



NORFOLK WATER  
STRATEGY PROGRAMME

# Investing in Nature for Norfolk's Water Security

**Norfolk Water Fund**

Business case and next steps, February 2024



# Norfolk Water Strategy Programme: Core Partners

---

Since its inception in February 2021, the Norfolk Water Strategy Programme has been led by four Core Partners.

**Norfolk County Council** is the upper-tier local authority for Norfolk, providing services countywide to more than 900,000 residents. The council is responsible for strategic local government services in the county, such as local flood risk, highway management, social services, education and minerals and waste planning. The County Council, with its 84 elected Members, plays a leading role in ensuring that Norfolk has a growing economy, thriving people and strong communities.

**Water Resources East** is a not for profit, independent multi-sector membership organisation, formally recognised by Defra and the Environment Agency as one of five regional water resources planning groups in England. WRE has more than 180 members, including numerous Norfolk-based organisations. Its vision is for the region to have sufficient water resources to support a flourishing economy, a thriving environment and the needs of its population and for the region to be seen as an international exemplar for collaborative integrated water resource management. WRE published its first multi-sector Regional Water Resources Plan for Eastern England in December 2023 and is now focusing on a number of innovative exemplar projects demonstrating catchment level, integrated water management approaches.

**Anglian Water** is a water company regulated under the United Kingdom Water Industry Act 1991. It is the largest water and water recycling company in England and Wales by geographic area. Anglian Water supplies water and water recycling services to almost seven million people in the East of England, including Norfolk and in Hartlepool. Anglian Water works to bring environmental and local prosperity to the region it serves through its commitment to Love Every Drop and in 2020, the company received a Queen's Award for Enterprise: Sustainable Development – the UK's highest accolade to celebrate business success.

**The Nature Conservancy** is a global conservation organisation dedicated to conserving the lands and waters on which all life depends. Guided by science, TNC creates innovative, on-the-ground solutions to our world's toughest challenges so that nature and people can thrive together. TNC is tackling climate change, conserving lands, waters and oceans, providing food and water sustainably and helping to make cities more sustainable. It works across 72 countries deploying 4,000 staff and many volunteers using a collaborative and partnership-based approach that engages local communities, governments, the private sector, and other partners. Norfolk is the first of two European pilot Water Funds initiatives supported by The Nature Conservancy (TNC).

In addition to the Core Partners, the programme counts on WWF's support. **WWF** is a leading independent conservation organisation, with over five million supporters. WWF are active in more than one hundred countries. Through its engagement with the public, businesses, and government, WWF focuses on safeguarding the natural world, creating solutions to the most serious environmental issues facing our planet, so that people and nature thrive. The programme has been funded since its inception by Norfolk County Council on behalf of all Norfolk councils, and by Anglian Water, The Nature Conservancy and WWF-UK.

---

# Acknowledgements

---

This business case has been prepared by the Nature for Water Facility for the Norfolk Water Strategy Programme. We would like, alongside the programme's Core Partners, to thank the following institutions for their support during the process: Jeremy Benn Associates (JBA), Environment Agency, The Rivers Trust, the Norfolk Rivers Trust, WWF-UK, and the Wendling Beck Environment Project.

## About the Nature for Water Facility

[The Nature Conservancy](#) and [Pegasys](#), with support from FutureWater, have developed '[Nature for Water](#)' (N4W), an initiative seeking to support local partners in tackling pressing water security challenges by delivering Nature-based Solutions at scale. Our global team offers gold-standard technical assistance in a large range of demand-driven services to conceptualise, develop and scale Watershed Investment Programs designed to deliver water security benefits within a defined service area.

## Our technical assistance is provided through:

- Sponsored engagements: our twice-annual call for proposals offers pro-bono technical assistance to local partners with exceptional enabling conditions. By 2025 we aim to support more than 30 applicants on this basis.
- Fee-based partnerships: we have pioneered an integrated watershed Nature-based Solutions consultancy model that relies on an 'impact-first' mindset to help clients deliver their long-term water security objectives.

Since our 2022 inception, we have supported 25 watershed investment programmes to meet their local water security challenges.

## Lead authors

### **The Nature for Water Facility**

Jack Beard, Lola Grundmann and Thomas Skurtis.

### **The Nature Conservancy**

Rob Cunningham.

### **Water Resources East**

Hannah Gray, Daniel Johns, Alice Leonard, Luke Waterman.

Any opinions, findings, and conclusion or recommendations expressed in this document are those of the authors and do not necessarily reflect the views of the NWSP Core Partners and funders.

---



# Contents

<b>Norfolk Water Strategy Programme:</b>	<b>i</b>	<b>5. Learnings and recommendations from the business case</b>	<b>51</b>
<b>Core Partners</b>		5.1 Not all selected NbS are created equal, but almost all make reasonable economic and financial sense	52
<b>Acknowledgements</b>	<b>ii</b>	5.2 To stack or not to stack?	55
<b>Contents</b>	<b>iii</b>	5.3 Actions to accelerate the adoption of NbS at scale in Norfolk	57
<b>List of acronyms</b>	<b>v</b>	5.3.1 Tackling barriers to long-term agreements	58
<b>Key audiences</b>	<b>vi</b>	5.3.2 Investing in building the evidence base to refine benefit estimates and support better decision making	58
<b>Executive summary</b>	<b>1</b>	5.3.3 Incentivising nature positive Nutrient Neutrality solutions?	59
		5.3.4 Improve returns on stacking by harmonising processes to reduce project preparation costs	59
<b>1. Context and objectives</b>	<b>8</b>	<b>6. Norfolk leading the way: building a portfolio of flagship NbS projects</b>	<b>60</b>
1.1 Background to the Norfolk Water Strategy Programme	9		
1.2 June 2022 Progress Report	10	<b>7. Moving forward</b>	<b>64</b>
1.3 NWSP engagement and partnerships	11	7.1 Implementing reference projects	65
1.4 Objectives of this publication	13	7.2 Securing finance	65
		7.3 Establish the Norfolk Water Fund	67
<b>2. Overview of Norfolk's water security challenges</b>	<b>14</b>	7.4 Explore new opportunities	68
2.1 Natural capital and water assets	15		
2.2 Water security challenges	16		
<b>3. Nature as a solution to Norfolk's water security challenges</b>	<b>19</b>		
3.1 Identification of priority areas for action	20		
3.2 Nature-based Solutions identified for Norfolk	21		
<b>4. Building the case for Nature-based Solutions</b>	<b>27</b>		
4.1 Step 1: Identify most suitable areas for each NbS in priority catchments	30		
4.2 Step 2: Assess ecosystem services delivered by selected NbS	35		
4.2.1 Ecosystem Services Assessment Methodology	35		
4.2.2 Trade-offs in Ecosystem Services delivery	37		
4.3 Step 3: Estimate costs and the size of proposed portfolio	38		
4.3.1 Costs	38		
4.3.2 Modelled portfolio	39		
4.4 Steps 4a and 4b: Estimate economic benefits and revenue streams	43		
4.4.1 Economic benefits	43		
4.4.2 Revenue streams	46		
4.5 Steps 5a and 5b: Economic benefits and financial performance	47		
4.6 Scaling delivery and benefits: going beyond BNG and NN revenues	49		

# Contents

<b>Box 1</b> – What are Nature-based Solutions for water security (NbS-WS)?	10	<b>Figure 14</b> – Sensitivity of economic benefits to +/- 20% changes in main assumptions.	54
<b>Box 2</b> – The East of England Nature-based Solutions Planning Hub.	12	<b>Figure 15</b> – Sensitivity of financial performance to +/- 20% changes in main assumptions.	54
<b>Box 3</b> – Water Security Challenges facing Norfolk.	17	<b>Figure 16</b> – Comparing NN and BNG stacking scenarios.	56
<b>Box 4</b> – Nutrient Neutrality: An example of how degraded water quality impacts Norfolk's economy.	18		
<b>Box 5</b> – Agriculture and Nature-based Solutions.	25		
<b>Box 6</b> – Nature-based Solutions as a viable alternative to traditional sewage treatment systems.	26	<b>Table 1</b> – Priority Nature-based Solutions for the Norfolk Water Fund.	23
		<b>Table 2</b> – Overview of economic and financial analyses performed in the business case.	29
<b>Figure 1</b> – From challenge to opportunity.	5	<b>Table 3</b> – Enabling and restricting factors for the implementation of priority Nature-based Solutions.	31
<b>Figure 2</b> – Overview of priority catchment for the creation of a Water Fund in Norfolk.	21	<b>Table 4</b> – Key ecosystem services metrics assessed through modelling.	35
<b>Figure 3</b> – Identifying Nature-based Solutions to water security challenges in Norfolk.	22	<b>Table 5</b> – Implementation and maintenance costs of selected NbS.	39
<b>Figure 4</b> – Steps to building the Norfolk Water Fund business case.	28	<b>Table 6</b> – Proposed portfolio of NbS for Norfolk based on A-WINEP budget.	40
<b>Figure 5</b> – Results of opportunity mapping for arable conversion to grassland.	32	<b>Table 7</b> – Relative size of catchment compared with agricultural area, area suggested for NbS implementation, and the area of benefits achieved by implementation.	41
<b>Figure 6</b> – Results of opportunity mapping for soil management activities.	33	<b>Table 8</b> – Volume and market value of P and N Nutrient Neutrality (NN) offsets and BNG units.	47
<b>Figure 7</b> – Results of opportunity for where so-called “edge-of-field” NbS are best implemented.	34	<b>Table 9</b> – Summary of cost benefit analysis.	48
<b>Figure 8</b> – Model framework and constituent models used in impact calculations.	36	<b>Table 10</b> – Comparative analysis of NbS economic and financial performance.	52
<b>Figure 9</b> – Results of ecosystem services delivery from differing degrees of NbS implementation against multiple indicators.	37	<b>Table 11</b> – Stacking NN and BNG: comparing scenarios.	56
<b>Figure 10</b> – Relative sizes of catchment, agricultural area and NbS implementation and benefit.	42		
<b>Figure 11</b> – Benefits of selected NbS and their unitary economic value.	44		
<b>Figure 12</b> – Lifetime costs and benefits of investing in NbS for Norfolk.	48		
<b>Figure 13</b> – Total and annual funding needs of the proposed portfolio of NbS.	49		



## List of acronyms

---

<b>BCR</b>	Benefit to Cost Ratio
<b>BNG</b>	Biodiversity Net Gain
<b>CaBA</b>	Catchment Based Approach
<b>CaSTCo</b>	Catchment Systems Thinking Cooperative
<b>DEFRA</b>	Department for Environment, Food & Rural Affairs
<b>EA</b>	Environment Agency
<b>ELMs</b>	Environmental Land Management schemes
<b>Ha.</b>	Hectare
<b>LNRS</b>	Local Nature Recovery Strategy
<b>N</b>	Nitrogen
<b>NbS</b>	Nature-based Solutions
<b>NbS-WS</b>	Nature-based Solutions for water security
<b>NCC</b>	Norfolk County Council
<b>NE</b>	Natural England
<b>NN</b>	Nutrient Neutrality
<b>NPV</b>	Net Present Value
<b>NWSP</b>	Norfolk Water Strategy Programme
<b>Ofwat</b>	Water Services Regulation Authority
<b>P</b>	Phosphorus
<b>RAFs</b>	Runoff Attenuation Features
<b>RCR</b>	Revenue to Cost Ratio
<b>SAC</b>	Special Area of Conservation
<b>sRAFs</b>	Surface RAFs (field level features along flow pathways, e.g. shallow scrape)
<b>cRAFs</b>	Catchment RAFs (features located in the drainage network, e.g. leaky dam with attenuation pond)
<b>SSSI</b>	Sites of Special Scientific Interest
<b>TNC</b>	The Nature Conservancy
<b>WSC</b>	Water Security Challenges
<b>WINEP</b>	Water Industry National Environment Programme
<b>A-WINEP</b>	Advanced WINEP
<b>WFD</b>	Water Framework Directive
<b>WRC</b>	Water Recycling Centre
<b>WRE</b>	Water Resources East

---

## Key audiences

This business case describes water security issues facing Norfolk and the economic and financial case for investing in Nature-based Solutions to address them. It has been designed to meet the needs of regulators, local authorities and investors/funders but will be of interest to a wide range of economic, environmental and farming stakeholders. With this diversity in mind, it blends technical and non-technical analyses that we hope will be beneficial to all audiences.

<b>Project developers and landowners</b>	The business case identifies where Nature-based Solutions might be implemented in Norfolk and provides details on their respective economic and financial performance. It also assesses the potential for stacking Nutrient Neutrality and Biodiversity Net Gain schemes.
<b>Decision makers and local authorities</b>	The business case establishes the relevance of Nature-based Solutions to the county's economy and highlights the role of public and private funding for their implementation at scale.
<b>Funding and financing institutions</b>	The business case provides an overview of short and long-term funding needs and assesses how potential revenue streams from environmental markets might contribute toward covering costs and be used in repayable finance schemes.
<b>Regulators and environmental markets actors</b>	The business case provides reflections on the current limitations of the nascent Nutrient Neutrality and Biodiversity Net Gain markets and on how they could be developed to become more effective instruments to deliver environmental and economic outcomes.
<b>General public and civil society</b>	The business case provides an overview of Norfolk's natural capital and water assets, of the water security challenges facing the county, and showcases the relevance of Nature-based Solutions to address them.

---

# Executive summary



## Executive summary

---

### EXECUTIVE SUMMARY

#### **Norfolk is facing significant threats to its unique water assets, jeopardising its water security**

The county is endowed with internationally significant ecosystems and related biodiversity, in particular rare chalk streams, lowland peat, heathland, salt marshes and wetlands. This natural capital, and the surface and groundwater that underpin them, support a variety of water users including public water supply (90% of the total abstraction demand) and agriculture, which represents around 60% of land use in the county and holds the majority of water abstraction licenses by number.

However, Norfolk faces a 'perfect storm' when it comes to its water resources, with threats to both quantity and quality of water in the environment as well as increased flood risk. Projections show that the region needs to become much more water efficient, and to invest in significant new sources of water supply, to support a growing regional economy and adapt to climate change. In addition, few water bodies meet good status for surface water quality due to nutrient pollution, physical modification and poor flow regimes. Groundwater assets are in poor status in virtually the whole county because of diffuse pollution from both rural and urban areas and point source pollution from wastewater and industrial discharges. Lastly, flood risk has been increasing in recent years, with 32,000 properties in the county estimated to be at risk from surface water flooding in a 1 in 200 annual probability event.

#### **Immediate challenges and opportunities**

Our work has focussed on the most pressing water security issues in the county and the opportunities they bring for unlocking investment namely:

- Low flows and water availability which threaten the long-term viability of irrigated agriculture, industries that rely on water abstraction, and the water and wetland environment.
- Water quality, which puts at risk the health of internationally important wildlife sites and, as a result, has triggered the imposition of Nutrient Neutrality obligations on new housing and other relevant development types.
- Biodiversity loss and soil degradation which impact catchments that feed the county's rivers, streams and wetlands.

The magnitude of the challenge demands that public and private stakeholders, landowners and local NGOs join forces and transform the business-as-usual approach into a coordinated and common long-term vision for sustainable solutions. Investing in nature, through a collective action mechanism such as the Norfolk Water Fund, can improve water security and also enhance numerous other ecosystem services that benefit business and communities in the county.

---

### Testing a viable portfolio of Nature-based Solutions

Some of the proposed NbS entail the conversion of arable land to other uses. Even though these solutions bring significant water, biodiversity and other benefits, we are conscious that a large-scale strategy cannot rely exclusively on arable land conversion, and that balance between food production and nature restoration needs to be found. This is why our business case assumes that only 5% of arable land is converted to grassland, and 2% is dedicated to riparian restoration. Experience suggests that NbS tend to lend themselves to less productive parcels of land, and by design, contribute toward conservation objectives without material loss of yield. And, from a landowners perspective, NbS can reduce input costs whilst generating alternative sources of revenue - in some cases providing stable, long-term, income streams - hence increasing farm profitability.

### Demonstrating the economic benefits and financial viability of Nature-based Solutions

Our analysis demonstrates that a £29.9 million portfolio of Nature-based Solutions can generate significant economic value to Norfolk, with each £1 invested unlocking £6.70 in benefits. Furthermore, regardless of future developments in environmental markets and Nutrient Neutrality, the benefits of implementing Nature-based Solutions still outweigh the costs, clearly demonstrating the important role they could play in the county.

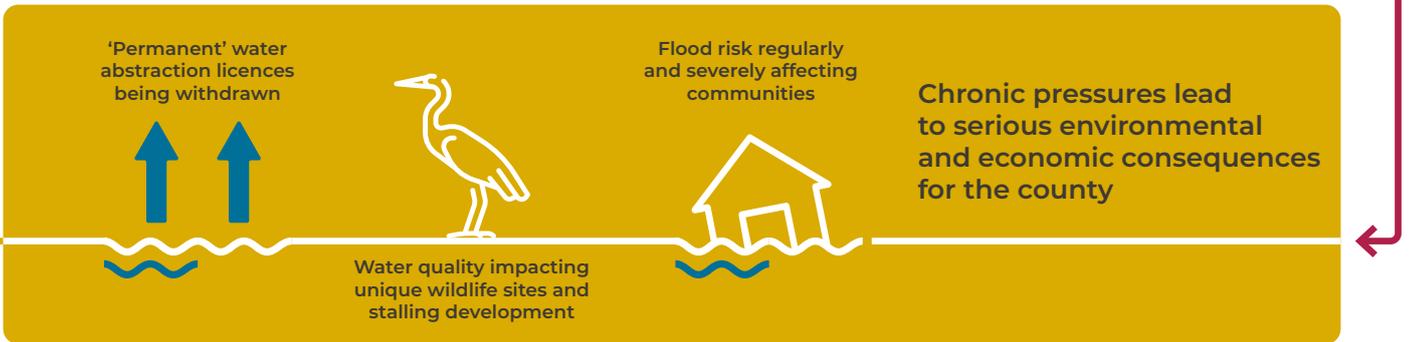
From a financial perspective, through the nascent Nutrient Neutrality and Biodiversity Net Gain environmental markets, this portfolio could offer a good return on investment, with a total revenue to cost ratio of 1.5 and a discounted net present value of £14.8 million. It is important to note that Nutrient Neutrality and BNG markets are both capped by the level of demand from housing and infrastructure developers. Revenues will thus be limited, and the financial performance of the business case presented will not be scalable beyond the point where demand is met.

### NbS can deliver catchment scale benefits beyond current private market demand

Our biophysical modelling indicates NbS have the potential to deliver improvements to low flow conditions and water quality in the Wensum and Broads significantly above that required to meet the needs of the BNG and NN markets. NbS are therefore well placed to play a central role in protecting and enhancing Norfolk's unique water and wetland environment, within a framework that supports economically and environmentally sustainable agriculture. Securing delivery of NbS at this scale will require innovative thinking in terms of private and public funding that reflects the full range of co-benefits to private business and wider public goods including community health and wellbeing.

Our benefits assessment is based on best evidence but is partial and therefore underestimates the potential gains. For example, deploying NbS will generate significant social benefits in the form of green supply-chain job creation in rural communities as well as the health and wellbeing benefits for Norfolk residents and tourists who visit the countryside, rivers and wetlands. These benefits are real but difficult to quantify.

Business case for a Norfolk Water Fund:  
safeguarding environmental and economic wellbeing  
through Nature-based Solutions



**The Norfolk Water Fund**  
Aiming for a £30 million portfolio of Nature-based Solutions for improved water security

Runoff attenuation features      Riparian restoration      Soil management practices      Arable conversion to grassland

<p>More water in the landscape</p> <p><b>3.7</b> million m<sup>3</sup>/year</p>	<p>Improved river water quality</p> <p><b>273</b> kgs of phosphorus and 13,794 kgs of nitrogen offset/year</p>	<p>Improved habitats for wildlife</p> <p><b>25,800</b> ha benefiting from NbS interventions</p>	<p>Unlocked housing development</p> <p><b>1,721</b> houses 'unlocked' worth £158 million</p>	<p>Climate &amp; air quality benefits</p> <p><b>£10.8</b> million worth of CO<sub>2</sub> capture and removal of micro-particulates</p>
---	--	---	--	---

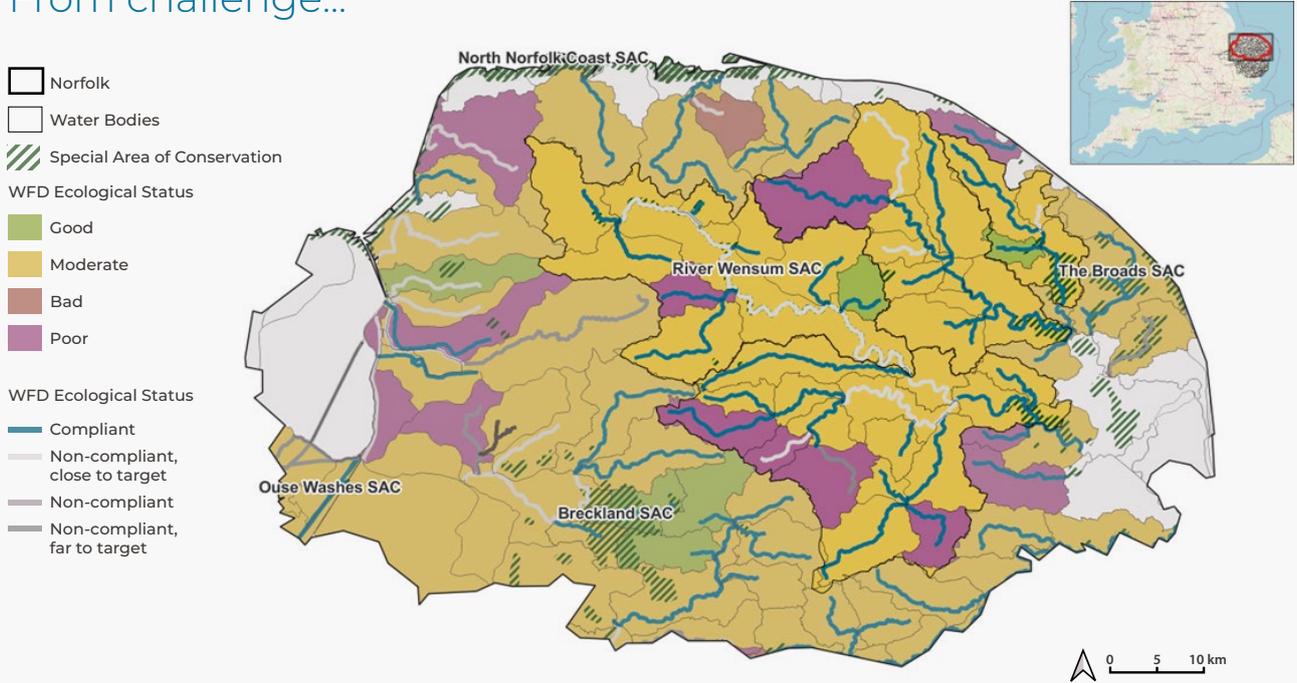
Each £1 invested in Nature-based Solutions unlocks £6.70 in benefits

£44.5 million of new revenue for farmers from Nutrient Neutrality and Biodiversity Net Gain environmental markets

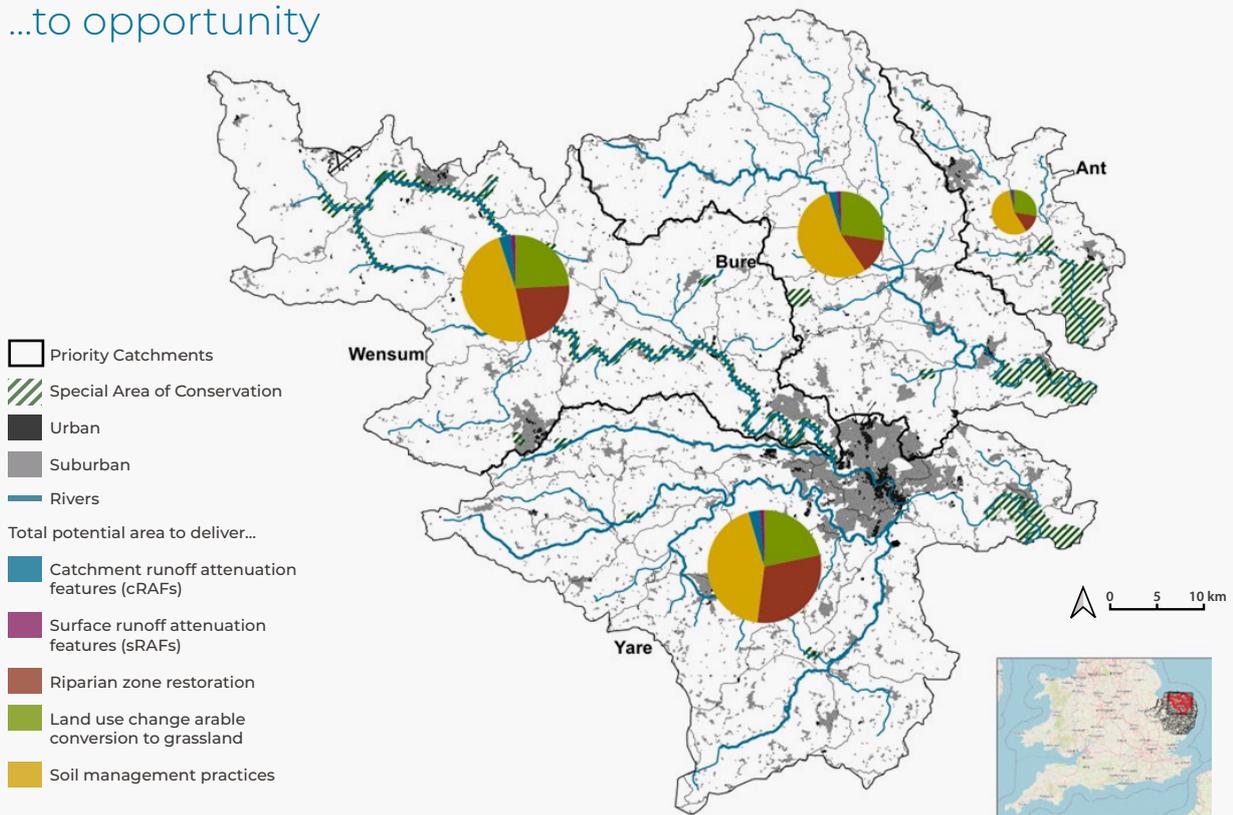
Significant opportunity to create jobs and generate social, health and wellbeing co-benefits

Figure 1 – From challenge to opportunity.

## From challenge...



## ...to opportunity



## Scaling up the Norfolk Water Fund

### Funding considerations

Over the next 12 to 18 months, the Norfolk Water Fund will enter a ramp-up phase during which the Programme will continue to focus on supporting more flagship pilot projects. This will require funding for feasibility studies and implementation, as well as the set-up of a robust monitoring protocol. Total budget for this period is estimated at £2 million of which £0.8 million has already been secured thanks to the financial support of Core Partners, WWF and pro-bono work performed by the N4WF and law firm Morrison Foerster. This leaves the Programme with a net funding need of £1.2 million at this stage.

Then, building on this bottom-up approach, the NWSP ambition is to roll-out from 2025 onwards a broader, top-down strategy aiming to deploy NbS at the county-scale.

In addition to possible revenues from environmental markets, funding for this scale-up phase will need to come from a blend of public and private sources. Public grants, private donors and charities will play a central role in the funding strategy. They can take risks to support NbS programmes that private financiers with return expectations cannot. They will especially be important while uncertainties regarding environmental markets are dispelled.

We also envisage a growing role for the private sector. Most notably there is an opportunity through Corporate Social Responsibility budgets to fund specific conservation outcomes, and by aligning NWSP to core business priorities such as Anglian Water's proposed Advanced-WINEP programme for the 2025-2035 period (subject to regulatory approval)<sup>1</sup>.

### Reflections on opportunities and challenges for the Nutrient Neutrality and BNG markets

*Stability is required to support the development of nascent environmental markets.* NbS have significant up-front costs and lead in times to prove full functionality. Both landowners and investors will need confidence that NbS markets are secure before putting land and capital into land management that may take months or years to generate returns.

*Private markets for NbS offer significant environmental funding.* The NbS portfolio modelled in this study would generate a regionally significant revenue of £27.2m from private BNG and NN markets. This could play a key role in leveraging public and private investment at a scale to meet wider water security challenges in Norfolk.

*More work needs to be done to make landowners comfortable with long-term agreements.* Our engagement with landowners suggest the long timescales for Nutrient Neutrality agreements (up to 125 years) is a disincentive to uptake. This may be less of an issue for field margin NbS which retain flexibility over land use in the core cultivated areas. We will continue to work through our pilots and engage with landowners and the wider Nutrient Neutrality community to understand how the long-term security of Nutrient Neutrality agreements can be guaranteed while addressing landowner concerns.

<sup>1</sup> Anglian Water (2023), [A-WINEP Stage 1 Submission: Partnership for regeneration and resilience](#). The A-WINEP proposal covers a wide range of environmental outcomes, not all of which would align with the aims of the Norfolk Water Fund.

*Practical opportunities for stacking Nutrient Neutrality and BNG markets are constrained.* Our modelling found that while the NbS portfolio offers a good return on investment, the financial benefit of stacking BNG and Nutrient Neutrality income is limited and has to be weighed against administrative complexity of entering into both markets. Moreover, we found that satisfying demand from markets for Nitrogen, Phosphorus and BNG place very different requirements on scale and type of NbS required. Collectively these findings suggests that while stacking might make financial sense for some NbS at a farm scale, across the portfolio as a whole, the scope will be constrained.

### **Where do we go from here?**

This report marks the end of the first phase of the NWSP by demonstrating the opportunity and economic case for implementing Nature-based Solutions at scale in Norfolk. Now that the case is established, this study phase will give way to a delivery-oriented agenda that focuses on implementing flagship projects, securing funding and financing, and establishing the governance of an operational Norfolk Water Fund.



**Section 1**

---

# Context and objectives

## Section 1

# Context and objectives

### SECTION 1

Context and objectives

## 1.1

### Background to the Norfolk Water Strategy Programme

Norfolk County Council initiated the Norfolk Water Strategy Programme (NWSP) to ensure greater focus on water security challenges and stimulate innovation in tackling them. It joined forces with Anglian Water, a leading water utility responsible for water supply, sewerage and water recycling services at a regional level (including Norfolk), with Water Resources East and The Nature Conservancy, a global conservation NGO, to define how to best invest in its natural environment to address those challenges.

**The NWSP was launched in February 2021 with the high-level aims to:**

- Ensure that water (either too much or not enough) is not a barrier to economic development and growth in Norfolk.
- Increase resilience of water resource management for all users, including the agri-food sector.
- Deliver wider benefits in terms of flood risk and water quality.
- Identify opportunities and mechanisms to restore and enhance the environment.
- Provide opportunities for water-related businesses.
- Deliver water-related climate change mitigation and adaptation strategies, including net zero carbon targets.
- Provide academically rigorous evidence to policymakers.
- Influence and shape WRE's Regional Water Resources Plan for Eastern England.

Nature-based Solutions for water security (NbS-WS) are at the heart of the NWSP strategy. We believe that investing in such solutions at scale and in a targeted manner can effectively complement more traditional approaches to:

- Improve the effectiveness and efficiency of the overall programme of measures that will be deployed to address water security challenges in the county.
- Make a measurable impact on water security in the county, in line with overall targets.
- Contribute to strengthening Norfolk's resilience to climate change and aim to achieve net zero.
- Generate environmental benefits and contribute to the recovery of natural capital in Norfolk.
- Support a transition towards a 'green economy', with the creation of green jobs.

SECTION 1

Context and objectives

Box 1

**What are Nature-based Solutions for water security (NbS-WS)?**

Nature-based Solutions are defined by the International Union for the Conservation of Nature (IUCN) as 'actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits' (IUCN, 2016).

Water security is defined as the provision of an acceptable quantity and quality of water for health, livelihood, ecosystems and production, coupled with an acceptable level of water-related risks to people, environments and economies (Sadoff & Grey, 2017).

1.2  
**June 2022 Progress Report**

Since February 2021, the NWSP has performed detailed technical analyses and engaged with local stakeholders to characterise Norfolk's water assets, understand the county's water security challenges and identify how investing in nature can help address them. We have mapped existing local Nature-based Solutions initiatives, analysed the regulatory framework and financing landscape to characterise challenges and opportunities to support such investment programmes.

In June 2022, the results of these analyses were synthesised in a Progress Report and presented to local stakeholders for feedback on a set of recommendations regarding governance and funding arrangements to foster collaboration and targeted investment in nature recovery to address Norfolk's water security challenges. The Progress Report sets out proposed priority challenges to address and geographical areas for engagement.

**The main recommendation was to establish two inter-linked governance mechanisms:**

- **The Norfolk Water Hub:** a Collective Action Platform that aims to disseminate information, connect actors, influence the delivery and adoption of NbS-WS, and mobilise funding in general.
- **A Norfolk Water Fund** dedicated to the delivery, in close collaboration with on-the-ground organisations, of coordinated investment programmes with clear performance indicators. In its first phase, this fund would work in the Bure and Wensum catchments, with a primary focus either on (i) water resource/intra-year variability with expected co-benefits in terms of water quality, or (ii) on nutrient balancing and water quality, with potential benefits on water flows and quantity.

The Progress Report along with technical reports can be downloaded from WRE's website: <https://wre.org.uk/projects/norfolk-water-strategy-programme/>.

## 1.3

### NWSP engagement and partnerships

Across regulatory frameworks, planning and delivery, many organisations and actors are playing key roles in Norfolk that enable the delivery of NbS for water security outcomes.

Over the last 12-18 months, extensive engagement has been carried out with numerous stakeholders to ensure the programme delivers value for Norfolk's environment and economy.

#### Some examples of engagement are:

- **Regulators** – increasing our understanding of the challenges in catchments and the extent of publicly funded programmes of work (e.g. Environment Agency's Water Environment Investment Fund), exploring opportunities and innovative solutions within the regulatory approach to water security challenges and Nutrient Neutrality (Natural England).
- **Delivery partners** – collaborating on opportunities to deliver pilot NbS projects, understanding their capacity to delivery NbS projects at scale, linking into catchment partnerships and work already underway (e.g. CaSTCo water quality monitoring) and leveraging existing relationships and networks with landowners.
- **Landowners and farmers** – linking in to farming cluster groups (e.g. Upper Wensum) and direct engagement with landowners to understand their challenges and needs when it comes to making decisions on land use and alternative forms of income. Also, further exploration of pilot NbS projects.
- **Anglian Water** – alignment on approach to the Advanced WINEP (recently submitted to Ofwat for regulatory approval in 2024) and alternative approaches to delivering environmental outcomes and investment. Also, collaboration on the production of resources for the Eastern of England Planning Hub (see Box 2), which aims to support the delivery of NbS.
- **Local government** – engagement with the Environment team at Norfolk County Council on how NbS data from the programme can support the production of the Local Nature Recovery Strategy (LNRS). The team has also provided technical advice and support to local planning authorities and Norfolk Environmental Credits as a joint venture that aims to find solutions to Nutrient Neutrality.
- **Prospective funders** – exploring the risk appetite of funders to invest in NbS, the type of financing mechanisms and size of investments at this stage.

Further work in the next phase of the programme will aim to build on existing partnerships. Enabling partnerships across a broad base of organisations will help overcome barriers to delivering NbS at scale, allocate funding more efficiently and ensure multiple economic and environmental outcomes are delivered.



#### SECTION 1

Context and objectives

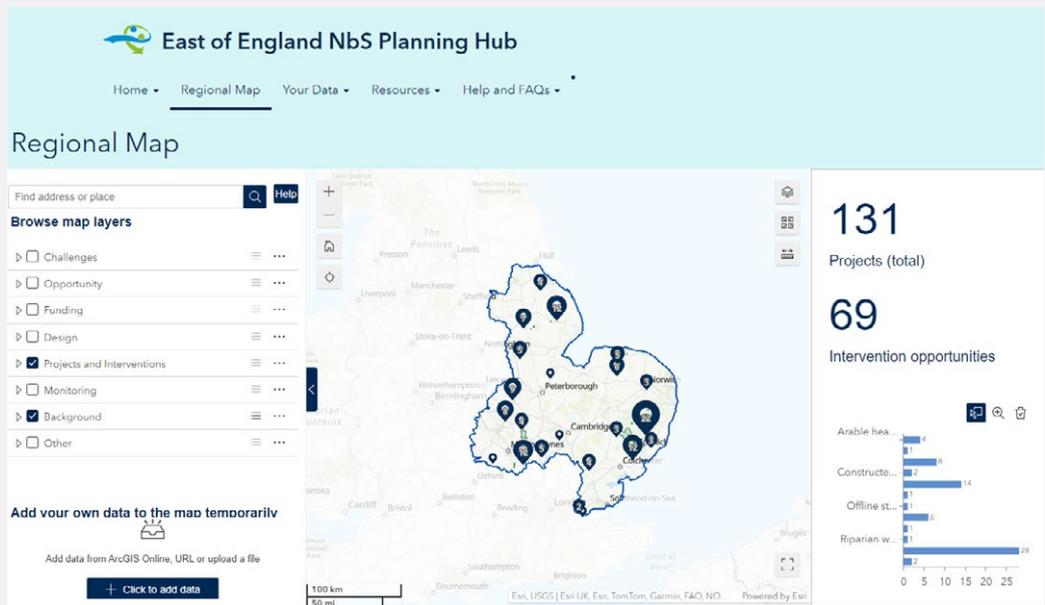
SECTION 1

Context and objectives

### Box 2 The East of England Nature-based Solutions Planning Hub

The East of England NbS Planning Hub is a collaboration between Anglian Water, the NWSP and The Rivers Trust to create an open-source spatial planning platform that enables strategic planning of Nature-based Solutions. Funded primarily by Anglian Water and TNC, the NWSP is leveraging the expertise within the Hub to develop detailed datasets and understanding of land suitability for NbS both within the NWSP's target catchments and more broadly across the Anglian Water region.

The platform will enhance the catchment planning process, enabling catchment partnerships to access datasets developed by the NWSP and others, such as those underpinning Anglian Water's environment programme (WINEP). By offering data and the functionality for organisations to record NbS opportunities and project delivery, the platform will improve transparency and increase partners' ability to effectively plan catchment delivery and identify opportunities for collaboration, acceptable level of water-related risks to people, environments and economies (Sadoff & Grey, 2017).



**SECTION 1**

Context and objectives

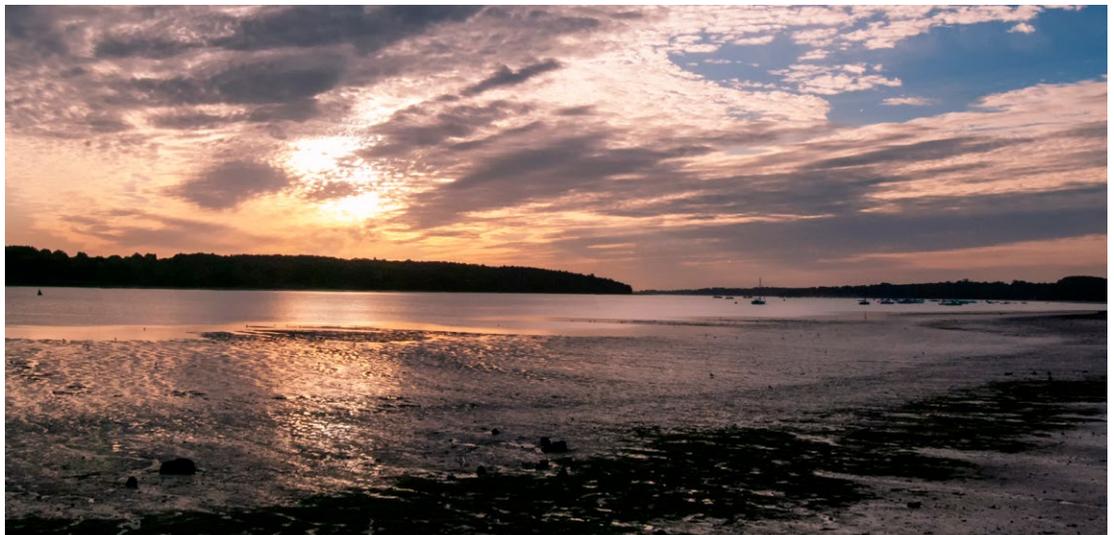
## 1.4 Objectives of this publication

Since June 2022, the NWSP has mainly focused on:

- Engaging with local landowners to identify opportunities to develop NbS pilots, in a bottom-up effort to build a portfolio of flagship projects that will serve as a foundation to foster the adoption of NbS at scale in the county.
- Engaging with local and national scale stakeholders to develop a common vision on barriers for the adoption of NbS in Norfolk and ways to overcome them.
- Developing the business case for NbS in Norfolk and identify potential funding sources for the programme.
- Defining the most appropriate legal structure for the Norfolk Water Fund.

**This report aims to present the conclusion of this work and in particular:**

- (i) Presents the conclusions of the business case and discusses the implications of the lessons learned from this exercise, especially for the nascent environmental markets for Nutrient Neutrality and Biodiversity Net Gains.
- (ii) Highlights projects that have been supported by the NWSP and showcases the progress made towards the adoption of NbS in the county.
- (iii) Presents the next steps in developing the Norfolk Water Fund.



## Section 2

---

# Overview of Norfolk's water security challenges



## Section 2

# Overview of Norfolk's water security challenges

### SECTION 2

Overview of Norfolk's water security challenges

The NWSP has extensively analysed Norfolk's natural capital and water assets and the challenges they are facing. The details of this work can be found in the [June 2022 Progress Report](#) and a supporting technical report. This section presents a summary of the key findings to provide the reader with the necessary context and background for understanding the business case.

## 2.1

### Natural capital and water assets

Norfolk is endowed with internationally significant natural capital and water assets and associated biodiversity. [The Natural Capital Evidence Compendium for Norfolk and Suffolk](#), (NBIS, 2020) developed for Norfolk and Suffolk County Councils by the University of East Anglia and other organisations, states: "Understanding these natural assets, the benefits we derive from them and the pressures upon them is a fundamental requirement if we are to ensure that we can maintain and enhance them into the future".

Norfolk's water assets include rare chalk streams, lowland peat, heathland, salt marshes and wetlands. Significant water assets include productive aquifers and rivers and streams which are, for the most part, self-contained within the county. Arable agriculture represents around 60 percent of land use in the county, with drained lowland peat areas in the Fens and Broads representing particularly productive areas for agriculture.

Water demand across the county is met by abstractions from surface water and groundwater assets. These support a variety of water users, with public water supply representing around 90 percent of the total volume of water demand, but the vast majority of water abstraction licenses granted to agriculture. Return flows of water from public water supply, agriculture and industry cause significant issues with water quality across the county.

Changes in climate—including more frequent and intense dry spells, and more frequent and severe high-intensity rainfall events—will place pressure on Norfolk's natural water assets through altering the baseline ability of ecosystems to provide water and also by increasing water demands from agriculture and other industries. Housing and population growth will increase total water demands for public water supply, also increasing wastewater streams and resulting pollution to the aquatic environment. The largest driver for seeking alternative sources of water by 2040 is the need to restore water-dependent habitats such as chalk streams by allowing more water to remain in the environment. This amount will vary according to the level of environmental ambition deemed appropriate for the county.

**SECTION 2**

Overview of  
Norfolk's  
water security  
challenges

## 2.2 Water security challenges

Norfolk faces water security challenges (WSCs) which can be grouped into four categories:

- Water resources.
- Water quality.
- Flooding.
- Habitat degradation and physical modification.

The NWSP conducted a high-level analysis of a variety of spatial datasets to characterise WSCs at the Water Framework Directive Operational Catchment level. This analysis showed that catchments facing extreme challenges include the Wissey and Northwest Norfolk Rivers. Water quality is a significant problem in all catchments assessed, whereas issues relating to water resources, flooding and physical modification are more spatially variable. The four key water security challenges are explained in more detail in Box 3.



**SECTION 2**

Overview of  
Norfolk's  
water security  
challenges

Box 3

**Water security challenges facing Norfolk**

---



**Water resources**

Surface water and groundwater abstractions for agriculture and public water supply are from chalk aquifers or directly from chalk streams. Public water supply is stretched in Norfolk, with supply and demand currently delicately balanced and deficits predicted by 2050 in some areas without the development of additional water supply options. Considering that many rivers and streams in Norfolk are currently non-compliant with environmental flows (notably in the Wensum, Nar and Broads SSSIs), it is likely that many abstraction licences will be capped or revoked in the coming years.

---



**Water quality**

Challenges come from diffuse sources relating to rural and urban runoff and point source pollution from wastewater and industrial discharges. At present, very few water bodies in Norfolk meet WFD requirements for surface water quality (with phosphorus levels the major barrier to improvement), and many areas of the county designated as highly vulnerable to nutrient pollution. The major chalk aquifer underlying Norfolk is at 'poor' status due to agricultural pollution. Trade-offs are present between planned development in the county and constraints relating to maintaining good water quality for ecosystems and public water supply.

---



**Flooding**

Large parts of Norfolk are exposed to flood risk, with many areas reporting flooding over the last decade. Areas of concern include urban areas in and around Norwich, Watton and Dereham. Given planned housing growth in Greater Norwich, it is likely that the surrounding areas will be prone to flooding from both fluvial and pluvial sources. Groundwater flooding is an area of emerging concern in which more work is needed to understand the dynamics of risk across the county.

---



**Habitat degradation and physical modification**

The vast majority of water bodies across Norfolk are in a non-natural, modified state. Breaking down and disconnecting natural hydrological processes has clear impacts on flow regimes, water quality and ecology.

SECTION 2

Overview of  
Norfolk's  
water security  
challenges

Box 4

**Nutrient Neutrality: An example of how degraded water quality impacts Norfolk's economy**

Nutrient Neutrality rules apply where sites designated under the [Habitats Regulations](#) have been identified as being in 'unfavourable condition' due to nutrient pollution (excess nitrogen and/or phosphorus). The rules stem from a court judgement that clarified there is an obligation to prevent further deterioration of these internationally important wetland sites.

In effect, Nutrient Neutrality rules mean that planning permission cannot be granted for a relevant development in the catchments of a failing Habitats Regulation site unless developers can demonstrate the additional nutrient load generated from sewage and runoff will be offset.

Norfolk holds two of England's 27 failing designated sites - the Norfolk Broads and the River Wensum. The catchments of these sites cover around 40% of the county including Norwich and several towns subject to significant growth, including Dereham and Fakenham. In total, around 37,000 dwellings will require nutrient mitigation in these areas up to the 2038 planning cycle according to Royal Haskoning's [Nutrient Mitigation Solutions](#) report published in April 2023.

Water quality modelling of the catchments indicates that enhanced sewage treatment will significantly reduce nitrogen and phosphorus loads to the Wensum and Broads but will not, in itself, achieve Nutrient Neutrality when growth is factored in. As a result, there is a pressing need to identify a full range of alternatives, including NbS, that can reduce nutrient loading from rural and urban runoff.



## Section 3

---

# Nature as a solution to Norfolk's water security challenges



SECTION 3

Nature as a solution to Norfolk's water security challenges

Section 3

# Nature as a solution to Norfolk's water security challenges

Water security challenges are traditionally addressed by a combination of demand management and so-called 'grey', or engineered, infrastructure solutions such as dams, dykes, reservoirs, sewage treatment and water transfers. More recently, interest in Nature-based Solutions to address water security challenges has increased, to consider connections across the whole catchment, including land use patterns and the biophysical functions of associated ecosystems alongside the social and economic drivers that shape them.

Nature-based Solutions can help control the quantity, timing and quality of freshwater flows. They can also have benefits such as improving water quality, reducing flood risk and regulating water resources. They can achieve a variety of co-benefits including biodiversity conservation, can help reduce disaster risk, improve health and livelihoods, and help actors meet their climate change mitigation goals. They can cost-effectively enhance service delivery, while also increasing infrastructure systems' resilience and flexibility in a changing climate (United Nations, 2018).

## 3.1

### Identification of priority areas for action

The NWSP has focussed effort on catchments that have the greatest water security challenges and opportunities for NbS delivery. A full description of geographical prioritisation is presented in the [2022 Progress Report](#) but can be summarised as focusing on catchments in the county facing the greatest water security challenges, alongside where there are active stakeholders and existing initiatives which give us confidence that NbS projects can be implemented in the short to medium term.

**These criteria have driven us to focus on Special Areas of Conservation (SAC) catchments (Figure 2), namely:**

- **The Wensum** – A chalk river, the full length of which is designated as a SAC, which joins the Yare and drains into the Broads SAC.
- **The Yare, Bure and Ant** – which drain into the Yare, Bure and Ant Broads SACs respectively.

The sensitivity of these sites and strict regulatory obligations to meet favourable status means there has been a long history of stakeholder engagement in their management. At the same time the challenges they face in terms of nutrient and environmental flow targets offer opportunities for investment in NbS to supplement existing and planned grey infrastructure investment.

SECTION 3

Nature as a solution to Norfolk's water security challenges

Figure 2 - Overview of priority catchments for the creation of a Water Fund in Norfolk.



### 3.2

#### Nature-based Solutions identified for Norfolk

A key advantage of NbS over grey infrastructure is their ability to deliver a spectrum of outcomes including water, carbon and biodiversity-related ecosystem services. Given the water security challenges and policy drivers identified in Section 2, this programme has chosen to prioritise NbS most aligned to deliver against water resources, water quality and biodiversity outcomes. It should be noted that the NbS prioritised for implementation also have the potential deliver a wider range of benefits, notably carbon sequestration; amenity and welfare benefits for local communities; and the economic benefits of rural job creation and sustaining agricultural production. These benefits fall outside the scope of our modelling.

**SECTION 3**

Nature as a solution to Norfolk's water security challenges

Figure 3 illustrates how targeted outcomes in terms of water resources, water quality and biodiversity uplift can be achieved via prioritising the restoration and enhancement of natural processes including:

- Increasing the ability of the landscape to retain water.
- Disrupting the mobilisation and transport of pollutants.
- Restoring and protecting habitats in key priority areas.

Figure 3 – Identifying Nature-based Solutions to water security challenges in Norfolk.

	 <b>Low flows and water availability issues</b>	 <b>Water quality challenges</b>	 <b>Biodiversity loss and soil degradation</b>
<b>Water security challenge</b>			
<b>Response</b>	<ul style="list-style-type: none"> <li>• Increase sponge functioning of landscape</li> <li>• Increase infiltration to ground water</li> </ul>	<ul style="list-style-type: none"> <li>• Decrease the mobilisation and delivery of nutrient pollution to rivers and streams</li> </ul>	<ul style="list-style-type: none"> <li>• Promote habitat creation and soil conservation in priority areas</li> </ul>
<b>Nature-based Solutions</b>	<ul style="list-style-type: none"> <li>• Runoff attenuation features</li> <li>• Soil management practices</li> </ul>	<ul style="list-style-type: none"> <li>• Land use change</li> <li>• Riparian buffer creation and restoration</li> </ul>	<ul style="list-style-type: none"> <li>• Land use change</li> <li>• Soil management practices</li> </ul>

The identification of these natural processes was conducted alongside stakeholder engagement to identify which NbS are best suited to lowland agricultural catchments in Norfolk and which of these would likely have the highest degree of acceptance amongst farmers, landowners and key implementation partners.

Another key criterion for NbS selection was the ability to be deliver against key funding streams, namely the demand for NbS emerging from the Nutrient Neutrality and Biodiversity Net Gain markets. This process helped to identify four specific nature-based interventions for implementation by a Norfolk Water Fund; these are described in Table 1 on the next page.

Table 1 – Priority Nature-based Solutions for the Norfolk Water Fund.

SECTION 3

Nature as a solution to Norfolk's water security challenges



**Runoff attenuation features**

Edge-of-field measures to attenuate and store runoff under high flow events, these may include scrapes, sediment traps and ditch blocking efforts.

**Water Resources Impact**

Features attenuate runoff and encourage infiltration to ground water



**Water Quality Impact**

Water storage helps to settle out sediment and absorb nutrients



**Biodiversity Impact**

Features create important ephemeral wet aquatic habitats



**Riparian restoration**

Re-planting and restoration of habitats along riparian areas to buffer runoff before it enters stream or river networks. May include grassland or woodland dependent on location.

**Water Resources Impact**

Increases in evapotranspiration may have negative impacts on water resources



**Water Quality Impact**

Buffer area provides natural filtration of pollutant-rich runoff before it enters rivers and streams



**Biodiversity Impact**

Creation of priority habitat area with high biodiversity value, benefits to water bodies through shading and woody debris



SECTION 3

Nature as a solution to Norfolk's water security challenges



**Soil management practices**

In-field measures to decrease runoff and encourage infiltration consisting of: minimum tillage practices, buffer strip creation, introduction of cover crops.

**Water Resources Impact**

Improved soil structure and reduced compaction allows for increased infiltration



**Water Quality Impact**

Decreases in runoff lead to reductions in pollutant mobilisation



**Biodiversity Impact**

Positive impact on birds and invertebrates



**Arable conversion to grassland**

Conversion of arable land to native, species-rich grassland. Priority species and grassland type depend on the location of implementation.

**Water Resources Impact**

Increases in evapotranspiration compared to open soil may have negative impacts on water resources



**Water Quality Impact**

Cessation of fertiliser inputs leads to reductions in nutrient export from land, decreases in runoff lead to reductions in pollutant mobilisation



**Biodiversity Impact**

Creation of priority habitat area with high biodiversity value



**SECTION 3**

Nature as a solution to Norfolk's water security challenges

Box 5  
**Agriculture and Nature-based Solutions**

Agriculture plays a vital role in the economic prosperity of Norfolk and the farming sector will be key in the delivery and maintenance of NbS. As a result, the Norfolk Water Strategy Programme is focusing on NbS types which work within and alongside functional and productive agricultural systems and, in doing so, can offer secure long-term funding streams that offer a way of diversifying farm income.

**When prioritising NbS for implementation, a key distinction is hereby made:**

- In-field interventions work within agricultural systems, seeking to optimise or modify agricultural processes to benefit water and biodiversity outcomes.
- Edge-of-field interventions work at the periphery of agricultural systems, for example in drainage ditches, riparian areas or along hedgerows. These areas are often of minimal value for producing crops.

A key aim of portfolio creation (Section 4) is to maximise the impact on priority water security and biodiversity metrics, whilst minimising land take, especially in areas of high agricultural value. This is achieved via seeking to prioritise edge-of-field measures over wholesale land use change, and targeting any arable conversion measures in areas of low productivity (agricultural grade 4 or 5) using land classification maps.

**SECTION 3**

Nature as a solution to Norfolk's water security challenges

Box 6

**Nature-based Solutions as a viable alternative to traditional sewage treatment systems**

Anglian Water provides sewerage treatment to over 460,000 people in Nutrient Neutral catchments in Norfolk through 86 Water Recycling Centres (WRCs). These WRCs serve populations (domestic and industry) ranging from just over 370,000 at Norwich to less than ten people in isolated rural communities.

Although larger works have been subject to progressively tighter phosphorus limits over the past 10 years treated sewage effluent from WRCs remains a significant source of phosphorus, and to a lesser extent nitrogen, in Nutrient Neutral catchments. Emissions are expected to fall dramatically by 2030 as a result of new treatment technology combined with tighter legislative requirements. This will result in sewage treatment for 95% of the population served by Anglian Water in NN zones meeting Technically Achievable Limits.

Homes and other buildings not connected to the mains sewerage system typically rely on septic tanks or package treatment plants. An estimated 5,600 properties or more in the Ant, Bure and Wensum catchments have these kinds of private systems with the vast majority offering very limited treatment for nitrogen or phosphorus. If sited correctly, discharges to ground will benefit from the treatment offered by soils, but evidence suggests private discharges can have an impact on water quality at the local and catchment scales. We might anticipate some improvements as homeowners respond to updated legal requirements for private discharges but there remains no specific obligation to treat for nitrogen or phosphorus.

Overall, this means emissions of nitrogen and phosphorus from sewage is set to fall significantly as Anglian Water's improvements are rolled out by 2030 but local water quality may still be impacted by private discharges and small WRCs. Treatment wetlands, like those installed by the Norfolk Rivers Trust for Anglian Water at Ingoldisthorpe and other NbS schemes such as irrigated orchards could play a role in mitigating emissions from small discharges with funding generated through the nutrient offsets created. However, the feasibility and costs are hugely variable and site specific, so we have not attempted to quantify revenues and offsets at this stage.



**Section 4**

---

# Building the case for Nature-based Solutions

Section 4

# Building the case for Nature-based Solutions

SECTION 4

Building the case for Nature-based Solutions

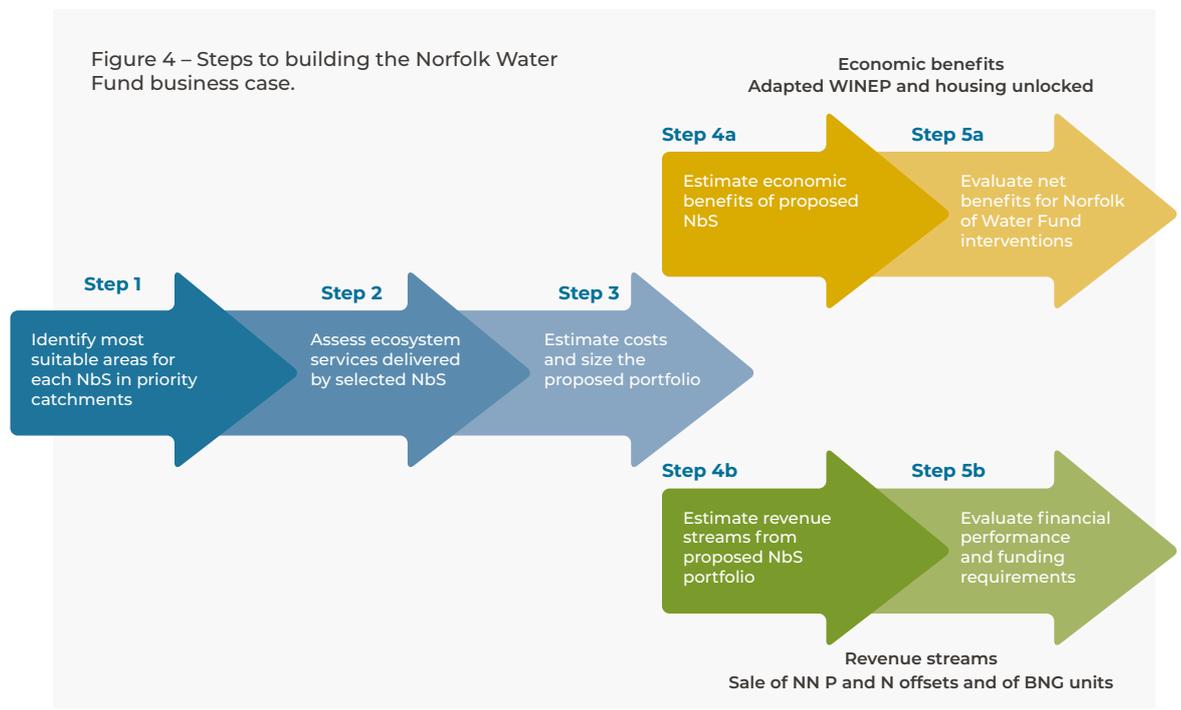
## Aims and approach

This business case has two main objectives:

- First, it aims to assess the benefits to the Norfolk economy of implementing NbS in the Ant, Bure, Wensum, and Yare catchments. To do so, it compares total costs to various economic benefits, adapting the Wider Environmental Outcome methodology developed by the Environment Agency for water company WINEP options development.
- Second, it evaluates the financial performance of the selected NbS portfolio. Not all benefits generated by NbS can be monetised. However, it is important to assess how those that can might generate income and help recover costs. This financial appraisal is done by comparing costs to revenue streams from the sale of Nutrient Neutrality offsets and Biodiversity Net Gains units.

From these economic and financial analyses, the biophysical, economic and financial performance of different selected NbS are compared to assess their potential attractiveness for the Norfolk economy and potential investors.

The steps to constructing the business case are summarised in Figure 4 below. Steps highlighted in yellow refer to the economic cost benefit analysis, whereas the green steps specifically refer to the appraisal of the financial performance of the proposed portfolio of interventions. Table 2 provides an overview of how these economic and financial analyses are conducted.



**SECTION 4**

Building the case for Nature-based Solutions

Table 2 – Overview of economic and financial analyses performed in the business case.

<p><b>Economic analysis</b></p>	<p><b>Economic costs</b></p> <p>Account for the negative impacts on the Norfolk economy related to the implementation of NbS. This includes compensation to landowners for the transition from arable land to other uses. Otherwise assumed to be net zero, given the profile of the NbS portfolio implemented.</p> <p>Also includes financial costs (see below).</p>	<p><b>Economic benefits</b></p> <ul style="list-style-type: none"> <li>• Reduction in nutrient pollution.</li> <li>• Increase in water availability through additional infiltration.</li> <li>• Improved air-quality and associated health benefits.</li> <li>• Climate regulation and associated contribution to meeting national GHG targets to avert damaging climate change.</li> <li>• Unlocking housing development and associated benefits in terms of employment, public finance, private revenues and other local benefits.</li> </ul> <p><b>Beneficiaries</b></p> <ul style="list-style-type: none"> <li>• Actors in relevant sectors of the economy with a reliance on water (agriculture, WASH, industry).</li> <li>• The people of Norfolk.</li> <li>• The environment and biodiversity.</li> </ul>
<p><b>Financial analysis</b></p>	<p><b>Financial costs</b></p> <p>Costs of designing, managing, implementing and monitoring the impact of a portfolio of NbS.</p> <p>Supported by project developers.</p>	<p><b>Financial revenues</b></p> <ul style="list-style-type: none"> <li>• Sale of NN phosphorus and nitrogen offsets.</li> <li>• Sale of BNG units.</li> </ul> <p>Collected by landowners and shared with project developers to cover financial costs.</p>

**SECTION 4**

Building the case  
for Nature-based  
Solutions

**A timeline driven by the specificities of the Nutrient Neutrality offsets market**

The business case models 30 years of project implementation and maintenance, plus the time necessary for Water Fund feasibility study and set-up (assumed to be three years to reach scale). This long-term horizon is customary for modelling Nature-based Solutions and aligns with BNG market obligations, which are also of 30 years.

However, according to Nutrient Neutrality obligations, any nutrient load must be offset in perpetuity (125 years). To reflect this requirement, we have discounted all the cost obligations landowners would face beyond the business case horizon and aggregated them into the last modelled year.

**4.1**

**Step 1: Identify most suitable areas for each NbS in priority catchments**

To maximise the potential for NbS to achieve benefits, it is important that the right NbS are prioritised in the right places within the landscape. For each NbS identified in Section 3.1, there are specific enabling biophysical factors which allow NbS to achieve maximum benefits against prioritised outcomes (Table 3).

The Norfolk Water Strategy Programme worked closely with the Environment Agency and their consultants Jeremy Benn Associates (JBA) through their [Working with Natural Processes](#) programme to identify opportunities to deliver NbS based on enabling factors such as topography, land use and restrictive factors such as source protection zones.

Opportunity maps have been created for a variety of interventions which could broadly be classified as flood zone, catchment storage and buffering interventions. Alongside these 'edge of field' NbS, extensive analysis helped to identify the highest priority areas for 'in-field' NbS including soil management and arable conversion to grassland. This was based on identifying priority areas to decrease runoff and increase infiltration, alongside targeted changes in land use in low-productivity agricultural areas.

**SECTION 4**

Building the case for Nature-based Solutions

Table 3 – Enabling and restricting factors for the implementation of priority Nature-based Solutions.

Nature-based Solution	Enabling or Restricting Factors
<b>Runoff attenuation features</b>	<ul style="list-style-type: none"> <li>+ Situated on flow accumulation pathway</li> <li>+ Situated on (small headwater) drainage network</li> <li>- Not in source protection zone</li> <li>- Not in high frequency flood zones</li> </ul>
<b>Riparian zone restoration</b>	<ul style="list-style-type: none"> <li>+ Adjacent to rivers or drainage network</li> <li>+ On arable land or poor quality, improved grassland</li> <li>+ In priority habitat creation or restoration areas</li> <li>- Not in source protection zone</li> </ul>
<b>Soil Management</b>	<ul style="list-style-type: none"> <li>+ On arable land parcels</li> <li>+ In areas of low permeability, high runoff</li> <li>+ On areas identified as high risk of water quality impacts by SCIMAP<sup>3</sup></li> <li>+ On areas which are frequently used for high-risk crops e.g. maize</li> <li>- Not in source protection zone</li> <li>- Not in high frequency flood zones</li> </ul>
<b>Arable conversion to grassland</b>	<ul style="list-style-type: none"> <li>+ Located on low productivity agricultural land parcels</li> <li>+ In priority habitat creation or restoration areas</li> <li>+ On areas identified as high risk of water quality impacts by SCIMAP<sup>3</sup></li> </ul>

The results of the opportunity mapping exercises are shown in Figure 5, Figure 6 and Figure 7 below.

These outputs are useful for providing a high-level overview of the total capacity within the landscape to implement priority NbS and are used as input in the impact modelling process described in Section 4.1.

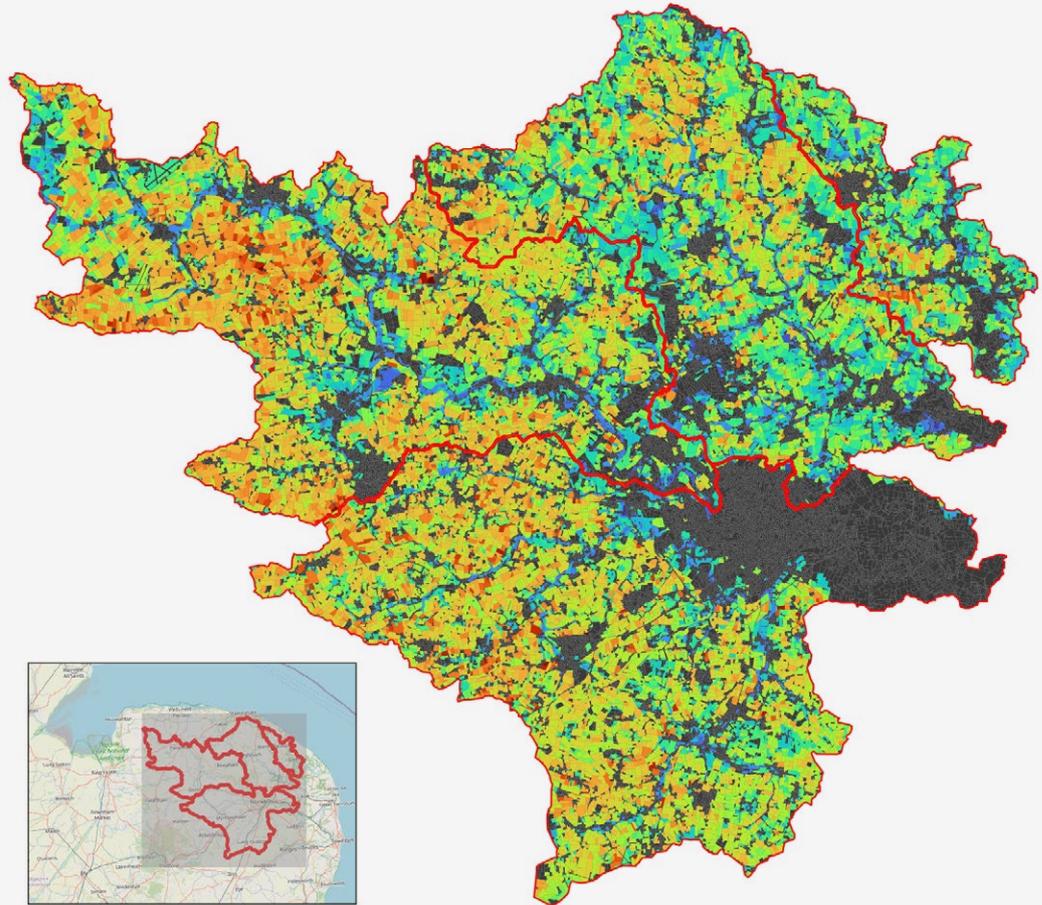
We have also worked with Norfolk Rivers Trust to test the value of these maps in targeting on-the-ground NbS implementation at the landholding to field scale. This gives us greater confidence that the mapping provides a faithful representation of NbS opportunities.

<sup>3</sup> <https://scimpa.org.uk/>

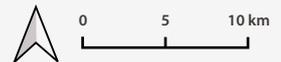
SECTION 4

Building the case  
for Nature-based  
Solutions

Figure 5 – Results of opportunity mapping for arable conversion to grassland.

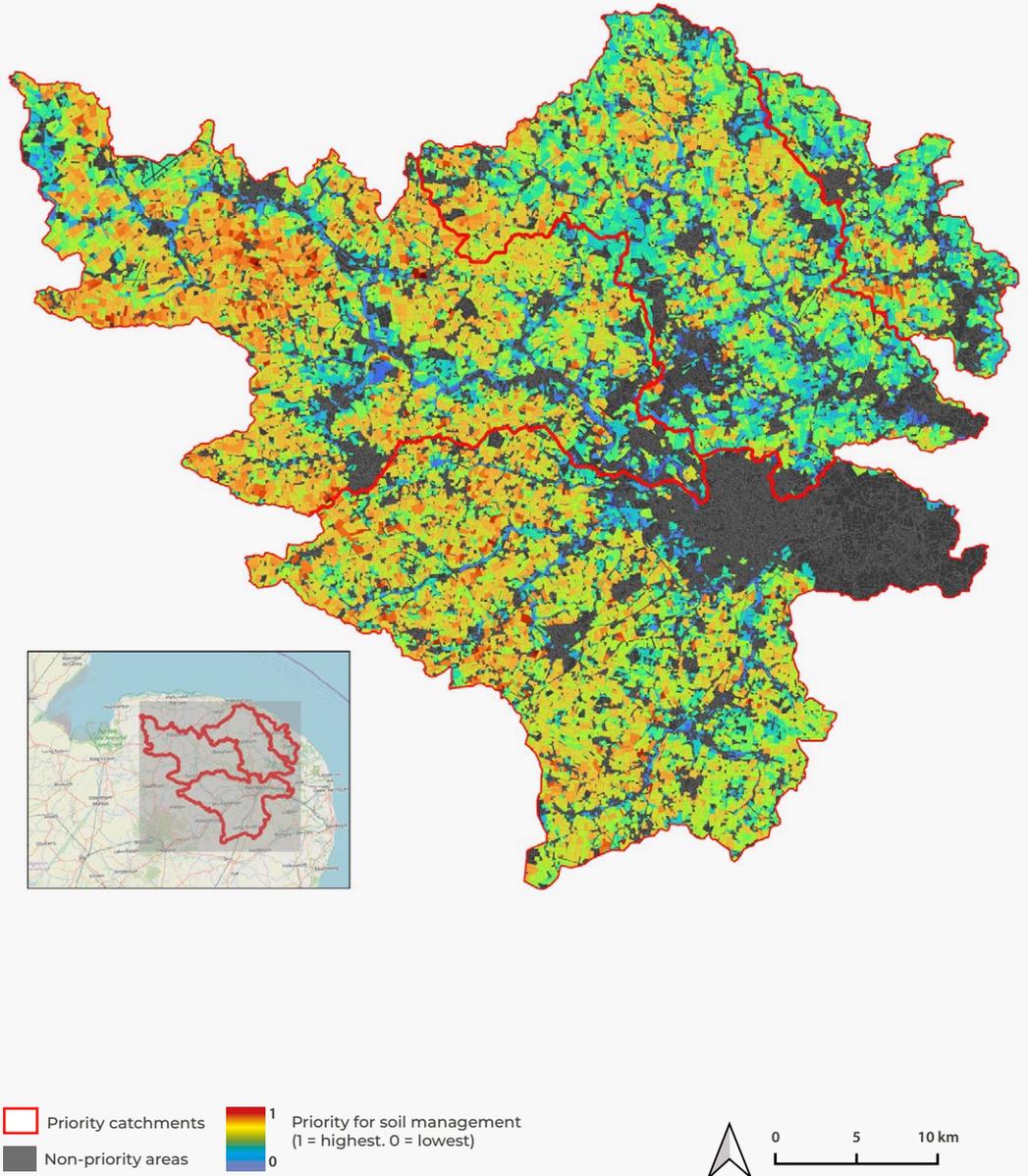


 Priority catchments  
 Non-priority areas  
 Priority for soil management  
(1 = highest. 0 = lowest)



**SECTION 4**  
Building the case  
for Nature-based  
Solutions

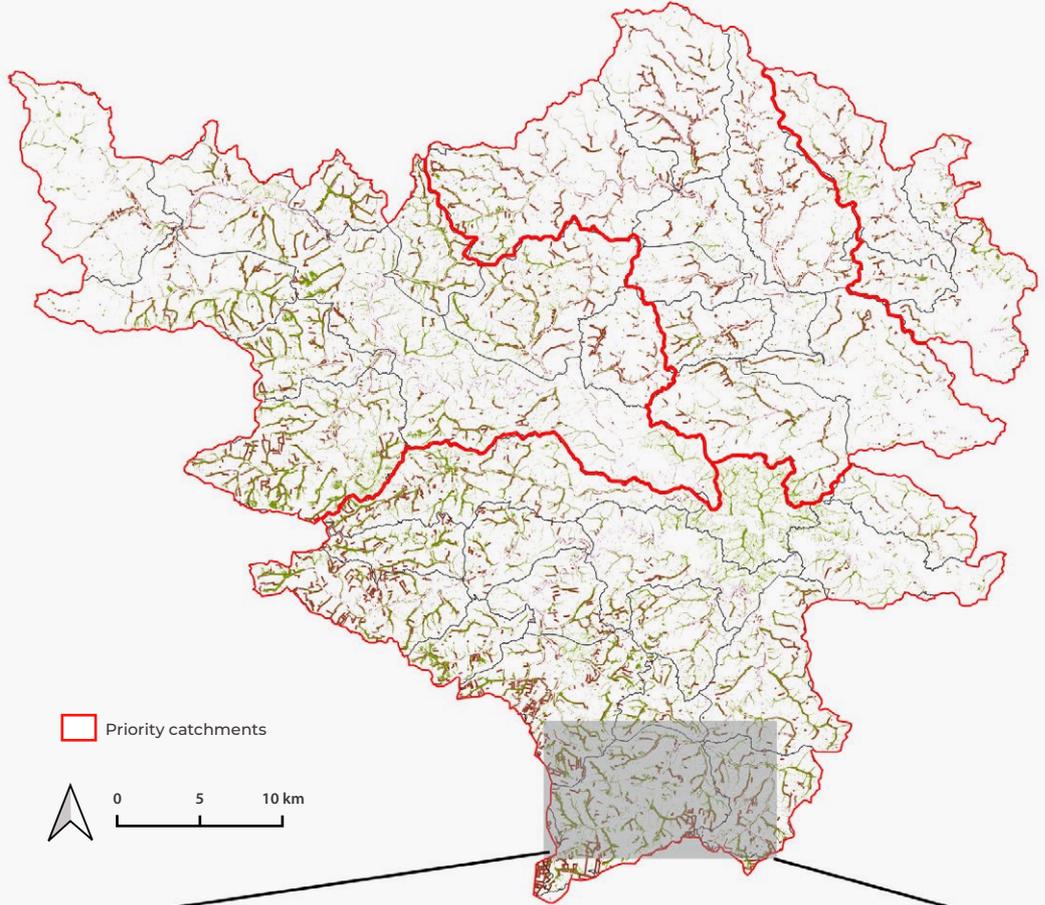
Figure 6 – Results of opportunity mapping for soil management activities.



SECTION 4

Building the case  
for Nature-based  
Solutions

Figure 7 – Results of opportunity for where so-called “edge-of-field” NbS are best implemented. Data credit to the Environment Agency and JBA.



<b>Runoff attenuation features</b>	<b>Buffering</b>
 RAF on flow accumulation pathway	 Riparian zone restoration
 RAF isolated	

SECTION 4

Building the case  
for Nature-based  
Solutions

## 4.2 Step 2: Assess ecosystem services delivered by selected NbS

Ecosystem services modelling was performed to quantify the impact of the priority NbS on key ecosystem services, namely; water quantity, quality and biodiversity. This was achieved through spatially distributed modelling of a number of idealised NbS portfolios to evaluate outcomes in the form of priority metrics (Table 4). These portfolio outcomes were subsequently fed into the business case (see Section 4.5).

Table 4 – Key ecosystem services metrics assessed through modelling.

Metric	Units
Infiltration enhancement provided by NbS	m <sup>3</sup> /year
Nitrogen export mitigated by NbS implementation	kg/year
Phosphorus export mitigated by NbS implementation	kg/year
Biodiversity uplift delivered by NbS implementation	Biodiversity Net Gain (BNG) units

### 4.2.1 Ecosystem services assessment methodology

Biodiversity Net Gain and Nutrient Neutrality outcomes were assessed using methods adapted from calculators created by the relevant regulatory bodies e.g.: the BNG 4.0 calculator ([Natural England, 2023](#)) and the Nutrient Neutrality calculator for the Broads ([Natural England, 2022](#)). This approach has limitations, not least in the conservatism of the Nutrient Neutrality assumptions, but ensures consistency between the outcomes calculated at the portfolio, catchment and individual NbS intervention scales. It also gives us confidence that the outcomes will meet regulators' expectations.

For modelling infiltration uplifts, a simple approach based on Working with Natural Processes water resources modelling performed by the Environment Agency for the Wensum and Bure catchments was created. This relates land use or the size and upstream area of RAFs to their relative impact on infiltration.

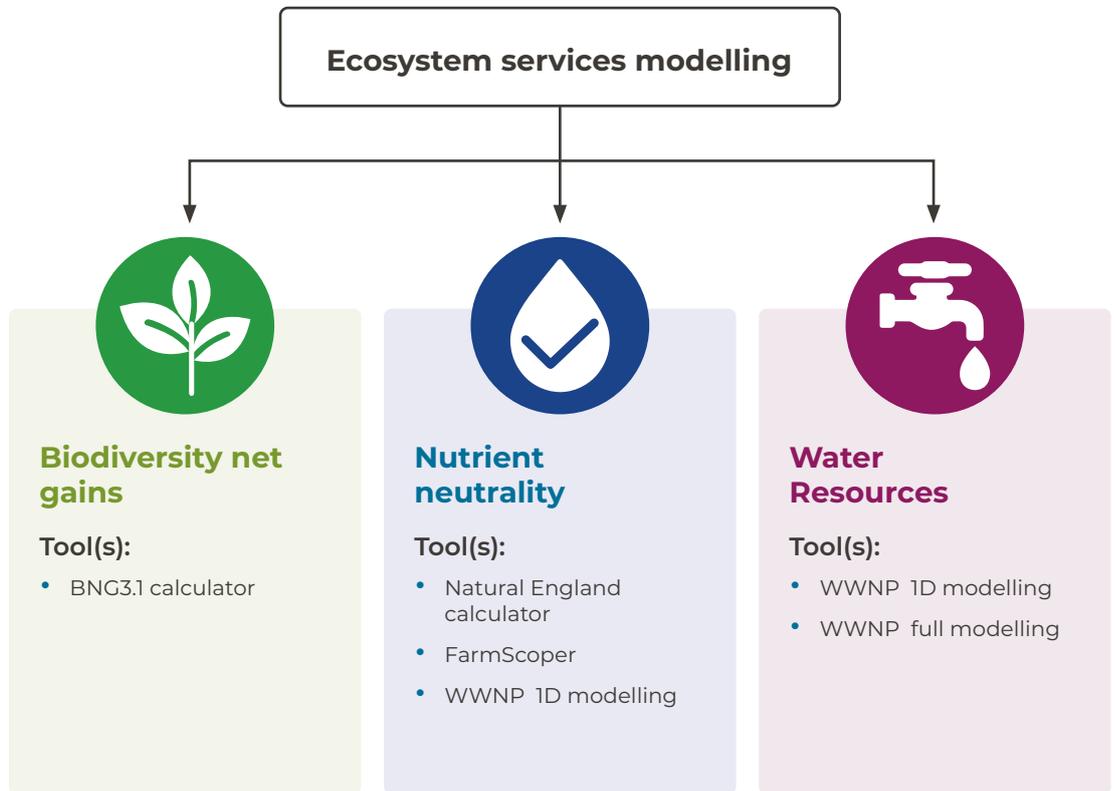
SECTION 4

Building the case  
for Nature-based  
Solutions

Figure 8 represents how the NWSP's methodology combined the three assessment tools into a single, *NbS portfolio tool* for the assessment of ecosystem services delivery.

The NbS portfolio tool allows users to input an area for the delivery of NbS (e.g. 1,000 hectares of soil management) and creates a spatially distributed portfolio of NbS based on modelling of where NbS can be positioned in the landscape. It then calculates delivery against infiltration, nutrient mitigation and biodiversity uplift metrics.

Figure 8 – Model framework and constituent models used in impact calculations.



SECTION 4

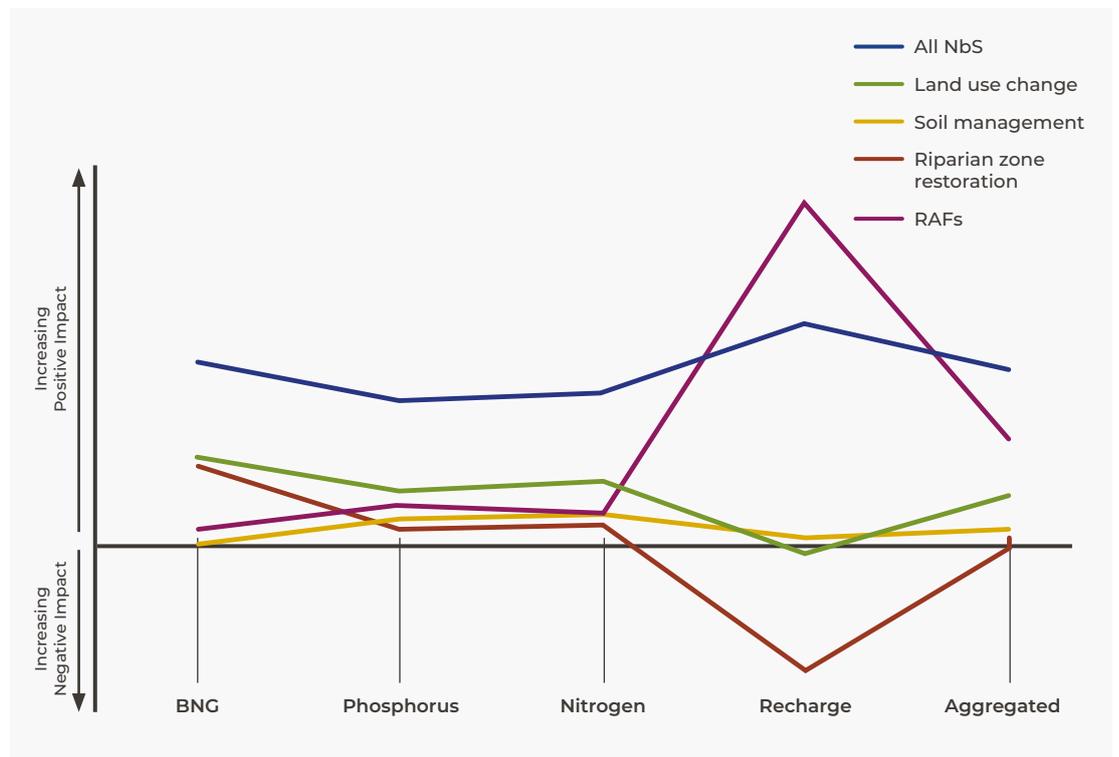
Building the case  
for Nature-based  
Solutions

### 4.2.2 Trade-offs in ecosystem services delivery

Using the tool described in Section 4.2.1, the efficacy of implementing different NbS portfolios can be explored in relation to several key indicators for the delivery of ecosystem services. This shows that trade-offs exist between the implementation of different combinations of NbS, with the implementation of any single NbS potentially maximising outcomes for one indicator (e.g. phosphorus mitigation) but leading to sub-optimal outcomes for others (Figure 9).

A key finding is that implementing a balanced portfolio of different NbS helps deliver against multiple objectives, particularly delivery against water resources and water quality outcomes. This finding is in line with a study conducted by Imperial College in partnership with the NWSP which looked at NbS implementation in the Wensum and Yare catchments ([Liu et al., 2023](#)). This helps inform the portfolio building steps described in Section 4.3.2.

Figure 9 – Results of ecosystem services delivery from differing degrees of NbS implementation against multiple indicators.



SECTION 4

Building the case  
for Nature-based  
Solutions

## 4.3

### Step 3: Estimate costs and the size of proposed portfolio

#### 4.3.1

##### Costs

The cost component for this business case can be divided into two main categories:

- Programme expenditure, which corresponds to Water Fund feasibility studies, Water Fund set-up, and administrative and management costs.
- NbS design, implementation and maintenance costs.

**Programme expenditure** is mainly driven by Water Fund staff costs (74% of total costs). To manage the proposed portfolio of 91 projects (see further down this section), we have assumed a team of three full-time equivalent staff grows to six full-time equivalent after a ramp-up phase of one year. Assumptions for human resources costs are standard for the UK market and have been validated with WRE.

**Design costs** are different for Nutrient Neutrality and BNG. In particular, Nutrient Neutrality projects require baselining to evaluate the phosphorus and nitrogen potential. For some NbS, such as soil management, land use change from arable to grassland and riparian restoration, this baselining can be done, if data is available, through modelling. However, runoff attenuation features require sampling which can be expensive given the need to capture specific rainfall events (we have assumed £5,000 per project).

**NbS implementation and maintenance costs** have been estimated from different sources, including a NbS database commissioned from Mott MacDonald by the NWSP, a Wetlands for life report on constructed farm wetlands ([WWT-Mackenzie, S.M. and McIlwraith, C.I., 2015](#)), and discussions with local stakeholders with expertise in NbS such as the Wendling Beck Environment project. These costs are presented in Table 5.

**SECTION 4**

Building the case for Nature-based Solutions

Table 5 – Implementation and maintenance costs of selected NbS.

Metric	Implementation		Maintenance	
	Quantity	Unit Cost	Quantity	Unit Cost
Soil management - cover crops	173	£/ha.	173	£/ha./year
sRAFs (200 m <sup>2</sup> )	6,250	£/feature	625	£/feature/year
cRAFs (5,000 m <sup>2</sup> )	26,563	£/feature	2,656	£/feature/year
Land use change (arable to grassland)	5,490	£/ha.	619	£/ha./year
Riparian restoration	7,541	£/ha.	1,488	£/ha./year

Note that riparian restoration is assumed to be a mix of land use change from arable to grassland (64%) and from arable to woodland (36%). This has been estimated based on opportunities for woodland implementation in the selected catchments.

Maintenance costs are recurrent each year throughout the model timeframe, to make sure that the conditions that led to the monetisation of benefits through the Nutrient Neutrality or BNG markets are adequately maintained over their respective regulatory periods.

### 4.3.2 Modelled portfolio

#### Prioritisation methodology

To allocate this budget to the different NbS, we have designed a prioritisation methodology based on the following five criteria: lifecycle implementation and maintenance costs, water quality uplift, water quantity uplift, biodiversity uplift and acceptability to landowners. We have applied the same weight to all five criteria, to reflect the importance of all these objectives. These weights could be changed should more focus be placed upon specific aspects (e.g. water quality, or cost efficiency).

Also note that, even though some NbS have better results than others, we have opted for a balanced portfolio (i.e. not 100% composed of the top ranked NbS) since there is a degree of uncertainty regarding the performance of each NbS, and the reality on the ground is that the actual NbS implemented will depend on landowners' preferences, local conditions etc.

#### A realistic investment size based on potential A-WINEP budget for NbS

The total investment value one can use to construct a business case depends on several factors and the overall objective of the exercise. Rather than presenting a theoretical, large-scale portfolio of interventions, we have focused on a reasonable investment size that both corresponds to realistic short to medium term availability of funds and can guide local stakeholders in their decision-making processes.

**SECTION 4**

Building the case for Nature-based Solutions

In order to do this, we have bench marked the total costs against Anglian Water's A-WINEP investment proposal for the 2025-2035 period, including the anticipated match funding at a rate of 70%. Given the NbS maintenance and monitoring obligations that will extend beyond 2035, the total modelled costs sum up to £29.9 million (equivalent to £54.2 million not discounted).

It should be noted that final approval of A-WINEP investment rests with Ofwat through the standard PR24 price review process which is due to conclude in December 2024. As a result, it could be subject to significant revision. That said, around £30 million is considered to represent a realistic scale of investment for planning purposes.

From the costs presented in the previous section, and based on the prioritisation methodology described above, this discounted budget allows for the implementation of a portfolio of 568 hectares, composed as shown in Table 6 below. Note that implementation is modelled to last for five years from 2025.

We have assumed that this portfolio would be composed of projects grouping different NbS. To estimate the total number of projects, we have made assumptions on the maximum number of hectares or features that could be implemented on an average farm of 87 ha. ([UK Government, 2023](#)). Aware of the challenges posed by changes in land use, we have assumed that cover crops could be implemented on 5% of arable land, that no more than 2% of arable land could be converted to grassland plus 2% used for riparian restoration. Last, we estimated that 2 sRAFs and 2 cRAFs could be implemented on each farm. This results in a total number of 91 projects for the modelled portfolio.

Table 6 – Proposed portfolio of NbS for Norfolk based on A-WINEP budget.

Nature-based solution	Implemented
Soil management - cover crops	293 ha.
sRAFs	2 ha. / 43 features
cRAFs	31 ha. / 156 features
Land use change (arable to grassland)	180 ha.
Riparian restoration	62 ha.
<b>Total</b>	<b>568 ha.</b>
Total number of projects	91

**SECTION 4**

Building the case for Nature-based Solutions

**Portfolio area and impact**

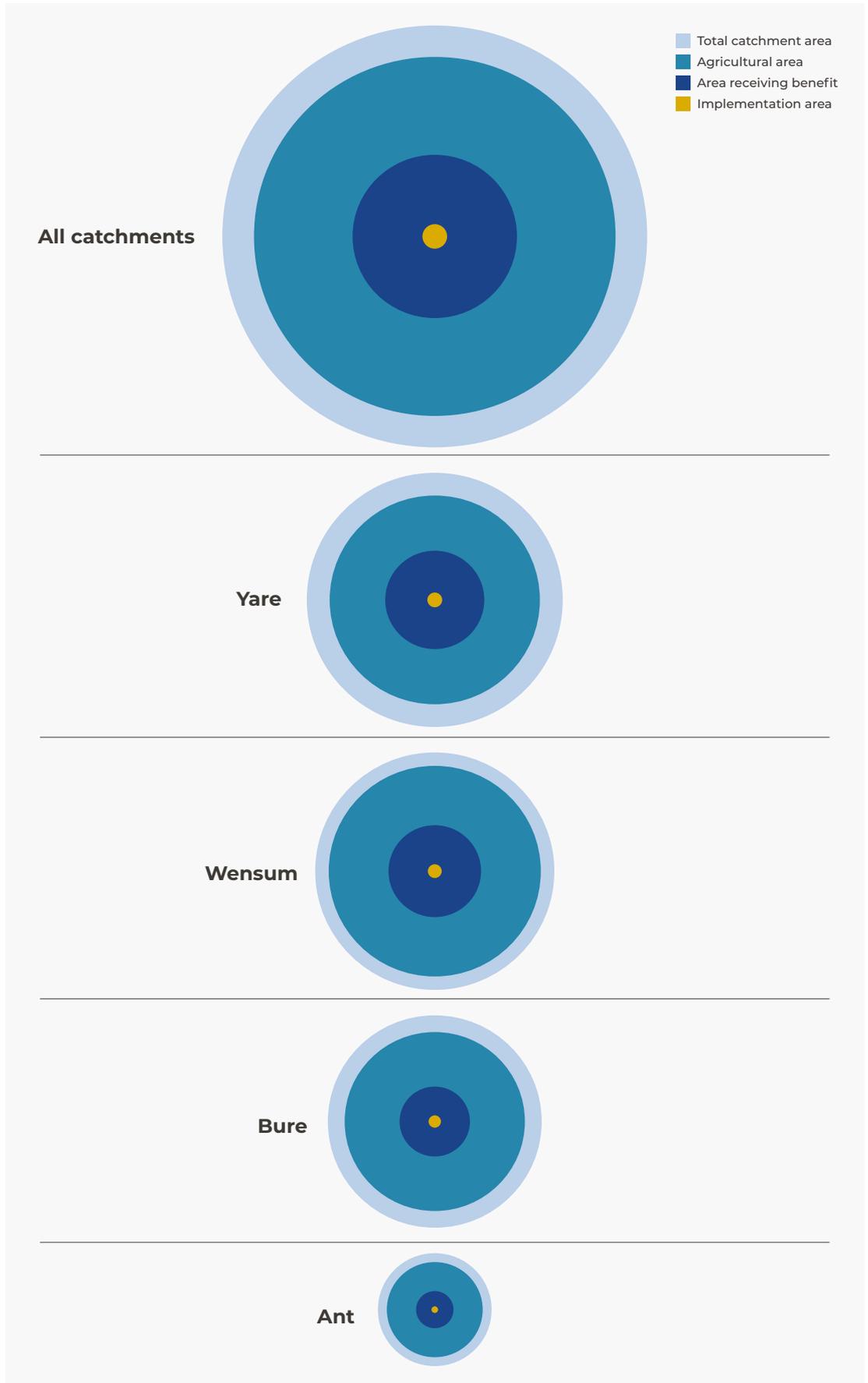
The portfolio considered within our business case analysis represents a relatively modest spatial footprint in terms of the landscape of Norfolk. Table 6 shows that the area targeted for NbS implementation only represents an area of 568 Hectares, or around 0.3% of the total area of the Wensum, Yare, Bure and Ant combined. Ecosystem Services modelling shows that the area which will receive benefits from these interventions – whether this be from improved water quality or increased availability of water – is, however, 40 times larger than the implementation area (Table 7 and Figure 10).

Table 7 – Relative size of catchment compared with agricultural area, area suggested for NbS implementation, and the area benefitting from NbS implementation.

Catchment	Total Catchment Area	Agricultural Land (Percent of total)	Area NbS Implemented (Percent of total)	Area Benefitting from NbS (Percent of total)
Wensum	57,703	43,746 (76%)	200 (0.35%)	8,105 (14%)
Yare	65,411	44,032 (67%)	224 (0.34%)	10,561 (16%)
Bure	45,737	32,488 (71%)	121 (0.26%)	5,600 (12%)
Ant	13,033	8,931 (69%)	23 (0.18%)	1,550 (12%)
<b>All catchments</b>	<b>181,884</b>	<b>129,196 (71%)</b>	<b>568 (0.31%)</b>	<b>25,817 (14%)</b>

**SECTION 4**  
Building the case  
for Nature-based  
Solutions

Figure 10 – Relative sizes of catchment, agricultural area and NbS implementation and benefit. Size of circles are directly proportional to the respective area.



SECTION 4

Building the case  
for Nature-based  
Solutions

## 4.4

### Steps 4a and 4b: Estimate economic benefits and revenue streams

#### 4.4.1

##### Economic benefits

To estimate the benefits of the proposed NbS to the Norfolk economy, we have adapted the methodology set by the Environment Agency for the appraisal of the Wider Environmental Outcome of WINEP investments. In particular, we have focused on the following metrics:

- **Water quality:** given the specificities of Norfolk and the impact of the Nutrient Neutrality regulation on the local economy, we have used the capacity to offset phosphorus and nitrogen as a proxy for water quality uplift. The market price has been estimated based on discussions with local stakeholders at £75,000 per kilogram for phosphorus and £1,000 for nitrogen. It sits within a range of between £55,000 – £100,000 for a kilogram of phosphorus publicly reported (see [Frank and Knight](#) and [Greenshank Environmental](#)). The value captures lifetime monetary value of the water quality benefit. For this reason, it is accounted for only once in the year following implementation, rather than annually as for the other benefits.
- **Water supply:** we have used the groundwater recharge potential as a metric to assess the benefit of NbS on water availability. In our base case, each cubic metre of additional infiltrated water is valued at £0.18/year, which corresponds to what can be observed for some replenishment schemes in the county.
- **Climate regulation:** we have compared the sequestration/emissions rates of the proposed NbS to the 'enclosed farmland' habitat type described in the WINEP methodology to estimate an annual volume of benefit, expressed in tCO<sub>2</sub>e/ha/year. For the proposed set of NbS, only land use change to grassland and riparian restoration generates actual benefits. This volume is then multiplied by the number of hectares implemented and the price for carbon proposed by the UK government ([Valuation of greenhouse gas emissions: for policy appraisal and evaluation, 2021](#)).
- **Air quality - pollution removal:** as for climate regulation, we have compared the removal rates for different pollutants (micro particles - PM<sub>2.5</sub>, sulphur dioxide – SO<sub>2</sub>, nitrogen oxides – NO<sub>2</sub> and ozone – O<sub>3</sub>) of the proposed NbS to the 'enclosed farmland' habitat type, and multiplied the results by the monetary value indicated in the WINEP methodology (corrected for inflation). Results are not significant, except for riparian restoration which, thanks to its woodland component, contributes to removing 0.004 tonnes of micro-particles (PM 2.5) which present a very high value according to the methodology (£1.8 million per tonne).

**SECTION 4**

Building the case for Nature-based Solutions

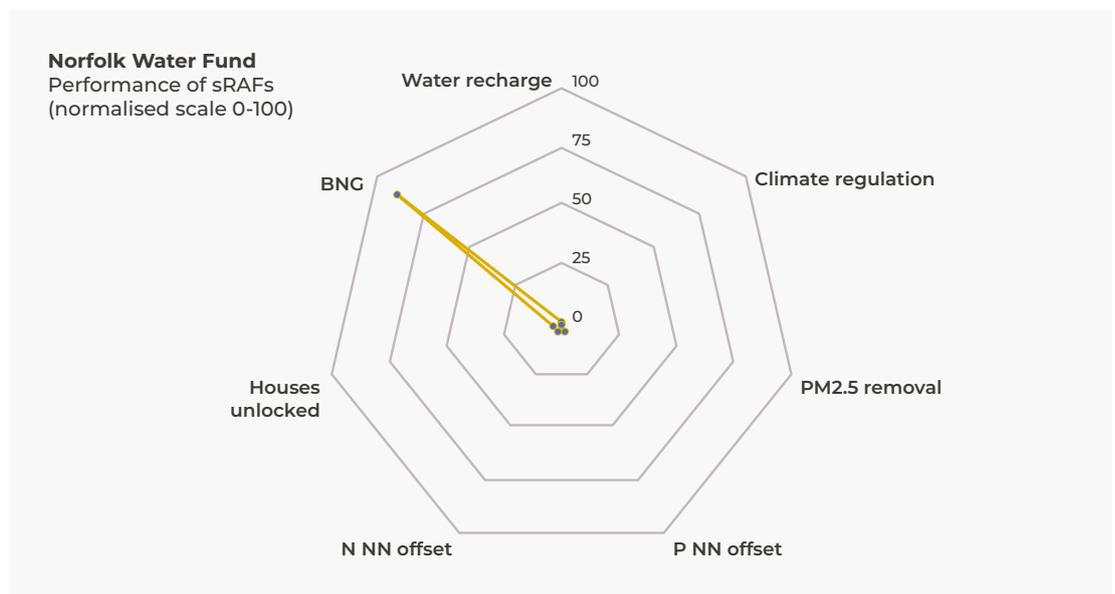
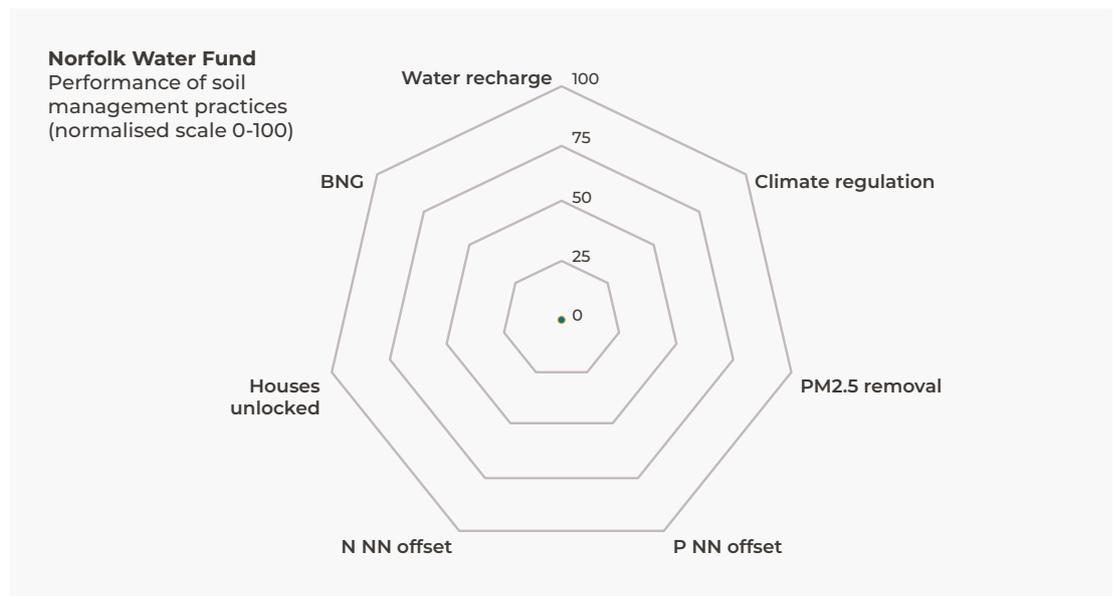
In addition to these metrics, we have also considered the value of unlocking housing development stalled by the Nutrient Neutrality regulation. For this, we have used the value of £154,281 per house calculated by Lichfields on behalf of the House Builders Federation ([Lichfields, 2022](#)). We have applied a correction factor of 25%, to reduce the effect of potential biases, resulting in a value of £115,711 per house in our base case. As for water quality, this benefit is accounted for only once, in the year after implementation.

Note that, as advised by the WINEP methodology provided to water companies by Ofwat and Environment Agency, we have not captured the undeniable biodiversity importance of the proposed interventions, given both the difficulty to value it and the risk of double counting.

Figure 11 compares the performance of the selected NbS for each type of benefits and presents the economic value per metric used in the base case.

Figure 11 – Benefits of selected NbS and their unitary economic value.

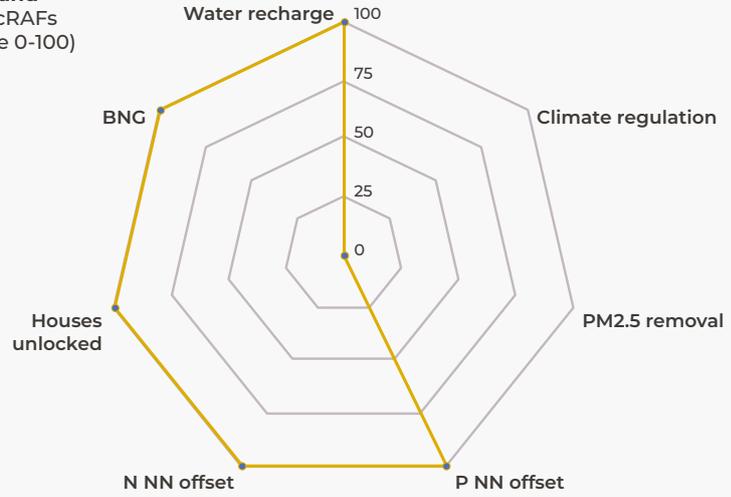
Note: these charts compare the performance of each selected Nature-based Solution for the ecosystem services analysed in the business case. A value of 0 in the normalised 0-100 scale does not imply an absence of benefit, but rather shows that the specific solution performs poorly compared to others solutions in the analysis



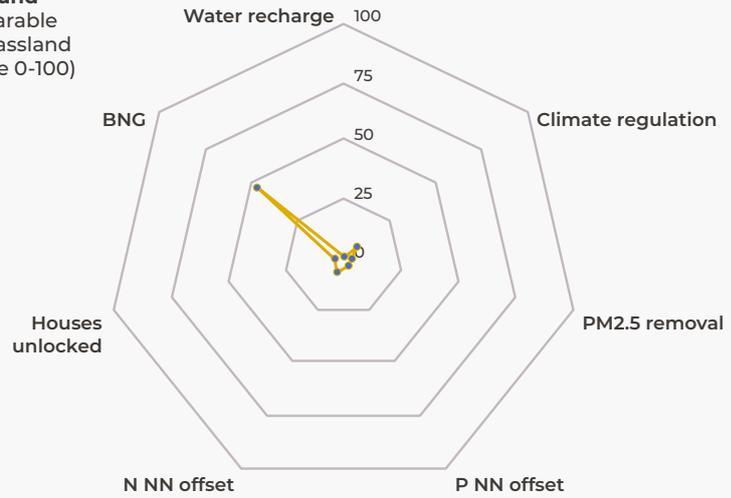
**SECTION 4**

Building the case for Nature-based Solutions

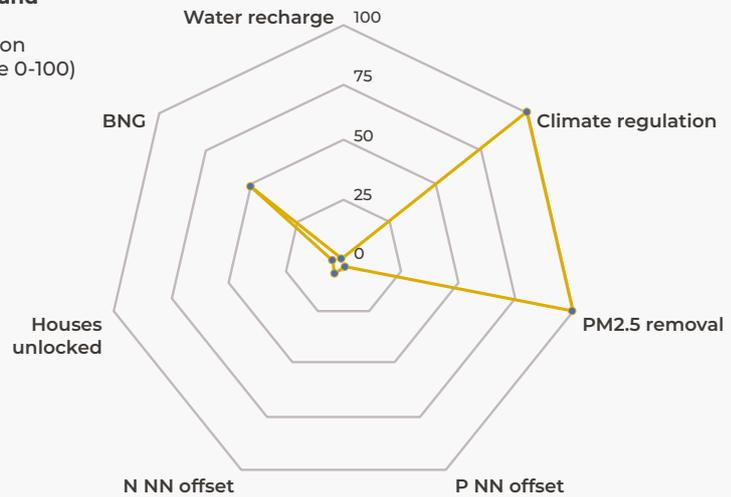
**Norfolk Water Fund**  
Performance of cRAFs  
(normalised scale 0-100)



**Norfolk Water Fund**  
Performance of arable conversion to grassland  
(normalised scale 0-100)



**Norfolk Water Fund**  
Performance of riparian restoration  
(normalised scale 0-100)



SECTION 4

Building the case  
for Nature-based  
Solutions

## 4.4.2

### Revenue streams

The business case focuses on potential revenue streams from the sale of phosphorus and nitrogen Nutrient Neutrality offsets and BNG units. We have assumed that it is possible to stack<sup>4</sup> both revenue sources, as per the current guidance of the UK government on combining environmental payments<sup>5</sup>.

### Nutrient Neutrality

Revenue streams have been assessed by multiplying the volume of phosphorus and nitrogen offsets (in kg/year) by their market prices, which we have estimated to be of £75,000 and £1,000 respectively (see 4.4.1 for source).

It is important to recognise that the Nutrient Neutrality market size is limited by the number of homes needing to be offset and the availability of mitigation credits from elsewhere. To calculate this cap, which is based on maximum phosphorus and nitrogen loading in the area of study and average emissions from typical households, we have used the results of the Royal Haskoning Norfolk Nutrient Guidance report of April 2023.

Payments for offsets are received upfront, once the project and its expected uplift is validated by the Local Planning Authority. However, payment timing can vary depending on whether monitoring is required to establish a baseline and impact. For projects that can be robustly modelled (soil management, conversion of arable to grassland and riparian restoration), we have assumed that offsets can be validated in the same year that implementation occurs. For projects requiring monitoring before credits can be claimed (RAFs), we have assumed two years to allow for implementation plus baseline building.

In all cases, the upfront payment means that landowners receive a single instalment for benefits generated in perpetuity (125 years). As a result, payment rates and contracts should cover obligations to adequately maintain NbS over that timeframe.

### Biodiversity Net Gain

The BNG units market functions in the same manner as for Nutrient Neutrality. The volume of BNG units generated by each NbS, depending on the habitat type created (see Section 4.1), is multiplied by the market value that we have assumed to be of £30,000 per unit, based on local market intelligence. This results in a unit price that is significantly cheaper than the statutory scheme (as anticipated) and within the range of early trades reported by [Townsend Chartered Surveyors](#).

The size of the market is also capped and depends on annual demand, which is driven by infrastructure development in the county. We have estimated an annual maximum volume of 215 units based on local market intelligence.

<sup>4</sup> Stacking: multiple credits or units from different nature markets are sold separately from the same activity on a piece of land.

<sup>5</sup> See: <https://www.gov.uk/guidance/combining-environmental-payments-biodiversity-net-gain-bng-and-nutrient-mitigation>.

**SECTION 4**

Building the case for Nature-based Solutions

Once duly registered and a conservation covenant in place, units can be sold. Payment can be claimed upfront in compensation for a discount to account for uncertainty on outcomes. This is what we have modelled in the business case.

The number of Nutrient Neutrality offsets and BNG units generated by each selected NbS, as well as their market value is detailed in Table 8.

Table 8 – Volume and market value of P and N Nutrient Neutrality (NN) offsets and BNG units.

	Metric	P NN offset		N NN offset		BNG	
Economic value	GBP/metric	75,000		1,000		30,000	
Soil management - cover crops	ha.	0.10	5th	4.59	5th	0.00	5th
<b>Runoff Attenuation Features (RAFs)</b>							
sRAFs (500 m <sup>2</sup> )	ha.	0.28	4th	12.33	4th	4.35	2nd
cRAFs (2000 m <sup>2</sup> )	ha.	5.33	1st	234.00	1st	4.85	1st
Land use change (arable to grassland)	ha.	0.32	2nd	21.30	2nd	2.30	4th
Riparian restoration	ha.	0.30	3rd	20.46	3rd	2.38	3rd

## 4.5 Steps 5a and 5b: Economic benefits and financial performance

Our analysis demonstrates that a diversified portfolio of NbS can generate significant economic benefits for Norfolk. The benefit to cost ratio of the modelled interventions is of 6.7, meaning that, for each £1 invested, £6.70 worth of benefits could be unlocked.

As detailed in Table 9 and represented visually in Figure 11, housing development represents the majority of the benefits (1,720 houses unlocked - 79%). However, even without taking housing development into consideration, benefits still exceed costs, with a benefit-to-cost ratio of 1.4. This results from the benefits to Norfolk catchments of offsetting 273 kg/year of phosphorus, 13,794 kg/year of nitrogen, and an additional groundwater recharge volume of 3.8 million cubic metres per year.

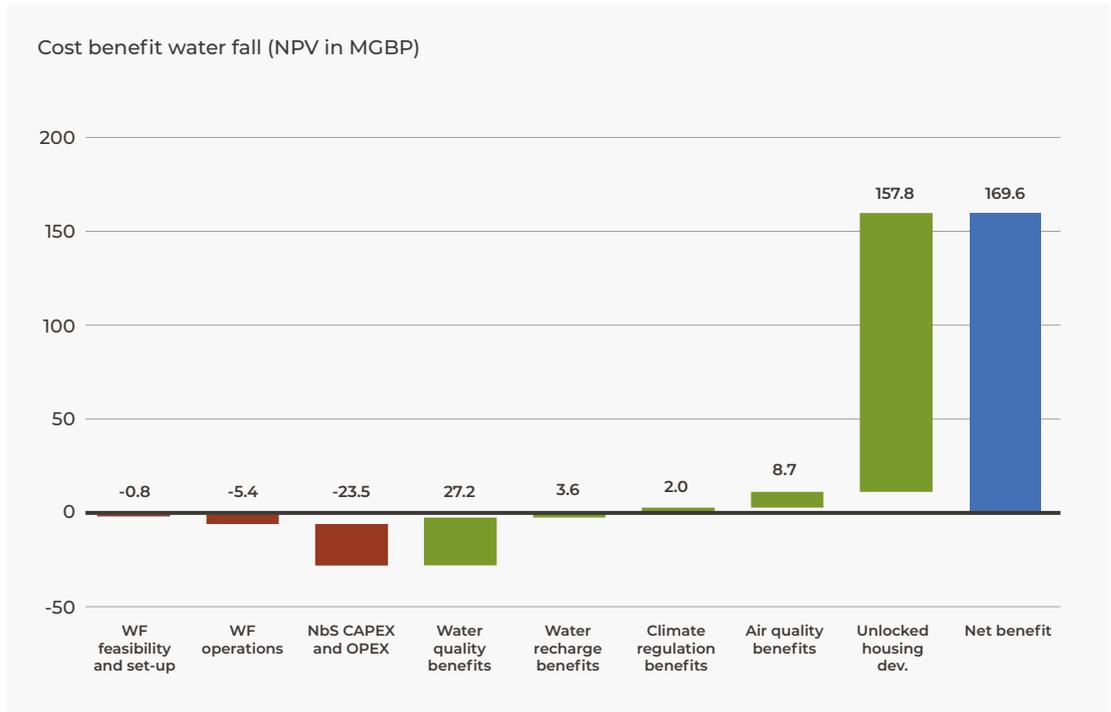
**SECTION 4**

Building the case for Nature-based Solutions

Table 9 – Summary of cost benefit analysis.

<b>Cost benefit analysis - Economic value of NbS portfolio to Norfolk</b>			
<b>Total costs</b>	29.9		
Programme costs (set-up, admin. and management)	6.3	21%	m GBP (NPV)
Design, implementation and maintenance costs	23.6	79%	m GBP (NPV)
<b>Total benefits for the Norfolk economy</b>	<b>199.4</b>		
Adapted WINEP methodology	41.6	21%	m GBP (NPV)
Water quality benefits	27.2	14%	m GBP (NPV)
Water recharge benefits	3.6	2%	m GBP (NPV)
Climate regulation benefits	2.0	1%	m GBP (NPV)
Air quality benefits	8.8	4%	m GBP (NPV)
Other economic benefits to the Norfolk economy	157.8	79%	m GBP (NPV)
Housing development	157.8	79%	m GBP (NPV)
<b>Benefit to cost ratio</b>			
Adapted WINEP methodology		1.4x	Multiple
All benefits		6.7x	Multiple

Figure 12 – Lifetime costs and benefits of investing in NbS for Norfolk.



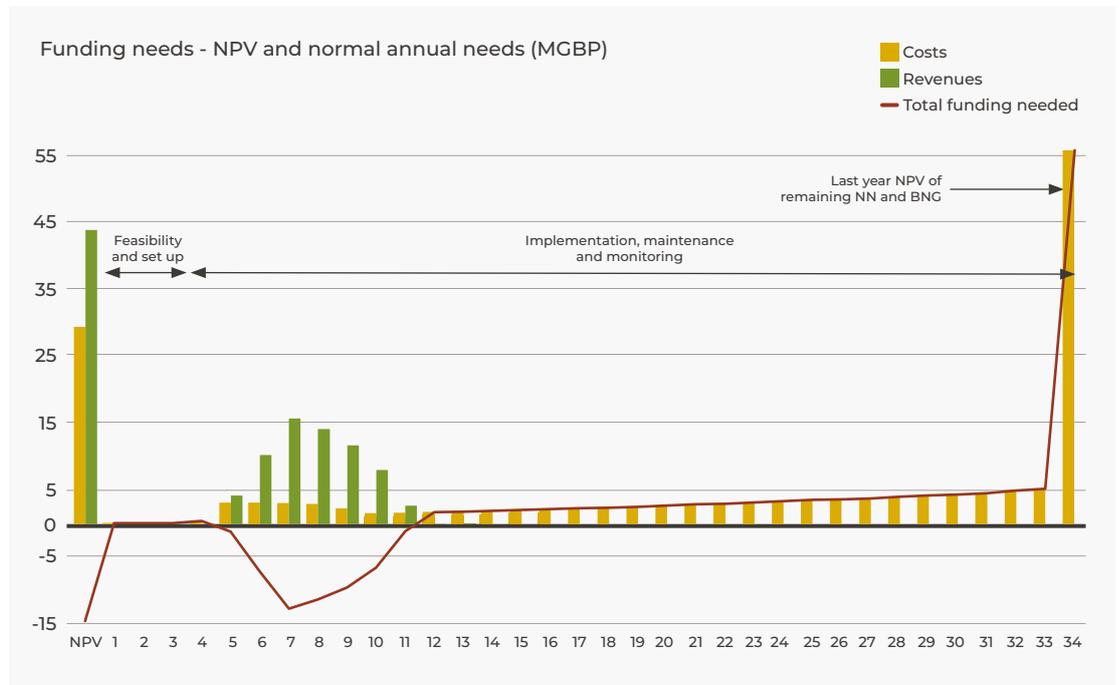
**SECTION 4**

Building the case for Nature-based Solutions

In terms of financial performance, the modelled portfolio covers its funding needs. The total revenue to cost ratio stands at 1.5, and the portfolio's discounted net present value is of £14.8 million. This results from the sale of 273 P NN offsets, 13,794 N NN offsets, and 723 BNG units, representing 3%, 19% and 11% of estimated market demand, respectively.

It is important to note that Nutrient Neutrality and BNG units markets have distinctive cash flow profiles, with both upfront investment and revenues, and long term maintenance and monitoring obligations. This suggests a need to mobilise bridge financing to cover design and implementation costs until NN offsets and BNG unit sales are made, as well as adequate management of the proceeds from these sales, in order to avoid cash shortfalls in subsequent years (Figure 13).

Figure 13 – Total and annual funding needs of the proposed portfolio of NbS.



## 4.6 Scaling delivery and benefits: going beyond BNG and NN revenues

As demonstrated in preceding sections, the portfolio we have included in our business case is capable of delivering significant environmental gains, which translate to economic benefits for the wider Norfolk economy. This analysis also shows that implementation costs could be offset through revenues generated via private markets (namely BNG and Nutrient Neutrality).

That said, revenues from BNG and Nutrient Neutrality are limited by the scale of those markets. Our analysis indicates these private markets could unlock an important but relatively small proportion of the overall benefits offered by NbS. This suggests NbS have the potential to play a much greater role in protecting and enhancing Norfolk's unique water and wetland environment while supporting sustainable economic growth.

**SECTION 4**

Building the case  
for Nature-based  
Solutions

For water resources, our work with the [Environment Agency's Working with Natural Processes \(WWNP\) initiative](#) looked at the potential of NbS to deliver water resources benefits and low flow uplift. This demonstrated that implementing around 700 Runoff Attenuation Features across the Wensum could lead to a 5% increase in flows in the lower Wensum, whilst also adding between 150 and 450 megalitres of water to groundwater storage in an average year. According to our NbS costing, this would cost around £70 million. For reference, the same modelling suggests this is the same magnitude of benefit for low flows in the Wensum than if all surface and groundwater abstractions were to cease across the catchment.

For water quality, biophysical modelling shows that a portfolio of around £200 million could deliver around 1,500 kilogrammes of phosphorus and 75,000 kilogrammes of nitrogen mitigation across the Wensum, Yare, Bure and Ant. SAGIS modelling commissioned by Anglian Water suggests that there is no technically feasible route to meeting water quality targets through large scale end of pipe sewage investment. As such, the level of nutrient mitigation which could be delivered by a larger portfolio of NbS could play a central role in reducing damaging nutrient loads alongside other interventions such as urban green infrastructure and the upgrading of private sewage systems.

These costs may seem high but have to be compared with a counterfactual involving large, engineered infrastructure with an associated carbon footprint for construction and operation. Instead, NbS treat the problem at source and have the potential to generate environmental, socio-economic and wellbeing co-benefits.

**These larger portfolios represent a significant value proposition to the wider Norfolk economy and have the potential to:**

- Deliver against targets for meeting site condition for water and wetland Special Areas of Conservation (SACs).
- Improve environmental and abstractor resilience by mitigating drought impacts on low flows.
- Contribute to nature recovery that benefits wildlife and community wellbeing and Norfolk's tourist economy.
- Generate new, diversified sources of income for farmers and landowners.

The portfolio presented in our business case represents a significant first step in unlocking NbS and testing implementation and financing models for their delivery.

Securing delivery of NbS at a larger scale to unlock further benefits described above will require innovative thinking in terms of how private and public funding is structured to capture the full range of co-benefits to private business and wider public goods including the community health and wellbeing.

## Section 5

---

# Learnings and recommendations from the business case



Section 5

# Learnings and recommendations from the business case

SECTION 5

Learnings and recommendations from the business case

As well as informing Norfolk's stakeholders about the relevance of Nature-based Solutions to the county, we want to share the lessons learned in developing this business case and contribute to the public debate about how to best achieve water, environmental and economic objectives in this type of context.

## 5.1

### Not all selected NbS are created equal, but almost all make reasonable economic and financial sense

As discussed in Section 4.3.2, we have opted for a balanced portfolio, composed of NbS targeting different water security challenges. This is all the more important as, in addition to the ecosystem services assessed in this business case, each NbS can generate significant additional value (e.g. pollination, recreational value, biodiversity) that should not be overlooked. Still, it is interesting to compare the performance of each NbS, to guide both landowners and financiers.

Table 10 shows that land use change from arable land to grassland and riparian restoration are the most attractive solutions from a financial standpoint, while delivering significant benefits to the wider Norfolk economy. They present roughly the same profile, but riparian restoration outperforms thanks to significant pollution reduction benefits. However, even though they are attractive on paper, it should be noted that wholesale change in land use might not be readily adopted by all farmers.

Table 10 – Comparative analysis of NbS economic and financial performance.

	Economic benefits - benefit to cost ratio				Financial performance	
	with housing		without housing		revenue to cost ratio	
Soil management - cover crops	6.6x	1st	1.1x	3rd	1.1x	4th
sRAFs	0.2x	5th	0.0x	5th	0.1x	5th
cRAFs	6.1x	2nd	1.4	2nd	1.4x	3rd
Land use change (arable to grassland)	2.6x	4th	1.1x	4th	2.3	1st
Riparian restoration	4.0x	3rd	4.1	1st	2.0x	1st
<b>Total portfolio</b>	<b>6.7x</b>		<b>1.4x</b>		<b>1.5x</b>	

Note: administrative costs are allocated to NbS according to weight of their lifecycle costs relative to total portfolio costs.

---

**SECTION 5**

Learnings and  
recommendations  
from the  
business case

**Catchment Runoff Attenuation Features (cRAFs)** are also greatly attractive to the Norfolk economy as they provide an efficient way of tackling both water resources and water quality challenges. Moreover, their expensive lifecycle costs are covered by the revenue they generate from both NN and BNG. This could arguably be the most interesting solution for Norfolk.

**Cover crops** are a cheap way to create benefits for Norfolk, mainly through the unlocking of housing development (benefit to cost ratio of 6.6, best amongst all NbS).

However, their revenue to cost ratio is low, at just 1.1 and greatly depends on the possibility to combine different NbS to dilute preparation costs (see next section). Also, without BNG revenues, this solution will be very sensitive to actual N and P offset performance, market prices and the ability to secure NN delivery over 125-year period. Thus, it might not always be viable as a NN solution on a standalone basis. Landowners willing to focus only on cover crops might rather turn to Environmental Land Management Schemes (ELMS) for funding, which could cover total implementation costs for 5 years (Countryside Stewardship code SW6) or look to offer short-term NN agreements to bridge the gap until long-term solutions are put in place.

Despite a relatively better performance for water quality, quantity and BNG uplift than other selected NbS (except cRAFS), **Surface Runoff Attenuation Features (sRAFs)** end up ranking fifth and last in terms of economic benefits and financial performance due to high lifecycle costs compared to monetisable benefits. Yet, sRAFs should not be discounted particularly if, at the project scale, there are site-specific opportunities to deliver at lower costs and better performance than the model anticipates.

Overall, combining all solutions create a portfolio that balances benefits to the economy, financial performance, and attractiveness to landowners.

It is important to keep in mind that this business case has been built based on averages, in particular for biophysical metrics and for costs. It is especially sensitive to phosphorus, nitrogen, and biodiversity uplifts, as well as to the market value of NN offsets and BNG units and the discount rate used. However, even though there might be an optimism bias in the values used, stress tests show that results are not massively altered by significant changes in main assumptions (Figure 14 and Figure 15). In any case, it will be key, in the next phase of the NWSP, to identify the locations with the best enabling conditions to maximise benefits and revenues, especially if repayable finance schemes are explored to finance projects.

---

**SECTION 5**

Learnings and recommendations from the business case

Figure 14 – Sensitivity of economic benefits to +/- 20% changes in main assumptions.

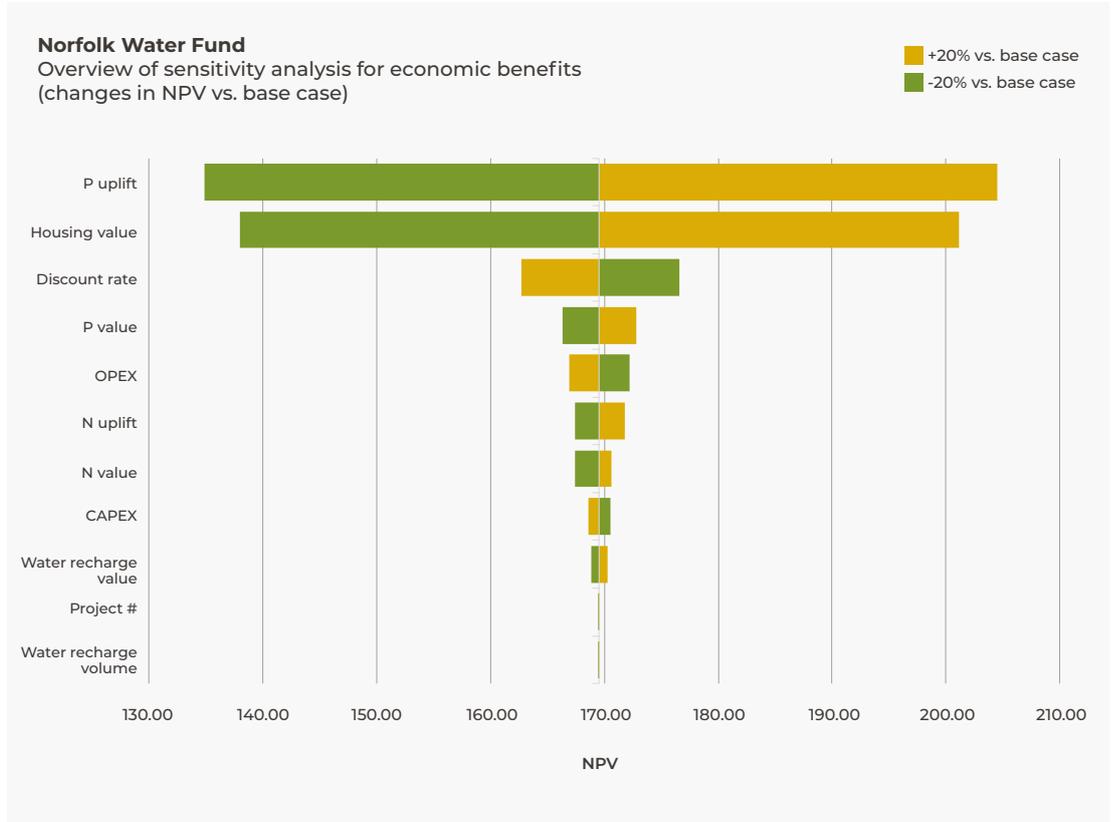
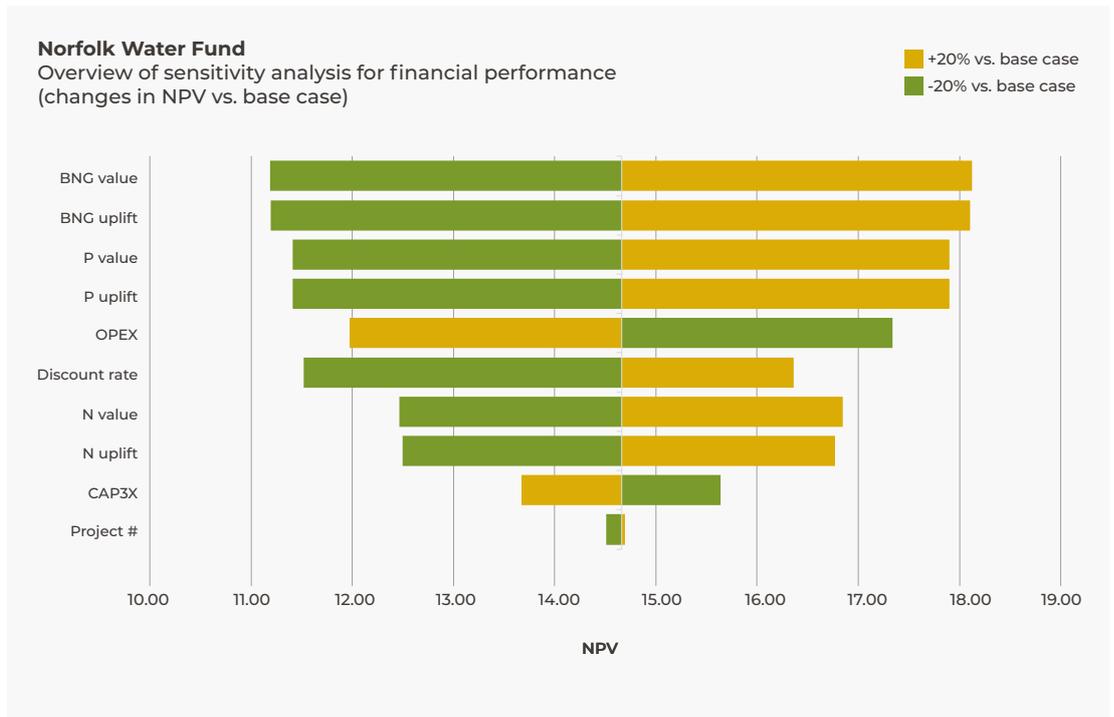


Figure 15 – Sensitivity of financial performance to +/- 20% changes in main assumptions.



SECTION 5

Learnings and recommendations from the business case

## 5.2

### To stack or not to stack?

As explained in Section 4.4.2, it is currently possible to generate, from the same piece of land and set of NbS, revenue streams from both Nutrient Neutrality and BNG markets. Stacking entails more complexity and higher preparation costs. The question for landowners naturally is: is it worth it?

To answer this, we have compared the revenues to costs ratios of each NbS in three scenarios: a) NN only over 125 years, b) BNG only over 30 years, and c) NN and BNG. See Table 11 and Figure 16 for a summary of our findings, including the best scenario for each NbS type.

Note that, contrary to the analysis presented in Section 4.5, we have not included here administrative and management costs, which were previously distributed to each NbS based on the weight of their implementation area in the total portfolio. Also, we have not grouped NbS into projects, which means that project preparation costs weigh fully on each NbS. This different approach allows for a clear understanding of revenue:cost ratios for individual NbS types. Compared to a portfolio approach, this approach favours RAFs, which have expensive lifecycle costs, and penalises other cheaper solutions, especially cover crops, for which preparation costs are high compared to investment and maintenance costs.

An interesting finding is that, even though differences between the two best options are not dramatic, stacking NN and BNG only make sense for cRAFs, because multiple revenue streams help absorb high lifecycle costs. For other NbS, BNG gives the best return with the exception of cover crops, as they do not generate BNG units.

Our analysis suggests that returns from the Nutrient Neutrality market will not be attractive enough to deliver land use change, buffer strips or cRAFs. Moreover, landowners entering the BNG market could consider adding a Nutrient Neutrality component, but gains are not significant (except for cRAFs) and certainly limited when additional regulatory complexity and contract length are considered.

It is also important to note that the sizes of the Nutrient Neutrality and BNG markets are both capped and that revenues will be limited by the size of the market in the county. Therefore, the financial performance of the business case presented will not be scalable beyond the point where demand is met. Our analysis shows that, a portfolio with the same NbS composition and designed to saturate the BNG market would, on the one hand, generate too many nitrogen Nutrient Neutrality offsets, leading to investment inefficiency, and on the other hand provide just 30% of the phosphate mitigation required. This points to another constraint on the scale of opportunity for stacking BNG with NN and raises the question about what future forms of income could be deployed to support a mixed portfolio of NbS in Norfolk.

**SECTION 5**

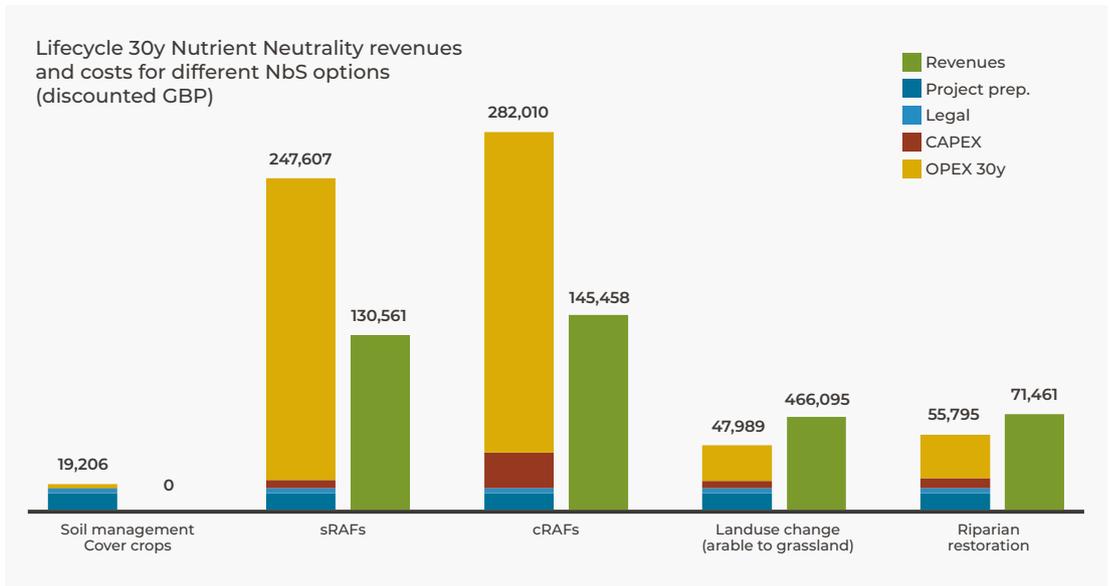
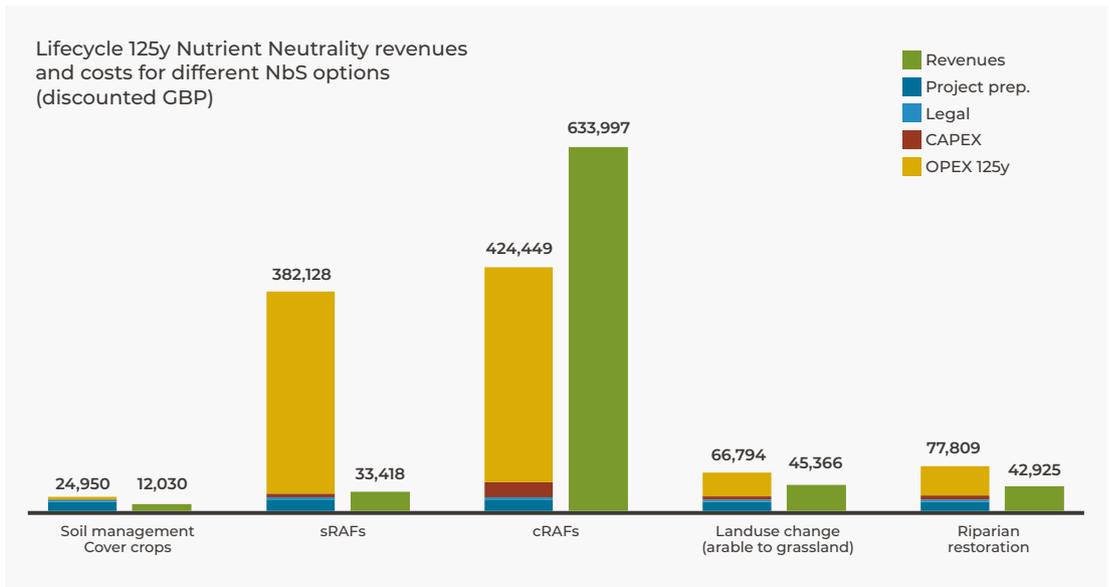
Learnings and recommendations from the business case

Table 11 – Stacking NN and BNG: comparing scenarios.

Revenue cost ratio	NN	BNG	NN=BNG		Best scenario
	125y	30y	125y and 30y		
Soil management - cover crops	0.5x	0.0x	0.3x	0.5x	NN
sRAFs	0.1x	0.5x	0.4x	0.5x	BNG
cRAFs	1.5x	0.5x	1.8x	1.8x	NN + BNG
Land use change (arable to grassland)	0.7x	1.4x	1.4x	1.4x	BNG
Riparian restoration	0.6x	1.3x	1.2x	1.3x	BNG

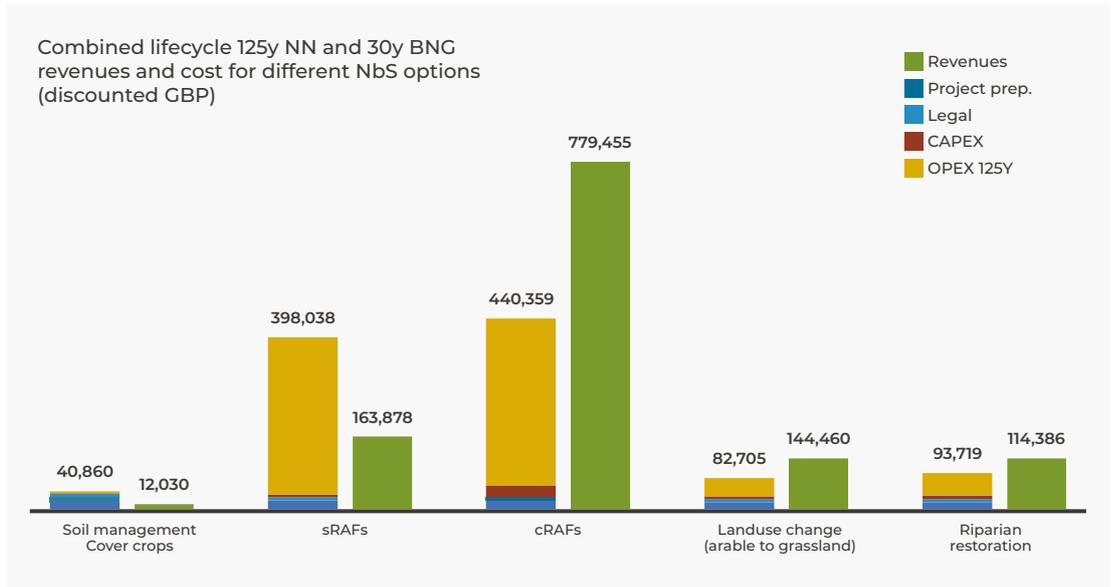
Note: administrative costs are allocated to NbS according to weight of their lifecycle costs relative to total portfolio costs.

Figure 16 – Comparing NN and BNG stacking scenarios.



**SECTION 5**

Learnings and recommendations from the business case



### 5.3

#### Actions to accelerate the adoption of NbS at scale in Norfolk

We list below a set of actions that will better incentivise the adoption of NbS at scale and how we plan to engage.

##### Mobilising up-front investment to share risk

Our work demonstrates there will be a significant gap between the upfront investment required to deliver and verify effectiveness of NbS and the generation of returns through the sale of Nutrient Neutrality and/or BNG credits (see Section 4.5).

Experience suggests farmers and lenders will be unwilling to put significant capital at risk to cover those up-front costs given the level of risk they see in an untested and innovative market. As a result, some form of up-front finance and risk-sharing will be required to encourage farmers to engage in early stages of the programme.

We have considered a variety of approaches that could achieve this by blending philanthropy, grants, water company funding, social impact investment, concessionary lending etc. Establishing a preferred option and the governance/ legal structures required to deliver support to farmers and landowners developing projects will be a key element of the next phase of our work.

##### Ensuring market stability to build confidence

As outlined above, risk and risk sharing are key considerations in the development of the NbS market. While we are looking at innovative ways of sharing and reducing financial risk, the fundamental issue for any investor is confidence that the market will remain stable over a long-enough period to earn a return.

We will work closely with regional stakeholders such as Norfolk Environmental Credits and Local Planning Authorities to bolster that confidence, and support those working at a national scale on nature markets to ensure we are sharing learning that can improve design, clarity and confidence over time.

**SECTION 5**

Learnings and recommendations from the business case

## 5.3.1

### Tackling barriers to long-term agreements

Our landowner engagement suggests that long-term agreements for Nutrient Neutrality (up to 125 years) could be a significant barrier to uptake of NbS. Concerns include financial considerations such as tax liability and financial viability over very long time periods; as well as more cultural/ethical questions around retaining flexibility for future family generations to make decision about farming and the food security implications of moving from food production.

Some of these concerns may be addressed through careful targeting of NbS, particularly in areas of low productivity or in landscapes farmers are keen to restore as a legacy for future generations. But we recognise that more needs to be done. So, we will continue to work with farmers, landowners, regulators and the wider NbS community to understand and help address barriers through our programme and pilot projects.

## 5.3.2

### Investing in building the evidence base to refine benefit estimates and support better decision making

Our modelling is based on draft NE guidance on estimating the effectiveness of NbS interventions on nutrient loads to Special Areas of Conservation (SACs). These take an inherently conservative view of available evidence, reflecting the precautionary principle required to protect these internationally important wildlife sites. We see an opportunity to refine the relatively limited evidence base these assumptions are made on through robust monitoring and evaluation of early schemes.

This would be most effective if carried out in a coordinated manner to ensure experimental design is replicable, maximising the impact of each scheme in order to build the evidence base for widespread dissemination.

#### Integrating NbS into strategic plans

The NWSP tries to prioritise NbS which can achieve holistic benefits for the prioritised catchments but will undoubtedly be further strengthened through interactions and collaboration with stakeholders working to develop strategic plans that will shape catchments and landscapes. This should, for example, include working with Norfolk County Council on their local nature recovery strategy, landowners and NGOs developing Landscape Recovery projects and catchment plans drawn up by CaBA groups. We intend to use the East of England Planning Hub as a tool for sharing geo-spatial information held by different parties interested in nature recovery and catchment planning and thus help optimise targeting and decision making.

**SECTION 5**

Learnings and  
recommendations  
from the  
business case

### 5.3.3

#### **Incentivising nature positive Nutrient Neutrality solutions?**

Engineered infrastructure, technological solutions and certain Nature-based Solutions can all be eligible as NN offsets. The current 'one-price for all' system will naturally drive actors to favour the most cost-efficient solutions. This can certainly make sense for infrastructure and technology, but is not appropriate for Nature-based Solutions, that generate a variety of co-benefits that cannot necessarily be valued and paid for. A methodology to incorporate these benefits could be developed and be the basis for a premium price for solutions that deliver wider environmental outcomes. The methodology proposed by the EA for WINEP could be a good starting point as could stacking public payments through ELMS where additionality can be proven.

### 5.3.4

#### **Improve returns on stacking by harmonising processes to reduce project preparation costs**

We have seen in the previous section that the financial attractiveness of NbS projects partly lies on the possibility to combine NbS to create economies of scale, and that stacking different revenue streams can be penalised by cost duplication. Harmonising processes for the NN and BNG markets could reduce costs and create incentives for adoption. The difference in the biophysical processes underlying NN and BNG can present a challenge, with little overlap possible for feasibility and baseline definition. However, some project preparation components, such as validation, registration and legal structuring could be aligned to avoid making 'stacked projects' overly complex. This is an area of rapid policy development and we will work with Local Planning Authorities and regulators to provide practical insights into how synergies between BNG, Nutrient Neutrality and other markets can be achieved.



**Section 6**

---

Norfolk leading the way: building a portfolio of flagship NbS projects

## Section 6

# Norfolk leading the way: building a portfolio of flagship NbS projects

61

### SECTION 6

Norfolk leading the way: building a portfolio of flagship NbS projects

Multiple projects are underway in Norfolk, looking at how NbS interventions can deliver improved outcomes for both the terrestrial and water environment. Whilst different projects are at varying scales and stages, each are great examples of how partnerships and innovative solutions can improve outcomes both for the environment and societal challenges.

Building on the experience of these existing projects, a key objective of the NWSP is to support partners delivering projects on the ground and generate valuable lessons which will reduce the barriers to entry for NbS project developers. The top-down effort to identify a viable portfolio of NbS for implementation described in Section 4 has been complemented by a bottom-up strategy of identifying and engaging with projects delivered on-the-ground across priority geographies for the NWSP. The long-term vision is for these two visions to interact, with knowledge gained through bottom-up projects reducing the uncertainty associated with the assumptions required in top-down business planning.



SECTION 6

Norfolk leading the way: building a portfolio of flagship NbS projects

## Norfolk NbS flagship projects



### Wendling Beck Environment Project (WBEP) – [WBEP](#)

is a pioneering habitat creation, nature restoration and regenerative farming project, spanning almost 2,000 acres of land north of the market town of Dereham. It is a collaboration between private landowners, local authorities, environmental NGOs, and Anglian Water, as well as a pilot under the [Natural Environment Investment Readiness Fund](#) programme. The project continues to inform national policy on an assortment of topics for land use change and private investment by delivering NbS and habitat improvements for emerging NN and BNG markets. This project is implementing regenerative farming practices alongside landscape-scale habitat creation and delivering a range of Nature-based Solutions for water, including 5.6KM of river restoration.



### Ingoldisthorpe Wetland – In 2018, Anglian Water and the Norfolk Rivers Trust partnered to [construct a new wetland](#)

adjacent to Ingoldisthorpe water recycling centre (WRC). One hectare in size, the wetland receives final effluent from the WRC and aims to use natural processes to remove pollutants such as ammonia and phosphate before returning the water to the River Ingol. Science is at the heart of the wetland project, whereby partners are continuously working with the Environment Agency to review its performance relative to the permitting standards set for final effluent discharge from the WRC.



### Riverlands – This [programme at The National Trust](#) aims

to restore some of the UK's most precious rivers. Since 2018, works have been underway in the headwaters of the Bure at Blickling and Felbrigg estates, along with surrounding landowners, to deliver water quality and habitat improvements through interventions such as sediment traps, river meandering and bank restoration.

## NWSP supported pipeline

The following projects exemplify how the NWSP works with key actors in the county and showcases the pipeline of projects being brought forward and supported by the programme.

### SECTION 6

Norfolk leading the way: building a portfolio of flagship NbS projects

#### **Nature for Norwich** is one of [WWF's six global Nature based Solution Accelerator projects](#).

This will be a close collaboration between WRE, Swallowtail Consulting (the team behind the Wendling Beck Environment Project) and the Crown Point Estate, focusing on their 2,000 ha. site next to the River Yare in Norwich. The project will explore the potential NbS to deliver water quality and biodiversity benefits, and ultimately identify optimal land use scenarios that strike a balance between positive outcomes for people and nature. This exploration and feasibility phase aims to create investible propositions by the end of 2024.

#### **Wensum NbS monitoring trials:**

Working in partnership between WRE and the Environment Agency, the project will use WWF and EA funding to ground truth the potential in the Wensum catchment for nature-based runoff attenuation features (RAFs) to slow down and store water from farmland to help replenish aquifers and support more resilient baseflows. Modelling suggests such features could be highly beneficial and cost effective, and the project will provide a real-world opportunity to test and validate these results. If the trials validate the models, it could pave the way for much greater investment in nature-based approaches to baseflow improvement.

#### **Home Farm, Sennowe (two sites):**

Norfolk Rivers Trust have identified two sites within the Wensum catchment that have potential as pilot projects to demonstrate how NbS can improve water attenuation, aquifer recharge and habitat creation. This pilot project has potential to attract natural capital market funding through the Norfolk Water Fund.

To reach a 'shovel-ready' project, a baseline feasibility study is proposed, with funding for this being provided through WRE. The purpose of the feasibility study is to provide an evidence base from which to develop designs for the two sites on the Sennowe Estate.

#### **Floodplain reconnection scheme:**

A shovel-ready floodplain and re-meandering project in the mid-Yare catchment that will be implemented in spring 2024 to test blended funding between partners and the BNG metric tool for riverine habitats. It will also try to deploy a nutrient monitoring strategy to build better evidence for how this type of NbS can settle out sediments and nutrients. This is being delivered by Rivers Ecology, the delivery arm of Norfolk Rivers Trust, and funded by WWF through WRE.

Section 7

---

Moving forward



## Section 7

# Moving forward

### SECTION 7

#### Moving forward

With this business case, the NWSP is reaching the end of its first stage. Now that the relevance of NbS is established, the NWSP will move to a delivery-oriented agenda that focuses on implementing flagship projects, securing funding and financing, and establishing the governance of the Norfolk Water Fund.

## 7.1

### Implementing reference projects

As explained in previous sections, constructing a base of reference projects through a bottom-up approach is fundamental for widespread adoption of NbS. Mainstreaming these type of solutions as credible, complementary options to engineered infrastructure and technology will depend on creating sound evidence of benefits and operational feasibility.

The NWSP is currently developing a pipeline of projects in close collaboration with key players in the sector (Section 6). On top of identifying new opportunities, the programme will focus over the next year on testing market mechanisms, creating tools and processes to facilitate project replication, building the capacity of delivery partners and monitoring pilot results to generate feedback loops and much-needed evidence.

At the end of this delivery ramp up period, the then created Norfolk Water Fund should enter into a phase of larger scale delivery, deploying the top-down approach presented in this document.

## 7.2

### Securing finance

Over the next 12 to 18 months, during the Norfolk Water Fund ramp-up phase, the programme will continue to focus on supporting flagship pilot projects. This will require funding for feasibility studies and implementation, as well as the set-up of a robust monitoring protocol. The total budget for this period is estimated at £2 million. Thanks to the financial support of Core Partners, WWF and pro-bono work performed by the N4WF and law firm Morrison Foerster, £0.8 million has already been secured to cover costs related to the Norfolk Water Fund feasibility study and set-up, as well as programme management. This leaves the programme with a net funding need of £1.2 million between now and April 2025.

---

**SECTION 7**

Moving forward

Building on this bottom-up approach, the NWSP has the ambition to roll-out, from 2025 onwards, a broader, top-down strategy aiming at deploying NbS at county-scale. A realistic target could be the implementation of a portfolio based on the business case presented in this document, which has been sized at £29.9 million over 30-years to seize the opportunity presented by Anglian Water's A-WINEP for the 2025-2035 period. In this scenario, the company would contribute to 30% of total costs over that 10 year period (£4.7 million), and would be looking to leverage 70% partnership funding from public, private and philanthropic sources.

Total funding need would therefore amount to £25.2 million and could be well covered by Nutrient Neutrality and BNG revenues. However, these environmental markets have distinctive cash flow profiles, with both upfront investment and revenues, and long-term maintenance and monitoring obligations.

This suggests a need to mobilise bridge financing to cover design and implementation costs until sales become effective and units can be sold to the market. There also needs to be robust management of the proceeds from sales to ensure there are no shortfalls in funding for ongoing maintenance throughout the required period. Until revenue streams start flowing, there will therefore be a gap to bridge to cover an estimated £1.7 million of costs for programme management, as well as project preparation and initial implementation.

Given the interesting financial profile of the modelled NbS portfolio, the NWSP funding strategy going forward could be based on blended finance, combining public grants with different sources of private and donor funding.

Public grants and private donors/charities will play a central role in the funding strategy. They can take risks to support NbS programmes that private financiers with return expectations cannot. They will especially be important while uncertainties regarding NN and BNG markets are dispelled.

**Public grants identified include:**

- **EA's Water Resources Funding**, derived in part from a levy on abstraction charges. This funding pool includes the EA's Chalk Stream funding, which allocates around £200k per year for the Norfolk region, which could potentially be directed through the Norfolk Water Fund.
  - **EA's Water Environment Improvement Fund**, providing a two-to-one match funding ratio to expedite on-the-ground water projects. A Norfolk Water Fund could serve as a facilitator, assisting local projects in accessing and securing funding from these sources.
  - **Norfolk County Council:** NCC is anticipating confirmation of the Norfolk County Deal (a Norfolk Investment Fund), which involves the devolution of £30 million from national government to the county. This funding is earmarked for initiatives aimed at achieving socio-economic improvements, which NbS are greatly positioned to generate, on top of environmental benefits. Funding is expected to be £5-6 million over 3 to 5 years.
-

**SECTION 7**

Moving forward

The private sector could be mobilised through Corporate Social Responsibility budgets to fund specific conservation outcomes. We have mapped and prioritised private businesses and agricultural supply chain actors in Norfolk based on their level of business interest in water and ability to mobilise significant funding. In total, 227 potential actors were identified that the NWSP could approach, for instance the following key actors:

- **British Sugar:** The agricultural producer grows most of its sugar beet in Norfolk with a heavy reliance on water both for irrigation and food processing.
- **Sainsbury's and Lidl:** Supermarket chains have a vested interest to ensure the resilience of their supply chain. Lidl for instance, has committed to spend £4 billion on UK agriculture in 2023 as part of their Corporate Social Responsibility initiatives. Some of those funds could be drawn to Norfolk, as the UK's leading region for horticulture and cereal crops, as well as pig and poultry farming.
- **Britvic:** The British soft drinks company has a significant supply chain interest in Norfolk and holds a large abstraction license in the region. Given the centrality of water to their business, Britvic reports on the water intensity of their production and actively participates in a Water Stewardship and Biodiversity Program, providing support to the Norfolk Rivers Trust.

If and when NN and BNG markets firm up and provide sufficient visibility of potential income, and provided that the market caps allow for enough revenues to be generated, repayable finance could also be secured, through a scheme in which private investors finance the programme on the back of future revenue streams from the sale of NN offsets and BNG units. The NWSP will therefore activate this business case and engage with financiers to test their appetite to support the implementation of NbS through this type of scheme.

## 7.3

### **Establish the Norfolk Water Fund**

The NWSP has been working with law firm Morrison Foerster to identify the most appropriate legal framework and governance arrangements for the Norfolk Water Fund. A wide array of possibilities has been identified and compared, from a hosted programme run from within one of the Core Partners to a fully independent company or non-profit organisation. The decision will be made based on the delivery model eventually adopted by the fund (e.g. project aggregator vs. direct investor) and the constraints imposed by the financiers identified at the time of the Water Fund constitution. This legal structuring is an important next step to facilitate the transition as part of this next phase of ramping-up the delivery of pilots to implementation at scale.

**SECTION 7**

Moving forward

## 7.4 Explore new opportunities

Sewage treatment could represent a great opportunity to use NbS alongside traditional treatment solutions, both for centralised and distributed systems:

- NbS are routinely evaluated in Anglian Water's options appraisal process when designing upgrades to Water Recycling Centres. The NWSP is working closely with Anglian Water to understand what benefit treatment wetlands could play in improving local water quality and generating nutrient offsets at small works that fall outside of planned nutrient upgrades to Technically Achievable Limits.
- Private sewage treatment systems also represent a great opportunity, with over 5,600 properties not connected to mains sewerage in the Ant, Bure and Wensum catchments (source: Natural England, 2015<sup>6</sup>). Small treatment wetlands could offer a competitive alternative to package treatment plants for upgrading septic tanks. The NWSP will assess the viability of such options and, if proven, try to mobilise funding to scale-up this solution.

<sup>6</sup> <https://publications.naturalengland.org.uk/publication/6150557569908736>

<https://publications.naturalengland.org.uk/file/5251247343927296>

<https://publications.naturalengland.org.uk/file/5752380302819328>



**NORFOLK WATER**  
STRATEGY PROGRAMME

To find out more

email [nwsp@wre.org.uk](mailto:nwsp@wre.org.uk)

visit [wre.org.uk/projects/norfolk-water-strategy-programme/](https://wre.org.uk/projects/norfolk-water-strategy-programme/)



The Nature  
Conservancy



**Norfolk**  
County Council

love every drop  
**anglianwater**



Prepared by:

**Nature for Water**  
Local solutions. Global impact.