

Nature for Water FACILITY
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Re-Naturalising the Trent River

Business Case Report

October 2026
Trent Valley, United Kingdom

Acknowledgements

This assessment was conducted by the Nature for Water Facility for Derbyshire Wildlife Trust and its partners. Derbyshire Wildlife Trust has provided critical strategic input and data to this work.

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Derbyshire Wildlife Trust:
Derbyshire Wildlife Trust is a local nature-recovery charity dedicated to protecting and enhancing wildlife and wild places across Derbyshire. It is part of The Wildlife Trusts' federation, and combines scientific expertise with strong community engagement, delivering nature-based solutions through habitat restoration, biodiversity enhancement and education. With extensive experience in catchment-based work and practical delivery of nature-based solutions, Derbyshire Wildlife Trust plays a key role in driving local environmental initiatives and partnerships.

Nature for Water
The Nature for Water (N4W) Facility is a global technical assistance programme led by ***The Nature Conservancy (TNC)*** and delivered in partnership with ***Pegasys***. Its mission is to support local champions in designing and launching large-scale watershed investment programmes that deploy Nature-based Solutions (NbS) for water security, biodiversity and climate resilience. The Facility offers hands-on, tailored support across hydrology, ecology, GIS, governance, finance and stakeholder engagement – delivered through pro-bono, fee-based services. TNC is one of the world's largest conservation organisations, working in over 70 countries to create science-based, collaborative solutions to the world's most pressing environmental challenges. Pegasys is a mission-driven consultancy with deep expertise in policy, sustainability and nature finance, operating across Africa, Europe, and globally. Together, TNC and Pegasys have supported over 50 watershed investment programmes worldwide, catalysing investment in healthy ecosystems and resilient communities.

With thanks to the Rivers 2040 partners:



Executive Summary

England's rivers are in crisis. Decades of intensive land use, urban development and diffuse pollution have left the country's river systems severely degraded, while a changing climate is intensifying flood risk, deepening drought vulnerability and accelerating the loss of species and habitats that underpin both ecological and economic resilience. Against this backdrop, the national **Rivers 2040 programme** – a collaboration between Trent Rivers Trust and eight Wildlife Trusts and sponsored by Intact Insurance and the Royal Society of Wildlife Trusts – is working to demonstrate how **coordinated, catchment-scale restoration can transform the future of UK rivers.**

This business case was **commissioned by Derbyshire Wildlife Trust (DWT) and produced by Nature for Water,** in close collaboration with DWT whose bespoke science assessment and local expertise form the evidential foundation of the analysis. Together, this work makes the case for Re-Naturalising the Trent Valley and makes the wider proposition that large-scale river restoration is not an environmental aspiration, but an economic and social imperative.

The Opportunity

The Trent Valley is one of England's most significant river corridors, flowing from its headwaters in Staffordshire through the Midlands to the Humber Estuary, and supporting around six million people across rural and urban landscapes. It is also one of the country's greatest opportunities for large-scale restoration. Several factors make it uniquely suited as a flagship catchment: the prevalence of low-lying floodplain land that floods regularly, rendering conventional arable farming increasingly unviable; the presence of active mineral extraction operations whose legal restoration obligations create a direct mechanism for land use change at no cost to the Programme; and the significance of the underlying Sherwood Sandstone Aquifer, one of England's largest groundwater resources, which makes effective catchment management essential to long-term water security. Despite these opportunities, current restoration efforts remain fragmented, underfunded and insufficiently coordinated to deliver change at the scale required.

The Economic Case

The economic analysis at the heart of this business case demonstrates a compelling return on investment. Across four representative study sites extrapolated to the full Trent Valley catchment, **the Programme generates a Benefit-Cost Ratio of 7.33**, meaning that for every 1 invested, 7.33 in economic benefits is realised. A long-term, **catchment-wide programme** would require **approx. 1.3 billion over 30 years and yield approximately 10 billion** in economic benefits expressed in discounted, present-day terms. To contextualise this, Severn Trent Water alone has committed 15 billion to capital investment across the Midlands over just five years as part of its AMP8 programme[1], the majority directed at grey infrastructure. The 1.3 billion required to restore the Trent Valley represents less than a tenth of that single company's five-year spend yet delivers an economic return above seven times the investment across a far broader range of outcomes.

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[1] The eighth Asset Management Period (2025–2030), setting out water companies' investment and performance commitments for the current regulatory cycle in England and Wales.

For the selected study area within the catchment, **benefits are generated across a wide spectrum of ecosystem services**, with the largest contributions from carbon sequestration (212 million), flood management (152 million), recreational value (54 million), ELM revenues (49 million), physical health (46 million), water quality (41 million), and green jobs (31 million), among others. **Current market incentives, however, are not yet sufficient to drive restoration at the scale required**. While revenues from schemes such as Environmental Land Management payments, Biodiversity Net Gain and carbon markets can offset a significant share of programme costs, practical constraints on combining these funding streams mean that restoration is often not financially attractive for landowners based on market incentives alone. This reinforces the need for blended funding models and public investment to unlock the much larger economic and societal benefits of nature restoration.

Critically, **these benefits are not abstract**: they represent real avoided costs, reduced public expenditure and economic value that accrues to households, businesses, water companies, councils, and the natural environment alike. Every benefit is ultimately a benefit to the economy, where nature is not treated simply an amenity, but is regarded as a critical infrastructure. This business case evidences it as such.

The cost of inaction is equally clear. Escalating flood damages, rising economic damages, deteriorating water quality, and the accelerating loss of biodiversity represent costs that will fall increasingly on the public purse and on communities across the Trent Valley. These risks extend into the insurance and mortgage markets too. Left unmitigated, flood risk could leave some homeowners with properties that are uninsurable or hard to mortgage. This is one reason the insurance sector is treated throughout this business case as a risk, resilience and data partner, rather than simply a source of funding. Continuing the current trajectory is not a neutral option, it is an increasingly expensive one which is too large to be borne sustainably by users.

Funding

No single funding source can deliver a programme of this scale. A **blended approach** is required, drawing on public grants, regulatory funding, water company investment, philanthropic capital and ecosystem service markets. As the Programme matures and evidence builds, other sources can be targeted such as private, repayable finance. This assessment identifies a wide range of relevant funding sources across the public, private, and third sectors[2], including DEFRA's Environmental Land Management Schemes, EA and Natural England grant programmes, water company Advanced Water Industry National Environment Programme (A-WINEP) investments[3], infrastructure operators with direct financial interests in flood risk reduction, and foundations such as Esmée Fairbairn and Arcadia.

A critical distinction runs through this analysis: between **financiers** providing upfront or long-term capital and **outcome buyers** (organisations that derive measurable benefit from restoration and can be structured to pay for specific outcomes). Conflating the two risks misaligning incentives and leaving significant funding inaccessible. Funding also needs to flow in tiers, with philanthropic and early-stage public capital covering programme set-up, governance, science and feasibility in the first instance,

[2] Organisations operating independently of government and the private sector, including charities, voluntary organisations, community groups and social enterprises.

[3] Water company investments delivered to meet statutory environmental obligations and improve the water environment.

before private investment and outcome-linked finance become viable as the Programme matures and demonstrates returns.

Critically, the current funding landscape is **structurally misaligned**. The billions flowing into single-purpose grey infrastructure, such as such as wastewater treatment plants or flood defence walls designed to address a specific challenge, far exceed the funding currently directed towards nature-based restoration, not because NbS perform worse, but because existing appraisal frameworks are designed to favour engineered solutions. This is compounded by persistent challenges around quantifying and verifying NbS outcomes, the absence of consistent design and monitoring standards, limited long-term evidence, and the relative ease with which engineered solutions can be modelled, appraised and financed (Royal Society of Wildlife Trusts & Intact Insurance, 2025). Reforming these frameworks is key, through DEFRA's White Paper 'A New Vision for Water' for instance (A New Vision for Water, 2026) alongside the policy and regulatory environment governing water industry investment and flood risk management. It is a prerequisite for unlocking nature-based solutions at the scale the Trent Valley requires and beyond, scaling up across all catchments in England.

Governance

Long-term delivery requires **a dedicated coordinating function** with responsibility for fundraising, partnership management, programme coordination, and monitoring and evaluation. A hosted governance model, anchored within an established organisation such as a Wildlife Trust or Rivers Trust, is essential during the Programme's establishment phase, with the potential to transition to an independent Special Purpose Vehicle as funding, partnerships and delivery activities expand. Governance arrangements must operate at landscape scale, reflecting the mandates and interests of all contributing stakeholders. The emerging Regional System Planner architecture proposed in the Government's water white paper, building on the Cunliffe Review, offers a live opportunity to embed the Programme within a formal cross-sectoral planning framework. The Trent Valley is well placed to lead that ambition.

Replicability and Next Steps

The Trent Valley Programme is designed not only to restore one of England's most important river catchments, but to provide a **replicable model for catchment-scale restoration across England**. The evidence assembled here, spanning economic valuation, funding assessment, governance design and risk analysis offers a **transferable framework** that can be adapted to other catchments within the Rivers 2040 programme and beyond.

The immediate priorities are to establish the governance and coordination structures needed to move from business case to programme delivery; to formalise partnerships with key funding stakeholders; to develop the pipeline of shovel-ready projects needed to attract investment; and to engage with policymakers on the regulatory and appraisal reforms that will determine how nature-based solutions can be deployed at the scale England's rivers urgently need.

The evidence presented in this Business Case demonstrates that catchment-scale restoration represents a credible and increasingly necessary investment. The challenge now is not **whether** to invest, but **how** to establish the governance, financing and delivery mechanisms needed to implement it at scale.

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Definitions:

Nature-based Solutions (NbS) are actions to protect, sustainably manage, and restore natural or modified ecosystems in ways that address societal challenges effectively and adaptively, while simultaneously providing benefits for human well-being and biodiversity (IUCN, 2016).

Natural Flood Management (NFM) is commonly treated as a subset of nature-based solutions applied to flood and coastal erosion risk management. NFM involves working with natural processes to alter, restore or enhance landscape features so that water is slowed, stored or absorbed across the catchment, thereby reducing flood risk downstream while delivering wider environmental and social benefits.

List of Acronyms

Abbreviation	Meaning
AgBMPs	Agricultural Best Management Practices
AMP8	Asset Management Period 8
A-WINEP	Advanced Water Industry National Environment Programme
BNG	Biodiversity Net Gain
BaU	Business as Usual
CaBA	Catchment Based Approach
CIC	Community Interest Company
CBA	Cost-Benefit Analysis
CSHT	Countryside Stewardship Higher Tier
DWT	Derbyshire Wildlife Trust
DEFRA	Department for Environment, Food & Rural Affairs
EA	Environment Agency
ELM	Environmental Land Management
EMCCA	East Midlands Combined County Authority
ESG	Environmental, Social and Governance
EU	European Union
EWCO	England Woodland Creation Offer
FCERM	Flood and Coastal Erosion Risk Management
FCRIP	Flood and Coastal Resilience Innovation Programme
GIS	Geographic Information System
Ha	Hectare
HM	His Majesty (as in HM Treasury)
N4W	Nature for Water
NFM	Natural Flood Management
NbS	Nature-based Solutions
NE	Natural England
NPV	Net Present Value
PES	Payments for Ecosystem Services
SSSI	Site of Special Scientific Interest
SPV	Special Purpose Vehicle
SFI	Sustainable Farming Incentive
WFD	Water Framework Directive
WISER	Water Industry Strategic Environmental Requirements
WCC	Woodland Carbon Code

1. Introduction

Derbyshire Wildlife Trust (DWT), on behalf of The Wildlife Trusts and Intact Insurance, asked Nature for Water to produce a Business Case for Re-Naturalising the Trent Valley, helping to build public, landowner and decision-maker support for river restoration across the UK. This business case underpins the national Rivers 2040 programme, which seeks to inspire a new vision for the UK's rivers by showing how long-term, catchment-scale restoration can deliver wide-ranging benefits for people, nature and the economy, creating more resilient communities, using the River Trent as a flagship example.

Sponsored by Intact Insurance and the Royal Society of Wildlife Trusts, Rivers 2040 is a collaboration between Trent Rivers Trust and eight local Wildlife Trusts[4], and is structured around three phases:

1 **Phase 1:** Research to understand the full benefits of Natural Flood Management (NFM).
2 **Phase 2:** An inspiring vision for UK's rivers.
3 **Phase 3:** Delivering the vision.

This business case contributes to Phase 2 by demonstrating how restoring the Trent's main channel, floodplain and wider catchment can reinstate natural hydrological, physical and ecological processes – driving ecosystem recovery and strengthening socio-economic resilience. This business case will not only address the specifics of the Trent Valley but also provide a replicable model for other rivers and landscapes across England, laying the foundation for the wider Rivers 2040 vision, and outline any risks and mitigation measures. Throughout this report, this coordinated initiative to realise and maintain large-scale river restoration in the River Trent will be referred to as the "Programme".

1.1. Background

The State of UK Rivers

Rivers in England are vital to communities, the economy and nature: they supply water, regulate floods by storing and slowing the movement of water across the landscape, provide spaces for recreation and connect people to the natural world. Yet across the UK, rivers are in a degraded state. Since the Industrial Revolution, channels and floodplains have been heavily modified, and today they are further stressed by diffuse pollution from agriculture, sewage discharges, road runoff and plastics. Housing development and climate change compound these pressures, increasing the frequency and severity of flood and drought events, leaving these critical systems, and everyone who depends on them, vulnerable.

As of January 2025, around 6.3 million properties in England are at risk of flooding from rivers, the sea, and surface water. Without additional interventions, this could rise to 8 million properties by mid-century, meaning one in four homes could face flood risk, while key energy, transport, and water treatment infrastructure may also be at risk (Environment Agency, 2025).

[4] Birmingham & Black Country Wildlife Trust, Warwickshire Wildlife Trust, Staffordshire Wildlife Trust, Derbyshire Wildlife Trust, Nottinghamshire Wildlife Trust, Leicestershire & Rutland Wildlife Trust, Lincolnshire Wildlife Trust and Yorkshire Wildlife Trust.

The Environment Agency further warns that, due to climate change, population growth and environmental pressures, England could have a public water supply deficit of 5 billion litres per day by 2055, with an additional 1 billion litres per day needed for agriculture, energy and industry (Environment Agency, 2025). Nature is also in rapid decline, with the loss of key species and pollinators undermining ecosystem resilience and long-term agricultural productivity.

Widespread diffuse pollution is contributing to both human health challenges and the deterioration of ecosystem integrity. Concurrently, the loss of key species, particularly pollinators, is eroding ecosystem resilience and undermining long-term agricultural productivity across the UK, with significant implications for food security and sustainable land use. More broadly, nature functions as national critical infrastructure, underpinning the foundation and resilience of the entire economy; its continued decline therefore represents an escalating national security risk.

Policy frameworks have not yet fully enabled integrated, catchment-scale planning, but momentum is building – particularly following the 2025 Cunliffe Review (Independent Water Commission, 2025), and the subsequent Government White Paper (Defra, 2026) which reinforced the need for whole-system water management and regional coordination/planning. The Rivers 2040 programme seeks to fulfil this using the River Trent as a pioneering case study to demonstrate how coordinated, catchment-wide restoration can deliver benefits for people, nature and the economy.

The Opportunity for River Restoration in the Trent Valley

The Trent Valley lies at the heart of England, following the course of the River Trent from its headwaters in Staffordshire through the Midlands and on to the Humber Estuary, where it meets the North Sea. As one of the country's major river corridors, it flows through both rural landscapes and densely populated urban centres, supporting around six million people and providing water for homes, agriculture, industry and nature.

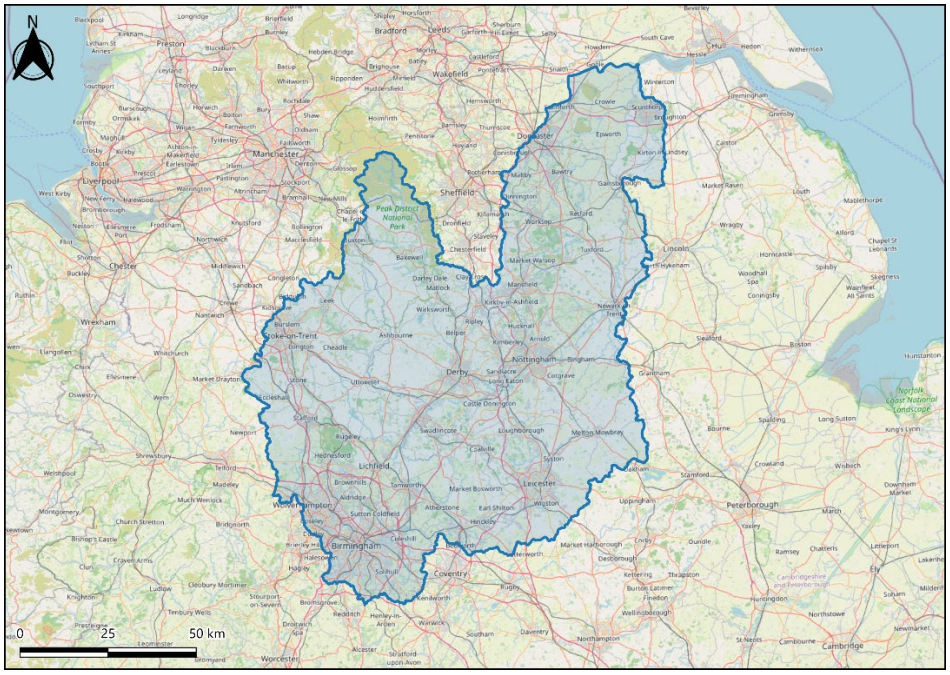


Figure 1: Full Catchment Area for the Business Case

Today, the Trent Valley faces a suite of interconnected challenges. Decades of intensive agriculture, industry and urban development have heavily modified the river and its floodplain, reducing habitat quality and severing the river from its natural regulating processes. Pollution from agriculture, wastewater and urban runoff continues to degrade water quality, while climate change is intensifying flood risk, drought pressure and ecological stress across the catchment. At the same time, environmental degradation creates unequal access to nature and green space and increases exposure of some communities to flooding and degraded air and water quality.

Despite these pressures, the Trent Valley presents one of the UK's greatest opportunities for large-scale river restoration. Its size, visibility and diversity of landscapes make it uniquely placed to demonstrate how healthy rivers can support resilient communities, thriving wildlife and a more sustainable future.

In addition, parts of the Trent Valley area also overlie the Sherwood Sandstone Aquifer, which is one of the UK's largest and most important groundwater resources. It extends across much of central and northern England, including the Midlands and parts of Yorkshire, Cheshire and Lincolnshire. It supplies drinking water to millions of people, supports river baseflows and dependent ecosystems during dry periods, and plays a critical role in drought resilience and long-term water security. Its high permeability and storage capacity also make it vulnerable to pollution and over-abstraction, meaning effective catchment management is essential to protect water quality and availability under increasing climate and land-use pressures, rendering it an insightful pilot to secure long-term water resilience.

Furthermore, the prevalence of regular flooding across much of the Trent Valley floodplain presents a compelling case for land use change. The River Trent catchment has a long history of river, tidal and surface water flooding, regularly flooding low-lying agricultural land (The Environment Agency, 2010). For land that floods with sufficient frequency to disrupt growing seasons and damage crops, conventional arable farming becomes economically marginal. Directing such land towards nature restoration – allowing the floodplain to store and slowly release water, recharge groundwater and support wetland habitat – would relieve pressure on unviable farm businesses while actively delivering the hydrological and ecological outcomes central to this Programme. The valley's flooding patterns are not simply a challenge to be managed; they signal that nature restoration may represent the most resilient long-term use of this land.

Lastly, the Trent Valley is well suited as a pilot for large-river restoration because active mineral extraction creates a clear mechanism for land-use change. Mineral extraction companies, such as Cemex, Heidelberg Materials and Tarmac, operate on land that was often previously used for agriculture and are legally required to restore it once extraction is complete. The end use is determined through lease agreements and associated planning permissions, negotiated between the operator, the landowner and counties. Increasingly, restoration to nature, rather than agricultural land, is becoming the norm, and research suggests that pockets of restored nature can give meaningful support to surrounding agriculture, demonstrating a virtuous cycle. This creates a major opportunity to deliver large-scale river restoration, with the mining sector financing upfront restoration capital costs and 30-50 years of after care, depending on the agreement. This would significantly lower the financial barrier to implementing NbS compared to other landscapes. Nevertheless, there remain barriers to delivering, and maximising, nature restoration through this pathway and beyond, discussed in the next section.

Barriers to Large-Scale River and Catchment Restoration

Despite the clear opportunity presented by the Trent Valley, several barriers continue to constrain large-scale river and catchment restoration across the Trent and the UK more widely.

Funding remains a fundamental challenge. Clear opportunities for private sector investment in NbS are still limited, and the multiple co-benefits delivered by catchment restoration, such as flood risk reduction, water quality improvement, biodiversity gain, carbon sequestration, and public health are not fully recognised. While these are attractive to a range of funders in theory, in practice they require a level of multi-stakeholder financial coordination that rarely materialises. Where benefits accrue to multiple parties, so too must funding, yet assembling landscape-scale blended finance packages demands collaboration and governance structures that do not yet exist in most catchments.

Evidence and recognition also remain insufficient. There is still a lack of robust, site-specific evidence that NbS can cost-effectively address water-related challenges such as flooding at the scale required to shift decision-maker and investor confidence. This is compounded by the absence of nationally accepted design, monitoring and performance standards to consistently measure, track and demonstrate the success of interventions. Co-benefits are frequently overlooked in appraisal frameworks, and without a compelling, quantified evidence base, it is difficult to make the case for restoration over conventional flood management or agricultural land use.

Technical capacity at the landowner level is a further constraint. Navigating the natural capital space by understanding which interventions deliver which benefits, how they can be financed, and how to engage with the regulatory and planning system, remains complex, and many landowners lack the expertise or support to participate effectively.

In the Trent, and relevant to other key parts of the UK, mineral extraction potentially offers one route towards NbS delivery supported by private sector investment. However, beyond the broader challenges noted above, several barriers are specific to delivering restoration through the mineral extraction pathway and at the scale envisaged by this Programme:

- Land ownership and planning permissions. Where land is not owned by a mineral company, landowners may prefer restoration to agriculture or other economically productive uses. While regulation increasingly supports nature-based restoration, planning permissions may still be granted – particularly where land is capable of high-yield agricultural production or where other compelling local considerations apply – for sites to be restored to agriculture or alternative uses rather than nature.
- Regulatory constraints on main river channel works. Regulation relating to works in and directly affecting main river channels is highly stringent. Securing the necessary consents and permissions can be both difficult and time-consuming, which can constrain the ambition and pace of restoration, particularly where the most ecologically significant interventions involve the main channel itself.
- Fragmented responsibilities and planning. Catchment- and river-scale planning is hampered by fragmented responsibilities across regulators, including the Environment Agency and local planning authorities, which do not always coordinate effectively. This limits the ability to align restoration decisions across sites, maximise the land-use change opportunity created by mineral extraction, and deliver the most ambitious and coherent programme of works across the valley.

Taken together, these barriers mean that, whilst the Trent Valley presents a genuine and significant opportunity for NbS at scale, current efforts, structures, and incentives are not sufficient to realise it. Delivery remains fragmented, underfunded and overly dependent on individual landowner decisions and ad-hoc project-by-project approaches. Without a step change in coordination, evidence and finance, meaningful and lasting land use change across the catchment will not be achieved. The consequences of inaction are not neutral: continuing on the current trajectory risks locking in a degraded catchment that is increasingly costly to manage, with escalating flood damages, deteriorating water quality, and the irreversible loss of habitats and species. The Environment Agency has already projected that the number of people at risk from flooding in the Trent catchment could more than double within 50 to 100 years under climate change: costs that will fall on communities, insurers and the public purse if the underlying drivers are not addressed. Incremental, business-as-usual approaches are unlikely to be sufficient; the scale of the opportunity, and the scale of the risk, demands a more ambitious and coordinated response.

This business case directly addresses several of these barriers. By demonstrating that coordinated river and catchment restoration can deliver meaningful environmental outcomes and unlock significant economic co-benefits, it aims to provide a compelling, evidence-based case for catchment-scale action. It is also intended to encourage public authorities to improve coordination across planning, regulation and delivery. Beyond the mineral extraction context, we assessed wider funding models capable of enabling NbS at scale, both on former extraction sites and across the broader Trent Valley catchment.

1.2. Aims and Objectives

This report aims to deliver an evidence-based case for investment in river and catchment restoration in the Trent Valley, demonstrating the value of NbS in strengthening the region's long-term economic and environmental resilience. In doing so, it provides a robust, evidence-backed articulation of benefits that can be used in follow-on discussions with beneficiaries and partners to support conversations with local authorities on planning coordination and the development of co-financing arrangements for this transition. Its objectives are as follows:

i. Articulate the economic return on investment (E.ROI) of re-naturalising the Trent Valley through land-use change, using natural capital data to assess financial value, economic cost–benefit and investment potential.
ii. Evaluate the socio-economic benefits, including job creation, reduced flood and drought risk, and implications for farming and land use within local and regional development strategies.
iii. Assess financial mechanisms and funding models, spanning public and private capital, environmental credits, subsidies and blended finance approaches.
iv. Identify risks, trade-offs and barriers, together with mitigation strategies for data gaps, stakeholder support, delivery models and long-term viability.
v. Demonstrate replicability by capturing lessons, metrics and frameworks that can inform roll-out across other priority catchments.

2. Methodological Approach

The methodological approach for this work was structured around three distinct but interlinked workstreams, delivered over a ten-month period:

1. A literature and case study review, to contextualise the business case and learn from other projects to advise on potential funding models, governance arrangements, associated risks and possibilities for replication.
2. A stakeholder analysis and targeted engagement to understand the key challenges in the Trent Valley, validate assumptions and identify potential funders as well as considering the potential roles of different stakeholders in long-term governance arrangements for a programme.
3. An economic and financial analysis to value the wider socio-economic benefits of large-scale river restoration and understand the potential of nature-market revenue streams.

In parallel, Derbyshire Wildlife Trust (DWT) conducted bespoke science modelling to estimate the ecosystem service uplifts associated with large-scale river and catchment restoration. Modelled metrics included, for example, water quality improvements, flood risk reduction, water recharge and carbon sequestration. These impact metrics were used as inputs to Pegasys' economic and financial analysis, which translated the science outputs into monetary values. The Trust leveraged models such as NatureInsight, FARMSCOPER and other technical approaches to estimate the difference between a defined baseline scenario and a recovery scenario. Pegasys advised and guided DWT on the methodological approach but did not undertake the science modelling. Accordingly, this report outlines only the methodologies for the workstreams owned by Pegasys (see Figure 2). The detailed methodologies underpinning DWT's modelling are not presented here, however, the input data used are provided in Annex C.

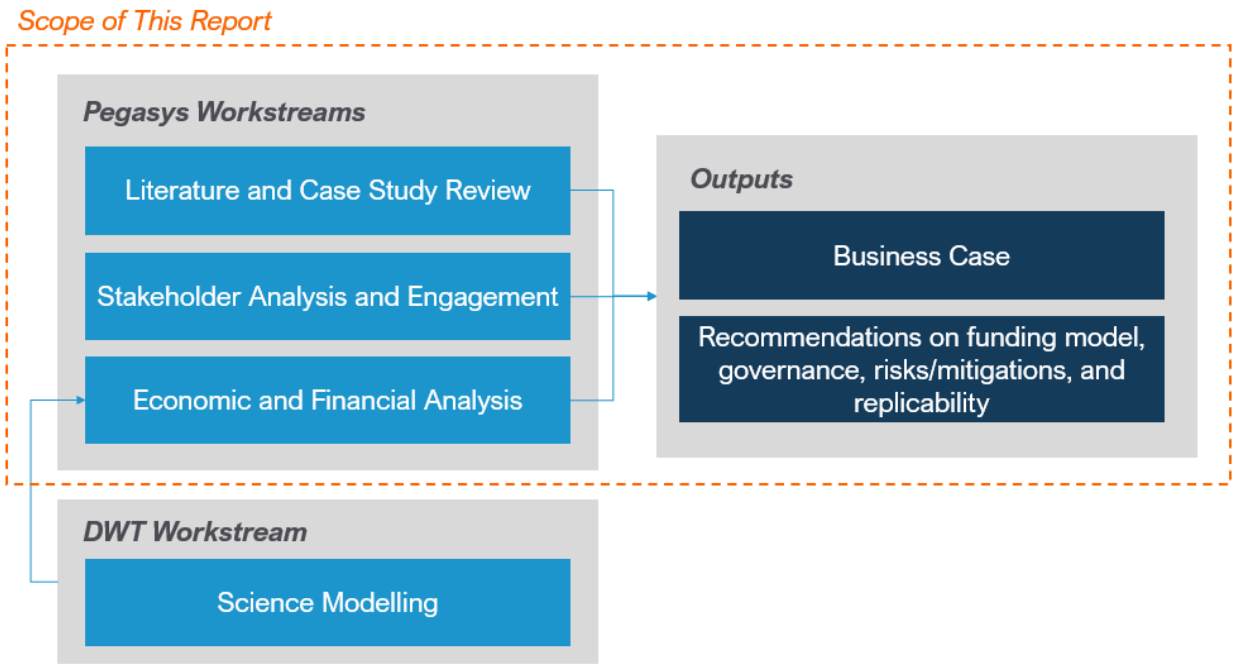


Figure 2: Methodological Approach - Workstream Overview

This approach ensured the recommendations and findings were grounded in practical feasibility and stakeholder relevance, ultimately seeking to deliver evidence, insights and actionable options for scaling the Rivers 2040 programme.

2.1. Literature and Case Study Review

The rapid literature review focused on background documents provided by DWT, complemented by targeted online research. The reviewed literature covered natural capital assessments, floodplain restoration, rewilding business cases and other relevant analyses undertaken in the Trent Valley and adjacent regions with similar lowland or mixed agricultural contexts.

The comparative case study review initially identified a long list of 28 river and/or nature restoration projects across the UK and Europe, which were assessed at a high level (see Annex B: Table 17 and Table 18 for the long list). From this long list, four case studies were selected for more detailed review, ensuring representation across different geographies, intervention approaches and funding models, and thereby generating robust and transferable insights. The selected case studies were:

- The Wyre Catchment Natural Flood Management (NFM) Project (Annex B, Table 19)
- Holnicote Estate's 'Stage 0' river restoration Project (Annex B, Table 20)
- Milton Keynes Floodplain Forest (Annex B, Table 21)
- The Border Meuse Restoration Project (Annex B, Table 22)

The detailed review focused on specific criteria around landscape type, priority water-related challenge, scale, lead actors, financing models, governance arrangements and ecosystem service outcomes. Together, the literature and case study review helped to identify funding sources, assess the funding mechanisms, and identify the funding models.

2.2. Stakeholder Analysis and Engagement

The Stakeholder Mapping and Analysis was undertaken to clearly identify the target audience for the business case, specifically potential funders. It also provided an initial framework for considering the potential roles of different stakeholders in long-term governance arrangements for a programme with a long-term horizon. As part of the process, a stakeholder map was developed to categorise stakeholders according to their levels of influence and interest, alongside preliminary thinking on their potential roles. Both outputs were developed through online research, the conversations held as part of the stakeholder engagement, and refined in alignment with the project team.

Stakeholder engagement was highly targeted, focusing only on key stakeholders for information gathering and validation purposes. Discussions were held not only with potential funders, but also with other relevant stakeholders to validate the analysis and test the emerging thinking.

2.3. Economic Service Analysis

Science Modelling Framework

The purpose of the science modelling was to assess NbS opportunities, construct a feasible restoration scenario for the Trent catchment, and quantify the ecosystem service outcomes that could be delivered. The outputs from the science modelling provided the biophysical data used within the economic analysis.

While spatially based, the NbS opportunity mapping was intended to represent restoration of the Trent catchment at a strategic of implementation rather than attempting to produce a detailed design for every potential intervention location across the whole catchment. It should therefore be interpreted as an evidence-led assessment of opportunity, scale and benefit across different areas of the river landscape, rather than a place-based delivery plan.

The modelling was undertaken in six stages:

1. Define representative study area boundaries.
2. Establish the baseline land use, habitat and hydrological context.
3. Identify NbS suitability through spatial opportunity mapping.
4. Develop a feasible restoration scenario based on modelled NbS implementation.
5. Model changes in ecosystem service provision.
6. Aggregate and scale outputs to inform catchment-level economic analysis.

Economic and Financial Assessment Framework

The methodology for developing the business case was centred on an economic and financial analysis. The analysis adopted a natural capital approach to holistically capture the wider benefits of restored ecosystem services to the economy, people and nature, including benefits that are not directly monetised by any actors (eg the recreational value of public green spaces). The business case is primarily designed to demonstrate the value of large-scale river restoration to councils, public-private companies and other public authorities, whose objectives are focused on delivering public value rather than financial returns. However, the wider economic benefits also help to make the case to a wide-ranging audience, including private actors, by demonstrating the value of at-scale river restoration to economic resilience.

As part of the economic analysis, the study also extracts and presents the financial revenues associated with nature restoration activities. These revenues cover Environmental Land Management payments, carbon markets, and Biodiversity Net Gain, and are presented to illustrate the potential income streams that could accrue to landowners through land-use change. Within the economic model, these revenue streams are shown separately to ensure they are clearly visible, making them easier to identify and to use as part of engagement with landowners.

The analysis followed a cost–benefit framework, comparing A) Programme Benefits with B) Programme Costs over a 30-year period. The programme was defined as a coordinated effort to fund, implement and maintain NbS at scale over the long term.

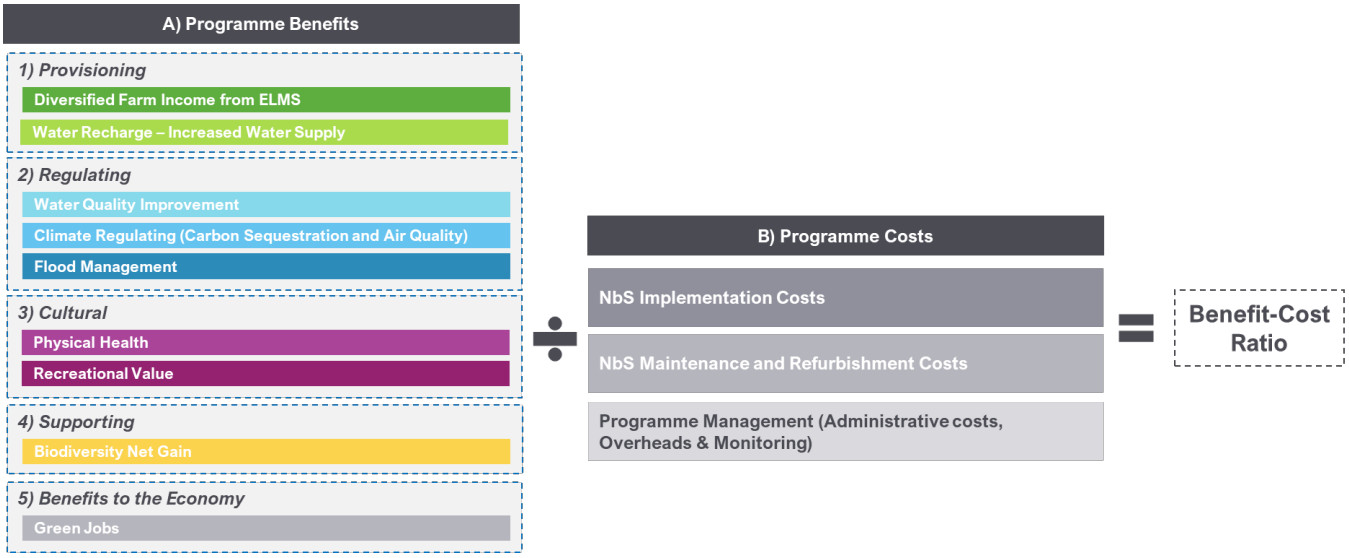


Figure 3: Economic Assessment Structure

For the purpose of the analysis, a few general assumptions about the economy and the planned Programme had to be made, which are listed below:

- **Inflation:** The analysis was conducted in nominal terms, meaning it does not adjust future costs for inflation, as recommended by HM Treasury's Green Book (HM Treasury, 2022). This decision was made to allow decision makers to focus on evaluating the real social costs and benefits of a project, without the complexity of predicting inflation rates over long-time horizons.

- **Discount rates:** The analysis used the UK's social discount rate of 3.5 per cent over 30 years of the Programme, also recommended by HM Treasury's Green Book (HM Treasury, 2022). This rate was used to evaluate the present value of future costs and benefits. This rate is used in similar analyses.

- **Currency:** The CBA was modelled in Great British Pounds (£).

- **Phased implementation:** The CBA assumed a phased implementation over three years. However, incorporating this assumption directly into the science models would have introduced significant complexity. Therefore, the science models assume that all implementation happens in year one. The implementation and related benefits were then postponed in the Cost-Benefit Analysis to generate more realistic cost curves and cost-benefit calculations by applying a three-year ramp-up profile to both costs and benefits.

Study Area Selection and Extrapolation Approach

Given the scale and complexity of the Trent Valley catchment, the science modelling conducted by the DWT, did not cover the entire catchment area. Instead, the team selected four representative study areas (see Figure 4) that cover the wide-ranging catchment characteristics of the area including a mix of upland and low-land agriculture as well urban and industrial areas, including a number of mineral extraction sites (see Table 1 and Annex C). This was important because NbS opportunity,

ecosystem service provision and implementation constraints vary substantially with landscape context. The results of these study sites were then used for the economic analysis and extrapolated to the entire catchment area. For a full outline of the assumptions used, please refer to Annex C.

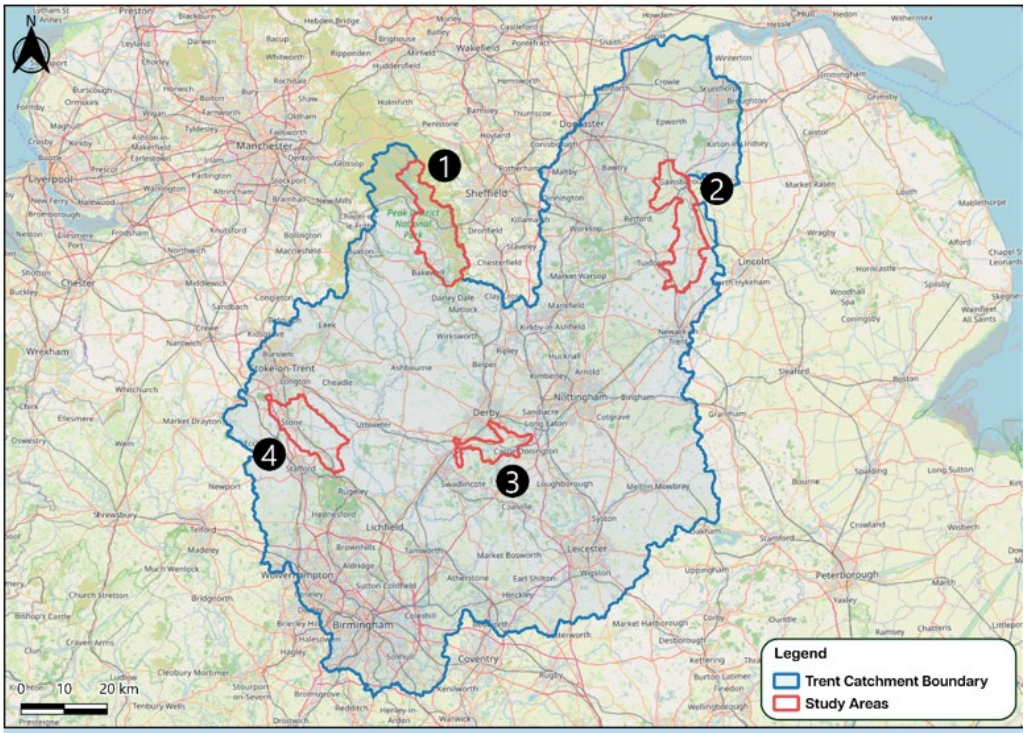


Figure 4: Study Area Selection

Table 1: Study Area Sites and Selection Rationale

Study Area Site	Selection Rationale
Derwent from Westend to Wyre	Representative example of upland river system characterised by moorlands and pasture.
Trent from Carlton-on-Trent to Laughton Drain	Representative example of a mixed agricultural land use upper river system with limited woodland and small urban areas.
Trent from Dove to Derwent	Representative example of a predominately arable farmland lower river system.
Trent from Tittensor to River Sow	Representative example of agricultural area of a middle river system connected to large urban centres and mineral extraction sites.

NbS Selection and Implementation Areas

DWT, advised by N4W, selected a portfolio of NbS to be modelled, aimed at maximising the delivery of ecosystem services, with a particular focus on flood risk reduction, carbon sequestration and biodiversity enhancement. The selection was made based on local expertise within DWT and on Nature for Water's experience supporting large scale catchment restoration initiatives globally, as well as NFM projects in the UK (in Norfolk and Warwickshire). The modelled NbS are presented in Figure 5.



Figure 5: Selected NbS for modelling

NatureInsight was used to identify spatial opportunities for the selected NbS. NatureInsight is an opportunity mapping and hydrological modelling tool developed by Arup and SCALGO to support scoping potential NbS interventions. It combines spatial datasets, multi-criteria analysis and hydrological modelling to assess where interventions may be suitable and what indicative benefits they may generate. The tool applies a consistent 250 m by 250 m grid, allowing each grid square to be scored and compared across large areas.

Table 2 below outlines the NbS that were selected, the rationale for their inclusion, as well as the modelled implementation areas (four study areas). The implementation areas for each NbS were informed by the science modelling, which identified where interventions would deliver the greatest benefits (also called 'opportunity mapping'). A realistic proportion of these opportunity areas (averaging 20 per cent in each study area) was then assumed to represent the area that could realistically be implemented and taken forward in the impact modelling and economic assessment.

Table 2: NbS types, inclusion rationales and implementation areas

NbS type	Inclusion rationale	Combined implementation area (Ha) *across all four study areas*
Buffer strips	Reduce sediment, nutrient and pesticide runoff from agricultural land before it reaches rivers. They improve water quality while creating habitat corridors for wildlife.	**2,618 Ha**
Floodplain reconnection	Restores the natural connection between rivers and their floodplains, increasing floodwater storage and reducing downstream flood risk. It also creates valuable wetland habitats and improves ecological functioning.	**284 Ha**
Grip blocking	Slows water movement across upland peat landscapes by blocking artificial drainage channels. This reduces flood peaks downstream while helping restore peatland habitats.	**88 Ha**
Peat management	Restores degraded peatlands to improve water retention, reduce erosion and increase carbon storage. Healthy peatlands are among the most important natural carbon sinks in the UK.	**312 Ha**
Runoff attenuation features	Captures and temporarily stores surface runoff during rainfall events, reducing flood risk and sediment transport. These interventions help manage water at source before it reaches river systems.	**337 Ha**
Soil management	Improves soil structure and infiltration, reducing erosion and agricultural runoff. Healthier soils increase water retention, support agricultural productivity and enhance resilience to drought.	**5,987 Ha**
Tree planting	Increases carbon sequestration, intercepts rainfall and stabilises soils. Woodland creation also strengthens habitat connectivity and supports biodiversity recovery.	**1,563 Ha**
Wet woodland	Creates flood-resilient habitats that store water, improve water quality and support a wide range of species. Wet woodlands deliver multiple ecosystem services while contributing to long-term catchment resilience.	**329 Ha**
TOTAL		**11,518 Ha**

Ecosystem Service Modelling

Ecosystem service modelling is the process of estimating and quantifying the flow of benefits that the natural environment generates. For Rivers 2040, ecosystem services were modelled for a baseline scenario and a post NbS intervention implementation restoration scenario. This allowed the analysis to compare existing ecosystem service provision with estimated change under the restoration scenario, providing a clearer basis for assessing the scale, direction and materiality of benefits associated with catchment restoration.

Table 3: Ecosystem services modelled, relevance and physical measure

Ecosystem service	Welfare benefit	Physical metric
Biodiversity	Habitat condition, ecological connectivity and species abundance support all other ecosystem services and contributes to wider non-market value of nature.	Net change in biodiversity: Biodiversity Net-Gain habitat units.
Climate regulation	Reduced climate damage through additional carbon sequestration and storage from habitat creation, woodland establishment and peatland restoration.	Tonnes of carbon dioxide equivalent sequestered or avoided: tCO_2e/year.
Flood regulation	Reduced flood risk to communities, property, infrastructure and land through increased water storage, slower runoff and reduced peak flows during storm events.	Additional flood storage volume, change in peak flow, and properties impacted within flood-risk areas.
Water quality regulation	Improved ecological quality of rivers, recreational benefits for local communities, and reduced water treatment costs.	Annual reduction in sediment, nitrate and phosphorus loading: kg/year.
Water supply	Increased water retention within the catchment, supporting resilience during dry periods and improving the regulation of flows.	Additional annual water recharge: m^3/year.
Air quality	Poor local air quality and pollutants have significant impact on public health. Vegetation has the capacity to remove and mitigate air pollutants.	Changes in concertation of pollutants: kg/year.
Agricultural production	Change in agricultural output where land is taken out of production or management is altered as part of the restoration scenario.	Hectares of habitat change for productive agricultural land affected and associated change in livestock based on Defra's regional agricultural data.
Recreation value	Improved welfare from visits to natural environments including health, wellbeing and enjoyment benefits associated with habitat creation and landscape enhancement.	Estimated number of visits/year and welfare value/year to green spaces.
Physical health	The natural environment creates opportunities for informal physical exercise enabling individuals to achieve recommended guidelines for physical activity.	Number of physically active visits/year based on recreational visits/year.

The detailed methodology for the impact modelling was conducted by the DWT team and can be found in Annex F.

Cost Assessment

To estimate The Programme's costs over 30 years, three categories were conceptualised as follows:

1. **Implementation costs:** These include all costs directly related to the execution of the interventions, such as equipment and labour.
    - Implementation costs were sourced from Arup's NatureInsight tool, which was also used for the scientific analysis, and refined using historical data from Derbyshire Wildlife Trust. Costs were set on a per-hectare basis, allowing for ease of application and consistent scaling across the landscape.
2. **Maintenance costs:** These encompass all costs required for the long-term upkeep of the interventions. They were calculated by determining the different maintenance requirements for each NbS, and assuming a level of effort (in number of days/year) required for maintenance activities.
    - Maintenance costs were added to Arup's NatureInsight implementation costs using expert N4W judgment from previous UK projects in Norfolk and the Warwickshire Avon, as well as a literature review. Costs were set on a per-hectare basis, allowing for ease of application and consistent scaling across the landscape.
3. **Operational costs:** These refer to operational costs not directly tied to implementation and/or maintenance, and include:
    - **Overheads and Administrative costs:** These are critical costs to making the entire Programme function smoothly over the 30-year period, such as programme management, office supplies, and IT and communications infrastructure. These costs were defined to represent 20 per cent of the total implementation and maintenance costs (Shiteng Kang, 2023).
    - **Monitoring costs:** These are essential to track the effectiveness and impact of interventions over the 30-year period, such as ecological surveys, water quality testing, and remote sensing analysis. These costs were defined to represent 5 per cent of the total implementation and maintenance costs (Shiteng Kang, 2023).

This approach was adopted to ensure that all costs associated with the full lifecycle of NbS delivery were comprehensively captured. It also enabled the cost framework to be adaptable to different implementation scales, ensuring accurate budgeting and resource allocation.

Table 4: Intervention Costs

Intervention type	Category	Area type	Total cost[5](£)
Buffer strips	Implementation	Per hectare	914/ha
	Maintenance	Per hectare	1,000/ha
Floodplain reconnection	Implementation	Per hectare	16,500/ha
	Maintenance	Per hectare	1,000/ha
Grip blocking	Implementation	Per hectare	15,000/ha
	Maintenance	Per hectare	1,000/ha
Peat management	Implementation	Per hectare	328/ha
	Maintenance	Per hectare	500/ha
Runoff attenuation features	Implementation	Per hectare	26,000/ha
	Maintenance	Per hectare	500/ha
Soil management	Implementation	Per hectare	214/ha
	Maintenance	Per hectare	500/ha
Tree planting	Implementation	Per hectare	1,920/ha
	Maintenance	Per hectare	1,000/ha
Wet woodland	Implementation	Per hectare	1,920/ha
	Maintenance	Per hectare	1,000/ha

Benefit Assessment

The benefit assessment was based on the outputs of the bespoke modelling conducted by Derbyshire Wildlife Trust and was structured around comparing the outcomes of two scenarios:

- **Baseline scenario (Business-as-Usual):** Represents continuation of current land use and management practices and assumes no additional NbS implementation beyond existing activities.
- **NbS scenario:** Represents the implementation of a defined portfolio of NbS across the catchment and reflects changes in land cover and ecosystem function.

For each category of benefit, the NbS scenario was assessed relative to the baseline scenario. The difference (uplift) between the two scenarios was quantified using biophysical or activity-based metrics, and subsequently monetised using established economic valuation approaches. This approach ensures that only additional benefits attributable to NbS are captured in the economic case.

The benefit valuation relied on best practice guidance and methodologies, such as:

- HM Treasury's Green Book for economic appraisals
- WINEP Methodology (Water Industry National Environment Programme)
- The Environment Agency (EA) Guidelines
- The Water Framework Directive (WFD)

[5] *Figures are presentation in today's monetary terms. Implementation costs per hectare are assumed to be incurred evenly over the first three years of the Programme, with one-third of the total implementation cost applied in each year. Maintenance costs per hectare are applied at the full per-hectare rate each time maintenance is undertaken over the 30-year Programme period (typically every two or three years, depending on the NbS), rather than being spread evenly across all years.*

- Biodiversity Net Gain (BNG) Guidance
- The OrVAL Tool (Outdoor Recreation Valuation).

A detailed breakdown of each benefit's valuation methodology can be found in Annex C.

Cost-Benefit Analysis

Several key economic appraisal indicators were calculated to summarise the overall performance of the economic case:

- **Benefit–cost ratio (BCR):** The ratio of the present value of total economic benefits to the present value of total costs, indicating the economic return generated per unit of investment.
- **Net present value (NPV):** The difference between the economic benefits and costs over the appraisal period, expressed in present value monetary terms.

These indicators provide a consistent basis for comparing NbS with alternative interventions and for assessing overall value for money.

By capturing both market and non-market benefits, the economic case demonstrates the full value proposition of NbS, extending beyond direct revenues to include public, environmental and societal gains. This comprehensive perspective is critical for informing public sector decision-making, attracting blended finance, and justifying investment in NbS as a strategic alternative or complement to traditional infrastructure.

Business Case Results

This section presents the results of the economic assessment, including the costs of implementing the proposed NbS portfolio, the value of the ecosystem services generated, and the overall economic case for large-scale river restoration across the Trent Valley.

Costings Results

The areas defined under the prioritised NbS portfolio (Section 2.3) were then applied to the corresponding unit costs per hectare for implementation and maintenance of each NbS. Once these costs were established, overheads and administrative expenses, as well as monitoring costs, were computed based on the percentage allocations described in Section 2.3.

Table 5 presents the resulting discounted costs of the Programme over 30 years in nominal terms[6] for the targeted modelling area, and the prioritised NbS portfolio described in the Science Analysis section.

[6] *All costs and benefits are presented in nominal terms, meaning they exclude the effects of inflation and are expressed in today's prices. This approach, consistent with HM Treasury Green Book guidance, allows the analysis to focus on the real economic value of costs and benefits over time rather than assumptions about future inflation.*

Table 5: Summary of discounted Programme costs

Implementation	Maintenance	Operational	Total programme
£21 million	£45 million	Overheads and Administrative costs: £15.4 million Monitoring: £4.3 million **Total: £20 million**	£86 million

Figure 6 illustrates the distribution of undiscounted costs[7] (amounting to 124m), in nominal terms, over time for the targeted modelling areas. Undiscounted costs are presented in this case to provide a clearer picture of how expenditure is distributed across the Programme lifecycle, avoiding the distortion introduced by discounting, which substantially reduces the apparent value of costs incurred in later years.

It was assumed that most would occur within the first three years during the scaling of implementation, amounting to £40 million, which represents approximately a third of total Programme costs. After this period, costs drop significantly, leaving only operational costs and maintenance expenses. The concentration of costs early in the project is a common assumption to make the return on investment indicators more conservative. This is because costs have a greater bearing on the benefit-cost ratio (BCR) when they occur early in the project, resulting in a lower BCR.

The cyclical pattern in costs reflects the different maintenance schedules of the NbS included in the Programme. Interventions have different maintenance requirements, meaning they might be maintained on three, four, or five-year cycles. As a result, certain years contain maintenance activities for multiple NbS interventions at the same time, leading to higher costs, while other years require less maintenance and therefore show lower expenditure. This creates the regular fluctuations observed in the cost profile over the 30-year period.

[7] Discounted costs express future costs in today's money by applying a standard discount rate, reflecting the principle that costs incurred in the future are generally valued less than costs incurred today. Undiscounted costs show the actual timing and magnitude of expenditure over the Programme's lifetime without this adjustment, making it easier to understand when spending occurs. Both are presented to provide complementary perspectives on the Programme's cost profile.



Figure 6: Cash flows of undiscounted costs of the Programme, in nominal terms (over 30 years)

Benefits Results

The economic assessment reveals a strong mix of ecosystem services that deliver meaningful economic value early in the Programme and continue to grow over time. Benefits are generated across all ecosystem service categories, demonstrating the wide-ranging value of large-scale river and floodplain restoration. Total annual benefits increase progressively throughout the assessment period as ecosystems recover and mature. As the NbS become established, they deliver a greater range and magnitude of ecosystem services, allowing benefits to increase over time and reach their full potential.

The largest share of benefits comes from carbon sequestration and flood management, which together account for over 60 per cent of the total economic value generated. Carbon benefits increase steadily throughout the Programme as newly established woodlands and restored habitats mature and sequester increasing amounts of carbon over time. Carbon value is captured through three separate metrics: the social cost of carbon (190 million), the Woodland Carbon Code (22 million), and the Peatland Code (0.3 million). The relatively small contribution from the Peatland Code reflects the fact that peatland restoration was only modelled within the Derwent from Westend to Wye study area. In contrast, flood management benefits begin accruing much earlier in the Programme, as interventions such as runoff attenuation features and floodplain reconnection start reducing flood risk soon after implementation. Similarly, Environmental Land Management (ELM) payments can be accessed rapidly, providing an early revenue stream for landowners and contributing to the strong benefits observed in the initial years of the Programme.

Additionally, substantial benefits are also delivered through improved water quality, biodiversity enhancement, recreational opportunities, public health improvements and green jobs. While water supply benefits are comparatively smaller, this is primarily because groundwater recharge was not prioritised as a key objective during the selection and targeting of the NbS portfolio, rather than reflecting a lack of potential impact.

Figure 7 presents the distribution of undiscounted benefits over the 30-year assessment period. Total annual benefits increase steadily as restoration measures mature and ecosystem functions strengthen, reaching approximately £38 million per year by Year 30. This highlights the ability of the Programme to deliver multiple, stacked benefits to communities, businesses, and the environment, while building long-term resilience across the Trent Valley.

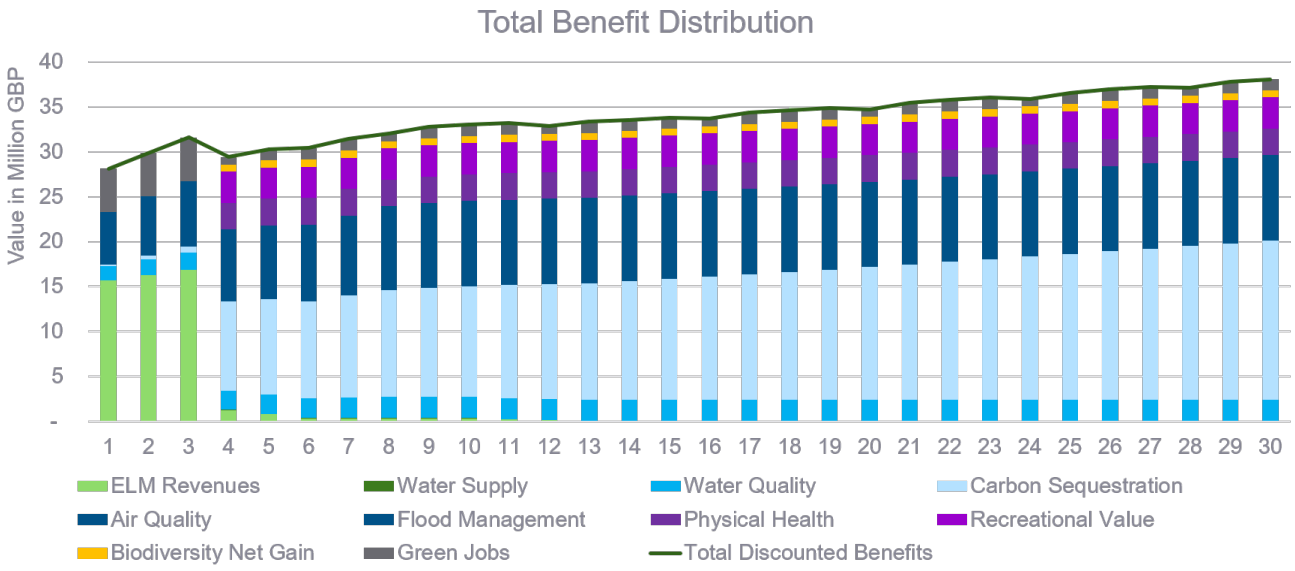


Figure 7: Total Benefit Distribution (undiscounted)

Unquantified benefits

The economic analysis shows that, at-scale, NbS implementation would provide considerable benefits. In reality, we predict that the total realisable benefits would exceed what we determined as part of this scope of work. This is because there are numerous other benefits that we did not determine, which could encapsulate a broader range of environmental, social and economic outcomes. An example of other meaningful benefits which could be further explored if of interest to key stakeholders and/or funders are:

- **Additional flood-related benefits,** such as reductions in Combined Sewer Overflows (CSOs), lower economic damages, avoided repair costs, and avoided flood damage to major infrastructure and agricultural land. As an order of magnitude, CSOs are a major issue in the UK, with estimated annual costs of 212–257 million in England alone (DEFRA, 2023). NbS could potentially meaningfully help address this issue, when implemented in the right areas where they keep rainwater away from the sewer systems.
- **Fewer restrictions on water abstraction licences in the future**, enabled by improved groundwater recharge and a more reliable water supply.
- **Water treatment cost savings** resulting from improved water quality, reduced diffuse pollution and lower levels of nutrient-rich agricultural run-off. Severn Trent, as part of its 2025-2030 business plan, highlights treatment cost savings of 2 for each 1 spent on reducing pesticide, nitrate and cryptosporidium concentrations from agricultural activity, an approach that includes NbS use.
- **Wider economic benefits**, including knock-on effects like increased ecotourism and the unlocking of land for housing development due to reduced flood risk.

Comparing Costs and Benefits

Figure 8 below presents the discounted costs and benefits generated by the Programme across the four study areas over the 30-year assessment period. The waterfall chart illustrates how individual ecosystem service benefits compare against the discounted costs of implementation, maintenance and programme operation. The analysis demonstrates that the benefits generated by nature restoration substantially exceeds the costs incurred, with significant benefits delivered across provisioning, regulating, cultural, supporting and economic ecosystem service categories.

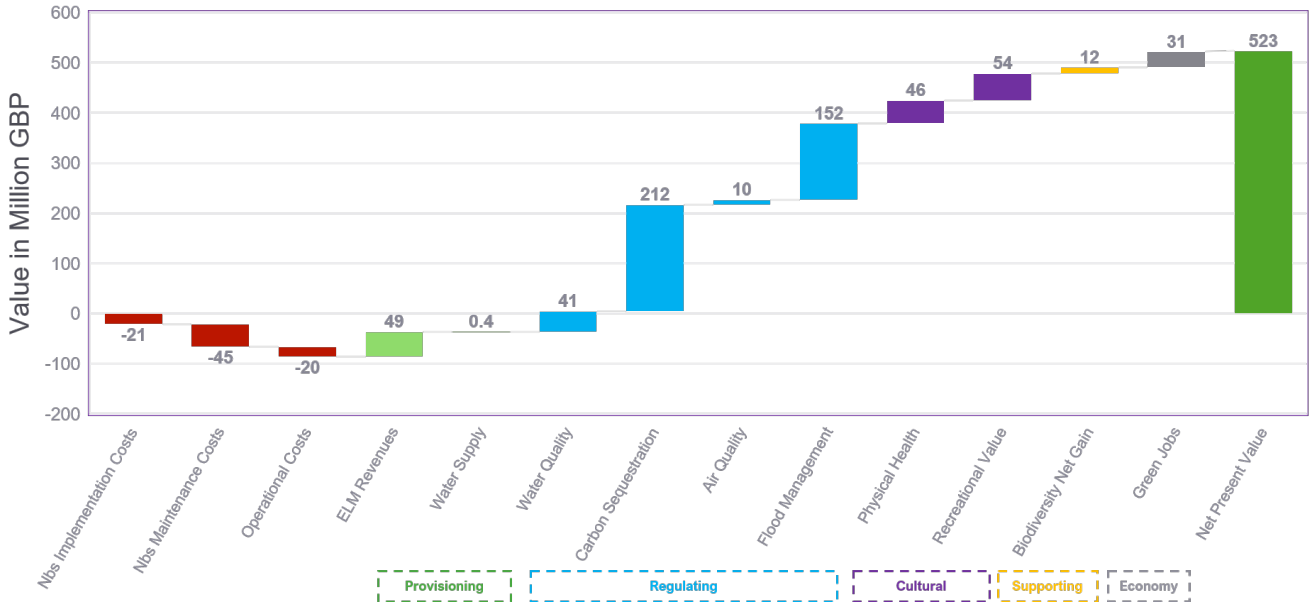


Figure 8: Waterfall chart showing Programme Costs, Benefits, and Net Present Value

An interesting finding relates to the financial incentives currently available to landowners. Across the four study areas, total revenues from Environmental Land Management (ELM) payments, Biodiversity Net Gain (BNG), the Woodland Carbon Code and the Peatland Code amount to approximately 83 million in discounted terms, compared to 86 million in Programme costs. Importantly, this estimate does not fully account for additionality requirements and stacking restrictions[8], which can limit the ability to combine revenue streams. In practice, the financial returns available to landowners are therefore likely to be lower. This highlights a key challenge for nature restoration in the UK: while the wider economic benefits are substantial, current market-based incentives alone are often insufficient to make restoration financially attractive at scale. Lessons from previous N4W Facility work in Norfolk also suggest that the potential for public and market-based revenues should be considered carefully when assessing scalability. ELM funding may not be available at the scale required for catchment-wide restoration, while BNG remains a relatively small market and carbon markets may also face limits to demand as nature restoration activity increases.

Based on the above values, the CBA 'decision metrics' were calculated for the four study areas. The results were then extrapolated to the wider catchment area by applying the cost and benefit values

[8] *In practice, revenues from schemes such as ELM, BNG, the Woodland Carbon Code and the Peatland Code cannot always be claimed simultaneously for the same intervention. Stacking multiple payments typically requires demonstrating additionality, meaning that each payment must be linked to a distinct environmental outcome that would not otherwise have been delivered. As a result, the total revenues available to landowners are often lower than the theoretical maximum presented in this analysis.*

per hectare from each study area to corresponding elevation zones across the catchment. This approach assumes that areas with similar topographic characteristics will generate comparable costs and benefits from NbS implementation. The results can be found in Table 6 below. A detailed description of the extrapolation methodology is provided in Annex C.

Table 6: CBA Decision Metrics

Metric	Result
Benefit-Cost Ratio (BCR)	• Modelling area (four study areas): 7.09 • Entire catchment area: 7.33
Net Present Value (NPV)	523 million (four study areas)

Table 6 highlights that the BCR exceeds 1, indicating that the benefits of the Programme outweigh its costs and confirming it as an economically viable investment. The analysis in the modelled area of the four study sites shows that for every 1 invested, the Programme would generate 7.09 in benefits. Scaled to the entire catchment area, the benefits would grow to 7.33, as highlighted in Figure 9 below. The slightly higher BCR for the whole catchment extrapolation is due to our assumptions that (a) costs will be marginally less expensive as NbS are scaled due to operational efficiencies, whilst (b) benefits will remain the same, as NbS scaled across the catchment are similar to the ones contained in the four study areas - or even grow marginally due to cumulative system improvements.

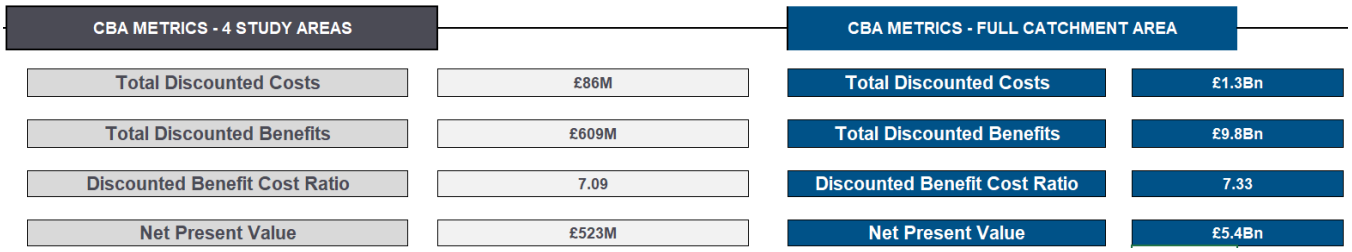


Figure 9: Comparison of CBA Metrics: 4 study areas vs full catchment area

The NPV is also positive, meaning that the Programme is expected to generate greater benefits than the costs incurred in today's terms, indicating a strong economic case for investment. The magnitude of the NPV (523 million for the study area) indicates that the scale of the value added is significantly greater than the discounted costs, further supporting the economic case for the Programme.

It is important to note that this NPV estimate is conservative. A large proportion of the Programme's costs are incurred during the early years of implementation, whereas many of the benefits accrue gradually over time as ecosystems recover and mature. Because future values are discounted, benefits realised later in the 30-year assessment period are discounted more heavily than costs incurred upfront. This reduces their contribution to the NPV and results in a more conservative estimate of the Programme's economic value.

This is typical of NbS projects, as their benefits take longer to accrue compared to grey infrastructure projects. This risks low cost-effectiveness of NbS programmes when investment decisions are made over shorter time periods, such as five years. Over decades, however, benefits start to significantly

exceed costs, which emphasises the need for long-term, investment decision-making and planning, sustainable funding and effective governance arrangements. These are components of a successful investment programme across the entire catchment.

Summary and Conclusions from the economic analysis

By comparing the monetary costs against the expected financial and economic benefits, the Cost-Benefit Analysis highlights that a Programme could deliver substantial provisioning, regulating, cultural, supporting, and economic growth services.

The assessment shows that while river restoration requires significant investment, its long-term positive benefits outweigh its costs. The Benefit-Cost Ratio (BCR) indicates that for every 1 invested, 7.09 of benefits are realised across the four study areas, and 7.33 of benefits would be realised across the whole catchment area. Additionally, the Net Present Value (NPV) is positive, reinforcing the Programme's ability to generate economic value.

Benefits are generated across a broad range of ecosystem services, with the largest contributions coming from carbon sequestration and flood management. The benefits are distributed as follows (discounted values):

- **Carbon sequestration** (£212 million). This combines benefits from a reduction in the social cost of carbon (190 million), the Woodland Carbon Code (22 million) and the Peatland Code (0.3 million)
- **Flood management** (£152 million)
- **Recreational value** (£54 million) and **physical health** (£46 million)
- **ELM revenues** (£49 million)
- **Water quality** (£41 million)
- **Green jobs** (£31 million)
- **Biodiversity Net Gain** (£12 million)
- **Air quality** (£10 million)
- **Water supply** (£0.4 million)

Taken together, these benefits make a compelling economic case for scaling NbS across the Trent Valley. Critically, every benefit identified – flood risk reduction, improved water quality, biodiversity recovery, carbon sequestration, public health, recreation – is ultimately a benefit to the economy. This reframing matters because ecosystem resilience and economic resilience are not competing priorities: they are the same thing. Nature is not an amenity to be protected at the margin of economic decision-making; it is the foundation upon which a functioning and productive economy depends.

The economic benefits identified in this business case also speak directly to the cost of inaction. The flood benefits modelled here are expressed as avoided costs; real economic damage that restoration prevents from occurring. Every pound of flood damage not avoided falls on households, businesses, insurers and the public purse. But the financial consequences of inaction extend beyond direct flood damage, and it is worth distinguishing between several related but distinct pressures now building across the insurance and mortgage markets. As flood risk rises, homeowners in exposed areas

already face higher premiums and, in some cases, reduced availability of cover. Insurers may decline to renew policies in the highest-risk locations altogether, as recently seen in Tenbury Wells, where flood insurance for public buildings was refused following near-annual flooding. In addition, lenders are beginning to restrict mortgage lending on the highest-risk properties independently of insurance status, as Nationwide has already done in parts of England (Norman, Corfe, & Gillett, 2026). These pressures compound one another: without insurance, a property becomes very difficult to mortgage, and if it is unmortgageable, it becomes very difficult to sell, potentially trapping owners in homes of falling value. Recent analysis estimates that, without progress in lowering flood risk, 430,000 mortgage-holding properties in England could become uninsurable or prohibitively expensive to insure by 2050, creating so-called 'climate mortgage prisoners' unable to remortgage, sell or relocate (Norman, Corfe, & Gillett, 2026). At the scale of the Trent Valley, and under a trajectory of increasing climate risk, the cumulative cost of inaction is not a theoretical concern, it is a certainty. The question is not whether the Trent Valley can afford restoration, but whether it can afford to go without it.

A catchment-wide Programme requires an estimated investment of around 1.3 billion over 30 years, yielding approximately 10 billion in economic benefits expressed in present-day terms. To put this into perspective, Severn Trent Water alone has committed 15 billion of capital investment across the Midlands over just five years as part of its AMP8 programme – the majority directed at grey infrastructure. The 1.3 billion required to restore the Trent Valley represents less than a tenth of that single company's five-year spend, yet delivers a return nearly seven times the investment across a far broader range of outcomes. This underscores both the relative affordability of nature-based restoration and the profound misalignment between where investment currently flows and where it would generate the greatest long-term value.

A related question is whether equivalent flood benefits could be delivered through grey infrastructure. In many cases they could, and a single-outcome cost comparison might even favour engineered solutions. But this framing misrepresents the choice on offer. Grey infrastructure delivers one outcome; NbS deliver many concurrently and without additional cost. Grey infrastructure also carries the risk of becoming a high-regret investment: a fixed response to a dynamic and worsening problem, with little capacity to adapt as climate and catchment conditions continue to change. The single-outcome appraisal frameworks widely used by water companies and other infrastructure investors are structurally biased against NbS, omitting the co-benefits that make them the stronger choice on any whole-system assessment. Addressing this appraisal gap is critical and a prerequisite for deploying NbS at the scale that the Trent Valley, and England's rivers more broadly, urgently require.

Crucially, this level of investment is not all required upfront, as early funding can already unlock meaningful outcomes such as reduced flood risk and improved water quality, while building momentum and confidence for broader implementation over time. In fact, only a fraction of the total funding is needed to begin delivering measurable results, laying the groundwork by achieving early wins, demonstrating proof of concept, and piloting delivery mechanisms with landowners. This phased approach enables adaptive learning and strengthens the foundation for scaling up over the longer term.

This diversity of benefits is a key strength of the Programme's economic case – value is generated across multiple outcome streams simultaneously, rather than being dependent on any single benefit. However, this multiplicity also has implications for funding: where benefits accrue to many, so too

must financial responsibility. The stakeholders best placed to contribute funding, and the mechanisms through which different benefit streams might be monetised and allocated to relevant off-takers, are discussed in the following section.

3. Programme Funding

This section assesses the potential funding sources, funding mechanisms and funding models for large-scale river and land restoration identified through the literature and comparative case study review. It begins by examining the key beneficiary groups, their respective challenges and their interests in large-scale river restoration, outlining the associated investment propositions. The section then compares different funding mechanisms and assesses their suitability to the Trent Valley context, before outlining the funding models identified through the case study review, highlighting their advantages, limitations and implications for implementation, scalability and replication. Insights from the case studies are integrated throughout to illustrate key considerations.

3.1. The Challenges with the Current Funding Landscape

The scale of investment required to deliver meaningful, lasting restoration across the Trent Valley is substantial, as outlined in the previous section. Yet the funding currently directed towards NbS catchment restoration is dwarfed by the sums flowing into activities that continue to degrade the very systems restoration seeks to repair. Investment in intensive agriculture, hard flood defence infrastructure and water industry capital programmes collectively represent billions of pounds of annual public and regulated expenditure in catchments like the Trent – the vast majority of which is directed towards single-purpose, engineered solutions that treat symptoms rather than causes. Nature-based restoration, by contrast, receives a fraction of this investment, and what does flow in arrives piecemeal: project by project, site by site, without the landscape-scale coordination needed to deliver cumulative, catchment-wide impact. The result is a funding landscape that is structurally misaligned with the scale and nature of the challenge.

This is not simply a question of finding more money. It is a question of reshaping how existing money is spent. Two of the largest water-related funding streams in England – the Water Industry's capital investment programme and the national Floods budget – are currently scoped and prioritised in ways that predominantly result in grey infrastructure solutions: concrete, chemicals, and engineered channels that deliver single outcomes and lock in carbon-intensive approaches for decades. Neither stream is routinely guided by a multi-capital or nature-first appraisal framework, meaning that NbS are frequently overlooked not because they perform worse on balance, but because the criteria used to evaluate options do not capture the full range of benefits they deliver. Changing this, by ensuring that these major funding streams are directed by systems-based thinking that accounts for water quality, flood risk, biodiversity, carbon and public health together, would represent a transformative shift, and one that is both technically justified and increasingly supported by emerging policy. Mechanisms such as the Accelerated WINEP and evolving floods funding policy are beginning to move in this direction, but the pace and ambition of change has so far fallen well short of what is needed.

There is also a deeper structural challenge. Even where funding criteria are improved, some legislative requirements, particularly around water quality standards, are currently framed in ways that effectively mandate expensive, chemically intensive solutions, regardless of whether a nature-based alternative would deliver better overall outcomes across a range of indicators. Addressing this will ultimately

require not just policy change but legislative reform: a move towards a genuine systems approach to water management, in which the objective is optimising outcomes across the whole catchment rather than compliance with siloed, single-medium standards. England's emerging cross-sectoral regional water planning framework offers a live opportunity to embed this approach at scale, and this business case demonstrates that the Trent Valley should be at the forefront of that ambition.

3.2. Informing the Objectives for Water Reform

With momentum growing for such a move towards integrated water management, a new regime could tackle the funding challenges outlined above. The exploration of ‘a streamlined and consolidated approach to regional water planning’ as set out in the UK Government’s Water White Paper, along with the discussion of ‘a system planning function operating at Wales level’ in Welsh Government’s parallel Water Green Paper (Welsh Government, 2026), offer the opportunity to move towards a system where funding decisions are taken in a far more integrated and strategic way. Neither government has set out a proposed mechanism to achieve this as yet, but a range of potential options exist.

Requiring a more substantial change from current regimes, the ‘Catchment Systems Operator’ model (Helm, 2015) would see independent bodies map out long-term catchment objectives covering water resources, flooding, agricultural run-off, sewage discharges and other pressures, forming catchment plans and then deploying funds for their delivery. Those funds would be drawn from water bills, pollution fines, the flood defence budget, agricultural payments and other relevant sources – or, at the model’s most radical, charged directly to beneficiaries / contributors, such as via taxation and green levies upon polluters. In either case, the model would collect and redeploy money already earmarked for water-related spend, but would distribute it in a more coherent, outcome-focussed way to achieve multiple water environment objectives.

Other models could see the proposed regional (England) and national (Wales) water planners collecting just a portion of those same budgets, or - at the end of the spectrum requiring least change from current approaches - exerting influence over how budgets (to be retained by existing operators such as water companies, the Environment Agency, the Rural Payments Agency and their equivalents in Wales), are spent. The latter could be achieved by mechanisms such as Ministerial Directions, or legal duties for budget holders to have regard to the priorities set out by the water system planners.

No matter the model, the Rivers 2040 Business Case is an excellent source of evidence demonstrating the benefits that could be secured for society by moving to a streamlined and consolidated approach to water planning. An approach that more readily provides the capital to deliver coherent, catchment-wide restoration is one that offers the greatest opportunity to secure the environmental and societal benefits that sustainable water management delivers.

The introduction of such changes will not be immediate, and the model selected by each government may go only some of the way towards a fully-integrated, fully financed approach. As such, we now explore aspects of funding and governance that provide the opportunity for delivery of the Rivers 2040 vision in advance of water reform. These approaches can work within current constraints, but could also themselves form a part of a future, more coherent water management model.

3.3. Funding Sources

Against this backdrop, the successful delivery and long-term resilience of large-scale restoration in the Trent Valley will depend on a diversified, blended approach to funding – one that integrates public and private investment, aligns the risk appetites and strategic priorities of multiple sectors, and bridges the gap between upfront capital requirements and long-term operational costs. Critically, it must also be accompanied by deliberate efforts to reshape the policy, regulatory and governance environment so that the largest existing funding streams are reoriented towards nature.

In assessing potential funding sources, an important distinction must be drawn between two fundamentally different types of financial contributor. The first are outcome buyers: public bodies, regulators, and private organisations that derive direct, measurable benefit from restoration and can be structured to pay for specific outcomes, whether through grants, regulatory mechanisms, or market-based instruments. The second are financiers: investors providing upfront or long-term capital, whether repayable or non-repayable, to fund delivery. These two groups have different motivations, different risk tolerances, and different expectations of return, and must be engaged through different mechanisms. Conflating the two – as funding assessments for large-scale restoration often do – risks misaligning incentives and leaving significant capital inaccessible.

The greatest need, and the most enduring force capable of sustaining this effort, is long-term structured coordination across all funding partners. This is rare in large-scale restoration, but it is the only model capable of sustaining collective investment, collective action, and the progressive delivery of common good at catchment scale. The following sections set out the principal funding sources available, the distinction between outcome buyers and financiers within each, and the reforms needed to unlock their full potential.

Despite growing focus on mobilising greater levels of private finance for nature restoration, public authorities and third-sector organisations continue to play a critical anchoring role in initiating, coordinating and sustaining projects. The stakeholders listed below represent organisations across sectors with a track record of investing in nature restoration in the UK and highlight potential avenues for securing funding for catchment-scale initiatives.

Table 7: Example organisations with proven track record of investing in river restoration or NbS projects

Category	Organisation Type	Funder
Charities/ Foundations	Non-profit Foundations / Philanthropic donations	Esmée Fairbairn Foundation Arcadia Oak Foundation
	International NGOs	WWF
	Conservation Charities	The Woodland Trust The Rivers Trust Royal Society for the Protection of Birds (RSPB) The Wildlife Trusts Wildfowl and Wetlands Trust (WWT) The National Forest
Public	Department for Environment, Food & Rural Affairs (DEFRA)	Water Environment Improvement Fund (WEIF) Water Restoration Fund (WRF) Environmental Land Management Scheme (ELM) – Countryside Stewardship Higher Tier (CSHT) Farming in Protected Landscapes (FiPL) England Woodland Creation Grant (EWCO) Nature for Climate Peatland Grant Scheme (NCPGS)
	Executive Non-Departmental Public Bodies (NDPB)	Environment Agency (EA) Natural England National Lottery Heritage Fund
	Local Authorities	Councils Lead Local Flood Authority (LLFA)
	Universities	University of Salford University of Cambridge – Cambridge Conservation Initiaitive (CCI)
Private	Mineral Extraction Sector	Hanson Quarry Products
	Insurance Sector	Intact Insurance Aviva Insurance Co-Op Insurance Flood Re
	Banking Sector	Triodos Bank
	Water Utilities Companies	Northumbrian Water United Utilities Wessex Water

A longer list of potential funders can be found in Annex A, which can serve as a reference for future engagement. It is not exhaustive and may require further adjustment moving forward.

Different funders have different priorities, risk appetites and return expectations, and not every benefit stream will be relevant or accessible to every funding source. The table below provides an initial mapping of the Programme's projected benefits against the funders and outcome buyers most likely to value them, offering a starting framework for understanding where funding interest is likely to be strongest. Each of these relationships is explored in greater detail in the sections that follow.

Table 8: Benefits and Corresponding Funders/Stakeholders

Benefit	Potential funder/Stakeholder for whom the benefit is of interest and relevant to
Reduced flooding	DEFRA; regional flood and coastal committees; statutory flood authorities (Environment Agency, internal drainage boards, local authorities, water companies); businesses with premises or supply chain at risk; communities; landowners; infrastructure developers and operators; insurance companies.
Carbon	Local councils; Environment Agency; landowners; water companies and most other private organisations due to offsetting targets; philanthropic organisations and foundations
Water quality	Water companies; Environment Agency; philanthropic organisations and foundations

Water supply	Water companies; private abstractors
Air quality	Local authorities; communities
Biodiversity Net Gain	Landowners; infrastructure developers; minerals sector; philanthropic organisations and foundations
ELM revenues	Landowners
Green jobs	Local authorities; communities; philanthropic organisations and foundations
Recreational value	Local authorities; communities; philanthropic organisations and foundations
Physical health	Local authorities; communities; philanthropic organisations and foundations

Charities and Foundations

Foundations and Philanthropic Organisations

Foundations and philanthropic organisations represent an important source of funding for nature restoration, usually offering non-repayable grants. Increasingly, foundations also offer recoverable grants, which are a form of zero-interest loan that requires repayment but on terms that would be unacceptable to commercial lenders, typically with extended repayment periods, no interest, and significant flexibility around timing. The Esmée Fairbairn Foundation, for example, supports restoration initiatives aimed at improving biodiversity and water quality through grants and loans of up to several million pounds, including the flagship Natural Flood Management (NFM) project in the Wyre Catchment (Annex B, Table 16). Similarly, Arcadia, a foundation with a strong focus on nature recovery, has supported UK-based initiatives such as the Transforming the Thames Partnership and the Oder Delta on the Polish-German border (Annex B, Table 16) via the Cambridge Conservation Initiative. These organisations represent significant funding opportunities where projects align with their values and strategic priorities. Grants are particularly valuable in the early stages of the Programme, where the work is most exploratory and the risk profile highest. Grants can cover feasibility studies, pilots, work required to formalise governance, baseline assessment and outline design that commercial funders and repayable finance instruments are typically unwilling to support.

Conservation Charities

National and local conservation charities, including Wildlife Trusts, Rivers Trusts, The National Forest, the RSPB and the Woodland Trust deploy their resources to deliver projects aligned with their charitable conservation objectives. Where direct funding is unavailable, these organisations secure and utilise funds from grant-giving, philanthropic and other sources, and can also act as delivery partners or intermediaries, enabling access for partnership programmes to public grants or philanthropic donations, as demonstrated by the Wyre Catchment NFM Project (Annex B, Table 16) and the Upstream Thinking Programme (Annex B, Table 23).

Public Entities

DEFRA Grants and Funds

DEFRA administers a range of grants and funds that represent some of the most significant public funding sources for river and catchment restoration in England and have supported many relevant projects including the Holnicote Estate 'Stage 0' river restoration project and the Upstream Thinking Programme (Annex B, Table 20, Table 23). Relevant schemes span both ongoing environmental land management subsidies and competitive grants for landscape-scale initiatives:

- **Environmental Land Management Schemes (ELMS)**: comprising the Sustainable Farming Incentive (SFI), Countryside Stewardship Higher Tier (CSHT) and Landscape Recovery, collectively offering a spectrum of support from farm-level NFM actions through to long-term, large-scale land use change and ecosystem restoration.
- **England Woodland Creation Offer (EWCO):** supporting riparian and floodplain woodland creation, delivering water quality, flood attenuation and biodiversity co-benefits.
- **Nature for Climate Peatland Grant Scheme (NCPGS):** funding peatland restoration across England, relevant to upland parts of the Trent catchment where degraded peat contributes to flashy runoff and poor water quality.
- **Paludiculture Exploration Fund**: targeting wet and rewetted land farming alternatives, relevant to low-lying floodplain areas where conventional arable farming is no longer viable.
- **Water Environment Improvement Fund (WEIF):** channelled through local catchment partnerships to fund habitat restoration, river improvements and flood management, with match funding requirements that leverage additional private and third-sector investment.
- **Water Restoration Fund (WRF)**: competitive grants of up to 2 million for projects improving water quality and restoring water environments, open to catchment partnerships, NGOs, landowners and local authorities.
- **Local Nutrient Mitigation Fund**: grants to local authorities and catchment partnerships to deliver nutrient neutrality schemes, including wetland creation and river buffer restoration.
- **Defra's 5.2 billion Flood and Coastal Erosion capital investment programme (2021–2027)**: the overarching capital envelope from which FCERM Grant in Aid flows; worth referencing as context for the scale of existing public investment in flood risk management.

The Environment Agency (EA) and Natural England (NE)

The EA and NE are central to river and catchment restoration in England as funders, regulators, technical advisers, and in some cases direct delivery partners. Hence, their engagement is essential to the Programme.

The EA holds the primary statutory mandate for flood risk management in England (supported in the delivery of responsibilities by Lead Local Flood Authorities) and the flood risk reduction benefits evidenced in this business case provide a strong basis for securing its support. Historically, the EA's funding appraisal tools favoured grey infrastructure and failed to capture the co-benefits of nature-based approaches, but this is changing. Recent FCERM funding policy reforms reflect a growing body of UK evidence that NFM can deliver flood risk reduction cost-effectively while generating multiple additional benefits, and the evidence presented in this business case is directly relevant to that evolving framework.

To date, the EA has operated predominantly as a direct capital provider in catchment restoration. However, there is a compelling case for it to evolve towards a more flexible role as an outcome buyer, commissioning and paying for specific, verified flood risk outcomes rather than funding discrete infrastructure projects. This model has precedent: in the Wyre catchment, the EA structured its involvement as an outcome purchaser, contributing funding in exchange for defined flood risk reduction delivered through nature-based interventions. Replicating and scaling this approach in the Trent Valley would represent a significant step towards a more efficient and nature-positive model of public flood risk investment, allowing catchment restoration programmes to attract more finance from investors.

Natural England's role is equally important, particularly in relation to SSSI condition, species recovery, and Local Nature Recovery Strategies, all of which intersect closely with the Programme's objectives. As statutory bodies with influence across planning, regulation and public investment, their early and sustained engagement will be critical to delivering the Programme at the scale and ambition envisaged. Relevant grants from the EA and NE include:

- **EA Flood and Coastal Erosion Risk Management (FCERM) Grant in Aid** – the main government capital funding stream for flood risk schemes, now being reformed to better support NbS alongside traditional grey infrastructure.
- **Flood and Coastal Resilience Innovation Programme (FCRIP)** – the 200 million Defra/EA programme supporting 25 areas across England to develop innovative NFM and flood resilience solutions, highly relevant given the Trent catchment's flood risk profile.
- **Species Recovery Programme Grant Scheme (Natural England)** – grants of up to 1.5 million for habitat creation and enhancement targeting priority species, directly applicable to riverine and wetland restoration.

Regional Flood and Coastal Committees (RFCCs)

Regional Flood and Coastal Committees (RFCCs) are statutory committees that oversee and help shape Flood and Coastal Erosion Risk Management (FCERM) investment within their respective regions. They provide an important link between the Environment Agency, Lead Local Flood Authorities, and other local partners, helping to coordinate flood risk management priorities and investment across administrative boundaries. Given the scale of the Trent catchment and the importance of flood risk reduction to the Programme, engagement with the relevant RFCC would therefore be important from an early stage.

RFCCs also have the ability to raise local levy funding from Lead Local Flood Authorities to support flood risk management activities that fall outside nationally funded schemes. This provides a potential source of locally raised public finance for catchment-scale interventions, particularly where projects can demonstrate benefits across multiple local authority areas. While the scale of available levy funding is relatively limited compared with national FCERM investment, it could provide an important contribution to Programme costs and help unlock complementary sources of funding.

RFCCs also play an important governance role in reviewing and approving the Environment Agency's annual programme of FCERM investment. Securing their support could therefore be valuable not only in relation to local levy funding, but also in aligning nature-based interventions with regional flood risk priorities and strengthening the case for EA investment. Early engagement would help ensure that the

Programme is reflected in wider flood risk management planning and that opportunities for combining different sources of public finance are identified.

Councils

Local councils represent an important and often under-utilised funding source for river restoration, particularly where projects can demonstrate tangible socio-economic benefits and contributions to community wellbeing – areas in which this business case is well-evidenced. The projected benefits across physical health, recreational value and green job creation are of particular relevance to council priorities and provide a strong basis for engagement. Councils also have an important role as Lead Local Flood Authorities (LLFAs), with statutory responsibilities for managing local flood risk and developing local flood risk management strategies. This creates a direct opportunity to align catchment restoration with local flood risk priorities and investment.

Several local authorities within the Trent catchment have already demonstrated appetite for this kind of work. Warwickshire, Derbyshire, Staffordshire and Nottinghamshire County Councils, alongside Birmingham City Council, have previously supported comparable initiatives and could play a leading role in building broader council engagement across the catchment. Their early involvement would carry significant weight in encouraging neighbouring authorities to commit. As LLFAs, these authorities can also help identify and prioritise areas where nature-based interventions could contribute to local flood risk reduction, potentially supporting access to local levy and other flood risk management funding.

Securing council support is also strategically important beyond direct funding. Local authorities shape planning policy, lead Local Nature Recovery Strategies, and hold influence over land use decisions across the catchment – meaning their engagement is as valuable for the enabling environment it creates as for the financial contribution it represents.

The National Lottery Heritage Fund

The National Lottery Heritage Fund has played a major role in financing river restoration across the UK, supporting projects such as the River Soar Project, Hogwill Beck Restoration, Upper Dee and Cattie Burn Restoration, and the Land of the Fanns Partnership Scheme (see long list). Funding programmes range from 10,000 to 10 million and prioritise projects that connect communities with the UK's natural and cultural heritage.

- **National Lottery Heritage Fund**: not a government grant but distributes public money and remains an active funder of river and catchment restoration; frequently used as match funding alongside government schemes.

Private Entities

Water Utilities Companies

Water companies allocate significant capital to catchment management and frequently fund upstream NbS where they offer a more cost-effective alternative to traditional downstream treatment infrastructure. Through the Advanced Water Industry National Environment Programme (A-WINEP), water companies can also fund high-value environmental projects beyond their standard regulatory obligations, creating a meaningful additional route for nature-based investment at catchment scale.

The water quality and flood risk reduction benefits evidenced in this business case are of direct relevance to the water sector. Improved water quality helps companies fulfil their environmental obligations while reducing treatment costs. Flood risk reduction is equally pertinent: flooding is a significant contributor to combined sewer overflows (CSOs), a highly politically charged issue on which water companies are under intense regulatory and public pressure to improve. NbS that reduce flood peaks and slow runoff therefore address water company priorities directly and should be framed as such in engagement with the sector.

Anglian Water's recently launched 11 million Catchment Regeneration Fund offers a directly relevant precedent. Delivered under its A-WINEP programme, the fund supports partnership projects delivering NbS across 11 target catchments, with a 50:50 match funding requirement that leverages equivalent third-party investment alongside the water company contribution. The Upstream Thinking Programme, funded by South West Water and delivered by local partners including Devon Wildlife Trust, Cornwall Wildlife Trust and the Westcountry Rivers Trust, provides a further precedent, demonstrating how long-term utility engagement can be structured within a Payment for Ecosystem Services framework and blended with National Park and public funding to create a multi-layered financing model.

In the Trent Valley, Severn Trent Water is the dominant utility partner, with Anglian Water and Yorkshire Water relevant across the lower and northern reaches of the catchment respectively. All three have demonstrated appetite for river restoration investment and carry the regulatory mandate and capital scale to be meaningful long-term contributors to the Programme. Aligning the Programme's objectives and evidence base with their own investment cycles and future A-WINEP commitments should be an early and sustained priority.

The Mineral Extraction Sector

As set out earlier in this business case, the mineral extraction sector plays a pivotal role as a mechanism for land use change and nature restoration in the Trent Valley, and close engagement with operators is critical to the Programme's success. Examples from the UK (eg the Milton Keynes Flood Plain Forest; Annex B, Table 21) and Europe (eg the Border Meuse Restoration Project; Annex B, Table 22), demonstrates that gravel extraction companies can be transformative partners in large-scale restoration.

Importantly, mineral extraction companies are legally required to restore their sites once extraction is complete, meaning that a degree of nature restoration in the Trent Valley will occur through this pathway without direct cost to the Programme. In this sense, the sector is less a traditional funding source and more a critical delivery partner/mechanism, yet the decision of whether to restore to nature or other land uses such as agriculture lies with the landowners.

Our engagement with the sector has identified several barriers that currently constrain restoration ambition. The introduction of Biodiversity Net Gain requirements, whilst well-intentioned, has in practice lowered the bar for some operators by setting a minimum standard that does not incentivise more ambitious outcomes. Stringent regulatory restrictions on works in and adjacent to main river channels present a further constraint, as does the need to bring landowners along where extraction sites adjoin privately owned land.

This business case is intended to provide the evidence base needed to make the case to policymakers and the local planning authorities who regulate the sector that some of these rules and incentive structures may warrant revision. This might unlock the potential for more ambitious, nature-led restoration outcomes and the long-term economic resilience that would follow.

The Insurance Sector

As flood risks rise, the insurance sector has an increasingly important interest in the effectiveness of catchment-scale Nature-based Solutions (NbS), extending well beyond its traditional position as a funder of resilience initiatives or a beneficiary of reduced losses. Insurers generally do not control flood-defence investment decisions, and their primary role remains risk assessment, pricing and risk transfer rather than the direct financing of risk reduction. Insurance premiums provide an important market signal that reflects underlying flood risk and, in doing so, help encourage investment in resilience by those responsible for managing that risk. In a competitive market with relatively small underwriting margins, insurers have limited scope to fund resilience measures directly at scale, and doing so through insurance premiums would effectively transfer the cost to policyholders while weakening the risk signal that insurance is intended to provide. Consequently, investment in public flood resilience infrastructure, including catchment restoration, remains primarily a matter for government and other public funding sources.

To date, insurer support for NbS has therefore been driven largely through grant funding rather than core insurance operations or investment portfolios. Rather than a philanthropic or ESG-driven adjunct to core business, this support is more accurately understood as an early contribution to climate adaptation and resilience, reflecting insurers' direct commercial interest in reducing the frequency and severity of the claims that catchment restoration is designed to prevent. These initiatives have played an important role in demonstrating the value of catchment restoration and helping to crowd in wider sources of finance, but this funding is unlikely to reach the scale required to deliver catchment-wide transformation. Encouraging precedents nevertheless exist. Intact Insurance has funded community-led nature-based solutions ranging from sustainable urban drainage in Gloucestershire (Table 16) to the restoration of 200 hectares of the Jacques-Cartier Bog in Quebec. Co-op Insurance's participation in the Wyre Catchment NFM Project and Aviva's support for the River Soar initiative demonstrate how insurer-backed projects can contribute to on-the-ground delivery while building the evidence base for wider adoption. AXA UK has commissioned independent research into local climate and flood risk to inform underwriting and public policy engagement (Norman, Corfe, & Gillett, 2026), and Zurich Insurance Group's Flood Resilience Alliance has invested in community-level flood resilience programmes internationally since 2013 - evidence that insurer engagement with flood resilience extends across the market, rather than resting with one or two organisations alone.

A key challenge in moving beyond demonstration projects is evidencing the long-term financial value of catchment restoration in terms that the insurance sector can recognise. This business case does not assume that nature restoration will translate automatically or directly into lower premiums for individual policyholders; the relationship between restoration and insurance pricing is complex and not yet guaranteed. Although NbS should, in principle, contribute to lower flood risk and ultimately be reflected in insurance pricing, significant barriers remain, including limited long-term datasets, difficulties in attributing reductions in claims to specific interventions, and a lack of standardised approaches for measuring and verifying outcomes at catchment scale. Addressing these evidence gaps will be essential before restoration outcomes can be consistently incorporated into long-term pricing models or investment decisions. Alongside improved measurement, standardised methodologies and outcome verification will be critical to creating the confidence needed for wider private sector participation.

These pressures are not evenly felt. Insurance affordability is already strained by the suppression of risk-reflective pricing: FloodRe currently caps premiums for eligible high-risk homes, but without it, annual policies for the highest-risk properties are estimated at 8,000–10,000, against a current average of 500–750 (Norman, Corfe, & Gillett, 2026). FloodRe is itself due to close in 2039, and because it only covers residential properties built before 2009, commercial premises - including the small businesses that anchor many riverside communities in the Trent Valley - are excluded from its protection altogether and must already absorb risk-reflective pricing or the cost of self-funded resilience measures. The burden also falls disproportionately on lower-income and asset-poor households: in constituencies with a high concentration of flood-risk mortgaged homes, losing access to competitive mortgage rates could add more than 10 per cent to a household's disposable income in some areas, turning more homeowners into climate mortgage prisoners who cannot remortgage, sell or move. Without insurance, these same households would have to cover storm damage themselves. Rebuilding a three-bedroom house typically costs between 30,000 and 45,000 depending on the damage, yet the average UK adult has only around 16,000 in savings, nowhere near enough to cover a single bad flood (Norman, Corfe, & Gillett, 2026). Catchment-scale restoration, by reducing how often and how badly areas flood, directly affects whether insurance stays affordable and available for the communities least able to absorb these costs.

There is nonetheless growing evidence that NbS support flood resilience and risk reduction more broadly: analysis of six Wildlife Trust natural flood management (NFM) schemes found estimated reductions in peak flow of 2–10 per cent for smaller, more frequent flood events, alongside an average benefit-cost ratio of 1:4.47 over 10 years, rising to 1:10.79 over 30 years once wider social and environmental benefits are included, signalling attractive returns for multiple stakeholders (Stantec, 2025). This same research identifies the insurance sector as an important stakeholder in NFM, with a role extending to the provision of data, finance and collaboration with other sectors, even where direct commercial incentives to invest remain limited (Stantec, 2025).

Looking further ahead, insurers could also engage as financiers and long-term investors rather than simply as grant funders or ESG contributors, but this will require the Programme to evidence long-term financial returns in terms that the sector recognises. If catchment-scale restoration can demonstrate a credible, quantified relationship between investment and reduced claims exposure over a 20-to-30-year horizon, it opens the door to structured investment vehicles through which

insurers could deploy patient capital and receive returns linked to verified risk reduction outcomes. While still a nascent concept, it represents a significant and largely untapped financing opportunity. Beyond direct investment, the insurance sector also holds significant potential to act in the future as an offtaker of ecosystem services and to de-risk capital within Payment for Ecosystem Services arrangements, providing the financial confidence needed to attract broader investment into catchment restoration as the supporting evidence base matures.

The Banking Sector and Private Investors

The Wyre Catchment NFM Project (Annex B, Table 19) offers an instructive precedent for the role private finance can play in scaling nature-based restoration. By securing an 850,000 loan facility drawn from a mix of commercial, private and philanthropic sources, the Wyre project demonstrated that blended repayable finance can bridge the gap between upfront capital requirements and longer-term ecosystem service revenues. The Trent Valley Programme should look to develop comparable structures, using repayable finance to mobilise investment at a scale that grant funding alone cannot reach, while the evidence base and revenue streams needed to attract mainstream private capital continue to mature.

Central to attracting private finance is a fundamental reframing of NbS as an asset. Nature is critical infrastructure that underpins a healthy economy just like roads, bridges and reservoirs do, yet it is rarely financed as such. Banking institutions routinely provide long-term debt finance for engineered assets; equivalent instruments for natural assets are necessary.

Infrastructure Development and Operators

With Biodiversity Net Gain (BNG) now mandatory in England, developers must deliver at least a 10 per cent net gain in biodiversity, often through off-site credits. River restoration and NbS are well placed to generate these credits, creating a revenue stream that can support long-term management and monitoring costs. National Highways and Network Rail have previously supported habitat restoration in this context, and West Midlands Trains, East Midlands Railway, and National Grid represent further potential partners in the Trent Valley. Major built infrastructure related to water (such as for flood defence or water resources provision), will also typically require the delivery or purchase of BNG units, and is likely to have a specific requirement for watercourse units or wetland habitats, given the requirement to compensate for losses through like-for-like provision by habitat type. This means that development by these sectors could be particularly relevant as a market for Programme delivery.

Beyond BNG, infrastructure operators have a direct and largely underexplored financial interest in the flood risk reduction benefits that catchment restoration delivers. The welfare costs of weather-related disruption to the transport network have been estimated at between 100 million and 520 million per day of disruption in England, with flooding a leading cause. Flooding in 2013 alone cost Network Rail around 12 million in compensation and a further 15 million in damage repairs (Department for Transport, 2026). NbS that slow and store floodwater at catchment scale can reduce the frequency and severity of these disruption events, prolonging the operational lifespan of road and rail assets and deferring costly repair and resilience programmes. For operators such as National Highways and Network Rail, whose assets run directly through and alongside the Trent floodplain, this represents a tangible and quantifiable financial benefit, and a credible basis for structured contribution to the Programme as outcome buyers.

Industrial, Manufacturing, Food and Agriculture Sector

The UK's industrial and agri-food sectors are increasingly investing in NbS as part of their ESG commitments and to protect local water resources. These investments are often strategic, aimed at improving supply chain resilience and mitigating operational risks. For instance, Nestlé Waters UK has successfully funded river and habitat restoration through its partnership with the Staffordshire Wildlife Trust.

As a major agricultural hub, the Trent Valley hosts a supply chain vital to retailers and food producers such as Nestlé, PepsiCo and various national supermarkets. These entities face increasing pressure to report on their environmental impacts and dependencies, driving a commercial incentive to invest in catchment restoration. Such involvement is typically channelled through frameworks like Landscape Enterprise Networks (LENs) or organisations like the Trent Rivers Trust. Engaging such organisations in decision-making is essential to aligning project outcomes with company sustainability mandates to support funding. Key potential stakeholders include Rolls-Royce, Toyota, BASF and Nestlé (Hatton site), all of whom share an interest in the long-term health and stability of local water catchments.

3.4. Funding Mechanisms

The following section outlines the identified potential funding mechanism for the Programme, based on a multi-criteria ranking. In this context, funding mechanisms are the specific, individual, financial instruments used to mobilise and channel capital into restoration activities. Several individual mechanisms can be combined in one funding model. Integrating a variety of funding mechanisms creates a diversified revenue base, providing the financial stability necessary to attract long-term capital. Establishing a clear ranking of these mechanisms ensures the project selects the most appropriate ones to align with the specific regional context and mandates of key stakeholders and funders.

To ensure long-term viability, each potential mechanism was evaluated against a standardised scoring model ranging from 1 (lowest) to 3 (highest). This methodology prioritises mechanisms based on their funding potential, regulatory alignment, scalability and duration of support. The analysis distinguishes between priority mechanisms, forming the foundation of the financial strategy, and secondary options, providing valuable but supplementary support. By integrating public funding, private nature markets, and utility-led investments, the project adopts a *blended finance* approach that mitigates early-stage risk while securing the long-term revenue certainty required for landscape-scale environmental recovery.

Funding Mechanism	Funding Potential	Institutional Capacity	Social Acceptability	Sustainability	Scalability	Project Relevance	Rating
National Public Funding							3
- Public Grants (DEFRA, Natural England, EA)							2.85
- DEFRA subsidies (Environmental Land Management Schemes)							3
Bilateral Payments for Ecosystem Services (PES) Contracts							3
Biodiversity Net Gain Market							3
Water company investments							3
Repayable capital (e.g. Green Banks/Green Lending, Impact investing)							2.75
Nutrient Neutrality Markets							2.65
Voluntary carbon market							2.55
Lotteries (e.g. National Lottery Heritage Fund)							2.5
NGO programme funding							2.5
Local government grants (e.g. Councils, Combined Authorities)							2.4
Economic outputs (incl. recovered materials and reduced costs)							2.4
Green or Sustainability Bonds (e.g. Green Gilts)							2.4
Other compensation for planned environmental damage (e.g. District Level Licensing)							2.3
Foundations and charitable trusts							2.3
Corporate sustainability (CSR/ESG, water stewardship commitments)							2.05
Challenge funds and innovation grants							1.95
Taxes and fees from tourism sector (e.g. entrance fees)							1.65
Individual/private philanthropic donations							1.65
Water use assosciations							1.55
Corporate philanthropy or donations							1.5
Community contributions (cash or in-kind)							1.5
Conservation tax credits							1.4
Social and development impact bonds							1.3
Multilateral development banks							1.3
Crowdfunding and digital finance							1.15
Bilateral donors and aid agencies							1.15
Debt-for-nature swaps							1

Figure 10: Funding mechanisms matrix. Green is high, yellow is medium and red is low.

Figure 10 presents a matrix ranking funding mechanisms by priority, based on several key criteria: funding potential (scale and reliability of finance), institutional capacity within the UK context (alignment with existing UK frameworks), social acceptability (public and stakeholder support), long-term sustainability (financial durability), scalability (potential for expansion across catchments, including in combination with other mechanisms), and relevance to the project context (applicability to the Trent Valley and its stakeholders).

The overall prioritisation score was calculated using a weighted scoring model. Each funding mechanism was assessed against all criteria and assigned a rating of high (3), medium (2), or low (1). These ratings were then applied according to the following criterion weightings:

Funding Potential	Institutional Capacity	Social Acceptability	Sustainability	Scalability	Project Relevance
25 per cent	20 per cent	15 per cent	15 per cent	10 per cent	15 per cent

It is important to note that the matrix brings together both revenue-generating funding mechanisms and debt or repayable finance. These represent distinct approaches to financing the Programme, with different implications for repayment, risk allocation and the underlying source of returns. At this stage, however, the objective is to consider the full range of potential funding sources and mechanisms that could contribute to financing nature-based solutions, rather than to make a final determination on the most appropriate financing structure. The distinction between revenue and repayable finance should therefore be considered when interpreting the results and would warrant further assessment as the Programme develops.

The maximum possible rating under this matrix is 3, and the minimum is 1. Funding mechanisms are ranked from highest to lowest overall score. Mechanisms scoring between 2.5 and 3 are identified as priority funding mechanisms. Those scoring between 2 and 2.5 are considered relevant but secondary options, while mechanisms scoring below 2 are not recommended. Accordingly, the top funding mechanisms identified for this project include national public funding, payments for ecosystem services, nature markets, water company investments, repayable funding and lottery grants, described below.

Top Priority 1: National Public Funding

National Public Funding– including grants from DEFRA, the Environment Agency, and Natural England – provides the essential capital required for the initial phases of project implementation. Beyond direct implementation, these grants also serve as a signal of government endorsement, providing the institutional confidence necessary to attract further blended finance. While traditional grants are frequently limited by their 'one-off' nature, agricultural subsidies (including Environmental Land Management Schemes) additionally offer a more durable, long-term mechanism to incentivise land managers across the catchment, ensuring both the scalability and permanence of restoration efforts.

Furthermore, the UK Government has signalled a commitment to nature recovery through the 11 million Water Restoration Fund, for which the Programme is well positioned to support its evolving policy priorities by delivering catchment-scale interventions that tackle Reasons for Not Achieving Good Status (RNAGS), contribute to species recovery targets, align with Catchment Plans and Local Nature Recovery Strategies (LNRSs), strengthen the pipeline of planning and feasibility projects, and restore priority habitats such as wilder river corridors. Additionally, there is a broader pool of over 100 million generated from water company fines, which represents another national public funding opportunity for the programme. This ring-fenced capital represents a high-potential revenue stream for restoration initiatives and aligns directly with the strategic objectives of the project.

National Lottery Heritage Fund grants currently provide valuable financial support, particularly for community-focused or culturally significant restoration projects. However, these are typically restricted to fixed-term capital works, offering less long-term scalability or ongoing stewardship. While these funds serve as an excellent catalyst for initial implementation, they must be integrated with more durable revenue streams to ensure the project's operational sustainability.

Top Priorities 2 & 3: Payments for Ecosystem Services and Nature Markets

Within the UK's broader Payment for Ecosystem Services (PES) landscape, Biodiversity Net Gain (BNG) credits represent a primary funding mechanism for the Trent Valley. Unlike Nutrient Neutrality credits, which are restricted to specific catchments flagged for nutrient neutrality, such as the River Mease, BNG is now a mandatory requirement for nearly all developments in the region. This offers greater scalability

and funding potential than nutrient-based markets. The BNG framework also ensures project permanence by mandating management and monitoring for a minimum of 30 years.

As a critical industrial and housing corridor, the Trent Valley has a high demand in off-site biodiversity units. For example, the East Midlands Combined County Authority (EMCCA) has set a target of 100,000 new homes across Derbyshire and Nottinghamshire, a goal that will significantly drive the local market for BNG offsets. In contrast, while the voluntary carbon market is well-established through the Woodland Carbon Code and Peatland Code, it remains subject to price volatility and generally offers lower revenue potential and financial stability compared to the BNG market.

While BNG operates within a structured regulatory market governed by statutory biodiversity credits and fixed compliance rules, other PES schemes may rely on bilateral agreements – bespoke, private contracts negotiated directly between a specific buyer and seller to deliver tailored environmental outcomes.

As the environmental restoration and ecosystem services sectors are still emerging, investors remain cautious regarding the inherent risks of nature-based projects. To overcome these barriers and enhance investment appeal, it is essential to emphasise multi-benefit outcomes. By 'stacking' diverse ecosystem services, the project can present a more robust value proposition. However, while bundling (the sale of multiple benefits as a single unit to a single buyer) is common, stacking is subject to additionality requirements. This necessitates proving that each benefit is distinct and would not have occurred without specific additional intervention (additionality). While this is essential to prevent double-counting and ensure a high-integrity offer, the associated administrative and measurement burdens can complicate the realisation of a project's full financial potential.

Table 9: Potential Buyers of Ecosystem Services

Ecosystem Service	Potential Buyers
Biodiversity – Biodiversity Net Gain credits	• Housing and infrastructure developers (incl. National Highways, Environment Agency, Lead Local Flood Authorities and water companies) (mandatory) • Mineral extraction sector (mandatory) • Businesses, organisations, individuals (voluntary)
Nutrients – Nutrient Neutrality credits	• Housing developers • Providers of new tourism, hospital, prison and care home facilities • Agricultural enterprises
Carbon – Carbon credits in Voluntary Carbon Market	• Businesses, organisations and universities with ESG goals or requirements • Local authorities • Individuals
Flood reduction	• Water utilities companies • Environment Agency • Municipal and local governments (incl. councils) • Local businesses • Insurance and reinsurance companies (philanthropy, ESG goals or requirements)

Improved water resource and quality	• Corporations with supply chain interests in the area
	  ○ Manufacturing and industrial sector
	  ○ Agricultural sector
	• Drinks and bottling bompanies (Coca-Cola, etc.)
	• Municipalities
	• Water utilities companies
	• Local technology and data companies

Top Priority 4: Water Company Investments
Driven by the UK Government's Water Industry Strategic Environmental Requirements (WISER) and the Water Industry National Environment Programme (WINEP), water companies in England are increasingly mandated to enhance catchment health, specifically to mitigate nutrient pollution and satisfy tightening environmental standards. To meet these obligations, they provide significant, long-term capital allocations that offer a degree of financial stability for catchment-scale programmes. Because water companies operate across large geographic regions, they have both the capacity and the regulatory requirement to invest at landscape scale.

Critically, however, the direction of alignment is shifting. Emerging reforms to the water industry – Including the establishment of a new regional water planning architecture – mean that water companies are increasingly expected to align their investment priorities with those of the catchment and its partnerships, rather than the other way around. This reframing is significant: it positions catchment partnerships such as the Trent Valley Programme not as supplicants seeking utility support, but as the legitimate setters of landscape-scale priorities to which water company investment should respond. Ensuring that the Programme's objectives are embedded in regional water planning processes is therefore essential to securing long-term utility engagement and directing water company capital towards the most impactful restoration outcomes.

Top Priority 5: Repayable Funding (Working Capital)
Repayable finance – typically sourced from commercial banks or private impact investors – serves as a critical mechanism to bridge the gap between initial implementation costs and the realisation of long-term revenues. These loans or facilities provide the upfront capital necessary to launch project phases before Payment for Ecosystem Services (PES) revenues have fully matured, acting as support funding. However, leveraging repayable funding requires a strong governance structure and a high degree of revenue certainty to ensure debt servicing and investor confidence.

Other
Beyond the primary funding mechanisms identified, several supplementary streams, such as NGO programmes, local government grants and revenue from recovered materials, offer potential but often lack the scale and long-term continuity required for operations. Similarly, challenge funds, innovation grants and corporate sustainability allocations are inherently volatile, as they remain subject to the shifting fiscal priorities of the donor organisations.

Furthermore, while tourism-based levies provide meaningful community engagement, they generate limited revenue and are highly susceptible to fluctuations in market demand. And, while water use associations generally support advisory and facilitation, they typically lack the capital necessary to directly finance large-scale restoration. Ultimately, these pathways are best used to diversify the funding mix and should only be pursued alongside the more robust, primary financial mechanisms identified earlier.

3.5. Funding Models

This section examines funding models that can be used to attract and channel finance towards river and nature restoration across the Trent Valley catchment, encompassing both restored mineral extraction sites and wider upstream interventions. Funding models are defined here as structured approaches to providing capital expenditure (capex) and/or operational expenditure (opex) for nature-based interventions, sometimes combining two or more instruments as part of a broader financing approach.

Insights are drawn from the literature and case study review, complemented by Pegasys' experience in developing funding models for catchment restoration in the UK and internationally. The models presented are not mutually exclusive; in practice, multiple approaches are typically combined within a single catchment investment programme, depending on local conditions, stakeholders, and the maturity of available funding opportunities.

A critical insight from experience of delivering programmatic funding at landscape scale is that finance needs to flow into the catchment in tiers, sequenced according to risk profile and the readiness of different funders (Figure 11).

The first tier is philanthropic and early-stage public funding, covering the costs that most funding instruments will not touch: programme set-up, governance development, baseline science, monitoring, feasibility work, and the development phases needed to make subsequent investment viable. This tier works in concert with any public funding already flowing into the catchment but crucially coordinates it rather than allowing it to arrive piecemeal.

The second tier unlocks once the programme reaches sufficient maturity, when there is enough evidence, governance and demonstrable return on investment (through ecosystem services and the revenues from nature markets they create) to bring in more structured capital. This is where private sector investment, water company contributions, and outcome-linked finance instruments become viable, funding specific interventions and, where appropriate, trading in ecosystem service markets. The transition between tiers is not automatic; it requires deliberate programme management and the sustained coordination of funding partners that is so often absent from large-scale restoration efforts.

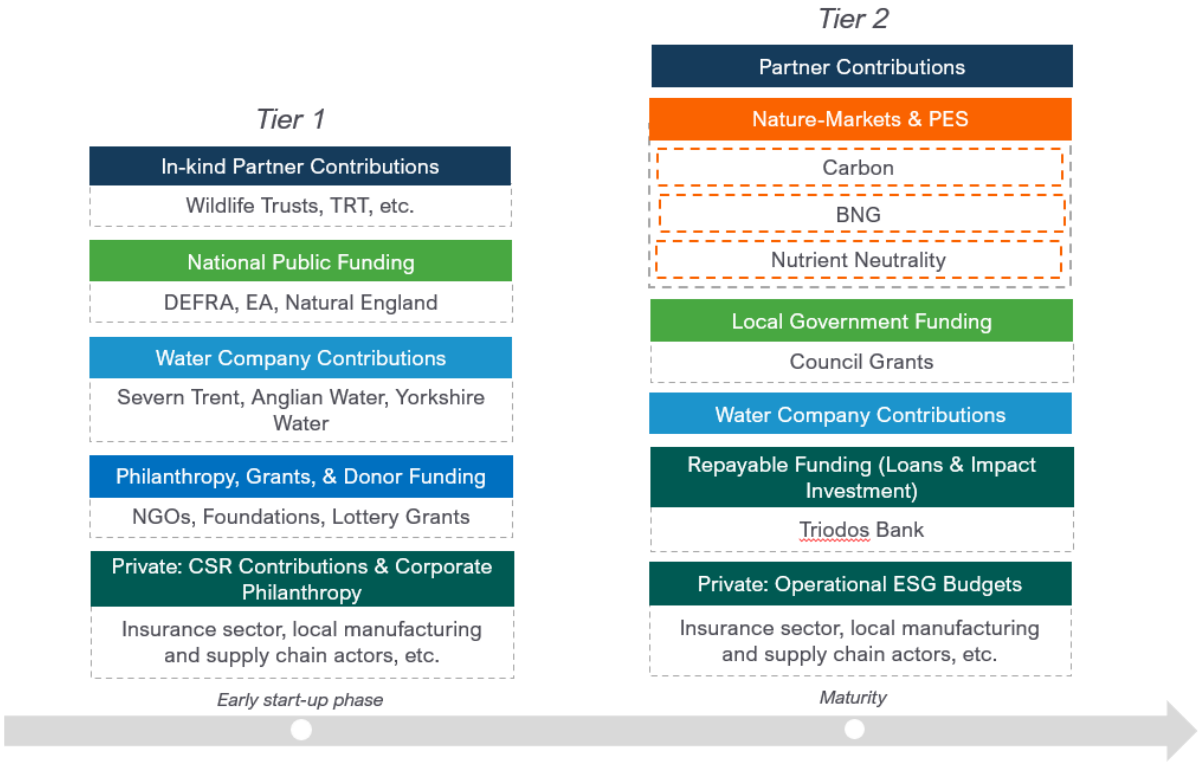


Figure 11: A Phased Implementation of Funding Mechanisms

The funding models outlined in the next sections below should be understood as options and building blocks that could be combined and sequenced across these tiers as part of a larger investment programme for the Trent Valley.

Model 1: Basket Fund (Grant Funding)

Model 1: Basket Fund (Grant Funding)
The first model is a 'basket fund', which aggregates non-repayable capital, typically grant funding from multiple sources, and distributes it to high-priority nature restoration projects via a competitive process aligned with the strategic objectives of the fund and the broader investment programme.

This model reflects how many conservation NGOs already operate and can be adapted to coordinate funding at catchment scale. In the UK, organisations such as The Rivers Trust and The Wildlife Trusts play a central role in aggregating and distributing funding in this way. Catchment-scale initiatives such as the Norfolk Water Fund have attempted to pool funding for coordinated delivery (although the model has evolved now), and the Rewilding Britain Innovation Fund offers a further example of the model in practice.

Where multi-source aggregation is challenging, funds may also be channelled by a single organisation with a match funding requirement placed on applicants. Anglian Water's Catchment Regeneration Fund is an example: it deploys A-WINEP regulatory funding into catchment interventions through a competitive application process, with every 1 of utility money required to be matched by 1 from a separate source.

A key structural advantage of the basket fund model is that each funder's money can be held in a separate account, maintaining distinct custody, audit trails, and compliance reporting in line with each

funder's individual grant conditions, while decision-making, prioritisation, and operations are managed centrally by a single fund administrator. This means funders with strict legal or regulatory requirements governing how their money is used can participate without their funds being commingled with those of others, while the programme as a whole retains the governance and efficiency benefits of centralised management. In practice, this is often achieved through a fiscal sponsorship or hosted fund arrangement, with an umbrella organisation such as a Rivers Trust or Wildlife Trust administering grants on behalf of multiple funders under one roof, with separate accounting lines for each.

The limitations of this model are nonetheless significant:

- Generating a strong pipeline of projects is difficult given landowner barriers and the complexity of restoration project development.
- Securing match funding at project level is a persistent challenge, particularly for smaller or earlier-stage interventions.
- Prioritising the right interventions in the right locations to maximise catchment-wide impact requires sophisticated spatial planning that basket funds rarely have the capacity to deliver.
- The model relies entirely on grant funding, with no mechanism to generate revenue or recycle capital – limiting its ability to scale beyond the size of available grant pools.

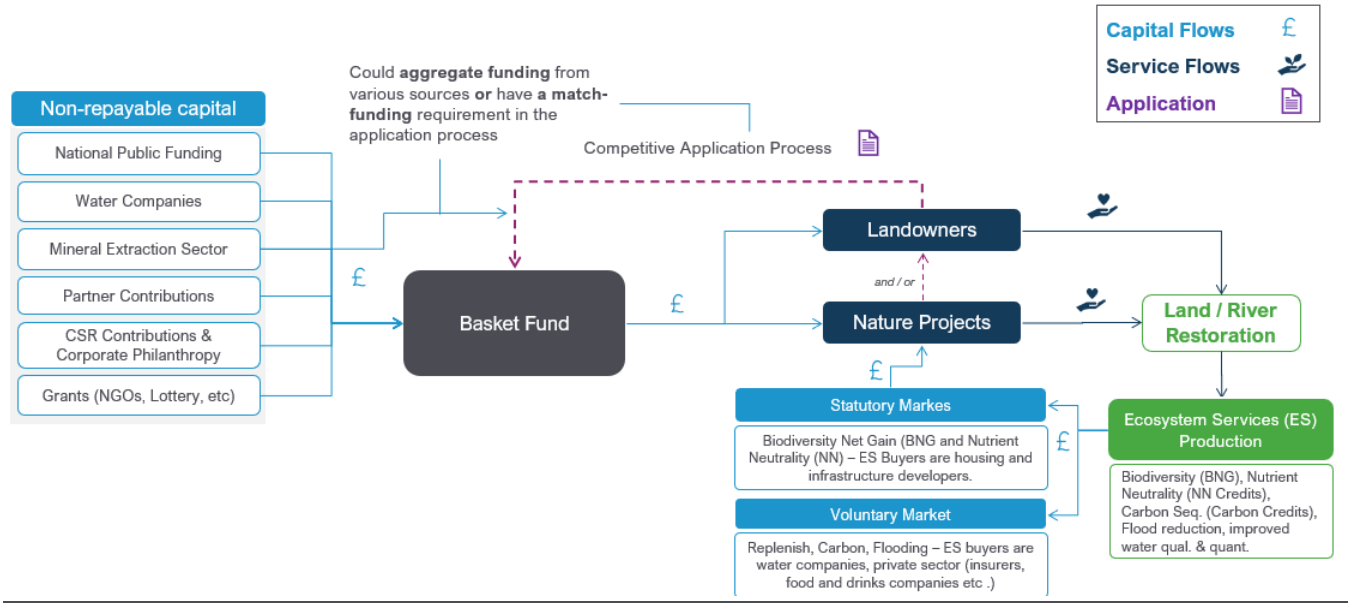


Figure 12: Basket Fund Structure

Advantages

- Improves coordination across fragmented funding sources
- Enables more strategic, catchment-scale delivery of restoration projects
- Can attract multiple funders and increase overall investment (especially with match funding)

Disadvantages

- Difficult to build a strong pipeline of projects (e.g. landowner barriers, complexity)
- Securing match funding can be challenging for applicants on top of managing project complexity
- Reliant on grant funding with no revenue generation or capital recycling mechanism

Model 2: Centralised Nature Market Model

In this model, a **blended finance vehicle** invests in catchment interventions to generate ecosystem services, which are then sold into environmental markets (eg Biodiversity Net Gain, nutrient neutrality), and potentially to local buyers for non-statutory benefits such as flood risk reduction. Revenue generation from ecosystem services can help the vehicle attract **repayable capital** (eg debt, impact investment), helping to cover upfront capital costs and long-term maintenance, with revenues used for repayment.

An example in the UK is the Wyre Catchment, where a blended finance approach has been piloted to fund natural flood management and other interventions. This model represents a shift towards treating nature as an **income-generating asset class**, which can attract private finance. This is possible in the UK, because environmental markets are real – specific natural assets and environmental outcomes have been unitised and are being sold.

However, there are several challenges:

- high complexity and transaction costs in structuring such vehicles
- dependence on relatively immature and evolving nature markets, which reduces confidence among private financiers (eg BNG, nutrient neutrality)
- long-term contractual commitments (eg 30+ years for BNG) that can deter landowners
- complexity around 'stacking' or combining ecosystem service payments due to regulatory constraints
- difficulty in securing buyers, particularly for non-market benefits such as flood mitigation

In addition, existing pilots (such as Wyre) are relatively **localised**, raising questions about scalability and replicability. It is also worth noting that in practice, most existing blended finance models continue to rely public funding and philanthropic capital, reflecting the current limitations of ecosystem service markets and the challenges of generating sufficiently predictable returns for private investors.

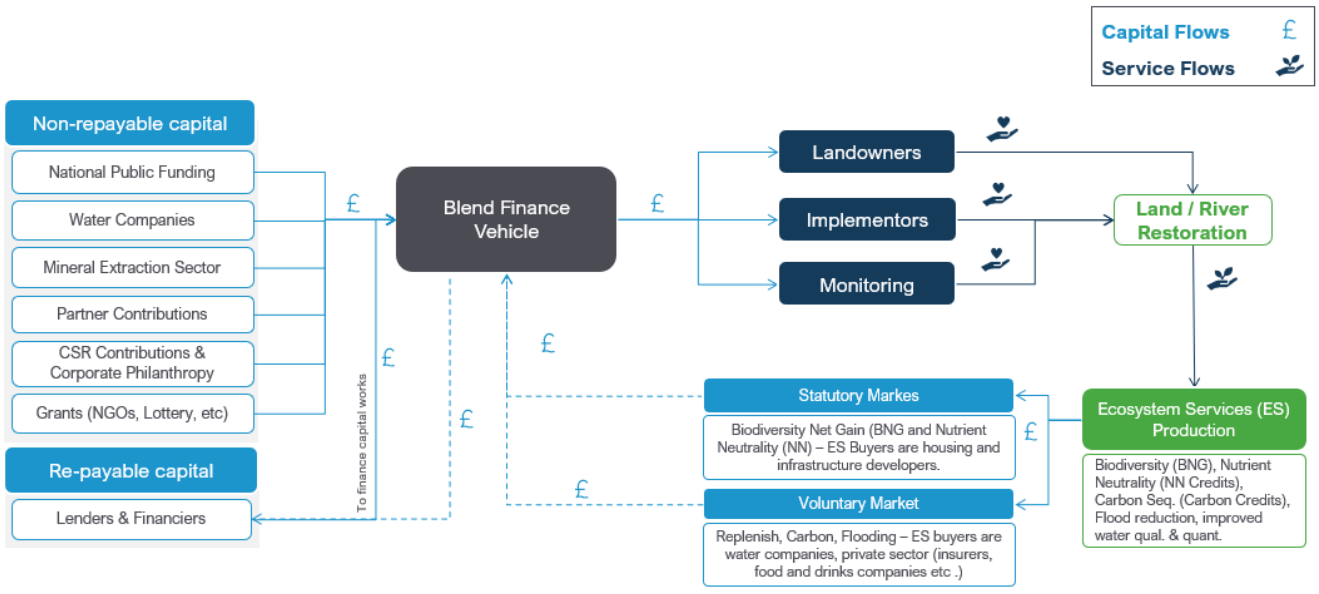


Figure 13: Blended Finance Vehicle Structure

Advantages

- Generates revenue from ecosystem services, enabling repayment of investment
- Attracts private and repayable capital (e.g. debt, impact investment)
- Supports long-term funding for both upfront costs and ongoing maintenance
- Helps position nature restoration as an income-generating asset class

Disadvantages

- High complexity and transaction/structuring costs
- Relies on immature and evolving environmental markets
- Long-term contracts can deter landowners
- Regulatory challenges around combining ("stacking") revenue streams
- Difficulty securing buyers, especially for non-market benefits
- Limited evidence of scalability beyond local pilots

Model 3: Insurance Backed Facility

As outlined above, participation in nature markets and restoration schemes is often perceived as risky by landowners due to regulatory uncertainty, long-term commitments, and potential impacts on farm income. In addition, a lack of early-stage funding (eg feasibility, design and investment readiness) is widely recognised as a key barrier to project development. Some initiatives are beginning to address this gap. For example, the Rewilding Britain Innovation Fund provides grant funding for feasibility and early-stage development. However, this does not address financial risk borne by landowners.

A potential evolution is the creation of an insurance-backed technical support facility, which would provide technical assistance to landowners to design and implement NbS, support feasibility and project development, and include an insurance mechanism to compensate landowners if interventions negatively impact farm profitability. The insurance-backed model is best understood as an emerging conceptual approach rather than an established insurance solution: it has not yet been tested, developed or validated in practice by insurance practitioners, and this business case does not present it as a proven or currently deliverable model.

Such a model could help overcome one of the key barriers to scaling NbS: the lack of a robust and investable project pipeline. At present, there are no established UK examples of fully integrated insurance-backed technical support facilities for NbS. However, there are some early-stage examples making use of this model to help reduce Nitrogen use (see Hardyfield). Other emerging insurance innovation – such as BNG insurance products – primarily address **downstream delivery risk**, rather than the early-stage development risk this model is intended to address, and they have not yet been validated for application to nature restoration at catchment scale.

There is growing interest in using insurance to de-risk natural capital investments, but key challenges for this model would include:

- the need for robust monitoring and evaluation systems to verify losses
- the cost and structuring of insurance products
- limited actuarial data for NbS-related risks

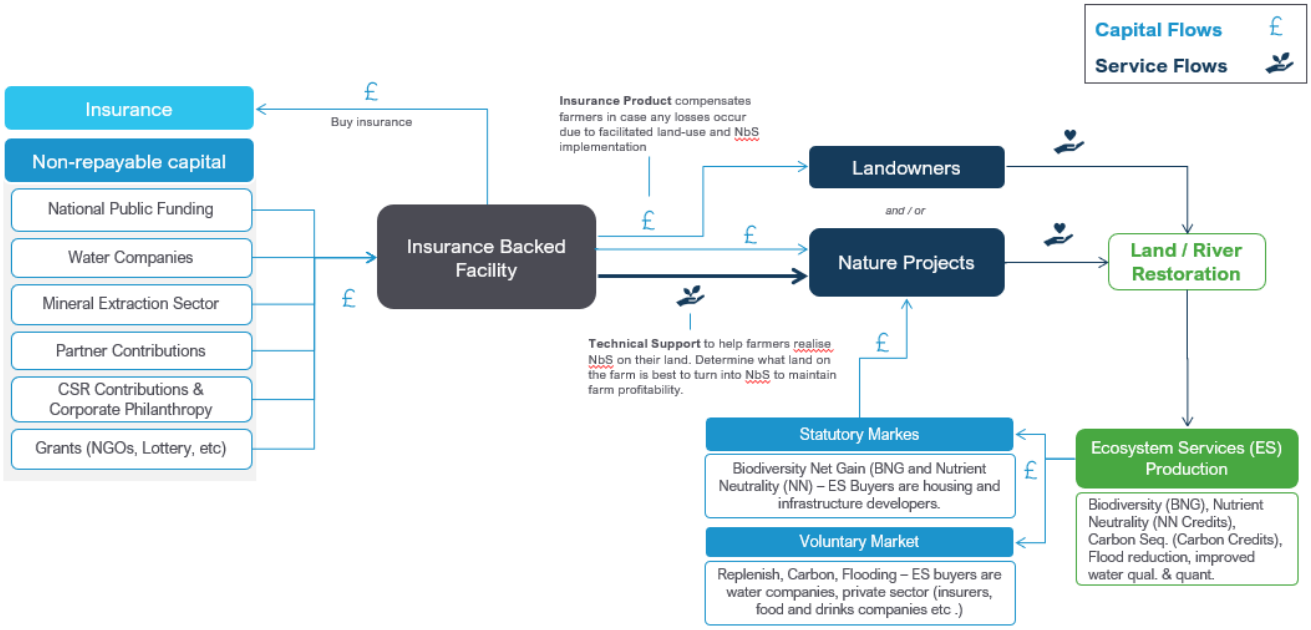


Figure 14: Insurance Backed Facility Structure

Advantages

- Reduces perceived risk for landowners, encouraging participation
- Supports early-stage project development (feasibility, design, investment readiness)
- Provides technical assistance to improve project quality and delivery
- Insurance mechanism can protect farm income and de-risk interventions
- Helps build a stronger, investable pipeline of projects

Disadvantages

- Requires robust monitoring and evaluation to verify losses
- Potentially high cost and complexity of insurance products
- Limited actuarial data for nature-based solutions risks
- Few established examples, with models still largely untested in practice

Model 4: Endowment Fund

A key barrier to nature restoration is securing reliable long-term funding for management and maintenance. While mechanisms such as Biodiversity Net Gain impose long-term obligations (typically 30 years), funding is often provided upfront, but not in the long-term. This creates challenges around financial sustainability over time.

One approach to addressing this is the establishment of an endowment fund, where capital is invested and returns are used to finance ongoing site management over the long-term. This model could also be applied at a broader landscape scale – for example, within a blended finance vehicle, basket fund, or insurance-backed facility – by allocating a portion of capital to generate ongoing investment income rather than deploying all funds upfront. This approach to capitalising the fund on a regular, incremental basis could prevent the need to fully capitalise the fund in the early years.

This approach is particularly well suited to restored mineral sites, where landowners may receive significant revenues from extraction. A share of these revenues (eg sand and gravel royalties) can be ring-fenced and invested to support long-term stewardship.

A UK example is the Floodplain Forest Nature Reserve, where mineral royalties have been used to fund habitat creation, public access infrastructure and ongoing management. The site is managed by The Parks Trust, which operates a wider endowment-based model to sustainably finance green space management over the long term.

Overall, this represents a hybrid approach combining extractive revenues, ring-fenced restoration funding and an institutional endowment structure.

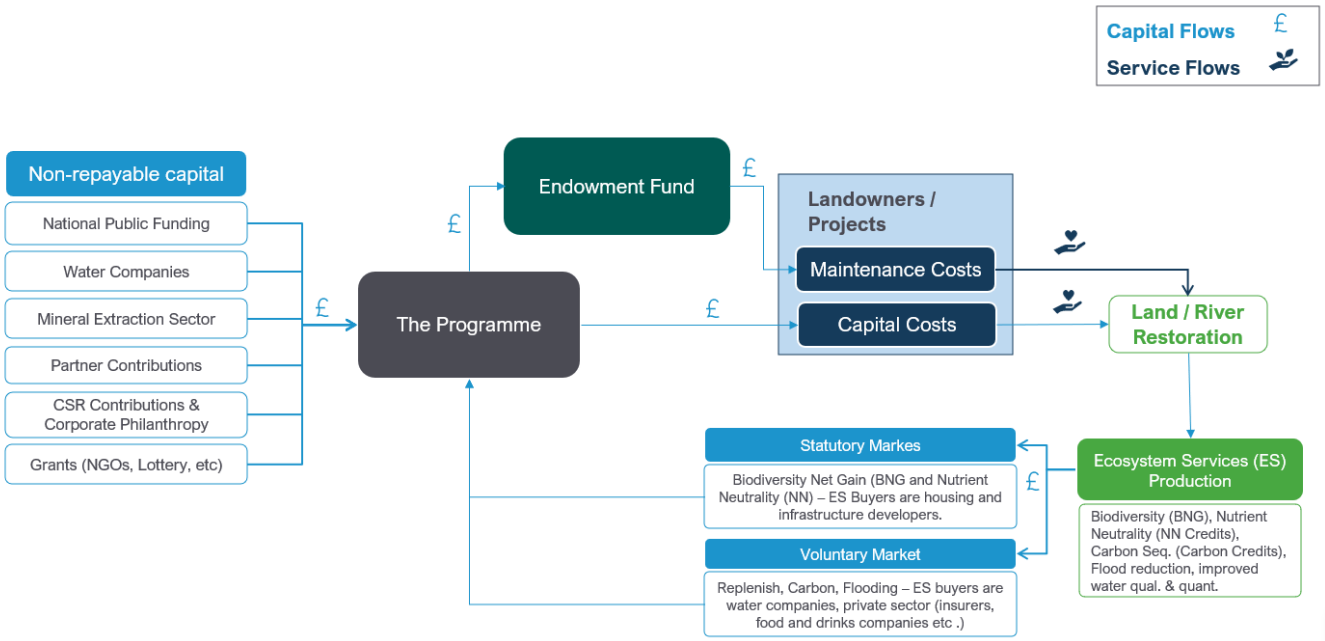


Figure 15: Endowment Fund

Advantages

- Provides long-term, sustainable funding for management and maintenance
- Reduces reliance on uncertain future funding streams
- Enables perpetual stewardship through investment returns
- Can leverage existing revenue sources (e.g. mineral extraction)
- Supports integrated, strategic site management over the long term

Disadvantages

- Requires significant upfront capital to establish the endowment
- Long-term financial performance depends on investment returns
- Capital is typically locked in, limiting flexibility
- Model applicability may be limited to sites with strong initial revenue sources (e.g. extraction)

4. Programme Governance

Establishing clear governance structures capable of channelling funding effectively and enabling sound decision-making is essential to ensuring delivery, accountability, and the long-term maintenance of land use change at scale. Governance is the critical architecture through which ambition becomes action, and through which fragmented funding streams, competing stakeholder interests, and complex regulatory obligations are brought into productive alignment.

This section draws on insights from the literature and case study review and stakeholder engagement to consider the potential roles of different actors in governing and financing the Programme over time. Critically, governance models for catchment-scale restoration must themselves operate at landscape scale. They cannot be designed around individual projects or sites if they are to deliver the coordinated, cumulative outcomes that the Trent Valley requires.

In this context, the role of the Regional System Planner, as proposed in the government's recent water sector white paper, is highly relevant. The Regional System Planner concept is intended to provide strategic, cross-sectoral oversight of water management across regional catchments, coordinating the investment and obligations of water companies, regulators, and other actors within a shared spatial framework. If implemented as envisaged, it could provide exactly the kind of landscape-scale planning architecture that large-scale river restoration programmes need, and the Trent Valley Programme should position itself to engage with and influence that emerging framework from the outset.

The following sections outline governance arrangements capable of sustaining implementation over time and consider how the roles of the stakeholders previously discussed can be structured to support long-term delivery.

4.1. Governance Models

The choice of governance must flow directly from the nature of the specific funding sources and mechanisms the scheme is most likely to rely on. Currently, two primary models are crystallising within the UK landscape: a hosted programme, where an existing organisation leads with support from external actors, and a Special Purpose Vehicle (SPV), which involves the creation of a standalone incorporated entity. These models and their suitability for the project are described below. However, these should not necessarily be viewed as mutually exclusive or fixed choices. Lessons from N4W Facility work in Norfolk suggest that a hosted model can provide an effective starting point, with the option to transition to an SPV as the programme grows and the scale or risk to the host increases. This provides flexibility to respond to evolving policy and institutional arrangements, particularly given the current pace of reform across the water sector.

Governance Model 1: A Hosted Programme

One option is a hosted programme, in which one or more established organisations are responsible for developing and managing the project. Strategic direction is typically provided by a steering committee comprising key partners and stakeholders, with working groups or sub-committees established as needed to oversee specific components such as nature-based solution (NbS) prioritisation or monitoring and evaluation.

Roles, responsibilities and decision-making processes are usually formalised through a Memorandum of Understanding (MoU), supported by a Management Plan defining objectives, milestones, and implementation arrangements, providing an overarching framework for delivery. This structure avoids the creation of a new legal entity, making the model faster and cheaper to establish.

Under this model, non-repayable capital (eg government grants, philanthropic donations and corporate contributions) is paid directly to the host organisation and generally ring-fenced for project purposes. The host acts as the institutional anchor, managing finances, aggregating ecosystem services and overseeing delivery. While specific activities may be contracted out, the host retains overall responsibility for implementation.

The host may compensate landowners for delivering NbS and engage third parties for delivery, monitoring or evaluation. Ecosystem services generated may be monetised through mechanisms such as BNG or carbon credits. Revenues may flow through the host or, alternatively, landowners may contract directly with buyers with the host acting as an advisor or facilitator.

Advantages

This model is well suited to contexts where the host organisation is financially strong, well governed, long-lived, and trusted by funders and communities. It is particularly appropriate where funding is dominated by grants or public budgets, PES payments are voluntary, relatively small in scale, and no leverage or debt servicing is required. Trusted intermediary roles played by hosts can strengthen landowner participation and support long-term stewardship.

A key advantage is simplicity: no new entity is required, a single organisation provides leadership and continuity, and delivery can proceed relatively quickly once agreements are in place. Setup is generally cheaper due to lower transaction costs and the use of existing processes and resources. The host's institutional legitimacy and reputation may also boost the project's credibility and facilitate funding access. By aggregating ecosystem services, the host also minimises costs for buyers and landowners. Although time may be required to agree on governance arrangements and formal documentation, implementation is generally straightforward.

Limitations

A major constraint of this model is its weak suitability for large-scale private investment, complex multi-buyer or multi-revenue structures, and long-term restoration projects that require durable financial vehicles. Limited ring-fencing (ie the legal separation of specific assets or revenue streams to protect them from competing claims) and fiduciary clarity can deter investors, while payments for ecosystem services contracts may be less attractive to buyers seeking a clearly bankable counterparty. A

bankable counterparty is an entity with sufficient legal standing, financial robustness and contractual enforceability to satisfy the due diligence requirements of lenders and investors. Without one, financing institutions are typically unwilling to commit capital. Where these protections are absent or unclear, private investors and ecosystem service buyers are less likely to engage, regardless of the underlying environmental or financial merits of the programme.

The programme would operate under existing host governance and procedures. While advantageous for reducing initial costs and lead times, these frameworks can be restrictive and often misaligned with specific programme objectives. Governance transparency may be reduced, with conflicts of interest harder to manage. Furthermore, the model creates dependency: shifts in host priorities, leadership, or funding cycles pose significant continuity risks. Conversely, the host must assume liability and enter into legal agreements on the programme's behalf, increasing its own risk profile. Finally, capacity constraints may leave host organisations overstretched, undermining credibility with both communities and funders.

Evidence from Comparable Projects

This model is exemplified by the Upstream Thinking programme (Box 5), led by the Westcountry Rivers Trust (WRT) with partners including South West Water (SWW). WRT acted as host, aggregating delivery across landholdings and compensating farmers through long-term contracts (10-25 years) funded primarily by SWW as a single buyer, alongside public and charitable contributions. While the hosted programme model presents significant limitations to scaling (discussed below), the Upstream Thinking Programme, now in phase 4, covers over >144,000 hectares of managed land and reflects how consistent funding support and strong governance can drive a hosted programme expansion.

Another UK example is the Holnicote Estate 'Stage 0' river restoration Project (Box 2), hosted by the National Trust. Although not incorporating PES, it demonstrates effective delivery through a simple hosted programme supported by public and charitable funding.

Scale and Replicability

While this model allows flexibility of activities and funding within a watershed, scalability is constrained by the host organisation's capacity. Expanding into additional sub-catchments or new watersheds can strain staff, systems and governance, particularly when expansion falls outside the host's core mandate. Internal resistance may also arise if expansion is not aligned with staff roles or incentives.

As scale increases, host systems (finance, procurement and monitoring) can become bottlenecks, and long-term liabilities related to maintenance and monitoring can accumulate, limiting growth. Consequently, this model is generally confined to a single watershed, occasionally extending to a few sub-catchments.

Replicability is also limited. Success depends heavily on the host's credibility, leadership and local relationships, as well as informal decision-making processes that are difficult to transfer. Establishing similar programmes elsewhere typically requires a comparable host institution with sufficient capacity, trust and long-term commitment.

Table 10: Summary of advantages and risks of a hosted programme model

Advantages	Risks and Limitations
• Simple structure with no need to establish a new legal entity • Faster and cheaper to set up, with lower transaction and administrative costs as can leverage host's existing resources • Institutional legitimacy derived from the host's track record and reputation • Ability to aggregate ecosystem services • Trusted intermediary role strengthens farmer participation and stewardship • High flexibility and adaptive management, including response to climate shocks • Direct access to the host's pool of expertise	• Roles, accountability, and decision-making may lack clarity • Conflicts of interest are harder to identify and manage • Weak ring-fencing and fiduciary ambiguity • Less suited to complex, multi-buyer or multi-revenue arrangements • Limited suitability where large-scale private capital or leverage is needed • Limited suitability for long-term restoration • PES contracts may be less attractive without a bankable counterparty • Exposure to changes in host priorities, leadership, or funding cycles • Capacity constraints can lead to overstretch and loss of credibility • Dependence and continuity risk if the host organisation fails • Subject to existing host governance and operating procedures • Host must assume liability on behalf of the hosted programme • Limited scalability across multiple sub-catchments or watersheds

Governance Model 2: A Special Purpose Vehicle

The second model is based on the establishment of a Special Purpose Vehicle (SPV), created specifically to manage and deliver the project. The SPV would operate as an autonomous, legal entity with responsibility for contracting, financial management and governance. A dedicated Board of Directors, supported by specialist committees, would provide oversight and ensure that project objectives are delivered transparently and efficiently.

A range of different legal entities could be considered, including Community Interest Companies (CICs), Private Companies Limited by Shares or Guarantee, Charitable Incorporated Organisations, Development Corporations, or Limited Liability Partnerships. However, in practice, the SPV model is often implemented through a CIC, which provides a suitable structure for hosting project operations while insulating partners from legal and financial risk. This approach has been successfully applied in the UK's Wyre Catchment and the Aire Resilience Company (ARC). Alternatively, Development Corporations have been used for initiatives like the Severn Valley Water Management Scheme, where local authority funding and cross-border collaboration between Wales and England were central. Given these complexities, specialist legal advice is essential to determine the most appropriate structure for the specific project context.

Overview of the Financial Model

All capital associated with the project would flow through the SPV, including non-repayable funding (government grants, philanthropic contributions and mineral extraction sector payments) and working capital from private investors or lenders. The SPV would allocate funding across three core functions: landowner payments, project delivery, and monitoring and evaluation.

Environmental interventions would generate ecosystem services such as biodiversity enhancement, carbon sequestration and natural flood risk reduction. These services can be monetised through mechanisms such as BNG and carbon credits. Revenues from ecosystem service buyers would be

paid to the SPV and recycled into the project to support ongoing landowner payments, operational costs, and investor repayment where applicable. As revenues and prices may fluctuate, the SPV bears performance and market risk where outcomes or demand underperform expectations.

The model also allows for the creation of an endowment fund (a permanent financial reserve invested to generate a reliable annual income stream) to support long-term management. This is recommended only after investment repayment to avoid locking capital that may be required for cash-flow stability and debt servicing during early operational phases.

Advantages

The SPV model provides clear, standalone governance, delineating project objectives, ring-fencing project finances and avoiding competing organisational priorities. By contracting directly with landowners, investors, buyers, and delivery partners, legal and financial risks are confined to the SPV, insulating participating organisations and improving attractiveness to private and institutional capital, including blended finance.

Additionally, the aggregation of multiple landholdings and delivery partners within a single contractual framework enables ecosystem services to be delivered at scale, improving reliability for buyers and diversifying delivery risk across sites. From an investor perspective, this improves risk-adjusted returns compared to single-site delivery. This model allows for a larger range of funding mechanisms, and depending on the selected legal entity, can benefit from potential tax exemptions.

Early and sustained engagement with landowners, communities, and ecosystem service buyers is essential. Incorporating landowner needs into contract design and ensuring demand certainty from buyers reduces revenue volatility and supports long-term viability, particularly where payments are results-based.

Evidence from Comparable Projects

The SPV model has been successfully implemented in the UK, notably through CICs established for the Wyre Catchment NFM Project (Annex B, Table 19) and the Aire Resilience Company (Annex B, Table 16). In both cases, the legal structure enhanced credibility, supported community engagement, and enabled the use of blended finance. Stakeholder feedback highlighted improved investor confidence and clearer accountability.

However, these cases also demonstrate challenges. While legal incorporation can be relatively quick, the broader establishment process, including governance design, financial structuring, monitoring frameworks, and fundraising, can take much longer. Newly formed SPVs may also face funding constraints due to limited financial track records. For example, in the Wyre Catchment NFM Project, Woodland Trust funding had to be channelled through The Wyre Trust rather than the CIC due to procurement and risk policies.

Risks, Limitations and Mitigation

Establishing an SPV introduces additional governance complexity, higher administrative and reporting requirements, and longer setup times before full operation. Because these entities lack a prior track record, this may deter some funders, reduce programme credibility and lead to early-stage financing constraints.

Where a CIC structure is used, additional limitations include the absence of charitable tax benefits and restrictions on equity investment, but this can be addressed by selecting an alternative legal structure.

An additional risk is that the SPV bears the revenue and performance risks, leaving it exposed to fluctuating market demand and pricing for ecosystem service credits. Where outcomes are difficult to attribute or verify, monitoring and verification gaps can lead to disputes under results-based or blended finance arrangements.

These limitations can be mitigated through phased implementation, robust monitoring frameworks, conservative revenue assumptions, time-limited contracts with extension options, and clear performance milestones that build confidence among buyers and investors. Contractual flexibility allowing entry and exit as policies or markets shift, and strong coordination across management, landowners and sites is critical for long-term resilience.

Scalability and Replicability

This model offers strong scalability. Clear capital structures enable larger investments from multiple funders, while standardised contracts and performance metrics allow for aggregation once a common template is established. In CIC-based models, strong legitimacy and community engagement further support expansion across different communities.

As scale increases, complexity rises due to greater landowner participation, diversified outcomes, and higher transaction costs. These challenges can be addressed through capacity building, though in practice, scalability is typically capped at the regional or basin level.

The model also demonstrates high replicability within shared regulatory contexts, using similar buyer profiles and clearly measurable and monetisable outcomes. Success depends on social acceptance, effective stakeholder engagement, and strong leadership.

Table 11: Summary of advantages and risks of an SPV funding and governance model

Advantages	Risks and Limitations
• Clear, standalone governance with defined roles and responsibilities • Ring-fenced finances with clear income and expenditure tracking • Legal and financial risks sit with the SPV, protecting partner organisations • Increased attractiveness to private investors and lenders due to risk isolation • Well-suited to blended finance structures • Aggregation of multiple landowners enables delivery at scale and risk diversification of ecosystem service • Monetisation via BNG and carbon markets creates recurring revenue streams • Designed for long-term governance beyond initial project delivery • Greater flexibility than a hosted programme and a wide variety of entity types to choose from • CIC structures enhance community trust and landowner engagement • High potential scalability and replicability	• Longer setup period before full operation • Higher administrative and reporting costs • More complex governance and reporting • May require separate resources to operate • Revenue and performance risk borne by the SPV • Limited financial track record at inception may deter some funders • Strong coordination required across multiple landowners and sites • Market demand and price uncertainty for ecosystem service credits • Ongoing liabilities for monitoring, verification, and long-term maintenance • Monitoring and outcome attribution challenges may create disputes under results-based payment models

4.2. Stakeholder Roles

This matrix serves as a strategic tool for prioritising engagement and defining specific stakeholder roles. While those with high interest and influence naturally exert the most impact on decision-making, the remaining quadrants represent essential partners who must also be integrated into the process. Consequently, stakeholders are categorised into two primary tiers: Primary Roles, which directly shape project design and implementation, and Secondary Roles, which provide essential facilitation and support (Figure 16).

Under this framework, stakeholders with the highest combined influence and interest typically assume decision-making roles. Conversely, those with high funding capacity but lower immediate interest, such as the infrastructure sector, are positioned as funders, while high-interest groups with limited capital, such as NGOs, serve as implementers. While these designations are not exhaustive and may expand to include additional parties, they provide a clear roadmap for engagement. Establishing these defined roles and responsibilities early ensures a more efficient approach to the model's long-term implementation.

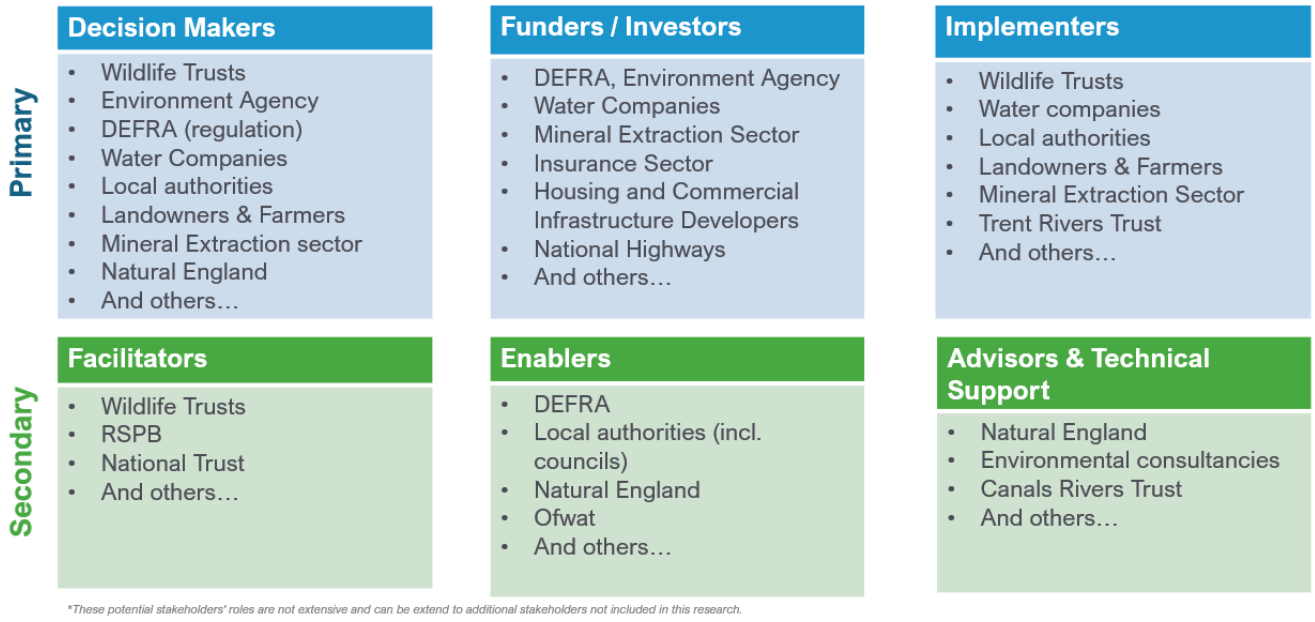


Figure 16: Potential roles of relevant stakeholders

Given the chosen funding model, a robust and transparent governance framework is vital. Success depends on identifying all relevant stakeholders and strategically integrating them into the project hierarchy. By appointing the right partners to the Steering Committee and aligning sub-committees with core project objectives, the partnership can ensure both accountability and effective delivery. Trust in good governance, alignment of core objectives and accountability for outputs are key in establishing the most suitable framework.

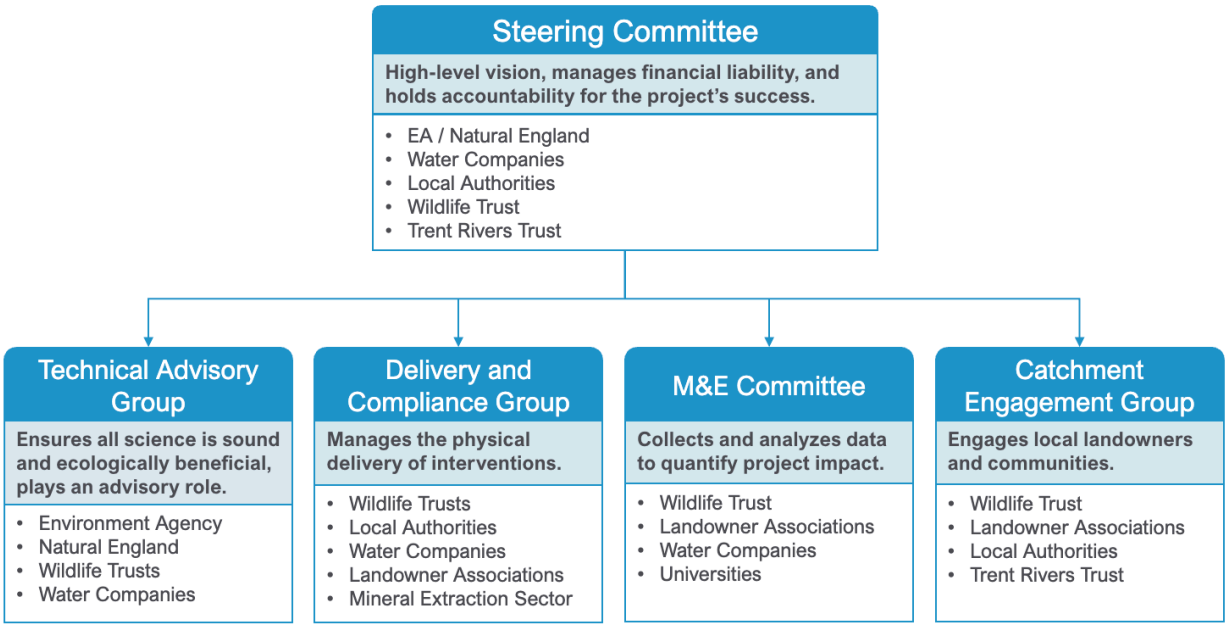


Figure 17: Preliminary governance model

Figure 17 outlines a proposed governance structure designed to facilitate the complex, multi-stakeholder nature of river restoration. Key regional actors – including the Environment Agency, Natural England, water companies, local authorities and the Wildlife and Rivers Trusts – are central to this partnership due to their regulatory oversight, funding capacity, and regional influence, making them ideal for a Board of Directors.

Strategic Steering Board (The Board)

Whether constituted as a Board of Directors or a Steering Committee, this body provides the strategic mandate for the project. Its primary function is to align high-level strategy with effective delivery, overseeing decision-making and project accountability. While four specialised committees are proposed below, the final number will be scaled based on specific delivery, engagement and monitoring requirements.

Functional Committees

- **Technical Advisory Group:** Also referred to as a Scientific Advisory Board, this group provides the evidence base for the project. By offering technical recommendations and scientific guidance, they ensure that interventions are sound and beneficial. Key stakeholders with deep regional expertise – such as the Environment Agency, Natural England and the Wildlife and Rivers Trusts – ensure that the science remains robust from the design phase to field implementation. These stakeholders generally have more of an advisory role.
- **Delivery and Compliance Group:** Functioning as an operations committee, this group manages day-to-day implementation and project management. Tasked with the physical delivery of watershed interventions, they coordinate hands-on activities with landowners, local authorities, and potentially the mineral extraction sector. This group ensures that outputs are delivered on time and meet all regulatory requirements. Relevant stakeholders for this group include the Wildlife Trusts, local authorities, water companies, local landowners and potentially the mineral extraction sector.

- **M&E (Monitoring & Evaluation) Committee:** This committee manages and implements the framework used to track performance and measure environmental and social impacts. They provide the data necessary for adaptive management, involving stakeholders active in the field. Potential stakeholders in this committee are landowner associations, Wildlife Trusts, and academic researchers from local universities.
- **Catchment Engagement Group:** This group facilitates dialogue with stakeholders not directly involved in daily operations, particularly local communities and wider landowner networks. By leveraging the local knowledge of Rivers Trusts and local authorities, they ensure the project maintains its local acceptability to operate within the Trent Valley.

This structure serves as a starting point and must be refined through consultation to ensure multi-party agreement. Finalised roles, responsibilities and legal liabilities should be codified in a Memorandum of Understanding (MoU) or a similar formal agreement. The stakeholders listed currently serve as illustrative examples and are subject to confirmation during the engagement phase.

5. Risks, Trade-offs and Mitigations

This section outlines the potential risks and trade-offs associated with delivering nature and river restoration at scale in the Trent Valley. Risks are grouped into thematic categories, and mitigation measures are set out for each.

Table 12: Risks and Mitigation Strategies

Risk	Mitigation Strategy
Stakeholders	
Limited interest and buy-in	Develop a robust business case and conduct early-phase pilot activities to provide "proof-of-concept." Evidence-based planning and inclusive stakeholder engagement will showcase the efficacy of NbS to secure trust from funders and local communities.
Landowner opposition	Prioritise early co-design of the delivery model to align with landowner interests. De-risk and incentivise participation by ensuring the financial model provides tangible benefits to the landowners.
Limited social acceptability	Prioritise continuous community engagement throughout the project /programme lifecycle to ensure residents understand and value the natural changes to the landscape.
Reputational risk	Implement a transparent, public-facing monitoring dashboard. Providing real-time data on biodiversity gains and river flow levels builds public trust through verifiable evidence.
Funding	
Performance uncertainty & ecological failure	Utilise phased implementation and adaptive management plans to allow for structural adjustments if habitats fail. Diversify risk by aggregating large land areas; if one site underperforms, others can maintain overall service delivery and funding stability. Insurance can also mitigate the financial risk.
Natural disasters	Mitigate the financial impact of events like flooding or fire by spreading interventions across a wide geographic area. Secure specialised insurance products to provide a financial safety net against catastrophic physical loss.
Valuation risk	Reduce price uncertainty by adopting the UK Government's Green Book supplementary guidance on 'Natural Capital Accounting'. This provides a standardised, defensible fiscal value for non-market benefits like carbon sequestration and mental health.
Policy shifts & grant accessibility	Maintain a proactive grant-monitoring plan and seek early guidance from regulators on application relevance. Diversify income streams to ensure the project is not critically dependent on a single government scheme.
Priority changes of funding stakeholders, lack of long-term engagement.	Use clear, transparent contracts that balance flexibility with security. Implementing medium-term (5-10 year) agreements ensures enough time for ecological results to manifest while allowing stakeholders periodic windows for re-evaluation.
Market risk: Market Price Crashes	Protect against the volatility of Payment for Ecosystem Services (PES) markets by utilising 'Floor Price' guarantees or government-backed 'contracts for difference'. These mechanisms provide private investors with a predictable minimum return.
Lack engagement interest from investors or perceived high risk	Secure initial implementation via non-repayable grants to establish credibility. Leverage a strong business case and the reputation of

	the lead organisation or steering committee to attract further investment. Utilise a blended finance approach, pooling diverse NbS funding mechanisms into a single portfolio to spread risk for private investors.
Lack of long-term landowner engagement	Implement multi-year contracts (eg 5–10 years) to ensure sustained participation through the project's critical lifecycle. Use Conservation Covenants–voluntary but legally binding agreements–to secure environmental outcomes even if the property changes ownership.
Governance	
Lack of strong local leadership	Formalise leadership by appointing a high-profile Sponsor (institutional) and local Champions (individual). These figures act as the principal advocates for the programme, securing resources and maintaining momentum through the development and design phases.
Lack of local capacity & limited resources	Identify resource gaps early to trigger targeted capacity-building or recruitment. Mitigate shortages by fostering a culture of data and skill-sharing across a diverse stakeholder network to maximise collective expertise.
Priority changes & discontinuities	Establish a robust, independent governance structure, a strong programme vision and a clearly defined management plan to insulate the project from shifts in political or institutional priorities. Utilising a SPV can further decouple the programme from the specific mandates of individual lead organisations.
Unclear legal responsibility & liabilities	Explicitly define legal responsibilities within the governance design and formalise them via a Memorandum of Understanding (MoU). Legal agreements must specifically address 'residual risk' and downstream liability in the event of natural structure failure.
Ineffective communication	Implement a structured governance framework with clearly defined roles and reporting lines to prevent data siloing. A unified communication strategy ensures all actors operate aligned.
Conflicting mandates & misaligned priorities	Draft a comprehensive Programme Mandate that aligns the diverse objectives of all involved stakeholders. This written outline serves as the primary reference point to ensure all partners remain committed to shared goals.
Potential bottlenecks	Streamline regulatory and administrative processes through a dedicated governance steering committee. Proactive engagement with regulators early in the project lifecycle ensures that administrative hurdles do not derail delivery timelines.

6. Recommendations

This section will outline the recommendation on the funding and governance model, with a view to create an approach that can be replicated in other areas, supporting the wider mission of the Rivers 2040 programme. It will also summarise potential areas of further work that could be conducted to strengthen the next phase of the programme.

Recommendations on Funding Model

The economic analysis demonstrates a compelling case for investment, but no single funding source can finance a catchment-scale restoration programme. A long-term, blended finance approach should therefore be adopted, combining public funding, private investment and nature market revenues to reflect the wide range of beneficiaries.

Key recommendations are:

1. **Develop a blended finance strategy that evolves over time.** Early Programme delivery should primarily rely on philanthropic funding and public sector grants to establish governance, develop projects and deliver initial restoration activities. As evidence, partnerships and revenue streams mature, private sector investment, water company contributions and outcome-linked finance mechanisms become increasingly viable, reducing reliance on grant funding over time. The pace of this transition will vary between projects and catchments, depending on their specific context and how quickly they develop the evidence base, governance arrangements and revenue streams needed to attract private capital.
2. **Differentiate between financiers and outcome buyers**. Not all organisations that contribute funding need to directly purchase ecosystem service outcomes. Public funders, philanthropic organisations and impact investors can provide upfront capital to enable implementation, while outcome buyers such as water companies, local authorities, the private sector (including insurers) and developers contribute based on the benefits they receive or when risk is reduced to a level which enables a return. This distinction will broaden the pool of potential funders and create a more resilient financing structure.
3. **Continue strengthening nature markets while recognising their limitations**. Existing markets provide an important source of revenue but, under current additionality and stacking rules, are unlikely to fully finance restoration. Continued engagement with government, regulators and market operators should seek to improve market design and unlock greater private investment into catchment restoration.
4. **Package projects and ecosystem services together**. Rather than seeking funding for individual restoration projects, multiple interventions and ecosystem service outcomes should be bundled into a single investment proposition. This reduces transaction costs, creates larger and more predictable investment opportunities, and enables a wider range of public and private funders to participate.

Recommendations on Governance

Successful delivery will require a dedicated organisation capable of coordinating multiple partners, funding streams and projects over several decades. Governance should therefore prioritise simplicity, accountability and flexibility.

Key recommendations are:

1. **Establish a central 'orchestration' function.** A dedicated programme team should be responsible for fundraising, partnership management, stakeholder engagement, programme coordination and Monitoring & Evaluation (M&E). This function should act as the single point of coordination across delivery partners, ensuring a consistent strategic direction while reducing fragmentation and transaction costs.
2. **Clearly define stakeholder roles and decision-making responsibilities.** Governance arrangements should reflect both the mandates of participating organisations and the benefits they receive from the Programme. Public authorities, delivery organisations, funders, private sector partners and technical experts should have clearly defined responsibilities and decision-making powers, creating transparent accountability while encouraging long-term collaboration.
3. **Adopt a hosted governance model in the short- to medium-term, with the potential to transition to a Special Purpose Vehicle (SPV) as the Programme matures.** A hosted model provides a practical and low-cost mechanism to establish the Programme quickly by leveraging existing institutional capacity and relationships. As the scale of funding, partnerships and delivery activities increases, transitioning to an independent SPV would provide greater operational independence, strengthen accountability and create a dedicated entity capable of managing long-term blended finance arrangements.
4. **Develop a Monitoring & Evaluation framework.** A robust M&E framework should be established from the outset to track implementation progress, quantify ecosystem service outcomes and demonstrate value for money. Consistent reporting will support adaptive management, strengthen the evidence base for NbS and provide the transparency required to maintain confidence among funders, investors and delivery partners.

Recommendations for Replicability and Scale

While this business case focuses on the Trent Valley, the approach has been designed to support wider application across the Rivers 2040 programme and other UK catchments.

Key recommendations for replicability and scalability are:

1. **Use the Trent Valley as a flagship demonstration programme, as already intended.** The scale, diversity and visibility of the catchment provide a unique opportunity to demonstrate how coordinated river restoration can deliver benefits for water security, climate resilience, biodiversity and local communities. Lessons from the Trent should be used to build confidence among policymakers, funders and delivery partners across England.
2. **Strengthen project readiness across the pipeline.** Early investment should focus on developing a portfolio of implementation-ready projects, including feasibility studies, opportunity mapping, stakeholder agreements, governance arrangements and funding strategies. Improving project readiness will accelerate delivery and make projects more

attractive to public and private investors. Working with public land and institutional landowners may help to get pilots ready more quickly as resistance from private landowners remain high.

3. **Standardise approaches to project development, costing, valuation and monitoring.** Developing a consistent methodology for opportunity mapping, economic assessment, cost estimation and M&E will improve comparability between catchments, reduce transaction costs and make it easier to build robust business cases for future programmes.
4. **Share lessons learned and delivery experience.** Practical experience from implementation, governance, financing and stakeholder engagement should be systematically captured and disseminated through the Rivers 2040 programme. Building a shared evidence base will reduce duplication of effort, improve programme design and accelerate the adoption of large-scale river restoration across the UK.

Recommendations on Further Work

1. **Explore farm-level nature revenue modelling.** Further work could explore projecting nature-related revenues from BNG, carbon, and other emerging markets at a farm-level to provide greater certainty and reassurance to landowners. This could involve developing a detailed case study for a specific site, modelling a range of intervention scenarios, and projecting future revenue streams associated with each option. Such analysis would also be valuable to minerals companies, given their significant role in site aftercare and long-term land management.
2. **Policy and planning system alignment.** Further analysis could focus on how planning policy and regulation could be better aligned across authorities at a landscape scale, enabling more efficient processes and supporting the delivery of larger-scale, more ambitious projects. This work could also examine wider policy barriers that currently constrain ambition. Engagement with minerals companies highlighted that, in some cases, BNG requirements can limit restoration ambition for minerals sites and do not always sufficiently incentivise high-quality or exemplary outcomes.
3. **Go-to-market and fundraising strategy.** Further work could develop a detailed go-to-market strategy to support DWT and partners in approaching funders and securing investment for the programme. This could include the creation of a targeted funder database, tailored value propositions, and bespoke pitch decks aligned to different funding audiences.

7.The Implementation Roadmap

With the business case now established, the next phase of work must focus on funder engagement and on the operationalisation of the Programme. Success at this stage depends on formalising the partnership structure, defining the governance model, and securing initial implementation funding to catalyse momentum. Establishing this robust foundation is essential to create the regulatory and financial certainty required to unlock broader co-financing opportunities. By providing a transparent framework that private entities can trust, it can effectively lower the barrier to entry for private capital, driving the Programme toward a successful and sustainable blended finance approach.

The following 10 steps outline the strategic path from concept to field-scale execution:

Phase 1 – Establish the Programme (0–12 months):

1. **Formalise partnership structure:** Establish a coordinating function to lead the initiative.
2. **Secure initial funding:** Identify and pursue short-term opportunities to finance immediate startup costs.
3. **Refine governance:** Conduct a detailed assessment to clarify roles and decision-making processes.
4. **Engage stakeholders:** Launch a targeted strategy to ensure continuous alignment with key actors.

Phase 2 – Prepare for Delivery (6–18 months):

5. **Prioritise field-scale interventions:** Use existing opportunity mapping to select high-impact priority areas.
6. **Design delivery model:** Define the practical mechanics and internal capacity required for execution.
7. **Draft five-year implementation plan:** Define strategic milestones and a clear trajectory for scaling up.
8. **Establish M&E framework:** Build a Monitoring & Evaluation system to provide transparency and track progress.

Phase 3 – Scale Delivery and Finance (18 months onwards):

9. **Launch pilot projects:** Deliver initial projects to demonstrate proof of concept, refine delivery approaches and build confidence among partners and funders.
10. **Develop a sustainable funding strategy:** Build on the evidence generated through early delivery to broaden the funding base, strengthen ecosystem service markets and progressively attract larger-scale public and private investment through a blended finance model.

The Vision: Rivers 2040

The Rivers 2040 Programme aims to be a blueprint for English river restoration. By leveraging NbS, it seeks to deliver cleaner water, resilient wildlife habitats, and enhanced flood protection for local communities. To transform this vision into reality, the immediate priority is to solidify the management, funding and governance models that will underpin the Programme's success.

8.Conclusions

The assessments presented in this business case are compelling and unambiguous. They demonstrate that large-scale river and catchment restoration across the Trent Valley is viable and has a meaningful economic return of investment.

A programme requiring an estimated **1.3 billion over 30 years generates approximately 10 billion in economic benefits across flood risk reduction, water quality, biodiversity, carbon sequestration, public health, recreation and green employment**. These are not marginal or abstract outcomes; they are real financial benefits that accrue to communities, businesses, water companies, public authorities and the natural environment alike. The analysis also makes clear that the cost of inaction is not neutral. It is cumulative, worsening, and ultimately far greater than the cost of intervention. The Trent Valley presents a unique opportunity to become a case study for a holistic river-scale approach with unmatched ambitions, which could lead change across the UK. The conclusions below synthesise the key findings across the stakeholder, economic, funding, governance, replicability, and risk workstreams, and set out the priorities for moving from business case to programme delivery.

Table 13: Conclusions Table

Section	Key Findings and Recommendations for Further Work
Stakeholder analysis	• The Programme creates value for a diverse range of stakeholders, including public authorities, water companies, Wildlife Trusts, mineral operators, developers, private sector businesses (including insurers) and local communities, each with different interests and potential roles. • Stakeholder engagement validated the proposed approach and highlighted broad support for large-scale river restoration, while identifying funding, governance and coordination as key priorities for implementation. • As the Programme progresses, engagement should move from consultation towards formalising partnerships and defining long-term roles and commitments.
Economic and financial analysis	• The economic assessment demonstrates a strong case for investment, with benefits substantially exceeding Programme costs and value generated across provisioning, regulating, cultural, supporting and economic ecosystem services. • Carbon sequestration and flood management are the largest benefit categories, but significant additional value is generated through recreation, public health, water quality, biodiversity, ELM revenues and green jobs, demonstrating the strength of stacked ecosystem service benefits. • Current nature market revenues alone are unlikely to make restoration financially attractive for landowners, reinforcing the need for public investment and blended finance.
Funding model	• No single funding source is capable of delivering a programme of this scale; a blended finance approach is required to reflect the diversity of beneficiaries. • Public and philanthropic funding should provide early catalytic funding to establish the Programme and de-risk delivery, complemented by Payments for Ecosystem Services, nature markets, water company investment and repayable finance mechanisms as the Programme matures.

	• Financing strategies should distinguish between organisations providing upfront capital and those purchasing ecosystem service outcomes, broadening the pool of potential contributors.
Governance	• Long-term delivery requires a dedicated coordinating function responsible for fundraising, partnership management, programme coordination and Monitoring & Evaluation. • Governance arrangements should reflect stakeholder mandates and the benefits different organisations derive from the Programme, creating clear responsibilities and accountability. • A hosted governance model provides the most appropriate structure during Programme establishment, with the potential to transition to an independent SPV as funding, partnerships and delivery activities expand.
Replicability and scalability	• The Trent Valley provides a flagship demonstration of how large-scale river restoration can deliver multiple benefits through a coordinated programme approach. • Developing consistent approaches to project development, costing, valuation and monitoring will make future business cases more efficient and comparable. • Continued investment in project readiness and systematic sharing of lessons learned will strengthen the wider Rivers 2040 programme and accelerate replication across other UK catchments.
Risks and trade-offs	• The main barriers to implementation remain fragmented funding, governance complexity, regulatory constraints and the limited maturity of current nature markets. • At the same time, the cost of inaction will continue to increase through greater flood damages, biodiversity loss and declining ecosystem resilience. • Pilot projects, adaptive management and continued policy engagement will help reduce delivery risks while strengthening the long-term evidence base for NbS.

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Annex F. Literature and Case Study Review

Below is the list of criteria that helped guide the case study review.

Table 15: Criteria for case study comparisons for river re-naturalisation projects

Category	Examples
Landscape type	Upland / Lowland / Urban / Rural / Mixed / Coastal
Dominant land use	Agriculture / Forestry / Urban / Mixed / Moorland / Pasture
Priority water security challenge	Flood mitigation / Drought resilience / Water quality / Erosion control / Combined
Nature-based solution type	Wetland creation / River restoration / Tree planting / Soil management / Leaky dams
Scale of intervention	Catchment / Sub-catchment / Regional / Community-wide
Local leadership / partner consortium	Local authorities / NGOs / Community groups / Utility companies
Funder type	Government (eg Defra, EA) / NGO / Private sector / Water companies / Blended finance
Funding model	Private-sector led / Blended finance / Public initiative / Outcome-Based finance /
Governance model	Hosted Programme / Incorporated Entity / Umbrella Agreement
Monitoring & evaluation	Baseline established? (Y/N) / Monitoring methods / Outcome metrics used
Policy linkages	WFD / 25 Year Environment Plan / Local Nature Recovery Strategies / Biodiversity Net Gain
Ecosystem services targeted	Carbon sequestration / Biodiversity / Recreation / Flood regulation / Water quality

Table 16: List of NFM and Wider Catchment Management Projects

LOCATION CATCHMENT	LEAD / KEY PARTNER(S)	PROJECT / FOCUS AREA	WATER SECURITY CHALLENGE & NBS	SCALE	FUNDING	GOVERNANCE	LINK / SOURCE
GLOUCESTERSHIRE	Gloucestershire Wildlife Trust, Intact Insurance	Climate-resilient communities; insurance sector involvement	NbS: swales and attenuation basins, new wetlands, rain gardens, green verges, SUDs	Two- year project plan, started 2023.	Intact Insurance Group Funded phase 1, Now in phase 2		Intact – Climate Resilience
NATIONAL / VARIOUS	Highways England	National NFM fund linked to infrastructure & roads					Highways England NFM Fund
RIVER SOAR	WWF, Aviva Insurance, Trent Rivers Trust	Natural Flood Management (NFM) initiatives	NbS:: In-channel storage eg leaky barriers; Offline and online storage eg ponds, wetlands,	Three-year partnership project (2021/2024)	Total committed investment: £4.3M (2021 -2024), increasing to £6.7M when planned investment over next five	Hosted Programme – Trent Rivers Trust.	Natural Flood Management in the Soar

			floodplain reconnection, swale; Surface flow interception e.g. brash bundles, gully stuffing, hinged trees.		or so years is included. Funding provided by: National Heritage Lottery, EA, LLFA, National Forest and a Parish Council.		
RIVER AIRE	Aire Resilience Company Leeds Flood Alleviation Scheme (Leeds FAS)	Privately funded catchment resilience project	to significantly reduce the risk of future flooding in Leeds		Will raise a public-private investment mix: Public sector capital grants and private sector cash flow of finance facility. Plan to sell ES and flood management measures (Buyer consortium of businesses)	Creation of a CIC.	Aire Resilience Company
WYRE CATCHMENT	Wyre Rivers Trust, Multiple Partners	NbS, NFM, blended finance model	Reduced flood risk		The Project's Community Interest Company (CIC) has successfully raised a nine-year £850k private loan facility to help fund the interventions. Blend of public and private finance. Investors repaid with PES.	Community Interest Company to attract investment.	Wyre NFM Project
NORFOLK	Water Resources East (WRE)	Norfolk Water Strategy – long-term resilience and funding models			Looking to create the 'Norfolk Water Fund' to obtain 30 million pounds to develop this project		Norfolk Water Strategy
WARWICKSHIRE AVON CATCHMENT	Warwickshire Wildlife Trust, Severn Trent, Environment Agency, Warwickshire County Council	Long-term water resilience and NFM				Hosted Programme	Warwickshire Nature4Water

Table 17: List of River Restoration Projects in the UK

PROJECT NAME	RIVER / CATCHMENT (LOCATION)	KEY PARTNER (S)	KEY ACTIONS (NBS)	PRIMARY BENEFITS	SCALE	FUNDING	GOVERNANCE	NOTES	LINK / SOURCE
HOLNICOTE ESTATE 'STAGE 0' RIVER RESTORATION	River Aller & Horner Water, Somerset (Exmoor)	National Trust, Environment Agency, Somerset Rivers Authority	Reconnected river to floodplain, re-meandered channels,	Reduced flood risk, rapid biodiversity recovery, improved		Significant funding from Interreg 2 Seas Co-Adapt programme,	Hosted programme (Led by the National Trust, and supported by the	Completed ~2023; recognised nationally as a	Link; Link; Link

			created wetlands	habitat complexity		Defra's Green Recovery & Species Survival Funds and others.	Environment Agency).	model project three-year project.	
HOWGILL BECK RESTORATION	Howgill Beck, Cumbria (North Pennines AONB)	RSPB, North Pennines AONB Partnership, Dynamic Rivers	Re-meandered 1.8 km, reconnected floodplain, added natural wood structures	Restored natural processes, increased bird diversity		funded by Northumbrian Water (South Tyne Holistic Water Management Project), Defra (Farming in Protected Landscapes), The National Lottery Heritage Fund.	Hosted/managed by the RSPB; Was delivered through a multi-partner collaboration (partnership model)	Won UK River Prize; flagship upland restoration	Link
RIVER ADUR / KNEPP RE-MEANDERING	River Adur, Knepp Estate, West Sussex	Environment Agency, Knepp Estate, Ouse & Adur Rivers Trust	Weir removal, canal infilling, floodplain reconnection	Restored natural flow, improved habitat diversity, supported rewilding		£300,000 river restoration Mainly funded by Knepp estate and natural England, some EA and more recent phases backed by UK government grants like the Landscape Recovery Programme (DEFRA)	Hosted Programme (Knepp Estate)	Early large-scale lowland river rewilding (SE England)	
UPPER DEE & CATTIE BURN RESTORATION	Upper Dee & tributaries, Aberdeenshire / Cairngorms	River Dee Trust, Cairngorms National Park Authority, estates	New meandering channel, large wood placement, riparian tree planting	Cooler water for salmon, habitat complexity, climate resilience	The site includes 3km of river and 135 hectares of floodplain.	The National Lottery Heritage Fund	Hosted Programme	Ongoing; part of "One Million Trees" programme	
RIVER OF LIFE I & II	River Thames floodplain, Oxfordshire	Earth Trust, Environment Agency, Thames Water	Created backwaters, scrapes, floodplain wetlands (~50 ha)	Boosted fish and bird populations, flood storage, biodiversity gain		Phase 1: funded primarily by the Environmental Agency, with support from Earth Trust supporters. Phase 2: funded by Trust for Oxfordshire's Environment (TOE2) and a Biffa Award, Water Environment Grant through the European Agricultural	Hosted Programme	Phase II expanding; monitored for long-term outcomes	

						Fund for Rural Developme nt.			
RIVER THAME WETLAND & BACKWATER CREATION	River Thame, Buckinghamsh ire	River Thame Conservati on Trust, EA, Freshwater Habitats Trust	Constructed offline wetlands and backwaters	Fish nursery habitat, nutrient trapping, flood storage				Complete d 2022–23; largest Thame catchmen t project	Link, Link
RIVERS OF THE FANNS	Tributaries in east London / Essex (Thames fringe)	Thames21, local authorities, communiti es	Urban channel naturalisatio n, floodplain reconnectio n, community engagemen t	Flood risk reduction, urban biodiversity, local stewardship	26 projects across an area spanning 70 square miles.	Heritage Lottery Fund	Land of the Fanns Partnership Scheme; The Partnership Agreement for the Land of the Fanns LPS has been signed by each member of the Strategic Board.	Active catchmen t partnershi p model Delivery phase 2017-2022	Link
TRANSFORMI NG THE THAMES / GREATER THAMES ESTUARY	Lower Thames & Estuary, SE England	ZSL, EA, Crown Estate, RSPB, Natural England	Coastal and estuarine habitat restoration, saltmarsh and reef creation	Water quality, carbon storage, fisheries habitat		The Endangered Landscapes & Seascapes Programme (Cambridge Conservatio n Initiative, Arcadia)($5 million), the Environmen t Agency, the Ida Davis Foundation, the Linbury Trust, Marshall Wace and Oak Foundation.	Partnership model	Scaling up to restore hundreds of ha by 2030	Link, Link
SEVERN ESTUARY SALTMARSH & WETLAND CREATION	Awre Peninsula, Gloucestershir e	WWT, Aviva, Environme nt Agency	Managed realignment, farmland to saltmarsh, intertidal habitat	Flood protection, carbon sequestratio n, coastal biodiversity	148-hectares of low-lying land on the Awre peninsula	£21 million donation from Aviva aimed at restoring up to 250ha of saltmarsh.	Hosted Programme (WWT)	£21 m project; building on Steart Marshes lessons	Link
STEART MARSHES MANAGED REALIGNMEN T	River Parrett / Severn Estuary, Somerset	Environme nt Agency, WWT	Sea defence breach to create intertidal wetlands	Flood storage, carbon capture, bird habitat	Establish ed a new wetland nature reserve by opening 400ha of land to deliberate flooding	£21m	Hosted Programme (EA, WWT). Construction was carried out by Team Van Oord.	National flagship site; long-term monitorin g ongoing	
RIVER WYLYE / SEVEN HATCHES RESTORATIO N	River Wylye (Hampshire Avon SAC), Wiltshire	Environme nt Agency & partners	In-channel enhanceme nt, side-channel reconnectio n, habitat restoration	Enhanced chalk stream morphology and flow diversity		Majority: European Union's LIFE-Nature programme, Remaining: provided by participating UK partners on a cost-share basis: Natural England, Environmen t Agency,	Hosted programme (Natural England) – as part of the Strategic Restoration and Management (STREAM) project	Monitored as WFD case study	

						Wildlife Trusts (Wiltshire & HIOW), Wessex Water. £1 million total project budget			
BEAVER-LED NATURAL RIVER RECOVERY	Various catchments (e.g. Kent, Devon, Scotland)	Beaver Trust, Wildlife Trusts, landowners	Beaver reintroduction to create dams and wetlands	Slowed runoff, trapped sediment, created wetland habitat		Devon Beaver project: With funding from Viridor Credits Environmental Company and the Truell Charitable Foundation		Recognised as native species (England, 2022); expanding	Link, Link
UPSTREAM THINKING PROGRAMME	River Otter		soil and nutrient management interventions and wider NbS	Protection of river channels, erosion reduction, pollution filtration, improved water quality and nutrient balance		ES purchased by South West Water (SWW) as single buyer. Additional non-repayable funding provided through the Exmoor National Park Authority, and the Devon Wildlife Trust (DEFRA funding via Natural England's Countryside Stewardship agreements).	Hosted programme let by the Westcountry Rivers Trust (WRT)		Link, Link; Link; Link

Table 18: List of River Restoration Projects in the EU

Project Name	River / Catchment (Location)	Key Partner(s)	Key Actions	Primary Benefits	Scale	Funding Mechanism	Governance	Insights for DWT Business Case	Status / Notes	Links / Sources
River Meuse	River Meuse (Dutch–Belgian border)	Four nature conservation organisations, WWF, two River Management Authorities, Regional Landscape Kempen en Maasland and others	Restoring floodplain, widening and re-meandering channels, creating wetlands	Reduced flood risk, rapid biodiversity recovery, improved habitat complexity, recreation and tourism	Restoration of a 45 km river section across the Dutch and Belgian border	Mostly financed through commercial gravel extraction, with companies funding restoration in exchange for extraction rights. Total financing: €550 million.	Dutch side: Creation of a Community Interest Company (CIC)	Quantified increases in eco-tourism opportunities	Completed – EU's largest river restoration project	Link
Rewilding Sweden	Nordic Taiga (Sápmi,	Rewilding Europe, local communiti	Floodplain reconnection, riverbed	Biodiversity recovery (including fish),		Grants and donations (Swedish Postcode Lottery		Demonstrates integration of	Active rewilding landscap	Link

	northern Sweden)	es, Sami reindeer herders	restoration (sand and gravel), riparian wetland and woodland restoration	reduced flood risk, cleaner rivers, improved water retention		Foundation, Open Rivers Programme, private donors, Västerbotten County Administrative Board)		rewilding with traditional land use; community-driven catchment restoration	e since 2023	
Oder Delta Rewilding	Oder Delta, Baltic Coast (Polish–German border)	Rewilding Oder Delta, Rewilding Europe, local NGOs, nature agencies	Wetland restoration, riparian tree planting, barrier removal, stone and gravel introduction	Increased water storage, temperature regulation, habitat connectivity, biodiversity enhancement		Grants and donations (German Postcode Lottery, Endangered Landscapes Programme, Arcadia, WWF, Krombacher Brewery, DUH, LIFE Programme); European Regional Development Fund (Interreg); European Outdoor Conservation Association (EOCA)		Demonstrates ability to pool multiple funding streams by aligning projects with different funding objectives (eg eagle conservation, lynx restoration)	Ongoing restoration of the Ina River and surrounding delta ecosystems	Link
Greater Côa Valley Rewilding	Côa River, Portugal	40 Côa Valley enterprises; Rewilding Europe Capital	Species reintroduction (horses and bulls), riparian vegetation recovery, landscape-scale corridor restoration	Reduced wildfire risk, biodiversity recovery, habitat connectivity, eco-tourism		Grants, donations and loans (Cambridge Conservation Initiative, LIFE Programme, Symington Impact Fund, Rewilding Europe Capital loans)	LIFE WolFlux	Demonstrates blended finance combining private loans with EU funding	Ongoing; first privately owned nature reserve in Portugal; UNESCO World Heritage Site	Link
Tarutino Steppe Rewilding Project	Tarutino Steppe, Ukraine	Rewilding Ukraine, Rewilding Europe, local partners	Steppe restoration, free-roaming herbivore reintroduction	Improved soil health, carbon sequestration, biodiversity		Endangered Landscapes & Seascapes Programme, LIFE Programme, targeted government funding		Illustrates strong carbon–biodiversity co-benefits in agricultural landscapes	Active despite war-related challenges	Link
Dauphiné Alps Rewilding Project	Upper Drac and Durance catchments (French Alps)	Rewilding Europe, local authorities, regional NGOs	River corridor and wetland restoration, floodplain reconnection, forest recovery, wildlife corridor establishment	Improved water regulation, biodiversity restoration, ecosystem connectivity		Grants and donations (Dutch Postcode Lottery, Arcadia, OAK Foundation, Stichting Sub3); LIFE Programme; Rewilding Europe Capital loans		Demonstrates blended finance combining grants, donations, public funding and private loans	Designated a Rewilding Europe landscape in 2024; baseline ecological studies underway	Link
Integrated Sediment Management in the Mimikawa River	Mimikawa River, Japan	Miyazaki Prefecture, Kyushu Regional Development Bureau, local governments, Miyazaki University, KEPCO, Central Research Institute of Electric Power Industry	Restoring natural sediment flow while balancing flood control, water use and environmental conservation			Funded by Miyazaki Prefecture	Technical Committee on Integrated Sediment Flow Management established by the Prefecture; Prefecture developed integrated sediment management policy	Demonstrates coordinated governance for catchment-scale sediment management		

Río Lempa Conservation and Restoration Program	Río Lempa, El Salvador	Catholic Relief Services (CRS), FIAES, ASA, MARN, MAG, ANDA, MINSAL, U.S. International Development Finance Corporation (DFC), Government of El Salvador, CAF	Catchment conservation and restoration programme		20-year programme	$350 million commitment to the watershed ($200 million for conservation/restoration and $150 million endowment fund). Supported by a $1 billion debt conversion agreement involving DFC, Government of El Salvador, CAF, CRS, FIAES and ArtCap Strategies.	Managed by a consortium led by CRS (technical lead) and FIAES (Fund administrator). Programme Supervisory Board oversees allocation of Conservation Trust Fund resources.	Demonstrates innovative debt-for-nature financing combined with a long-term endowment fund and multi-partner governance	Ongoing	

Table 19: The Wyre Catchment Case Study

BOX 1: THE WYRE CATCHMENT NATURAL FLOOD MANAGEMENT (NFM) PROJECT

Location: Northwest Lancashire, England

Extent: 70 hectares

Status: Ongoing – Implementation Phase (2019 – Present)

Project Partners: The Rivers Trust, the Wyre Rivers Trust, Triodos Bank UK, the Environment Agency, United Utilities, Flood Re, Co-op Insurance, and the Esmée Fairbairn Foundation

The Wyre Catchment NFM Project aims to reduce flood risk in the Wyre River catchment through NbS. The project involves more than 1,000 measures designed to store, slow and intercept floodwater, reducing peak flows across the catchment. In addition to lowering flood risk, the project is expected to deliver wider ecosystem services, including carbon sequestration, increased biodiversity and improved water quality.

To manage the project and attract investment, a not-for-profit Special Purpose Vehicle (SPV) was established: The Wyre Catchment Community Interest Company (CIC). As an independent legal structure, the CIC removed risk from the partners, facilitating the sourcing of external investment.

The CIC secured a nine-year private loan facility of £850,000 to help fund project interventions, alongside a £627,000 grant from the Woodland Trust through the Northern Forests Grow Back Greener programme, part of Defra's Nature for Climate Fund. This grant was issued over the first three years of the project. Total capital expenditure for the project is estimated at £1.5 million, with ongoing running costs of approximately £50,000 per year, including land management payments and maintenance.

Project delivery is being led by the Wyre Rivers Trust, supported by volunteers. Over the nine-year period, approximately £2 million in ecosystem services payments is expected. These revenues from ecosystem service buyers will be paid to the CIC, where they will be used to service investment repayments and cover land management and maintenance costs.

References

- www.greenfinanceinstitute.com/hive/revenues-for-nature/case-studies/the-wyre-catchment-natural-flood-management-project/
- www.greenfinanceinstitute.com/wp-content/uploads/2025/05/Wyre-NFM-Technical-Case-Study.pdf.

Table 20: The Holnicote Estate's 'Stage 0' Project Case Study

BOX 2: THE HOLNICOTE ESTATE'S 'STAGE 0' PROJECT	
Location: Exmoor National Park, Somerset, England **Extent**: 1.2 km section of the River Aller, 7 hectares **Status**: Completed (2020-2023) **Project Partners**: The National Trust, the Environment Agency, Somerset Rivers Authority (SRA)	The Holnicote Estate 'Stage 0' Project was a river restoration initiative that has since gained national recognition, winning the UK River Prize for Catchment Restoration in 2025 for its work restoring natural floodplain dynamics in the River Aller and Horner Water catchments. It represented the first large-scale attempt in the UK to reset a river system by fully reconnecting it with its surrounding floodplain. Key interventions included reconnecting river channels to the floodplain, re-meandering straightened sections and creating wetlands. The project also incorporated habitat restoration, grazing management and species reintroductions, resulting in the creation of seven hectares of waterscapes and wetlands. The project was delivered through a partnership model hosted by the National Trust, with support from the Environment Agency and the Somerset Rivers Authority (SRA). Significant funding was secured from the Interreg 2 Seas Co-Adapt programme and DEFRA's Green Recovery and Species Survival Funds. Additional contributions came from National Trust capital funding, the Environment Agency, the Somerset Rivers Authority, and the Green Recovery Challenge Fund, reflecting a primarily public- and charity-funded model. The Holnicote Estate 'Stage 0' Project is also part of the National Trust's multi-million-pound Riverlands programme, which supports five river catchment restoration schemes across England and Wales.
References - stagezeroriverrestoration.com/docs/biblo/2021_bowles_theStageZeroApproach.pdf - www.nationaltrust.org.uk/visit/somerset/bossington/stage-0-one-year-on - news.exeter.ac.uk/centre-for-resilience-in-environment-water-and-waste/pioneering-river-restoration-declared-a-success-delivering-incredible-benefits-for-nature-and-people-within-12-months-of-completion/	

Table 21: The Milton Keynes Flood Plain Forest Case Study

BOX 3: THE MILTON KEYNES FLOODPLAIN FOREST	
Location: Milton Keynes, Buckinghamshire, England **Extent**: 50ha, approx. 2km **Status**: Completed (2007-2015) **Project Partners**: The Parks Trust, Hanson Quarry Products, Scott Wilson, Milton Keynes Council, the RSPB and the Environment Agency	The Milton Keynes Floodplain Forest is a large-scale river restoration project that transformed approximately 50 hectares of the River Great Ouse floodplain into a dynamic floodplain forest and wetland landscape. Developed in 2007, the project aimed to restore natural flooding processes, enhance biodiversity, and provide accessible green space within Milton Keynes' parks network. Studies identified the need to reshape the floodplain to achieve target habitats, leading The Parks Trust to partner with Hanson Quarry Products to combine gravel and sand extraction with landscape restoration. This process created lakes, ponds, and back channels, enabling the development of wet woodland, reedbeds, marsh and wet grassland habitats, and improving hydrological connectivity. The project cost approximately £900,000 and was funded through royalty payments from commercial gravel extraction and the sale of minerals by Hanson Quarry Products. These funds were ring-fenced to cover the costs of establishing the habitat, installing the visitor access infrastructure and the future management of the site. The restored floodplain provides flood storage during high flows and delivers recreational and wellbeing benefits through public access. Project implementation as well as long-term management was led and hosted by The Parks Trust. Building on this foundation, a range of subsequent river and floodplain restoration projects have continued across the Milton Keynes area.
References - www.ecrr.org/Portals/27/River per cent 20Great per cent 20Ouse per cent 20case per cent 20study.pdf - www.therrc.co.uk/assets/files/case_studies/milton_keynes_floodplain_forest_park.pdf - afterminerals.com/case-study/manor-farm-floodplain-forest-nature-reserve/ - www.bbc.com/news/articles/cj4w414k7ero	

Table 22: Border Meuse Restoration Project Case Study

BOX 4: THE BORDER MEUSE RESTORATION PROJECT	
Location: Belgium-Netherlands Border **Extent**: 45–50 km of river **Status**: Ongoing – works expected to continue to 2027 **Project Partners**: Grensmaas Consortium, Natuurmonumenten, VNBM	The Border Meuse (Grensmaas) project is one of the largest river restoration initiatives in Western Europe, restoring natural river dynamics along a 45–50 km stretch of the River Meuse on the Dutch–Belgian border. Initiated in the early 1990s, the project aims to restore natural river dynamics, enhance biodiversity, and reduce flood risk through NbS, generating economic value through gravel extraction and nature-based development. The project is primarily financed through commercial sand and gravel extraction, with private companies funding restoration works in return for extraction rights. Total investment is estimated at €550–700 million, with public authorities contributing with subsidies for planning, land acquisition, governance, and long-term management. Water management authorities contributed to technical river engineering components, while EU programmes such as LIFE and Interreg supported targeted restoration actions and cross-border cooperation. Implementation on the Dutch side is led by the Consortium Grensmaas, a public–private special purpose entity comprising gravel extraction companies, civil engineering firms and the conservation organisation Natuurmonumenten. This arrangement enabled efficient delivery of river widening, floodplain restoration and extraction works, balancing commercial and ecological objectives, while cross-border coordination is ensured through the Flemish–Dutch Bilateral Meuse Commission (VNBM), which aligns flood safety standards, design parameters and strategic objectives. The project has significantly reduced flood risk for surrounding communities, achieved high public acceptance, and catalysed nature-based tourism, generating more than €25 million in annual revenues. Since 2017, it has been further developed under the River Park Meuse Valley initiative, strengthening the river landscape's ecological, cultural and recreational value.
References - rewildingeurope.com/news/river-meuse-restoration-shows-the-wide-ranging-benefits-of-working-with-nature/ - oppla.eu/case-study/river-meuse-project - grensmaas.nl - pmc.ncbi.nlm.nih.gov/articles/PMC6231075/.	

Table 23: The Upstream Thinking Programme Case Study

BOX 5: THE UPSTREAM THINKING PROGRAMME	
Location: Devon and Cornwall, Southwest England. **Extent**: >144,000 hectares **Status**: Ongoing – Phase 4 (2025-2030) **Project Partners**: Westcountry Rivers Trust, South West Water (SWW), the Devon Wildlife Trust, the Cornwall Wildlife Trust, Exmoor National Park Authority	The River Otter catchment in Devon has experienced increased nitrate pollution from agricultural intensification, degrading raw water quality and raising treatment costs. In response, the Upstream Thinking programme was launched in 2010. Led by the Westcountry Rivers Trust (WRT) and funded by South West Water, it delivered soil and nutrient management measures and NbS, such as mire and culm grassland restoration, to reduce runoff, erosion and pollution. The approach improved water quality and allowed farmers to reduce fertiliser use. WRT acted as the project host, working with local landowners to implement these measures. The resulting ecosystem services – primarily improved water quality and nutrient balance – were purchased by South West Water (SWW) as a single buyer, reflecting SWW's recognition that upstream land management is more cost-effective than investing in expensive water treatment infrastructure. Payments were made to WRT, which compensated farmers through long-term contracts (10–25 years), conditional on maintaining agreed land management practices and verified through monitoring by WRT and the University of Exeter. Additional non-repayable funding was provided by organisations including the Exmoor National Park Authority, while the Devon Wildlife Trust secured DEFRA funding through Natural England's Countryside Stewardship agreements. Between 2015 and 2020, the project delivered an £11 million programme across 11 catchments in Devon and Cornwall. This project has now moved to Phase 4 (2025-2030), expanding across the Dart, Exe, Fowey, Otter, Tamar and Tavy catchments.
References - catchmentbasedapproach.org/learn/upstream-thinking/ - catchmentbasedapproach.org/learn/upstream-thinking-catchment-management-evidence-review-water-quality/ - www.cornwallwildlifetrust.org.uk/sites/default/files/2020-11/Upstream per cent 20Thinking per cent 202015-2020 per cent 20Report.pdf#page=28.10 - wrt.org.uk/project/upstream-thinking/?utm_source=chatgpt.com - www.cambridge.org/core/journals/cambridge-prisms-water/article/case-study-of-payments-for-ecosystem-services-and-the-need-for-integrated-catchment-management-experiences-from-the-westcountry-rivers-trust/9382007B40363163C4802D825D671B5A	

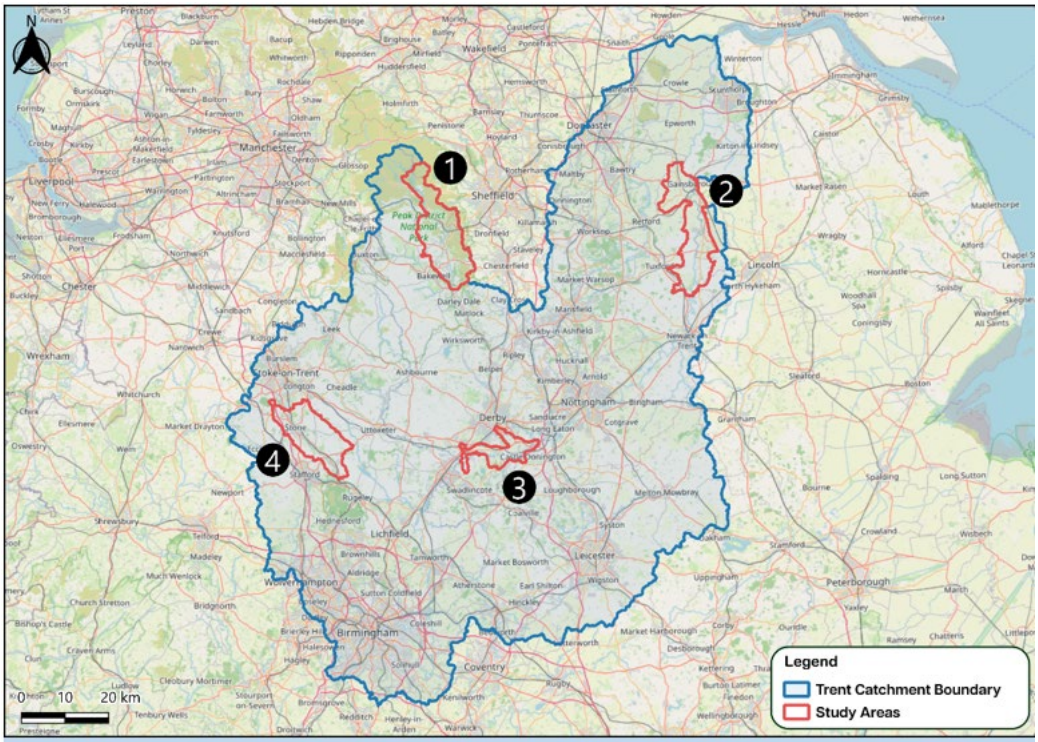
Table 24: The Great Jacques-Cartier Bog Case Study

BOX 6: GREAT JACQUES-CARTIER BOG RESTORATION	
Location: Quebec City Region, Canada **Extent**: 200 hectares **Status**: Completed 2023 **Project Partners**: Intact Insurance The Nature Conservancy of Canada	As part of its commitment to building climate-resilient communities, Intact Financial Corporation invested in the protection of the Great Jacques-Cartier Bog through its partnership with the Nature Conservancy of Canada (NCC). Working alongside federal and provincial governments, the initiative secured nearly 200 hectares of one of the last large peatlands in the greater Quebec City region, helping bring approximately 60 per cent of the bog under protection. The project demonstrates how nature-based solutions can strengthen flood resilience. Peatlands act as natural water-storage systems, absorbing significant volumes of rainfall and snowmelt and releasing water slowly over time. This reduces runoff, lowers peak water levels during storms, and helps protect nearby communities and infrastructure from flooding. As heavy precipitation events become more frequent and severe, preserving natural assets such as peatlands offers a cost-effective and sustainable complement to traditional flood-management infrastructure. Beyond flood mitigation, the Great Jacques-Cartier Bog improves water quality, stores carbon, moderates local temperatures and supports biodiversity. The project demonstrates how investing in nature-based solutions can make communities more resilient to climate change while protecting biodiversity. It forms part of Intact Insurance's five-year, $8 million partnership with NCC to protect and restore wetlands across Canada.
References: News | Intact Financial Corporation - Press Releases -	

Annex G. Methodology of Financial and Economic Analysis

C1. Case Study Selection for DWT Science Modelling

Derbyshire Wildlife Trust, advised by Pegasys, selected four study sites (corresponding to Water Authorities) to conduct its impact analysis modelling. Pegasys then extrapolated and averaged those figures across the catchment before running the CBA at catchment scale.



1. Derwent from Westend to Wyre
2. Trent from Carlton-on-Trent to Laughton Drain
3. Trent from Dove to Derwent
4. Trent from Tittensor to River Sow

Figure 18: Selection of Four Case Study Sites for Science Modelling Conducted by DWT

C2. Economic Analysis Methodologies and Science Inputs

This section sets out the methodology for the economic case for implementing NbS at scale, which forms a second core pillar of the overall Business Case alongside the financial case. The economic case is primarily aimed at councils and other public authorities, whose objectives are focused on delivering public value rather than generating direct financial returns.

Unlike the financial analysis, which assesses direct revenues accruing to farmers and landowners, the economic case captures the wider economic value of restored ecosystem services delivered by NbS across the catchment. It therefore adopted a natural capital approach to holistically assess benefits to the economy, people and nature.

The analysis followed a cost–benefit framework, comparing A) Programme Benefits with B) Programme Costs over a 30-year period. The programme was defined as a coordinated effort to fund, implement, and maintain NbS at scale over the long term.

Benefit Assessment:

The benefit assessment was structured around comparing the outcomes of two scenarios:

- **Baseline scenario (Business-as-Usual):** Represents continuation of current land use and management practices and assumes no additional NbS implementation beyond existing activities. It also assumes that current mining sites are converted to low-grade agricultural land rather than NbS.
- **NbS scenario:** Represents the implementation of a defined portfolio of NbS across the catchment and reflects changes in land cover and ecosystem function.

For each category of benefit, the NbS scenario was assessed relative to the baseline scenario. The difference (uplift) between the two scenarios was quantified using biophysical or activity-based metrics, and subsequently monetised using established economic valuation approaches. This approach ensures that only additional benefits attributable to NbS are captured in the economic case.

Each benefit was assessed using a bespoke methodology appropriate to its underlying biophysical or socio-economic mechanism, outlined below:

- **Provisioning services:**
    - **Environmental Land Management Payments**: NbS were aligned with Sustainable Farming Incentive (SFI) and Country Stewardship (CS) schemes, allowing farmers to and landowners to obtain payments.
        - *Science input: NbS description (for identifying corresponding SFI and CS activities) and implementation areas (Hectares)*
    - Water recharge: NbS offer water recharge benefits (often expressed in m3/year), which can be monetised using the ONS recharge unit value for public water supply of £0.46/m3 (2020).
        - *Science input: Total increased water supply (m3/year).*
- **Climate regulation services:**
    - Water quality improvement: At a waterbody level, NbS can contribute to Phosphorus and Nitrogen load reductions, which can be cross-referenced with the Water Framework Directive's (WFD) targets for good status. This then helps understand the overall impact on the water body's quality, and whether NbS can help change its WFD status based on its reasons for not achieving good (RNAGs). We then assume which of the five water quality components *(fish, invertebrates, macrophytes, clarity, and river channel condition),* with recreational safety excluded to prevent overlap) are impacted and improved by the NbS Portfolio, if any. Each water quality component has 1/5th of the total water quality band improvement value. Multiplied by the length of each water body (kms), and the value each water body holds (£/km), this results in a total water quality improvement benefit.
        - *Science input: Load reductions for Phosphorus (kg/year), Nitrogen (kg/year).*

- Carbon sequestration: NbS capture significant amounts of carbon (tonnes/ha/year or carbon credits/year), which can be monetised and sold on the voluntary carbon markets under the UK Woodland Carbon Code and Peatland Code (£/credit/year); or can be economically quantified using the social cost of carbon (£/tonne/year).
    - *Science input: Net Carbon sequestration (tCo2/year) per NbS.*
- Air quality improvement: The analysis compares habitat types under baseline and NbS, with attached Air Pollution removal rates (tonnes/ha/year for PM2.5, SO2, NO2, O3), and avoided health damages linked to the removal of pollutants (£/tonnes/year).
    - *Science input: Description of land cover and surface areas (Hectares) under both BaU and NbS scenarios.*
- Flood management: The economic assessment used two methodologies for valuing flood reduction: 1) The avoided flood damage to property (using the Multi Coloured Manual's values) linked to reduced peak flow and flood depth; and 2) NbS act as natural flood storage mechanisms, with attached values in £/m3 representing avoided flood storage reservoir construction cost.
    - *Science input 1: Annualised avoided flood damage (£/year).*
    - *Science input 2: Additional flood storage per NbS (m3/year).*

- **Cultural services:**
    - Recreational value: NbS create recreational opportunities for surrounding populations, which can be monetised using the Outdoor Recreation Valuation (OrVAL) tool (£/year).
        - *Science input: Recreational value per study area (£/year).*
    - Physical health: Recreational sites provide "active visit" opportunities to local communities, with positive impacts on users' physical health (£/visit/year) (reduced economic pressure on public health system, derived from the number of active visits per year) as per the WINEP methodology.
        - *Science input: Number of visits per study area (visits/year).*
- **Supporting services:**
    - Biodiversity uplift: Through habitat restoration or creation (e.g. wetlands, grasslands), NbS can generate BNG units within DEFRA's statutory framework which can be sold to developers requiring credits to meet BNG obligations. Costs for producing a unit were provided by DWT (£28,000/unit), while prices were sourced from the 2026 Biodiversity Units UK Pricing Report ((Biodiversity Units UK, 2026) .
        - *Science input: Net Habitat Units per NbS (units/year), and type of Habitat.*
- **Benefits to the economy:**
    - Green job creation: The implementation and long-term maintenance of NbS creates job opportunities for local communities, which can be quantified using levels of effort and monetised using yearly indicative salaries. Of the total NbS implementation and maintenance costs (£96 million undiscounted), it was assumed that 25 per cent of those corresponded to human labour, which is a conservative assumption based on data previously observed as part of N4W's Warwickshire Avon Project, essentially creating 828 direct Full-Time Equivalent jobs. A multiplier of 0.9 to measure additional green jobs created was applied as per the Multiplier Effects Toolkit (HM Government, 2026) . A salary of £29,000/year was assumed for the monetisation
        - *Science input: NbS implementation and maintenance areas (Hectares/year).*

C3. Results scale-up

Step 1: Calculate costs and benefits for the study areas

The scientific and economic analysis was undertaken for four representative study areas across the Trent catchment. **For each study area**, total costs and benefits were calculated and then converted into **costs per hectare and benefits per hectare.** This created a standardised set of values that could be applied to other parts of the catchment with similar physical characteristics.

Step 2: Assign study areas to altitude zones

Each study area was assigned to an altitude zone based on its average elevation and landscape characteristics. These zones were used as proxies for broader catchment conditions and intervention suitability.

Table 25: Study Areas and their respective Altitude Zones

Study Area	Area (ha)	Altitude Zone
Trent from Dove to Derwent	17,049	85–194 m
Trent from Carlton-on-Trent to Laughton Drain	18,085	10–32 m
Trent from Tittensor to River Sow	9,352	-10–32 m
Derwent from Westend to Wye	16,994	195–635 m

Step 3: Classify the Entire Catchment by Altitude

The full Trent catchment was then divided into the same altitude zones using a Digital Terrain Model (DTM), as illustrated in Figure 19 below. Each altitude band represents areas with broadly similar topographic conditions to the corresponding study area.

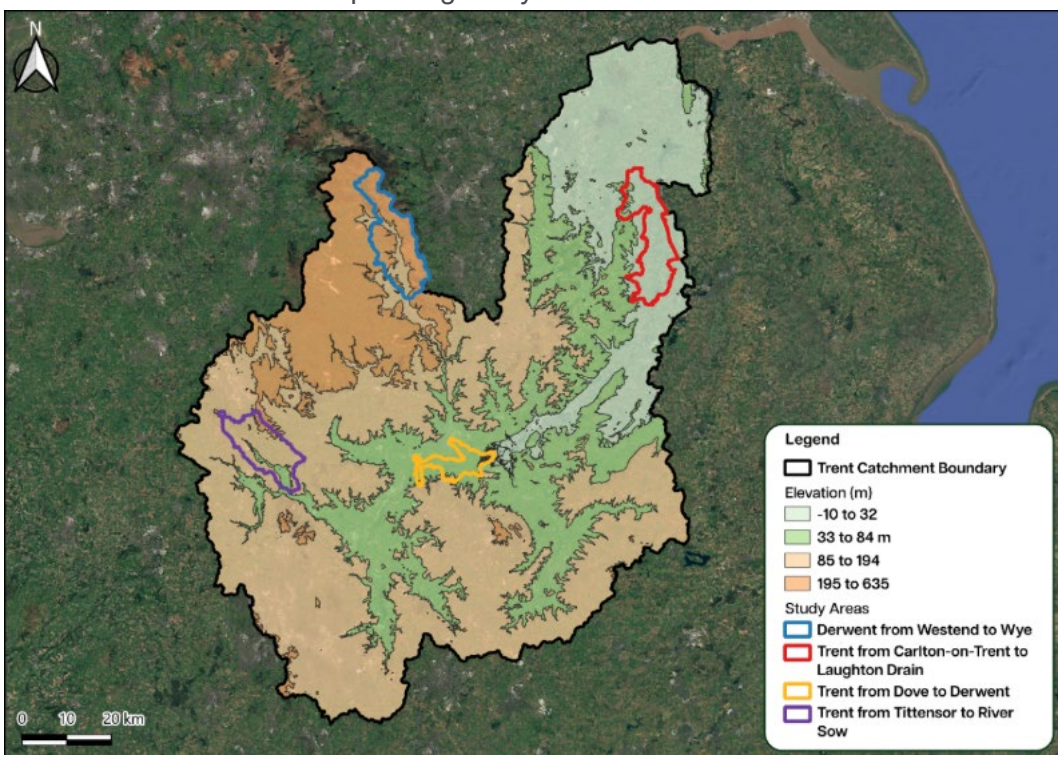


Figure 19: Full catchment area altitude zones

Step 4: Scale costs and benefits to the catchment

The cost per hectare and benefit per hectare values derived from each study area were applied to the corresponding altitude band across the wider catchment. This allowed the study area results to be extrapolated to all areas with similar topographic characteristics.

The scaled results for each altitude band were then aggregated to estimate the total **Programme costs and total Programme benefits for the entire catchment area**. This approach provides a practical method for estimating catchment-scale outcomes while ensuring that differences in landscape characteristics across the catchment are reflected in the analysis.

C4. Science inputs used for economic modelling

Figure 20 provides a summary of the modelled ecosystem services for each study area[9].

Outputs	Derwent fro Westend to V	Trent from Carlton-on-Tre Laughton Drain	Trent from Do Derwent	Trent from Titt to River So
Catchment Area (ha)	20,047	19,163	7,030	15,317
NbS Intervention Area (ha)	2,459	4,613	1,855	2,600
Additional Flood Storage (m3)	749,988	174,747	78,788	436,845
Intervention Cost (£)	£10,094,626	£2,784,553	£1,052,830	£6,830,975
Net Water Quality - Nitrate (kg/yr)	-28,792	-42,971	-11,262	-59,094
Net Water Quality - Phosphorus (kg/yr)	-460	-180	-66	-405
Net Water Quality - Sediment (kg/yr)	-198,622	-75,643	-18,611	-147,872
Net Agricultural production (£/yr)	-£1,044,104	-£2,039,177	-£581,631	-£2,652,347
Net Biodiversity (HU)	14,473	8,736	1,339	5,784
Net Carbon Sequestration (tC02e/yr)	19,447	9,048	3,148	5,955
Net Additional Water Supply (£/yr)	53,534	1,972	5,251	9,421
Annualised Additional Water Supply (m3/yr)	£24,626	£907	£2,415	£4,334
Recreation - Additional Visits (vists/yr)	682,842	301,839	78,714	410,502
Recreation - Additional Wellfare Value (£/yr)	£1,835,246	£446,558	£178,139	£1,005,538
Annualised Avoided Flood Damage (£/yr)	£2,432,432	£296,026	£4,827,412	£178,242

Figure 20: Ecosystem Services Summary

The below figures show ecosystem services provided in each study area and for each NbS.

Derwent from Westend to Wye

Threshold Score = 70	Buffer Strips	Floodplain Reconnection	Grip Blocking	Peat Manageme	Runoff Attenuation Feature	Soil Manageme	Tree Pla	Wet Woodlar	Total
Number of opportunities	212	89	553	100	753	5	796	54	2,562
Area (m2)	1,950,000	890,000	884,800	3,125,000	1,882,500	243,750	13,956,250	1,656,250	24,588,550
Area (ha)	195.0	89.0	88.5	312.5	188.3	24.4	1,395.6	165.6	2,458.9
Additional flood storage (m3)	2,944	89,000	221,200	9,375	376,500	441	23,123	27,406	749,988
Baseline carbon sequestration (tC02e/yr)	889	296	-6,580	-3,036	1,219	37	19,810	3,913	16,549
Potential carbon sequestration (tC02e/yr)	1,294	310	-6,367	-2,812	1,302	67	37,114	5,088	35,996
Net carbon sequestration (tC02e/yr)	405	15	213	224	82	30	17,304	1,175	19,447
Baseline habitat units (HU)	10,564	4,734	39,913	7,583	39,406	197	40,805	2,680	145,880
Potential habitat units (HU)	10,962	5,311	40,661	10,041	39,712	197	49,622	3,847	160,354
Net habitat units (HU)	399	578	748	2,459	306	0	8,818	1,167	14,473

Figure 21: Derwent from Westend to Wye Ecosystem Services

Trent from Tittensor to River Sow

Threshold Score = 70	Buffer Strips	Floodplain Reconnection	Grip Blocking	Peat Manageme	Runoff Attenuation Feature	Soil Manageme	Tree Pla	Wet Woodlar	Total
Number of opportunities	957	129	0	0	524	254	74	9	1,947
Area (m2)	8,946,875	1,290,000	0	0	1,310,000	12,696,875	1,550,000	209,375	26,003,125
Area (ha)	894.7	129.0	0.0	0.0	131.0	1,269.7	155.0	20.9	2,600.3
Additional flood storage (m3)	14,384	129,000	0	0	262,000	25,370	2,513	3,578	436,845
Baseline carbon sequestration (tC02e/yr)	1,576	282	0	0	1,212	-374	2,312	332	5,340
Potential carbon sequestration (tC02e/yr)	3,803	327	0	0	1,255	1,179	4,194	538	11,295
Net carbon sequestration (tC02e/yr)	2,227	45	0	0	43	1,553	1,882	205	5,955
Baseline habitat units (HU)	38,083	5,768	0	0	20,899	5,269	3,998	456	74,473
Potential habitat units (HU)	41,339	6,780	0	0	21,373	5,269	4,902	594	80,257
Net habitat units (HU)	3,256	1,012	0	0	474	0	904	138	5,784

Figure 22: Trent from Tittensor to River Sow Ecosystem Services

Trent from Carlton-on-Trent to Laughton Drain

Threshold Score = 70	Buffer Strips	Floodplain Reconnection	Grip Blocking	Peat Manageme	Runoff Attenuation Feature	Soil Manageme	Tree Pla	Wet Woodlar	Total
Number of opportunities	1,357	46	0	0	42	634	2	84	2,165
Area (m2)	12,703,125	460,000	0	0	105,000	31,700,000	62,500	1,096,875	46,127,500
Area (ha)	1,270.3	46.0	0.0	0.0	10.5	3,170.0	6.3	109.7	4,612.8
Additional flood storage (m3)	24,816	46,000	0	0	21,000	63,400	31	19,500	174,747
Baseline carbon sequestration (tC02e/yr)	-1,739	76	0	0	51	-1,055	61	797	-1,808
Potential carbon sequestration (tC02e/yr)	2,017	96	0	0	57	2,822	104	2,146	7,241
Net carbon sequestration (tC02e/yr)	3,755	20	0	0	5	3,877	42	1,348	9,048
Baseline habitat units (HU)	35,805	1,742	0	0	1,535	10,728	116	2,988	52,913
Potential habitat units (HU)	43,154	2,153	0	0	1,579	10,728	152	3,884	61,649
Net habitat units (HU)	7,349	411	0	0	44	0	36	896	8,736

Figure 23: Trent from Carlton-on-Trent to Laughton Drain Ecosystem Services

Trent from Dove to Derwent

Threshold Score = 70	Buffer Strips	Floodplain Reconnection	Grip Blocking	Peat Manageme	Runoff Attenuation Feature	Soil Manageme	Tree Pla	Wet Woodlar	Total
Number of opportunities	278	20	0	0	34	305	14	31	682
Area (m2)	2,590,625	200,000	0	0	85,000	15,246,875	71,875	356,250	18,550,625
Area (ha)	259.1	20.0	0.0	0.0	8.5	1,524.7	7.2	35.6	1,855.1
Additional flood storage (m3)	4,814	20,000	0	0	17,000	30,470	120	6,383	78,788
Baseline carbon sequestration (tC02e/yr)	-100	39	0	0	66	-402	4	232	-162
Potential carbon sequestration (tC02e/yr)	628	47	0	0	69	1,462	82	697	2,985
Net carbon sequestration (tC02e/yr)	728	8	0	0	3	1,865	79	465	3,148
Baseline habitat units (HU)	11,604	925	0	0	1,106	7,833	944	1,520	23,931
Potential habitat units (HU)	12,466	1,077	0	0	1,147	7,833	976	1,772	25,270
Net habitat units (HU)	862	152	0	0	41	0	32	252	1,339

Figure 24: Trent from Dove to Derwent Ecosystem Services

Column1	Nitrate (kg/yr)	Phosphorus (kg/yr)	Sediment (kg/yr)	Ammonia (kg/yr)	Methane (kg/yr)	Nitrous Oxide (kg/yr)	Pesticides (units/yr)	FIOs	Soil Carbon	Energy Use	Production
Baseline	192,719	1,875	739,863	86,501	1,071,867	21,055	3	1,299,827	1,782,173	2,163,085	£7,690,248
Post-intervention	163,927	1,414	541,242	76,035	928,796	17,297	2	1,045,884	2,307,009	1,875,260	£6,646,145
Change	-28,792	-460	-198,622	-10,465	-143,071	-3,758	-1	-253,942	524,836	-287,826	-£1,044,104
Change (%)	-14.9%	-24.6%	-26.8%	-12.1%	-13.3%	-17.8%	-30.7%	-19.5%	29.4%	-13.3%	-13.6%

Figure 25: Water Quality Metrics - Derwent from Westend to Wye

Column1	Nitrate (kg/yr)	Phosphorus (kg/yr)	Sediment (kg/yr)	Ammonia (kg/yr)	Methane (kg/yr)	Nitrous Oxide (kg/yr)	Pesticides (units/yr)	FIOs	Soil Carbon	Energy Use	Production
Baseline	341,253	1,005	351,610	137,331	624,440	45,843	976	47,626	2,011,182	6,994,833	£19,276,974
Post-intervention	298,281	825	275,967	118,957	570,558	39,153	744	36,293	2,022,344	6,355,300	£17,237,798
Change	-42,971	-180	-75,643	-18,374	-53,881	-6,689	-232	-11,333	11,162	-639,533	-£2,039,177
Change (%)	-12.6%	-17.9%	-21.5%	-13.4%	-8.6%	-14.6%	-23.8%	-23.8%	0.6%	-9.1%	-10.6%

Figure 26: Water Quality Metrics - Trent from Carlton-on-Trent to Laughton Drain

Column1	Nitrate (kg/yr)	Phosphorus (kg/yr)	Sediment (kg/yr)	Ammonia (kg/yr)	Methane (kg/yr)	Nitrous Oxide (kg/yr)	Pesticides (units/yr)	FIOs	Soil Carbon	Energy Use	Production
Baseline	112,061	343	93,379	64,096	448,683	18,138	218	43,076	611,087	2,283,653	£7,473,482
Post-intervention	100,799	277	74,767	58,006	413,738	15,897	173	32,414	712,935	2,141,290	£6,891,851
Change	-11,262	-66	-18,611	-6,089	-34,945	-2,241	-45	-10,662	101,848	-142,363	-£581,631
Change (%)	-10.1%	-19.3%	-19.9%	-9.5%	-7.8%	-12.4%	-20.7%	-24.8%	16.7%	-6.2%	-7.8%

Figure 27: Water Quality Metrics - Trent from Dove to Derwent

Column1	Nitrate (kg/yr)	Phosphorus (kg/yr)	Sediment (kg/yr)	Ammonia (kg/yr)	Methane (kg/yr)	Nitrous Oxide (kg/yr)	Pesticides (units/yr)	FIOs	Soil Carbon	Energy Use	Production
Baseline	449,389	1,619	602,701	262,943	2,359,002	68,026	318	243,945	1,584,459	6,931,212	£27,271,794
Post-intervention	390,295	1,215	454,828	233,245	2,138,057	57,290	230	176,847	1,799,973	6,368,940	£24,619,448
Change	-59,094	-405	-147,872	-29,698	-220,945	-10,736	-88	-67,099	215,513	-562,273	-£2,652,347
Change (%)	-13.1%	-25.0%	-24.5%	-11.3%	-9.4%	-15.8%	-27.8%	-27.5%	13.6%	-8.1%	-9.7%

Figure 28: Water Quality Metrics - Trent from Tittensor to River Sow

Annex H. Funding Mechanisms

Table 26: Definition of Funding Mechanisms

Funding Mechanism	Definition
National public funding	Direct fiscal allocations from the central treasury to government departments (such as DEFRA or the Environment Agency) to deliver statutory environmental obligations, national resilience infrastructure, and public policy objectives.
Public grants (DEFRA, Natural England, EA)	Non-repayable funds awarded by state agencies to support specific environmental outcomes like habitat creation or flood risk reduction.
DEFRA subsidies (Environmental Land Management Schemes)	A 'public money for public goods' framework where land managers receive ongoing payments for adopting practices that improve air and water quality, enhance biodiversity, or mitigate climate change.
Bilateral payments for ecosystem services (PES) contracts	A direct commercial agreement where a 'buyer' (eg a water utility) pays a 'seller' (eg a farmer) to manage land in a way that guarantees a specific environmental benefit.
Biodiversity Net Gain market	A regulatory requirement for developers to purchase 'biodiversity units' from restoration projects to ensure a mandatory 10 per cent increase in habitat value relative to their development site.
Water company investments	Capital expenditures where utilities invest in catchment-based 'upstream' solutions to reduce long-term operational costs, improve raw water quality, and meet environmental permit requirements.
Repayable capital (eg Green Banks/Green Lending, Impact investing)	Financial investments made into environmental projects with the expectation of a specific financial return alongside a measurable, positive ecological impact.
Nutrient neutrality markets	A compliance mechanism where developers buy offsets from land managers who have reduced nutrient runoff (nitrates/phosphates) to ensure new housing does not degrade protected water authorites.
Voluntary carbon market	A platform where private organisations or individuals purchase independently verified carbon credits, generated by projects that sequester or avoid CO_2, to meet internal ‘net zero’ or sustainability targets.
Lotteries (eg National Lottery Heritage Fund)	Grant funding derived from a percentage of lottery ticket sales, distributed to projects that preserve, restore and engage people with the natural landscape.
NGO programme funding	Capital deployed by non-profit organisations from their own reserves or specific fundraising campaigns to implement direct conservation actions on the ground.
Local government grants (eg Councils, Combined Authorities)	Funding allocated by regional authorities to support local environmental resilience, social well-being and community infrastructure.
Economic outputs (incl. recovered materials and reduced costs)	Revenue generated directly by the project, such as the sale of sustainably harvested timber and biomass, mineral extraction, or the internal 'avoided cost' of future flood damage.
Green or Sustainability Bonds (eg Green Gilts)	Fixed-income financial instruments issued by governments or corporations specifically to raise capital for projects with verified environmental benefits, requiring the issuer to provide transparent reporting on the 'use of proceeds' and ecological impact.

Other compensation for planned environmental damage (eg District Level Licensing)	A strategic payment system where developers pay into a central fund for regional habitat creation (eg for Great Crested Newts) rather than managing mitigation on a site-by-site basis.
Foundations and charitable trusts	Grant-funding provided by private entities or family offices that distribute wealth to projects aligned with their specific environmental or social mission.
Corporate sustainability (CSR/ESG, water stewardship commitments)	Funding derived from a firm's operational budget to mitigate supply chain risks or fulfil public commitments to Environmental, Social, and Governance (ESG) performance.
Challenge funds and innovation grants	Time-limited, competitive funding rounds designed to de-risk the testing of new technologies or novel approaches to environmental restoration.
Taxes and fees from tourism sector (eg entrance fees)	A 'user pays' model where levies on visitors, parking, or tour operators are ring-fenced to fund the ongoing maintenance and restoration of the local ecosystem.
Individual/private philanthropic donations	Capital gifted by high-net-worth individuals to support projects that align with their personal values or conservation interests.
Water use associations	Collective management entities composed of local stakeholders who pool financial resources and coordinate activities to protect the health, quantity and reliability of a shared water catchment for mutual benefit.
Corporate philanthropy or donations	Discretionary capital grants provided by businesses to environmental projects, typically driven by brand reputation, community engagement, or altruism, rather than as a direct offset for their operational footprint or regulatory compliance.
Community contributions (cash or in-kind)	Localised support through small-scale crowdfunding or 'in-kind' contributions such as volunteer labour, local knowledge and the use of communal equipment.
Conservation tax credits	Government-authorised tax deductions or credits granted to landowners who encumber their property with permanent conservation easements or habitat protections.
Social and development impact bonds	Outcome-based financing mechanisms in which investors provide upfront capital and are repaid based on the achievement of agreed social or environmental outcomes.
Multilateral development banks	Long-term loans from international financial institutions that provide technical assistance for large-scale sustainable development projects.
Crowdfunding and digital finance	The use of online platforms to aggregate small financial contributions from a large number of individuals to fund specific, tangible environmental milestones.
Bilateral donors and aid agencies	Direct financial transfers from one nation's government to another, specifically earmarked for conservation or climate adaptation projects that meet international development goals.
Debt-for-nature swaps	Official government agencies from one country that provide funding to another for environmental protection and developmental assistance.

Annex I. Detailed Science Modelling Approach

F1. Purpose and Scope of Scientific Modelling

Derbyshire Wildlife Trust (DWT) undertook scientific modelling to estimate the expected change in ecosystem service provision under a strategic scenario for re-naturalising the Trent catchment. The modelling provided the biophysical evidence base for the Financial and Economic Analysis presented in the Business Case.

The assessment compared two scenarios: a baseline representing the landscape and hydrological context at the time of modelling in 2025/26, and a nature-based solution (NbS) restoration scenario representing the full implementation of the selected NbS intervention portfolio. The scientific models did not simulate the annual phasing of delivery, year-to-year climatic variability or the time required for habitats and ecosystem services to mature. The selection of the four representative study areas and the method used by Pegasys to extrapolate study-area costs and benefits across the wider Trent catchment are described in Annex C.

F2. Overview of the Modelling Framework

The modelling was undertaken through five stages:

- Define the spatial study-area boundaries and, for flood-risk analysis, the downstream areas with a plausible hydrological relationship to the modelled intervention scenario.
- Design the NbS scenario using the NatureInsight NFM opportunity mapping tool and undertake hydrological modelling within SCALGO.
- Prepare and analyse spatial data in QGIS, including baseline habitat, agricultural land use, watercourses, flood risk, access and national receptor datasets.
- Calculate individual ecosystem services baseline provision and estimate NbS scenario uplift.
- Aggregation and integration into the Economic Analysis.

Table 28: Primary modelling tools and their role within Rivers 2040

Tool or method	Primary role within Rivers 2040
NatureInsight, developed by Arup and SCALGO	NbS opportunity mapping; intervention-specific area and storage assumptions; implementation costs; habitat-unit and annual carbon-balance calculations; and storm event hydrographs.
SCALGO Live geospatial and watershed tools	Terrain-based watershed delineation, flow-path and contributing-area analysis, sub-watershed definition and additional interrogation of hydrological connectivity undertaken alongside the NatureInsight assessment.
QGIS	Geospatial data preparation and analysis.
FarmScoper	Estimation of changes in diffuse agricultural pollution, including nitrate, phosphorus and sediment, and provision of supporting inputs to the agricultural assessment. Estimation of change in gross profit of agricultural production.

Supplementary spreadsheet models	Bespoke ecosystem models were created within Excel for additional water supply and recharge, flood-risk valuation, recreation and public-health services.

F3. Definition of Spatial Study Areas and Downstream Beneficiary Areas

Scientific modelling was undertaken for the four representative case study sites identified in Annex C1.

SCALGO Live watershed and terrain-analysis tools were used to confirm hydrological connectivity and to delineate sub-watershed boundaries and contributing areas for each study site. A separate spatial boundary was required for flood-risk benefits valuation because an upstream intervention may affect receptors beyond the Water Body in which it is located (SCALGO, n.d.).

For each study site we defined a downstream beneficiary area by following the principal flow pathway and associated floodplain to the next major confluence or another agreed downstream limit. The boundary extended to the next major confluence downstream limit selected to avoid including receptors without a plausible flood risk regulation relationship to the modelled intervention study site.

The beneficiary-area boundary was used only for the flood-risk assessment. Other ecosystem services were reported within the study-area boundary unless the relevant method required a different contributing area, such as the runoff area used in the additional water supply calculation.

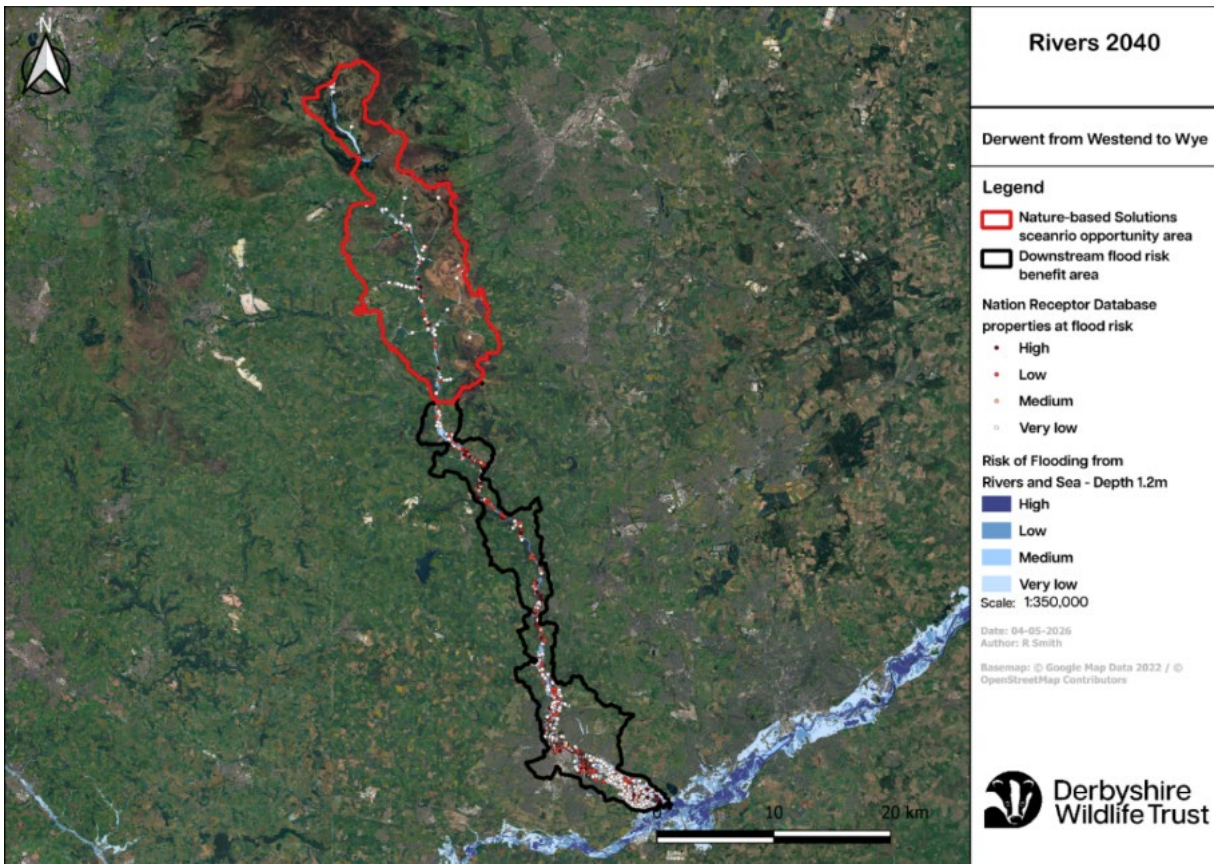


Figure 29: Example of downstream beneficiary area for one representative study area

F4. Nature-Based Solution Scenario Design

DWT and Pegasys agreed an NbS intervention portfolio responding to the principal water, biodiversity and climate challenges of the Trent catchment. The final portfolio comprised buffer strips, floodplain reconnection, grip blocking, peat management, runoff attenuation features (RAFs), soil management, tree planting and wet woodland. The inclusion rationale and combined implementation area for each intervention are presented in Table 2 of the main report.

Table 29: Interpretation of the modelled NbS interventions

Modelled intervention	Interpretation within the strategic scenario
Buffer strips	Permanent or semi-permanent vegetated margins adjacent to watercourses or field runoff pathways, intended to slow runoff, intercept sediment and nutrients and improve habitat connectivity.
Floodplain reconnection	Restoration of functional connection between a watercourse and its floodplain, including the broad effects of bank lowering, embankment set-back or breaching, floodplain excavation and wetland or washland creation.
Grip blocking	Blocking or interruption of artificial drainage grips in upland peat or moorland to retain water, slow runoff and support recovery of peatland hydrology and habitat.
Peat management	Restoration or improved management of degraded peatland to retain water, reduce erosion and net greenhouse-gas emissions and improve peatland habitat condition.
Runoff attenuation features	Small storage or flow-interception features, such as earth bunds, scrapes, offline ponds or constructed wetland-type features, located on runoff pathways.
Soil management	Changes in agricultural practice intended to improve soil cover, structure, organic matter and infiltration, including cover crops, reduced tillage and contour-based runoff management.
Tree planting	Woodland and tree establishment, including riparian planting, in-field trees and wider woodland creation where mapped evidence indicates relative suitability.
Wet woodland	Woodland creation or restoration in locations subject to intermittent or regular flooding or other floodplain influence.

NatureInsight was used for the principal NbS intervention opportunity-mapping for the study sites. It divides the UK a consistent grid of 250 m by 250 m cells, equivalent to 6.25 ha per cell. For each cell, the tool summarises nationally available spatial evidence and applies intervention-specific lookup scores, weightings, and constraints to produce a suitability score out of 100 (Arup and SCALGO, 2024).

The multi-criteria assessment includes baseline land cover, Agricultural Land Classification, slope, runoff-pathway characteristics, floodplain and surface-water flood information, soil texture, peat and priority-habitat information, wind exposure for tree planting, indicative cost, maintenance requirements, intervention life, and the potential contribution of each intervention to a range of ecosystem services. The score is not derived solely from a weighted average. NatureInsight also

applies hard constraints and intervention-specific rules, including restrictions based on land cover, wind exposure and upstream drainage area. Other combinations of evidence can increase a score, such as the interaction between soil texture and slope for soil management. A higher suitability score indicates that a particular NbS intervention is more favourable for that cell (Arup and SCALGO, 2024).

A suitable 6.25 ha grid cell is not treated as though the selected NbS intervention would be implemented across the whole cell. NatureInsight applies fixed feature assumptions for discrete interventions and land-cover-dependent proportional coverage assumptions. This converts opportunity area into an estimated physical footprint and prevents the model from assuming complete land-use conversion where only a smaller feature or partial change is intended. The modelling did not assume where this NbS implementation area was spatially specific within the grid cell (Arup and SCALGO, 2024).

For Rivers 2040, we applied a project-specific suitability threshold of 70 out of 100 and default weighting. Opportunities scoring 70 or above were retained for scenario development. The threshold was selected to focus the assessment on relatively high-ranking opportunities while retaining sufficient coverage to construct a strategically meaningful restoration scenario.

Table 29 summarises the principal NatureInsight whitepaper assumptions for the eight NbS interventions selected (Arup and SCALGO, 2024).

Table 30: Published NatureInsight area and storage assumptions relevant to the Rivers 2040 intervention portfolio

Intervention	NatureInsight whitepaper assumption at 250 m grid-cell scale	Rivers 2040 application
Buffer strips	Land-cover-dependent coverage. Typically 5-15 per cent of a cell (3,125-9,375 m²) where the baseline land cover is eligible. Effective soil-storage depth also varies by baseline land cover.	Confirm whether the NatureInsight default coverage and storage assumptions were retained.
Floodplain reconnection	One feature per cell; approximately 1 ha of land take; 100-200 m of river affected depending on floodplain width; approximately 1,000 m³ storage.	Confirm feature count, land take and storage used.
Grip blocking	Sixteen peat or timber dams per cell; approximately 400 m³ total storage, based on 25 m³ per location.	Confirm number, spacing and storage used.
Peat management	50 per cent of the cell, equivalent to 3.125 ha, converted from degraded to improved peat; approximately 93.75 m³ additional effective storage based on 3 mm.	Confirm that peat opportunity and condition evidence supported use of this default.
Runoff attenuation feature	One feature per cell; 50 m by 50 m footprint (2,500 m²); average depth 0.2 m; approximately 500 m³ storage.	Confirm footprint, depth and storage used.
Soil management	Land-cover-dependent coverage. The published defaults range from 20 per cent	Confirm the coverage applied to arable,

	to 80 per cent of a cell (12,500-50,000 m²) where eligible, with effective storage varying by baseline land cover.	pasture and other eligible land.
Tree planting	Land-cover-dependent coverage, density and cost. Published coverage ranges from 5 per cent to 50 per cent of a cell (3,125-31,250 m²), depending on existing land cover.	Confirm coverage, planting density and storage assumptions used.
Wet woodland	Uses land-cover-dependent tree-planting coverage and density assumptions. NatureInsight also allocates a proportion of RAF-type storage according to the percentage coverage of wet woodland within the cell.	Confirm coverage, planting density and storage assumptions used.

The final scenario represented approximately 11,518 ha of intervention across the four study areas, equivalent to an average of approximately 20 per cent of their combined land area.

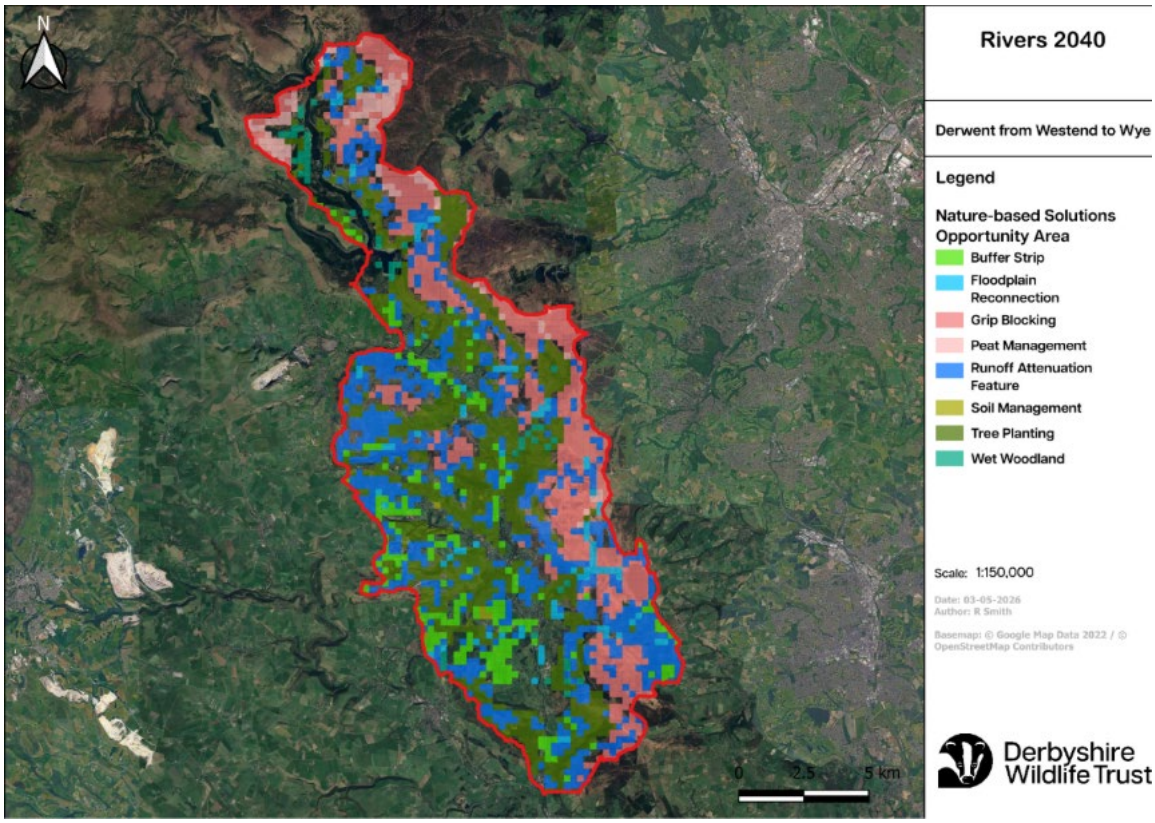


Figure 30: Example NatureInsight opportunity map showing retained opportunities, suitability scores and the intervention-selection rule for one representative study are

F5. Geospatial Data Preparation and Spatial Analysis

NatureInsight outputs were exported and processed in QGIS, alongside land use, habitat, metrological, national receptor, surface water, local planning authority, and public access datasets, to create the spatial inputs required by the individual ecosystem service models. All layers used for area

calculations were managed in British National Grid (EPSG:27700) (Natural England, 2025; Rural Payments Agency, 2024; Environment Agency, n.d.-a, n.d.-b).

The principal geospatial processing steps were:

- Import the NatureInsight NbS opportunity grid and clip it to the relevant study-area boundaries. Grid cells for which less than 50 per cent of the total cell area fell within the study-area boundary were excluded from further assessment.
- Spatially intersect each retained NbS grid cell with the additional datasets required for the modelling. For each cell, relevant attributes and area were derived from the overlapping intersection of layers.
- Create service-specific spatial datasets, including watercourse buffers, public-rights-of-way buffers, National Receptor Dataset flood risk intersections, and contributing areas used in the additional water-supply calculations.
- Reclassify source habitat and land-cover categories into the common analytical classes required by the biodiversity, carbon, air-quality, recreation and agricultural assessment methods.
- Derive the baseline and post-intervention habitat and land-use composition for each retained grid cell and calculate the area transitioning between baseline classes and the habitat or land-use class associated with the selected NbS intervention.
- Export the processed spatial attributes and calculated areas in CSV format for use as inputs to the individual ecosystem-service models.

Table 31: Principal spatial datasets

Datasets	Use within NatureInsight and Geospatial modelling
NatureInsight opportunity and output data	Intervention suitability; selected opportunity cells; published footprint and storage assumptions; indicative implementation cost; annual carbon balance; and habitat-unit outputs.
LiDAR and SCALGO terrain/flow data	Flow pathways, flow accumulation, slope, watershed and contributing-area delineation and hydrological connectivity.
Corine Land Cover 2018	NatureInsight baseline land-cover assessment, intervention coverage assumptions and annual carbon-balance calculations.
Living England Habitat Map Phase 4	NatureInsight baseline habitat-unit calculation and DWT habitat, recreation and land-cover processing.
CROME	Interpretation of agricultural land use and arable or grassland extent within supplementary modelling.
Agricultural Land Classification	NatureInsight opportunity scoring and supplementary interpretation of productive agricultural quality.
Soil texture, European Soils/HOST_OPEN, peat and priority-habitat data	Soil-management opportunity; peat opportunity; and NatureInsight rainfall-runoff assumptions.

PXR and SAAR/CEH-GEAR rainfall data	NatureInsight design rainfall and constant baseflow inputs.
Risk of Flooding from Rivers and the Sea	NatureInsight opportunity scoring and DWT flood exposure and beneficiary-area assessment.
National Receptor Dataset	Identification and classification of receptors within downstream flood-risk beneficiary areas.
Watercourse network	Buffer-strip analysis, watercourse adjacency and hydrological connectivity.
Public rights of way and access data	Identification of habitat change with a relationship to existing recreational access.

Several habitat and land-cover classification systems were used across the modelling workflow. Corine Land Cover 2018 classes were reclassified into the consolidated land-cover groups defined in the NatureInsight whitepaper to inform intervention-area, storage, cost and carbon assumptions. Living England Habitat Map Phase 4 classes were separately matched to Statutory Biodiversity Metric habitat categories, following the crosswalk presented in the whitepaper, and were then translated to the closest relevant UK Habitat Classification category or aggregated broad habitat group required by the Rivers 2040 models. Reclassification was based on the NatureInsight whitepaper and The Natural Capital Register and Account Tool Technical Report v1.2 (2023) (Arup and SCALGO, 2024; European Environment Agency, 2020; Natural England, 2025; Lenane et al., 2023).

Table 32: Habitat and Land-cover reclassification key

Living England habitat map category	UKHab category	UKNEA category
Arable and horticultural	Cropland - cereal crops	Enclosed farmland
Improved grassland		Enclosed farmland
Bog	Wetland - blanket bog	Freshwaters - open waters, wetlands and floodplains
Fen, marsh and swamp		Freshwaters - open waters, wetlands and floodplains
Water	Lakes - temporary lakes ponds and pools (H3170)	Freshwaters - open waters, wetlands and floodplains
Dwarf shrub heath	Heathland and shrub - Upland heathland	Mountains, moorlands and heaths
Acid, calcareous, neutral grassland		Semi-natural grasslands
Bracken	Grassland - bracken	Semi-natural grasslands
Unclassified	Unclassified	Unclassified
Bare ground	Urban - bare ground	Urban
Built-up areas and gardens	Urban - vegetated garden	Urban
Broadleaved, mixed and yew woodland	Woodland and forest - lowland mixed deciduous woodland	Woodlands

F6. Ecosystem Service Modelling

Ecosystem services were assessed by comparing the baseline scenario with the fully implemented NbS scenario. For each service, the net change was calculated as the modelled NbS output minus the baseline output displaced or altered by the intervention.

F6.1 Biodiversity

Metric

Biodiversity Net Gain=NbS scenario habitat units (HU)−Baseline habitat units (HU)*Biodiversity Net Gain=NbS scenario habitat units HU−Baseline habitat units (HU)*

Method

NatureInsight calculated the proportion of each Living England Habitat Map class intersection within each grid cell. Each mapped class was matched to an associated habitat category in the Statutory Biodiversity Metric and assigned the corresponding distinctiveness score and a condition category using the assumptions set out in the NatureInsight whitepaper. Baseline habitat units for each study site were calculated as mapped habitat area multiplied by the distinctiveness score and condition score (Arup and SCALGO, 2024; Defra, 2024).

For the NbS scenario, NatureInsight assigned each quantified intervention an assumed proposed habitat type, distinctiveness score and condition category. The baseline habitat units associated with the modelled intervention footprint were removed proportionately and replaced with the proposed habitat units for that intervention. Biodiversity uplift was calculated as the net-gain difference between baseline habitat unit value and NbS scenario unit value (Arup and SCALGO, 2024).

F6.2 Climate Regulation

Metric

Net change in annual greenhouse gas balance=*Net change in annual greenhouse gas balance=*

baseline annual carbon balance ($tCO_2e\ y^{-1}$)−NbS annual carbon balance ($tCO_2e\ y^{-1}$)*baseline annual carbon balance tCO2e y−1−NbS annual carbon balance tCO2e y−1*

Method

NatureInsight calculated the proportional coverage of Corine Land Cover 2018 classes intersection within each grid cell and applied annual emissions or sequestration factors to estimate the baseline annual carbon balance. The factors compiled in the NatureInsight whitepaper were derived principally from Natural England's Carbon storage and sequestration by habitat: a review of the evidence (Gregg, et al., 2021) and Woodland Carbon Code sequestration guidance, supplemented by the habitat-specific literature (Arup and SCALGO, 2024; Woodland Carbon Code, 2024).

For the NbS scenario, the baseline carbon value associated with the intervention footprint was removed proportionately and replaced with the applicable intervention-specific annual carbon value. The Net change in annual greenhouse gas balance difference between the baseline and NbS scenarios is reported in tonnes of carbon dioxide equivalent per year.

F6.3 Water Quality

Metric

Annual pollutant load reduction=*Annual pollutant load reduction=*

baseline annual pollutant load (kg y−1)−NbS annual pollutant load (kg y−1)*baseline annual pollutant load kg y−1−NbS annual pollutant load (kg y−1)*

Method

Water quality was assessed within FarmScoper, a farm decision-support model that estimates annual nitrate, phosphorus and sediment losses by combining the configured crop and livestock system with soil, climate and management characteristics and applying pollutant-loss coefficients from its underlying models.

For each study site, a representative farm system was configured using a FarmScoper Farm template matching the most common regional farm type. Baseline agricultural land use was characterised in GIS using the Crop Map of England (CROME). CROME parcel classifications were used to identify mapped crop types and calculate the area of arable crops and agricultural grassland within each study area. Where detailed crop rotations could not be represented consistently, arable land was modelled using winter wheat as the common crop proxy. Livestock inputs for each study site were estimated by applying a average regional stocking density for cattle and sheep per hectare to permeant and rotational grassland within the study site. Average regional stocking densities derived from Defra datasets for 'Structure of the Agricultural Industry in England and the UK at June' (Defra, 2025) and applied to the area of agricultural grassland mapped within each associated local authority within each study site (ADAS, 2021; Rural Payments Agency, 2024; Defra, 2025).

A baseline scenario was modelled in FarmScoper to estimate annual nitrate, phosphorus and sediment losses associated with existing agricultural land use and management. Under the NbS scenario, agricultural land converted to woodland, wetland or semi-natural grassland was assumed to cease agricultural land-use and was therefore removed from the relevant crop or grassland area within the model. Livestock numbers were reduced in proportion to the productive grassland area removed. Soil management was treated as a change in practice that retained agricultural production (ADAS, 2021).

The FarmScoper mitigation measures applied to the remaining agricultural area were selected with technical input from Arup. The principal assumptions are summarised in Table 33. The calculation was completed separately for nitrate, phosphorus and sediment. The net reduction for each individual pollutant-load was calculated as the difference between baseline and NbS scenario value. Economic value (£) for each individual pollutant-load was calculated within the economic analysis and aggregated together to provide a total annual value of water quality benefits for each study site.

Table 33: FarmScoper representation of water-quality interventions

NbS intervention	FarmScoper representation and assumption
Buffer strips	Represented through the applicable buffer-strip mitigation measure.
Soil management	Represented through cover-crop management. The land remained in production, with FarmScoper mitigation factors applied to reduce nutrient and sediment losses.
Other NbS interventions	Reduction in pollutant-load represented through change in agricultural land-area and associated reduction in livestock for grazing land. No additional FarmScoper mitigation effect was assigned.

F6.4 Air Quality

Metric

Net additional annual pollutant removal = *Net additional annual pollutant removal =*

NbS annual pollutant removal (tonnes y^{-1}) − Baseline annual pollutant removal (tonnes y^{-1}) *NbS annual pollutant removal tonnes y−1− Baseline annual pollutant removal (tonnes y−1)*

Method

Air-quality regulation was assessed using the Environment Agency's Natural Capital Register and Account Tool (NCRAT). Baseline and post-intervention habitat areas were grouped into UKNEA broad habitat type. For each scenario, the area of each habitat category was multiplied by the corresponding annual pollutant-removal coefficient to estimate the mass of $PM_{2.5}$, NO_2, SO_2 and O_3 removed from the atmosphere each year. The resulting physical metric was expressed as tonnes of pollutant removed per year. The net air-quality benefit was calculated separately for each pollutant as the estimated annual removal under the NbS scenario minus the estimated annual removal under the baseline scenario.

F6.5 Additional Water Supply and Recharge

Metric

Recharge Volume ($m^3 y^{-1}$) = Volume Capture ($m^3 y^{-1}$) − Evaporation ($m^3 y^{-1}$) *Recharge Volume m3y−1=Volume Capture m3y−1−Evaporation m3y−1*

Volume Capture ($m^3 y^{-1}$) = Min [Avalible supply, Storage potential] *Volume Capture m3y−1=Min [Avalible supply, Storage potential]*

Storage Potential ($m^3 y^{-1}$) = *Storage Potential m3y−1 =*

design storeage capcity (m^3) × Number of times filled to capcity (n y^{-1}) *design storeage capcity m3×Number of times filled to capcity (n y−1)*

Avalible supply (m^3y^{-1})=catchment area (m^2)×Runoff coefficient ×Annual Rainfall ($m\ y^{-1}$)*Avalible supply m3y−1=catchment area m2×Runoff coefficient ×Annual Rainfall (m y−1)*

Method

Additional water supply was assessed using the Capture and Infiltration Method (A-4) from the Volumetric Water Benefit Accounting framework. The method is intended for interventions that capture rainfall or surface runoff and promote infiltration, with increased recharge reported as the volumetric water benefit. The method assumes that water retained after evaporation and withdrawal losses infiltrates and contributes to groundwater recharge. For each relevant study area, the annual runoff available was estimated from the contributing catchment area, average annual rainfall and a weighted runoff coefficient value for NbS scenario land cover. Annual storage potential was calculated from the assumed design storage capacity and the estimated number of times that capacity would be filled during a typical year. The volume captured was taken as the lower of available supply and storage potential, ensuring that the calculation did not exceed either the runoff available from the contributing catchment or the capacity of the modelled interventions (Reig, Larson, Vionnet, & Bayart, 2019) .

Recharge under the NbS scenario was calculated by deducting evaporation losses from the captured volume. Withdrawal losses were not deducted from the captured volume because any water withdrawn from the modelled NbS interventions was assumed to constitute beneficial additional water supply within the scenario. As the A-4 method assumes baseline recharge is zero for a new rainwater-harvesting intervention, the estimated recharge volume was treated as the net uplift (Reig, Larson, Vionnet, & Bayart, 2019) .

F6.6 Flood Risk Regulation

Flood-risk regulation was assessed through three stages:

1. Additional flood-storage capacity for NbS interventions was calculated within NatureInsight;
2. Hydrological modelling within SCALGO+NatureInsight was undertaken to calculate changes in peak flow for a range of storm events;
3. Resulting NbS peak flows were used to estimate changes in the number of properties flooded and the associated annualised avoided flood damage.

Additional Flood Storage

Metric

Additional flood storage (m^3)=*Additional flood storage (m3)=*

NbS discrete feature (n)× feature specific additional flood storage ($m^3\ n^{-1}$)*NbS discrete feature n× feature specific additional flood storage (m3 n−1)*

Additional flood storage (m^3)=*Additional flood storage (m3)=*

NbS intervention area (m^2)× NbS specific additional flood storage ($m^3\ m^{-2}$)*NbS intervention area m2× NbS specific additional flood storage (m3 m−2)*

Method

NatureInsight calculated additional flood-storage capacity for each selected NbS intervention using intervention-specific assumptions applied within each 250 m × 250 m grid cell. For discrete-feature interventions, runoff attenuation features, floodplain reconnection, grip blocking, large woody debris and gully stuffing, storage was calculated from the modelled number of features per selected grid cell multiplied by the default storage volume per feature. For example, one runoff attenuation feature per selected grid cell × 500 m^3 per feature = 500 m^3 of additional flood storage per selected grid cell.

For land-use interventions, peat management, tree planting, buffer strips, soil management and wet woodland, NatureInsight estimated the intervention footprint within each selected grid cell from the baseline Corine land-cover class and multiplied this area by the applicable additional effective storage depth. Tree-planting storage was also adjusted for planting density, while wet woodland combined land-cover-dependent soil storage with a proportionate allocation of runoff-attenuation storage. Storage was then summed across all selected grid cells and interventions to calculate the total additional flood-storage capacity for each study area.

Hydrological Response

Metric

Peak flow reduction (m^3s^{-1}) = *Peak flow reduction m^3s^{-1} =*

baseline peak flow (m^3s^{-1}) − NbS peak flow (m^3s^{-1}) *baseline peak flow m^3s^{-1} − NbS peak flow m^3s^{-1}*

Method

Storm-event hydrographs were generated in NatureInsight for the downstream extent of each study site beneficiary area sub-watershed. NatureInsight represents the watershed response to a design rainfall event by estimating the volume of runoff generated across the sub-watershed and routing that runoff to the downstream outlet over time. The resulting hydrograph describes the change in flow through the event, including the timing and magnitude of the peak. Baseline hydrographs were generated for the 10-, 20-, 50-, 100-, 200- and 500-year events, from which peak flow and peak timing were extracted (Arup and SCALGO, 2024; SCALGO, n.d.).

For the NbS scenarios, the additional storage calculated in the first stage was entered into the Aggregate Storage Model and assigned to land-use, runoff or floodplain storage categories. For each category, the model applied the total storage volume, number of features, inflow threshold, proportion of upstream flow entering storage, storage height and outlet characteristics. Flow entering storage was removed from the baseline hydrograph and released back into the system as controlled outflow. The resulting NbS hydrographs were then compared with the baseline hydrographs to calculate changes in peak flow and peak timing (SCALGO, n.d.).

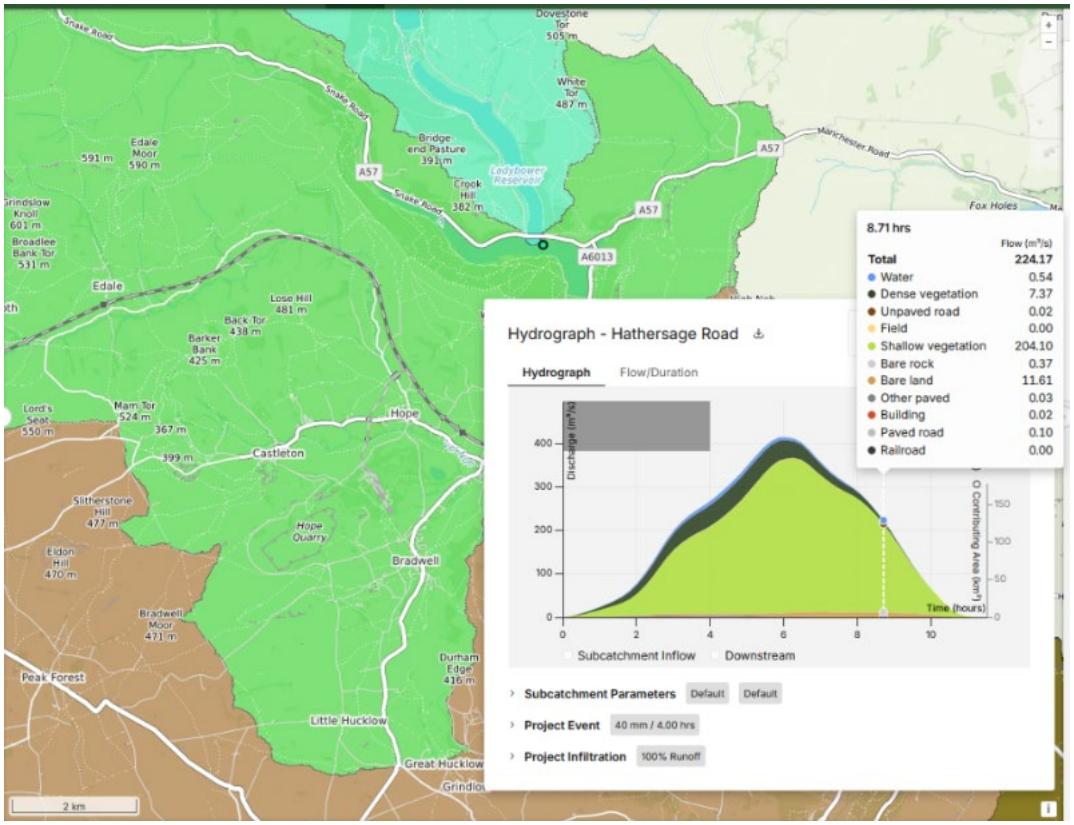


Figure 31: NatureInsight Hydrograph

Avoided Flood Damage

Metric

Annualised avoided flood damage (£ y^{-1})=*Annualised avoided flood damage £ y^{-1}=*

estimated annual damage under baseline scenario (£ y^{-1})−esimtaed annual damage under NbS scenario (£ y^{-1})*estimated annual damage under baseline scenario £ y^{-1}−esimtaed annual damage under NbS scenario £ y^{-1}*

Annual flood damage=sum of flood dmage across flood event probability bands × the difference in their annual exceedance probabilities*Annual flood damage=sum of flood dmage across flood event probability bands × the difference in their annual exceedance probabilities*

Method

The National Receptor Dataset for each downstream beneficiary area was intersected with Environment Agency flood-depth layers. Each property was categorised within applicable shallow, medium or deep flood-depth. Only residential and non-residential or commercial property records with an applicable Multi-Coloured Manual property classification were included in the damage calculation. Other receptor and asset classes were excluded because the model assessed direct property damage only and did not apply separate valuation methods for infrastructure, utilities, transport assets, agricultural land, or environmental receptors (Environment Agency, n.d.-a, n.d.-b; Flood Hazard Research Centre, n.d.).

Table 34: Properties treatment within avoided flood damage modelling

National Receptor Dataset grouping	Treatment in the model
Residential properties	Included and counted within the applicable flood-depth band.
Non-residential and commercial properties	Included where an applicable property classification and damage value were available.
Unclassified property records or records without an applicable damage classification	Excluded because a consistent damage value could not be assigned.
Transport, utility and other infrastructure receptors	Excluded from the property-damage calculation.
Agricultural land, environmental receptors and other non-property assets	Excluded from the property-damage calculation.

For each design flood event, baseline damage was calculated by multiplying the number of properties within each flood-depth band by the corresponding Multi-Coloured Manual damage value and summing the results across the included property classes and depth bands (Flood Hazard Research Centre, n.d).; (Penning-Rowsell, et al., 2014) :

Baseline event damage = *Baseline event damage =*

sum of properties within each depth band × associated damage per property value*sum of properties within each depth band × associated damage per property value*

The baseline peak flow generated by NatureInsight was paired with the corresponding property counts and baseline damage for the same flood event. The results from the modelled events defined a baseline response curve linking increasing peak flow to increasing property exposure within each depth band. The associated flood-damage curve was obtained by applying the depth-band damage values to those property counts.

For each flood event, the NbS peak flow was located on the baseline peak-flow–property-exposure curve. The model used linear interpolation between the two adjacent baseline peak-flow points that bracketed the NbS peak flow to estimate the number of properties flooded under the NbS scenario in each depth band. The estimated NbS property counts were multiplied by the same depth-band damage values to calculate damage under the NbS scenario. Avoided damage was calculated separately for each design flood event:

Avoided event damage = baseline event damage − NbS event damage*Avoided event damage = baseline event damage − NbS event damage*

Baseline and NbS event damages were then integrated across their annual exceedance probabilities to calculate expected annual damage under each scenario. Annualised avoided flood damage was calculated as baseline expected annual damage minus NbS expected annual damage and reported in pounds per year (Penning-Rowsell et al., 2013).

F6.7 Recreation and Public Health

Metric

Estimated annual visits=*Estimated annual visits=*

new or enhance habitat (m^2)×habitat specific annual visit coefficient (n m^{-2} y^{-1})*new or enhance habitat m2×habitat specific annual visit coefficient (n m−2 y−1)*

Annual recreation welfare value=annual visits (n y^{-1})× welfarevalue per visit (£ n^{-1})*Annual recreation welfare value=annual visits n y−1× welfarevalue per visit £ n−1*

Estimate annual active visits=*Estimate annual active visits=*

Estimated annual active visits (n y^{-1})×propotion of visists classified as physically active (0.515)*Estimated annual active visits n y−1×propotion of visists classified as physically active (0.515)*

Method

Recreation was assessed using a habitat-based application of the Outdoor Recreation Valuation Tool methodology and supporting datasets. ORVal estimates adult recreational day visits and associated welfare values using a national recreation-demand model based on Natural England's Monitor of Engagement with the Natural Environment survey and a spatial dataset describing accessible recreation sites, their habitat composition and surrounding population. The ORVal dataset distinguishes accessible parks, paths and beaches and represents path habitat within a 25 m buffer on either side of the route. This 50m-wide access corridor was applied to mapped public rights of way and other accessible routes within the Rivers 2040 spatial analysis.

Baseline habitats habitat areas were intersected with NbS intervention areas within the mapped access buffers and other accessible land, and only the overlapping habitat area was included in the recreation calculation. Habitat-specific annual visit coefficients were derived from the ORVal-based recreation evidence collated in the ENCA Services Databook version 3.3 (Defra, 2026). For each habitat category, the annual recreation welfare value per hectare was divided by the applicable welfare value per visit to derive an estimated number of visits per hectare per year. The resulting coefficients were converted to visits per square metre per year and multiplied by the accessible area of each new or enhanced habitat. The results were summed across habitat categories to estimate total annual visits for each study area (Defra, 2026).

Annual recreation welfare value was calculated by multiplying the estimated annual visits by the ENCA welfare value per visit. This represents the welfare or consumer-surplus value received by visitors, derived from the ORVal travel-cost methodology, rather than expenditure within the local economy (Day and Smith, 2018b; Defra, 2026).

Public-health activity was calculated using the NCRAT assumption that 51.5 per cent of recreational visits are physically active, based on White et al. (2016). Estimated active visits were therefore calculated by multiplying annual visits by 0.515 and were supplied as the physical input to the public-health economic assessment. The NbS scenario assumed that no new paths, public-access rights, car parks or other visitor infrastructure were created (Lenane et al., 2023).

F6.8 Agricultural Production

Metric

Change in agricultral gross profit (£ y^{-1}) = *Change in agricultral gross profit £ $y-1$ =*

agricultural gross profit under the NbS scenario (£ y^{-1}) − agricultural gross profit under baseline scenario (£ y^{-1}) *agricultural gross profit under the NbS scenario £ $y-1$ − agricultural gross profit under baseline scenario £ $y-1$*

Method

FarmScoper was used to estimate the change in agricultural production using the same model and farm configurations described in Section F6.3. For each crop and livestock sector, FarmScoper multiplied the applicable output value per hectare or per head by the modelled crop area or livestock number and summed the results to calculate total annual agricultural production value. The output values were based on the John Nix farm-management data incorporated within FarmScoper, while any effects of mitigation measures on yield or livestock output were applied using the method-specific assumptions contained in the FarmScoper Cost Tool (ADAS, 2021).

Under the NbS scenario, agricultural land new habitat creation associated with NbS interventions was removed from the relevant crop or grassland area, and livestock numbers were reduced in proportion to the agricultural grassland area removed. Soil management was treated as retaining agricultural production. The difference between baseline and NbS agricultural production value was calculated for each study area.

F7. Aggregation and Integration into the Economic Analysis

Outputs from the individual ecosystem-service methods were consolidated in a common results workbook and aggregated by NbS intervention and study area. Potential overlap between outputs was reviewed before transfer to the economic analysis.

For catchment-scale extrapolation, the full project area was classified into four altitude zones corresponding to the four representative study areas. Mean elevation was calculated for each study area using GIS, and the study areas were ordered from lowest to highest mean elevation. The boundaries between altitude zones were set at the midpoints between the mean elevations of adjacent study areas. The area of each resulting altitude zone was calculated for use in the economic scale-up.

The final scientific outputs were provided to Pegasys at study area and NbS-intervention levels. Pegasys applied the economic valuation methods described in Annex C, converted the modelled study-area costs and benefits to per-hectare values, and applied these values to the corresponding altitude zones across the wider catchment. Results from the four zones were then aggregated to estimate catchment-scale costs and benefits.

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