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Transport Scotland Biodiversity Strategy

October 2026

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Foreword

Scotland's natural environment is one of our greatest assets. From our ancient woodlands and peatlands to our rivers, lochs, and coastlines, biodiversity underpins our wellbeing, our economy, and our unique cultural identity. Yet, like many nations, we face a stark reality: the continued loss and degradation of ecosystems threatens not only the species that inhabit them but also the services they provide to society. As we move towards a net-zero future, it is essential that our efforts to decarbonise transport go hand in hand with decisive action to protect and enhance our natural world.

As the agency responsible for our nation's connectivity, Transport Scotland has a crucial role to play in this endeavour. Our transport network traverses diverse landscapes, interacting with a wide array of ecosystems and habitats. This presents both challenges and opportunities for biodiversity conservation and enhancement.

As Chief Executive, I am proud to introduce Transport Scotland's Biodiversity Strategy and Delivery Plan, setting out how we will play our part in halting biodiversity loss and restoring nature, while delivering a transport system that is sustainable, inclusive, and resilient.

This sectoral Strategy represents Transport Scotland's commitment to aligning with the Scottish Biodiversity Strategy to 2045, and its overarching Framework. It outlines a comprehensive approach to minimising our negative impacts on nature and maximising our positive contributions to Scotland's unique biodiversity.

This Strategy is built around four strategic aims: to reduce the rate of ecosystem loss and degradation; to protect, restore, and enhance natural ecosystems; to increase landscape connectivity; and to avoid climate actions that harm biodiversity. These aims are underpinned by seven clear objectives - from embedding biodiversity into all our decision-making and promoting soil health, to managing invasive species, restoring habitats, and fostering meaningful partnerships with communities and stakeholders.

This is not just a plan for Transport Scotland - it is a commitment to future generations. A commitment to ensure that our transport networks do not come at the cost of nature but instead become part of its recovery. I look forward to working with our partners and stakeholders to create a transport network that truly works in harmony with nature, for the benefit of all Scotland's people and wildlife.

Together, we can build a transport system that continues to move people and goods efficiently, while also nurturing the ecosystems that sustain us all.

Alison Irvine
Transport Scotland Chief Executive



Executive Summary

‘Only by coming together to deliver substantial changes in the way we use and manage the asset which is our natural environment can we avoid irreversible damage to biodiversity.’

Scottish Biodiversity Strategy to 2045

Global biodiversity is experiencing an alarming decline driven by land use change, exploitation of natural resources, climate change, pollution, and invasive species. On average, global animal populations have declined by over 70% in only 50 years. In Scotland, wildlife has decreased in abundance by 15% since 1994 and one in nine species is at risk of extinction. The distribution of native flowering plants has decreased by half since 1970, affecting our pollinators, which play a crucial role in food production.

Scotland's transport infrastructure is fundamental to our nation's communities, businesses and visitors and is vital in providing access to essential services, such as healthcare and education. However, by its nature, the transport sector has historically contributed to biodiversity decline, through habitat loss and fragmentation, pollution, and traffic-wildlife collisions. As a national agency, Transport Scotland has already been working towards mitigating impacts of new transport infrastructure on biodiversity and implementing sustainable practices to enhance it on the existing transport network. However, the locked-in impacts of climate change are already intensifying, resulting in more frequent extreme weather events and increasing threats to our native wildlife. These escalating pressures further complicate efforts to safeguard Scotland's unique biodiversity.



The A9 and Highland Mainline Railway, passing through ecologically sensitive upland landscape
Photo: Jacobs/Gareth Talbot

The Scottish Government's recently published [Strategic framework for biodiversity](#) sets out the actions needed to reverse biodiversity loss in Scotland. This Strategy articulates Transport Scotland's plans to use the opportunities presented by the strategic transport networks to align with and support delivery of the Scottish Government's goals of halting biodiversity loss by 2030 and reversing it by 2045.

Transport Scotland recognises that the largely linear aspect of the land it manages lends itself well to landscape-scale habitat connectivity and restoration, while also presenting challenges including [the spread of plant diseases](#) and [invasive non-native](#) species (INNS).

The strategy is supported by a rolling Delivery Plan to deliver targeted actions to safeguard and restore biodiversity within the Transport Estate and help facilitate partnership working with other stakeholders to achieve maximum impact. Delivery Plan execution will be monitored and reported, with findings and new information incorporated into subsequent versions to ensure the strategic biodiversity outcomes remain evidence-based and adaptable.

Why the Strategy is needed

- Scotland's biodiversity, which we depend on, faces a crisis
- Transport infrastructure contributes to this decline through habitat fragmentation, soil disturbance, pollution, invasive non-native species (INNS) spread, wildlife collisions and sub-optimal legacy design and management approaches
- National commitments, for example the Scottish Biodiversity Strategy (SBS), Scottish National Adaptation Plan (SNAP3), National Planning Framework 4 (NPF4), Natural Environment Bill, require action to halt biodiversity loss by 2030 and reverse it by 2045

What the Strategy aims to achieve

- Reduce ecosystem loss and degradation (especially from infrastructure projects)
- Protect, restore, and enhance natural ecosystems
- Increase landscape connectivity across linear transport corridors
- Avoid approaches that harm ecosystems

How the Strategy will deliver change

- Embed biodiversity in all activities, decision-making, and supply chains
- Promote good soil health, storage, and management
- Manage the risk from INNS

- Preserve and increase landscape connectivity
- Improve existing habitats and their biodiversity benefits
- Restore and create high-quality habitats
- Promote public/stakeholder engagement and partnership working

Key themes running through the Strategy

- Embedding biodiversity in practice
- Landscape-scale thinking
- Soil as a critical asset
- Tackling INNS
- Partnership working
- Monitoring progress

What the Delivery Plan adds

- Specific actions
- Targets
- Timelines (evolving as legislation updates)
- Monitoring indicators
- Required collaborations
- Promotion of positive changes to resourcing, procurement, and contracts



The A83, Rest and be Thankful – As part of a nature-based approach to slope management, Transport Scotland has planted native woodland on the steep slopes above the road to help stabilise the ground and support engineering works aimed at mitigating landslip impacts. In addition, the woodland creation expands existing habitat networks, strengthening ecological connectivity and supporting biodiversity.

Photo: Jacobs/Maria Klimek

Chapter 1: Introduction

Biodiversity is the result of 4.5 billion years of evolution and represents the biological variety of life on Earth at all its levels, from genetic and species diversity to ecosystem variability. It is a complex web of nature essential for all the living processes. In addition to its intrinsic value, it is the source of core benefits and services that humanity depends on including food, air, water, materials as well as health and wellbeing.

There is an urgent need to act decisively to address the two closely interlinked crises of climate change and nature loss. The Scottish Government declared a Climate Emergency in 2019. The 2020 Statement of Intent on Biodiversity outlined the Scottish Government's commitment to the global drive to protect at least 30% of our land and sea for nature by 2030 ([30 by 30 initiative](#)). Scottish Ministers have also stated that the challenges facing biodiversity are as important as the challenge of combatting climate change.

The illustration below indicates the interaction between climate change and nature degradation. Climate change impacts include storms, flooding, drought, pests, disease, wildfires, and rising temperatures, while resilient ecosystems provide flood management, cooling, and carbon storage.



Twin Crises

The twin crises of climate change and nature degradation. Source: Scottish National Adaptation Plan 2024-2029. Reproduced with permission.

The mutually reinforcing link between biodiversity loss and climate change is well established. Healthy ecosystems stabilise the climate by absorbing and storing carbon dioxide but climate change is one of the key drivers of biodiversity loss.

Changing temperatures, altered rainfall patterns and increased frequency of extreme weather events are devastating habitats on a local and global scale causing unprecedented shifts in species distribution and abundance.

Degradation of habitats such as forests and peatlands reduces their carbon storage capacity and potentially makes them carbon emitters, in turn exacerbating climate change and creating a negative feedback loop.

“80% of ecological processes that form the foundation for life on Earth are impacted by climate change”

International Union for Conservation of Nature (IUCN)

However, nature is also one of the best tools we have to build climate resilience. Nature-based approaches such as restoring indigenous forests and wetlands and improving land management are among the most effective strategies for mitigating the effects of climate change. [Scottish National Adaptation Plan 2024-2029](#) (SNAP3) recognises this and includes measures to improve blue-green infrastructure, protect and enhance our natural carbon stores, and build Nature Networks.



Realignment of previously canalised Swine Burn to return it to a more naturalistic and ecologically healthy state at Junction 1A on the M9 as part of the Queensferry Crossing Project.

Photo: Jacobs/John Fowbert

The adoption of National Planning Framework 4 (NPF4) in 2023 marked a significant shift in Scotland's planning system, placing the twin climate and nature crises at the heart of planning policy and decision-making. NPF4 establishes climate change mitigation, adaptation and nature recovery as overarching priorities that should inform the preparation of plans and the determination of development proposals. In 2024, the Government published the [Scottish Biodiversity Strategy to 2045](#) and announced ambitious targets for the nation to be nature-positive by 2030, and to have restored and regenerated biodiversity by 2045. Alongside the *Scottish Biodiversity Strategy*, Scotland's strategic framework for biodiversity also includes six-year rolling [Delivery Plans](#) and the recently published [Natural Environment \(Scotland\) Bill](#), which provides a framework for statutory nature restoration targets. The strategy is also supported by the [Biodiversity Investment Plan](#) and [Natural Capital Market Framework](#) which set out recommendations to foster value-led public, private and philanthropic investment into nature restoration. Furthermore, all public bodies in Scotland have a duty – the Biodiversity Duty (see Section 5) – to further the conservation of biodiversity when carrying out their responsibilities.

As the agency responsible for Scotland's physical connectivity, as well as the management of one of the Scottish Government's most valuable assets and a significant landholding (i.e. the strategic transport network), Transport Scotland must ensure its own policies and programmes align with these challenging targets. SNAP3 commits Transport Scotland to developing a biodiversity strategy by 2026. Establishing biodiversity as a strategic priority in the planning and management of Transport Scotland's operations and activities is critical for safeguarding Scotland's natural environment. It will also help highlight and unlock opportunities for transport sector improvements which contribute meaningfully to national climate change mitigation and adaptation objectives and targets.

Scotland's natural capital assets make an important contribution to our prosperity. Pollinators support crop production, while woodlands, wetlands, and grasslands regulate the climate, improve air and water quality, and reduce the costs associated with drought, flood, and erosion. Recent analysis by [Scottish Government](#) summarised that natural capital annually supports over £40 billion in total economic output across a range of industries and area. The [direct economic benefit of nature-based tourism in Scotland](#) alone is estimated to be £1.4 billion each year. This is associated with 39,000 full-time equivalent jobs and annual visitor spending of more than £4 billion, accounting for nearly [40% of tourism expenditure](#).



Scottish bluebells are widespread throughout ancient woodlands - the main threat to the species comes from introduced non-native “Spanish bluebells” particularly near urban areas, roadsides, and other sites of human disturbance.

Photo: Jacobs/John Fowbert

The Transport Scotland Biodiversity Strategy is applicable to all areas of the agency's responsibilities, which include trunk roads, bridges, ports, airports, harbours, canals, rail networks, and ferry transportation. The quality and connectivity of ecosystems associated with the agency's assets require urgent attention to ensure they are fit to mitigate and adapt to climate change and deliver positive outcomes for biodiversity. Transport Scotland is committed to introducing the required changes to help achieve the national outcomes and targets in this ambitious timescale.



The diverse roadside landscape along the A82 near Bridge of Orchy with Beinn Dorain conical summit in the background. *Photo: Jacobs/Maria Klimek*

What is Biodiversity and Why is it Important?

Biodiversity is the variability of living organisms fundamental to the processes that sustain life on Earth, including humanity. It encompasses genetic diversity within species, between species and across ecosystems and habitats in a particular place. Biodiversity holds enormous value, enriching our lives in countless ways.

We depend on biodiversity. [Scotland's natural environment, viewed in terms of natural capital assets, is valued at £230 billion](#) and it underpins our prosperity. While a single native plant or animal species may not appear to have an obvious benefit to humankind, it may be vital to the survival of others, which we rely on for food, medicine, building materials, recreation, or climate change resilience. Pollinators are critical to crop production, invertebrates and microorganisms help to maintain soil health, while forests, wetlands and grasslands store carbon, filter pollution, improve air and water quality and reduce the risk of drought, flood and erosion. Biodiversity also positively influences our physical and mental health.

A high level of diversity in animals, plants and microorganisms at genetic, species and ecosystem levels not only allows us to thrive but it is the source of resilience, providing us with greater capacity to respond to and recover from a wide variety of disturbances caused by climate change, pests and diseases and natural disasters.



Scottish primrose is only found in Scotland and nowhere else in the world.
Photo: ©Lorne Gill/
NatureScot

Biodiversity is a complex web of interdependencies. Loss of just one species can have a [disproportionately large effect](#) on its natural environment resulting in cascades or [extinctions](#) or the [uncontrolled rise](#) of another species' population to the detriment of others.



Wild deer have no natural predators in Scotland so [deer management](#) is an important part of controlling deer numbers and protecting and restoring Scotland's biodiversity.

Photo: ©Lorne Gill/NatureScot

Once the balance in an ecosystem is lost, restoring it is a long and difficult process, and may not always be possible.

Various large-scale [landscape restoration projects](#) in progress in Scotland, such as [Cairngorms Connect](#) or [The Great Trossachs Forest](#), work to a 200-year vision. There are examples of successful [species reintroductions](#), such as [white-tailed sea eagles](#) and [beavers](#), to areas of Scotland. However, given the challenges of habitat, species, and ecosystem restoration, concerted efforts are needed to safeguard and enhance existing biodiversity assets before further losses occur.

To tackle the direct and indirect impacts of biodiversity decline, prevention is better than cure - [ecological and economic frameworks](#) show that preventing habitat destruction and environmental degradation is exponentially more cost-effective and practical than trying to reverse or 'cure' biodiversity loss after the fact.



Caledonian pinewood, Scotland's only native coniferous forest, that once covered much of the country, has suffered centuries of decline and is now protected under the European [Habitats Directive](#). Although less diverse than lowland oak and ash woodland, it supports wildlife species that occur nowhere else, including capercaillie, black grouse and the Scottish crossbill.

Photo: ©Lorne Gill/NatureScot

Transport Scotland's Need for a Biodiversity Strategy

The Scottish Government has committed to halting biodiversity loss by 2030 and reversing the decline by 2045. The first of these targets is less than five years away and with each passing year meeting this deadline becomes more challenging. Although the Natural Environment (Scotland) Act has recently received royal assent, the associated statutory nature recovery targets have still to be established and agreed. Transformative action is needed now to prevent irreversible biodiversity loss, and the Delivery Plan forming part of this Strategy is aimed at driving this forward, whilst remaining adaptable and capable of being updated when the relevant legislation becomes official.

The edges of Scotland's transport networks support a rich variety of flora and fauna and provide valuable habitats for a range of wildlife, including protected species of national and international importance. The quality and interconnectivity of ecosystems alongside and adjacent to the agency's transport estate require urgent attention to ensure they deliver positive outcomes for biodiversity.

Although legislation requires that Environmental Impact Assessment is undertaken for any new developments likely to result in significant impacts on the environment, it doesn't prevent impacts on biodiversity from occurring. Transport Scotland already looks for opportunities to extend new development boundaries where appropriate to provide suitable areas for ecological mitigation and biodiversity enhancements. However, availability of land alongside transport networks is often constrained, and the compulsory purchase route to secure land for such a purpose is both challenging and emotive. It is critical that ecological mitigation measures are carefully planned, designed, and implemented. Works must be delivered at the right time and within the anticipated window of opportunity, whilst being appropriately managed in the long term, including suitable monitoring and full documentation to ensure their success.

Biodiversity considerations have historically been perceived as less important than other aspects of the transport network management such as road safety. This translated to less funding and resourcing as well as limited awareness of biodiversity issues. The development of a Transport Scotland sectoral Biodiversity Strategy is needed to broaden the focus of the transport supply chain culture, to raise awareness of biodiversity importance, and to enable strategic investment into biodiversity, alongside the means necessary to understand and fully consider the natural capital value of the national transport estate. The Strategy will allow Transport Scotland to understand and deliver changes to its processes and practices to ensure it does all it can to support the challenging national biodiversity goals. As a government agency with extensive landholdings, Transport Scotland has both an obligation and an opportunity to contribute to these targets through the promotion of sustainable land management and integrating biodiversity considerations across its activities.

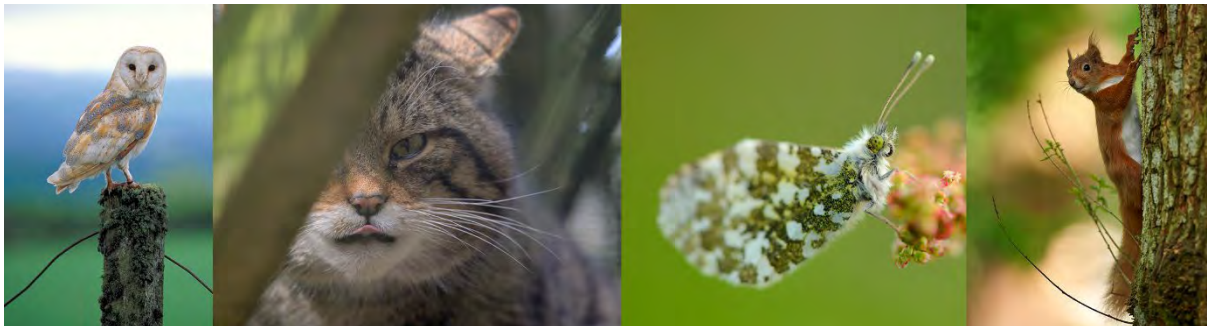
The Strategy will assist in indicating where the agency can best contribute to the goals and targets of the Scottish Biodiversity Strategy. It will help promote the restoration of biodiversity and seek to identify where the delivery of the responsibilities and actions of the agency, and its supply chain, will be adjusted to maintain and, where possible, enhance biodiversity.

It is recognised that there is a need to develop a biodiversity metric to support delivery of NPF4 and other planning policy. NPF4 Policy 3b states that national and major developments, or those subject to EIA, will only be supported where it can be shown that they will conserve, restore and enhance biodiversity, including nature networks, so they are in a demonstrably better state than without intervention. The policy requires that such proposals demonstrate significant biodiversity enhancement, in addition to any proposed mitigation and this, in turn, requires comprehensive and consistently applied measurement. The absence to date of a Scottish biodiversity metric has resulted in a range of methods being adopted to assess biodiversity impacts related to developments in Scotland, including broad use

of the English statutory biodiversity metric (often referred to as the 'DEFRA metric' or the 'English metric') which calculates the biodiversity of a site and currently requires developers to demonstrate a 10% minimum Biodiversity Net Gain (BNG). It is universally recognised that, whilst this metric has many positive attributes, its application is not wholly appropriate to the policy landscape in Scotland, or the specific requirements of our native habitats.

Work commissioned by the Scottish Government is progressing on the development of a Scottish biodiversity metric, specifically to support delivery of NPF4 Policy 3b and with a focus on adapting the existing English metric to produce a tool that is suitable for use within Scotland's policy and environmental context. NatureScot expects the Scottish biodiversity metric to be fully available in 2027, with a consultation planned this year on a working draft metric tool and accompanying guidance.

The main perceived benefits of metrics are that, where used appropriately, they can provide a consistent and transparent approach to calculating [changes in biodiversity](#) at a project level. Metrics provide clear assessment criteria and relatively easy to interpret outputs, supporting robust, evidence-based decision making. However, it is recognised that metrics have limitations as they apply a relatively simple and broad-brush approach and do not consider species or ecosystem function. Transport Scotland's [natural capital](#) approach (see below) will capture the potential value of ecosystem services provided by land within and immediately surrounding the Trunk Road Network.



Photos: ©Lorne Gill/NatureScot

1, 2. Vehicle collisions on rural roads are among the conservation threats to barn owls and Scottish wildcats in Scotland.

3. Populations of orange-tip butterflies are found widely across southern and central Scotland. [Recent surveys](#) suggest that their geographic range has increased in Scotland over the past 25-30 years and are now found as far north as Moray, possibly due to climate change.

4. Red squirrels are vulnerable to woodland habitat loss and severance resulting from transportation schemes.

Transport Scotland is already embedding the requirement to consider biodiversity enhancements, in line with NPF4 Policy 3b, on new road schemes.

Our Biodiversity Responsibilities

The aims and objectives that underpin the Transport Scotland Biodiversity Strategy are applicable to and can be applied across the full scope of the agency's assets. However, the strategy is most relevant to areas where actions and operations directly impact the condition of the landscape within and adjacent to Scottish Ministers' ownership or control. The most obvious and significant such area is the Scottish Trunk Road Network.

The Network is divided into four regional units and managed on behalf of Transport Scotland by Operating Companies through the Network Management Contract (NMC). Some parts of the Network are managed by private consortia under long-term Public-Private Partnership (PPP) concessions to deliver new infrastructure via Design Build Finance and Operate (DBFO) contracts.

As part of their roles both sets of contractors, the Operating Companies (OCs) and the DBFO concessionaires, are responsible for the annual preparation and delivery of area-focussed landscape strategies, landscape development plans, and landscape management reports, as well as annual sustainability reports. The contractors take on duties such as regular grass cutting, verge maintenance, and the control of invasive species. They must also ensure that the works they carry out support the promotion of biodiversity and conservation interests, which may require the careful use of pesticides and sensitive management of wildlife issues.

At the same time, other essential road safety and management responsibilities and obligations can have unintended negative consequences for biodiversity - these include preventing vegetation encroachment and maintaining the integrity of sightlines and CCTV camera visibility spays; delivering winter maintenance activities like salting and snow clearing; and the management of drains and ditches, including gully cleaning. It is important to harness a careful and balanced approach to these activities to maintain the safe operation of the Network whilst supporting nature connectivity and the agency's legal obligations to further the conservation of biodiversity when exercising its functions.

Transport Scotland operates a data management and performance monitoring platform known as Asset Management Performance System (AMPS), which records the assets that make up the Trunk Road Network estate which the OCs are required to manage and update. This includes a landscape inventory that records all aspects of the Trunk Road Network soft estate (the vegetated areas alongside roads). Transport Scotland's Trunk Road Information Manual (TRIM) sets out the OCs' contractual obligations for asset data inspection and maintenance required to achieve the agency's corporate management objectives.

These incorporate a suite of requirements related to the soft estate, including grass and verge maintenance, the management of trees, shrubs, and scrub vegetation, and the surveying, inspection, prioritisation, and control of non-native invasive and injurious species.

The promotion of active travel and expanding the National Walking, Wheeling and Cycling Network, offers opportunities for [biodiversity enhancement](#) and contribution to green networks, while also preventing large numbers of car journeys and thereby helping to avoid pollution as well as greenhouse gas emissions.

Natural Capital

The natural resources all around us, including air, water, minerals and all living things, provide flows of benefits or ecosystem services – direct and indirect contributions that nature provides for human wellbeing and quality of life, whether individually or to wider society. Recognising and incorporating ecosystem services in development models and management processes is referred to as a natural capital approach.

The importance of measuring natural capital is widely acknowledged as fundamental if Scotland is to become Nature Positive by 2030 and to restore and regenerate biodiversity by 2045. This approach considers nature as a capital asset to encourage policymakers and businesses to recognise the immense, often unvalued positive effect that nature provides to society. This can foster more sustainable decision-making and improved environmental protection, whilst supporting a more comprehensive understanding of wealth and value by recognising the inherent contribution of natural assets.

Transport Scotland has prepared a natural capital baseline assessment (and set of accounts) of the entire Trunk Road Network. A natural capital approach helps capture the true value of Transport Scotland's estate and demonstrate the potential value of ecosystem services provided by land within and immediately surrounding the Trunk Road Network.

The natural capital baseline assessment also provides a useful resource to inform the development of new projects as well as existing estate management opportunities, and a means to measure progress on the delivery of biodiversity objectives. The baseline is presented on two scales – Scope 1, within the maintenance boundary, which is land owned or managed by Transport Scotland; and Scope 2, within a 1km buffer (reducing to 100m in urban areas), representing land that may be influenced by, or have an influence on the management of the Trunk Road Network.

Biodiversity is not treated as an individual ecosystem service but is instead considered as a core component of natural systems that underpin the delivery of all other ecosystem services.

The ecosystem services included in the natural capital assessment are:

- food production
- wood production (timber)
- carbon sequestration and storage
- flood regulation
- air pollutant removal
- water quality regulation
- recreation
- noise reduction and
- pollination

Whilst many of these services will be more prevalent beyond the trunk road boundary, there is potential for Transport Scotland to have an influence on their provision through construction and operation related to the Trunk Road Network. The development of a natural capital baseline to inform decision making is of strategic importance in terms of understanding and influencing Transport Scotland's sum contribution to managing the natural environment and maximising opportunities for the agency to support the delivery of national biodiversity targets.

Our Estate

Most of the Transport Scotland estate comprises linear areas around the Trunk Road Network and Scotland's rail network. Other areas, such as parcels of land around ferry terminals, tend to be small and disconnected from other parts. Scotland's railway network is almost entirely owned and managed by Network Rail on behalf of the UK government. Thus, the Trunk Road Network estate is the prime beneficiary and driver of the Transport Scotland Biodiversity Strategy. Whilst most obviously associated with the roadside verges, the Trunk Road Network estate also incorporates remnants of habitat listed on the Ancient Woodland Inventory and Sites of Special Scientific Interest (SSSIs). The estate also contains wetland areas which contribute to a blue-green infrastructure network.

Transport Scotland manages 3,745km (2,327 miles) of trunk roads and motorways (the Trunk Road Network) which account for 7% of all roads in Scotland and carry

40% of all traffic and 70% of HGV traffic. The agency is responsible for over 11,000 hectares of land associated with the Trunk Road Network. Transport Scotland oversees the trunk road OCs' programmes of inspection, maintenance and improvement work and their delivery of routine maintenance.

The trunk roads operations and maintenance schemes, alongside new infrastructure projects, are all required to meet statutory, legislative and contractual requirements in relation to biodiversity, along with a range of standards set out in the Design Manual for Roads and Bridges (DMRB), including [LD 118 Biodiversity design](#) and [LD 117 Landscape design](#) (including Scotland National Application Annex).



Northern marsh-orchids growing on the verge of the A9 near Pitlochry. *Photo: Jacobs/John Fowbert*

Scotland's railway network (managed by Network Rail) extends 2,819km (1,751 miles) across the country. Transport Scotland is responsible for Scotland's rail policy and delivery, as well as providing input on matters reserved to the United Kingdom Government.

In addition, there is land associated with other parts of the transport network including various ports and harbours which come under Caledonian Maritime Assets Limited (CMAL) and are owned by Scottish Ministers. Transport Scotland acts as the Scottish Government's sponsor to provide management oversight and corporate governance via the Ferries and Ports Directorate.

Scottish Ministers own Highlands and Islands Airports Limited (HIAL) which operates 11 airports mainly across the west and north of Scotland. Separately, Scottish Ministers also own Glasgow Prestwick Airport. However, Transport Scotland's role in shaping biodiversity strategy here is likely to be limited given the [constraints on habitat and wildlife management](#) at [airports](#) and the fact that aviation policy is generally reserved to UK Government.

Scottish Canals is a stand-alone public body, funded (via Transport Scotland) by Scottish Government grant aid, working to protect and improve Scotland's canal network. The body manages an array of assets associated with the canal network, including structures, buildings, waterways, and towpaths. Historically it has had its own [Environment Strategy](#) which includes [Biodiversity Management](#).

The Decline in Biodiversity

The Scottish Biodiversity Strategy cites the five direct drivers of global biodiversity loss which are:

- changing use of land and sea resources, especially for agriculture, forestry, fish farming, and coastal infrastructure;
- direct exploitation of organisms via harvesting, logging, hunting, and fishing;
- climate change;
- pollution; and
- invasive non-native species (INNS) and growing prevalence of pathogens.



Clockwise from left:

Red squirrel and swift
(Photos: ©Lorne Gill/
NatureScot)

Puffin (Photo: Jacobs/
Mark Lancaster),

Examples of species
threatened with
extinction in Scotland.

Understanding the current state of biodiversity and the extent and rate of its decline in Scotland is the starting point for developing a strategy aimed at halting and reversing losses. Indicators of the abundance of marine seabird populations and selected terrestrial species in Scotland show [significant declines](#). Research published in the [State of Nature Scotland 2023 report](#) highlights that:

- since systematic monitoring of 407 species in began in 1994 the abundance of those species has reduced on average by 15% and in the last decade alone 43% have declined;
- since 1970 the distribution of half of flowering plants has decreased;
- one in nine Scottish species are threatened with extinction including mountain bumble bees, red squirrels, Scottish wildcats, capercaillies, swifts, puffins, curlews, kestrels, tree sparrows, brown hares, hedgehogs and alpine blue-sow-thistle to name just some terrestrial species; and
- Scotland's seabirds have declined by half between 1986 and 2019.

Scotland's environment is also influenced by indirect factors like consumption habits, demographics and urban growth, economics and technology as well as political, institutional and governance factors. They include the societal values, attitudes and behaviours that contribute to substantially exceeding our share of planetary resources.

While many of these fall outside the scope of this sectoral biodiversity strategy, Transport Scotland is committed to taking responsibility for raising awareness and influencing attitudes in areas within the scope of the strategy.

The Impact of Transport Infrastructure Upon Biodiversity

Construction of new transport infrastructure usually results in loss or fragmentation of habitats which can lead to their general long-term decline as they cease to be ecologically functional units. New construction also impacts wildlife, whether through habitat loss and noise and light pollution, introduction of dust, silt and other pollutants (e.g. fuel or exhaust fumes) or the danger posed by construction traffic and, following completion, the fast-moving vehicles on the new road. Unless mitigated, new infrastructure creates barriers to the movement of animals, thus fragmenting their populations and territories.

Development on greenfield land needs to be carefully considered, given its biodiversity potential, and take account of the [mitigation hierarchy](#), which prioritises avoiding impacts in the first place.

Any recognised need for a new transport corridor must be balanced with robust environmental assessment of the project, appropriate siting informed by the natural capital value of the receiving landscapes and the need to provide biodiversity enhancement.

Construction of new transport infrastructure usually involves felling trees, which constitutes a loss of biodiversity and contributes to habitat fragmentation. Improper disposal of material can also add to the spread of INNS and pathogens. The removal of vegetation also exposes soil to erosion from wind and water. Associated loss of soil (both particulate and nutrients) can lead to an unsuitable media for plant growth with the eroded material contributing to the pollution of freshwater habitats.

New transport infrastructure construction typically involves extracting, stripping, storing and moving large volumes of materials including minerals and soil. Construction traffic results in soil compaction, reducing the porosity and increasing the density of soil. This makes it more difficult for plant roots to grow through the soil and uptake nutrients and water. It also affects the diverse microorganisms that live in the soil (microbiome), which play a crucial role in maintaining soil health in a natural context and overall ecosystem functioning. Creation of impervious surfaces, such as roads, seals the soil, diminishing its capacity to support animals and plants and absorb and clean water. Pollution from construction activities results in soil contamination.

In natural environments, topsoil contains the highest concentrations of organic matter, nutrients and microorganisms, making it the most productive soil layer. One hectare of it can contain up to 5 tonnes of living organisms.

However, it takes more than 500 years to form two centimetres of topsoil which means it is a priceless, non-renewable resource. When improperly stored soil becomes degraded which in turn impacts on carbon sequestration and ecosystem resilience. New construction frequently results in surplus topsoil, which necessitates planning and finding uses for it. It can also adversely affect the local peat stores and the water environment, which impacts local ecosystems.

New transport schemes usually involve planting and seeding, which aim to replace or offset the vegetation and habitats lost due to construction but require appropriate ground preparation, regular maintenance and plenty of time to successfully establish and become an effective part of the ecosystem.

Biodiversity impacts can also be associated with business planning and decisions made related to supply chains and materials, and it is important that Transport Scotland continues to implement sustainable sourcing policies whilst supporting circular economy principles that reduce waste, promote recycling, and carefully consider the use of natural resources.

Existing transport infrastructure impacts biodiversity mainly through:

- forming a physical barrier within and between ecosystems and natural habitats
- traffic-related wildlife mortality and disturbance of adjacent habitats – affecting animal populations
- spread of INNS through seed and vegetative propagules, typically in the form of fragments of stem or rhizome, along transport corridors
- effects of pollutants such as heavy metals, nitrogen, particulates, ozone or substances used on roads in winter on the surrounding ecosystems and
- challenges associated with maintenance and management of the roadside vegetation and the culture within organisations responsible for it

The establishment of existing infrastructure has resulted in the fragmentation of areas of habitat, such as woodland, heathland or bog. This spatial disconnection has led to the isolation of species populations and the disruption of ecological connectivity resulting in a reduction in the functional integrity of these ecosystems, and the eventual decline and loss of biodiversity. [Red squirrels](#), for example, require a minimum woodland area of 200 hectares for a viable population although an area of 2000-5000 hectares is considered ideal.

Whilst it is increasingly recognised on recent and new transport schemes that there is a need for providing safe wildlife passage under or over the road to link habitats, such permeability is often lacking on historic transport routes.

Traffic-related wildlife mortality is another cause of biodiversity loss on existing transport infrastructure. Between January 2022 and May 2023 over 1,500 dead animals were recorded on Scotland's main roads. More than half of these were deer whilst 20% were badgers and 17% were foxes. Other animal deaths recorded included otters, owls and pine martens as well as domesticated animals and livestock.



Although widespread, there have been local declines in the range of the common blue butterfly, which is found in a variety of habitats, especially sunny, sheltered spots, including road verges.

Photo: Jacobs/Gareth Talbot

Marine wildlife, such as whales, seals and basking sharks, is also occasionally seriously injured or killed in [collision with vessels](#) (ship strikes). There is no readily available data on the mortality of birds resulting from collision with aircraft, however, due to the considerable danger posed by birds to aircraft and the people they carry, efforts are made to prevent [bird strikes](#) by discouraging them from areas around airfields and avoiding flight through areas where they are likely to be in higher concentrations. Ground nesting birds such as oystercatchers, which are highly vulnerable during their breeding seasons, are known to nest within areas of the Transport Scotland estate.

Transport routes also facilitate the spread of INNS with vehicles acting as major vectors of long-distance seed distribution through the slip stream around a vehicle as it moves and/or by physical attachment onto the vehicle's frame. Due to the higher proportion of traffic supported, national roads can have a greater volume of non-native species compared with local roads.

Existing impervious road surfaces and their runoff affect groundwater and its movement, which can result in deterioration or loss of important habitats such as bogs. Data is not yet collated for the Scottish Trunk Road Network, however, a report published in 2024 noted that there are more than 18,000 known outfalls associated with the motorway and Trunk Road Network in England and likely more than a million local highway drains discharging directly to watercourses.

Highway runoff samples show elevated levels of toxic and bioaccumulative priority pollutants that exceed published standards that have been set to protect aquatic organisms and wildlife from harm. Poorly designed road drainage systems such as upright kerbs and uncovered gully pots can act as 'death traps' for amphibians including frogs, toads and newts, which travel along kerbs to breed or migrate, leading to mass mortality or the isolation of populations.

[Air pollution around motorways](#) has been shown to affect the health of oak and beech trees, and vascular plant composition in blanket bog. Effects extended to 100m from the roads and were correlated with nitrogen dioxide (NO₂) concentrations.

Whilst there is a clear requirement to manage the risk associated with icy road surfaces in winter, the use of road salt is well-known in the enabling of [maritime \(salt-tolerant\) species](#) to spread along British roadsides.

[Sea plantain](#) is found along inland road verges and continues to spread on the verges of salt-treated roads in Scotland, supplanting less salt tolerant locally indigenous species.

The maintenance and management of the extensive trunk road landscape is subject to various resource constraints and the need to ensure public safety, which can sometimes conflict with achieving positive biodiversity outcomes. For example, vegetation must be cleared to maintain visibility required for road safety. Similarly, where ash dieback affects roadside trees, they need to be felled if they pose a risk to the public, rather than left to naturally decompose. In addition, special care needs to be taken when disposing of diseased trees and invasives to ensure compliance with the relevant [regulations and guidance](#) and to avoid spread of disease and INNS.

Some of the existing trunk road maintenance funding arrangements, such as performance indicators and payment mechanisms, can encourage the automatic adoption of frequent grass cutting or tree pruning and felling which can be detrimental to the biodiversity of the roadside landscape. However, there is potential flexibility within maintenance contracts that can be explored for future operations, including biodiversity-focussed specialist input, both at the higher decision levels and on the ground. The importance of preserving and enhancing biodiversity needs to be at the heart of the organisations managing the existing transport network through appropriate communication, training, new appointments and new incentives.

Chapter 2: Strategic Aims

Transport Scotland must ensure its own policies and programmes align with the various national plans and strategies relating to biodiversity, and specifically with the new [Scottish Biodiversity Strategy](#) (SBS). Achieving these targets will be challenging particularly the main objectives for the nation to be nature-positive by 2030, and to have restored and regenerated biodiversity by 2045.

The Strategy also needs to ensure that biodiversity considerations are embedded across the agency's activities and decision making. An introduction to each of the four Strategic Aims is provided below. Taken together, these will assist in delivering Transport Scotland's Biodiversity Duty and its contribution to the national nature-positive targets.

Strategic Aim 1: Reduce rates of ecosystem loss and degradation

NPF4 requires new developments to deliver positive effects for biodiversity, ensuring the environment is left in a demonstrably better state than before. The activities of Transport Scotland must seek to reduce the degradation and loss of natural habitats and systems. Infrastructure projects generally lead to the loss or reduction of habitats caused, for instance by land-take, pollution, and general environmental disturbance. This can affect the ability of a habitat to provide services such as food, water, and shelter for animals, making it harder for species to survive and generally reducing biodiversity viability. Reducing rates of loss and degradation will help Transport Scotland fulfil its Biodiversity Duty and support the Scottish Government's aims for Scotland to be Nature Positive by 2030. Positive effects for biodiversity will be measured using the forthcoming Scottish biodiversity metric expected to be in place in 2027.

Strategic Aim 2: Protect, restore, and enhance natural ecosystems

Protecting and restoring natural ecosystems will involve conserving intact natural habitats and implementing actions such as habitat restoration, pollution reduction, and the removal of invasive non-native species, and wherever possible avoiding their colonisation in the first place. Effectively managing areas adjacent to designated sites will help protect those sites and potentially expand natural ecosystems and the services they provide. In addition, site and ecosystem resilience will be increased, helping to maintain the ecosystem's capacity to maintain its essential functions. This

will help Transport Scotland fulfil its Biodiversity Duty and support the Scottish Government's aims for Scotland to be Nature Positive by 2030, and to have restored and regenerated biodiversity across the country by 2045.

Strategic Aim 3: Increase landscape connectivity

Landscapes can facilitate or impede the movement of organisms and ecological processes between habitat patches. Preserving or creating this connectivity is an important strategy in protecting biodiversity and maintaining viable ecosystems. The barrier effect created by much of the Transport Scotland infrastructure impedes this connectivity. Large infrastructure schemes will often have a requirement for wildlife permeability/landscape connectivity built into them, but much of the legacy infrastructure will not so retrospective improvements should be made where possible through modifications or maintenance activities. Improving and maximising this connectivity within and beyond the Transport Scotland estate will assist in increasing the resilience of ecosystems to climate change or other perturbations.

Strategic Aim 4: Avoid approaches that have negative outcomes for ecosystems and biodiversity

New construction projects or modification to existing transport infrastructure have the potential to cause negative outcomes for biodiversity, for example through habitat loss and severance. Whilst significant schemes are typically subject to environmental impact assessment, which looks at how ecological impacts can be mitigated, design efforts must be focussed on avoiding adverse impact altogether wherever possible. Furthermore, in addition to mitigating specific predicted impacts, designs must be future proofed in anticipation of possible future trends, providing opportunities for biodiversity to thrive in the long term and enhancements to achieve positive effects for biodiversity.

Maintenance and management approaches, often involving intensive 'blanket' management or chemical applications, can degrade ecosystems, removing habitats and disrupting wildlife lifecycles. Indiscriminate or frequent mowing can destroy wildflower habitats before native plants set seed and increases foraging wildlife mortality, as well as removing shelter and food sources for insects and small mammals. Spraying of herbicides reduces plant diversity, typically removing broad-leaved species that provide a food source to pollinators and introducing toxins into adjacent soil and water.

Removal or aggressive pruning of trees, hedgerows and scrub or removing deadwood can significantly reduce the carrying capacity of local ecosystems. We will continue to review the ways in which we manage the transport estate to avoid such negative effects on biodiversity.

Climate change significantly affects biodiversity by altering ecosystems and having such effects as habitat loss and increased ecosystem stress which can lead to species destruction and possible extinction. Moreover, measures to counter the more generalised effects of climate change may also indirectly and inadvertently affect biodiversity. Inappropriate afforestation, for example, may negatively impact ecosystems and the species they support. Where Transport Scotland undertakes climate mitigation measures, we will carefully consider and avoid any potential negative impacts on ecosystems and biodiversity. Nature-based solutions are vital to mitigating climate change by harnessing ecosystems to capture, store and help prevent the release of greenhouse gases.

Chapter 3: Delivery Plan

Delivering the change

Ecosystem restoration is achieved both through measures designed to mitigate losses and through the delivery of ecological enhancements. These approaches are implemented primarily as discrete interventions at the local level. However, there is an increasing need for a more interconnected, landscape-scale approach to achieve an appropriate level of mitigation and enhancement, particularly for new schemes which are now required to achieve positive effects for biodiversity.

The Strategy will integrate biodiversity considerations across the agency's activities and its supply chains through a series of

associated actions outlined in a [Delivery Plan](#). The Plan will roll across multiple years, providing a pragmatic approach to achieving the overall objectives of the Strategy while maintaining the necessary focus on the need for change. This flexibility will support the implementation and development of the actions, whilst accommodating any relevant new policy and guidance as it is brought forward.

To achieve the Strategy objectives, the cooperation of various parties is needed, such as public bodies, nature conservation organisations, Trunk Road Network OCs/DBFO concessionaires, and neighbouring landowners etc. The core areas of such collaboration must be based on the assumptions of inclusiveness, commitment, and shared responsibility. This approach doesn't need to be limited to the Strategy's footprint. The better the alignment of participating entities, the greater the real and long-term impact of the Strategy, as well as the social value derived.

Additionally, there are likely to be indirect benefits of implementing the Strategy, such as creating opportunities for nature-based tourism and economic diversification. The improvement of environmental quality, together with investments, managed roads, and other infrastructure will support a positive environment for local employment and businesses. All these actions will lead to stronger relationships with collaborating partners and a greater awareness of impacts on biodiversity and natural capital.

Strategy Objectives

The Transport Scotland Biodiversity Strategy has seven overarching objectives, and these are as follows:

Objective 1: Embed biodiversity protection and enhancement further into Transport Scotland's activities and decision making and those of its sub-contractors and consultants

To ensure that the strategic aims can be achieved, and to support many of the other objectives and actions of the Strategy, it will be necessary to ensure that biodiversity is embedded within all of Transport Scotland's activities and decision making, as well as those of its sub-contractors, consultants and supply chain. Many activities to protect and/or enhance biodiversity are currently undertaken by Transport Scotland and its sub-contractors. However, to fully realise the synergistic benefits of the Strategy, it will be essential to keep in place continuous improvement of existing approaches – enhancing these practices will ensure alignment with the Strategy's objectives and maximise their collective impact.

The inventory of landscape and ecological assets will be important to verify, update and maintain to ensure that all other objectives and many of their actions can be achieved. The inventory should be required to include, for example, habitat types and condition, wildlife fencing and crossing points, and other biodiversity related features. It must also be consistent, complete, and accurate across all aspects of Transport Scotland's activities, and those of its sub-contractors, to enable robust assessment. It could also be linked to other publicly available environmental sources, such as Sitelink.

To achieve this objective, six actions have been identified which will raise awareness of biodiversity amongst the various stakeholders, giving it the prominence required to ensure that targets can be met. This also requires that contractual and specification documents are amended/updated to ensure that incentives work in favour of biodiversity-related obligations.

It is important that the appropriately qualified people are in place as they support the actions of this and interrelated objectives, including for instance, [Objective 5: Manage existing habitats to improve condition and biodiversity benefits](#), and [Objective 6: Restore and create high-quality habitats](#).



Case Study:

On A9 Dualling Programme trials of native low growing seed mixes were undertaken to inform the development of wild flora species mixes to use in central reserves. The bespoke seed mixes, instead of the default stone chipping treatment within central reserves, are expected to benefit pollinators and enhance the wildlife habitat along the road corridor. *Photo: Jacobs/Mark Lancaster*

Objective 2: Promote soil health, storage and management

Natural soils are a complex system comprising biotic and abiotic elements including nutrients, minerals, organic matter and living organisms. This natural ecosystem is one of the main reservoirs of biodiversity on earth and supports essential ecosystem services like nutrient cycling, water regulation, carbon storage, food provision and pest control. The link between aboveground and belowground diversity is strong. There is often limited information on the distribution and properties of soils present on a site. This leads to a lack of understanding of what effects they may have on hydrology, their habitat potential and sensitivity to damage. This is a particular issue for carbon-rich soils supporting valuable peatland habitats and their role as carbon stores and in regulating water flows, as well as supporting biodiversity. Poor management of peat resources can result in erosion, increased flood risk and loss of sequestered carbon. The inappropriate use and management of natural soil resources can result in the failure of planting schemes and excessive surface runoff.

The actions are aimed at raising awareness of the importance of soil biodiversity, promoting and implementing soil protection measures, identifying and appropriately handling and using biologically valued soils. Some will require the further development of contract documents for both the delivery of new infrastructure projects and the NMC contracts to ensure that good practices are embedded in the activities of the various contractors. This objective has links with [Objective 1: Embed biodiversity protection and enhancement further into Transport Scotland's activities and decision making and those of its sub-contractors and consultants.](#)

The Scottish Soil Framework recognises soils as a critical natural asset which underpin all nature-based systems and are therefore vital for Scotland's communities and economy. Soil health, which defines its capacity to function and to adapt to change, is a key factor in sustaining terrestrial ecosystems and supporting environmental services. Soil health status (good or bad) is a record of its physical, biological and chemical properties.

Soils store, filter and transform many substances, including water, nutrients and carbon. Maintaining soil health will ensure a higher resilience and ability to respond to change. Avoiding soil degradation (i.e. a change in the soil health status resulting in a diminished capacity to function) will also support the activities of [Objective 6: Restore and create high-quality habitats.](#)



Scottish bluebells are a classic ancient woodland indicator species in Scotland, thriving in healthy woodland soils. Ancient woodland should be retained and its vegetation and soils protected.

The wholesale translocation of ancient woodland soils to attempt to mitigate direct impacts has been undertaken on some recent infrastructure projects, but there is currently little scientific evidence to prove that it will be successful in maintaining the ancient woodland soil microbiome, and soil handling in itself is disruptive to the soil structure. *Photo: Jacobs/John Fowbert*

Objective 3: Manage the risk from invasive non-native species

Non-native species are considered a primary risk to biodiversity especially when they are invasive. A number of these species have been identified within Transport Scotland's landholding through surveys associated with the maintenance of the Trunk Road Network or with large infrastructure projects some of which, but not all, are acknowledged to be invasive and a threat to biodiversity to some degree. Many of these species are now being treated through annual control programmes.

Not all non-native species are likely to be a threat to biodiversity; in invasive biology there has been a "tens rule" suggesting that only one in ten non-native species will become established, and of those, only one in ten will become a pest or invasive. There will therefore be a need to identify those species most likely to be a risk to biodiversity within the Transport Scotland estate and those that may become a risk due to, for instance, climate change. This will require raising awareness of the importance of the risk of these species to biodiversity, as well as providing information on the identification of these species.

Accurate information is required on the location of these species as well as an understanding of their relative risk to biodiversity, both currently and in the future. The types of species and their density is currently being recorded on the AMPS system, although consistency across all networks/contracts needs to be ensured; an accurate inventory will be paramount in ensuring that non-native species will be effectively managed

NatureScot lists only [four invasive plant species](#) that cause the most damage – rhododendron, Japanese knotweed, giant hogweed and Himalayan balsam – plus two others stated to have great potential to be invasive in certain habitats – American skunk-cabbage and giant rhubarb. However, the development of a list of priority non-native species for action will be required to consider a broader range than that which is currently identified. This will need to be appropriate to the Transport Scotland estate and will require regular review and updates as necessary. It should also be clear that the emphasis on the control of 'invasive' species should not be targeted at native species, such as rosebay willowherb, without specific direction.

Additionally, whilst plants are often the most visually obvious of invasive non-native species, the focus of this objective should not solely be on them. The list will also take cognisance of lists of priority species for management developed as part of the emerging Scottish Action Plan for Invasive Non-Native Species 2026-2032 as well as other species identified through local engagement and/or in sensitive areas such as the National Parks.

Partnership working ([Objective 7: Promote Public and Stakeholder Engagement and Partnership Working](#)) is likely to be needed in some situations to ensure success and prevention re-colonisation by a non-native species. The [Tweed Invasives Project](#) was initiated in 2002 and focused initially on controlling giant hogweed. It took a long-term, coordinated, catchment-scale, partnership approach to effectively control a non-native species. The Project continues to run managed by the Tweed Forum which is a partnership of 27 public and private organisations including the Scottish Government.



Invasive non-native plant species such as Japanese Knotweed and North American skunk cabbage (pictured) are a growing threat along transport corridors. *Photos: ©Lorne Gill/NatureScot*

Objective 4: Preserve and increase landscape connectivity

As stated under the strategic aim [Increase Landscape Connectivity](#), preserving and increasing landscape connectivity will protect wildlife, maintain viable ecosystems, and assist in developing resilience. By their nature roads cut across landscapes potentially affecting this connectivity and influencing population dynamics, community structure, and the flow of ecological processes. The actions under this objective will seek to identify locations of the existing transport network that are or might have been key connectivity points for biodiversity and look to develop solutions to reduce barriers. The actions will also seek to embed landscape connectivity into new infrastructure projects thus avoiding barriers in the first instance. Preserving and increasing landscape connectivity will help protect wildlife, maintain viable ecosystems, and assist in developing resilience.

Previous DMRB guidance on wildlife crossings is no longer available and new guidance is in preparation. Additional review work may need to be undertaken to identify the most appropriate provisions for connectivity interventions.

Incorporating blue-green infrastructure into new schemes can assist in creating new resilient ecosystems that will promote biodiversity and help landscape connectivity, along with potential additional benefits such as flood mitigation and, air and water quality improvements. Blue-green infrastructure can also be valued by communities for its aesthetics and well-being benefits.

This objective has links with [Objective 7: Promote Public and Stakeholder Engagement and Partnership Working](#) in relation to promoting partnership working to link biodiversity hotspots and engaging with stakeholders.



Wildlife overpass on the Tartu-Tallinn highway in Estonia. Photo: [Sillerkiil](#), [CC BY-SA 4.0](#) via [Wikimedia Commons](#)

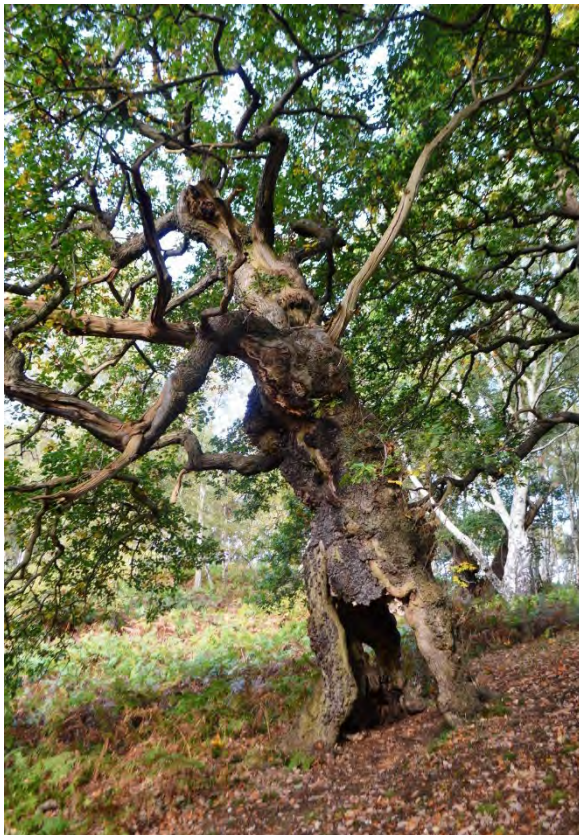
Objective 5: Manage existing habitats to improve condition and biodiversity benefits

Habitats that provide the necessary environmental resources and conditions for an organism or species to thrive, leading to the maintenance of a healthy population, are said to be in good condition. Existing habitats within the transport estate, and especially those associated with the Trunk Road Network, are often in sub-optimal condition due largely to historic insufficient consideration of environmental connectivity, and even some current practices and approaches to management. In some cases, understanding has changed such that the original design aims at the time measures were created are no longer relevant.

Managing existing habitats effectively should also enable opportunities for enhancement outwith the trunk road estate to be identified, allowing for increased landscape connectivity.

However, it is recognised that there will be parts of the transport estate where opportunities to improve condition are limited.

The trunk road estate may support old and veteran trees which are recognised for their value as habitats as well as cultural and heritage importance. Veteran trees can have significant decay features which can contribute to their exceptional biodiversity. However, these can represent challenges to the safe operation of transport infrastructure. The age of a veteran tree will vary significantly as silver birches may only live up to 100 years whereas oaks can live for several hundred years.



Veteran trees make an important contribution to biodiversity. Photo: ©John M [CC BY-SA2.0](#)

Roadside verges and other suitable grassed elements can create a network of wildflower rich grassland. Plantlife has produced [guidance](#) and information on the potential for grassland restoration and nature-friendly road verge management. Verges, when managed sympathetically, can become important refuges for some orchid species such as northern marsh-orchid and greater butterfly-orchid. However, nature-friendly management may be at odds with public perception where such management can be perceived as verges being unkempt and neglected. The actions of this objective will work closely with those in Objective 1 to improve the condition of roadside habitats and benefit biodiversity, and with those of Objective 7 in raising public awareness and understanding.



Case Study:

Greater butterfly-orchids on the A83 in Argyll. The species has suffered gradual but protracted decline. Verge management at this location has created conditions suitable for the species. *Photo: Jacobs/John Fowbert*

Objective 6: Restore and create high-quality habitats

Restoration and the creation of high-quality habitats is crucial for biodiversity, ecosystem health, and human well-being. It can also assist in infrastructure resilience and protection. Transport Scotland can play an important role in helping to deliver the Scottish Government's strategy and targets for halting biodiversity loss in Scotland and be Nature Positive by 2030, and to have restored and regenerated biodiversity by 2045.

The actions under this objective are aimed at ensuring good design appropriate to the relevant ecosystem, designing and managing habitats to improve their condition, and expanding areas of priority habitat where possible.

These actions seek to ensure good design when creating or restoring habitats; design that is relevant to and appropriate for Scotland. They are aimed at identifying the requirements of habitat areas in terms of current and intended species and then ensuring that there is a plan in place in place to achieve the intended ecosystem.

The actions are intended to be incorporated into the requirements for new schemes as well as for the ongoing maintenance and renewal, where needed, of existing vegetation areas.



Case Study:

On the Queensferry Crossing project new native woodland was planted in advance of the main road and bridge construction work to help mitigate the impacts of the scheme by reconnecting two fragments of existing ancient woodland. *Photo: Jacobs/John Fowbert*



Case Study:

Network Rail, in partnership with Forth Rivers Trust and NatureScot, has completed a major project to restore 273 hectares of peatland at Knoxfauld Farm north of Dunblane. As well as supporting flood management by retaining more water and increasing climate resilience, the project aims to improve wildlife habitats and restore natural peatland processes. With climate change expected to bring more frequent extreme weather, nature-based solutions such as peatland restoration will play an important role in helping transport infrastructure adapt while creating more space for wildlife to thrive.

Photo: ©Network Rail

Objective 7: Promote public and stakeholder engagement and partnership working

The actions under Promote stakeholder engagement and partnership working seek to raise the public awareness of the importance of the trunk road estate in delivering benefits to biodiversity. Public and stakeholder engagement can be an important way of achieving biodiversity goals. It can help build awareness, cooperation and assist in decision making. It will also help ensure that the Strategy has broad support amongst Transport Scotland's stakeholders and the public.

Partnership working will involve collaboration with a range of groups such as other parts and agencies of government, businesses, communities and non-governmental organisations. It may also include other groups and teams within Transport Scotland and as such there will be linkages to Objective 1 in embedding biodiversity further into Transport Scotland's activities and its teams. These partnerships may share resources, action plans and policies to achieve shared goals. The nature of the partnership will likely vary depending on what needs to be shared to achieve the specific goal/aim.

For the successful delivery of the strategy, there will be a need to engage with stakeholders and adopt a collaborative approach to many of the individual actions.

This objective will be important in facilitating projects and agreements across the trunk road estate and the adjoining landscapes where requirements and circumstances allow. There are cross-cutting linkages to other objectives and actions; Objective 3 (non-native species risks), Objective 4 (landscape connectivity) and Objective 6 (high-quality habitats) all have actions that support the need to promote partnership working with, for example, statutory bodies, landowners and other stakeholders, for effective delivery.



Case Study:

In 2026, Scottish Canals is working with Falkirk Council, Forth Climate Forest, Clyde Climate Forest, John Muir Way employability trainees, and The Conservation Volunteers (TCV), including Falkirk High schools and Forth Environment Link, Tamfourhill community and primary school, to plant community orchards and stepping-stone woodlands (5m x 5m in area) along the Forth & Clyde Canal, the Union Canal, and at The Falkirk Wheel. At the same time Scottish Canals is restoring gaps in historic hedgerows, which are rich sources of forage and shelter for urban wildlife, and many of which were originally planted by the early eighteenth-century canal builders.

Photo: ©Scottish Canals



Case Study:

During the planning phase of the Aberdeen Western Peripheral Route (AWPR), it was determined that sufficient ecological measures would not be possible to fully mitigate the impacts of the project within the corridor of land purchased for road construction. In response funding was provided to selected third party organisations for offset mitigation projects on private land within the wider area, including the reintroduction of water voles, wetland restoration, invasive non-native plant control and woodland habitat creation in the river catchments crossed by the new road. To address the potential impacts of the new road on red squirrels resulting from the loss and severance of woodland habitats, combined with competition from the invasive non-native grey squirrel, Saving Scotland's Red Squirrels joined efforts with Aberdeen City Council and Forestry and Land Scotland. Over the 10 years funded by the AWPR, significant progress has been made towards achieving the main goal to eradicate grey squirrels and facilitate the recovery of the iconic red squirrel in both Aberdeen City and Aberdeenshire. *Photo: Jacobs/John Fowbert*

Chapter 4: Governance

The delivery of the Strategy will be, primarily, through new projects and management measures within the existing Transport Scotland Estate. Whilst the Strategy reflects the wider objectives of the Strategic Framework for Biodiversity and the Scottish Biodiversity Delivery Plan 2024-2030, the responsibility for its governance, management and delivery will fall to Transport Scotland.

To maintain focus at the highest levels and monitor progress towards achieving the Strategy objectives, a suitably qualified Biodiversity Manager or Champion will be appointed within each Trunk Road Network OC or DBFO Concessionaire and on each new road project, who will liaise with and report to the Transport Scotland Biodiversity Lead.

Monitoring, Evaluation and Reporting

Transport Scotland's statutory [Biodiversity Duty report](#), published every three years, will contain analysis of the success of the Strategy including the extent to which the overall aims and objectives have been met. In addition, to maintain focus on the short-range 2030 target for halting biodiversity loss, the progress on delivering this Strategy's Delivery Plan actions will be reviewed and reported annually by the Transport Scotland Biodiversity Lead, via an Actions Tracker.

On existing trunk road schemes, biodiversity reporting as part of the Annual Landscape Management and the Annual Sustainability reports is already a requirement under the Network Maintenance Contracts, however, it will need to be more detailed, measurable, and include progress on delivery of each of this Strategy's Objectives. To achieve this, Transport Scotland and its supply chain will need to work on updating the relevant current and future requirements to ensure:

- improved biodiversity focus is built-into the contract and enhanced biodiversity reporting is aligned with the Delivery Plan objectives;
- appropriately skilled and experienced biodiversity specialists are appointed and empowered to make decisions affecting ecological assets and provide internal oversight of biodiversity reporting;
- landscape operatives are trained and equipped to improve biodiversity records and deliver the Strategy in the field;
- performance and compliance in relation to ecological information is measured using clear, deliverable indicators, e.g. species numbers/habitat area and condition, detailed georeferenced photographic and other records uploaded on AMPS, and KPIs, for example relating to INNS; and

- the contracts can accommodate future reporting requirements for example to align with updated Delivery Plan objectives or legislation changes, such as the introduction of statutory nature restoration targets.

Following consultation on this Strategy, it has been agreed that a Biodiversity Forum will be established and held every six months. The forum will involve appropriate representation from Transport Scotland, the Trunk Road Operating Companies and DBFO Concessionaires with the aim of reporting on biodiversity outcomes, ensuring a consistent approach, and sharing good practice across the four regional trunk road network units and DBFO schemes. Representatives from Network Rail, CMAL, Scottish Canals, HIAL and Prestwick Airport will also be invited to sit on the forum. This will also provide the opportunity to review relevant Actions and Activities from the Delivery Plan, discuss progress, and assess and agree any amendments or additional actions for the future.

Transport Scotland currently measures performance against business plan objectives, each of which is grouped under corporate plan priorities. Key Performance Indicators and milestones continue to be developed and refined to improve programme and portfolio management, and delivery of this Strategy will be added to them.

Effective Spending and Partnerships

This Strategy reinforces the need for biodiversity considerations to be incorporated into all facets of Transport Scotland's activities. This includes making informed decisions on actions to protect or promote biodiversity within the existing project parameters and budgets allocated for everyday actions and interventions.

However, the extent of the challenge and the scale of the targets we need to achieve dictate that dedicated funding and coordinated effort will be critical for the effective implementation of the Strategy, with resources allocated efficiently to optimise impact.

Collaborative working with partner organisations and neighbouring landowners will need to play an increased role to deliver meaningful and cost-effective benefits. Where existing resources dedicated specifically to biodiversity improvements are limited, for example for the maintenance of the 'soft' estate on the existing Trunk Road Network, changes to the management approach or techniques and improved engagement and understanding will be required to ensure the necessary improvements are delivered.

There may be a need to review and revise contract documentation, both for new works and maintenance activities, to encourage greater consideration of biodiversity impacts. One area might be to require appropriate staff appointments to champion and deliver biodiversity-focussed actions and mechanisms for enabling partnership working.

The approach to decision-making for prioritising biodiversity-related funding allocations within Transport Scotland has been informed, in part, by lessons learnt from the 2022 NatureScot report [large-scale nature restoration projects](#). The report explores barriers and opportunities to such projects, using initiatives mainly from within Scotland but also including examples from the rest of the UK and Europe.

Each year Transport Scotland will assess proposals for biodiversity related projects and determine funding allocations as part of our wider business planning process.

The approach criteria are to prioritise:

- actions directly contributing to reaching the nature restoration targets to be introduced by secondary legislation resulting from the Natural Environment (Scotland) Bill
- actions having landscape-scale (rather than localised) positive effects for biodiversity
- actions improving permeability and connectivity of the Transport Estate to counteract its barrier effect and contributing to wider habitat networks
- actions led by experienced chartered Ecology, Landscape, and Arboriculture specialists or reputable nature conservancies to ensure that any habitat restoration and improvement efforts are carefully sited and considered to avoid the mistakes of monoculture non-native afforestation and prevent greenwashing
- actions aligning with biodiversity improvements on adjacent land (e.g. on trunk roads passing through the National Parks' nature restoration projects)
- actions involving partnership working with a variety of organisations and ongoing engagement with local stakeholders and
- actions involving academics in monitoring and evaluation of changes at scale

Transport Scotland will also use opportunities for coordinating biodiversity actions with a wide variety of partners. For example, the agency will seek to work more efficiently and promote agreements and collaboration with all neighbouring landowners, local organisations, and volunteers to restore degraded habitats, to enhance habitat connectivity and nature networks, and control invasive non-native species where these extend beyond the boundaries of the Transport Scotland estate. On new road schemes this could be delivered as part of offset mitigation.

The agency will seek to increase partnership working with NatureScot, Forestry and Land Scotland, National Parks, Local Authorities and other entities to achieve larger-scale impact, including engagement with initiatives like 30 by 30, Nature30, and Nature Networks. Transport Scotland will also establish information exchange to ensure successful biodiversity enhancement solutions are shared between all bodies responsible for the Scottish roads and implemented on a large scale to maximise the effects.



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Published by Transport Scotland, October 2026

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