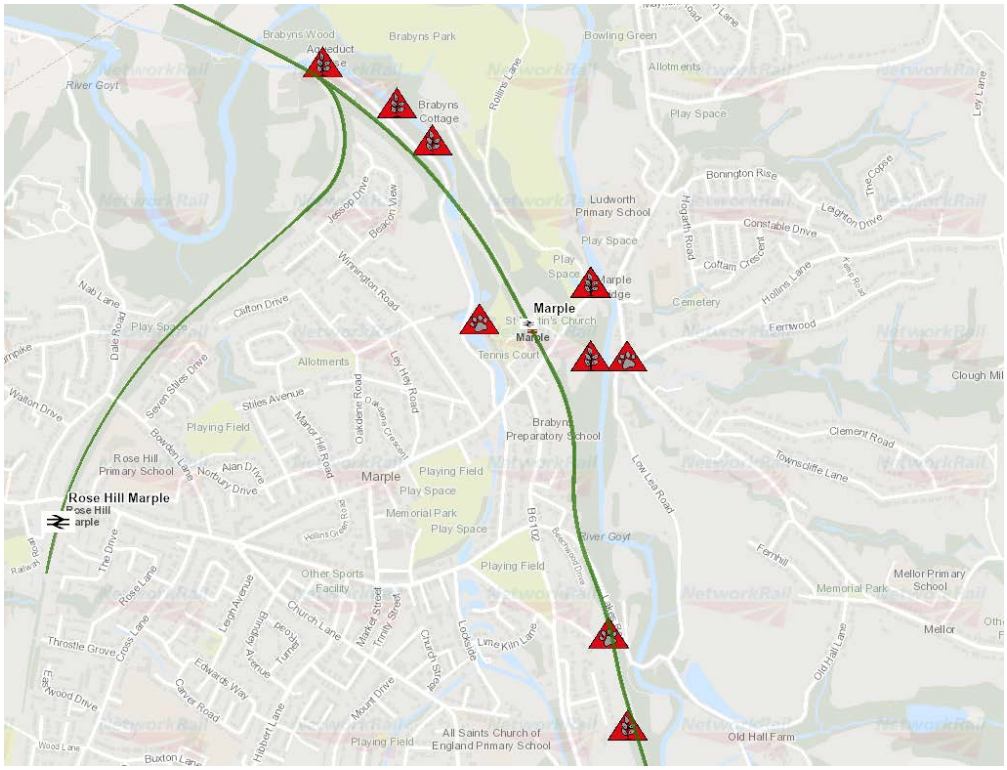

Figure 5: Representative distribution of INNS within NW&C Region

Our regional approach to habitat and vegetation management places emphasis on INNS management. Wherever vegetation management work is planned, an assessment as to the presence of INNS is made. Where INNS are present, and the proposed method of management or habitat structure does not consider them, it is changed accordingly to eradicate or contain the INNS, enabling native vegetation, of the desired type and structure, to establish and thrive.

4.5 Demonstration sites or projects

Below are several case studies which demonstrate the approaches adopted within NW&C region to successional planting and management of the correct habitats, in the correct locations to improve biodiversity and connect fragmented, whilst improving operational resilience.

Tring cutting

A Biodiversity assessment conducted at Tring Cutting (Figure 6) stated that the primary biodiversity value of the area is chalk grassland, with the potential to support invertebrates including several priority species of butterfly. The report recommended that to meet the safety and management requirements of the railway and to provide suitable basking and foraging habitat for a range of species; both the east and west bank should be cleared of all mature trees and any woody vegetation which could develop into a risk feature. Areas of low vegetation such as broom, gorse or bramble were to be retained.

This recommendation was carried out and vegetation was removed (Figure 7) in favour of returning this area into a more favourable and diverse chalk grassland.

Figure 6: Still from drone footage (facing south at approx. 33.0671 M.Yds) prior to vegetation management

The goal of chalk grassland management is the retention of a short sward and removal of nutrients. This prevents coarse grasses from becoming dominant at the expense of wildflowers and grasses which are indicative of the habitat. It also removes the operationally problematic species, allows easier inspection of the cutting by geo-tech teams and provides a reduction in risk to the railway from vegetation. As woodland habitat is operationally problematic discussions are ongoing around large scale vegetation clearance, ground preparation and hydroseeding with an appropriate calcareous grassland seed mix. A habitat management plan for this site will be created detailing ongoing maintenance which may include robomowers for working on steep gradients and spot spraying using drone technology.

Figure 7: Tring Cutting Vegetation Management in Action

Eden Rivers Trust Partnership

To actively address instances of asset failures due to flooding events, inter-disciplinary teams from within NW&C Region have begun working with the Eden Rivers Trust (ERT), and other stakeholders such as National Highways and the Environment Agency, to identify nature-based solutions to the impact of flooding events on infrastructure within the Eden catchment. To identify and prioritise locations all stakeholders provided information to the ERT regarding asset failures incurred due to flooding events, including the frequency and impact of such failures. The ERT then undertook a high-level assessment of the catchment, focussing on three key environmental opportunities: habitat connectivity, carbon storage and sequestration, and storage or slowing of floodwaters. Opportunity areas for each of these aspects could be ranked in terms of their individual impact, and then overlaid to understand their combined impact We could then overlay the location and impact of historic asset failures to gain a full understanding the locations which presented the greatest opportunities, where high impact asset failures, fell within areas of high overall environmental benefit (Figure 8). Using this initial assessment, we are planning future work with the ERT to fully scope and implement a program of habitat creation and improvement, working with neighbouring landowners, to deliver nature-based solutions and improve asset resilience.

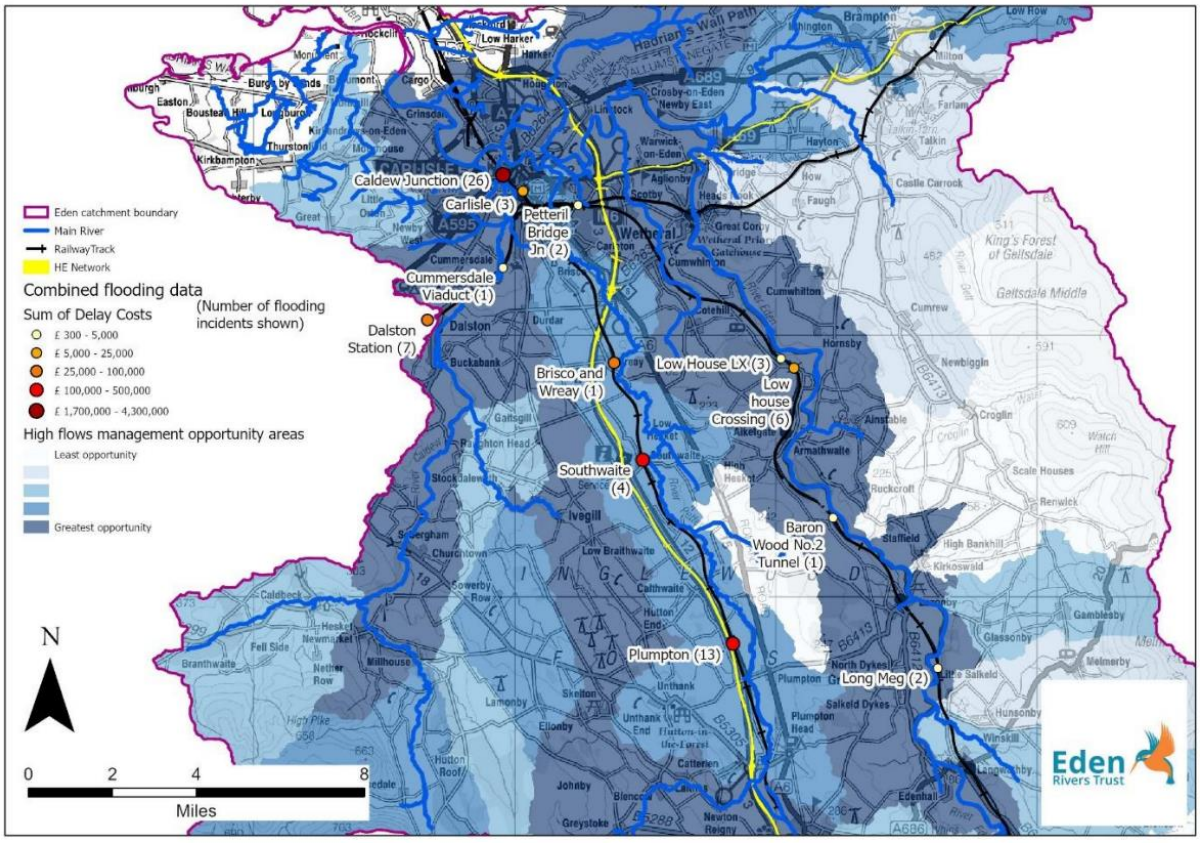

Figure 8: High-level scoping exercise undertaken by the ERT.

Natterjack Toads - Sellafield

In March 2022, Works Delivery Off Track were involved in a project a Sellafield Nature Reserve bounding our CBC1 line, where the boundary fence was no longer fit for purpose. The reserve is managed by the Amphibian and Reptile Conservation (ARC) Trust who could no longer graze the site and keep it in suitable condition for natterjack toads (Figure 9) due to the fence line. Our land along the west Cumbrian coast provides important refuge and hibernation habitats for natterjack toads. To rectify and improve this situation, WD off track liaised with the ARC Trust and the boundary fence was renewed. In addition, the team cleared the nature reserve of vegetation ready for the natterjack breeding season ahead, ensuring that the habitat was now suitable for the species.

Figure 9: Natterjack toad found on site near Sellafield nature reserve after the works to restore the habitat had been completed.

5 Priorities for biodiversity management on this region

The priorities for managing biodiversity by the end of CP6 is to focus on delivering no net loss in biodiversity. Work will include:

- Managing future work banks to deliver improved operational performance and the amount and quality of biodiversity, simultaneously.
- Work banks are assessed on the following criteria:
    - Designated sites such as Special Areas of Conservation (SAC), Special. Protection Areas (SPA), SSSI, or other local nature conservation designations, and their condition,
    - Protected or priority species and habitats,
    - INNS

    - Weather attributed Schedule 8 delay minutes and payments,
    - Any recorded public trespass incursions.
- Where the proposed vegetation management or habitat structure does not consider the above attributes, it shall be altered to consider and be more sympathetic towards biodiversity while delivering and maintaining improved operational performance, such as the implementation of nature-based solutions to address Schedule 8 delays.
- Producing Habitat Management Plans (HMP) and Vegetation Management Plans to reflect the above and ensure maintenance regimes are implemented to establish and/or maintain any created or managed habitats in compliance with NR/L2/OTK/5201 – Vegetation Management, as well as the objectives of the HMP.
- Working with key local stakeholders to help identify opportunities and work together on delivery.
- Habitat data monitoring - due to the perceived loss of around 665 Ha of bramble scrub, and the 909 Ha increase in lower quality ruderal/ephemeral habitat, we shall continue to monitor annual habitat data, to better understand how on-the-ground habitats, and other habitat management, is reflected in actual annual biodiversity figures.
- Where we believe this to be incorrect, we shall work to correct and/or supplement them with site specific biodiversity calculations, to demonstrate that our habitat interventions are, in fact, delivering a biodiversity improvement, that through current data collection methodologies, may currently be classified as a biodiversity loss.

6 Case studies

6.1 Examples of best practice habitat management approaches

We have consolidated much of the biodiversity and habitat management work being undertaken, across both the regional business and Capital Delivery, to define the principles of delivering no net loss and net gain of biodiversity and working towards compliance with the biodiversity standard: The below case studies provide some examples of these workstreams.

East West Rail – Biodiversity Net Gain, Ecological Compensation Sites and Data Management

East West Rail (EWR), a new railway which will connect Oxford and Cambridge, is the first project on the NW&C portfolio to deliver biodiversity net-gain in earnest. The project has

created multiple ecological compensation sites (ECSs) along the route to offset its impact, many of which we have a legal obligation to manage and monitor for up to 30 years. Management of the sites is split between NR, and numerous neighbouring landowners, an example of which is shown in Figure 10.

Figure 10: Bat house in an ECS on EWR

To ensure these sites are managed correctly, the project team has produced HMPs for on and offsite ECSs and worked with the local off-track maintenance teams in Bletchley to secure funding for the ongoing management of sites managed by NR, and payment arrangements for local landowners managing ECSs on our behalf. Furthermore, maintenance task management system, Ellipse, has also been utilised for the first time within the region to generate a tailored, rolling work bank for the management of each ECS, based on eachsites unique HMP, setting the precedent and procedure for similar works in the future. To ensure that other functions within NR follow a consistent approach to data management, the regional sustainability team has also worked with Ecologists from EWR to generate a system through which all ecological records collected by Ecologists can be transferred in NRs GeoRINM Viewer (GRV) and displayed visually onto maps of the rail network. We have also begun the process of creating a new layer within GRV, into which maps of the ECSs will be added and displayed visually on maps of the network, each containing a links to site specific management plans, which is an additional process which will be followed on future projects.

Works Delivery: Transposition of Vegetation Management Strategies in Habitat Management Plans

NW&Cs Works Delivery Drainage and Offtrack (DOT) function has utilised a document titled Vegetation Management Strategies (VMSs), to detail ecological constraints alongside a vegetation cutting plan for all vegetation management work that the function undertakes. VMSs, however, are limited as they do not detail future vegetation or habitat management procedures to ensure the vegetation management structure remains complaint, while safeguarding any ecological features present, which is a key requirement of HMPs and the Biodiversity Standard. We have therefore been working with colleagues from the DOT function to amend the VMS system, enable HMPs to be written when vegetation management work is specified by the client.

6.2 Examples of partnership working

Many of the locations at which we have delivered biodiversity and habitat improvements have been undertaken in partnership with both governmental and charitable organisations, with whom we share environmental and socio-economic development aspirations. By working with these organisations, we're able to pool resources to implement nature-based solutions to the problems we are attempting to overcome.

Works Delivery - Sand Lizard Habitat Creation – Natural England & Sefton Council

In partnership with Natural England and Sefton Council, we identified a section of railway adjacent to Sefton Coast Special Area of Conservation (SAC) & Site of Special Scientific Interest (SSSI), at Ainsdale, Merseyside. The site is known to support populations of sand lizard, which are rare in north-west England. Records from Natural England indicated numbers of sand lizards within the SAC & SSSI have declined due to the growth and succession of large trees and garden escapes, many of which were also causing operational problems such as leaf-fall, leading to adhesion issues, and encroachment over signal aspects.

Working in collaboration with Natural England and Sefton Council, we undertook a targeted approach to vegetation management, targeting the largest and most problematic areas of vegetation, within and immediately adjacent to the railway boundary (Figure 11).The intention is that this will deliver resilience to the performance of

trains and improve the habitat suitability for sand lizards by removing areas of dense vegetation canopy, creating open areas of basking, breeding habitat.

Figure 11: Before and after vegetation management (left) and an example of one of the new sandpits (right)

Following vegetation management, sand lizard habitat was improved further by creating several sandpits along the railway boundary to provide several new areas of egg-laying

habitat for the sand lizards (Figure 11). Following completion of these works, we will continue to collaborate with Natural England to monitor the success of the sand lizard population recovery.

A NW&C Biodiversity Steering Group, which has representatives from the Routes, Works Delivery (DOT and Civils) and Directorate of Safety & Engineering, had been working effectively through 2022. The group has been set up to help steer a collective and coordinated approach to the way that biodiversity is managed across the Region. The remit of this steering group is:

- To act as advocates for the sustainability strategy and its deliverables and providing constructive input to the development of biodiversity improvements

7 Future plans

7.1 Habitat management plans

In the next reporting period (January 2023– December 2023), we will report further on work undertaken, which will increase the amount of lineside estate under HMPs. This will include the continuation of projects which began during this year, the undertaking of Capital Delivery projects which include vegetation management, or the completion of further pilot projects. Some examples of which, are provided below:

Commonwealth Games Vegetation Management

Ahead of the Commonwealth Games, held in Summer 2022, Central Route undertook approximately 87 miles of vegetation management works on routes into Birmingham City Centre (Figure 12). Works included the removal of vegetation, to 2.75m from all Overhead Line Equipment (OLE), and the removal of all hazardous trees. The intention was that the works would deliver greater resilience to vegetation induced operational issues, such as obscured signal sighting, or vegetation striking trains and/or OLE.

Figure 12: Rail network serving Birmingham City Centre and Commonwealth Games stadia

In line with the priorities set out in Section 5 of this report, the sections of line, on which vegetation management was undertaken, were assessed as to their ecological qualities and appropriateness of the management techniques and proposed vegetation structure. Following this assessment, HMPs were implemented to maintain compliance with the vegetation management standard, while ensuring ecological features were conserved and enhanced.

Tree Veteranisation Trial at NAJ2

Veteranisation is the act of intentionally causing damage to young trees that would normally take years to occur naturally, whether it is woodpecker holes, broken branches, bark stripping etc. This naturally occurring damage helps to create areas of deadwood within a living tree, a critical habitat for a wide range of wildlife, such as bats, fungi, and insects. A site in NW&C of unmanaged broadleaved woodland was selected for a trial of this process. The site hosts a range of native tree and shrub species and is protected from public and rail disturbance due to the nature of its boundaries. The trees were cut, bark stripped, bore holes made and some were 'folded'to create the effect of years of natural weathering and damage (Figure 13). Continuing monitoring of this site will allow the region to identify quantifiable deliverable habitat gains which can be implemented lineside within normal VMS works, where safe and appropriate to do so.

Figure 13: Veteranisation techniques. Left: bark removal and strip cavity creation. Right: recreation of large animal damage

7.2 Stakeholder engagement plans for the next reporting period.

This final section provides details of work to be undertaken on existing and new projects with partners and stakeholders, with shared objectives to deliver greater biodiversity, often combined with other socio-economic benefits.

Eden Rivers Trust Partnership

In addition to the high-level scoping work which we have undertaken with the ERT, as discussed in Section 4.5, the 2023-24 reporting period will see this work expanded. As we now hold information of the greatest areas of opportunity for connecting natural habitat, storing carbon, and alleviating flood risk, aligned to locations of poor operational resiliency, we have scoped an additional piece of work within the catchment of the River Caldew, a tributary of the River Eden. This piece of work will entail detailed field surveys and landowner liaison to design and implement interventions to deliver operational and environmental benefit.

Harbury Cutting

As part of the Harbury cutting project works the SSSI area was restored to a favourable condition, ecology surveys were completed to establish the species present on the site. In addition, on-going discussions are required internally and with organisations such as the wildlife trusts, to manage the site appropriately going forward. The current aim is to have agreements in place to manage the site with grazing animals, so as not to allow the site to fall back into unfavourable condition.

One section of the site has failed to establish with vegetation due to clay exposed by the groundwork. The impermeable clay causes a drainage problem in winter and experiences higher temperatures in summer. Discussions are ongoing internally and with partners to explore the potential to import suitable topsoil to help establish calcareous grassland, a feature of the SSSI.

Figure 14: Harbury cutting following works.

Network Rail Scotland State of Nature Report 2022

1 Personnel & Document Control

Report author	Laura Moore, MIEnvSc
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Date	22/07/2024
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Date	

1.1 Document Control

Version number	Approved by Date	Description	Prepared by	Reviewed by	Authorised by
1.0		First draft	Laura Moore	Keira McLuskey	

2 Foreword

This report, for Scotland region, covers activities that took place in 2022. This retrospective report outlines the state of nature across our Scottish estate in 2022. It highlights key examples of the actions we undertook to build and enhance existing habitat on our land and where necessary control undesirable species. The report also covers our ambitions and plans to further improve biodiversity on our land and beyond.

Figure 1: *Network Rail Scotland region*

3 Executive Summary

3.1 Overview

Scotland's Railway covers a large geographical area from the Borders to Thurso at the far tip of the Northeast of Scotland.

The Scotland route operates through many nationally and internationally designated sites. This includes two National Parks (Loch Lomond and the Trossachs National Park and the Cairngorms National Park), 91 Sites of Special Scientific Interest (SSSI), 32 Special Areas of Conservation (SAC), 25 Special Protected Areas (SPA), 21 Ramsar sites.

Using the UK-Habitats Classification System (UKHab), a survey of the rail network by the UK Centre for Ecology and Hydrology (UK CEH), shows the Scotland region incorporates a range of habitats including deciduous woodland, arable and improved grasslands, as well as urban areas. These habitat types and designated sites support a range of species from

mammals and invertebrates to plant and fungi, including notable and protected species such as beaver, bats, numerous species of bird, and wildflower species.

Like other regions across the network, Scotland's Railway has the potential to act as a vital wildlife corridor by offering connectivity between habitats. We are therefore taking action to protect and enhance biodiversity within our lineside estate that could contribute to reversing an alarming trend of global biodiversity loss.

Scotland records the highest proportion of deciduous woodland land cover of all the Network Rail regions. This type of habitat support species of bats, birds, but notably in Scotland this type of habitat supports protected species like the red squirrel and pine marten.

Outside of London, Scotland's Railway operates the largest suburban rail network and provides access along busy commuter routes to our seven cities. Often habitats can be fragmented within these built-up areas, however along the railway corridor we find smaller networks of other types of habitats, like woodland and grassland, which form green corridors. These so-called green corridors facilitate the movement of species within these urban environments providing them with access to resources like food and shelter, meaning the railway has an important role in improving habitat connectivity.

3.2 Summary of ambitions for biodiversity management

Our strategic commitment is to enhance biodiversity across the region. Biodiversity was one of 10 key priorities within the CP6 Scotland's Railway Sustainability Strategy and was supplemented by a Biodiversity Delivery Plan. The delivery plan contained a series of milestones that support our ambition of improving the management, protection, and enhancement of biodiversity in the Scotland region:

- implementing the Network Rail Biodiversity standard NR/L2/ENV/122 within the Scotland region
- increasing the track miles with viable survey data
- delivering a series of regional training and learning events
- establishing a long-term Scotland's Railway Sustainable lineside strategy

3.3 Summary of achievements for biodiversity management

Through project and maintenance activities, and our partnerships with external stakeholders across the region, there were a number of achievements in 2022 with regards to the management of our lineside estate and improving biodiversity.

Some of our achievements include:

- Continued success at Dalgety Bay following a successful vegetation management pilot where we have had seen local biodiversity improvements and we also been able to replicate these measures on other vegetation management project sites.
- The publication of the Scotland Tree and Vegetation Management Specification which mandates the implementation of measures that will benefit local biodiversity such as the installation of habitat piles and raptor poles.
- Successful stakeholder engagement events, like our "Getting to Know Network Rail", where we have been able to explain the challenges and risks that we must collectively manage and showcase some of the work we are doing to promote biodiversity to key stakeholders.

3.4 What further action will we take?

Over the next couple of years, in partnership with Forestry and Land Scotland (FLS), we will deliver an ambitious biodiversity enhancement project which aims to protect, enhance, and expand habitats including nationally and internationally designated sites managed by FLS, over an area of approximately 200 hectares at Glenfinnan, near the Mallaig Line.

We will also continue to mitigate any unavoidable loss of biodiversity across the region and deliver improved biodiversity through habitat creation and restoration on our estate where possible.

We recognise that habitat creation and biodiversity-related projects outside of the railway boundary can increase social value by collaborating with local communities and groups to improve access to nature and green spaces. Therefore, we will continue to partner with groups such as The Tree Council to deliver community planting schemes.

Beyond 2022, we will establish an effective and efficient methodology to produce Vegetation and Habitat Management Plans, as well as developing the Scotland's Railway

Climate Action Plan in which Biodiversity is one of five key priorities for the next Control Period.

4 State of nature on Scotland region

4.1 Biodiversity metric calculation for the Scotland region

In 2020, the UK Centre for Ecology and Hydrology (UKCEH), in partnership with Network Rail, undertook a remote sensing survey of the entire rail network across England, Wales and Scotland. This survey produced a land cover map displaying 21 different habitat types found 1km either side of the rail network. The outputs from this survey were then used to calculate a baseline for Scotland region using the Defra 3.0 biodiversity metric, which utilises data on habitat type to calculate the biodiversity value of a particular area.

This initial analysis presented the Scotland region with baseline figures of a total of 7506.23 hectares of habitat with a value of 43,348.18 biodiversity units. The proportion of habitat types found across Scotland are shown in Figure 2.

Since this initial baselining exercise, regional biodiversity units have been provided to the region, from our Technical Authority on an annual basis to identify changes in habitat type, condition and changes in biodiversity units.

The dataset provided for the year 2022, indicates a total of 7,507.22 hectares of habitat (a break down is shown in Figure 3) with a value of 35294.26 biodiversity units. This latest data set indicates a downward trend when compared with the figures for 2021 and 2020 (baseline), shown in Table 1. The data presented has been challenged as they indicate changes in habitat types that we do not recognise and are unable to attribute to our activities on the railway.

Year	2020 (baseline)	2021	2022
Biodiversity Units	43,348.18	42,192.68	35,294.26
Total area (Ha)	7506.23	7507.23	7,507.22

Table 1: *Scotland region biodiversity units 2020-2022*

4.1.1 Data limitations

There are known limitations with the data, especially because the survey uses 10m resolution imagery. This means each pixel shows a 10-meter by 10-meter area on the ground. For the mapping of habitats, this resolution might not be accurate, as it can miss

smaller or mixed habitats, making it hard to correctly identify different types of vegetation and important habitat features.

The inclusion of 1km of habitats either side of the railway also make it difficult to distinguish what habitats are in- or outside of the railway boundary, and ultimately what is within our control to manage and maintain.

The UK CEH have acknowledged the current limitations of the data and have also stated that when comparing two or more land cover maps over time, some changes between dates will be genuine, but some will result from errors in the classification of habitats leading to further inaccuracies in the datasets.

We acknowledge the data is currently very immature and so we can only provide a high-level snapshot and basic analysis at present We expect the data accuracy to improve over time which will allow us to conduct further analysis on the changes in habitat types and quantitively assess the biodiversity value across our estate in Scotland.

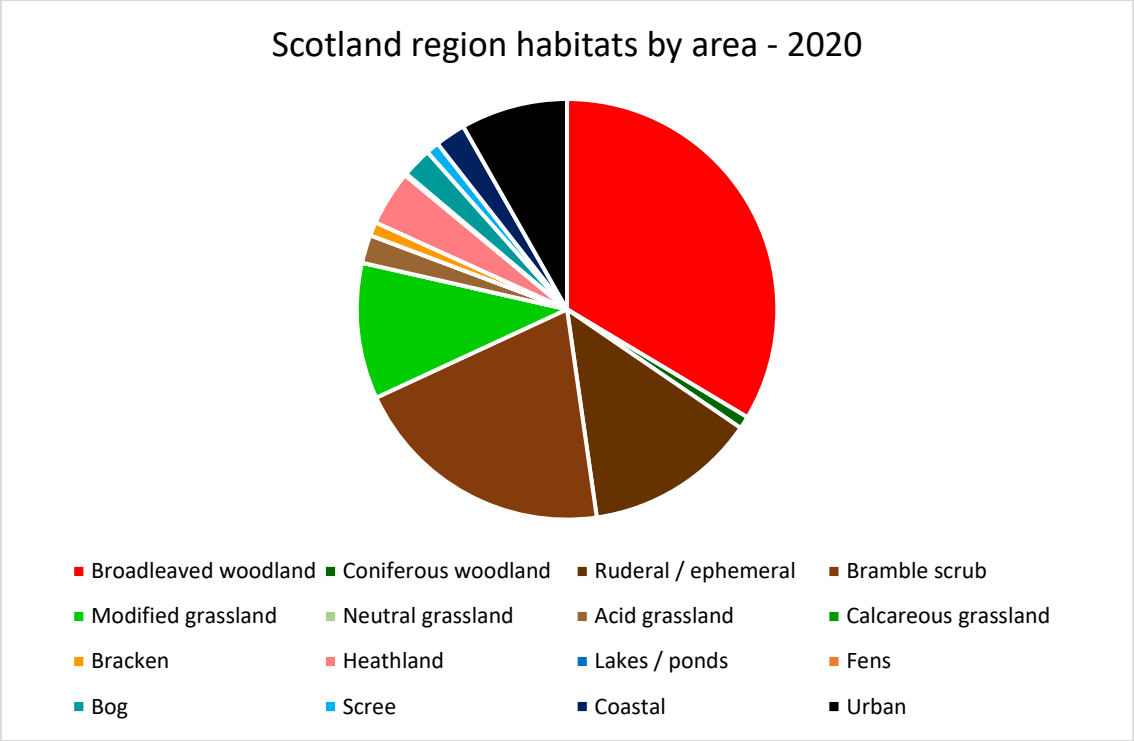

Figure 2: *Proportion of habitat types in the Scotland region in 2020*

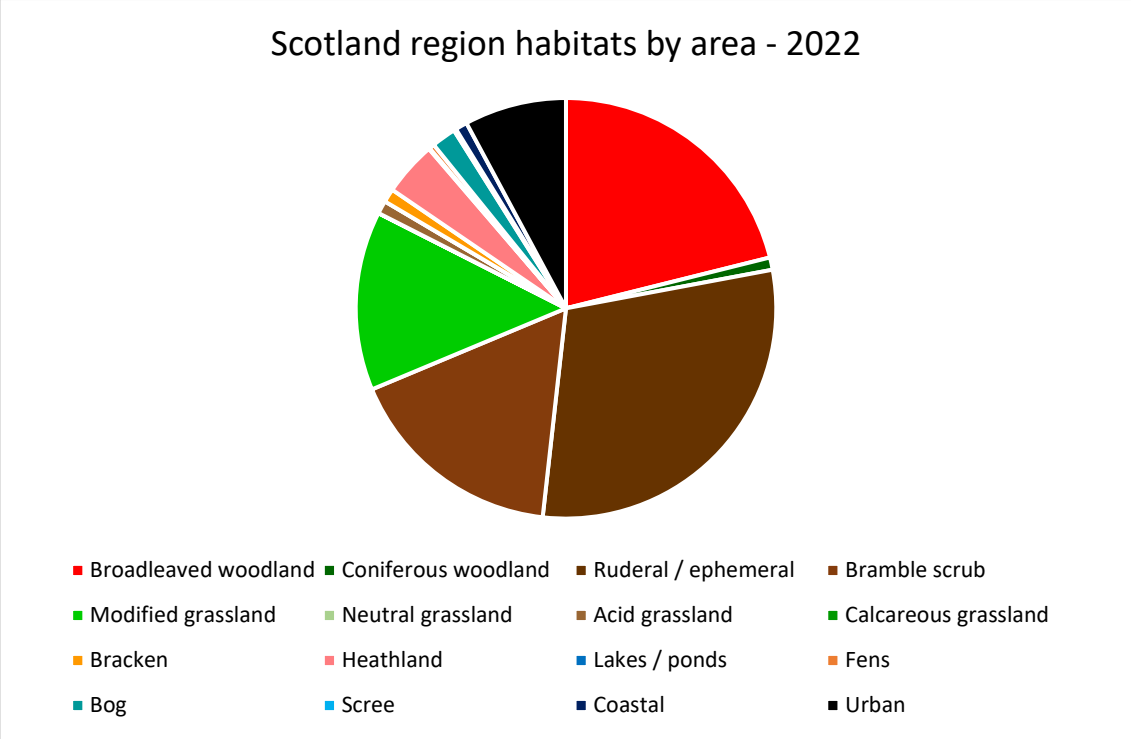

Figure 3: *Proportion of habitat types in the Scotland region in 2022*

4.2 Region habitat types

In Scotland, the railway network traverses a diverse range of habitats, each with unique ecological significance. In the West Highlands, the railways pass through extensive montane and moorland habitats, characterised by heather, peat bogs, and rocky outcrops. A section of the railway along the West Highland Line can be seen in Figure 4 located in Rannoch, an area which has international importance due to its significant bog habitat. These areas support species such as red deer, golden eagles, and rare plants like the Scottish primrose. The peatlands here are crucial for carbon storage, playing a significant role in climate regulation.

Figure 4: *A section of the West Highland Line located in Rannoch*

Moving eastward, the Central Belt features woodland and grassland habitats. Deciduous forests, dominated by oak, birch, and Scots pine, provide vital habitats for rare and protected species like red

squirrels and pine martens. The grasslands are home to pollinators like bees and butterflies, which are essential for maintaining biodiversity.

In the East and North-East, including Aberdeenshire and the Moray coast, our network expands through agricultural and wetland areas. These habitats are important for bird species such as ospreys, waders, and waterfowl. Wetlands, in particular, are crucial for water filtration and flood control.

The Southern Uplands are characterised by upland heath and grassland habitats, supporting ground-nesting birds like grouse and curlew.

The railway also connects Scotland's major cities, and traverse more urban environments where the habitat is more fragmented, limiting the movement of species. An example of this can be seen in Figure 5, where the railway passes through a predominantly built-up, urban area with grassland scattered around with poor connectivity.

Figure 5: *Section of the railway through the town of Linlithgow*

While these areas are fragmented, they do provide essential green spaces for urban wildlife, and like other regions across the network, Scotland's Railway has the potential to act as a vital wildlife corridor by offering connectivity between these habitats through its lineside.

4.3 Priority species/habitats in the Scotland region

Our railway estate provides habitat which supports an array of priority species considered to be of principal importance for biodiversity conservation in Scotland. Examples of these species include Beaver, in which previous efforts to protect this species seen the installation of Beaver pass under the railway (the first of its kind in the country).

Our woodland habitat in the region supports priority and protected species like the pine marten, which can be found primarily in the northwest highlands, and the red squirrel, found across the region in coniferous, broadleaved and mixed woodland areas.

Our lineside also provide favourable habitat and food sources for invertebrate species like the Small blue butterfly, which is known to feed of Kidney vetch found on our lineside in both the southwest and northeast of the region.

4.4 Invasive species on the region

There are many invasive plants and injurious weeds found across the Scotland region and we have a legal obligation to prevent them from spreading or causing a nuisance. Invasive non-native species (INNS) are a growing problem for the region and our strategy is to manage them, rather than try to eradiate them. We collaborate with neighbouring landowners and other stakeholders, like NatureScot, to ensure efforts to manage INNS are effective as possible.

Each of the four maintenance Delivery Units (DU) in the region: Glasgow, Motherwell, Edinburgh and Perth are responsible for controlling INNS within their area. Information collected on the occurrence of INNS indicates Japanese knotweed, giant hogweed and Himalayan balsam are the most prolific across the region, with all three species recorded in every DU.

Japanese knotweed:

Spreads underground by direct growth of rhizomes (roots) and above ground through the transfer of plant fragments to new locations. Above ground stems can grow rapidly, up to 2m in 30 days, and the plant is able to grow through substrates including tarmac and concrete, meaning it can pose safety and operational issues for the railway. It can also impact our lineside neighbours due to issues when selling property within a certain distance of knotweed on Network Rail land.

Figure 6: *Japanese knotweed*

Figure 7: *Himalayan balsam*

Himalayan balsam:

Often found growing along rivers, disused railway lines or in similar linear corridors where it dominates habitats, grows densely and shades out native plants. Plants can produce more than 500 seeds before it dies in the Autumn. When the seed pods are ripe, the slightest touch causes them to burst open catapulting and dispersing the seeds up to 7m away.

Giant hogweed:

Thrives in any habit, but particularly where soil has been disturbed like riverbanks, derelict land, or railway embankments. Its spread endangers the survival of native plants, and it can harm grazing animals. This plant also poses a health risk to humans, causing severe irritation, swelling and painful water blisters when skin comes into contact with the sap in sunlight.

Figure 8: *Giant hogweed*

During 2022 work was completed to map the spread of INNS across the region and improve visibility of what had been treated.. Using available data on known INNS sites and data from each DU workbank, we have been able to map known sites and indicate whether the site has been sprayed each year as part of our annual spraying regime. An example of this data is shown in Figure 9.

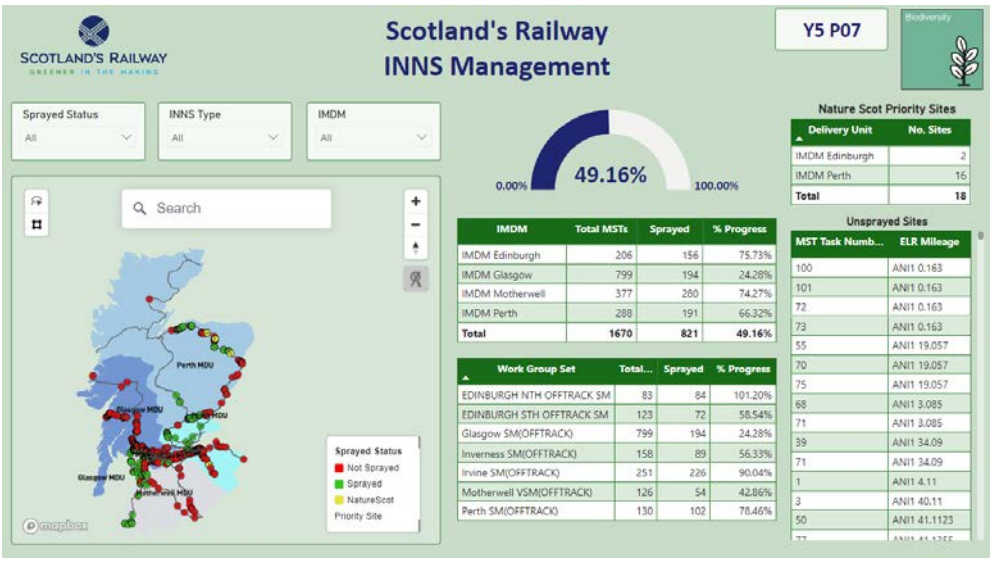

Figure 9*: Example extract from the INNS Management Dashboard*

4.5 Demonstration sites or projects

4.5.1 Dalgety Bay Update

The 2021/22 State of Nature report gave an overview of our project at Dalgety Bay in which new lineside management techniques were being trialled and was one of the first major Scottish trials of multiple off-setting and biodiversity mitigation options on scale since the issue of the biodiversity standard NR/L2/ENV/122.

Figure 10: *Common spotted-orchid, Dactylorhiza fuchsii recorded growing at the Dalgety Bay site*

The site was selected as it is one of Scotland's most problematic areas during the Autumn period because of overgrown vegetation and leaf fall on the line, and despite tree management in this area, it has not stopped these issues from continuing.

During the works at the site there were a number of measures put in place, aimed at improving biodiversity in the area. This included the installation of bird and bat boxes, the creation of habitat piles, leaving tree stumps in-situ with cuts and incisions, and retaining features suitable for bird nesting and bat roosting.

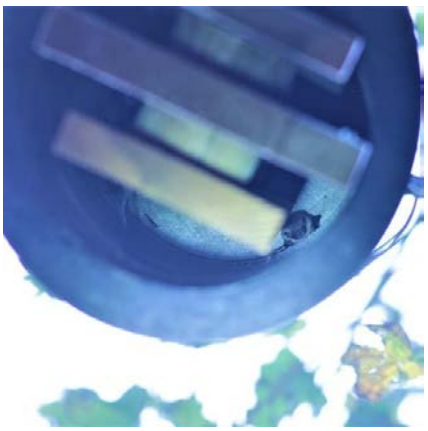

Figure 11: *Bat using one of the newly installed bat boxes at the Dalgety Bay site*

Since the completion of the works at the site, our Ecologists have been monitoring the since and by the end of 2022, have noted biodiversity improvements. This includes 5 bats being recorded in 3 different boxes that were newly installed at the site. Tall tree stumps left in-situ were seen to have vigorous dense regrowth, providing excellent nesting habitat, and the shaded area under sycamore canopy that was opened up as a result of the vegetation works has been giving way to allow the growth of more flowering plants, which is of benefit to pollinator species.

4.5.2 Biodiversity upskilling

A concerted effort has been made to equip colleagues with the essential tools and guidance necessary for making informed choices regarding biodiversity.

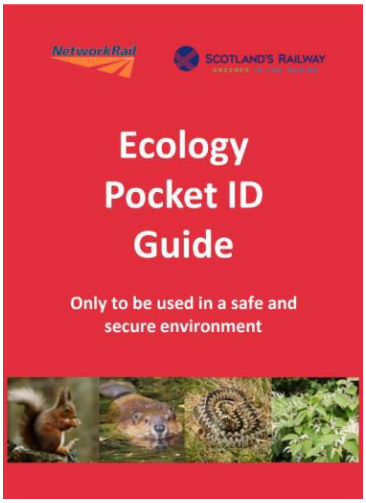

Figure 12: *Scotland region Ecology Pocket ID Guide*

One instrumental initiative is the publication of the Ecology Pocket ID Guide. While these are not intended to replace our team of ecologists, the guide provides colleagues with information on how to identify Scotland-specific protected and invasive species. It also outlines the action to be taken if any of these species are encountered to minimise disturbance of these species. Physical copies of the pocket guides have been distributed to site-based teams to ensure they have them to hand while out and about across the network, and a digital version is readily accessible to all colleagues, arming them with knowledge on how to identify different species.

5 Priorities for biodiversity management on this region

As referenced in the 2021/22 Scotland State of Nature Report, the region published the Scotland Sustainability Strategy in 2021, which aligns with the Network Rail Environmental Sustainability Strategy 2020-2050. Biodiversity was one of the 10 priorities within this strategy.

The Scotland Sustainability Strategy was embedded within the region and focus given to achieving the milestones set out within the Biodiversity delivery plan.. Examples of these milestones included developing a methodology for producing Habitat and Vegetation Management Plans for the region and promoting the Biodiversity Standard NR/L2/ENV/122.

5.1.1 Scotland Region Tree and Vegetation Management Specification

In 2022 the Scotland Region Tree and Vegetation Management Specification was published, providing mandatory instructions to all delivery teams and all internal or externally procured activities when carrying out all tree and vegetation clearance works in the region.

The routine management of trees and vegetation is necessary to maintain a safe and operational railway, but it also has ecological benefits too. The clearance of vegetation not only removes overgrown trees and vegetation close to the railway to ensure they don't become dangerous and pose safety risks to trains, our passengers, railway staff and contractors, lineside neighbours and adjacent land users and owners, but it can also improve biodiversity by allowing more sunlight to reach the ground, creating conditions for a wider variety of species to grow and thrive.

The document describes trees and vegetation on our lineside as being a critically important resource in terms of the ecological benefit and services they provide and the biodiversity they support, while also recognising that trees and vegetation can and do present significant safety and or operational risks to the railway, our passengers, and our neighbours.

The aim of the Specification is to achieve a balance between safety, train performance and biodiversity. This means removing only what vegetation we need to, retaining unproblematic and protected trees and vegetation, and where appropriate enhancing the lineside.

The specification sets out specific instructions for incorporating ecological features into tree and vegetation management works. These measures include:

- A default minimum target of one habitat pile created per 1/8th of a mile (every ~200m) and side of the railway shall be attempted. Habitat piles mimic dead and fallen trees, providing food and shelter for a wealth of wildlife.
- At least one retained wildlife pole shall be left every ¼ mile where there is space. A wildlife pole is a tall, structure that provides a perching and vantage point for predatory birds (raptors). Many species of raptors will hunt from these perches or simply use them to rest.
- At least one supplementary ecological mitigation feature shall be installed every 1/8th of a mile and side these can include bird boxes, bat boxes, high stumps with features cut out or insect hotels. Raptor poles and habitat piles count towards this requirement.

Figure 13: *Example ecological measures. Left - Raptor pole; Right - Habitat pile*

6 Case studies

6.1 Examples of best practice habitat management approaches

6.1.1 Ecology measures incorporated into vegetation work

Following the successful vegetation management pilots at Dalgety Bay and West Highland Line (referenced in the 2021/22 Scotland Region State of Nature Report), progress has been made in incorporating ecology measures alongside our vegetation management works.

An example of our continuing progress was during our works to clear trees and vegetation on an 8-mile stretch of railway near Wick in the Scottish Highlands. The team cleared

trees and other vegetation to create a safe and maintainable rail corridor which will help to reduce delays and improve performance on services through the area.

To protect the local ecology and to compensate for the removal of trees, 16 bat and 16 bird boxes were installed, and leftover small branches were used to create habitat piles to support invertebrates and insects and to improve the overall diversity of the line. A pine-marten den was also created.

At this location it was not practical to replant lineside at the location where the vegetation was removed, however more than 400 trees and shrubs compatible with the railway environment were planted nearby.

To protect and assist the tree planting, biodegradable tree shelters and mulch mats were used instead of plastic, as a more environmentally friendly option to protect the saplings. This demonstrates how we can manage the lineside environment to protect wildlife and promote biodiversity while ensuring the safety and performance of the railway.

Figure 14: *Enhancement measures at the site of the works at Wick. Left - habitat pile in situ; Right - newly planted tree protected by biodegradable tree shelter.*

6.1.2 Preventing bird overhead line collisions

On our railway line at Patterton Viaduct there had been a number of reports of swans on the line, which resulted in train delays. Our Performance Team discussed the ongoing issues concerning the swans with our Ecology team who conducted a site visit.

During the site visit, it was noted that the viaduct sits between reservoirs at Dams to Darnley Country Park from which the swans were likely to be originated from. It was suspected that the swans were landing on the line either from hitting the overhead lines or from them thinking the viaduct was a watercourse.

The Ranger at the Dams to Darnley Country Park was contacted and measures for preventing the swans from landing on railway line on the viaduct agreed. Bird flight deflectors were installed on the overhead line during a nightshift. The installation of the deflectors has been successful, with zero repeat incidents at Patterton viaduct due to birds or swans on the line.

Figure 15: *Bird deflectors (circled in yellow) installed on the overhead lines on Patterton Viaduct*

6.2 Examples of partnership working

6.2.1 Road and Rail Ecology Works

As part of the works for the A9 road dualling project, QTS was engaged by Network Rail on behalf of Transport Scotland to construct the new pond at Lynebeg in the Scottish Highlands.

An ecological assessment conducted during the project's development highlighted the presence of a rare sub-species of caddisfly. Caddisflies are small, moth-like insects that play a vital role in freshwater ecosystems, serving as both prey and as indicators of water quality. The site was cleared and lined before the surrounding land was landscaped to

create a 60 by 20-meter pond. This pond will be left to mature for a year before the contents of an existing pond are relocated to provide habitat that supports the caddisfly.

The new pond and landscaping efforts will help protect the habitat that supports this rare species and facilitate its future translocation. The rarity of this sub-species in Scotland makes its conservation particularly important.

6.2.2 Stakeholder Events

6.2.2.1 'Getting to Know Network Rail'

During the summer of 2022, Network Rail Scotland hosted a 'Getting to know Network Rail' event which gave stakeholders the chance to learn first-hand how we safely manage vegetation around the railway.

Teams across the Scotland region, including the Sustainability, Works Delivery and RAM Lineside and Drainage teams, offered insight into our work at an event which included elected members, membership bodies representing landowners, utility companies, rail manufacturers, and council officers.

Participants were shown the 'what', 'why' and 'how' of our tree and vegetation management work and heard about the increasing threat posed to Scotland's railway from ash dieback and how Network Rail is planning for this.

Presenters also covered information about ecology, habitat and wildlife and outlined some of the sustainability measures being implemented on trial projects across the rail network.

Figure 16*: Councillor Mark McGeever, Chair of South Lanarkshire Council's Climate Change and Sustainability Committee in attendance at the Getting to Know Network Rail event.*

The railway touches almost every community in Scotland and our work not only impacts the millions who travel by rail but also our lineside neighbours and adjacent landowners. This type of event offered a unique opportunity to further develop and improve engagement with landowners and estates across the length and breadth of the country.

6.2.2.2 Scottish Land and Estates

In 2022 Scotland's Railway became a member of Scottish Land and Estates. This membership provides access to 1500 stakeholders which includes landowners, landlords, tenants, and agents many of whom we have previously been unable to reach, had limited contact with or with whom we have had previous challenges. Members include landowners of estates and farms of all sizes (public and private sector). We have joined Scottish Land and Estates to strengthen those relationships and reach out to even more communities we serve and work with.

Membership of Scottish Land and Estates brings a host of benefits for Scotland's Railway which includes a marketing agreement to get our key messages to stakeholders; attendance at regional receptions; gaining accreditation; the potential to win awards; and much more.

Since becoming a member, Network Rail Scotland has already attended summer shows across Scotland to spread the word about Scotland's Railway seen in Figure 17. This included the Royal Highland Show, the GWCT Scottish Game Fair at Scone and the Border Union Show.

Figure 17: *Scotland's Railway colleagues at the Royal Highland Show*

These shows give us the opportunity to engage with our lineside neighbours and stakeholders, and to explain the challenges and risks that we must collectively manage, like the growing threat of ash dieback, boundary repairs and renewals, animal incursions and the problems associated with climate change. It's also a chance to share the fantastic work that we are doing like making the rail network more resilient in the face of our changing climate and the work we are doing to promote biodiversity.

7 Future plans

7.1 Habitat management plans

Network Rail Scotland has obtained a temporary variation against Biodiversity standard NR/L2/ENV/122 Module 2 Habitat Management Plans, which revises the compliance date to the beginning of the next Control Period in 2024.

To prepare for this compliance date, we have been engaging with consultants to establish a methodology for the preparation of joint Habitat and Vegetation Management Plans. To test this methodology, a pilot to produce a joint Habitat and Vegetation Management Plan for approximately 2 miles of our network will be undertaken. This will help us better understand the most efficient and effective way to produce meaningful habitat and vegetation management plans for the full region and apply them across the entire network to produce plans that will help us to effectively manage biodiversity on our lineside.

7.2 Stakeholder engagement plans for the next reporting period.

As mentioned in the previous 2021/22 State of Nature report, Network Rail Scotland is partnering with Forestry and Land Scotland (FLS) to deliver an ambitious biodiversity enhancement project at Glenfinnan which will lead to the protection and expansion of natural habitats and woodland at the site.

We continue to work closely with FLS as part of this project, and as we enter the next reporting period, works are well underway to deliver the biodiversity enhancement works at this site.

Our partnership with the Tree Council goes from strength to strength as we plan the delivery of biodiversity enhancement through community tree planting projects. These will be collaborative projects undertaken by Network Rail volunteers in partnership with both the Tree Council and local community groups.

In our next report we will outline the preparation done for the next Control Period, Control Period 7, including undertaking a series of stakeholder engagement activities to discuss our priorities for biodiversity in the region.

Grove Park Railway Nature Site, Kent Route

Southern Region State of Nature Report 2022

Contents

1 Personnel & Document Control

Report author	
Position	
Date	25/07/2024
Report reviewer	Karin Skelton
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Position	Programme Manager [Sustainability]
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1.1 Document Control

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1.0	25/07/2024	V1	MOC	KS	KS

2 Foreword

This report, for Southern region, covers the period April 2022 to March 2023.

It outlines the state of nature on the Region's estate and the ambitions and plans we have to protect and maintain its habitats and associated biodiversity. It also highlights key examples of the actions we have undertaken to improve these habitats, and where necessary control undesirable species.

Figure 1: *Southern Region*

3 Executive Summary

3.1 Overview

The south area of England served by the Southern Region network is a rich area for wildlife. This part of the country contains a landscape of contrasts and a diversity of habitats.

The area of estate owned by Southern Region is approximately 7,832 hectares. Remote satellite assessments have identified 16 habitat asset classes as present on the Southern Region estate. Three habitat classes dominate: Bramble Scrub, Deciduous Woodland, Modified Grassland, and Heathland.

3.2 Summary of ambitions for biodiversity management

In 2021, we published our Regional Sustainability Plan 2020-24 which outlines our ambitions for a lineside managed sustainably for safety, performance, the environment, our customers and our neighbours.

Southern is committed to the following deliverables:

- Achieving no net loss in biodiversity on our lineside estate by 2024, and achieve biodiversity net gain of 10 % in each Region by 2035
- Recruitment of in-house ecologists to improve the management and assurance of our ecological risks and mitigation plans
- Creation of Habitat Management Plans covering the Region, with a focus on high value biodiversity sites including Sites of Special Scientific Interest (SSSIs) and Local Wildlife Sites (LWSs)
- Implementation of actions to enable the delivery of biodiversity net gain on major Capital Delivery projects
- Delivery of initiatives with partners and stakeholders as part of our wider sustainability strategy which aims to protect biodiversity and gives back to local communities by creating and supporting green spaces and volunteering opportunities.
- Establishment of processes to measure the value, condition and benefits generated by wildlife and nature on our network, and improved reporting and communication of these benefits and value delivered

3.3 Summary of achievements for biodiversity management 2022/23

3.3.1 Improved understanding of the biodiversity asset

We have focussed closing data gaps during 2022 and completed a significant project to work with multiple biological data providers to harmonise and collate more than two million records of Priority, Protected and Common species of animals, plants and fungi located within 500m of our running rails.

3.3.2 Railway Nature Sites

The Region has identified more than 100 locations on the network with good intrinsic biodiversity value and for potential to be managed principally as nature conservation areas. We have termed these potential locations 'Railway Nature Sites'. Works this reporting period have formally established 25 RNS locations.

3.3.3 Biodiversity in Blockades

We have developed approaches to make good use of planned periods of engineering works, where train operations are halted, to concurrently deliver biodiversity enhancements safely and efficiently.

3.3.4 Stakeholder initiatives

Our stakeholder initiatives portfolio continues to blossom with projects progressing in all Routes, and our main challenge being to resource our response to new and expanding opportunities. Priority partnership schemes include a Kent Pollinator Project, Surrey Hills AONB Landscape Connectivity scheme and Chichester Wildlife Corridor (Sussex Route); and a Biodiversity Collaboration with Southern West Rail (Wessex Route). Our flagship Regional partnership initiative is a portfolio of tree planting and community engagement schemes with the Tree Council.

3.3.5 Empowering our workforce

An important focus for our biodiversity programme is to equip our workforce with basic knowledge on biodiversity, on the risks posed to ecological features by operational activities, and on the practical actions that can be implemented to protect and enhance biodiversity. During 2022, we delivered updated Protected Species Awareness training courses that were attended by more than 300 staff and delivered topic briefings to more than 130 staff.

3.4 What further action will we take?

Our focus for 2023 is to:

- Create and publish a wider Land Management Strategy for Southern, to commence from the start of the new Control Period (2024). We recognise that responsibility for managing land and biodiversity is currently complex and split between various parts of the organisation. We are seeking to apply a key principle of managing biodiversity as a system, regardless of ownership of individual elements, which is spread across Sustainability, various Asset Management disciplines, and Property functions. Our new Strategy will define collectively agreed outcomes for biodiversity, set out a trajectory that will lead us to achieve the the necessary capabilities, and be grounded in a robust approach to monitoring biodiversity characteristics, problems, risks and opportunities.
- Establish strategies and organisational arrangements between the Region and Natural England that will permit our workforce to deliver vital maintenance, refurbishment and enhancement of the rail network whilst reducing delays, costs, risks and uncertainty for projects associated with the standard, development-focused, Wildlife Licensing model.
- Create and start to introduce new, standardised ways of working for Infrastructure Maintenance colleagues where Protected Species are likely to be present, with a focus on our highest-risk Species – Hazel Dormouse, Great Crested Newt, and Badgers. Our Ecological Work Instructions (EWIs) will set out the tasks that need to be delivered by staff to minimise and avoid adverse impacts to Protected Species, and to minimise or eliminate the likelihood of an offence being committed under nature conservation legislation.
- We will complete our work on establishing a series of 50 Railway Nature Sites around the Region, high value sites for nature which will be ring-fenced and safeguarded for the benefit of the railway and the communities we serve.
- We will complete our Control Period tree planting programme, in partnership with the Tree Council. Our planting plan for 2023 aims to deliver a further 30,000 trees, to be planted working with local communities, taking us past 100,000 planted trees in total since the partnership began.

4 State of nature on Southern region

4.1 Biodiversity metric calculation for the region

A baseline register of the habitat classes present on Southern Region network, and their spatial extent (area in hectares), was created through the processing of satellite images taken in 2019. Improvement in satellite data interpretation was applied to 2020 imagery and habitat calculations have been re-baselined.

As a result of the 2020 re-baseline, Southern Region is now estimated to own a total of **7832** hectares of habitat with a value of **44,471** Baseline Biodiversity Units.

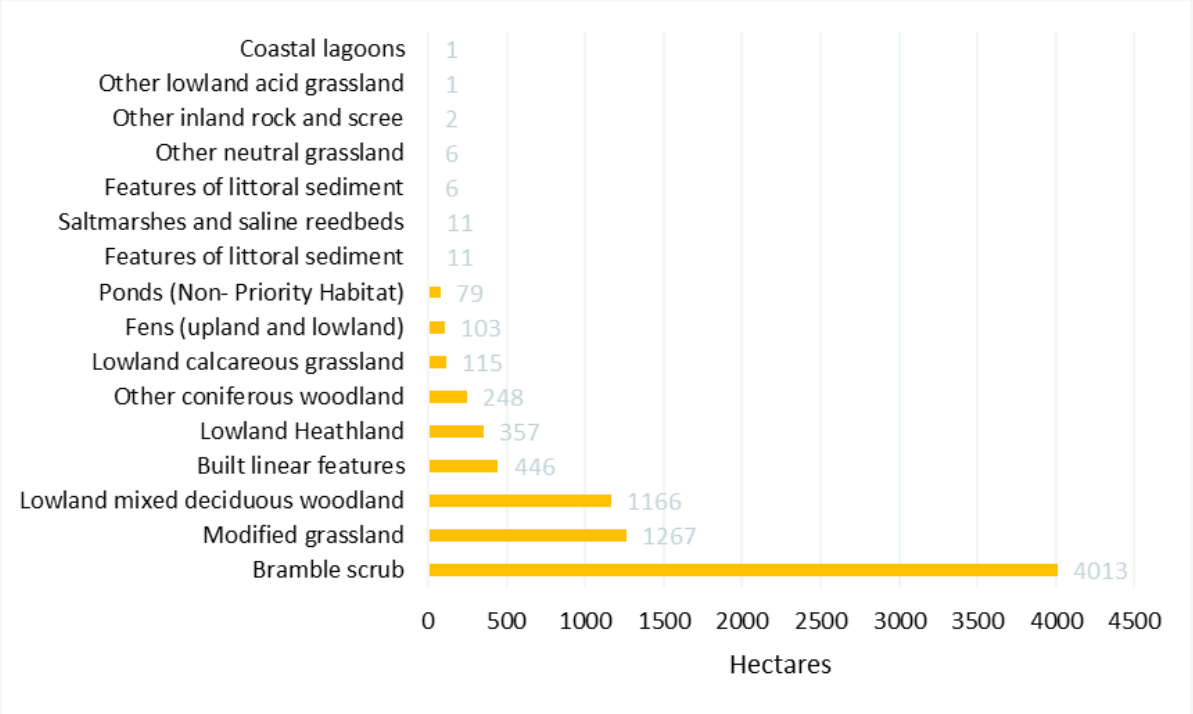
The composition of the score, and changes in the score, are provided in the table below.

	Area (hectares)					Total habitat units				
Habitat type	**2019**	**2020**	**2021**	**2022**	**Change 2020 to 2022**	**2019**	**2020**	**2021**	**2022**	**Change 2020 to 2022**
Lowland mixed deciduous woodland	1392	1473	1465	1166	-307	16701	17679	17586	13989	-3690
Other coniferous woodland	123	178	100	248	70	492	713	401	993	281
Bramble scrub	4050	4069	4111	4013	-56	16199	16276	16444	16051	-225
Modified grassland	1050	876	652	1267	391	4200	3504	2609	5067	1563
Other neutral grassland	4	0	9	6	6	33	1	75	46	46
Other lowland acid grassland	2	1	4	1	0	18	7	30	11	4
Lowland calcareous grassland	115	162	227	115	-47	1375	1947	2719	1385	-562
Lowland Heathland	337	262	485	357	95	4040	3140	5822	4283	1143
Ponds (Non- Priority Habitat)	135	140	80	79	-61	1078	1118	639	631	-488
Fens (upland and lowland)	46	36	193	103	68	733	573	3091	1655	1082
Other inland rock and scree	2	0	1	2	2	14	1	11	19	18
Coastal lagoons	0	1	1	1	0	3	6	15	8	2
Features of littoral sediment	32	22	16	11	-11	385	266	195	135	-131
Features of littoral sediment	9	1	1	6	5	113	11	12	72	60
Saltmarshes and saline reedbeds	86	159	29	11	-148	1030	1908	344	127	-1782
Built linear features	450	452	457	446	-6	0	0	0	0	0
Totals	**7832**	**7832**	**7832**	**7832**	**0**	**46414**	**47151**	**49992**	**44471**	**-2680**

4.2 Region habitat types

Remote satellite assessments have identified 16 habitat asset classes as present on the Southern Region estate. Three habitat classes dominate: Bramble Scrub, Deciduous Woodland, and Modified Grassland.

Habitat asset classes on Southern Region in 2022, as identified by remote assessment.



4.3 Priority Habitat & Species on the Region

125 Sites of Special Scientific Interest (SSSI) are within or adjoining our estate boundaries, to which we have a statutory duty not to cause damage or degradation. More than half of these Sites are located within Wessex Route (56 %), with the remainder then divided between Kent (25 %) and Sussex Routes (18 %). The SSSIs that intersect with our estate are organised by Natural England into management units and we have direct management responsibility for 220 hectares-worth of these.

As an 'arm's length' public body of the Department for Transport, Network Rail is required, under the Natural Environment and Rural Communities (NERC) Act 2006, to have regard to the conservation of biodiversity in England, when carrying out its statutory functions of operating and maintaining the railway.

The NERC Act contains a list of 943 species which are of principal importance for the conservation of biodiversity in England, drawn up in consultation with Natural England.

Of the priority species listed in the NERC Act, at least 118 species (13 %) are currently known from biological records to utilise the estate of Southern Region.

We have initiated and continue to work with a diversity of partners on conservation initiatives for a number of Priority Species on this list:

- Dormouse
- Great Crested Newt
- Sand Lizard
- Nightingale
- Farmland Birds (Turtle Dove, Reed Warbler, Corn Bunting)
- Kent Rare Moths (Black-veined Moth; Bright Wave; Fiery Clearwing; Fisher's Estuarine Moth; Marsh Mallow Moth; Sussex Emerald; Straw Belle; White-spotted Sable)

4.4 Invasive species on the region

Invasive non-native species of plants and animals are found throughout the Region and represent a significant challenge to biodiversity management. We are legally required to not facilitate the spread of such species but the majority that are found on the railway are widespread and it is unlikely that any can be completely eradicated from the Southern estate.

Reflecting their widespread status in wider biological records, the principal plant species of concern and control effort in Southern are Japanese Knotweed, Giant Hogweed, Himalayan Balsam, Rhododendron, Ragwort, and Buddleia.

During 2022/23, our lineside maintenance plan delivered cutting and mechanical treatment of more than 130,000m^2 (13 hectares) of these invasive plants.

The principal animal species of concern in the Region is the Oak Processionary Moth. We have undertaken control work across Kent, Sussex and Wessex during 2022 involving spraying of hundreds of infected oak trees.

4.5 Demonstration sites and projects

4.5.1 Kent Vegetation Management Pilot

Our flagship demonstration project is the Kent Vegetation Management Pilot, which comprises a total of 69 trial sites, each 1/8 of a mile long (approximately 200m) and of various widths. Site implementation was spread over three separate tranches, with the project starting in 2020 and subsequent tranches in 2021 and 2022.

During 2022, detailed botanical and invertebrate monitoring surveys were completed across 32 sites, and we are now in a position to compare and contrast the initial success habitat management techniques, and how habitats and invertebrate communities have responded. Key findings include:

- Overall, more than 140 species/genera of invertebrate identified across the project sites, with the highest recorded diversity at a site currently at least 48 species.
- For plants, more than 300 species/genera have been identified across the project sites, with the highest recorded diversity at a site currently at least 65 species.
- There was increased plant and invertebrate abundance measures across all Pilot sites.
- A relationship can be observed between plant and invertebrate species richness on sites (higher plant species richness = higher invertebrate species richness).

- There was an increase in the area of neutral grassland habitat on sites.
- There was a decrease in the area of scrub habitat.
- There was a reduction of tussocky grassland and dense scrub across sites.
- There was a shift towards open, more species rich grassland and woodland communities.

Example site progression from a poorly vegetated site with ballast and bare ground, to wildflower/grassland mix

The project is testing combinations of different types of management interventions (Habitat Management Techniques, HMTs) to achieve the following key habitat management outcomes:

1. Enhance grassland
2. Transform grassland
3. Enhance wetland
4. Conserve existing habitat
5. Enhance brownfield
6. Enhance woodland
7. Enhance scrub
8. Transform scrub to grassland
9. Transform scrub to woodland

Monitoring during the 2022 season has generated the following key observations:

- There has not yet been a significant effect on species abundance measures through delivery of any of the individual HMTs.
- There were almost significant increases in plant abundance measures for ‘Transform scrub to grassland’ and ‘Enhance grassland’ sites
- Measures of plant abundance in ‘Enhance wetland’ and ‘Conserve existing habitat’ sites have responded the least to HMT applications.

- Invertebrate abundance has increased as general response to all HMTs albeit this cannot yet be classed as a significant change.

The lack of statistical significance is likely due to insufficient replication of HMTs at this stage (not enough sites available for each HMT to be analysed in 2022). This is expected to be resolved by inclusion of the final tranche of sites into the analysis next year.

Data on seeding success was also available for the first time, and the following was observed:

- Seeding success was highly variable across sites (0-48 % of species sown found growing).
- Overall seeding success was low (20 % success across tranches) but was similar between tranches (22 % and 19 %).
- Some species were more successful than others (ranging between 0-100 % success) but with overall only 33 out of 70 species sown have been found growing across the sites and out of those, only 13 species had a germination success rate of 50 % or more.

Overall, the monitoring data is starting to fill a pot of learnings, which will be structured to help provide our estate managers with recommendations on how to manage and improve lineside habitats. The 2022 monitoring has highlighted that:

- Certain wildflower species are likely to be more successful than others in the railway environment, and that broadcast seeding of commercial, off-the-shelf mixtures may be inefficient. We have in response developed a 'railway seed mix' for ongoing testing, as part of the Kent Pilot but also for inclusion as part of other ecology initiatives and select operational jobs.
- Structural changes to the habitats need to be balanced against biodiversity measures; any larger roll out of the project's recommendations will need to consider a mosaic approach for enhancement works, rather than transforming large blocks of lineside habitat, so that all species groups and habitat functions (nesting/refuge as well as feeding) are considered.
- 'Enhance wetland' sites require further attention and research as measurable change in these habitats has so far been minimal. We plan to undertake more detailed studying of reedbeds in 2023 to assist with this.

5 Priorities for biodiversity management on the Region

Our strategic priority is to deliver against the objective of delivering no net loss in biodiversity by 2024 and achieving biodiversity net gain by 2035. Our delivery priorities are aligned to these outcomes and include:

- Improving workforce capability and engagement in managing biodiversity as an asset.
- Providing our workforce with wildlife identification skills and knowledge required so that they can discharge duties to biodiversity competently, safely and efficiently.
- Sharing best and good practice, relevant analysis, and lessons learned in order for the workforce to benefit from the experience of others and apply best practice on a day to day basis.
- Developing Regional policy, procedures and work instructions so that the consideration of biodiversity is appropriately captured and addressed within all the work that we do.
- Setting and monitoring a requirement for engineering projects and maintenance interventions to produce enhanced biodiversity assessments, proportionate to the size or scale of the project or intervention.
- Integration of biodiversity management in the business planning process through creation of Habitat Management Plans (HMP). HMPs will set out objectives, priorities and investment requirements over the short and longer terms. In order to see that the activities set out in HMPs are fully embedded within Route activities and receive the appropriate level of priority and funding, deliverables will be incorporated within Route Strategic Asset Management Plans and other Route Strategies. In this way, biodiversity management will become part of business as usual.
- Improved strategic planning for biodiversity management with external stakeholders. We will achieve this through providing and supporting platforms for discussion and information sharing between responsible and interested parties across the Region, and by engaging with external stakeholders and groups to support and enhance work in this area.

6 Report on Performance Indicators within reporting period

Our key targets are to deliver no net loss in biodiversity value by 2024, and to achieve biodiversity net gain on each route by 2035, compared to a baseline value established in 2020.

Performance indicator	Unit	Target	Actual (2022)	Status	Commentary
No Net Loss	Biodiversity Unit	47,151	44,471	Decrease	Target is to maintain 2020 baseline.
Net Gain	Biodiversity Unit	51,866	44,471	Decrease	Target 10 % increase on 2020 baseline
Regional HMP coverage	%	100 %	100 %	Achieved	Generic HMPs created

The updated biodiversity metric calculation for the region (section 4.1) indicates that biodiversity value has **decreased,** from the baseline position to 2022, by approximately 6 %.

The decline has been driven by significant changes reported in the value of our deciduous woodland and saltmarsh habitats. The former is reported as decreasing in area by some 300 hectares, while the latter is reported as losing 148 hectares. Conversely, biodiversity value is reported as significantly increasing in modified grassland, lowland heathland, and fen habitats, with area increases reported as 391, 95 and 68 hectares respectively.

We know that our vegetation management activity, principally to address operational and safety risk caused by woodland and scrub habitat types, impacted approximately 500 hectares of woody habitat between 2020 and 2022. This impact broadly corresponds with reported changes in both woody habitats (negative) and modified grassland (positive). Reported significant changes in heathland, fen and saltmarsh (and also coniferous woodland) are more difficult to account for - it is considered likely this is a classification error of the assessment method. Field investigations will be planned to validate and inform future assessments.

Southern Region has completed the creation of ‘generic’ Habitat Management Plans, that cover management objectives and prescriptions required to achieve these objectives, for all the high-level habitat types that have been identified through remote satellite mapping (see Section 4). While 100 % of our estate now has a management prescription aligned, our challenge for the final year of this Control Period is to identify priorities for delivery and to successfully obtain funding for plan implementation as part of CP7 Business Plan submission, with a view to commencing works at scale from 2024/25.

Over time, the ‘generic’ Plans will be replaced by a combination of ‘localised’ Habitat Management Plans and Species Management Plans, which we are implementing through our Environmental Sustainability Plan and in partnership with a diversity of external stakeholders, and ‘refined’ Plans that will incorporate considerations of actual habitat condition, functional connectivity, and potential to enhance other ecosystem characteristics.

7 Case studies

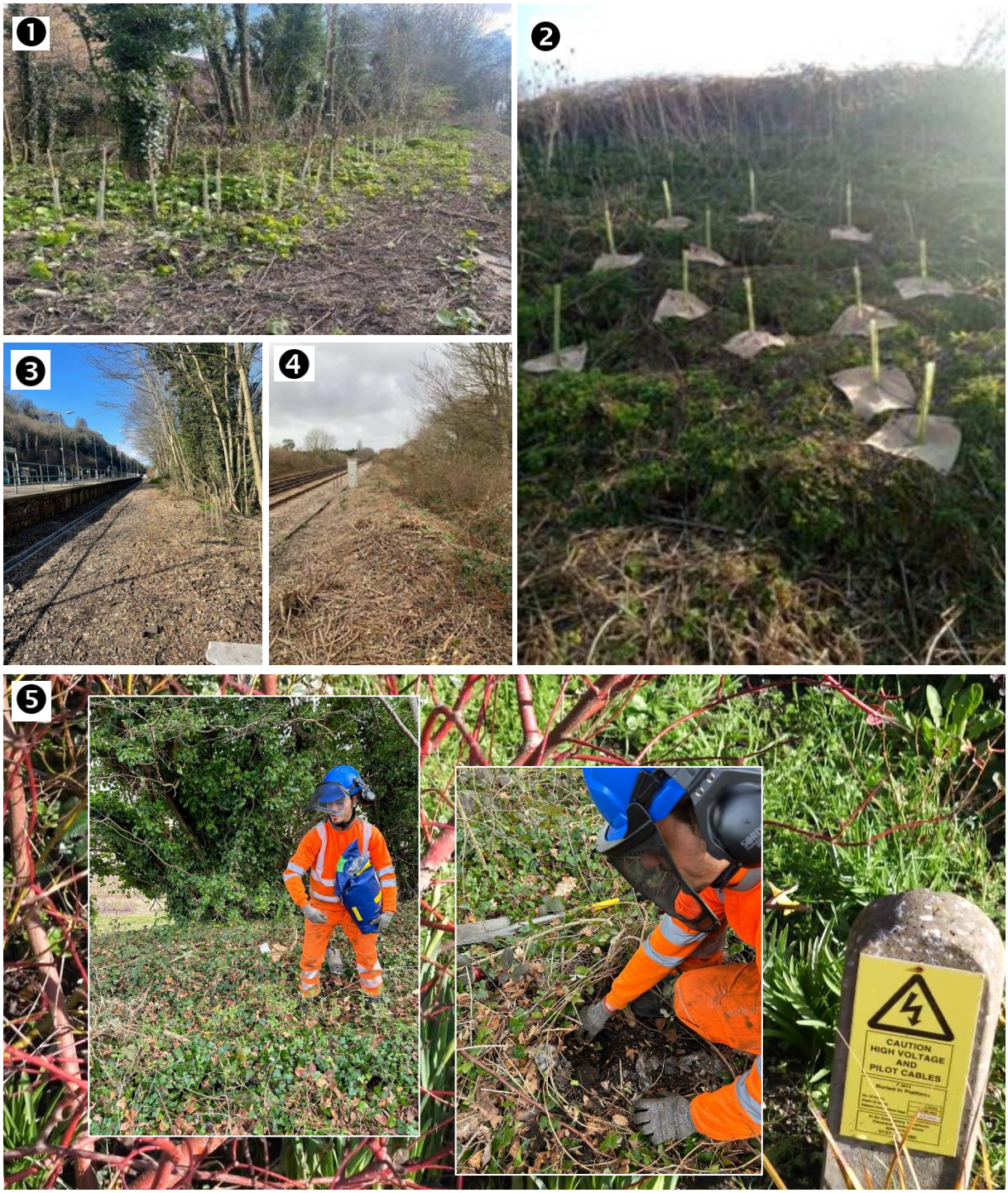
7.1 Biodiversity in Blockades - optimising use of railway access

Southern Region has a programme of ‘blockades’ - planned periods of time where we close the running of the railway, ranging from three days up to sixteen days, to deliver essential upgrades and enhancements to the rail infrastructure.

Southern recognised a potential opportunity to deliver enhancements for a different type of asset and posed a challenge: might we use the valuable window of time presented by a blockade to deliver works to improve the condition and value of lineside biodiversity.

The Ecology Management, Works Delivery, and Possessions Management teams of the Region have subsequently collaborated to develop business processes and plans for biodiversity enhancement in blockades, and have been testing approaches in select schemes. Some early learnings from our Kent Vegetation Management Pilot have been brought to bear and are showing promising signs of success in application.


Ground preparation/planting/seeding



❶❷ Whip Planting

❸ Ground preparation + seeding with wildflower mix for pollinators and birds

❹ Invasive buddleia and bramble removal

❺ Planting and seeding along station platform verges

Ecological Arboriculture

❶ Monolith creation

❷ ❹ Lightning strike simulation with nesting slot

❸ Nesting cavity

❺ Covered nesting cavity

❻ Nesting cavity

Ecological Feature Creation

❶ Simple ground hibernacula

❷ ❹ Hedge laying

❸ Dead hedging

7.2 Capital Project Works

Bracewell Road Embankment

Stabilisation works necessitated installation of concrete augured piles and regrading of the embankment profile. Pre-works ecological surveys identified that the habitat comprised mixed dense scrub and scattered trees. Although the habitat was not suitable to support protected species, it was identified as having value as a green corridor with the potential to support commuting and foraging. In consultation with lineside neighbours and working with Network Rail and the Tree Council guidance, a landscape replanting plan was developed comprising wildflower grassland meadow seed mix, scrub and woodland saplings and specimen trees at the embankment toe.

British native species were selected to attract wildlife, support the wider food chain and the ecosystem all year round (e.g. pollinators, nectar-rich and berry producing plants). The design also aimed to complement and enhance the existing retained shrub and scrub vegetation growing within the rail corridor and to be visually appealing.

Use of the Defra Biodiversity Metric delivered a 1.72 % biodiversity net gain.

7.3 Examples of partnership working

7.3.1 Tree Council

Our leading-edge partnership with The Tree Council continued during 2022 and the initial seed we planted in 2020, watered with a £1million pledge to set up local planting schemes across the Region, has grown and started to bloom into something that will leave a legacy for future generations.

The partnership worked on 20 projects at 77 locations across the Region, undertaking 112 volunteer days, with 50,563 native trees planted during the overwinter season of 2022/23 (Table 3). The projects supported core themes around Nature Recovery, Community Planting, Landscape Connectivity, Amenity Planting, Nature Based Solutions, Urban Resilience and Food Security.

Tree species planted 2022/23 season

Tree species	total	% of Total	Rank
Crataegus monogyna (Quick Thorn)	7746	16.0 %	1
Prunus spinosa (Blackthorn / Sloe)	6577	13.6 %	2
Fagus sylvatica (Common Beech)	5523	11.4 %	3
Acer campestre (Field Maple)	5163	10.7 %	4
Corylus avellana (Hazel)	3751	7.8 %	5
Cornus sanguinea (Common Dogwood)	2903	6.0 %	6
Malus sylvestris (Crab Apple)	2531	5.2 %	7
Sambucus nigra (Elder)	2254	4.7 %	8
Carpinus betulus (Hornbeam)	2233	4.6 %	9
Ligustrum vulgare (Common Privet)	2122	4.4 %	10
Frangula alnus (Buckthorn)	2116	4.4 %	11
Rosa canina (Dog Rose)	2083	4.3 %	12
Euonymus europaeus (Spindle)	2047	4.2 %	13
Other	3514	2.6 %	

For 2023/24, the planting target is 30,000 more trees, meaning the partnership will have delivered more than 100,000 native trees, far outstripping our initial target of 25,000. We will also be seeking to increase the numbers of volunteers engaged and provide a varied, seasonal year-round programme of opportunity.

"Southern's innovative partnership with The Tree Council brings great benefits for people and the planet. Our collaboration has, to date, established 78,187 trees, with 33 communities, including more than 766 volunteer hours. From increased carbon sequestration to habitat creation, attenuated flooding and improved air quality, together we are improving wellbeing in underserved communities and conserving wildlife for generations to come." - **Ian Turner, Head of Major Planting & Ecology Projects, The Tree Council**

7.3.2 Biodiversity Collaboration with Southern West Rail

The Region and South Western Railways have been working together on 'bigger picture' collaborative enhancement opportunities across a number of sites in Wessex Route.

An old marshalling yard site at Feltham was identified as an excellent site for a collaborative approach to biodiversity conservation. An area of 14 hectares is now being managed proactively for biodiversity. The site is a mixture of grassland, woodland and scrub bordering the River Crane Site of Importance for Nature Conservation. An annual of ecological assessment has been implemented and aim to monitor biodiversity change through botanical, bat, nesting bird, reptile and terrestrial invertebrate surveys.

Feltham Marshalling Yard Nature Site

Six species of bat, were recorded utilising the site in 2021/22, including Leisler's (Nyctalus leisleri) and brown long-eared (Plecotus auritus) for the first time. The site is home to breeding populations of common lizard (Zootoca vivipara) and slow worm (Anguis fragilis), as well a healthy common bird assemblage. It is especially important in the local

area for butterflies, with a large assemblage of locally important species found in the grasslands.

Our joint ambition is to open the site up to the public in 2022/23 becoming an important part of the urban green space corridor along the River Crane.

Another collaborative site is Ashurst Station in the New Forest. Working alongside the Royal Society for the Protection of Birds (RSPB), several enhancements are being established to help improve not only the station environs, but also an important area of wet woodland, a Habitat of Principle Importance, adjoining the station. Areas around the station are being enhanced with wildflower meadow planting and hedge laying in keeping with the surrounding National Park. Habitat management in the wetland will improve its condition, further enhancing the wider site for the species that inhabit the area.

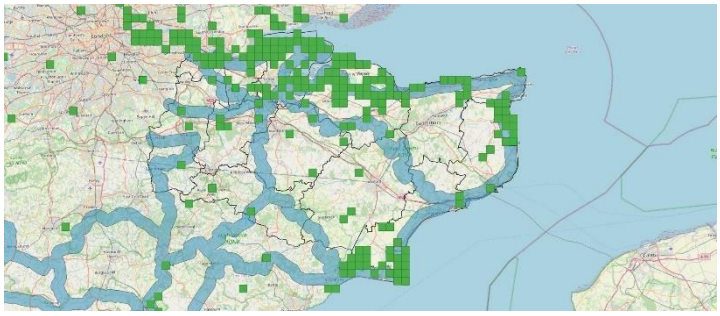
For 2022/23, further initiatives are being scoped collaboratively for several other stations.

7.3.3 Kent Pollinator Project

Pollinators have severely declined in recent decades with many under the threat of extinction. Network Rail has partnered with the Bumblebee Trust and Kent Wildlife Trust to identify areas within the network that could be enhanced as connecting corridor between isolated populations of rare and scarce pollinators present in the Kent area.

Utilising data from both Trusts, we were able to identify potential areas of the network that could be suitable for targeted enhancement for those species. The main objective for the initiative is to connect isolated populations of pollinators via the railway corridor.

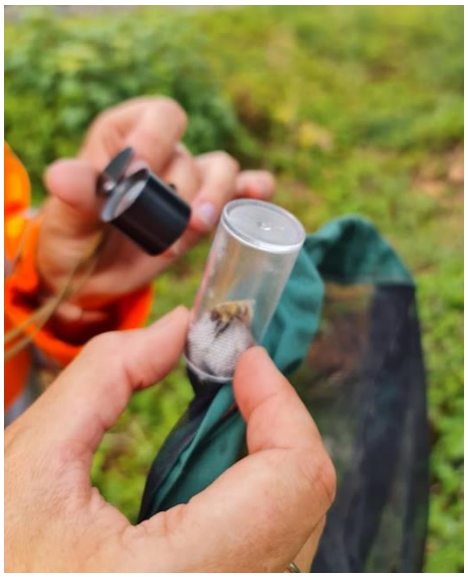
Potential hotspots for priority pollinator work in north Kent

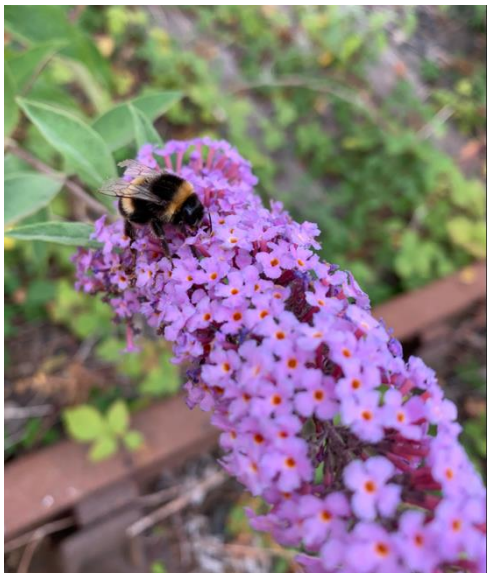


Further detailed surveys will be undertaken to capture the baseline prior the interventions with regular post-intervention monitoring being planned for the sites. Discussions are ongoing to employ newly developed technology to remotely detect the presence of wild pollinators.

Network Rail continues to collaborate with the Trusts to develop a detailed plan for intervention and long-term management plan for the target areas. Further phases of the project should identify additional sites for habitat improvements to benefit pollinators.

Field visits with pollinator partners identified key species such as the Shrill Carder Bee





7.3.4 Environment Agency collaboration to safeguard beavers & railway operation

Following 400 years of extinction, Beavers has been re-introduced back into the UK with the populations gradually expanding which inevitably includes areas close to the railways. Beavers are nature's greatest engineers and can rapidly change the habitat around their territories, including building dams, lodges and tunnelling.

Knowing that beavers been introduced to areas near the railway, Southern Region has been working closely with the Environment Agency to proactively monitor occurrence and support management works so to avoid or minimise impacts to the operation and safety of the railway.

Two members of the Ecology Management team have completed first-in-kind training provided by Natural England, and are the first within Network Rail to have been granted Licences to manage beavers within the network.

We are then able to build on our partnership with the Environment Agency going forward, now having capability to contribute to the conservation of beavers as they strive to establish themselves in the wider landscape. We have recently become a member of the National Beaver Management Forum and our future plans involve targeted monitoring of known colonies, upskilling of Regional staff on beaver ecology, and working together with other infrastructure managers, providing leadership in a to-be formed national forum, to facilitate the proactive management of the species across Southern Region and beyond.

Figure 1 A Beaver in Kent Route.
Photo credit: Lauren Baker, Kentish Stour Countryside Partnership

8 Future plans

8.1 Land Management Strategy

During 2023, we will create and publish a wider Land Management Strategy for Southern, to commence from the start of the new Control Period (2024). We recognise that responsibility for managing land and biodiversity is currently complex and split between various parts of the organisation.

We are seeking to apply a key principle of managing biodiversity as a system, regardless of ownership of individual elements, which is spread across Sustainability, various Asset Management disciplines, and Property functions.

Our new Strategy will define collectively agreed outcomes for biodiversity, set out a trajectory that will lead us to achieve the necessary capabilities, and be grounded in a robust approach to monitoring biodiversity characteristics, problems, risks and opportunities.

8.2 Biodiversity Net Gain Strategy

An important input to our cross-discipline Land Management Strategy is our new Biodiversity Net Gain Strategy, due to be complete in the first half of 2023. Our objective is stated straightforwardly: against a baseline starting position for our estate established for the start of 2024/25, deliver a 10 % biodiversity net gain by 2035.

Conceptualisation and implementation of a strategy to deliver this objective is much more complicated, as the approach needs to set-out an uptick in the volume of proactive habitat management we undertake while offsetting a complex myriad of operational and engineering activities that adversely impact biodiversity value.

The Strategy will cover how Southern will tackle this complexity to deliver the required measurable improvement for biodiversity. Consideration will be given to the creation and enhancements of habitats as part of planned management action as well as in association with major infrastructure projects; principles will be established for achieving the BNG target though on-site lineside enhancements, by providing enhancements to agreed sites elsewhere, and through the procurement of biodiversity offsets.

8.3 Stakeholder engagement plans for the next reporting period.

Southern Region recognises that engagement and partnership with a wide range of stakeholders on all significant biodiversity-related matters is central to the successful implementation of our Regional biodiversity plan and achievement of our key net gain objective.

Opportunities to work with stakeholders throughout the next reporting period include:

- Meeting formally with strategic Biodiversity Partnerships, Local Authorities, key landowners (farming estates), and nature conservation groups to consult on inclusion of perspectives, knowledge and needs from beyond those held within the railway corridor.
- Meeting less formally with other stakeholder and community groups, and sharing of knowledge, actions and achievements through our communications channels to keep our key stakeholders updated, engaged and informed.
- Educating lineside neighbours and our customers about biodiversity management practices, and values, on and near the railway, and how they can support and inform our work.
- Expanding volunteer opportunities for our workforce and stakeholders such as ‘Friends of’ groups, and at community events such as tree planting days.
- Implementing interpretive signage at high biodiversity value railway sites and stations (in partnership with our Train Operator colleagues).
- Hosting engagement and educational activities on biodiversity management.

Wales & Western Region State of Nature Report

Contents

1. Personnel & Document Control

All ecologists should state their membership level of a recognised professional body (e.g. CIEEM, IEMA) alongside their name.

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2. Foreword

As a response to the Varley Review in 2018, Network Rail responded with a commitment to meeting the recommendation for each route to produce annual state of nature reports. This commitment was captured in the Network Rail Environment and Sustainability Strategy. This report, for Wales & Western region, covers activities that took place from April 2022 to March 2023.

It outlines the state of nature on the region's estate and the ambitions and plans we have to protect and maintain and enhance its habitats and associated biodiversity. It also highlights key examples of the actions we have undertaken to improve these habitats, and where necessary control undesirable species.

The Wales & Western Region serves Wales, the Thames Valley, West of England, and the South West Peninsula. The Region is made up of two Routes:

- Our Wales & Borders route, which link Cardiff, Newport, Swansea, Wrexham, and Shrewsbury, and provides rail connections in more rural areas.
- Our Western route, which stretches from London Paddington station to Penzance, through Bristol and up to the boundaries of Wales, Worcester, and Basingstoke.

Figure 1 Extent of the Wales & Western Region (Image: Network Rail)

In addition to the commitment for each Region to produce a State of Nature, the Wales & Borders Route are also required to produce a summary report[1] every 3 years on how we have worked to fulfil our Section 6 Duty under the Environment (Wales) Act 2016. Network Rail are committed to enhancing and maintaining the biodiversity value of its land where possible and reasonably practicable.

3. Executive Summary

3.1 Overview

Across the Wales & Western Region, the delivery teams have progressed with commissioning targeted baseline ecology surveys of our lineside estate to inform vegetation management works. Due to the prioritisation of targeting vegetation management in areas where Ash Dieback is causing a threat to the line, the baseline surveys have prioritised those particular areas. The objective for the Wales & Borders Route is to complete the baseline ecology surveys to boundary by the end of Control Period 6 (CP6). In Western the aim is to complete baseline ecology surveys across the Route by the end of Control Period (CP7).

The habitat mapping data produced by the Centre for Ecology & Hydrology (CEH) on behalf of Network Rail, assessed sixteen habitat types, with bramble scrub being the most abundant habitat reported covering approximately 21 % of our lineside. Since the baseline was created in 2019, there has been a 22 % reduction in area of broadleaved woodland, was also reported.

Rare and priority species recorded across the Region include Great crested newt, Dormice, Slow worm, Natterjack toad, Adder, Hedgehog and common cuckoo.

3.2 Summary of ambitions for biodiversity management

The Wales & Western are committed to ‘Maintain and enhance’ so far as is consistent with the proper exercise of our functions to be compliant with our ‘Biodiversity Duty’ in Wales; and achieving ‘no net loss’ in biodiversity on our lineside estate in England by 2024.

[1] Network Rail's summary report - environment act wales

Our commitments include:

- The Region will actively engage with key external and internal stakeholders in relation to Biodiversity.
- Aim to have sufficient Ecology resource in order to be compliant with the ENV122 standard.
- Continue to look at finding innovative solutions to lower the impact of our engineering works on the environment.
- Improve the knowledge base internally at Network Rail to allow staff to recognise opportunities to enhance biodiversity when programming or project management,
- Improve basic knowledge of staff to identify biodiversity and ecological constraints.
- Retention of a corridor of vegetation along the boundary of our land holdings wherever it is practicable to do so.

3.3 Summary of achievements for biodiversity management

- The Region has continued to fund remaining works on the Pilot Sites programme of works.
- The Delivery teams (i.e. Capital Delivery and Maintenance) are continuing to procure ecology surveys to inform planning of works. These include Phase 2 surveys for protected species, including Bats, Dormice and Great Crested Newts.
- Across the Region we have several European Protected Species mitigation licences in place to enable works to proceed to maintain our lineside vegetation and also for enhancements.

3.4 What further action will we take?

The focus for the coming financial year is to deliver the demonstration projects to inform future biodiversity and habitat management across the Region, with a focus on a pragmatic approach to sympathetically work with the existing habitats present on site - with the right habitat in the right place. We are aiming to work with nature rather than change the habitats or plant species that will not survive without excessive maintenance required and without aiming for floriculture.

The Region will continue to progress with delivering the ELR ecology surveys on the Wales & Borders route which is being managed with direct input from the Ecologists in the Delivery Units. On the Western route, Construction Services have been progressing with coordinating the ELR surveys ahead of the vegetation management works. These surveys

will inform future works and allow mitigation to be planned ahead of time and permissions to be acquired where there are ecological constraints identified.

We will continue to embed requirements to positively manage our assets to 'maintain and enhance' biodiversity and be complaint with external legislation with regard to ecology. We are also focusing on the Cultural Change around embedding requirements for positive management for biodiversity and ecology, and also embedding Ecologists within the Delivery teams who act as the first point of call for provision of advice.

In January 2023, the 'intelligent client' model will be launched in Wales & Western region, with Ecological services being contracted out to six long-term supply chain partnerships for renewal projects. This model aims to support buildings, civils, electrification, and plant project in CP7. This represents a change to the way in which the region has managed renewal projects, with a newly created Environment Manager in Capital Delivery to support this new model of working.

The region is working on procurement of a new Wales & Western Ecology Framework of Suppliers to provide support to the teams on delivery of work. This will aim to provide better coverage of support to teams across the Route, including the more remote areas such as coastal locations in Wales including Pembrokeshire, Llŷn Peninsula, and Cornish coastline for instance.

Through consultation with Natural Resources Wales (NRW) and Welsh Government (WG), we will work towards resolving the question around using the Biodiversity Metric 3.0 for calculating Biodiversity in Wales and meeting the requirements under Net Benefit for Biodiversity[2] (NBB) on the Railway.

4. State of nature on Wales & Western region (period between April 2022 and March 2023

There is a distinct difference between environmental legislation and policy and therefore the way in which Ecology and Biodiversity are managed in the devolved nations. Legislation and policy are written by two different governments, with different requirements. The devolved nations have separate statutory and governing bodies, with permissions (including licensing and consenting) being processed differently. There are

[2] Net-Benefits-briefing.pdf (cieem.net)

distinct differences between the ways in which licensing for both survey and mitigation are managed, and the guidance provided by the Statutory Nature Conservation Organisations (SNCO's) in England and Wales.

In Western, the Biodiversity Metric tool was developed to be used to calculate Biodiversity using a qualitative measure, whereas in Wales this tool has not been recognised as a way to calculate a value for biodiversity by either WG or NRW and they are looking to use a quantitative measure through the application of NBB. Network Rail continue to request for the Biodiversity Metric tool to be used (both internally and externally) for projects across the Region in order to provide a standard reporting approach. Regional staff will continue to consult with external stakeholders to resolve this issue in Wales and a Biodiversity Strategy for the region will be produced at the start of CP7.

4.1 Wales & Borders Route and the Section 6 Duty under Environment (Wales) Act 2016

With reference to the Section 6 Environment (Wales) Act 2016 Summary report produced in December 2019, the Wales & Borders Route has progressed with commitments which would enable the Wales & Borders route to fulfil their Section 6 duty. A summary report was also produced and published by Network Rail for the period December 2019 – December 2022.

4.2 Biodiversity metric calculation for the region

The DEFRA Biodiversity metric, which uses habitat as a proxy for biodiversity, has been used in the Wales & Western region to provide a biodiversity score measured in habitat units. Table 1 provides an overview of scores derived from habitats which occur within the Network Rail property boundary.

Different habitat types are assigned a 'distinctiveness' and 'condition' rating, where highly distinctive habitats in good condition score more than habitats with low distinctiveness in poor condition. Figure 2 illustrates the types of habitats which occur in the region and their relative proportion.

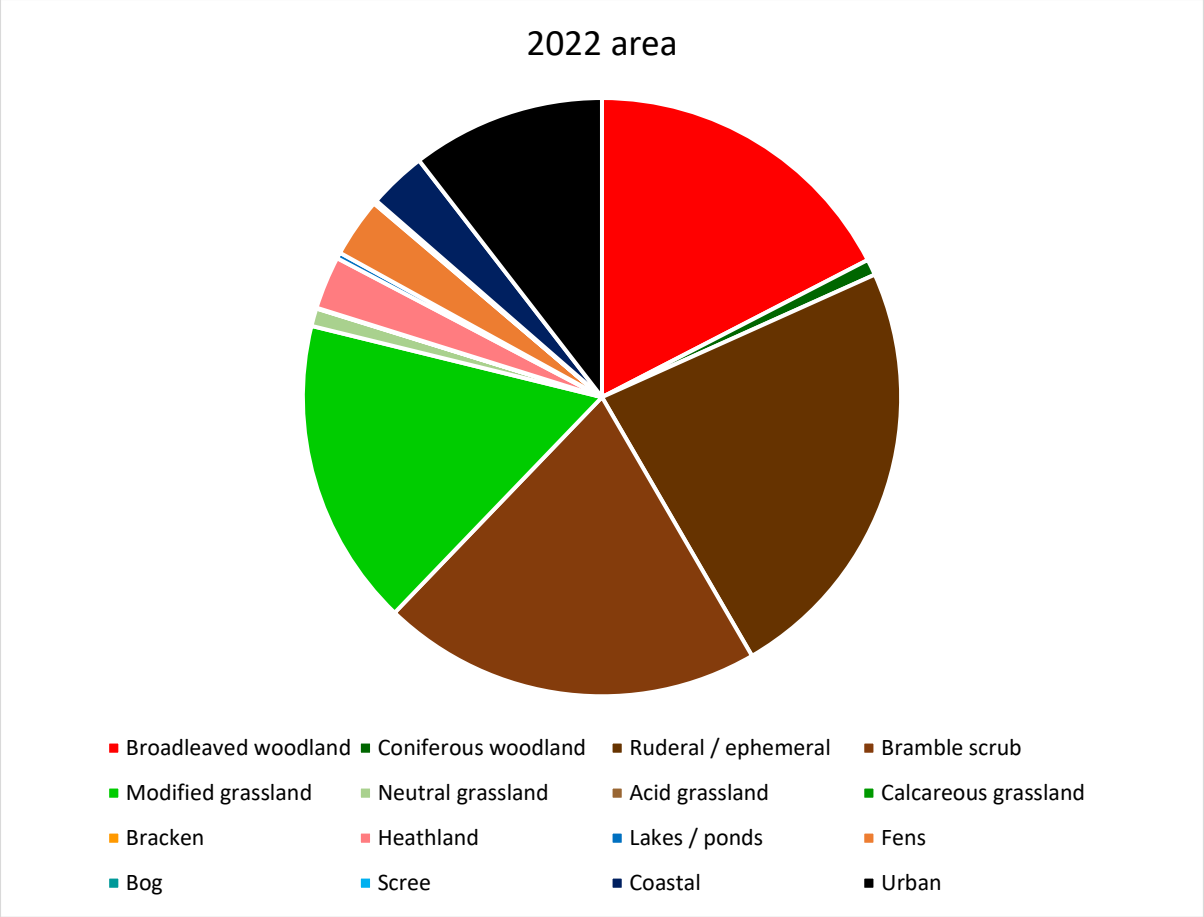

Figure 2 Pie chart illustrating the area of habitat types on the Wales & Western regional estate.

Over the three reporting periods the area of Ruderal / ephemeral habitats has increased, with a reduction in broadleaved woodland and bramble / scrub. The UK Habs definition of Ruderal / ephemeral habitats is '*Short patchy plant associations of ruderal or ephemeral species with ≥5% cover and perennial grass species <75% cover*'[3].

[3] ukhab – UK Habitat Classification

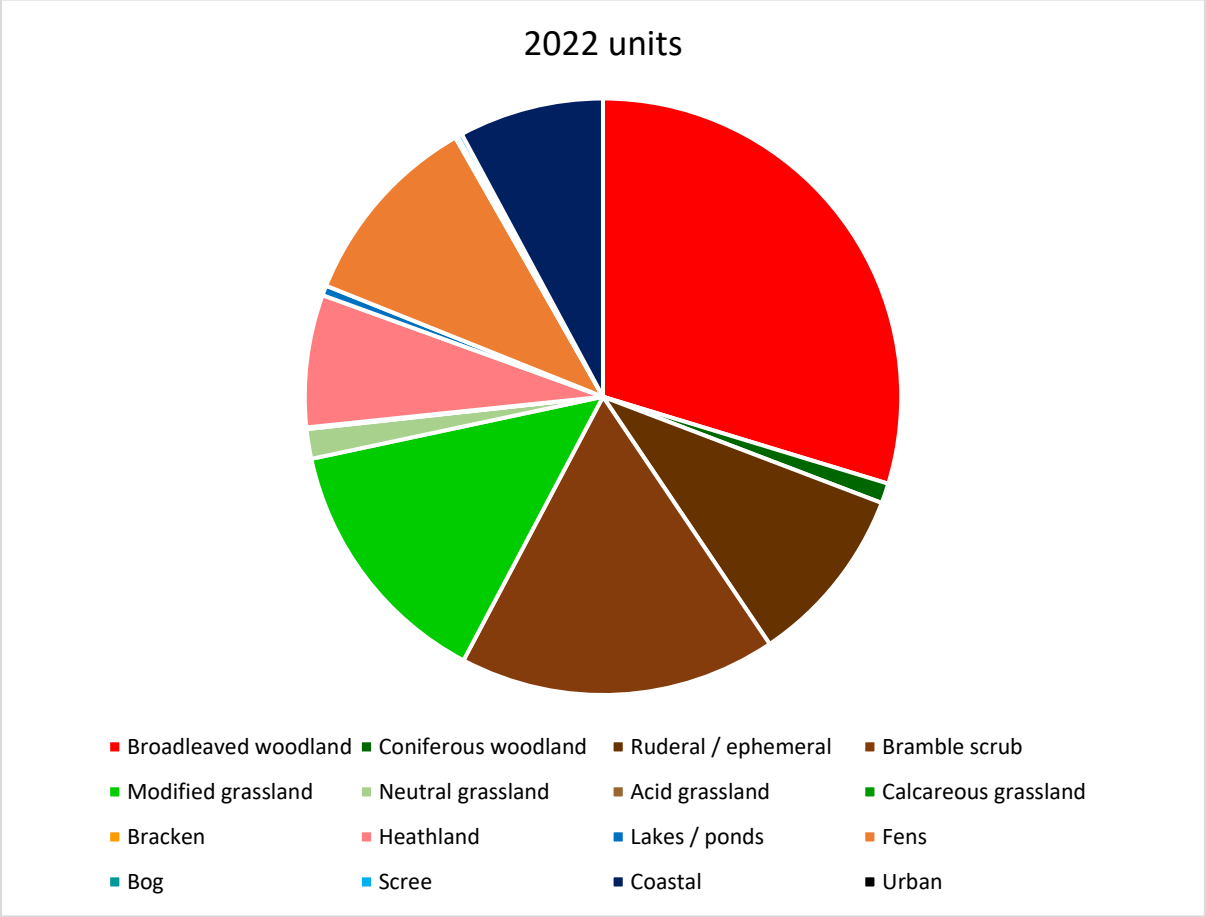

Figure 3 Pie chart showing units of habitat proportions for 2022 on the Wales & Western regional estate

As with the two previous reporting periods, when considering the habitat units then broadleaved woodland remains the dominant habitat type represented on our estate in Wales & Western, however the area has significantly reduced (see Figure 3). Units of Ruderal / ephemeral habitats have increased since the previous reporting period in 2021, in addition to an increase in units for Modified grassland has increased, with the area of Calcareous grassland and Acid grassland also being significantly reduced in area. The Calcareous grassland and Acid grassland are both broad (i.e. priority) habitats[4].

Habitat in the region has a total area of 9,140.38 ha and a habitat unit value of 43,722.72. Therefore, since the last reporting period (April 2021 to March 2022), there has been a reduction in area and also a decrease in habitat unit value in the Wales & Western region.

[4] UK BAP Priority Habitats | JNCC - Adviser to Government on Nature Conservation

Table 1 DEFRA Biodiversity metric scores for habitats identified in the Wales & Western region in 2022.

Habitat type	Area (hectares)	Distinctiveness	Condition	Habitat units
Other woodland; broadleaved	1528.18	Medium	Moderate	12225.44
Wet woodland	15.92	High	Moderate	191.04
Lowland mixed deciduous woodland	15.92	High	Moderate	191.04
Upland oakwood	15.92	High	Moderate	191.04
Lowland beech and yew woodland	15.92	High	Moderate	191.04
Other Scot's Pine woodland	39.55	Medium	Moderate	316.4
Other coniferous woodland	39.55	Low	Moderate	158.2
Ruderal/Ephemeral	2134.54	Low	Poor	4269.08
Bramble scrub	1878.77	Medium	Poor	7515.08
Modified grassland	1520.94	Low	Moderate	6083.76
Other neutral grassland	87.83	Medium	Moderate	702.64
Upland acid grassland	2.07	Medium	Moderate	16.56
Lowland calcareous grassland	1.93	High	Moderate	23.16
bracken				
Upland Heathland	261.33	High	Moderate	3135.96
Ponds (Non- Priority Habitat)	29.5	Medium	Moderate	236
Fens (upland and lowland)	292.06	V.High	Moderate	4672.96
Lowland raised bog	3.89	V.High	Moderate	62.24
Inland rock outcrop and scree habitats	0.13	High	Moderate	1.56
Other inland rock and scree	13.32	Medium	Moderate	106.56
Coastal lagoons	11.77	High	Moderate	141.24
Features of littoral rock	75.56	High	Moderate	906.72
Features of littoral sediment	43.61	High	Moderate	523.32
Features of littoral rock	26.57	High	Moderate	318.84
Features of littoral sediment	18.79	High	Moderate	225.48
Saltmarshes and saline reedbeds	109.78	High	Moderate	1317.36
Built linear features	957.03	V.Low	N/A - Other	0
TOTAL	**9140.38**			**43722.72**

- **Connectivity**

Remotely sensed habitat data, together with habitat specific connectivity mapping, available on the GeoRINM Viewer as Environmental Opportunity maps produced on behalf of Network Rail by UKCEH[5], can be used to identify locations to prioritise opportunities for habitat restoration and creation. One of these GIS layers identifies areas

[5] UKCEH_Report_Network Rail_Potential_for_Biodiversity_Net_Gain (1).pdf

for Pollinator Habitats. This can be used in conjunction with B-Lines[6] identified as transport links for pollinators across the landscape.

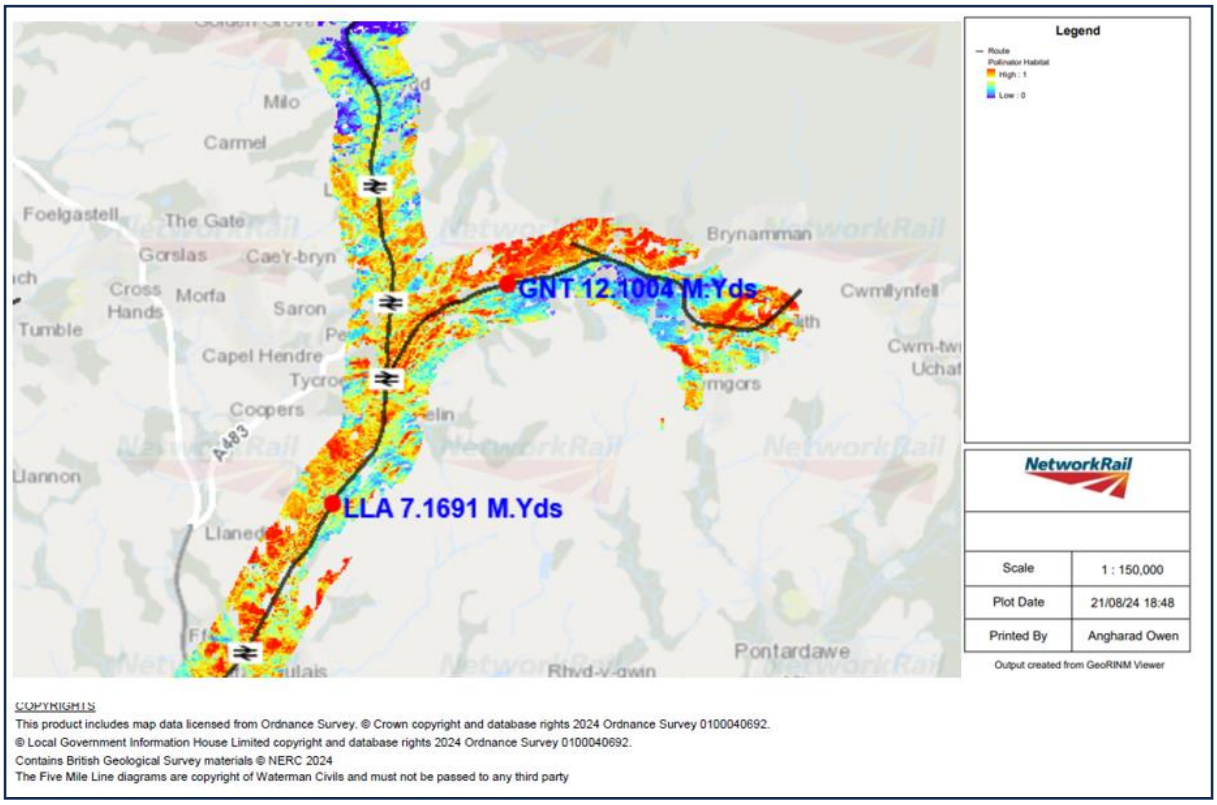

Figure 4 Map illustrating Pollinator Habitat opportunities in South Wales near Ammanford on the LLA and GNT ELRs.

4.3 Region Designated sites.

According to the National Database of Sites of Special Scientific Interest (SSSIs) on Network Rail Land (2013) the Wales & Western Region's lines run through or adjacent to 129 geological and biological SSSIs, 11 Special Protection Areas (SPAs) 11 Ramsar sites and 29 Special Areas of Conservation) SACs. Condition assessment is assessed by the Statutory Authority (i.e. NRW and Natural England) broken down by management unit and does not provide an overall condition assessment for the entire site.

4.4 Priority species and habitats on the region

In Western we have found several bat species through survey procured by our delivery teams to inform the planning of works. These include Common pipistrelle (*Pipistrellus pipistrellus*) and Soprano pipistrelle (*P. pygmaeus*) commuting and foraging over sites. On renewals projects in Western where vegetation management was required to facilitate

[6] B-Lines - Buglife

works, bat boxes were installed on several locations as mitigation for the loss of both hibernation and day roosts of Common pipistrelles.

Figure 5 Photos of bat boxes installed as mitigation for vegetation management works in Western (Photo credit: Morgan Sindall)

Bird species recorded during surveys on the Western Route included Cetti's Warbler (*Cettia cetti*), Reed Warbler (*Acrocephalic scirpaceus*) and also records of hearing Cuckoo (*Cuculus canorus*) calling in reed habitats. An ecologist noted that cuckoos parasitise warbler nests.

Dormice are recorded across Wales and Western on and adjacent to our lineside.

Ancient woodland has been recorded on our land at several locations on the Wales & Borders Route.

4.5 Invasive species on the region

Since 2019 in Wales, we currently conduct a substantial work bank focussed on Japanese knotweed (*Fallopia japonica*) every year. The sites are in the 100's and the work is conducted by suitably qualified personal from Construction Services. The work bank is made up of individual locations that have been reported to NR via the helpline from members of the public, lineside neighbours, Local Authorities, and outside companies (i.e. NRW). The site's details are recorded, and a spray regime of 3 years is started with records kept after each individual spray to ensure no missed treatments.

Near Fairbourne in North Wales, the Region is planning to continue with the clearance of *Rhododendron ponticum* as requested by the Snowdonia National Park Authority (SNPA).

The SNPA have been controlling the *R.ponticum* from areas of the Celtic Rainforest[7] as part of a LIFE funded project[8]. Controlling the spread of R.ponticum at this strategic location is important as the seeds of the *R. ponticum* are known to travel distances by wind and water, therefore protecting the coast will stop the spread of this INNS inland to the Celtic Rainforest. *R.ponticum* has also been recorded on localised sites in Western.

An ecology report procured by Network Rail to inform drainage works near Filton in April 2022, identified variegated yellow archangel which is a Schedule 9 species. A method statement including biosecurity risks was used to inform the delivery of works.

4.6 Demonstration sites or projects

During the reporting period April 2022 – March 2023, the region funded the remaining work required on the 'Pilot Sites' managed through the regional 'Biodiversity Implementation Programme' (BIP). These sites included:

- **Chipping Campden**

At this location on the OWW the Pilot Site involved planting on an adjacent landowner's land to mitigate for slope stability works. The Director of Engineering and Asset Management (DEAM) Ecology team revised the planting design to enhance for Biodiversity to include habitat management works, whilst incorporating requirements from the landowner. Deer fencing was installed. Unfortunately, the UK experienced a drought in 2022, which has resulted in some of the original plants dying but these will be replaced in 2023.

[7] Celtic Rainforests Wales | Eryri National Park (gov.wales)
[8] LIFE 3.0 - LIFE17 NAT/UK/000020 (europa.eu)

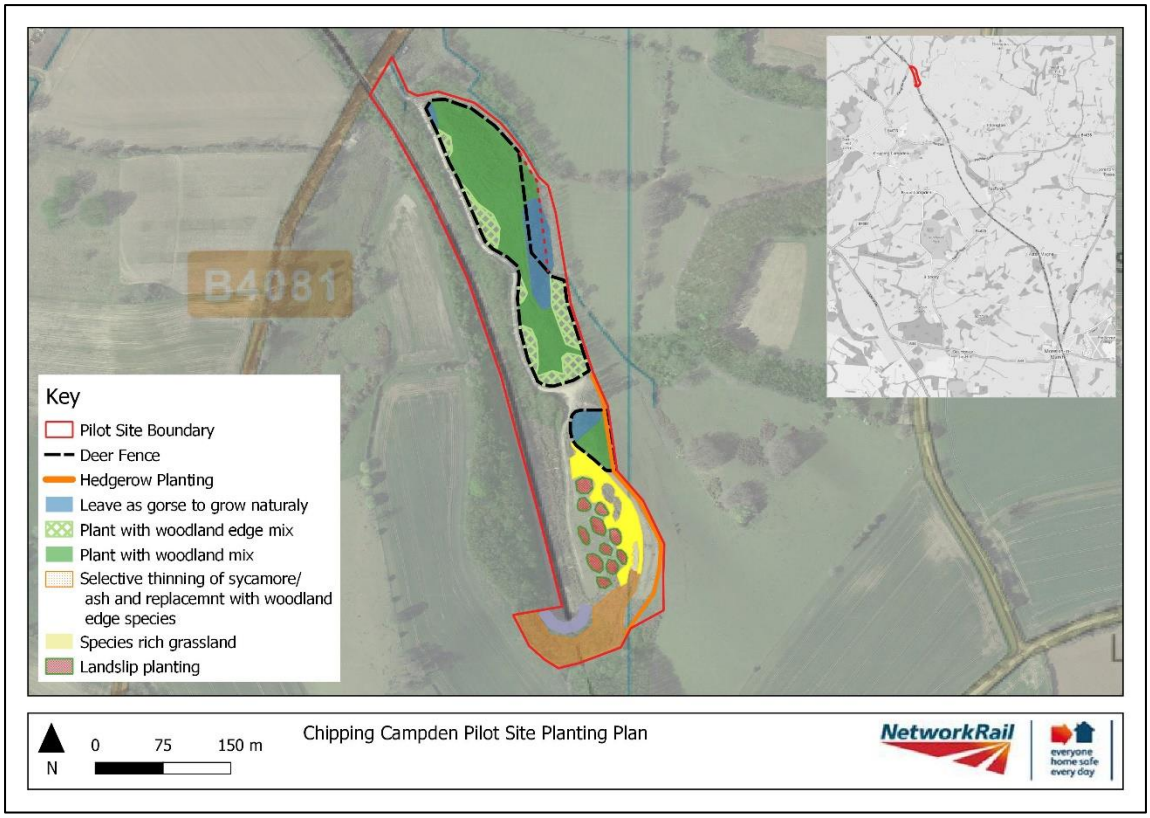

Figure 6 Chipping Campden habitat management and planting plan prepared by DEAM Ecologist

➢ South Marsten

This Pilot Site is on the MLN1 near the village of South Marsten. The area included stands of semi-improved grassland which were being encroached by Bramble and losing condition. The Pilot Site project undertook works to benefit biodiversity at this site and habitat management work was informed by an initial Phase 1 habitat survey of the area undertaken in August 2020.

Figure 7 South Marsten site following previous habitat management works (Photo credit: James Darke, Network Rail)

- **Cliff Farm**

Cliff Farm Pilot Site is on the SWM2 line. The Environment Manager (Ecology) in the DEAM Ecology team reviewed the original tree report and found that the report it did not have sufficient detail or rationale to support removal of all the trees in line with NR standards on threats for DDD (Dead, Diseased, Dangerous) trees and the report was not undertaken by a suitably competent individual with a Level 3 NQF in line with Network Rails standards.

Works Delivery procured a revised Arboricultural survey in 2021, which was undertaken by a Level 3 NQF qualified Arboriculturist. The new survey identified a reduced number of approximately 20 trees which required removal or management works. Due to the limited number of trees being removed and the benefits of temporary increased light on woodland ground flora, no further works were required for Biodiversity enhancement as the ground flora could regenerate naturally.

The DEAM Ecologists also identified breeding and nesting birds during their site walkovers, which would benefit from thinning of the woodland corridor at this location. Therefore, the remit for biodiversity enhancement did not include replanting, and the habitat management works to fix the safety issues resulted in a benefit for the existing wildlife on site. Prior to the Ecology surveys of this site, the plan was to replace any trees removed.

- **East Polden**

On the CCL line Network Rail completed a project[9] in the Autumn of 2022 to remove 40 mature Ash and Field Maple trees from the lineside which borders the Somerset Wildlife Trust Reserve, Green Down. Green Down and parts of the Network Rail lineside in the area form part of the East Polden Grasslands SSSI, a stronghold of the Large Blue butterfly (*Phengaris arion*), which went extinct in the UK in the 1970s and was reintroduced to Green Down in 1992.

The trees that were removed were shading the limestone grassland which the Large Blue relies upon for its larval foodplants, Wild Thyme (*Thymus serpyllum*) and Wild Marjoram

[9] Network Rail celebrates World Habitat Day with biodiversity bonanza for rare butterfly (networkrailmediacentre.co.uk)

(*Origanum vulgare*) and the single species of red ant which it parasitises as part of its life cycle. Large Blue butterflies require good quality grasslands and shading reduces their condition, making them less suitable for the species. Removing the trees helped to maintain the quality of the habitat for the Large Blue in the future, as well as improving the situation for safety and maintenance in that part of the CCL line, as many of the trees showed signs of Ash Dieback disease.

Working closely with Natural England and the Somerset Wildlife Trust (SWT), the DEAM team worked with a vegetation management contractor (Ground Control) to produce a method which overcame many of the logistical and legal problems of the site to deliver this important work in partnership with Network Rail's neighbours and wider stakeholders.

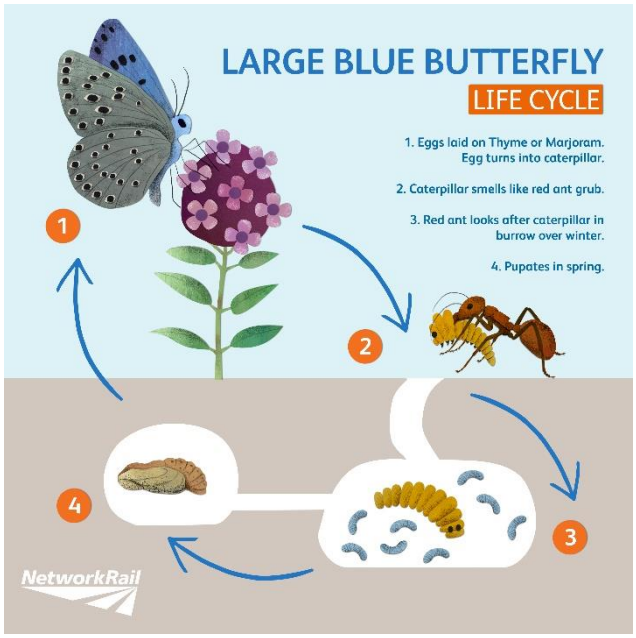

Figure 8 Large Blue Life Cycle (Image credit: Network Rail)

5. Priorities for biodiversity management on this region

- Expanding our internal Ecological technical resource to provide support across the teams and functions.
- Development of Habitat Management Plans (HMP) which will inform the Vegetation Management Plans (VMP) which are requirements under Standard 5201 and ENV_122. This will be an ongoing programme of works past CP7, and these plans will require revision when major schemes change the estate or new constraints, or opportunities are identified.
- Completion of baseline surveys across the Wales & Borders Route by the end of the Control Period which will inform the HMP and VMP for each ELR.
- DEAM Ecology team to continue to work on habitat enhancement for biodiversity.
- Continue to build on external relationships with key stakeholders and seek opportunities to work with for instance Local Nature Partnerships.
- Push forward with the Cultural Change.
- Completion of the 'Pilot Site' projects with regional funding provided to complete remaining sites.
- Ecologists to continue to work with the Contracts & Procurement (C&P) team on new supplier Frameworks to ensure that the minimum requirements set by the Wales Route Ecologist in 2019 for Ecological resource is delivered by the Contractors.

6. Case studies

6.1 Examples of best practice habitat management approaches

Parc Slip – habitat management

The Parc Slip Pilot Site is located on the POR/ OVE near Tondu. Adjacent to the land owned by Network Rail is the Parc Slip Nature Reserve[10], managed by the Wildlife Trust of South and West Wales. Dormice and Great Crested Newts are among the species recorded in this local area and on the Nature Reserve.

The POR/ OVE line is out of use at present, but works are ongoing to improve the condition of the line to be used as a relief route in the future. The Wales & Borders Route have planned vegetation management 3m from running rail to comply with vegetation management standards. The Pilot Site works incorporated this requirement to cut back the vegetation to 3m from the running rail, into coppice management of the woodland on the lineside to benefit both future maintenance needs of the railway with improving habitat for Dormouse. Three blocks of woodland are planned to be cut in scalloped shaped areas and allowed to regrow every five years. Vegetation management works were undertaken under licence from Natural Resources Wales. Dormouse boxes were installed on the Nature Reserve as a requirement of the mitigation contract, which has resulted in the boxes being more easily accessible and also away from the future operational land.

For future planned works on the line, Network Rail aim to continue to work in partnership with the Wildlife Trust of South & West Wales who are lineside neighbours and adjacent landowners.

6.2 Examples of partnership working

Natterjack Toads in Flintshire, North Wales

Network Rail have previously collaborated with the Amphibian and Reptile Group (ARC) in Flintshire, North Wales to create suitable habitats to release of Natterjack Toads (*Epidalea calamita*) and a successful reintroduction programme was sponsored by Network Rail in 2018[11]. Natterjack Toads are a protected species. In August 2022, the North Wales Delivery Unit (DU) identified a requirement to undertake drainage work at

[10] Parc Slip Nature Reserve – Bridgend | The Wildlife Trust of South and West Wales (welshwildlife.org)
[11] North Wales natterjacks win green award | Amphibian and Reptile Conservation (arc-trust.org)

Bagillt where an overbridge flooded during heavy rainfall. Drainage ditches at this location were identified on inspection as being overgrown and collapsed in certain areas. The work Site lies within 100m of the Dee Estuary Site of Special Scientific Interest (SSSI), Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar site. Proposals to remediate the flooding had the potential to have impacts on these protected sites, therefore consultation with NRW was undertaken and a Habitat Regulations Assessment (HRA) submitted. An Ecologist in the DU was also consulted on the works, and it was identified that the Natterjack Toads would be an ecological constraint to works, therefore Network Rail engaged with ARC and NRW for advice and permissions. A licensed Natterjack Toad Ecologist from ARC was contracted to supervise the works as an Ecological Clerk of Works (ECoW), providing toolbox talks and pre-construction checks of the habitats. Works were conducted in November, with no natterjacks were encountered and the ditching was successfully completed.

Figure 9 Natterjack Toad (Photo credit: Anna Humphries, Network Rail)

6.3 Example of improved management of an Asset where protected species are present.

Britannia Bridge

Britannia Bridge is an iconic structure owned by Network Rail. Regular maintenance is required such as lintel replacements, and various inspections work to the walls and tower. It is an important connection between the main land and Ynys Mon, with utilities supplies utilising the crossing in addition to the main road. In 2021, Network Rail was alerted to the presence of Peregrine falcons using the structure for nesting. We had received some bad press in this instance[12], so in 2022 the DEAM Ecology team were asked to assist with planning the work.

Peregrines are a charismatic bird; they are highly adaptable and mobile. Breeding sites are often monitored by local birders, and in this instance staff from both the RPSB, NRW and also Bangor University, were all concerned that our work would disturb the birds. The DEAM Ecology team began early consultation with local stakeholders, and early advice to the Asset Management and delivery teams to plan their work. Due to lack of internal resource to undertake the fieldwork, the DEAM Ecology team recommended engaging with a Raptor expert ornithologist who had experience of working in this area of the country and would advise on licensing requirements and undertake monitoring of the site. The Project Manager also identified other outside organisations to notify of the presence of the Peregrines and potential for nesting, these included Welsh Water, the power company, the Highways department at Gwynedd County Council, and also Transport for Wales (TfW).

Through the monitoring undertaken by the ornithologist it was identified in May 2022 that the peregrines were not breeding, and Network Rail was able to agree with NRW to complete the required works. Through the monitoring of the site by a Raptor expert, Network Rail and the external stakeholders could demonstrate that we have followed best practice and have confidence in results of their monitoring and advice.

In future years, Network Rail plan to continue to engage with the ornithologist and various stakeholders to aim to avoid any negative impact to the peregrines at this location, and plan works to avoid the breeding period wherever possible. This project was

[12] Best laid plans: Network Rail amends bridge refurbishment work after protected birds found nesting in tower (networkrailmediacentre.co.uk)

an excellent example of collaboration with stakeholders both internally and externally, and recognition that specialist ecological advice was required.

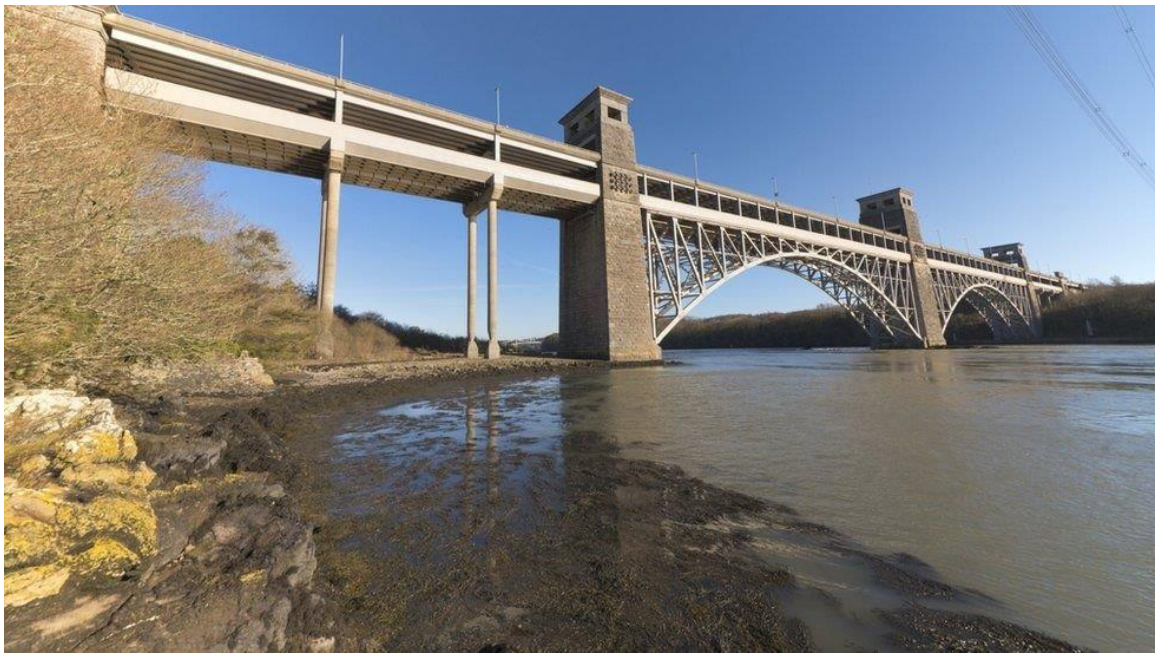

Figure 10 Britannia Bridge (photo credit: Griffiths Civil Engineering and Construction)

7. Future plans

7.1 Habitat management plans

The regional strategy for completing habitat management plans is to prioritise the areas where there are protected sites within and adjacent to Network Rail's boundary, and against areas where the baseline ELR surveys as these are completed. The output of the habitat management plans will aim to inform the management per eighth of a mile to compliment and overlap with management of other assets reported in Ellipse. Due to the extent of information that this will generate, actions and data will need to be held in an effective ecology database so as to filter the information so that it can be understood by individuals across the business functions. The Region is currently working on a requirements document for this Ecology Database solution, in consultation with the other Regions.

7.2 Stakeholder engagement plans for the next reporting period.

The Region will actively engage with key external and internal stakeholders in relation to Biodiversity, this will be mainly through the Nature Partnerships, and specifically in Wales via the working groups focused on Area Statements[13]. This stakeholder engagement will include continued engagement with WG, TfW, NRW and charities including the Royal Society for the Protection of Birds (RSPB) and Wildlife Trusts. Due to limited internal Ecological resource this engagement will continue to be based on business needs. Once we have additional Ecologists in post at a strategic level in DEAM focusing on Asset Management, then we will have dedicated resource with time for meaningful discussions with external stakeholders working on long-term aims and can strategize effectively to identify opportunities which a non-technical expert might not recognise. When we have that resource in place, then stakeholder engagement will be stepped up in the Wales & Western region.

7.3 Increasing Internal Resource

The overarching strategy and planning for biodiversity in the region are managed by the DEAM Ecology team which are a regional resource working across Wales & Western. The Ecologists in this team are recruited and mentored to provide specialist technical expertise in relation to biodiversity and habitat management. The DEAM Ecologists also

[13] Natural Resources Wales / Area Statements

undertake site survey, reporting, support the project managers and also work on solutions to mitigate for delivery of works to proceed.

Following the ‘Intelligent Client’ model becoming live in January 2022, the Capital Delivery teams have no internal Ecologist roles; instead, they will use external Suppliers.

In Wales, the Maintenance team have now created additional Ecologist roles and have five internal Ecologists to advise the Offtrack teams, and they will be based in the depots to allow visibility and easy access to advice in relation to Ecology when delivering works. This has not been replicated in Western, but there are plans to recruit in the near future.