OXFORDSHIRE LOCAL NATURE PARTNERSHIP

Enabling nature-based carbon sequestration in Oxfordshire

Implementation of nature-based markets in Oxfordshire

Cherwell DISTRICT COUNCIL NORTH OXFORDSHIRE

South Oxfordshire District Council
Listening Learning Leading

Vale of White Horse District Council

WEST OXFORDSHIRE DISTRICT COUNCIL

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Executive summary

This report forms part of a study seeking to develop a market for nature-based carbon sequestration in Oxfordshire. This report focusses on understanding what is needed to develop the market implementation framework to enable nature-based carbon credit transactions, as well as buying and selling of wider environmental benefits or ecosystem services.

We explored several aspects relevant to local supply and demand for these units. We put this in the context of national and international considerations of market activity, price and regulation. And we sought examples of potential solutions.

It is worth noting that much of our demand and supply exploration resulted in limited responses. This could be taken as a sign that the market conditions do not exist. But following consultation with various other stakeholders it appears there is an element of ‘market analysis fatigue’, with landowners and businesses alike feeling reluctant to answer more speculative questions about whether or not they would buy or sell units.

The project funded partners to carry out market testing and market building activities, including natural flood management opportunity mapping and ecosystem service baseline surveys. This preparatory work has led to further externally funded activity which can be seen as a beneficial outcome and evolution of the project, representing longevity and sustainability of the project.

Throughout the project, a number of challenges or barriers were identified that projects or buyers may face and, where possible, potential solutions to these are proposed. Some of these solutions are already being implemented by external partners; others require resolution at national government level.

It is considered that the most practical, appropriate approach is to work towards what’s described as the Land Function Exchange, but utilising existing infrastructure such as that developed by Oxfordshire Local Nature Partnership (OLNP) with the NatureMark shopfront and Oxfordshire Nature Recovery Fund. Development of a programme of strategic projects for the delivery of the Local Nature Recovery Strategy will also align with the findings of this report.

Contents:

Introduction

In other sections of this project, we have examined the evidence base and monetisation potential of nature-based carbon sequestration and storage across different habitats.

In this report we have reviewed, and developed, a set of high-integrity market principles for nature market transactions in the county.

This section explores the practical considerations of enabling, or bringing about, transactions.

Project Scope & Objectives

Our overall objective was to lay the groundwork for a functioning ecosystem service market in Oxfordshire. To do this we sought to understand market conditions, discover non-technical barriers to implementation, explore potential market framework and operational model solutions, and bring forward some transactions. This report includes:

1) An exploration of supply and demand of nature-based services like carbon sequestration and flood management
2) Exploration and analysis of market frameworks and models that could enable transactions
3) Supporting the 'investment readiness' of at least one project.

3Keel was engaged to undertake part 1). They also provided input to part 2). Part 3) has been brought forward via Atkins Realis in the North East Cotswold Farmer Cluster and by Nicholsons, in Burnehyll Community Woodland, Cherwell.

One of the original intentions of the project was to explore the suitability of area-based insetting (ABI) for nature-based carbon projects, working with the team at Oxford City Council who have been exploring the applicability of ABI to an insetting/retrofit project. This ABI work has ceased, and activity is being picked up by Zero Carbon Oxfordshire Partnership, which is referred to towards the end of the report.

Potential for nature-based markets in Oxfordshire

There is a need to develop a clearer understanding of the potential market for nature-based carbon and wider ecosystem services in Oxfordshire.

Market review, undertaken by 3Keel

To start this research, 3Keel were appointed to undertake a market review (3Keel, 2025). The report is in can be found on the LNP's website. This work aimed to:

- Assess potential supply of, and demand for, ecosystem services in Oxfordshire, including identifying key parties who may be interested in participating.
- Identify the practical arrangements through which those ecosystem services could be transacted, including developing a strategy for establishing an Oxfordshire ecosystem services 'shopfront' and pipeline of transactions.

The key findings of this work were:

- Oxfordshire's landscapes are well-placed to deliver the following ecosystem services: carbon storage; flood regulation; interaction with nature; and biodiversity net gain.
- Oxfordshire's current land use is better at delivering these ecosystem services: flood regulation; cooling and shading; carbon storage; water quality regulation.
- Oxfordshire's current land use is undersupplying these ecosystem services relative to need: flood mitigation; water quality services. Place-making services such as recreation, sense of place and aesthetic value were also underrepresented. Cooling and shading (mostly in the form of urban canopy cover) is poorly provided, and need for this ecosystem service is expected to increase over time and may become more relevant for business premises operators/owners and health services.
- The mapping identified the following opportunities:
    - For the key areas of interest, e.g. flood regulation, there is potential for more land to be used for this purpose, particularly lower grade farmland.
    - The land currently being used for carbon sequestration is effective at delivering this service, but the overall land area used for this purpose is low.
    - Anticipated buyers for flood and water quality services include utilities, manufacturing, real estate and public administration/local authorities.
    - Place-making services (recreation, sense of place and aesthetic value) could be monetised, but at this stage it is unclear exactly how.
    - There is potential interest from real estate owners for air quality and urban cooling/shading services.
- The key findings from engagement with local businesses on interest in providing funding for nature-based carbon or nature restoration were:
    - The interest in nature-based carbon was lower than expected.
    - Organisations were more interested in funding local projects that deliver impact e.g. tree planting initiatives, or projects that an organisation can build a connection with, e.g. opportunities for corporate volunteering days/team away days.
    - Opportunities for nature-based solutions exist in some areas, e.g. natural flood management projects, which may be supported by major utility companies such as Thames Water. There is already an active project with Network Rail, Thames Water and the North East Cotswolds Farmer Cluster.
    - Several organisations were seeking Oxfordshire-based Biodiversity Net Gain projects.

- Several barriers to businesses investing in nature-based solutions were identified. These are summarised in Table 1. A number of these are common to Forum for the Future's landowner engagement exercise (Forum for the Future, 2025).

Table 1 The barriers that businesses face to investing in nature-based solutions

Barrier	Findings from 3Keel report
Lack of clear business case	• Many businesses do not believe there is a direct link between operations and local ecosystem services. • Carbon credits and BNG are becoming more familiar, but co-benefits of natural flood management or local air quality remain difficult to attribute to business operations. **Project team reflections and implications** • Further engagement with businesses is required to communication links between nature-based services and business operations. This should include real-world examples of corporate benefit. • There is a greater role for the Taskforce on Nature-related Financial Disclosure (TNFD) recommendations and guidance for businesses to report on their nature-related dependences, impacts, risks and opportunities.
Lack of sustainability capacity	• Sustainability is not a mainstream function in many businesses. Nature-based solutions often falls between different departments internally. **Project team reflections and implications** • The market needs to cater for organisations with different levels of understanding and capacity, for example development of tiered structure to accommodate SMEs.
Lack of pressure to act	• Unless compliance purposes require it (e.g. BNG), many businesses don't feel a need to act. • Voluntary nature of initiatives means investment is targeted on more immediate operational needs and net zero investment (e.g. transition from gas or diesel fleets to electric vehicles). **Project team reflections and implications** • The Government needs to develop appropriate incentive or regulatory mechanism to drive behaviour.
Fear and uncertainty	• Some businesses are cautious about risk reputation by greenwashing and so are hesitant to support initiatives they do not fully understand or cannot easily monitor.

	• Initial focus for businesses is often on review of their own operations, assets and supply chain before looking externally. **Project team reflections and implications** • Marketplace must align with well-regarded, recognised, standards and principles.
Proximity and association	• There is limited appetite for bespoke or co-designed initiatives, with businesses preferring "shovel-ready", local projects with clear branding, impact metrics and unambiguous delivery plans. **Project team reflections and implications** • A county-wide buyer and seller market would meet this demand.
Timing and payback	• Nature-based solutions often work over many years (10-15+ yrs), not aligning with corporate planning cycles (typically 5 yrs). **Project team reflections and implications** • As noted previously, mechanisms are needed that can value projects, and capture future value now for funding purposes. • This is a significant issue as the average lifespan of a FTSE500 company being 18 years
Regulatory and policy ambiguity	• Rapidly changing and fragmented policy landscape is confusing for businesses. • In the absence of clear central government leadership, businesses are increasingly choosing to wait for greater clarity. **Project team reflections and implications** • Central government needs to focus on clear, consistent messaging, and rationality in policy promulgations • Inconsistent policy measures (e.g. BNG consultation & nature restoration fund so soon after BNG became mandatory) need to be avoided.

Area-based insetting project, undertaken by Oxford City Council

This project, and Oxford City Council's Low Carbon Oxford project, funded by Innovate UK's Net Zero Living programme, both seek to explore whether local demand within a local authority area could be matched with supply of credits from within that region. Low Carbon Oxford explored the feasibility of funding energy efficiency improvements in small businesses through financial contributions by other organisations wanting to contribute to emissions reductions and decarbonisation (Low Carbon Oxford Project team, 2025).

The Low Carbon Oxford project initially intended to use an ABI methodology and platform owned by Anthesis Consulting. Unfortunately, the project experienced challenges facilitating a complete end-to-end transaction between project development and funder. In addition, the

project team also faced issues associated with the varying standards of the voluntary carbon market and greenwashing risks.

A number of the Low Carbon Oxford project (LCOP) findings are relevant to this project:

- Using third party infrastructure for a market platform means that it is more difficult to make modifications to the platform within a reasonable timeframe and to meet funding requirements. However, developing a platform in-house requires budget and capacity within the team.
- Carbon credits need to be certified in order for buyers to use them to offset residual emissions. This creates a resource challenge for smaller, local schemes to go through the necessary verification. Development of a local standard was considered as a possible solution; however, the costs were deemed prohibitive.
- The significant carbon credit cost difference between local projects and the international carbon market could be made more compelling for potential purchasers given the local impact and wider co-benefits.
- There is a critical role of local authorities as a 'trusted intermediary'.

Demand for nature-based carbon credits from local authorities

All the local authorities in Oxfordshire have set net zero targets. As set out in the *Carbon sequestration in Oxfordshire* report, collectively the Oxfordshire local authorities are anticipated to have a total of between 10,250 and 13,915 tCO_2e residual emissions in 2030, depending on the level of investment in decarbonisation measures over the next five years. Oxfordshire County Council have allocated budget for 2025/26 for purchasing carbon credits, with the intention to source these locally. Investment in carbon credits by the other Oxfordshire local authorities will now not be possible until after local government reorganisation, however the future authorities may pursue purchasing carbon credits once they are established.

Additional evidence for wider demand for nature-based carbon credits

Through meetings and events where the project has been discussed, there is evidence to indicate that a number of smaller organisations in the county would have an interest in funding nature-based projects that deliver carbon sequestration.

This project was showcased at a local business seminar hosted by Ecosystem Knowledge Networks in March 2025, and discussion amongst attendees indicated that local business would be interested in purchasing carbon units in local projects. Participants were particularly interested when there was a local connection or longer-term relationship that could develop from that funding, such as follow-up visits and the potential to utilise for corporate events (team away days/volunteering activities). One challenge noted by several participants was knowing how or where to find local projects that were seeking funding. This is a key finding we aim to address.

Given the slightly divergent responses from the 3Keel engagement work, we sought to target the wider business community in Oxfordshire to identify potential demand through an online survey.

A short survey was circulated to over 5,000 business contacts held by the partner local authorities' Economic Development teams to gauge interest in local, nature-based carbon credit opportunities. Although only a small number of responses were received, these provided qualitative insights into local business perspectives. Respondents expressed broad support for the principle of investing in locally verified carbon projects, particularly where they delivered visible community or environmental co-benefits such as biodiversity enhancement or flood resilience. However, they also noted that awareness of carbon credit markets remains low and that clearer information on credibility, pricing, and impact measurement would be needed before businesses could engage confidently. These findings, though based on a limited sample, are helping to shape how such opportunities might be scaled and integrated into a wider Oxfordshire carbon market framework.

A survey-based research report was commissioned by *South Oxfordshire and Vale of White Horse* district councils to understand how small and medium-sized enterprises (SMEs) are engaging with Net Zero. It analysed 131 local business responses on their awareness, current actions, and future ambitions related to carbon reduction. While it primarily focused on barriers such as lack of finance; time, and resources, the report also highlighted that local businesses are motivated by personal values and are keen to act when given targeted support such as grants, mentoring, or access to sustainability platforms. Although the report does not directly assess demand for nature-based carbon credits, it suggests that SMEs' interest lies mainly in emission reduction within their own operations rather than purchasing external offsets. However, their openness to local, values-led sustainability actions implies that nature-based carbon credit schemes, particularly those with visible community or environmental co-benefits—could attract interest if presented as part of a trusted local Net Zero support framework (Oxford Brookes Business School, 2024).

The challenge of engagement has been a consistent theme across this project, identified by:

- Forum for the Future in their landowner engagement
- 3Keel in their corporate/larger demand sources
- Online survey respondents through council based Economic Development teams' online survey responses

The LCOP experienced similar issues, where the time and capacity constraints of smaller organisations limited engagement opportunities, even though such interventions could yield cost savings for the business (Low Carbon Oxford Project team, 2025).

Supply of ecosystem services in Oxfordshire

There is currently limited visibility of the supply side of ecosystem service markets in Oxfordshire. Biodiversity net gain (BNG) represents the only outlier where good information is available on the DEFRA register (including number of units available for sale, as well as how many units have already been traded or allocated from those sites). To further improve this visibility, OLNP have created a BNG habitat shopfront, where we display all Oxfordshire's habitat banks in one place. There are currently five, with a large number of units for sale. This makes Oxfordshire among the most strongly supplied counties in England.

There is less visibility of the carbon credits currently available in the county. At the time of writing (October 2025), there are no Woodland Carbon Units available to purchase in Oxfordshire. The nearest units available are in Bedfordshire. There is only one site in

Oxfordshire, Halle's Wood[1], that has Woodland Carbon Pending Issuance units available to purchase, it has a total area of 4.22 ha and is predicted to deliver 948 tCO_2e of claimable units. The first on-site verification of this project is due to take place in 2026, when some of the project's Pending Issuance Units may be commuted to Woodland Carbon Units.

This project explored other markets, not just carbon. Given the high incidence of flooding and the strategic importance of river and tributaries in Oxfordshire, natural flood management (NFM) represents another opportunity to deliver biodiversity enhancements that also result in outcomes that businesses and other organisations benefit from and therefore might be willing to pay for.

Because of this strategic importance, potential revenue stream, and the findings of the carbon market report (which showed that floodplains and wetlands sequester relatively high levels of carbon compared to cultivated agricultural land), this project funded NFM opportunity mapping in the Cherwell catchment. This catchment was selected because, alongside the Evenlode and Windrush (which both already benefitted from this mapping) it had the greatest potential to reduce flood risk in Oxfordshire.

This opportunity mapping highlighted the areas where NFM interventions (which include creation of leaky dams, scrapes, wetland, and riparian tree planting) could have the most impact. With support of a farm adviser, owners and farmers of several landholdings were approached, many of whom were willing to pursue the opportunity. At time of writing, funding applications had been submitted for detailed feasibility studies for three NFM schemes in the Cherwell catchment. This represents a great kick-start to creating a market for NFM in Oxfordshire.

[1] https://registry.spglobal.com/uklandcarbonregistry/public/wcc/projects/104000000027387

Landowner access to nature-based carbon markets

As discussed in more detail in the *Carbon Sequestration in Oxfordshire* report, the current breadth of carbon codes and standards creates practical challenges for both investors and landowners and managers. After setting out how landowners currently access the carbon sequestration market, this section of the report proposes a new approach, based on the findings of this project. A summary of recent trends in the carbon credit compliance and voluntary markets is set out in Appendix 1.

The current approach to accessing nature-based carbon market for landowners

Multiple codes and standards create additional transactional cost, complexity and increases the risk of double-counting of benefits, leading to potential accusations of "greenwashing". The current arrangement is summarised in Figure 1, with illustrative individual codes and their respective administration/market "pathways".

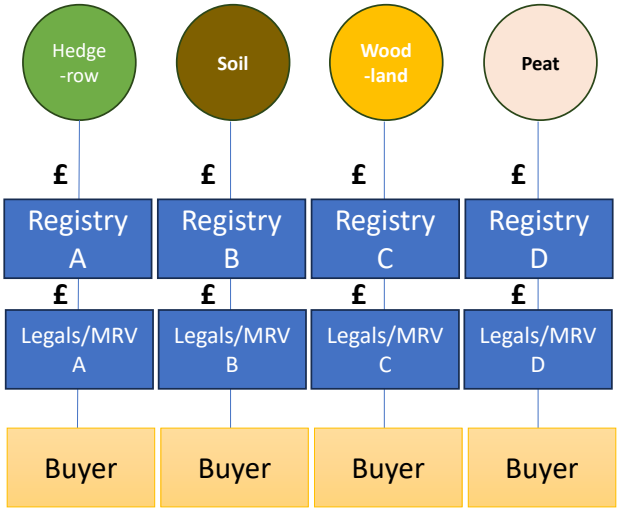

Figure 1: The current process for landowners to participate in nature-based carbon markets (N.B. MRV = measurement, reporting and verification)

A new approach to optimise access to nature-based carbon market for landowners

Given the challenges, this project has considered three alternative approaches to optimising access to nature-based carbon markets for landowners, some of which are already being applied in practice:

1) Aggregation of land interests across an area/landscape
2) Whole-farm carbon approach
3) Utilise broker(s) to facilitate market access

Aggregation of land interests across an area/landscape

In this approach, separate market infrastructure for the different carbon codes is retained (Figure 2) but groups of landowners/managers are brought together within each carbon code habitat.

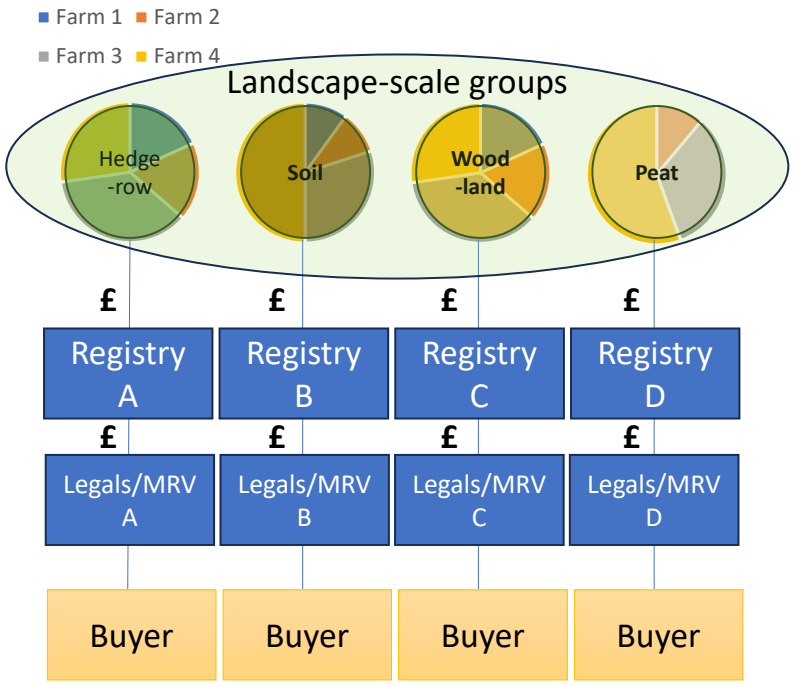

Figure 2: The process where groups of landowners are combined within each carbon code habitat to participate in nature-based carbon markets (MRV = measurement reporting and verification)

This builds economies of scale and reduced transaction costs by packaging together several farms' individual carbon habitat components. For example, 10 farms each with 300 m of hedge creates a 3 km bundle to sell to hedgerow carbon market. This could enable local projects to collectively reach corporates and institutions of larger scale and participate in Requests for Proposals from groups of organisations coming together to invest in carbon credits (examples are set out in the pooling buyers section of Appendix 1). However, buyers and sellers still have to deal with multiple carbon codes/registries, and the overall value of each package still tends to be modest unless there are a significant number of farms participating. There is also the risk of double-counting between different codes unless they are tightly and consistently defined (for example, in-field vs. field boundaries and non-productive areas of a farm).

This approach is being trialled by the North East Cotswolds Farmer Cluster through their Evenlode Landscape Recovery project. This report considers this approach to be the most progressed opportunity for Oxfordshire, and if successful OLNP will look to support others to adopt a similar framework.

Whole-farm carbon approach

In this approach, a single carbon code is developed that would capture carbon sequestration from several different habitats (Figure 3).

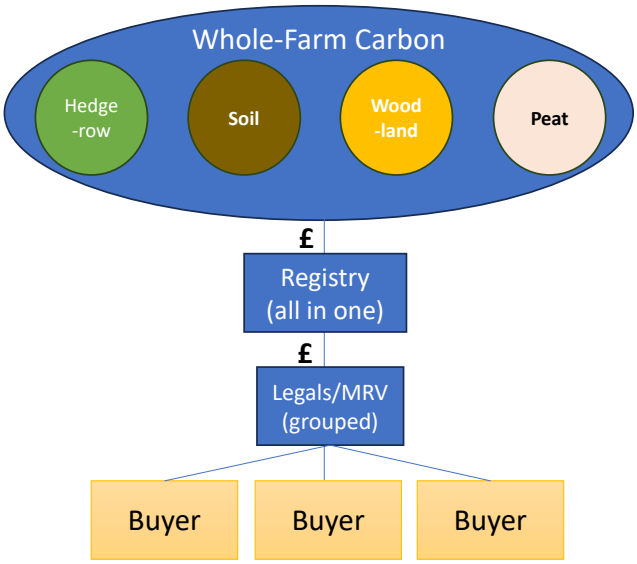

Figure 3: A process where a single carbon code is developed to combine a landowners' different habitats

This approach is significantly simpler for landowners and buyers. A farm with 100 acres of soil carbon, 300 m of hedgerow carbon and 50 acres woodland carbon could interact with a single carbon code and associated infrastructure or MRV. Buyers could acquire carbon units through a single registry, minimising the level of knowledge needed of multiple codes. Existing farm carbon calculator tools (such as Agrecalc, Cool Farm Tool, Farm Carbon Calculator and Sandy) could be used, although challenges associated with varying calculation assumptions and methodologies would need to be overcome (RSK ADAS Ltd, 2023).

There are currently few organisations offering this solution. The UK Carbon Code of Conduct Standard (UKCCC) does enable an entire land area to be assessed as a single holding (see further information in *Carbon Sequestration in Oxfordshire* report). However, it requires a farming enterprise to have achieved net zero before being permitted to sell carbon units to guarantee integrity of credits (UK Carbon Code of Conduct, 2025).

A challenge to developing a whole-farm carbon code is the time and cost involved in developing a new standard and obtaining suitable accreditation with a recognised accreditation body such as Verra. The viability of such an approach will partly depend upon the scale of carbon units that the scheme is anticipated to provide, but also the demand that may exist for such units.

Landscape-scale application of whole-farm carbon

There is nothing precluding a whole-farm approach being developed and applied at landscape scale (Figure 4).

Utilising this approach may provide an optimal outcome for buyers and sellers for the following reasons:

1) Creates potential to deliver a significant volume of credits, which would be attractive for local authority, larger corporate and institutional buyers.
2) Spreads credit purchases across a number of project sites, providing diversification and reducing the risks associated with non/under-performance by a landowner.
3) Enables farmers to continue to focus on food production, rather than having to convert land to non-productive uses such as woodland creation.

4) Provides administrative efficiencies such as sourcing project insurance and transaction negotiation and documentation.

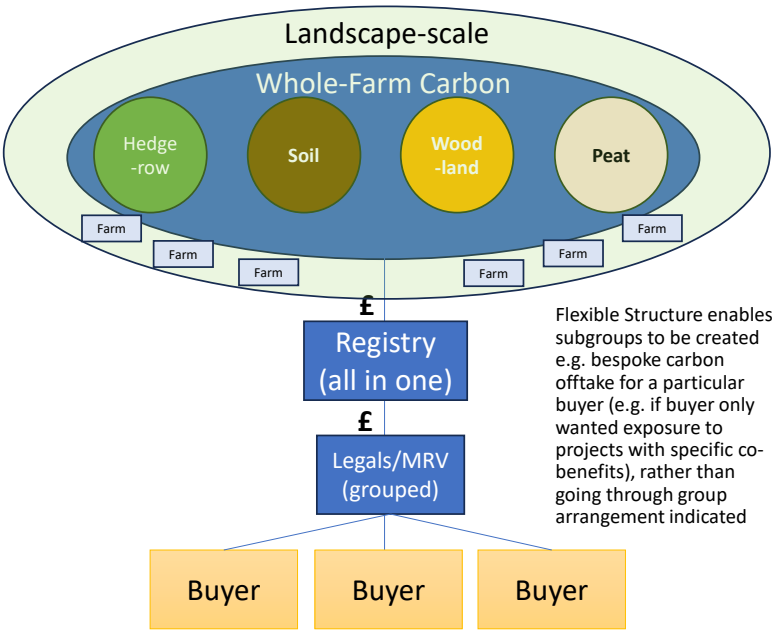

Figure 4: A process where the whole-farm approach is scaled up to the landscape scale.

There are complexities, primarily around allocation of risk and rewards between participating landowners, which need to be managed through effective contractual arrangements.

Practical considerations for development of a large-scale, single farm code

Organisations such as farm clusters or wider landscape partnerships could have a remit to deliver a large-scale single farm code. However, the government has recently announced that funding for farmer cluster facilitator roles will be ended. Other landowner/manager groups are forming, from co-operative producer models through to regional partnerships such as the Environmental Farmers Group, and these provide a critical mass of sellers which could enhance pricing power.

Funding will be required for the code development and approval process. This project has not gathered evidence on whether landowners and farmers might be willing to fund this process. However, given the potential national applicability, there is scope for this to be funded from either private sector sources (such as natural capital investors) or public sector or philanthropic sources. Alternatively, a not-for-profit model which charges a modest levy on carbon unit sales to support ongoing development of the code could deliver multiple benefits for the farming community (for example, a portion of the profit could be allocated to community benefit projects, such as farmer wellbeing initiatives or grant funding). It could also be possible to utilise a third-party broker or facilitator such as the Local Nature Partnership (if appropriately resourced).

A case study of a whole-farm carbon code being used in practice is available in Appendix 2.

Utilising brokers or facilitators to simplify carbon-market access

Using a broker

Using a broker may improve transaction efficiency. Entities such as Nature Broking or Respira provide scope for a buyer organisation to specify the types of carbon credit it wishes

to purchase, to fit with objectives or desired geographic area. A broker could also support local producers of carbon to access the market more efficiently.

However, unless designed and operated transparently and locally, this approach would limit the ability of buyers and sellers to develop longer-term commercial relations, an issue identified through Forum for the Future's report on engaging landowners in Oxfordshire (Forum for the Future, 2025).

Implementation costs are likely to be modest for utilising a broker. It may be possible to utilise a 'whitelabel approach', whereby an existing broker's platform is purchased and rebranded by local organisations.

The Local Nature Partnership as a facilitator

An approach utilising the Local Nature Partnership (LNP) in a facilitator role could provide a local solution. However, there are several practical challenges to address to ensure a robust, credible offering that is attractive to a wide range of buyers, and overcomes the funding challenges that Oxford City Council's LCOP (explored in section 3) experienced:

- LNPs currently operate on a 'hand-to-mouth' basis, with most only having secure funding for the current and next financial year.
- Very few LNPs have the necessarily in-house skills or capacity to undertake a facilitator role (this is something that the Local Investment in Natural Capital (LINC) project has found and sought to overcome)
- There may be regulatory risks and considerations associated with the sale/transaction process of financial products or carbon units.
- The contractual arrangements and funding mechanisms would need to be designed
- Clarification on which organisations take on the risk is required. There could also be reputational risks for a LNP if supported projects fail to deliver.
- LNPs are likely to have extensive networks for the supply side but buyer-side relationships are less well developed.

Despite these challenges, an LNP would, importantly, have a higher degree of trust from the supply side operators, and may be better placed to facilitate aggregation of larger parcels of credits.

Pros and Cons of each approach

In the short term, the project partners are advocating for groups of landowners to package together several farms individual carbon habitat components to enable local projects to collectively deliver a larger volume of credits (the approach that is being trialled by the North East Cotswolds Farmer Cluster). A whole farm carbon approach where a single carbon code is developed to incorporate different habitats owned by a single landowner is likely to be an effective approach in the future, although this will require significant work to implement which should be done at the national level. Further pros and cons of a whole-farm carbon code, landscape aggregation and the use of a broker are explored in Table 2.

Table 2: A summary of the different approaches that landowners could particulate in nature-based carbon markets.

Arrangement:	Pros	Cons
Whole-farm Carbon Code	✓ Single code, easier to follow, with consistent definitions ✓ Reduces transaction costs for buyers and sellers ✓ Reduces monitoring & verification costs (potential to use whole-farm carbon calculator toolkits?) ✓ Scope to use single registry function (enhances traceability and minimises double-counting risk) ✓ Lower cost per unit of carbon credited	× May not yield significant benefit at individual farm level if limited carbon sequestration output (e.g. only a few metres of new hedgerow) × Need to manage different permanence/leakage risks across varying habitats (Structural issue) × How to create scalable standard?
Landscape Aggregator (e.g. by farm cluster/ geographic region)	✓ Achieves scale across range of carbon credit types (soil carbon, woodland, etc.), reducing scheme costs per farmer ✓ Potentially attractive to larger ticket investors/ corporates who may currently be unable to fulfil their demand ✓ Greater negotiating strength when agreeing prices? ✓ Shared learning/knowledge transfer across the participant group of landowners/farmers	× Need to agree mechanism to allocate sales between participating farmers/landowners – this creates a layer of additional cost within the structure (though outweighed by scale economies?) × Need mechanism to manage reversal risks/future non-performance by individual landowners (financial compensation/insurance?)
Broker	✓ Provides scope for standardisation of documentation if broker has sufficient scale ✓ Can bundle packages across range of farm/carbon types and different geographic areas to suit specific buyer requirements	× Removes some of the effort from farmers in identifying buyers but still leaves them having to understand and comply with several carbon codes × Farmers become price-takers?

A nature-based solutions marketplace for Oxfordshire

The ambition of this project is also to explore the potential to establish an effective market for wider nature-based solutions (for example, natural flood management projects), and not simply carbon credits. Such projects may deliver sequestration benefits, but these are secondary co-benefits rather than the primary objective.

3Keel observed that *'a mechanism is needed to efficiently match supply and demand, to grow demand beyond the existing markets, and provide greater clarity and coordination between different markets'* (2025). This project has considered the suitability of three such market mechanisms for Oxfordshire:

1) Landscape Enterprise Network (LENs);
2) Land Function Exchange; and
3) A Coalition of the Willing.

A LENs framework for Oxfordshire

Landscape Enterprise Networks (LENs) is a marketplace framework developed by 3Keel. It focuses on building local markets around supply chain resilience and GHG emissions benefits arising from adopting regenerative agriculture interventions. There are a number of operational LENs marketplaces in the UK (for example in Cambridgeshire, Yorkshire and Humber, and Cumbria) as well as a growing number of international LENs marketplaces.

The 3Keel report identifies six key considerations for LENs marketplace success, set out in Tale 3.

Table 3: A summary of the considerations for success of a Landscape Enterprise Network

Consideration	Comment
Focus on customer need	Buyers are more likely to invest in cost-effective nature-based projects which deliver a core need for their organisation, rather than just an environmental need.
Place-based	Buyers often prefer solutions in close proximity to particular assets or within their supply chain. This also creates a link to local social, environmental and economic priorities.
Efficient transaction process	Buyers will have limited time and capacity to procure nature-based services. Established and efficient processes are need to convert initial interest to transactions.
Green commerce not green finance	There needs to be a commercial driver to bring buyer and seller together before private finance can play a role in funding solutions.
Build a business community	Opportunities to collaborate, grow, enhance efficiency and build confidence in nature-based solutions are realised through building a community of businesses around a common need/landscape.
Start small and simple, then build complexity	Collaboratively funding actions across a landscape can unlock greater funding and impact, but need to start small, with simpler, bilateral agreements.

In Oxfordshire, agriculture is a less significant contributor to county economic gross value added (GVA) than other regions where LENs has already been successful (Figure 5). This is likely because there is less productive land in Oxfordshire and a lack of key processing/infrastructure facilities. Opportunities to evolve resilient supply chains are therefore more limited and unlikely to be as obvious to identify as elsewhere.

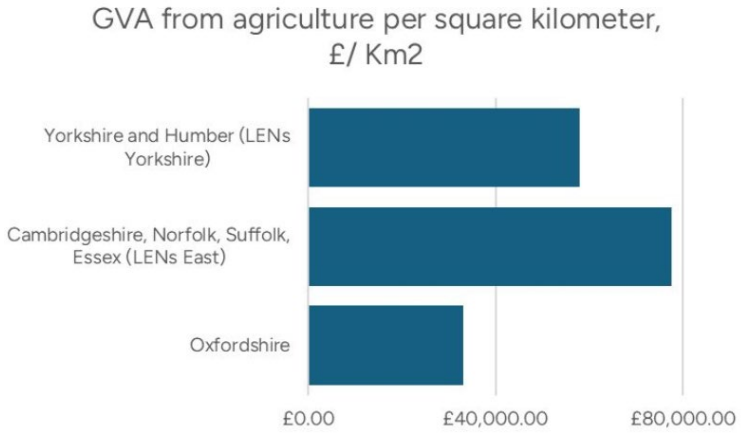

Figure 5: Gross Value Added (£/km2) from Oxfordshire agriculture, compared to other existing Landscape Enterprise Networks (3Keel, 2025)

Land Function Exchange

Given the challenges of utilising an established LENs model in Oxfordshire, this project proposes an alternative solution which seeks to match buyers and sellers through a broker service (Figure 6). It is likely that initially there will only be demand for a small number of projects, but the proposal would be to expand the range and scale of services, utilising common documentation to improve transaction efficiency and reduce costs.

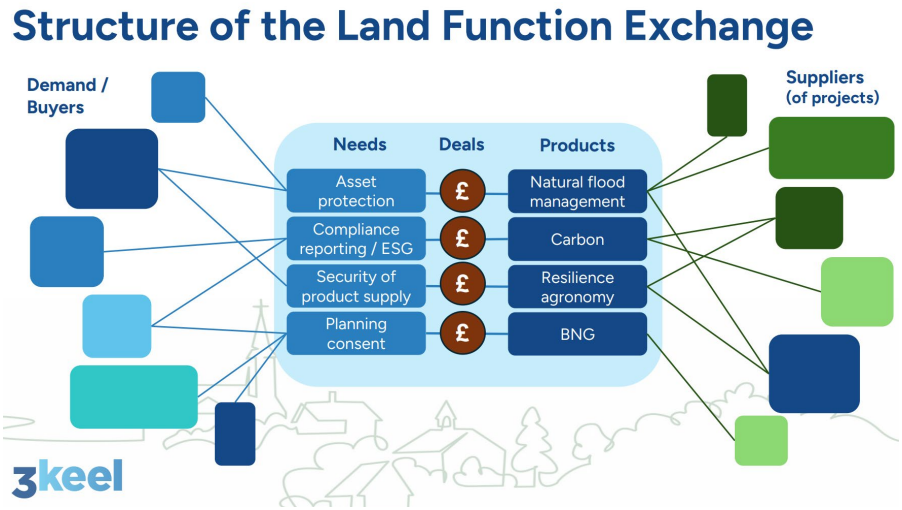

Figure 6: Structure of a Land Function Exchange (3Keel, 2025

The LENs could be led by locally based individuals or groups, potentially set up as a structure to benefit all parties through use of a community interest company.

Forum for the Future's report on engaging with landowners found that farmers and landowners need to be able to engage with a 'trusted' partner (Forum for the Future, 2025). This could take the form of landscape-level regional partnerships, or, for Oxfordshire, a mechanism that could utilise the LNP. This aligns well with the operating model (Figure 7) for Oxfordshire's Nature Finance market that was proposed in the Oxfordshire Local Nature Partnership's Nature Finance Strategy.

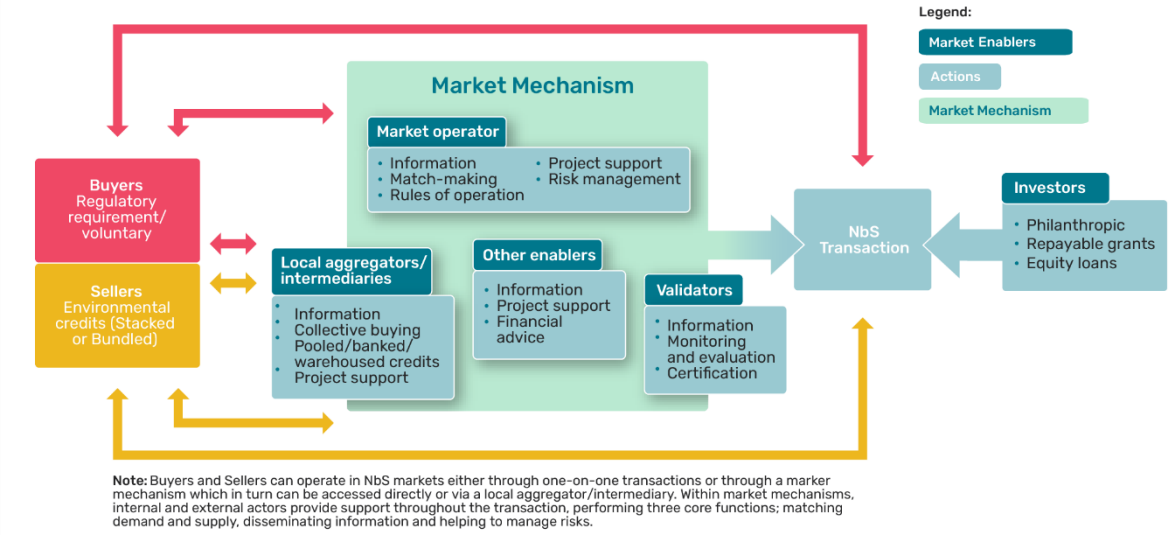

Figure 7: Proposed operating model for Oxfordshire's Nature Finance Market (OLNP nature finance strategy, 2023)

A county-level mechanism would align with the Local Nature Recovery Strategy (LNRS)and the nature recovery pipeline of projects. The carbon storage and sequestration potential of INRS opportunity zones, and the associated quantity of marketable carbon units that could be available over the next 30 years is estimated in Smith (2025).

Other ongoing work, including the 100Together Green Finance initiative, Oxfordshire Nature Recovery Fund (ONReF) (Box 1) and the work that has been taking place on developing a framework for highlighting higher-integrity BNG sites (Box 2), can integrate with the development of a Land Function Exchange, through use of existing website infrastructure

Box 1 – Oxfordshire Nature Recovery Fund (ONReF)

One of the non-technical entry barriers to nature markets is the high upfront costs for sellers, and the lack of accessible capital to meet these costs. This prevents some landowners from entering the market, resulting in domination by affluent landowners. To overcome these issues, OLNP, in partnership with Trust for Oxfordshire's Environment, has created the Oxfordshire Nature Recovery Fund (ONReF).

The fund loans money to landowners wishing to enter nature markets, typically to cover ecological survey and legal/accreditation documentation and sometimes including on-the-ground works. This loan is then repaid upon the sale of credits/units, or receipt of other related income.

ONReF loans money to project developers who can demonstrate three main criteria:

- The project will result in a significant increase in biodiversity
- The project can generate revenue to repay the loan
- They cannot access the finance elsewhere

and principles. ONReF can provide a solution for overcoming the high upfront cost (for example, baselining and legal work) of project development for opportunities that are capable of generating revenue.

Box 2 – NatureMark

To meet some of the issues regarding transparency in the biodiversity net gain market, Oxfordshire Local Nature Partnership has developed NatureMark, a virtual shopfront for habitat banks (sites with BNG units for sale). NatureMark is also a set of high integrity criteria, operating on a self-assessment basis, requiring habitat banks to publish relevant data they are not otherwise required to put in the public domain, but which will help buyers understand more about the design, ambition and integrity of each project.

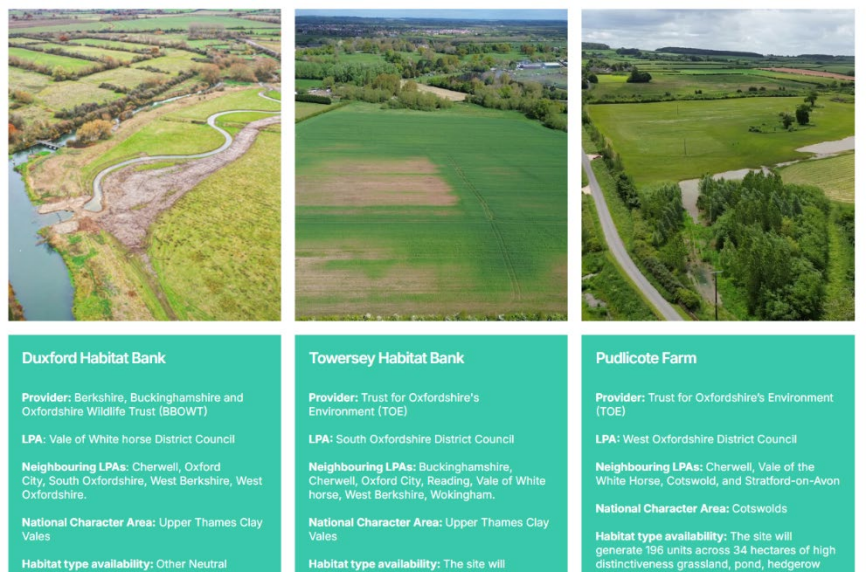

Figure 1: Screenshot of NatureMark website

There is further potential to expand the NatureMark concept to signpost high-integrity nature-based carbon and other ecosystem service project. There is also potential to strengthen the scheme through external assessment, with resulting accreditation, although there is a need for caution given the limited market demand that has been evidenced to date, and the extent to which price not quality currently dominates decision-making for BNG.

Coalition of the willing

A Land Function Exchange provides the potential to meet a number of objectives. However, until there is greater clarity on demand potential across the county, there is a potential risk of establishing the market infrastructure (and incurring associated costs) before the opportunity has been fully understood. The view of the project team and 3Keel is that bringing together a small-scale group of enthusiastic, willing market participants from both buy- and sell-side could provide a low-cost, lower-risk platform from which a market exchange could emerge.

This work is commencing, with the Zero Carbon Oxfordshire Partnership and the OLNP leveraging their networks. With an identified lead demand-side partner (Oxfordshire County Council), clear supply-side pipeline (via the Landscape Recovery projects in the Evenlode and Ock & Thame) and research support from Leverhulme Centre for Nature Recovery, this approach has the potential to kickstart market activity in Oxfordshire. This would demonstrate and bring together both supply and demand.

Next steps for implementation

The support and development of a nature-based solutions marketplace for Oxfordshire has progressed significantly through this project. However, further work is needed, led by the OLNP, to move this work forward to implementation.

The list below sets out the project team's proposed next steps.

Building demand

- Develop better picture of demand potential across the county via direct engagement with existing contacts and networks.
- Test local authorities' appetite for investing in carbon credits to offset residual emissions by 2030/35 (considering the limits imposed by imminent local government reorganisation).
- Explore potential for collective purchase agreements

Supporting supply of local, nature-based carbon credits

- Focus on existing carbon codes.
- The project is advocating for groups of landowners to package together several farms individual carbon habitat components to enable local projects to collectively deliver a larger volume of credits (the approach that is being trialled by the North East Cotswolds Farmer Cluster).
- Prioritise nature-based carbon projects for receipt of loans through ONReF.
- Adapt the NatureMark website to be appropriate for application to nature-based carbon.
- Explore potential for forward purchase agreements, providing upfront capital to reduce risk and fund delivery

Supporting development of wider nature-based solutions marketplace

- Organise a "Coalition of the willing" discussion to identify demand and supply potential
- Once demand picture has become clearer, test principles with buyers and potential projects to ensure acceptability/compatibility
- Explore potential to aggregate projects across the county through development of supply project database

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Appendix 1 – carbon credit compliance and voluntary markets

Carbon credits – trends in compliance market

Compliance markets are created in response to legally binding emissions reduction targets such as the 2015 Paris Agreement. In the UK this is through the UK Emissions Trading Scheme (UK-ETS). There is ongoing expansion of the coverage of ETS and carbon taxes globally. It is primarily the industrial and power sectors that have carbon taxes or an ETS scheme, and around 43-51% (respectively) of these sectors are subject to an ETS or carbon tax mechanism.

Currently, the UK-ETS does not permit use of nature-based credits. The UK Government has consulted on inclusion of such credits, however no decision has been made at the time of writing. The ability to utilise nature-based carbon credits in a compliance market is likely to generate an additional source of demand for these units.

The World Bank noted that in the twelve months to the end of March 2025, there was a trend towards use of nature-based removal credits amongst buyers. These credits have also attracted pricing premia relative to other removal credits. Whilst this has been evident for several years, see Figure 8, the scale of premium is now significantly greater than prior to 2023.

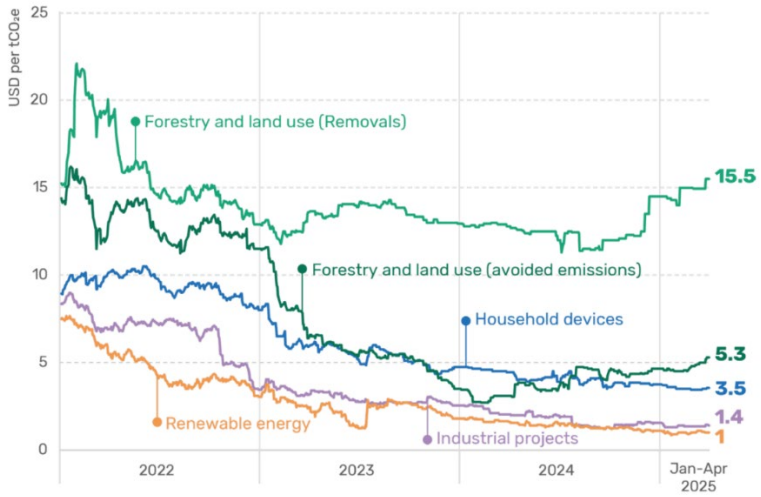

Figure 8: Exchange-traded carbon credit prices by project types, 1 Jan 2022-1 April 2025 (World Bank, 2025). Prices based on monthly and yearly averages of price assessments provided by Platts & S&P Global Commodity Insights. Nature-based sequestration projects are removals projects

Carbon markets – trends in voluntary market

Voluntary market carbon credits cost less than compliance market carbon credits. The voluntary carbon market has been disrupted in recent years by greenwashing concerns and low performance of a number of global carbon projects. Over the last year, the market has picked up again and several trends are emerging:

1. The impact of the ICVCM's Core Carbon Principles and the approach being taken to particular sectors by ICVCM is starting to be reflected in supply trends, with sectors

not receiving approval under ICVCM's CCPs showing notable declines in issuance (renewable energy projects falling by over 40%). The implication is that CCP-approval may be seen as a minimum benchmark of supply-wide quality for project developers.

2. Evidence suggests that credits with higher ratings from carbon credit ratings agencies (such as BeZero, MSCI, Sylvera) are achieving a premium in their pricing.
3. Removal credits (whether nature-based or engineered) are showing an increasing premium over reduction credits. This premium was 245% in 2023, but had increased significantly to 381% in 2024, however the removal credit share of the total (global) market is small, at only 5%.
4. Similarly, more recent credit vintages (those within the last 5 years), are seen to have a higher integrity threshold, traded at a 217% premium, relative to their position in 2023 (53% premium).

In the global voluntary carbon market, reported transaction values totalled US$535m in 2024, 29% lower than 2023, and significantly below the 2021 peak of US$2.1bn, as shown in Figure 9. The decline in 2024 comprised a 25% fall in volume (number of credits), and an average price decline of 5.5% relative to the previous year (Forest Trends Association, 2025).

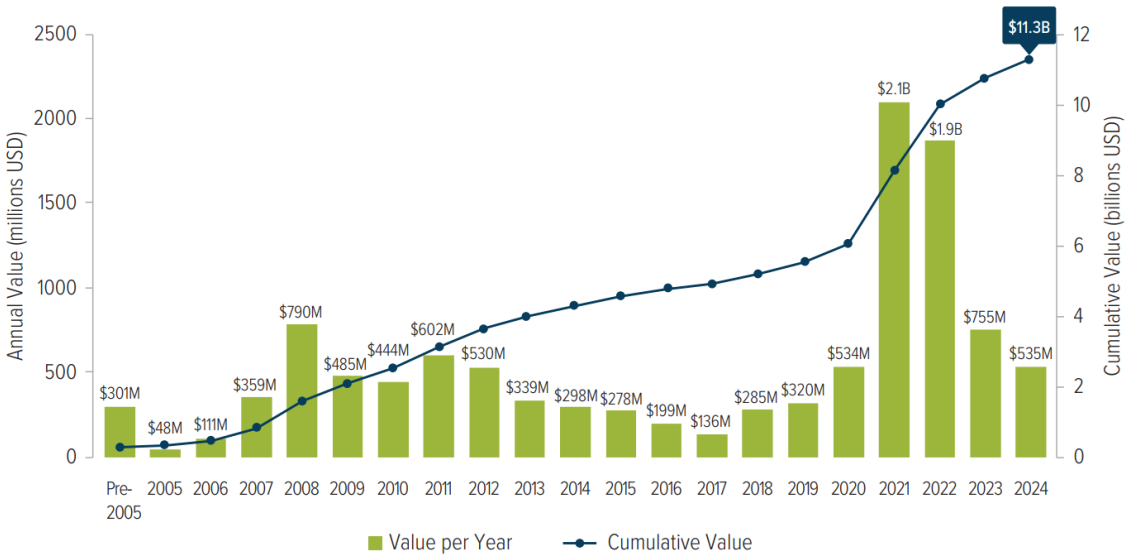

Figure 9: Voluntary Carbon Market Size by Value of Traded Carbon Credits (extracted from Forest Trends, 2025)

Despite this global trend, there has been increasing buyer demand for nature-based carbon credit projects, with MSCI research identifying 10 significant, multi-year offtake agreements signed with large technology and energy businesses concluded in the first half of 2024, and 55 offtake commitments in the first half of 2025. Although pricing evidence is limited, the average price was stated as US$50/tonne (MSCI Carbon Markets, 2025).

Across the major project standards, the UK Woodland Carbon Code represents a very small proportion of global volume (less than 0.5%). However, it is notable that the Woodland Carbon Code units trade at a significant premium to other standards (US$34.18/TCO2e in table 4 below, equivalent to c. £27/TCO2e at an exchange rate of USD1.27:£1, suggesting the pricing quoted below is for the pending issuance units which were last reported by the Woodland Carbon Code website at £26.85/unit).

It is not clear from the data whether the other standards are quoting verified, ex-poste carbon credit pricing, or if these are also ex-ante, potential issuance units. If the former, then

the premium for WCC units relative to other standards is even greater than the table suggests.

Table 4: VCM transaction trends by Project Standard Extract from (Forest Trends Association, 2025)

	2023			2024			Percent Change		
Standard	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume	Value	Price
VCS	56.6	$394.1M	$6.96	41.9	$194.8M	$4.65	-26%	-51%	-33%
ACR	10.8	$61.7M	$5.74	10.3	$121.4M	$11.82	-5%	97%	106%
Gold Standard	16.3	$103.9M	$6.37	9.8	$69.5M	$7.10	-40%	-33%	11%
CDM	6.9	$18.0M	$2.63	6.2	$8.3M	$1.35	-10%	-54%	-49%
CAR	3.4	$26.5M	$7.80	3.1	$32.5M	$10.60	-10%	23%	36%
Plan Vivo	1.6	$18.8M	$11.51	1	$12.8M	$13.14	-40%	-32%	14%
UK Woodland Carbon Code	0.3	$10.5M	$30.25	0.3	$9.5M	$34.18	-20%	-9%	13%
Canadian Standards Association	-	-	-	0.3	$1.7M	$6.62	-	-	-
Cercarbono	0.6	$2.4M	$4.17	0.2	$0.9M	$4.25	-64%	-63%	2%

Pooling buyers

There are several examples of groups of organisations coming together to invest in carbon credits.

Case study 1 – Symbiosis

Symbiosis, a coalition between Google, McKinsey, Meta Platforms, Microsoft and Salesforce, has committed to purchasing 20mt of nature-based carbon removal credits by 2030. This advance market commitment (AMC) provides certainty and incentivises the growth of innovate, supply-constrained carbon removal projects such as reforestation and agroforestry schemes and mangrove restoration projects.

Symbiosis have established quality criteria for reforestation and agroforestry projects and advise that projects have “at least 50,000 tonnes over 10 years or have at least 1,000 hectares of restoration expansion potential.” At the time of writing, Symbiosis have closed their first Request for Proposals (RFP) and are expecting to open the second round in late 2025 (Symbiosis Coalition, n.d.).

Case study 2 – Watershed

Watershed, an enterprise sustainability platform which manages over 2GT of emissions through its client-base of global financial services, technology and manufacturing organisations, launched a request for proposals (RFP) in 2025 for 1 megatonne of carbon removal credits. They sought to procure both nature-based and engineered removals on behalf of an aggregated pool of buyers.

Watershed have set out the eligibility criteria for their RFP, including that credits must be verified before delivery and that credits must have been issued, or have a high certainty of issuance, by the end of April 2026. The eligibility criteria do not set a specific price range, with applicants encouraged to present their most competitive offer. Projects of all sizes can apply, but projects delivering a greater volume of credits were prioritised for review. Projects should have a minimum 20yr permanence, with strong preference for 100+yrs in the case of nature-based credits. Projects with co-benefits would be prioritised.

Appendix 2 - case studies

Soil Association: Whole Farm approach to Natural Capital

The Soil Association and Woodland Trust have tested a whole farm approach to natural capital as part of a FIRNS funded project in Scotland, exploring the barriers landowners find when engaging with natural capital markets (Soil Association, April 2025). Similar issues were identified to those found in our project, notably capacity constraints on smaller landowners to engage with such markets with differing application and governance processes, and the challenge of being focused primarily on farming and food production.

In addition to exploring a whole-farm approach, the study also considered the impact of aggregation strategies with a sample of 5 farms. The approach was primarily based on tree-based interventions (woodland creation, agroforestry) and used Soil Association's Exchange platform/app for baselining and monitoring. The approach used a combination of the Woodland Carbon code calculator and specific carbon calculators developed by the Organic Research Centre for hedgerows and agroforestry.

The study did not explore the mechanisms by which different landowners may be brought together (i.e. whether via partnership, loose affiliation, corporate structure).

Table 5: Key findings

Positive Benefits	Challenges
1. Lower project development costs 2. Reduced data errors if single project development document and calculator tool used 3. Lower farmer time commitment 4. Aggregation increased visibility of project	1. Inconsistencies between WCC and Peatland code leading to practical difficulties (e.g. validation & verification requirements, approach to baselining) 2. Some integration issues with hedgerow code and agroforestry particularly where interventions occur at different times e.g. woodland creation in year 1, hedgerow creation in year 4 – how to assess for permanence and additionality; differing risk buffers 3. Verification & Validation processes need integration and signoff at scheme owner level 4. Aggregated costs may skew financial additionality outcomes for individual codes – need to approach additionality at whole farm level (this would seem appropriate)

A number of the issues identified from the study, as laid out in table 5, could be resolved through a process of integrating the various carbon codes.

It is possible that agroforestry and hedgerow codes could become modules of the Woodland Carbon Code in time. Registry development would also need to take place in order to maximise the benefit from development of a whole-farm carbon approach, enhancing both integrity (minimising double-counting risk) but also efficiency for market participants.

Across the five farm sites used in the study, the vast majority of the carbon sequestration over a 100 year period was projected to arise from woodland areas (around 80%), with the

contribution from hedgerows being around 3% (see Figure 10). In practice, this will obviously vary depending upon the characteristics of individual landowners and farms.

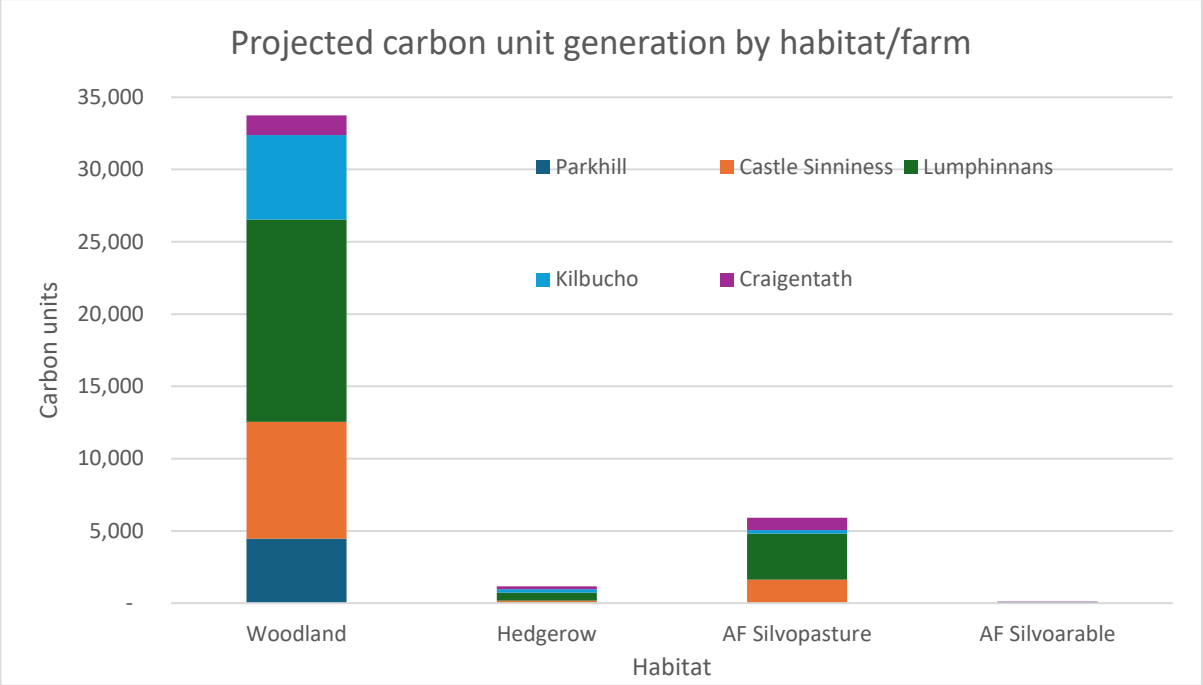

Figure 10: Projected carbon unit generation by habitat/farm from Whole Farm study (Soil Association, 2025)

Silvopasture planting delivered additional sequestration, however the density of that sequestration per hectare was less than woodland given the lower planting density (see Figure 11 below). The habitat with greatest sequestration rates on a per hectare basis, was hedgerows, however the total absolute projected sequestration was only a fraction of that achievable with woodland given the different areas involved. Nevertheless, the findings do highlight the potential role of hedgerows in delivering incremental sequestration without taking areas of land out of productive use.

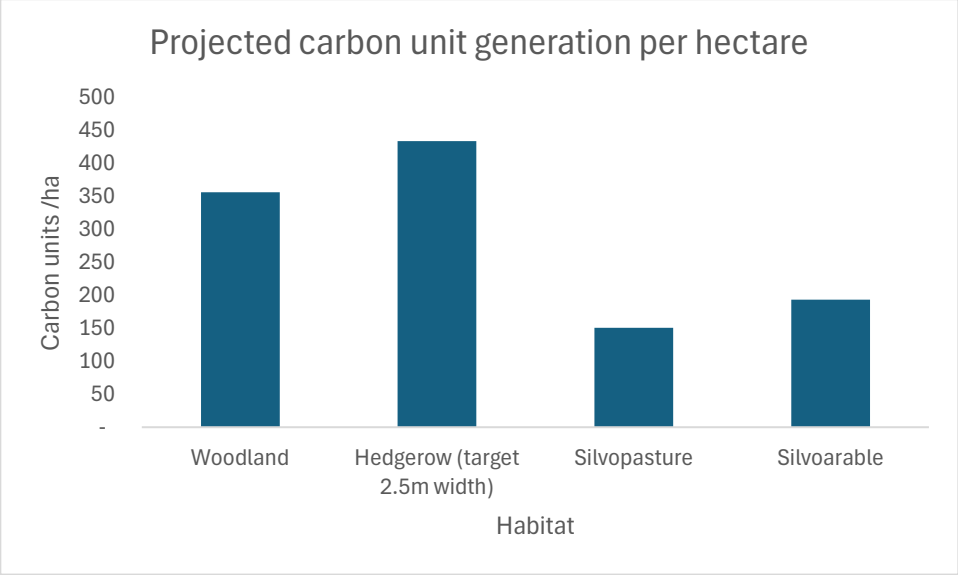

Figure 11: Per-hectare carbon unit generation (projected) (Soil Association, 2025)

Financial impact: Code aggregation

The study only assessed three farms for financial viability. The study, illustrated in Figure 12 below, projected forward over 100yrs on the assumption of carbon prices of £30/T for PIUs (projected issuance units, ex-ante) and £45/T for Woodland Carbon Units (ex-poste, verified) at 2024 prices, but subject to 2.5% inflation.

The study found that only woodland carbon projects were viable as standalone options, but aggregation could enable the other habitats to be subsidised.

On a cost basis, all habitats would require a significantly higher carbon unit value than current market pricing indicated by WCC (£26.85/unit for PIUs), however we understand these are on an undiscounted basis (i.e. ignoring the time value of money/inflation over the assumed project period of 100 years):

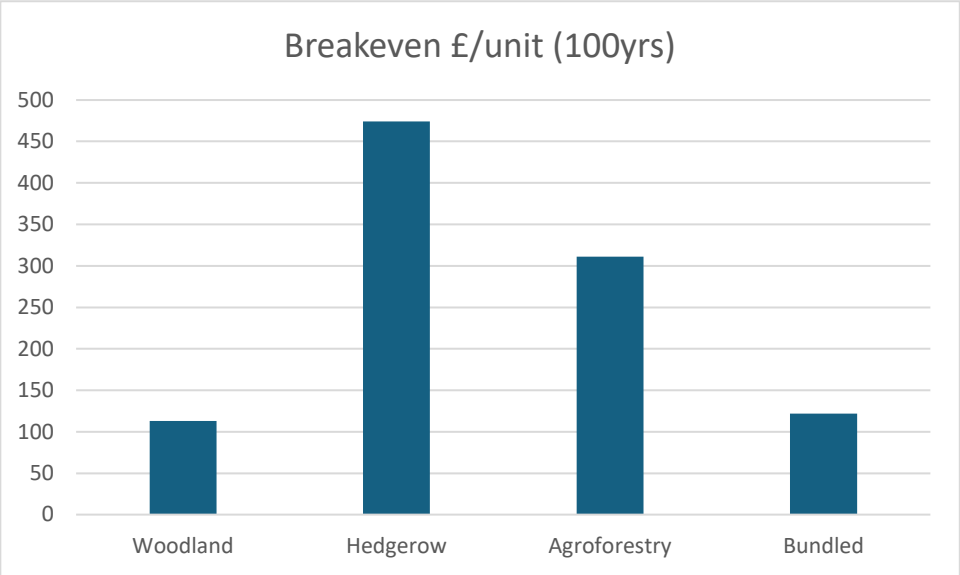

Figure 12: Breakeven price for carbon from alternative habitats (100yr project length) (Soil Association, 2025)

Longer term maintenance becomes more relevant for its impact on returns, and including a 3.5% discount rate (in line with HMT Green Book guidance), breakeven pricing over 70yrs would be £58/unit (vs. £113/unit) for woodland and £74/unit (vs. £122/unit) on a bundled offering.

The benefit of aggregation across habitats was estimated to reduce costs of validation and verification by around one-third. It also enhanced viability of lower carbon habitats through broader allocation of fixed costs (i.e. spread over more units) and lower unit issuance/registration/survey costs. Despite this, individual habitats (hedgerows and agroforestry) remained unviable on their own, requiring cross-subsidisation from other activities.

Financial impact: Multi-farm approach

Adopting a collective approach through aggregating a number of farms, the study found that across the 5 farms used in the study, and applying Soil Association Certification's validation and verification fees, costs were estimated to fall by 42%. In addition to the cost saving, there are wider benefits of aggregating through knowledge exchange, potential for more extensive nature recovery delivery and easier market access.

The study noted the additional coordination effort required in such an approach, and a need to define the contractual/governance arrangements in such a situation, though no additional costs were detailed in the study to reflect these overheads.

Whilst the study measured soil carbon stocks and in grassland areas, there was no inclusion of soil carbon sequestration (beyond that which may be captured through the Woodland Carbon Code), with project participants noting the challenges of accurately measuring flows in this habitat.

Overall project conclusions:

The work found that a whole-farm code may have benefits, delivering overall cost savings and enabling a greater proportion of on-farm carbon sequestration to be captured in monetizable units. However, the proportion of carbon sequestration delivered from the other habitats (hedgerows and agroforestry) was found to be less than 10% of the total additional sequestration projected to occur.

Working at a landscape/aggregated level across multiple farms was found to be potentially more beneficial in delivering cost-effective outcomes, and has the potential to share knowledge and potentially, enable kit-sharing arrangements if new equipment is required to enable certain new practices.

The project noted the importance of high integrity markets, but also the disproportionate burden such requirements place on smaller projects or landholders/managers.

By working with farmers across the project farms, the study did ensure the proposals were integrated effectively into the farming system to avoid any significant trade-offs with food production.

The study also noted that current pricing of nature based carbon was below the breakeven thresholder for all habitats, and that “other systemic developments are required on both the supply and demand side”. In the discussion, Finance Earth noted that voluntary demand for nature market offerings is insufficient and quite uncoordinated, making it challenging for smaller developers to participate in a market.

Soil Carbon & Water Resilience Project: North East Cotswolds Farmer Cluster

Over the past three years, Carbon Quester, the Environment Agency, AtkinsRealis and Rothamsted Research, alongside the North East Cotswold Farmer Cluster (NECFC) have undertaken an extensive soil carbon survey over 700 fields in the NECFC’s area to map, measure and quantify the link between soil carbon and natural flood management. The project measured soil texture, SOC and bulk density across arable land, pasture, and floodplain meadows.

The report’s key findings were:

1. Initial rate of SOC increase depends on how close the soil is to saturation
2. Improved Grassland builds SOC faster than floodplain meadow as it is more productive, however there is lower species diversity
3. Projected SOC stocks (based on modelling) in 30 years for herbal leys will vary materially depending on which stage of the rotation is being measured (leys grown for 4 years, followed by 4 years of cropping. SOC will increase in the former, but be lost in the latter as soil is cultivated)

4. Carbon storage capacity is linked to clay content of soils; greater clay content increases storage capacity (though there is a saturation point at which no incremental storage occurs)

Across three soil types in the area, the following projections of impact were calculated (assuming 30year forecast period):

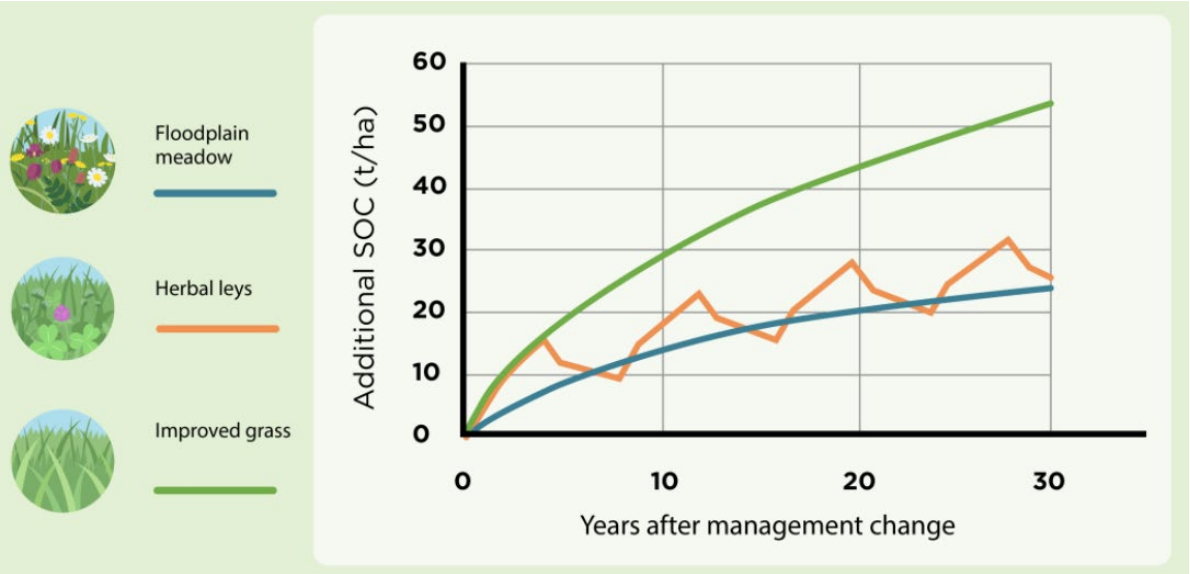

Figure 13: Projected increase in Soil carbon stocks over thirty years under different land use scenarios (Soil Association, 2025)

The project reported three case studies across three soil types, whose sequestration and storage potential were modelled over a 30 year period (Figure 13).

A co-benefit of enhanced organic matter in soils is the greater water retention capacity of the soils. Using AtkinsRealis' NFMStudio, the project explored the additional in-field water storage potential from land use change, projecting between 122m3/ha and potentially 425m3/ha increase in water retention, depending on land use (see table 6 below). Across the modelled area, such interventions had the potential to create an additional 1.97m m3 of soil water storage (the equivalent to 789 Olympic swimming pools), and reduce the flood peak by 21%:

Table 6: Projected effects of land use change on soil carbon & water retention capacity across three soil types (Soil Association, 2025)

Soil Type	Transition from Arable to:	T/C/ha initial:	T/C/ha @ end:	% change	Change in T/CO2e/ha	Increase in water retention (m3/ha)
Elmton (fine loamy soil over limestone)	Floodplain Meadow Restor'n	111	143	28%	117	273
	Herbal Ley	111	136	22%	117	355
	Improved Grassland	101	152	51%	187.2	360

Oxpasture (clayey soils, slowly permeable subsoils)	Floodplain Meadow Restor'n	122	164	34%	154.1	219
	Herbal Ley	85	114	35%	106.4	262
	Improved Grassland	102	161	58%	216.5	425
Denchworth (slowly permeable, clayey soils)	Floodplain Meadow Restor'n	95	119	25%	88.1	122
	Herbal Ley	95	121	27%	95.4	186
	Improved Grassland	95	148	56%	194.5	173

The project is continuing to undertake soil carbon sampling across the area of the North East Cotswolds Farmer Cluster, providing an empirical base from which future changes in management and sequestration rates can be measured.

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