Wansbeck Restoration for Climate Change

2023-24

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This report is written and produced by Katherine Williams, Consultant (https://katherinewilliamsfundraiser.com), on behalf of Groundwork North East & Cumbria. Groundwork NE & Cumbria is registered in England & Wales as a company limited by guarantee (number 2702815) and a charity (number 1017706): https://www.groundwork.org.uk/north-east-and-cumbria/.

March 2024

Front cover photo: Chris Woodcock

Contents

Introduction

The ***Wansbeck Restoration for Climate Change (WRCC)*** project is one of six pioneering nature projects which are part of the Nature Returns programme, led by Natural England in partnership with the Environment Agency, the Forestry Commission and Royal Botanic Gardens Kew. At the heart of the project are nature based solutions, exploring how landscape-scale interventions to restore natural habitats can help to tackle the environmental crisis and climate change.

Groundwork NE & Cumbria received funding for the WRCC project in 2023 and, over a period of 15 months from January 2023 to March 2024, has created/restored six priority habitats over 135 hectares of farmland in the Wansbeck catchment. Working in partnership with three land/estate owners and ten other agencies, this project has demonstrated the potential for productive farmland to support measures which restore natural processes and capture carbon, as well as delivering other benefits including improving water quality, reducing greenhouse gas emissions and storing water in the landscape.

This report was commissioned in January 2024 to summarise an exemplar project, celebrate success, share learning, showcase the strength of Groundwork partnerships and provide replicable case studies. It brings together quantitative and qualitative data collected by the project to draw conclusions about the likely long term impact of WRCC and to identify future opportunities.

» FILLING DITCHES TO RESTORE PEATLAND AT HARWOOD FOREST

Project summary

In February 2023 Natural England announced six pioneering projects across England which would receive funding through the *Nature Returns* programme. Together, these projects would trial the most effective ways to capture carbon and mitigate impacts of climate change through nature restoration at a landscape scale. Over a period of fifteen months, each project, from Plymouth to Northumberland, would utilise nature-based solutions to improve carbon capture across different habitats including grasslands, forests, wetlands and hedgerows. They would also explore sustainable funding opportunities for landscape-scale projects. It was intended that shared learning and analysis across all six landscapes would improve understanding and inform future initiatives around habitat creation/restoration and climate change.

Nature Returns is led by Natural England in partnership with the Environment Agency, the Forestry Commission and Royal Botanic Gardens Kew, sponsored by Defra, the Department for Energy Security and Net Zero and the Treasury. It aims to demonstrate the power of collaborative working to understand the value of nature-based solutions in tackling climate change and to deliver against the government's Environmental Improvement Plan. The six projects which received funding were Wansbeck Restoration for Climate Change (Groundwork NE & Cumbria), Wild Exmoor Carbon Sequestration Project (National Trust), Severn Solutions for Nature's Recovery (Gloucestershire

> Through Nature Returns, we are backing the science that asks what's really happening inside grasslands, floodplains and even orchards. Then we are connecting scientists, stakeholders and green investors to share what works, what doesn't, and why.
>
> Dr Tim Hill, Chief Scientist at Natural England*

*Writing in Natural England blog 25/09/23 (https://naturalengland.blog.gov.uk/2023/09/25/nature-returns/)

> Many of the solutions to climate change are all around us in the natural world. From trees, hedges and grasslands that absorb carbon from the air to the peat-rich soils that hold it in the ground, there are huge opportunities to catch carbon while achieving other benefits at the same time … The simple fact is that when it comes to our net zero ambitions Nature is our biggest ally and more we can do to restore it the better.
>
> Getting the scale of benefits we need requires working together collaboratively across entire landscapes.
>
> Tony Juniper, Chair of Natural England (Quoted in press release 11/02/2023)*

Wildlife Trust), Oxfordshire-Buckinghamshire Freshwater Network (Freshwater Habitats Trust), Derwent Living Forest (Derbyshire Wildlife Trust) and Plymouth's Natural Grid (Plymouth City Council working with the National Trust).

The Wansbeck Restoration for Climate Change (WRCC) project aimed to restore/create 144ha of mixed habitat, showcasing how collaboration between landowners can achieve landscape change which is better for nature, communities, economy and climate and establishing best practice which can be replicated in future.

The Wansbeck landscape is within the mid-Northumberland national character area. It is a rural productive landscape which is predominantly farmland with some forestry. It is a sparsely populated area with just a handful of small villages and farming hamlets within the project area (estimated population of around 1100 people[1]). Significant landowners in the area are National Trust (Wallington estate), Little Harle Farming Partnership and Middleton North Estate with several tenanted farms across these estates. Harwood Forest, also within the project area, is a productive conifer forest (Forestry England).

By working in partnership with the three estates (landowners) within the Wansbeck catchment, Groundwork NE & Cumbria intended to increase, restore and create priority habitat on ten sites, improving the capacity of the land to mitigate the impacts of climate change and showcasing the potential for nature-based solutions in a productive rural landscape. An integrated approach to catchment delivery would not only improve water quality and natural processes but also improve business resilience for enterprises dependent on Wansbeck's natural, cultural and built heritage.

[1] Parish populations: Wallington Demesne (Cambo) = 369, Rothley & Hollinghill = 160, Kirkwhelpington = 460, Middleton = 115

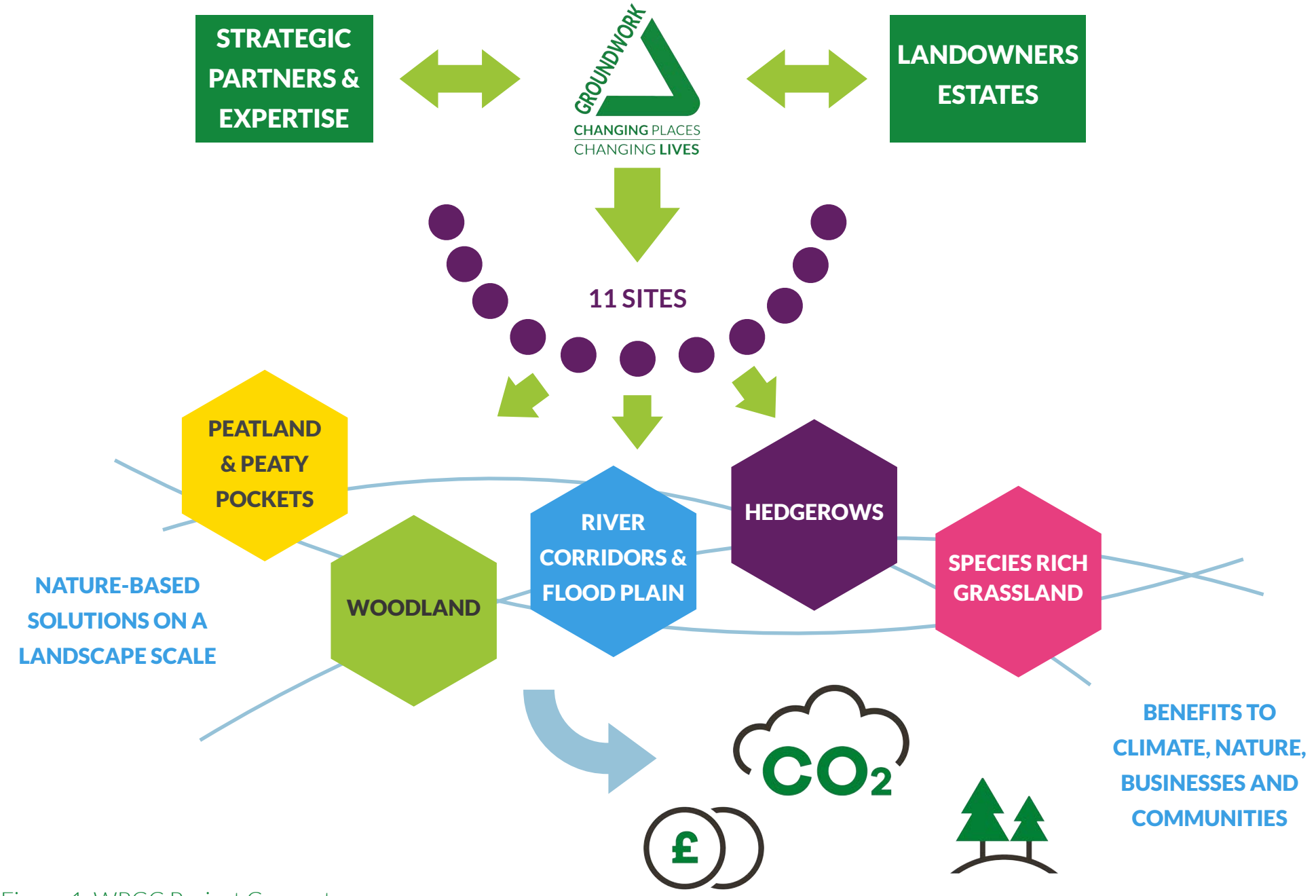


Figure 1: WRCC Project Concept

Priority habitats which have been created, extended or enhanced through the WRCC project:

- Heath and peaty pockets - 55 ha
- Peatland - 8 ha
- Species rich grassland - 48ha
- River corridors / flood plain mosaic habitat - 22.9ha
- Hedgerow - 6,600m (4.6ha)
- Woodland - 1.1ha

With baseline measurements and continuous monitoring, this project (along with the five other projects across England) planned to provide a new opportunity to quantify the potential for natural habitat creation/improvement to improve carbon sequestration, biodiversity and water quality. Funding supported data collection and analysis and new methodologies have been tested to better understand the impact of the activities which have been delivered through the project.

The final element of the project was to test and develop new and sustainable green finance models to managing land for nature. This would identify potential funding sources or investment opportunities and, with robust impact data to support, put together a financial portfolio which could underpin and sustain habitat management and nature-based solutions for the future. This research will provide a long term legacy for the project by beginning to identify both opportunities and likely barriers to accessing these.

The WRCC project is managed by Groundwork NE & Cumbria, with support from a Strategic Partnership (expert advisors: Natural England, Environment Agency, Woodland Trust, National Trust, Northumberland County Council and Northumbria University) and a Steering Group

which brought together the three landowners to co-ordinate land management efforts across the Wansbeck landscape. It was founded on learning from the then developing Local Nature Recovery Strategy (LNRS) led by Natural England which provided significant evidence and research to inform project design. The WRCC partnership has enabled a collaborative and co-ordinated landscape approach across ten different sites, demonstrating what future landscape-scale partnerships might look like to make meaningful contributions towards net zero targets.

Groundwork NE & Cumbria managed the funding and contracts to implement large scale restoration works. They worked directly with farmers and landowners to prepare site plans/ specifications, secure necessary permissions, procure specialist contracts and oversee delivery. They also co-ordinated the data collection and analysis, employing appropriate contractors to lead on this and to provide evidence of environmental impact.

Across all six projects supported by *Nature Returns*, communities have been engaged through volunteering and nature connection events. WRCC has delivered talks, met with Parish Councils and attended events in the small hamlets and villages within the Wansbeck catchment and surrounding area. More than 250 individuals have been directly engaged in a range of activities (not including exhibition visitors).

Photography walks, led by a professional photographer, engaged 18 individuals and the photographs were showcased in an exhibition which was first hosted by Wallington NT Visitor Centre (launch event attended by 30 people and a further 1,200 visitors in the following weeks) and then moved to Kirkharle Courtyard on the Little Harle estate. The landowner at Kirkharle has requested that the exhibition panels remain in situ until 2025 as they have created a lot of interest and enhanced the visitor experience. Students from two universities have also

participated in field work and talks about the project. Children from one primary school took part in a farm visit as part of a residential visit to the area and further school engagement activities are planned for spring/summer 2024.

Over twelve months, 44,900 trees have been planted (including 6.6km new hedgerow), 15km of peat grips (ditches) filled, 6 leaky dams installed, almost 11km of fencing installed, 340kg of new grassland/meadow seed sown and 8 new wetland scrapes created. Within the next 12 months it is expected that grassland/meadow diversity will increase and the flow of water in peatland areas and through farmland will slow with water looking clearer where cattle/sheep are unable to access floodplain areas. Wading birds are already making use of new wetland scrapes.

If these changes can be observed after a year (or less), the potential for the longer term change must be significant. Already nature and natural processes are returning. Over time, the natural ecosystem will become healthier and more biodiverse. As woodlands and hedgerows mature, as peatlands re-wet, as diverse habitats re-establish, the amount of carbon locked in the landscape will increase, water quality will improve and flood water will be more effectively managed.

At the same time, observations from farmers who have carried out similar interventions previously predicts that WRCC will deliver direct benefits to farming including providing shade and shelter for livestock, improving boundaries, stabilising soil/improving soil structure, improving earthworm diversity, improving health of livestock and reducing health care costs, and reducing need for supplementary feeding or soil treatments.

This project has demonstrated the potential to recover nature in a productive or agricultural landscape. The interventions delivered through the WRCC project, as part of a wider landscape effort by landowners and other stakeholders, have the potential to change the natural landscape

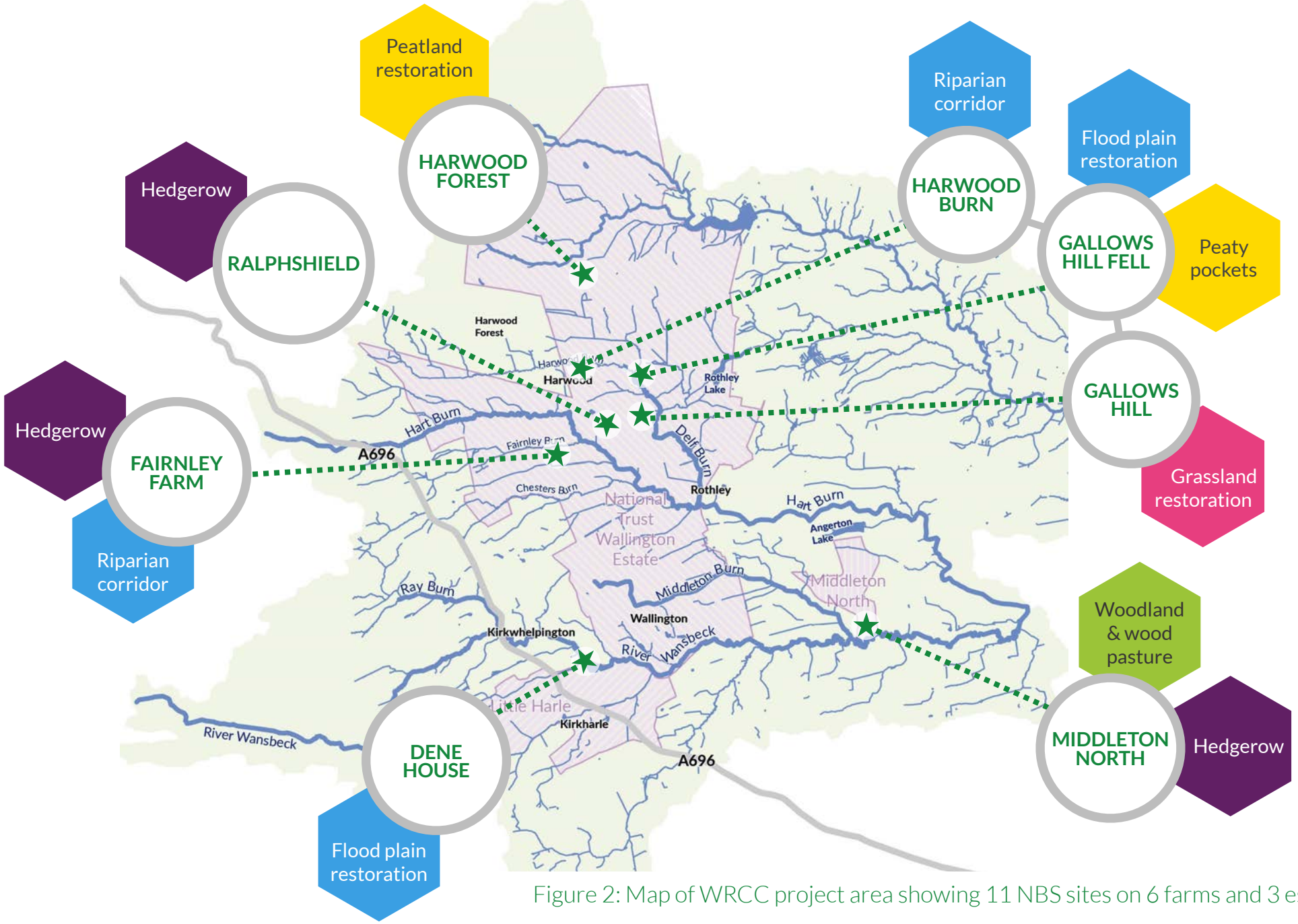


Figure 2: Map of WRCC project area showing 11 NBS sites on 6 farms and 3 estates

CASE STUDY: Habitat connectivity at Ralphshield Farm

26,200 native broadleaf hedgerow trees were planted to restore 3.6km of nineteenth century field boundaries at Ralphshield on the National Trust's Wallington Estate.

The current tenant farmer was invited to take part in the WRCC project by the National Trust. He says he was keen to take part as he supported the vision to restore natural habitat on his farm and beyond. Once works were agreed, all contracts were procured and managed by the Groundwork project team, this included contracts for soil preparation, fencing and tree planting. As this project is part of the Wallington Hall Estate (National Trust) planting had to conform to the designed landscape. This process was overseen by National Trust.

Contractors prepared field edges by strimming a 1.5m strip to remove vegetation and provide optimal soil conditions for new tree planting. Two year old native broadleaf transplants (450-600mm high) were planted in double staggered rows (300mm spacing, 6.6 plants per metre, 600mm spiral guard for each plant) within extra wide corridors (5-10m wide). Stock proof fencing was added to control grazing and allow regeneration of the understorey flora as the hedgerow establishes. In time this will allow mature 'super hedges' to develop. Some of the trees will be tagged to allow them to grow into mature hedgerow plants.

The new hedgerows at Ralphshield create corridors which connect other hedgerows, nature recovery sites, veteran trees, small woodlands and existing hedges; joining up habitats in a landscape-scale green mosaic. This extends ecological benefits beyond the farm

site, contributing to a healthier ecosystem across the Wansbeck catchment.

The 2023 bird surveys demonstrated that field margins play an important role in providing habitat corridors for bird species (site boundaries and buffer zones had greater bird diversity including species of conservation concern). As the Ralphshield hedgerows develop it is expected that they will improve diversity of habitat and food sources not only for birds but also invertebrates and mammals.

Restoring hedgerow habitat will also improve carbon storage and provide protection against the more extreme weather systems which are resulting from a changing climate. As the hedges grow and establish, they will maintain more consistent water availability during drought periods, help prevent soil erosion by intercepting surface run off during storms or prolonged rainfall, stabilise soils with their root systems and provide important shelter belts for stock.

The farmer has expressed some concern about the potential for seed from the hedgerow understorey to spread to his neighbouring fields as it develops, however, overall he says he has been keen to support nature recovery on his farm. He reflects that the wet winter brought additional challenges for planting and fencing but the final outcome was positive.

Ongoing maintenance will include removing the tree guards and managing stock access to the hedgerow areas. The hedge will need to be laid within ten years and any trees that fail will need to be replaced.

Hedgerow planting and fencing at Ralphshield farm

Site: Ralphshield Farm

Landowner: National Trust (Wallington Estate)

Original landuse: permanent pasture/improved grassland

WRCC interventions: 3588m new hedgerow planting (26,215 trees) with 7116m fencing and 12 gates

Species: Hawthorn (50%), Dogwood (20%), Blackthorn (10%), Hazel (10%), Field Maple (10%). Additional hedgerow trees (Sessile Oak and Sycamore) at 10m intervals.

Consents or pre-commencement considerations required:

- Confirm works are compliant with current Countryside Stewardship agreement and replicate historic field boundaries of designed landscape

Management requirements:

- Annual weeding and mulching until plants are established
- Monitor/replace stakes and shelter tubes for first five years
- Replant any failed trees and fill gaps
- After 2 years trim to 2m height/1.5m width leaving at least ⅔ hedges untrimmed each year (alternatively hedges may be laid)
- Remove/recycle tree stakes and tubes once trees established

CASE STUDY: Natural processes return to Harwood Forest

WRCC has implemented a process of 'ground smoothing' to restore peatland habitat at Harwood Forest

Like many sites across the Northumberland upland landscape, the Harwood Forest area was cleared in the 1950s, to make space for timber forest planting. Vast grids of ditches were dug to drain this site and others for forestry and agriculture. As a result the peatland habitat dried out and much of the native flora and fauna was lost.

A portion of the Harwood Forest timber crop was removed in 2015 and the site was earmarked for restoration to reverse the modifications that had previously lowered the water table to allow forestry planting.

The WRCC project worked in partnership with Forestry England to restore 8ha of natural peatland habitat through a process of ground smoothing. This involved using specialist contractors to bring in machinery to fill drains, block flow paths and flip/bury tree stumps to level the ground so that there are no peaks sitting above the water table. 3,000m of deep trenches were dug out and repacked with saturated peat to enable the soil to hold more water. Wetland pools were created to hold more standing water.

The site is now on a trajectory to return to a true peat bog habitat. It is already visibly wetter. Wetland pools are holding water and the works have restricted flow in channels and trapped water within the blanket bog. A rich bog habitat is recovering with species such as *Sphagnum* mosses, bog rosemary and cranberry, which

Image © Chris Woodcock

grew in the area before the forest planting, starting to return. In due course, it is expected that a rich diversity of invertebrates, amphibians and birds will also re-establish. This habitat creates the conditions needed to halt any further degradation of peat and for new peat formation. It is these two processes which make peatland habitat so important as a carbon sink by firstly stopping any loss of carbon from degrading peat habitat and secondly, over hundreds of years, sequestering carbon as vegetation is preserved in anaerobic waterlogged conditions.

Forestry England is committed to restoring 11,000 hectares of peatland across its northern district. Peatland restoration is not a 'quick fix' for carbon storage but, over the coming decades, its potential to sequester carbon is significant, particularly when it is delivered on a landscape scale. By holding more water at the top of the catchment, a rewetted deep peat landscape will contribute to flood water management, ensuring that water flows more slowly and consistently into lower watercourses and improving water quality to support a better riparian habitat in the rest of the catchment. Sites such as Harwood Forest are part of a much bigger picture.

Ongoing maintenance at this site will include monitoring water flow and removing any young trees which establish as a result of seed dispersal from the neighbouring forest. There is also an opportunity for bog pools to be seeded with *Sphagnum* from surrounding forest land (this could be done by volunteers).

Groundsmoothing at Harwood Forest

Site: Harwood Forest

Landowner: Forestry England

Original landuse: wet heath / former conifer timber forest

WRCC interventions: ground smoothing and stump flipping across whole site (8ha) with new wetland pools created in the process; 3000m of deep trench filled bunds (each trench ~1.5m deep using 750mm wide bucket)

Consents or pre-commencement considerations required:

- Site assessments in line with UK Forestry Standards

Management requirements:

- Monitoring regrowth in Y1 and then after a few years
- Potential for *Sphagnum* seeding
- Remove any tree saplings
- Monitor water flow

» PEAT SURVEYS AT HARWOOD FOREST (INSET PEAT CORE)

CASE STUDY: Creating boundaries Fairnley

New hedgerow corridors at Fairnley have completed 10km of boundary hedge around the farm.

Farmer Joseph Anderson has been reinstating hedgerows at Fairnley for more than 20 years. He has seen the difference that established hedging can make: for example, during the winter storm known as the 'Beast from the East' (2018) he recalls that the hedgerows were lifesaving for livestock, providing shelter from the wind and areas where the snow was much less deep.

The WRCC project is one of a series of environmental interventions at Fairnley and Joseph explains that this improves both habitat diversity and his agricultural/farming practice. The wide and enclosed hedgerow corridors have completed a double-fenced boundary hedge around the farm which is compliant with disease control regulations. This means that livestock on Fairnley Farm have no contact with any neighbouring farms, thus reducing any risk of infections spreading between stock. Once established, it will also provide shade and shelter.

The 10m wide mixed species hedgerows are a vital habitat for farmland birds. Those hedges which are longer established are full of nests - proof that a wide diversity of birds make their home there. Joseph says that this also benefits livestock welfare by helping to manage the number of flies on the farm.

WRCC has also facilitated riparian habitat improvements by restricting stock access to the Fairnley Burn which is already an important habitat for native crayfish and aquatic invertebrates. Rock lined drinking points have been created so that livestock can access the water without poaching the riverbed. This has safeguarded habitat adjacent to woodland areas and hedgerows to improve ecological connectivity.

The WRCC project (together with additional planting through the Great Northumberland Forest) has completed a boundary hedgerow but this is just part of wider ambitions at Fairnley Farm. The next project will be to plant more mature parkland trees which will also form part of the Great Northumberland Forest as well as further increasing the amount of shade and shelter available for livestock. Longer term Joseph is also thinking about restoring peatland habitat on moorland areas of the farm.

Whilst Joseph is a keen supporter of climate friendly farming he has shared concerns that the maintenance requirements for several km of fencing could prove to be a barrier for some farmers. Maintenance is supported by some but not all grant schemes and he hopes that this can be taken into account in future so that more schemes will provide maintenance payments to support interventions.

Planting hedgerow corridors at Fairnley Farm

Site: Fairnley Farm

Landowner: National Trust (Wallington Estate)

Original landuse: permanent pasture/improved grassland

WRCC interventions: 1200m new hedgerow planting in 5-10m wide protected corridors (7,920 trees)

Species: Hawthorn (50%), Dogwood (20%), Blackthorn (10%), Hazel (10%), Field Maple (10%). Additional hedgerow trees (Sessile Oak and Sycamore) at 10m intervals

Consents or pre-commencement considerations required:

- Confirm works are compliant with current Environmental Stewardship agreement

Management requirements:

- Annual weeding and mulching until plants are established
- Monitor/replace stakes and shelter tubes for first five years
- Replant any failed trees and fill gaps
- After 2 years trim to 2m height/1.5m width leaving at least ⅔ hedges untrimmed each year (alternatively hedges may be laid)
- Remove and recycle tree stakes and shelter tubes once trees established

Protecting the Fairnley Burn riparian habitat

Site: Fairnley Burn

Landowner: National Trust (Wallington Estate)

Original landuse: permanent pasture with improved grassland

WRCC interventions: fencing 3.5ha of riparian habitat to exclude livestock and allow natural regeneration of trees, scrub and other vegetation. 2 crossing points and 2 stoned up drinking bays created to allow drinking access and livestock movement.

Timing: avoid bird nesting season (April-August).

Consents or pre-commencement considerations required:

- Confirm works are compliant with current Environmental Stewardship agreement
- Ordinary watercourse permits for crossings
- White clawed crayfish assessments by licensed ecologist immediately prior to any works commencing

Management requirements:

- Natural regeneration of riparian vegetation during year 1
- Controlled grazing as required by ES agreement or management by mowing

» NEW LIVESTOCK CROSSING AT FAIRNLEY (INSET BEFORE WRCC)

PLANTING WIDE HEDGEROW CORRIDORS TO FORM AN ENCLOSED BOUNDARY

CASE STUDY: Creating a buzz at Gallows Hill

At Gallows Hill, a new farm business tenancy has nature recovery and regenerative farming at its heart. WRCC has facilitated three different schemes on the same farm: reconnecting the watercourse to create healthy flood plain mosaic habitat, re-wetting the fell to form peaty pockets and wet heath, and restoring species rich grassland.

A detailed catchment study by the National Trust's Regional Water Advisor, Duncan Wishart, revealed that the Harwood Burn corridor had been subject to significant change over decades and possibly centuries. This included Light Detection & Ranging (LiDAR) surveys which revealed a high density of drainage channels and also concluded that sections of the Harwood Burn had been straightened in the eighteenth and nineteenth centuries. Straightening the channels by damming and cutting off bends in the stream would have created more space for grazing and also facilitated land drainage.

The study recommended interventions which would reverse hydrological impacts by increasing interception of rainfall, increasing infiltration of water into the ground, reducing the rate of water transfer through the landscape, increasing storage of water in the landscaped slowing the rate of flow within the burn and the floodplain.

To achieve this, WRCC has reconnected paleochannels to the modified burn, allowing them to fill up during high flow events and increasing the amount of water which can be stored in the flood plain. With natural processes and a higher water table restored, this is enabling healthy flood plain mosaic habitat to recover including standing water, wet woodland, reed beds and scrub. In turn this will bring more diverse flora and fauna back to the site.

In the moorland areas of the farm, the natural hydrology has been restored to enable pockets of peat to recover. Grips have been blocked using a process known as 'zipping up' where vegetation is peeled back, ditches infilled and then turf replaced over the now level ground. Leaky dams were installed in the widest ditches and some areas were also reprofiled to level off the highest ground. The immediate impact of this is that the land is wetter and the water table higher. Wet flushes have been created which will support a more diverse range of invertebrates as well as wetland bird species such as curlews, lapwings and golden plover. In time this will enable mire and bog vegetation, including *Sphagnum* mosses, to return, eventually creating the conditions for the formation of peat and blanket bog.

Slowing the flow of water through the site will reduce soil erosion and sediment input into the Harwood Burn, thus further enhancing the riparian habitat. Conservation management of the moorland area with a late summer grazing regime will create a mosaic of shorter and longer swards for breeding waders. The floodplain area has been fenced to exclude livestock and allow natural regeneration of habitat.

48ha of grassland is being restored to species-rich grassland through a combination of sowing wildflower seed and conservation grazing to allow traditional hay meadow habitat to re-establish. This started with an intensive period of heavy grazing to achieve a very short sward, followed by scarification and tine harrowing to break up the thatch, remove dominant grasses and open up pockets of bare ground for new seed to establish. 16ha were sown with local Northumberland Meadow wildflower seed and livestock were then allowed back on the fields to help embed the seed into the soil. In particular, yellow rattle seed has been included as this is extremely effective at suppressing grass growth and enabling other species to establish. Additional green hay and plug plants will also be planted in some areas.

Seed and specialist advice was supplied by local farmer and wildflower seed producer Kevin Wharf (B&K Wharf Farming). The new meadows will produce an annual hay crop which will be used as fodder.

In other fields, conservation grazing has restored a more traditional grassland management regime, allowing a wider diversity of grassland species to return without planting or seeding.

In the UK 97 % of hay meadows and 80% of peatland have been lost or damaged due to changes in agricultural and land use practices. Returning these lost habitats to our farmed landscape is important for the rural ecology, water quality and carbon storage potential. Globally, peatland stores more carbon than all other vegetation types combined yet damaged or degraded peat habitat is also a major source of carbon emissions. Restoring peatland both removes a carbon source and increases potential for sequestration. Traditional hay meadows also have an important role to play in combatting climate change and can store significant quantities of carbon. Utilising local seed from within a 30 mile radius and using the hay crop on the farm further ensures that the carbon stored is not offset by the cost of shipping and planting seed or hay removal.

Restoring flood plain mosaic and riparian habitat at Gallows Hill and Harwood Burn

Site: Gallows Hill / Harwood Burn floodplain

Landowner: National Trust (Wallington Estate)

Original landuse: rough grazing

WRCC interventions: Re-establishing and reconnecting natural river course by by lowering banks in key locations and installing leaky dams to deflect high flows into palaeochannels

Timing: Before April or after August to avoid ground nesting season

Consents or pre-commencement considerations required:

- Detained specialist catchment study and modelling
- Ordinary watercourse land drainage consent
- Ecological assessment to identify presence of priority habitat/ species and outline mitigations to protect these
- Archaeological field survey prior to works commencing

Management requirements:

- Eliminate grazing by restricting livestock access at least until habitat has recovered

Peaty pockets at Gallows Hill Fell

Site: Gallows Hill Fell

Landowner: National Trust (Wallington Estate)

Original landuse: moorland/rough grazing

WRCC interventions: Larger grips reprofiled. 15,000m of grips across 55ha moorland blocked.

Timing: Before April or after August to avoid ground nesting season

Consents or pre-commencement considerations required:

- Ordinary watercourse land drainage consent
- Ecological assessment to identify presence of priority habitat/ species and outline mitigations to protect these
- Archaeological field survey prior to works commencing

Management requirements:

- Late summer grazing by cattle from end-July onwards (no grazing over winter or spring to avoid trampling nests)
- Monitoring rush regrowth and cutting/grazing as needed to maintain no more than 20-30% scattered rush cover

Grassland restoration at Gallows Hill Farm

Site: Gallows Hill Farm

Landowner: National Trust (Wallington Estate)

Original landuse: permanent pasture (98% improved grassland and 2% unimproved species rich meadow)

WRCC interventions: seeding and restoration of meadow habitat (GS6 grassland) by haymaking and conservation grazing (16ha) and pure conservation grazing only (32ha). Planting green hay and plug plants in some areas.

Consents or pre-commencement considerations required:

- No consents required but due care needs to be taken to protect rig and furrow archaeology (this precludes recultivation in some areas)

Management requirements:

- Manage grassland sites by conservation grazing, hay cutting or both to maintain diversity in the sward
- No manure, fertiliser or pesticide to be used in the establishment phase (this will take several years)

"It is likely that most bend cut-offs reflect deliberate modification of the stream to reduce channel length … the majority of the palaeochannels considered most likely date to the eighteenth and nineteenth century and reflect deliberate channel modification,"

Duncan Wishart, National Trust, Catchment Overview & Restoration Opportunity Report (November 2022)

» THE IMPACT OF BLOCKING GRIPS AT GALLOWS HILL TO INCREASE SURFACE FLOW

» LEAKY DAM INSTALLED AT HARWOOD BURN (GALLOWS HILL)

CASE STUDY: Working with nature at Middleton North

Hedge planting and new wood pasture are part of a much bigger picture at Middleton North, where farming and nature go hand in hand.

Charlie Bennett explains that he took the decision to prioritise nature on the farm in 2019. His priority was to bring nature back in a way that still ensured the farm functioned as an economically viable business. Since then he has restored traditional hay meadows, created new ponds/wetlands, reinstated a former ox bow lake and planted thousands of trees. He wanted to take part in the WRCC project as it would provide some connectivity - joining up different farms/sites all working towards the same goal.

Through WRCC, >5,000 native broadleaf trees have been planted to create hedgerows and wood pasture (25% pedunculate oak, 10% common alder, 10% goat willow, 40% silver birch, 5% bird cherry, 5% aspen and 5% holly). These will provide shade and shelter for grazing cattle and Charlie describes them as a vital part of the farm environment. He has also reduced stocking densities by allocating more land to grazing (with the same number of animals). As a result stock are healthier, worm densities are lower and there is less need for supplementary feed which all adds up to lower costs.

Woodland pasture, was once a dominant habitat in the farmed landscape but it was lost as grazing densities increased. Bringing this important habitat back at Middleton North has involved planting bare root tree species within feed enclosures to allow the woodland to establish and to exclude grazing stock. Native tree species planted were. Plastic tree guards have been provided for protection from deer and hares.

Image © Katherine Williams

At Middleton North additional care was needed to protect the archaeology of the site. Planting was only permitted in restricted areas of fields where the medieval ridge and furrow earthworks persist. The planting plans have respected this and ensured that the archeology, which is a lasting reminder that this land has been farmed for centuries, is preserved.

Maintenance requirements include regular weeding to ensure the trees are not choked by grasses, brambles and other species, and removal of the plastic tree guards.

Deciduous woodland pasture will increase carbon capture and storage by creating carbon sinks in the trees themselves and the increased leaf litter in the soil. Like hedgerows, woodland pasture provides shade and shelter, manages availability of water and supports biodiversity.

"We need to produce food but we also need to stop species going extinct. We need to do both, hand in hand,"

Charlie Bennett

Since Charlie started restoring nature on his farm five years ago he has seen a notable increase in birds and other species including yellowhammers, linnets and egrets. He explains that he hasn't lost any land but he has seen a wealth of benefits for his livestock, himself and the wider community.

Tree planting at Middleton North

Site: Bells Park, Middleton North

Landowner: Middleton North estate

Original landuse: permanent pasture

WRCC interventions: 659m new hedgerow planting in 3m wide corridors (4,350 trees) and 0.84ha new broadleaved woodland shelter belt planting (924 trees). All trees mulched with woodshed, bark or sheep's wool and protected by sheep netting fencing.

Species: Hedgerow - Hawthorn 60%, Blackthorn 10%, Hazel 10%, Holly 5% Honeysuckle 2% Dog Rose 5%, Common Sallow 8% with additional Common Oak and Beech hedgerow trees at 16m intervals; Shelter belt - Birch 40%, Alder 10%, Common Oak 25%, Common Sallow 10%, Aspen 5%, Bird Cherry 5% Holly 5%

Consents or pre-commencement considerations required:

- Confirm works are compliant with current CS agreement
- Forestry Commission Environmental Impact Assessment for new woodland
- Archaeological survey and associated precautions to protect medieval rig and furrow

Management requirements:

- Weeding until plants are established
- Replace stakes/tubes for first five years then remove and recycle
- Replant any failed trees and fill gaps
- After 2 years trim hedge to 2m height/1.5m width leaving at least ⅔ hedges untrimmed each year (alternatively hedges may be laid)

» SHELTERBELT PLANTED AT MIDDLETON NORTH (INSET BEFORE PLANTING)

CASE STUDY: Dene House Farm flood plain restoration

More natural flood plain mosaic habitat is holding water in the flood plain and supporting a more diverse range of species at Dene House Farm on the Little Harle estate.

WRCC has provided 1300m of fencing to restrict livestock access to the floodplain at Dene House Farm so that natural floodplain habitat could be restored. Once the fencing was in place, work could begin on recreating natural wetland habitat. This is predominantly three shallow scrapes, one in-line pond intercepting land drainage and one backwater reconnected with the river which were all dug with machinery to provide areas of standing water within the flood plain.

This area of land was not a significant grazing area so the measures to exclude stock have not had much impact on the area of productive land available. Instead, it will ensure this area can deliver benefits for nature. Livestock will have controlled access after bird nesting season to graze and poach the margins of the scrapes. This will control vegetation growth and provide muddy wetland margins which will be valuable feeding habitat for wetland birds.

No planting or seeding has happened and it is hoped that the areas will self seed naturally. This will need to be monitored over the next couple of years to ensure wetland vegetation is establishing.

After a few months of heavy rain at the start of 2024, these pools are already doing their job and holding water. Wintering wetland birds have been observed using the scrapes and it is expected that the diversity of birds using the farmland habitat will increase as a result.

This project was managed by Groundwork working closely with the farmer and landowner. As such the plans which were originally put forward have evolved to maximise the benefit for all stakeholders.

Flood plain mosaic habitat at Dene House

Site: Dene House Farm

Landowner: Little Harle Estate

Original landuse: permanent pasture

WRCC interventions: stock fencing and creation of three shallow scrapes, one in-line pond intercepting land drainage and one backwater reconnected with the river, gently sloping with irregular/ varied outlines, 500mm depth in central area. Wetland allowed to self seed naturally.

Timing: to avoid any nesting birds

Consents or pre-commencement considerations required:

- Confirm works are compliant with current Countryside Stewardship agreement
- Land drainage consent from Local Authority
- Ecological walkover prior to commencement
- Planning permission depending on extent of excavation work

Management requirements:

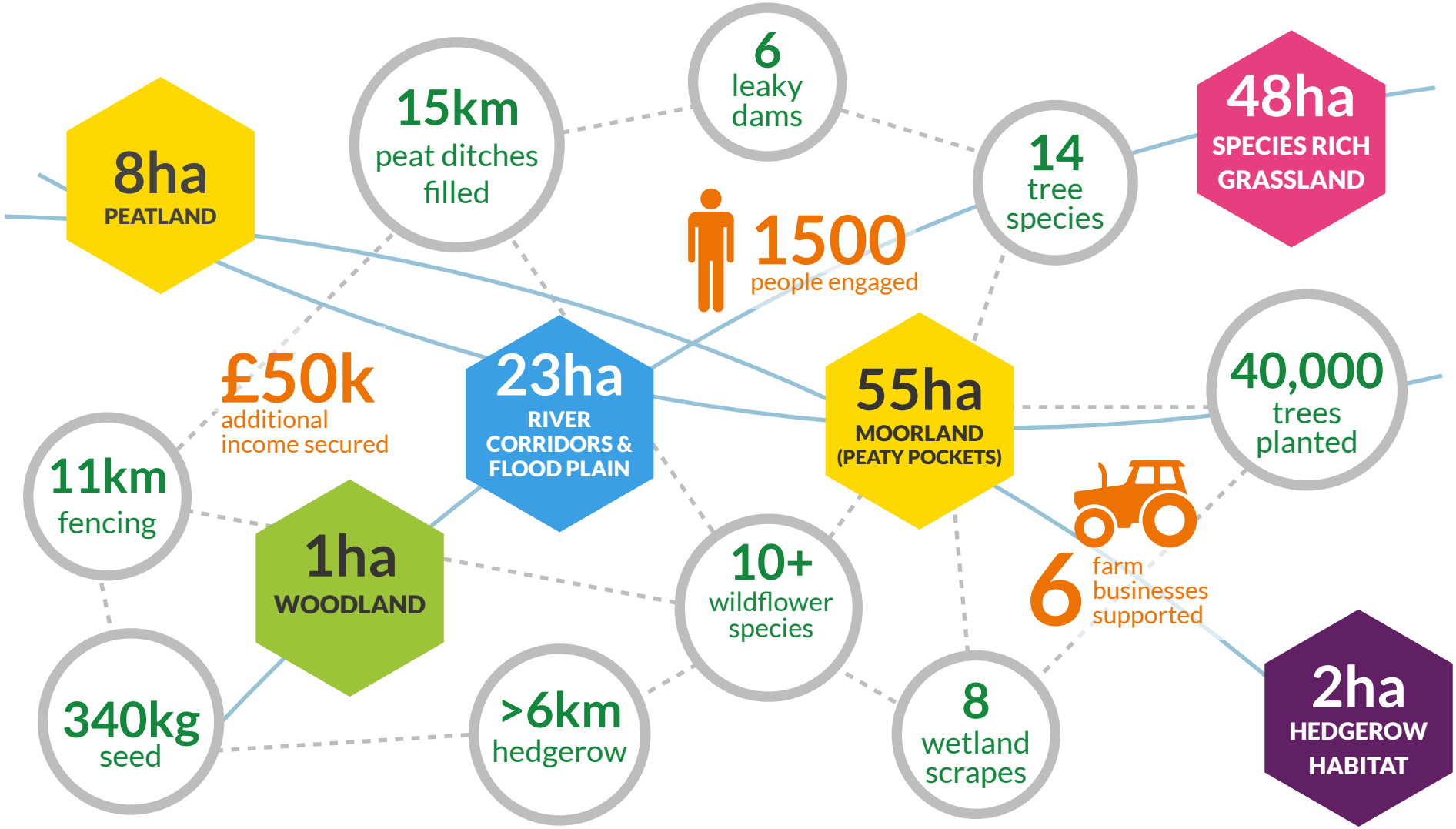
- Late summer grazing by cattle from end-July onwards (no grazing over winter or spring to avoid trampling nests)
- Monitoring rush regrowth and cutting/grazing as needed to maintain no more than 20-30% scattered rush cover

"Land ownership is all about stewardship and I've long been convinced of the need that one should farm in harmony with nature … I've always been very fond of that Kenyan proverb remember the land is not given to you by your ancestors, it is lent to you by your children,"

John Anderson, Little Harle Estate
(Forestry Commission Film *Planting 12,000 trees for future generations*, 2022)

» WETLAND POOLS CREATED ON THE FLOODPLAIN AT DENE HOUSE

WRCC At A Glance



Project impact

Although the long term impact of creating/enhancing natural habitat will not be observed immediately, monitoring throughout the WRCC project has provided an indication of the likely impact of these interventions. Throughout the project, scientific monitoring has gathered data to allow a robust analysis of impact.

- **Soil monitoring:** analysing carbon storage efficiency of different types of habitats and interventions by measuring moisture and extracting soil cores to provide samples for laboratory analysis.
- **Gas flux monitoring:** measuring the flows of carbon dioxide taken in by vegetation and released from soil in different habitats to to assess carbon storage efficiency in different types of habitats and interventions.
- **Vegetation monitoring:** estimating percentage cover of bare ground, litter, grasses, herbs, reeds and sedges using a 2m x 2m quadrat square samples to understand any changes in floral biodiversity.
- **Other biodiversity monitoring:** breeding bird surveys were commissioned.
- **Fixed point photography:** recording visible changes in the landscape.

Soil analysis provided by Natural England (2023) suggests that samples from floodplain mosaic habitat at Dene House Farm contained the greatest mean percentages of Carbon when compared to both grassland (Fairnley Burn, Gallows Hill and Middleton North) and fell (Gallows Hill) habitats. This can most likely be explained by the higher levels of sediment deposits in floodplain habitats providing regular input of nutrients such as nitrogen, phosphorus and potassium. There was very little variation between the other sites with the Gallows Hill fell recording very slightly more carbon than the grassland sites). Soil carbon percentages recorded in grassland and fell habitats were similar. Across all three habitats samples suggest that the carbon composition is almost entirely organic carbon.

Soil monitoring also measured carbon content change at different soil depths. This found that, across all three habitat types, the upper depth fractions contained significantly greater percentage of mean carbon which is probably explained by the higher levels of decomposition in top soil resulting in greater accumulation of organic matter compared to lower depth fractions.

This data provides a useful baseline. Changes in carbon sequestration will take decades to achieve so future monitoring will be needed to assess this but there is currently no schedule for this. Further analysis across more sites will also allow more robust conclusions to be drawn about differences between habitat types.

Groundwork carried out Gas flux or Greenhouse Gas (GHG) monitoring on four sites within the National Trust Wallington Estate: Middleton Bells North, Middleton Bells South, Middleton Floodplain (all on Middleton North farm) and Dene House. Additional monitoring and analysis was provided by Natural England but, at the time of writing, this data is not available. The groundwork monitoring found variation in levels of soil respiration across all four sites with the

> **When you can see the physical interventions and you can see with your own eyes that it's doing what it should be doing, as in it is holding water, and we've obviously had a bit of that [heavy rain] in the last 6 to 8 weeks. It's been a very good demonstration.**
>
> Land manager, quoted in ICF WRCC Case Study (2024)

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» ON SITE WITH JOHN ANDERSON (LITTLE HARLE) , MICHELE MACCALLAM (GROUNDWORK) & NATURAL ENGLAND ADVISORS

highest levels recorded at Middleton Bells North and lowest levels at Dene House. Levels of plant photosynthesis were also analysed and, again, this showed variation across the four sites with Middleton Floodplain recording the highest levels, Middleton Bells North recording low levels of photosynthesis and Middleton Bells South and Dene House both recording negative levels of photosynthesis.

Higher rates of soil respiration and plant photosynthesis often correlate with plant productivity and biodiversity but this is not always the case. Higher soil respiration could also be an indicator of loss of organic matter due to site disturbance or other factors. Given that Middleton Floodplain recorded high levels of plant photosynthesis but lower levels of soil respiration, it is difficult to draw conclusions about habitat productivity or biomass growth. Groundwork analysis of the results suggests that waterlogging in the soil could have created oxygen depleted conditions which would limit soil respiration. Photosynthesis could be limited at Middleton Bells North and Dene House due to low light levels but further habitat analysis would be needed to confirm this.

It is, therefore, not possible to draw conclusions from the 2023 gas flux monitoring results, but they do provide baseline measurements which can be compared to ongoing analysis which will begin over summer 2024. The data from Natural England, when this is made available, could also add additional insights.

Five sites were surveyed in September-October 2023 by Groundwork and Natural England to assess vegetation species richness and diversity. The survey technique was to record incidence of species within random 2m or 10m quadrats on each site. All the sites recorded at least 15 species with no single dominant species recorded anywhere. Little Harle recorded the greatest

species richness with 43 species (more than twice as many as any of the other sites). All the other sites recorded between 15 and 20 species.

This has provided simple baseline data for vegetative diversity. Vegetation diversity is likely to recover relatively quickly following changes to land management and it would be expected that more species would be observed in 2024 and that this would continue to increase in future years. Vegetative quadrant surveys will be repeated in summer 2024.

Breeding bird surveys were carried out by Andrew Kinghorn of Bird Watch North East. A total of 62 species were recorded on walked transects during the breeding season (June and July 2023) and 69 in the winter season. Many of these were interacting with the site boundaries or buffer zones and many were birds of conservation concern, sitting on either the red or amber list.

Additional information provided by the surveyor notes that, "*the shallow scrapes at Dene House that have been created are useful, not only for holding more water in the floodplain, but also for bird species such as winter Snipe (amber listed) and Jack Snipe, whilst passerines such as Dipper and Grey Wagtail have been seen to interact with this new habitat. At Gallows Hill, grip blocking and rewetting work undertaken will help curlew, redshank and snipe to feed and potentially breed in the area, whilst in the winter it is likely species such as Jack Snipe can use the area for foraging.*

"An impressive flock of approximately 350 Brambling were present at Gallows Hill during one visit in early winter, this is an impressive total for this winter visitor, numbers as high of this are of national noteworthiness. 100 Golden plover at Ralphshield were recorded in winter 2023.

"Yellowhammers were recorded in the hedgerows and skylark use the area for both breeding and wintering opportunities. Marsh tit was recorded at both Middleton and Gallows Hill: if this habitat can be maintained and ideally improved this could bolster the population of this red listed passerine, which

» PUPILS FROM MOBRAY PRIMARY SCHOOL AT FAIRNLEY FARM

is of both national and local conservation importance," (Andrew Kinghorn, by email, 2023).

He emphasises the significance of hedgerow connectivity for many passerine species, adding that planting new hedgerows and hedgerow habitat is likely to increase population densities of common passerines and will, potentially, also encourage rarer species to utilise these areas.

A fixed point photography methodology has been established and baseline images have been recorded by professional photographer Chris Woodcock. Further photographs will be taken in 2024 to record landscape change after one year and continued recording will provide a visual record as natural habitat becomes more established.

Water quality monitoring was not possible during the short WRCC funded period but a SONDES probe has been purchased to facilitate water quality monitoring in the future.

All the farmers and land managers have recognised that impact of the interventions on their sites is magnified when considered as part of the wider landscape. Each site is contributing to a more connected and diverse ecological landscape where nature is in recovery and there is increased potential for carbon storage (and loss of carbon from degrading peatland habitat is slowed).

It is encouraging that, for many of the farmers involved, WRCC was part of a much wider programme of works to restore nature and provide carbon-friendly farming solutions. Those sites within the Wallington Estate are contributing to the National Trust's target to plant 1 million trees on the 5,321 ha estate by 2030. The Great Northumberland Forest aspires to plant millions of trees in the county to meet the government goal of 30% of land restored for nature by 2030.

It is only by bringing voluntary, public and private sector organisations together and working towards a shared ambition, that targets to address the climate and biodiversity crises will be met. WRCC has demonstrated that achieving this does not have to involve compromises in farming: as evidenced through project case studies, nature-based solutions can breathe life into field margins and less productive land and they can deliver benefits which improve livestock welfare and reduce costs. Maximising the potential of this will, of course, depend on appropriate maintenance beyond the funded period of the WRCC project. This will include weeding hedgerows/sapling trees, removing tree guards, maintaining fences, managing stock access and grazing, and replacing any failed trees or filling in gaps. All of the farmers/landowners who contributed to this report highlighted maintenance as the biggest challenge involved with the project and most suggested that maintenance payments/support would make a difference in facilitating future NBS schemes.

Green finance has the potential to realise economic benefits from nature friendly land management. Specialist consultancy AtkinsRealis were appointed to map the potential for investment linked to the natural capital associated with nature-based solutions delivered through the WRCC project. The opportunity to explore and test different green finance models has provided robust information about the complex potential financial solutions which was not previously available. This has included researching opportunities for Biodiversity Net Gain (BNG), Woodland Carbon Code, Peatland Carbon Code, Nutrient Neutrality Markets, Water Company Catchment Schemes, Green Prescribing, sustainable tourism and natural environment improvement grants such as Countryside Stewardship, Sustainable Farming Incentive and England Woodland Creation Offer (EWCO).

> Groundwork is delighted to be given the opportunity to continue the programme of nature-based solutions for a second year within the Wansbeck catchment. We aim to create/restore a further 120ha of habitat as well as carrying out baseline assessments for new sites and continuing environmental monitoring of the year 1 habitats.
>
> Spreading the message about restoring nature and tackling climate change is an important part of this work and we will continue a programme of community engagement and volunteering.
>
> Michele MacCallum,
> Groundwork NE & Cumbria

It was not possible to generate revenue linked to BNG or Carbon Markets from the habitat enhancements delivered as part of WRCC but potential markets have been identified which could support environmental/biodiversity interventions in future. Ideally this would be across a suite of sites where the landowner/manager(s) are supportive of nature-based solutions and willing to enter into new agreements linked to marketable metrics. BNG is thought to be less viable in the Wansbeck catchment due to the rural nature of the area and, therefore, fewer development opportunities. Other schemes are likely to be viable as long as baseline assessments can be completed so that any carbon capture or biodiversity improvements can be quantified. The project team is also hopeful that the new higher level Countryside Stewardship (not yet released by DEFRA) will offer significant potential.

» SOURCING LOCAL NORTHUMBERLAND WILDFLOWER MEADOW SEED

» NEWCASTLE UNIVERSITY STUDENTS ANALYSING WATER SAMPLES

Next steps

The sites which were included in this project will continue to be managed for nature by the farmers and landowners who are responsible for them. This will include ongoing maintenance tasks, appropriate grazing/managing livestock access and removal of tree guards as hedgerows and other tree planting establish. Many of the farms involved already have plans to continue habitat restoration initiatives on their sites and this will further improve nature recovery and habitat connectivity in the catchment.

Groundwork will continue to facilitate vegetation surveys, bird surveys, soil carbon monitoring and fixed-point photography on these sites to better understand the impact of interventions delivered in 2023/24. This is important as evidence of change may not be observed for several years.

Following the success of the WRCC project, a second phase has been approved for funding through *Nature Returns*. This will involve six new sites within the Wansbeck catchment which are Catcherside Farm, Rothley West Shield, Gallows Hill Fell, Harwood Burn, Dyke Head and Greenleighton Farm. During this phase, work to engage and inform the wider community will continue by working with parish councils and other community groups in the area. New opportunities for volunteering will also be made available to support implementation of nature based solutions on the new sites.

Green finance aspects of the project will be progressed during Phase 2 to continue to explore (and hopefully implement) options to secure funding through green revenue streams. Groundwork has identified and initiated discussions with potential investors who could support the Green Finance strategy by, for example, contributing funds to offset their own carbon footprint. Phase 2 will provide an opportunity to continue this dialogue, develop and test robust financial methodologies and work towards putting financial agreements in place. The organisations who, at the time of writing, have expressed interest in working with WRCC to explore options for carbon offsetting and other environmental benefits are Northumbria Water, Ray Wind Farm, Northumberland County Council, Environment Agency, Lynemouth Power Limited and Tenth Revolution (recruitment agency).

There are opportunities for other projects, landowners and communities to learn from WRCC, particularly with respect to understanding the potential of green finance to support a productive landscape where nature is in recovery. It is recommended that work continues to engage stakeholders, disseminate best practice, share stories and promote positive messaging and that opportunities to do this locally, regionally and, perhaps, nationally should be sought. This will include disseminating information within environmental and farming sectors, promoting the project in local/regional/national media, and engaging with community forums.

SPECIALIST EQUIPMENT MAKES FIELD TESTING POSSIBLE (SOIL MOISTURE TESTING)

Conclusion

It is important to recognise that site-based interventions will be most effective where they are part of a wider landscape scheme. The strength of WRCC is how it has brought together a number of farms/sites and landowners to create connectivity of habitat in the wider catchment and as part of a landscape mosaic of interventions which, on some sites, have been in progress (and will continue) for decades. WRCC was informed by and contributing to the Local Nature Recovery Strategy (LNRS) in Northumberland. Alongside WRCC, other programmes are also helping nature to recover both on WRCC farms and elsewhere in the Wansbeck catchment. These include the Great Northumberland Forest, Northumberland peat partnership, and the National Trust's vision for nature recovery on the Wallington Estate. No single scheme can achieve change in isolation and the farms/land managers involved in WRCC have demonstrated how different opportunities can act together to bring about the greatest long term impact for nature.

The strength of this project is in partnerships and being able to draw on and maximise the skills and experience of a number of different stakeholders to deliver robust interventions, supported by scientific data. There are now opportunities to build on this during WRCC Phase 2.

Moreover, WRCC has established best practice and developed relationships within the Wansbeck catchment. The project team has developed their understanding of the legal and

administrative processes needed to implement habitat improvements and Nature Based Solutions. Landowners and farmers/land managers have developed skills and understanding and new relationships have been established with local contractors. This has potential to support and inform future projects, both within the Wansbeck catchment and in other areas.

It should also be recognised that WRCC is the only project within the *Nature Returns* programme that has been delivered in a productive farmed landscape, bringing together farming businesses and landowners to restore nature in a river catchment. It has provided exemplar sites, showcasing that farming and nature recovery can go hand in hand.

The Green Finance research has begun to identify new opportunities and sustainable financial models to support Nature Based Solutions on a longer term basis. WRCC Phase 2 will continue to research and test this.

Lessons from this project can hopefully be rolled out within the Wansbeck catchment and beyond.

There are also opportunities to further explore the need to engage rural communities with the natural environment. Increasing connection with nature and changing attitudes about the importance of nature in our local environment has been proven to benefit wellbeing (e.g. Natural England's MENE survey 2009-2019[2]). It is important now to recognise that barriers to connecting with nature exist in rural communities as well as urban areas. Activities delivered through WRCC to engage Parish Councils, local residents and visitors to the area are important and opportunities to continue this should continue. This will include promoting and celebrating success stories as natural habitats become more established. The farmers and land managers

[2] Natural England (2022) Monitor of Engagement with the Natural Environment (MENE)

involved in WRCC are rightly proud of the nature on their sites with many sharing that they enjoy seeing farmland birds, wading birds and other species. As the project progresses and establishes there will be more opportunities for more people to observe and enjoy a wider range of species and this has the potential to bring wellbeing benefits to rural communities.

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Acknowledgements: with thanks to Joseph Anderson, Tom Anderson, Charlie Bennett, Richard Guy, Paul Hewitt, Hylton Patrick and Neil Robson, farmers and land managers, who all gave up time to speak to me openly about the interventions on the land that they manage. Thanks also to Michele, Lesley, Helen, Isa and Lucas, Groundwork NE and Cumbria project staff, who have provided the data and images needed to pull this report together.

Case Study photos: images have been provided by Groundwork NE & Cumbria unless otherwise indicated.

**Press release quoted on page 4, last accessed 2024 - https://www.gov.uk/government/news/pioneering-nature-projects-launched-to-test-carbon-capture-methods-in-fight-against-climate-change*

nature returns

HM Government

The Wansbeck Restoration for Climate Change project is part of Nature Returns, a partnership of government departments, charities and organisations working together to build the evidence for nature-based solutions to climate change and biodiversity loss. It has been delivered by Groundwork North East & Cumbria working with local partners:

GROUNDWORK
CHANGING PLACES
CHANGING LIVES

Northumberland County Council
Forestry England
WOODLAND TRUST
Northumbria University NEWCASTLE
National Trust
MIDDLETON NORTH
LITTLE HARLE FARMING PARTNERSHIP
The Shears Foundation
RAY WIND FUNDS