FIRNS end of project report

Improved governance mechanisms for whole farm and farm cluster natural capital project implementation

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1. Executive summary and recommendations

Nature markets for natural capital projects in Scotland remain at an early stage of development, where the costs and complexity to deliver validated projects act as a significant barrier. This is especially true where land is owned or managed by farmers (on small and medium size farms), communities and civil society organisations. This is principally due to the small-scale of individual projects and the low capacity of individual land managers to navigate the requirements of multiple projects accessing different schemes or Codes, all with different application and governance processes. The delivery of natural capital projects in combination with – rather than at the expense of – food production presents a further barrier.

This FIRNS Round 2 project has explored opportunities for addressing these barriers using whole farm planning and aggregation as key mechanisms to address scale and to pool capacity, as well as to consider natural capital opportunities alongside food production. The project follows a short 6-month FIRNS Round 1 development project (October 2023 to March 2024), where the issues were explored via mostly desk-based work. The project has been delivered by Soil Association (applicant and lead partner), Woodland Trust, Finance Earth and Soil Association Certification. Representatives from Scottish Forestry and IUCN UK Peatland programme have provided advisory support on behalf of the Woodland Carbon Code and Peatland Code.

The project activities and analysis have focused around two main opportunities for aggregation:

1. Whole farm natural capital project development, validation and financial aggregation, to scale up at a farm level
2. Aggregation of individual farms into groups, clusters or networks, to support natural capital project development and implementation

To explore and evidence the whole farm opportunity, the Soil Association and Woodland Trust worked with five core farms and farmers across Scotland, to develop all the tree based natural capital opportunities at a farm level as a single 'project'. We used the Soil Association Exchange platform with its suite of metrics across soil health, biodiversity, carbon, water management, animal welfare and soil benefits to implement a whole farm planning approach for the integration of the natural capital projects into a farming model.

Soil Association Certification assessed opportunities for combining third-party validation across several habitats as part of a whole farm project, and Finance Earth analysed the associated financial implications. We worked with representatives from the crofting community to consider similar opportunities for crofts and developed a specific case study. Although the project focused on the carbon opportunity within farm woodlands, hedgerows, agroforestry and to some extent through peatland restoration, our work demonstrates that the whole farm approach is applicable to other natural capital opportunities.

To explore the opportunities for the aggregation of individual farms into groups we used the data from the five core farms' natural capital plans to consider the financial benefits of grouping, as well as the potential for third-party validations of groups of 'whole farm projects'. In addition, we sought wider views and perspectives on group mechanisms, via a general survey open to all and detailed discussions with an experienced group of farm cluster practitioners, scheme owners, project developers and relevant policy and government representatives.

Our key outputs from the project can be summarised as:

- Detailed project development and whole farm analysis for five core farms totalling almost 155 hectares (net) of potential new natural capital
- Detailed financial analysis for three core whole farm projects and the five farms as a group
- Natural capital project development on crofts – a case study

- Site-level validation and analysis for three core farms and development of a combined validation framework for whole farm projects
- Detailed engagement and option development for whole farm natural capital project delivery mechanisms

The analysis demonstrates that collectively these aggregation opportunities do offer financial benefits at both the whole farm and farm grouping level. The project has developed a prototype for a combined validation framework and the natural capital projects on most of the core farms are likely to be implemented. There is also strong evidence presented that grouping mechanisms can help to address the capacity issues facing farmers and other small landowners in accessing nature markets and that Scotland is in a strong position to capitalise on its existing local delivery partnerships (various existing forums, groups, clusters and networks) to help scale up local delivery of natural capital projects.

However, these measures alone will not be sufficient to scale delivery of natural capital projects from Scotland's farmed landscapes. There are more systemic issues currently facing the development of nature markets that will need to be addressed alongside aggregation, most notably demand side measures, to increase the level of market activity to drive up investment (and carbon prices), and to make aggregated projects more financially viable. Alongside these demand side measures are requirements for Code and scheme development, to enable combined validation of different habitat types and monetisation of other ecosystem services beyond carbon.

Our recommendations are therefore a mix of more systemic requirements, synthesising the conclusions and options, which are necessary prerequisites to support the more marginal benefits that can be achieved from various aggregation measures.

Demand side development

1. Scottish Government to work with UK Government and other devolved administrations to establish a clearer compliance framework to generate greater demand for nature projects that deliver multiple natural capital and community benefits, within value chains. Voluntary action alone will continue to be insufficient to drive nature markets and, given the inherent high transactional costs, only a compliance framework will support sufficient value from smaller scale projects in combination with farming.

Continued support for existing whole farm approaches

2. Scottish Government to use the current Whole Farm Plan requirements to further incentivize whole farm approaches, for example by linking capital grant support through NatureScot's Natural Capital Tool for natural capital projects to Whole Farm Plans.
3. Support initiatives that facilitate the combination of different habitat and ecosystem service uplifts via a single Code to facilitate a whole farm approach, with the necessary endorsement from BSI. E.g. Wilder Carbon, UK Carbon Code of Conduct, etc.

Supply side development

4. Support the Scottish Agricultural Organisation Society (SAOS) to update the business case and delivery model for the Scottish Farm Carbon cooperative concept – based on a mutual model for pooling and attracting investment for natural capital values.
5. Scottish Forestry on behalf of the WCC Executive to communicate and promote the current eligibility within the Code for many agroforestry systems.
6. Scottish Forestry on behalf of the WCC Executive to further refine small project requirements within the Code based on a small and low intensity project framework.
7. Scottish Forestry on behalf of the WCC Executive to consider satisfying IVCM requirements for scheme implementation at programme level rather than project level – to help reduce friction for

project sign off for smaller, lower risk projects.

Stronger support for Scotland's local delivery infrastructure

8. Scottish Government to nurture the existing local delivery partnerships in Scotland, e.g. through long-term funding and facilitation, and explore innovative devolved delivery models based on public payment guarantees in return for leveraged private investment in natural capital projects.

2. Introduction and context

Based on the latest economic report on Scottish agriculture, 91% of landholdings are less than 200 hectares (ha) in size, accounting for 23% of the agricultural area[1]. For this cohort of landowners and managers, largely made up of farmers, communities and civil society organisations, the complexity, uncertainty and cost of engaging with nature-based markets currently acts as a significant barrier to delivery for nature and natural capital development. This is principally due to the small-scale of individual projects and the low resource capacity of individual farmers and land managers to navigate the complexity of multiple projects required to access different schemes/Codes, all with different application and governance processes. This impact is further exacerbated by the challenges of delivering natural capital enhancement in combination with food production, as distinct from the focus of many larger projects, where food production is no longer an objective.

In October 2023, a consortium was awarded development Round 1 funding from the Facility for Investment Ready Nature in Scotland (FIRNS) managed by NatureScot and National Lottery Heritage Fund, to investigate solutions to these barriers by exploring the feasibility for an aggregated whole farm approach to developing natural capital projects. The consortium included Soil Association charity (SA), Woodland Trust (WT), Organic Research Centre (ORC), Finance Earth (FE) and Soil Association Certification Ltd (SACL). In addition, the consortium was supported by specialist input from Scottish Forestry (SF) and International Union for Conservation of Nature UK Peatland Programme (IUCN). This project was delivered as a desk-based exercise and concluded that there was scope for a further Round 2 FIRNS project, which was awarded funding in April 2024.

Although Round 2 has been a continuum from Round 1 in exploring the same issues, the Organic Research Centre was not able to participate, so this final report reflects the work of the new partnership, SA, WT, FE and SACL. The project was managed by SA, which applied for the funding as lead applicant on behalf of the consortium.

Whilst acknowledging other relevant initiatives that have sought to address the challenges of delivering natural capital projects through collaborative working at a catchment and landscape scale, this project was focused around two key opportunities for addressing (small) scale and (low) capacity:

1. Whole farm natural capital project development, validation and financial aggregation, to scale up at a farm level
2. Aggregation of individual farms into groups, clusters or networks, to support natural capital project development and implementation

To support the whole farm opportunity, we have worked 'on the ground' with five core farms and farmers across Scotland, as well as developing a separate croft case study. In addition, we have engaged with other farmers, crofters and their representatives in the selection process for the core farms, and through a survey, interviews and group discussions, to explore mainly tree-based natural capital opportunities at a farm level as a single 'project'. We adopted a whole farm planning approach considering a range of metrics within the Soil Association Exchange platform, although the specific project development focused on the carbon opportunity within farm woodlands, hedgerows, agroforestry and to some extent through peatland restoration. However, the whole farm approach is applicable to other natural capital opportunities such as biodiversity and water management as markets develop. The natural capital projects developed for the core farms provided the evidence base to consider project development benefits, as well as aggregated validation and verification opportunities and the financial implications of this approach

[1] Tab C5 in Scottish Government 2018 census data https://tinyurl.com/2rxztwtd [accessed 20 March 2025]

to whole farm aggregation.

To explore the second opportunity for aggregating individual farms and their natural capital projects, we have used the aggregated data from the whole farm natural capital projects developed for the five core farms to establish a hypothetical group. We have then assessed the validation & verification opportunities at a group level, as well as considering any financial implications. This analytical work has been supported by assessing different natural capital group 'service models', and the different governance options for managing an aggregated group mechanism. We used a general survey to get a wide range of inputs, supported by in-depth discussions on barriers and opportunities with a range of natural capital actors.

As well as the specific stakeholders engaged during the project, more general outreach and communication has been a core activity. We have had bilateral engagement with two other FIRNS funded projects (the Round 2 "Community Benefits" and Round 1 "Biodiversity Crediting" projects[2]), which have informed our project outcomes and are summarised in Section 5 of this report. Parallel to the main project activities, we have given input to the Natural Capital Tool product developers at NatureScot, engaged with other stakeholders on the Scottish Wildlife Trust's Nature Finance Pioneers Basecamp, written three blog articles centred around food production and natural capital as well as creating a new webpage on "Natural capital" on the Soil Association Scotland website (see Appendix for provisional URL). On 5 March 2025 we held a day-long workshop in Edinburgh, to share and discuss our proposed project conclusions with 25 stakeholders who had contributed to the project. In late April 2025, there is a webinar planned with registration open for all to present our project findings.

[2] Deciding Matters-led 'Community Benefits Certification Mark for UK Natural Capital Projects, made by the Nature Finance Certification Alliance and Scottish Forestry' and IUCN-led 'Biodiversity crediting for woodlands, peatlands and other ecosystems' projects

3. Whole farm planning for natural capital development (workstream 1)

3.1. Methodology

3.1.1. Choice of whole farm approach

To the best of our knowledge, a 'whole farm' approach to natural capital project development for farmers had not yet been developed or tested in Scotland, prior to this FIRNS project. Whole farm planning for agriculture, also referred to as integrated or holistic management strategies, recognises the interconnectedness of a farm and its working parts, from the way different habitats or livestock on the land support each other to the different elements of the business operations[3]. It prioritises looking at the role and impact of the farm on the immediate environment, and – where relevant – effects further afield, including the community.

One of the key aims of this project was to explore this approach as an enabling mechanism for small and medium-sized farms to engage with nature markets in Scotland. While number of staff or income can be used to class farms into small and medium categories, in this project farmed area i.e. hectares (ha) are the defining classification. In Scotland, average farm sizes range from 106 ha for specialist beef on LFA to 182 ha for dairy enterprises, so we aimed to work with farmers who have land within 50 ha of these averages[4]. The aim was to understand how farm size affects the design and decision-making process between project developer and landowner, to identify synergies between different Codes during validation and to what extent integrating different 'interventions' or habitat changes, such as new woodland, hedgerows and agroforestry as well as restored peatland, might improve project financial viability. Additionally, a key aim was to focus on tree based natural capital opportunities at a farm level as a single 'project'. The selection of these four land use changes is based on the existence of methodologies to predict carbon sequestration for each, and because it builds upon the work from FIRNS Round 1.

3.1.2. A whole farm approach to natural capital project implementation

For this project, we identified four steps which would define a whole farm approach for natural capital project implementation, outlined below. The first of these two steps (led by SA and WT respectively) ran alongside each other and were completed for each farm. The last two steps (led by FE and SACL respectively) were carried out in full for three farms and largely depended on data from the previous steps, although there was some iteration between them.

Creating natural capital plans

Each farm was paired with a WT outreach advisor to develop tree-based planting plans (see sections for each farm titled "Natural capital plans"). We encouraged farmers to be ambitious in their thinking, as this helped to generate a richer set of data. This engagement and process was deemed low risk for the farmers involved, as there were no obligations on them to implement any of the plans either within the timeframe of the project, or at a point in the future. That said, we are optimistic that most farmers will implement significant elements of the proposed projects.

Evaluating whole farm impacts

The Soil Association Exchange (SAE) platform was used to understand each farm's baselines (i.e. the

[3] Soil Association 'Planning for Change' (2024) whole-farm-plans-sa-report.pdf [accessed on 02/04/2025]
[4] Based on data from the chapter on 'Whole Farm Data', last updated in June 2024 https://www.fas.scot/the-farm-management-handbook/ [accessed on 03/02/2025]. Mixed = 142, general cropping = 164, specialist cereal = 133, dairy = 182, cattle & sheep LFA = 178, specialist beef LFA = 106, specialist sheep LFA = 111

current farming system/enterprise) through six overarching impact areas containing various metrics: Soil, Carbon, Biodiversity, Animal Welfare, Water and Social (Figure 1; see sections for each farm titled "Whole farm impacts"). While there are other online tools suitable for whole farm planning, e.g. Land App, LEAF Integrated Farm Management and the NatureScot Natural Capital Tool, the team at SA had previous knowledge of how to use the Exchange tool and interpret its results, as well as having existing positive feedback from other farmers about its use. Based on plans created with WT staff, the baseline scenario was evaluated against the new, proposed plans and potential outcomes for the six different impact areas were deduced.

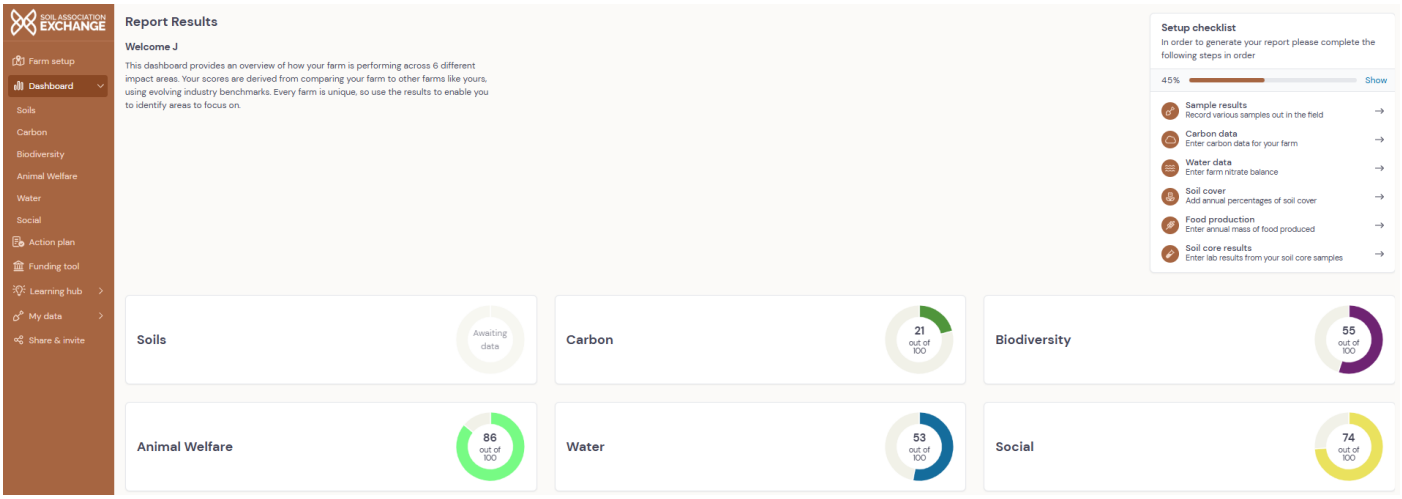


Figure 1: Example dashboard view of Exchange platform (web version)

Financial appraisal of whole farm natural capital plans

FE carried out project cashflow analysis covering capital costs, operating and maintenance costs, grant income (where available) and revenues for three sites (Farm A, Farm B and Farm C). Whole farm project data was agreed by the project team, identifying key data points such as carbon unit generation (per habitat), carbon credit vintages, cost of habitat delivery, maintenance costs and available grants (Forestry Grant Scheme/ AECS/ WT grants). FE applied assumptions for inflation, forward carbon prices, cost of sales and project discount rates to determine the profitability of the whole farm projects and identify the Net Present Value (NPV). A full list of the key assumptions and sources can be found in the Annex materials. See sections with "Financial appraisal", available for three farms, and 3.3.

Validating whole farm natural capital plans

SACL used various documents drafted by WT staff during project development to carry out trial validations for three farms (Farm A, Farm B and Farm C) based on requirements from the Woodland Carbon Code (WCC), Agroforestry Carbon Code (emerging) and Hedgerow Carbon Code (emerging). SACL then carried out a review of these documents to identify the challenges and opportunities for a validation process based on simultaneous assessment of multiple (whole farm) interventions. See sections with "Validation", available for three farms, and 3.4.

3.2. Core farm plans, validation and financial appraisal

3.2.1. Farm selection and location

SA worked with project partners, the Northwoods Rewilding Network and other stakeholders to access farmer networks for both organisations to promote the opportunity to participate in the project. This generated a longlist of interested farmers and after phone calls with ten landowners, we selected five working farms and farmers to work with across Scotland. The selection criteria included: i) Small to medium size, according to definition in 3.1.1., ii) Continued food production alongside natural capital development, iii) Enthusiasm and openness to create whole farm natural capital project plans, and iv) Willingness and availability to participate in a 12-month project for research purposes. Farm sizes range from 48 ha to 232 ha, hence satisfying the "small to medium" size requirement. Since an early project decision was to use the SAE platform and methodology to demonstrate a whole farm approach, the interest from some farmers who had already participated in the SAE programme in 2023 or 2024 was another influential criterion.

Unfortunately, the project team where not able to identify a site that had all interventions (peatland, woodland, agroforestry and hedgerow) As such, it has not been possible to undertake a pilot assessment that includes peatland. In the absence of a pilot site that included both woodland and peatland, an informal review was undertaken by aggregating datasets from a related WCC (WCC) project and PC (PC) site on contiguous land. It is emphasised that this did not occur as a formal review and is not one of the three sites assessed to scope. The fact that we were not able to identify a small or medium size farm with both peatland restoration and tree based natural capital opportunities, to some extent represents the reality on the ground for this opportunity and has therefore partly influenced one of our project conclusions.

The locations of the five farms that fulfilled the selection criteria defined above, are shown in Figure 2. Based on NatureScot's Landscape Map of Scotland[5], the northernmost farm – Farm D – is situated in the Mounth in South Aberdeenshire (landscape ID 32), two farms are in Fife (Farm A in the Firth of Tay, 50, and Farm C in Edinburgh and Firth of Forth, 59), Farm E is in the Borders region of Ettrick and the Moffat Hills (70) and the southernmost farm – Farm B – is on the southwest coast of Dumfries and Galloway, in The Machars (76).

[5] Naming classification and numbered codes according to NatureScot's 'Landscapes of Scotland': Landscape Map of Scotland | NatureScot Spatial Data Hub [accessed on 03/02/2025]

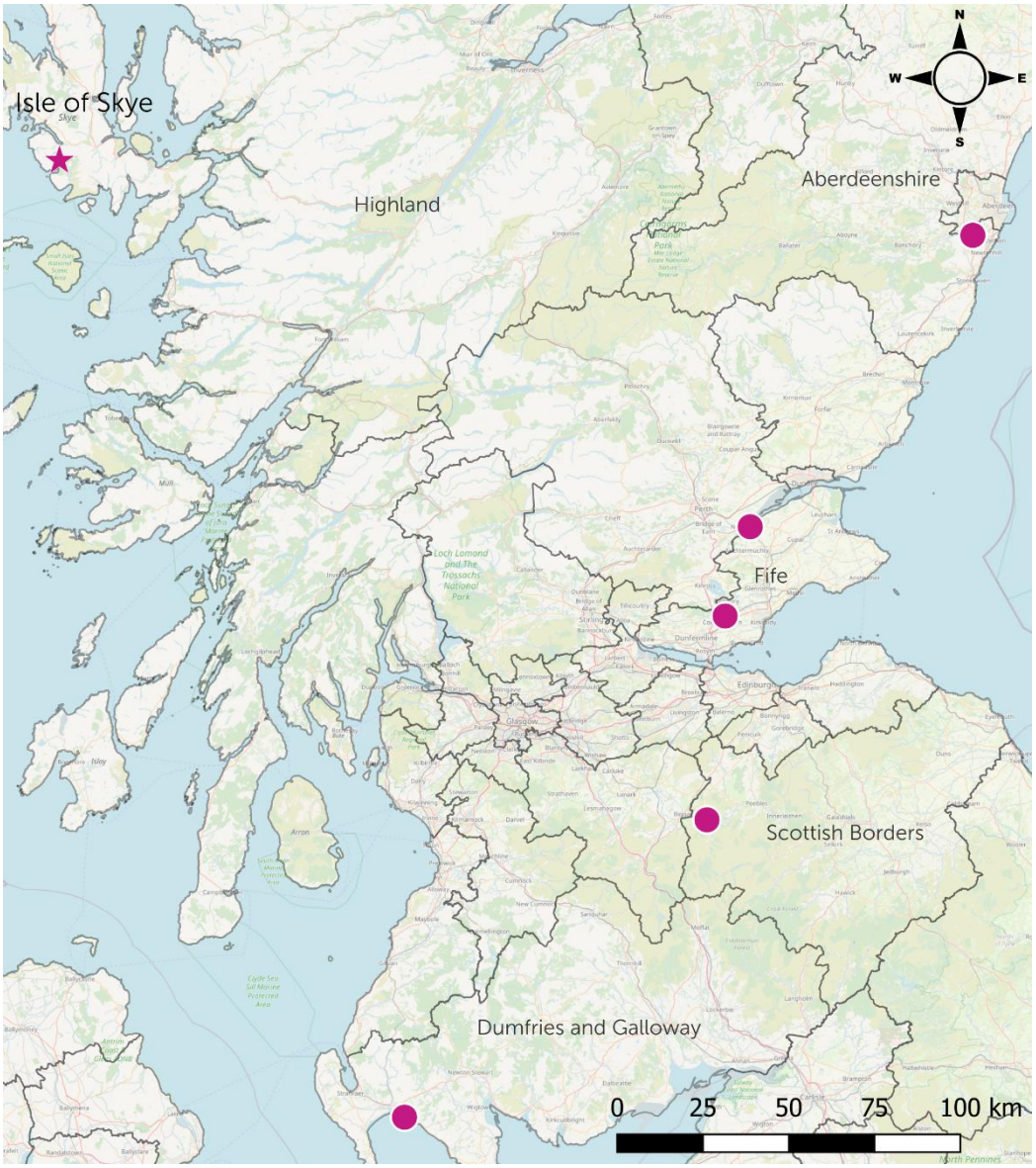


Figure 2: Map showing point locations of the five core farms and croft (labelled with star) participating in the project, as well as relevant local authority boundaries.(Map created using QGIS with OpenStreetMap base layer; Administrative Boundaries from May 2024, Office for National Statistics).

Three of the farms had an existing and completed SAE assessment (Farm A, Farm B and Farm E), while the other two farms (Farm C and Farm D) were supported through the process in the first few months of the project. Three of the landowners let out a portion of their land to other agricultural producers i.e. as landlords. For the two farms which had not been registered with the SAE prior to the start of the project, we included the activity of the tenant farmer as part of the whole farm's plans. This means that all types of agricultural activity, including inputs and livestock introduced by tenants, have been accounted for in each of the impact metrics for Farm D and Farm C but not for Farm A. While this contrasts with some of the Scottish Government's guidance around Whole Farm Plans[6], we considered these activities to be relevant for baselining purposes of this project, especially since one of the farms rented out their land completely and without these figures there would be no baseline to work from.

[6] Scottish Government 'Whole Farm Plan full guidance – Annex L: Carbon Audits including seasonal land' https://www.ruralpayments.org/topics/all-schemes/whole-farm-plan/ [accessed on 19/03/2025]

3.2.2. Farm A

Current farming system and future interests

Farm A was part of the preceding FIRNS project. It borders the banks of the Inner Tay Estuary (a Special Site of Scientific Interest) and the town of Newburgh in Fife. The low lying, fertile fields by the estuary to the North show Land Capability for Agriculture (LCA) classification 2, while sloping fields to the East and West have LCA 3.1 and 5.1 respectively. For this reason, a mixture of agroforestry options is available on this land, including shelter belts and productive trees within arable fields.[7] Roughly a quarter of the land is classed as Severely Disadvantaged Less Favoured Area, and this is mainly used as grassland. Of about 210 ha of utilised agricultural area, 61% (128 ha) is designated as cropland. 18 hectares of woodland already exist and there are several areas of gorse scrub and about 5600 m of existing hedging. The entire area sits within the Strathmore and Fife Nitrate Vulnerable Zone. One of the farm's main outputs is barley for a local whisky producer, but the land is also rented out for cattle and sheep grazing, and apples from the existing silvoarable system (trees within cropland) are used for cider production.

The landowner has had apple trees within their arable fields (Figure 3) since 2016/17 and has been a key advocate of silvoarable agroforestry in Scotland. Owing to the observed success and lessons from the first field converted to silvoarable land, the farmer is keen to integrate more trees into their arable and grassland systems.

Figure 3: Photo of existing silvoarable system at Farm A.

[7] Farm Advisory Service 'Farm Woodlands Information Sheet' (20??) https://www.fas.scot/downloads/information-note-trees-and-carbon-capture/ [accessed on 03/02/2025]

Natural capital plans

Net new planting: woodland 8.5 ha, hedgerow 997 m, silvoarable 0.39 ha (gross 5.75 ha, since low density spacing of >5m spacing with rows of apple trees) (see Figure 4)

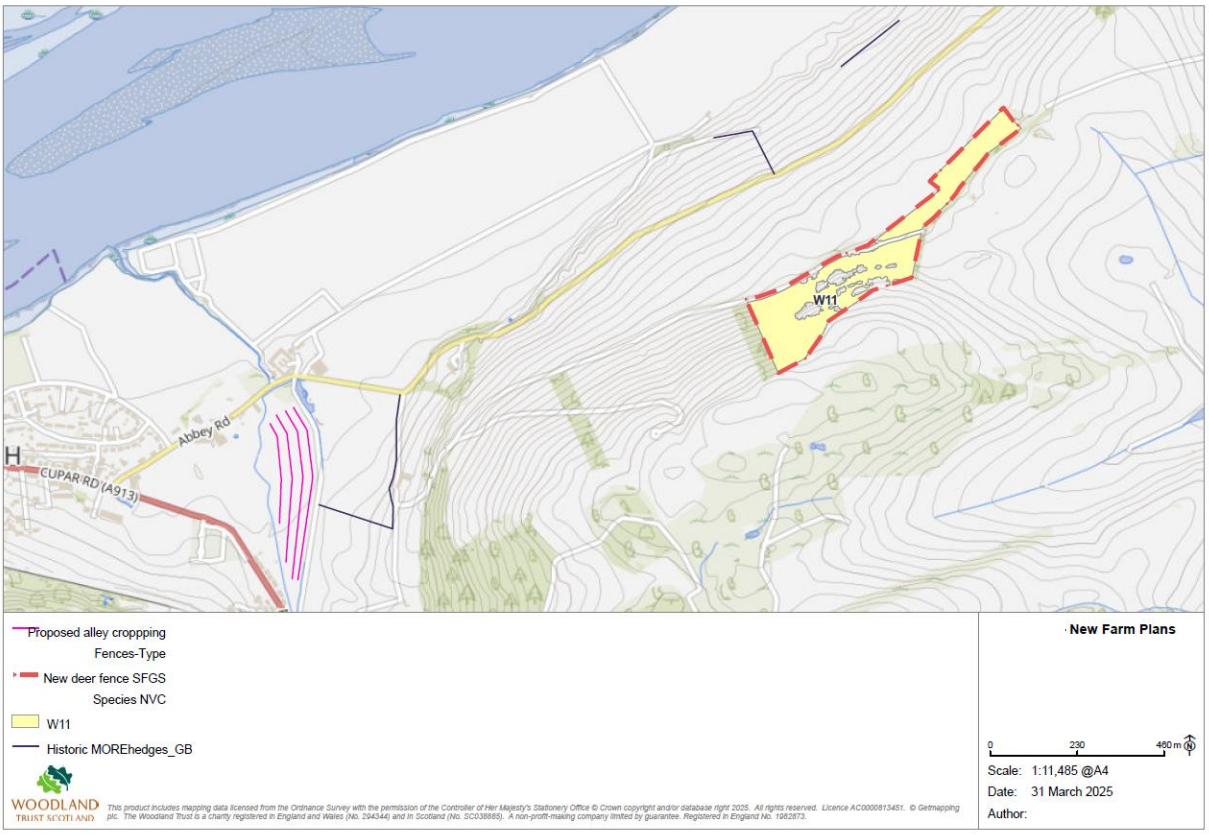


Figure 4: Natural capital plans for Farm A

Native Broadleaves – 9.42 ha [8.5 net] will be a mixture of locally appropriate species at 1600 stems/ha, to be protected with a perimeter deer fence and individual tree guards as appropriate. This compartment is being created for the purpose of registering with the WCC to realise income through carbon credits and to increase the native woodland habitat extent in the local area.

Agroforestry – Whole field parcel size – 5.75 ha [net crop area 0.4 ha] is proposed to be a very low density "alley cropping" format comprising rows of secondary crop trees [apple] at 27m distance rows between a primary arable crop, with a view for the apples to be harvested annually. Spacing between trees is approx. 3m with wildlflower planting along each row This creates a permanent low-density tree habitat alongside a wildflower strip habitat beneficial to pollinating insects. Diameter-at-breast-height measurement data were used from the FIRNS Round 1 project, collected by previous partners the Organic Research Centre as the basis for the AF (non-WCC) carbon calculation.

Hedging – Up to 1000m has been proposed to create linear wildlife corridors, linking up existing habitats with a multi species mixture to maximise potential for pollinators and nesting opportunities for birds. Spacing is five stems/m, protected with spiral guards and aiming for a 2.5 x 2.5m cross sectional area.

Whole farm impacts

Farm A currently shows positive impacts for all six metrics, including having a significant proportion of area already dedicated as space for nature (Table 1). Future improvements from the natural capital plans of this project are likely to include a carbon balance closer to net zero as well as greater habitat connectivity. It is possible that soil organic matter increases in fields with silvoarable systems, but this requires targeted sampling.

Table 1: Description of results over six sustainable impact areas from the SAE platform. Information from relevant submetrics in italics.

	Baseline (current)	Potential (future) impact
Soils	Soil types vary, with some fields showing silty texture and others more clay-based, and the range of *Soil Organic Matter (SOM)* thus also varies (from 2.7% on arable to 8.4% on grassland). *Soil pH* is very good (around 6.3) and *Bulk Density* is very good for the corresponding soil types. *Earthworm* counts are good for grassland per soil pit (~7) but lower for arable (~2). The silvoarable field shows higher *SOM* and *Earthworms* than other two arable fields sampled.	*SOM* may increase in the vicinity of new hedgerows and trees. Based on current data, *SOM* may increase in the field with the new silvoarable system. (To verify whether this change is related to tree integration needs more scientific analyses, but samples from the field which is destined for silvoarable could be taken before planting and then repeated every five years after planting, to test this at a basic level.)
Carbon	Total *Carbon Emissions* are low, most coming from farm inputs (47%), but result in a positive *Carbon Balance*. Sequestration from existing trees cancel out about a quarter of emissions, while *Soil Carbon Stock* is below average[8] (about 200 tCO2e/ha for arable and 350 tCO2e/ha for grassland).	A further 8.5 ha of woodland as well as extension of hedgerows and agroforestry will reduce improve carbon sequestration figures, bringing overall *Carbon Balance* closer to net zero. The silvoarable field shows higher *Soil Carbon Stock* than the other two arable fields sampled, suggesting that an increase may come about from a further silvoarable field.
Biodiversity	There are some interventions for *Habitat Management,* such as leaving stubble on fields, but there is opportunity for more. *Connectivity* between habitats is moderately good, owing to existing woodland and hedgerows, which is also linked to excellent *Space for Nature* (12.5% of total area). Multiple crops are grown in arable fields, resulting in good *Crop Diversity*. There is a wide range of *Bird Species* recorded, with many amber and red listed species, as well as very good diversity of *Flora* (33 unique species). *Hedgerow Structure* is good in some areas, but over-trimmed or overgrown in others, with some signs of being hedge-laying.	Hedgerow and woodland extension should lead to greater habitat *Connectivity* as well as *Space for Nature*. Continued hedge-laying and reduced trimming on new hedges could lead to improved *Hedgerow Structure*.
Animal Welfare	No data in Exchange, since cattle are from a leased herd.	No baseline to deduce changes from.
Water	*Water Runoff Management* is good, in part due to established green cover for most of the year as well as spring cultivation. *Potash Balance* is excellent, while *Nitrogen* is slightly in oversupply and *Phosphate* is inefficient. *Water Usage* comes mainly from abstracted groundwater.	*Water Runoff Management* should improve with the additional areas of tree planting. Due to low planting density of silvoarable and minimal effect of hedgerows, it is unlikely that nutrient balances will change much.

[8] Soil Association Exchange 'Measurement Protocol' (2024) https://www.soilassociationexchange.com/_files/ugd/21f3ea_5acb58c9b5724003bcb16c563fa808c6.pdf [accessed on 25/03/2025]

Social	The farm is a demonstration site for agroforestry and is well known for this across Scotland. *Community Engagement* for this reason varies, from participation in research projects (like this one) and attendance, e.g. as a panellist, at various sustainable farming events. The landowner has also engaged local schoolchildren in tree planting activities in the past. Cider from the silvoarable apple trees is made at a local fruit winery and sold at local grocery and farm shops.	Planting another field with apple trees will possibly stimulate further interest from the public, eNGOs and researchers. Greater capacity for apple or cider production is likely to add to the local food and drink culture and economy.

Financial appraisal

The Farm A whole farm approach generates 4,604 carbon units over the project life and has a project NPV of £85,394 (for assumptions please refer to Annex materials). With the highest carbon unit generation and revenues, Farm A's woodland (NPV of £172,870) subsidises the hedgerow and agroforestry (NPV of -£25,608 & -£61,868 respectively).[9] See Figure 5 for project cashflow over lifetime.

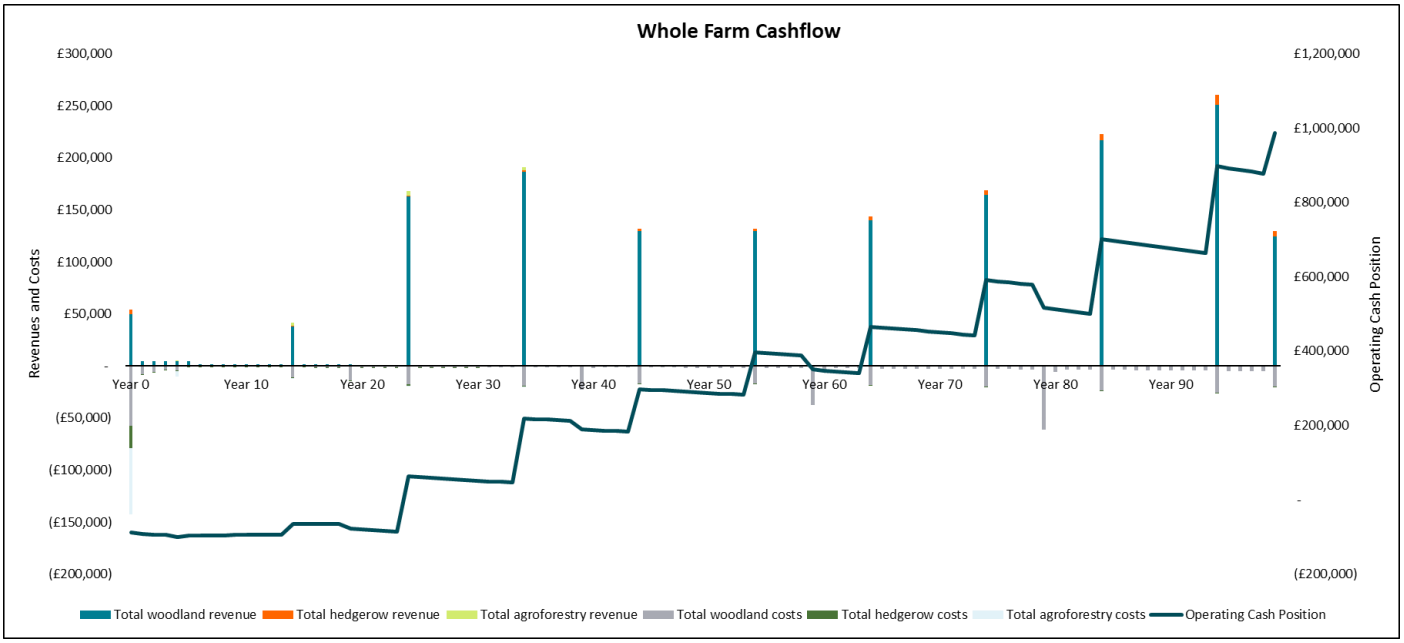


Figure 5: Farm A Whole Farm Cashflow

- Woodland has both the highest carbon unit generation (4,449 units, or 97% of the total) and highest level of grant funding available (Forestry Grant Scheme – FGS – capital & maintenance grants, with income from Basic Payment Scheme (BPS) included until Year 19). Woodland maintenance costs vary overtime due to inclusion of periodic higher costs, such as fence and gate costings (inflated).Despite the benefits for nature, Farm A's hedgerows (997m) only generate 57 carbon units (~1% of Farm A's total) and have little impact on total revenues generated. As such, hedgerows have a negative NPV, given capital costs exceeding available grants and no

[9] NPV was used to assess the financial viability of each habitat and the whole farm in aggregate. NPV calculates the current value of a future stream of payments (such as carbon credits; to calculate this FE, and the project partners, forecast future cash flows (habitat creation and maintenance costs, grant income available, Basic Payment Scheme (BPS and potential revenues) and a common discount rate was applied to all projects. For further detail on assumptions please see Annex materials.

maintenance grants available.

- Farm A's silvoarable agroforestry is not financially viable (-£61,868 NPV), with 98 carbon units generated over the assumed project life (30 years was selected for silvoarable). The habitat is not viable on a standalone basis as establishment costs exceed project income, with no FGS agroforestry grant funding being available as the silvoarable system is <150 stems per ha. The scheme falls under the minimum stocking and tree species requirements for inclusion within WCC.
- In the model, income from product sales (i.e. apple and cider production) was assumed to cover lifetime maintenance, however the negative NPV indicates that revenues from carbon sales alone is insufficient to cover costs without additional grant support.

Validation

As the first of the trial validations conducted, Farm A provided useful insights for the project whilst highlighting areas for further investigation and opportunities.

For the desk-based part of the validation, the aggregated documents created in Round 1 of the project (see Annex materials) along with supporting information provided by WT were tested. For woodland creation, financial additionality was checked through the WCC cashflow spreadsheet. Cost data was also provided for hedges and agroforestry and these were checked for consistency against documents and maps, with clarification provided by WT. The requirement for the landowner commitment under the WCC was waived as this requirement would not affect the result of the trial validation.

As the woodland portion was undergoing grant funding application, the draft operational plan from the application provided useful in evidencing many of the requirements. Where other interventions were not covered by this, separate management plans detailing establishment and ongoing maintenance were requested.

When assessing the carbon data, comparisons with the WCC, hedgerow and agroforestry calculators highlighted the need for a consistent buffer of carbon when different methodologies were used. The WCC calculator has a built-in buffer of 20% of the PIUs to go to the WCC buffer to ensure any loss of PIUs can be covered and this was applied to the other interventions.

The site visit was conducted in October 2024. Existing agroforestry and woodland creation were seen to be successful, giving a good indicator that future interventions would continue this success. The team were shown around planned sites for agroforestry and woodland to confirm suitability and verify information provided for the desk assessment, such as justifying ESC figures provided for the carbon calculations.

3.2.3. Farm B

Current farming system and future interests

Farm B is located on the craggy coastline of Luce Bay in southwest Dumfries and Galloway. There are several drystone dykes and some historic sites, including ruins which the farm is named after. All fields are classed as Severely Disadvantaged LFA, and LCA classes varying between 3.2, 5.1 and 6.1, indicating a moderate range of agroforestry options, such as shelter belts and lowland wood pasture. Of about 218 ha of utilised agricultural area, most of this is grassland, with 2100 m of existing hedge, some scrub, and a narrow strip of old deciduous woodland to the north of the farm. The westernmost boundary fence runs parallel to the coastline for about 500 m and is marked by a coastal path following littoral rock, gorse and elder scrub. The landowner grazes cattle and sheep up to this fence line throughout the year.

Due to its coastal, clifftop location and lack of trees the farm is very exposed, so the landowner's priority is to provide more shelter for livestock (Figure 6). Being part of the Southwest Scotland Regenerative Farmers Network, the landowner is already thinking about adapting to climate change and recognizes

that less productive grassland areas could be put to better use, such as providing natural shelter through tree planting. The landowner is keen to do planting in phases and to act as a demonstration site for other farms in the region.

Figure 6: View westwards at Farm B, across Luce Bay.

Natural capital plans

Net new planting: woodland 29.8 ha, hedgerow 2375 m, silvopasture 12 ha (see Figure 7)

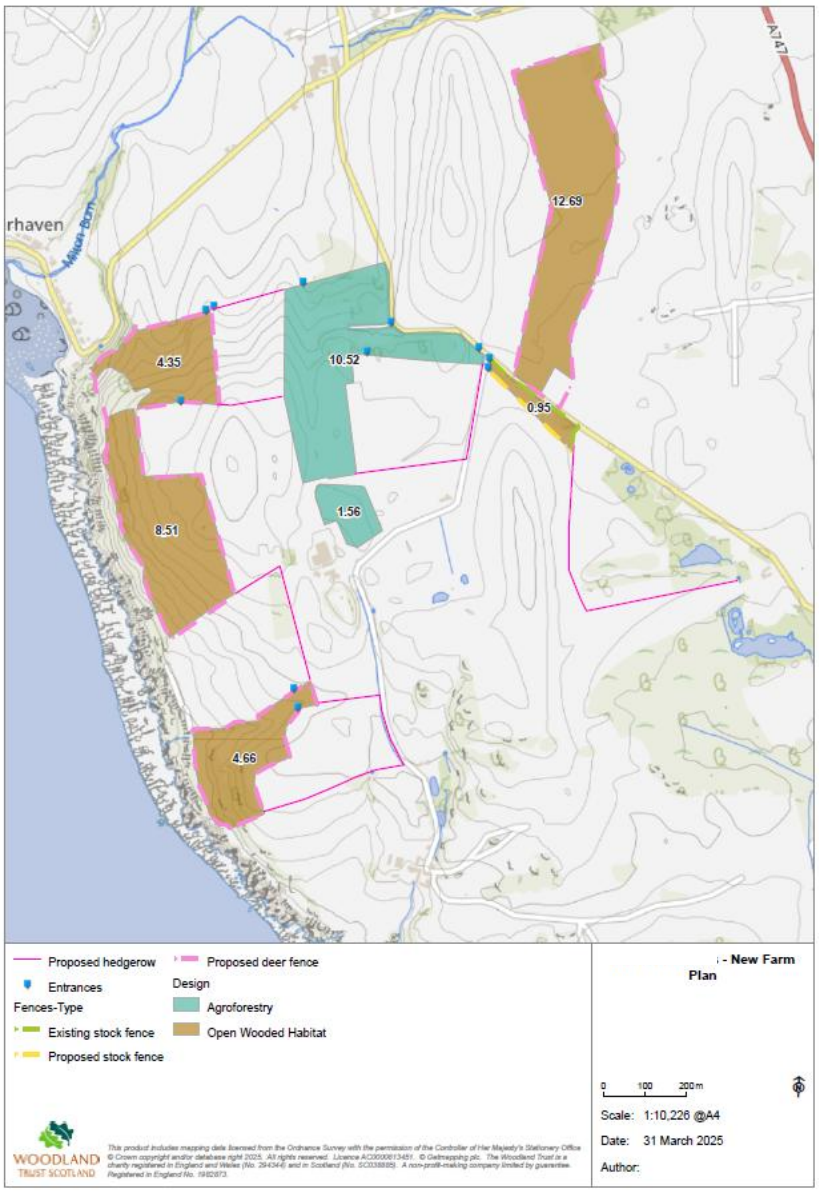


Figure 7: Natural capital plans for Farm B

Woodland – The proposed planting comprises several blocks of native species, of differing sizes to increase natural shelter on the farm, that is fairly exposed to southwest winds. Areas selected across the site aim to offer the most effective balance of livestock shelter with habitat connectivity. This means that the blocks largely will be focussed on the SW boundaries/corners of fields, creating linkages where possible to existing habitat or to other proposed interventions. Depending on the size of the individual blocks, early protection will be in the form of perimeter deer fencing for the larger blocks or individual tubes shelters for the smaller sites. Those areas within fenced areas will also be protected individually using smaller guards. Species selection has been determined given the relatively exposed conditions and so quick growing and hardy species will be planted (mostly at 1600 stems/ha) to create as early a canopy/shelterbelt as possible.

Hedging – Up to 1000m has been proposed to create linear wildlife corridors, linking up existing habitats with a multi species mixture to maximise potential for pollinators and nesting opportunities for birds. Spacing is five stems/m, protected with spiral guards and aiming for a 2.5 x 2.5m cross sectional area

Agroforestry – Approx. 12 hectares of the site have been earmarked for an agroforestry scheme, using

the FGS Agroforestry option. This will involve the planting of native/productive species at a density of 400 stems/ha using individual 1.8m wire mesh guards with a separate 1.2m tree shelter inside as protection. This is so the rest of the field can still be grazed under the stipulations of the grant scheme, in accordance with SGRPID. The average spacing between trees is 5m, this spacing per tree may be revised to allow better grazing practice.

Whole farm impacts

The most significant positive impact these plans are likely to have on Farm B' business is for animal welfare (Table 2). Further hedgerow and woodland integration as well as new silvopasture plots have the potential to improve shelter for livestock which may in turn boost animal health and therefore lower mortality rates.

Table 2: Description of results over six sustainable impact areas from the SAE platform. Information from relevant submetrics in italics.

	Baseline (current)	Potential (future) impact
Soils	Soils are predominantly clay to sandy loam and have good levels of *SOM,* mostly around 10% with one field showing 35%. *Soil pH* is very good (most fields above 6.5) while *Bulk Density* data shows that soil is well aerated (around 0.85kg/l). *Earthworm* counts are good (up to 15 per pit sampled).	If the landowner does not destock, soils on remaining grassland parcels may experience more trampling, leading to rise in *Bulk Density* over time. However, hedgerows and silvopasture may counteract this through improved aeration by roots, as well as increased *Soil Organic Matter* through leaf litter.
Carbon	*Carbon Emissions* on the farm are relatively high (1855 tCO2e/year) and most are caused by livestock (>95%) resulting in a positive *Carbon Balance*. There is minimal carbon sequestration (16.1 t CO2e/year) from existing trees and hedgerows. *Soil Carbon Stocks* are excellent (all fields showing more than 499 tCO2e/ha going up to 1341).	Additional tree features should lead to higher sequestration and overall improved *Carbon Balance*, although it is unlikely the plans will lead to net zero emissions by this measure alone.
Biodiversity	There are various interventions to improve *Habitat Management* on the land, for example delayed mowing and grazing as well as reduced hedgerow cutting. *Connectivity* between habitats is low since current hedgerows and woodlands are far apart, and *Space for Nature* is 6.5% of total area (mainly littoral rock, saltmarsh and some wooded and wetland areas). *Livestock Diversity* is good, since there are several breeds of both sheep and cattle. There are some amber and red *Bird Species* recorded on the farm and the diversity of *Flora* is good, with 24 unique species.	Hedgerow extension should lead to higher *Connectivity*. The increase in woodland area implies more *Space for Nature,* whilst trees in silvopasture plots and hedges may also attract more *Bird Species* and more diversity of *Flora*.
Animal Welfare	There is some *Antibiotic* use for livestock. *Welfare Outcomes for Beef and Sheep* are mixed, with a main issue being high mortality in cows and heifers.	Hedgerows, shelterbelts and in field trees on silvopasture plots should reduce cow and heifer mortality by providing protection from extreme weather and possibly improve health and possibly a reduction of antibiotic use through diversified browsing options.

Water	*Water Runoff Management* is very good, mainly due to establishment of riparian buffer strips along watercourses and their protection from livestock. Dirty water is sent to slurry store, resulting in good *Water Usage*.	*Water Runoff Management* should improve even further with the additional areas of tree and hedgerow planting.
Social	There is considerable *Community Engagement* so far, much of it being online (e.g. Farmer Time) but the farmer also attends multiple events throughout the year.	The landowner is already involved in various networks and they are looking ahead to act as a demonstration site for hedges and agroforestry, so this should improve the *Community Engagement* score further.

Financial appraisal

The Farm B whole farm approach generates 9,862 carbon units over the project life and has a project NPV of £272,559 (for detailed assumptions please refer to Annex materials). With the highest carbon unit generation and revenues, woodland subsidises the hedgerow and agroforestry (NPV of -£32,859 and -£12,577 respectively). See Figure 8 for project cashflow over lifetime.

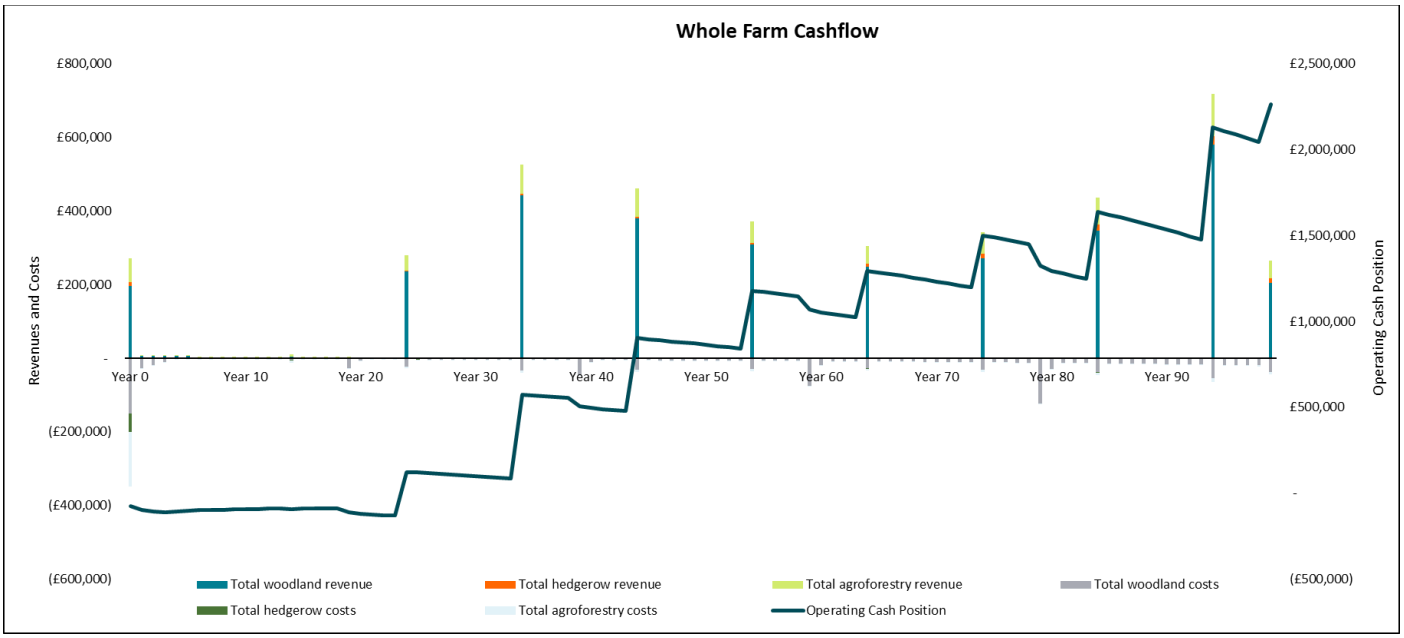


Figure 8: Farm B Whole Farm Cashflow

- Woodland has both the highest carbon unit generation (8,124 units, or 82% of the total) and highest level of grant funding available (FGS capital & maintenance grants, with BPS included until Year 19). Woodland maintenance costs vary overtime due to inclusion of periodic higher costs, such as fence and gate costings (inflated).
- Farm B hedgerows (2,375m) only generate 146 carbon units over the project life (~1% of the total) and revenues from carbon sales do not cover the capital and maintenance costs. With capital grants not covering costs and only limited maintenance grants available, hedgerows have a NPV of -£32,859.
- With a NPV of -£12,577, Farm B' silvopastoral agroforestry is marginally unviable, but will deliver additional co-benefits. In total, 1,592 carbon units (~16% of total) are generated over the project life (assumed as 100 years for silvopasture). The silvopastoral scheme meets the threshold for WCC (<5m spacing / 400 stems per ha) and qualifies for FGS agroforestry grants. While there is higher carbon sequestration than silvoarable habitats such as Farm A, the agroforestry would require additional grants or higher carbon prices to be financially viable.

Validation

The new aggregated documents were utilised for the assessment for Farm B. These were assessed alongside supporting evidence including soil maps, aerial imagery and management plans provided by WT. As with Farm C, the WCC templates for the carbon calculator and cashflow spreadsheet had been used for both woodland and agroforestry, therefore streamlining the data and the assessment for these. The woodland portion of the farm aims to be covered by grant funding, so the draft operational plan proved useful in evidencing the validation. The grant also covered the agroforestry section, so this was useful for evidencing the cashflow, carbon and eligibility criteria as well as understanding how grant funded agroforestry could be included within an aggregated assessment format.

The validation of the key documents raised a few questions on the location and size of the agroforestry element. When conducting the site visit, this was one of the main areas to investigate. On site, the agroforestry area was able to be confirmed and updated mapping supplied based on this. The rest of the site was walked over to assess the locations of each of the interventions. While the site is coastal and exposed, the ESC figures provided for the carbon figures were able to be verified from the success of established woodland and gorse in the area, proving that woodland would likely be successful in these areas and benefit the farm by providing shelter.

3.2.4. Farm C

Current farming system and future interests

Farm C is located in upland Fife, between the towns of Lochgelly and Cowdenbeath. The southern fields of the land borders the Fife Circle railway and Farm C pond, while historical land use in the area indicates intensive coalmining. LCA classes on the land are 3.2-4.2, with almost 50% of the area classed as Severely Disadvantaged LFA, indicating suitability for mixed agriculture and excellent potential for tree productivity, as buffer strips and shelter belts for livestock. Of 136 ha of utilised agricultural area, most of the land is permanent pasture with one 15 ha arable field. While there are several areas of shrubland, there are few trees and no woodlands or hedges on the farm (Figure 9). The area is wholly rented out to a local tenant farmer, with extensive livestock grazing, with Aberdeen Angus cattle in spring and summer and sheep in autumn and winter. The tenant owns the majority of the livestock. The main farmhouse is currently being renovated and there is a Core Path for walkers crosscutting the land.

Although the landowner does not come from a farming background and does not live on site, the buildings and fields are sometimes used to host training events around sustainable land use (e.g. through membership of Northwoods Rewilding Network and SA). They have been in ownership for two years and are interested in rewilding the land without compromising food production.

Figure 9: View to the western part of Farm C.

Natural capital plans

Net new planting: native/ productive woodland 36.8 ha, hedgerow 3850 m, silvopasture 15 ha (see Figure 10)

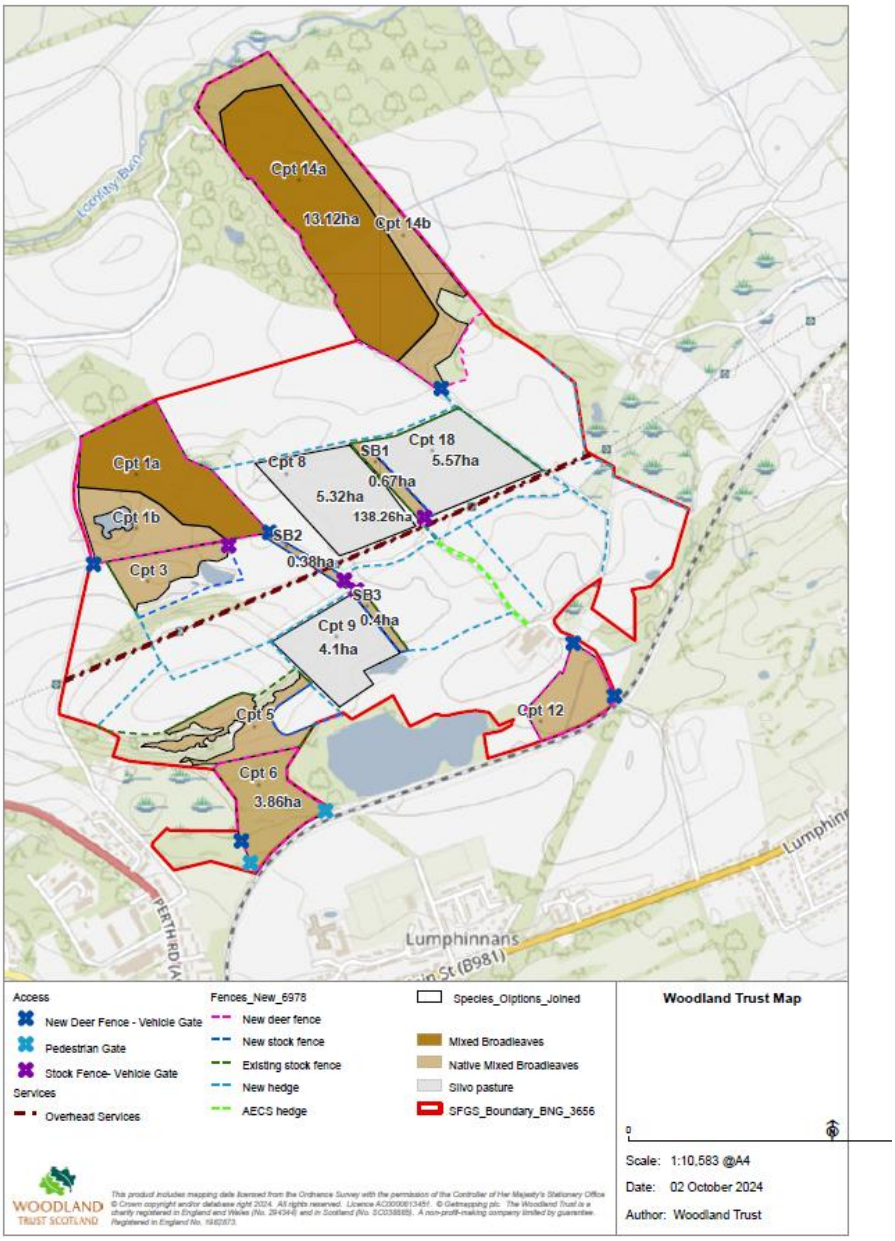


Figure 10: Natural capital plans for Farm C

The WT first visited Farm C approximately two years ago, shortly after the acquisition of the farm by the current landowner. The long-term objectives were outlined as improving the biodiversity, habitat and ecological value of the farm, whilst also maintaining sustainable farming productivity, and generating economic output. All these components were highlighted as being essential to the project. The decision was taken early on to not implement any significant land management or habitat changes and wait for roughly two years to fully assess the farm and its current state.

The current habitat on the farm consists primarily of semi-improved and rough grazing land, with one improved arable field. There are several permanent and semi-permanent lochans/ponds, with a larger water body just out with the farm boundary to the south. Presently there are very few trees within the ownership boundary, and no hedges. There is mature native woodland immediately adjacent to Farm C, providing good opportunity for ecological expansion and connectivity. Soils are predominantly brown

earths, with some small sections of alluvial soils. There are potentially some small areas of peaty soils, which will be surveyed, mapped, and excluded prior to any final designs.

Tree integration in the form of new woodlands, hedges, and agroforestry are key elements of this project. The WT has been working with the landowner in developing concept plans incorporating these elements as part of the whole farm plan. The aim is to maintain farming output by utilising less used and underproductive land for larger woodland planting, strategic placement of shelterbelts to best benefit livestock, and allocation of hedges along current field boundaries to reduce amount of new fencing required.

Productive Native Broadleaves (19.7 ha, net 17.75ha) at c2,500+ stems/ha – With economic sustainability in mind, productive native broadleaves have been included in the initial designs, with initial species selection being oak and wild cherry. These areas will be deer fenced with vole guards, and predominant ground prep will be inverted mounding. The long-term management of this woodland would be to never clear fell, with thinning/selective felling, thereby maintaining a native woodland habitat in perpetuity, whilst also providing a quality hardwood supply to local and national markets.

Native Broadleaf Woodland (22.4 ha, net 19.04ha) at 1600 stems/ha – Native woodland will be a mixture of deer fencing with vole guards, and stock fencing with tree guards. Suggested NVCs for new native woodland are W11 and W7 (depending on site specific features). Desk based ESC and soil studies suggest the following species in Table 3 to be suitable for this project.

Table 3: Suitable wood species for Farm C

Silver birch	Willow spp
Downy birch	Holly
Sessile oak	Hazel
Rowan	Hawthorn
Alder	Other shrubs (small numbers)

Hedging – Several different funding options have been explored for the project, including FGS, MOREwoods and MOREhedges. The site lies mostly within the core CSGN boundary, therefore making FGS an attractive option for the woodland planting. However, challenges arise when looking at implementing hedges and silvo pasture, as the grant options do not adequately cover the proposals to make it financially viable. Woodland Carbon has been explored, and the project will be registered, and a decision on if/how much to sell will be made as the financial models are finalised. Ultimately a holistic view of the tree integration will need to be taken to make sure that the project is financially viable and best suited for the overall aims of the farm.

Agroforestry (net 15ha) at 400/ha – Three fields have been allocated for agroforestry (silvopasture). This will include individual tree planting of Silver birch, Wild cherry, Sessile oak, Rowan, and Aspen. Robust individual tree protection in the form of cactus guards will be used so that impacts to livestock grazing will be minimal.

Whole farm impacts

The most significant positive impact these plans are likely to have are on carbon (Table 4). The plans proposed would significantly reduce the farm's carbon footprint. On the other hand, there is less certainty about the outcomes for the other four metrics. For example, due to the dramatic decrease in designated agricultural land, from 136 to 93 ha, it is unclear what will happen to the livestock. If the landowner does not destock, this may lead to negative effects in other areas of the farm, such as more trampling from intensified grazing, leading to more soil compaction, waterlogging and possibly poorer animal welfare.

Table 4: Description of results over six sustainable impact areas from the SAE platform. Information from relevant submetrics in italics.

	Baseline (current)	Potential (future) impact
Soils	Soils are predominantly clay/ loam and there are high levels of *Soil Organic Matter* across the sampled fields (ranging from 7.9 to 16.7%). *Soil pH* is very good on most fields (about 6.4), while *Bulk Density* data shows that soil is well aerated (0.9kg/l). *Earthworm* counts were low (up to four per pit sampled).	If the landowner does not destock, soils on remaining grassland parcels may experience more trampling, leading to rise in *Bulk Density.* However, hedgerows and silvopasture may counteract this through improved aeration by roots, as well as increased *Soil Organic Matter* through leaf litter.
Carbon	Although annual carbon emissions overall are low (271 tCO2e), most *Carbon Emissions* come from livestock (>95%) resulting in a positive *Carbon Balance*, in addition to relatively minimal sequestration (1.8 t CO2e/year, from scrub). *Soil Carbon Stocks* is below average (about 360 tCO2e/ha).	Assuming the landowner does not destock, additional tree features should lead to higher sequestration and overall improved *Carbon Balance* which is very close to net zero. If destocking occurs, the farmer may find it easy to achieve a negative i.e. below zero carbon footprint.
Biodiversity	There are very few interventions to improve *Habitat Management* on the land. *Connectivity* between habitats is supplied only by water bodies, and *Space for Nature* is 3.8% of total area (mainly heathland, scrub and water bodies). *Crop and Livestock Diversity* is low, since there is little variation in cropping and only two species of livestock and one breed of each. There are some amber and red *Bird Species* recorded on the farm and the diversity of *Flora* was very good for grassland areas, with 30 unique species.	Fragmentation of plots should result in improved *Connectivity*. The increase in woodland area implies more *Space for Nature*. Trees and hedges may also attract more *Bird Species* and more diversity of *Flora* in silvopasture plots.
Animal Welfare	No *Antibiotics* are used on livestock preemptively. *Welfare Outcomes for Beef and Sheep* are positive, with almost negligible cull, casualty and mortality rates.	Already high baseline score and natural capital plans are not expected to worsen this.
Water	*Water Runoff Management* is scored low due to absence of riparian buffer strips, dams or flood storage features, as well as lack of maintenance of artificial wetland. *Phosphate* and *Potash* balance is excellent, while *Nitrogen* application on the arable field depreciates the overall score for this metric (excess). As for *Water Storage*, no irrigation is used, the source is 100% from the mains and any dirty water is collected and disposed of responsibly.	While trees and hedgerows may improve *Water Runoff Management* due to their proximity to water bodies on site, intensified grazing may lead to worse *Nitrogen Balance*.
Social	*Food Production* (beef and lamb) is low while there is a relatively good score for *Community Engagement* due to the farm being host for several corporate or local events.	As a demonstration site for agriculture with trees and rewilding, the landowner may be able to host more on-farm training and events, contributing to *Community Engagement*.

A second version of this farm's SAE profile was created by SA, to show the change in land use on the same platform as a result of the planting plans drafted by WT (Figure 11). Aside from the changes in land use, another notable change is the Space for Nature (increase) and number of parcels (increase). While this

duplication feature does not yet exist on the SAE and hence a dummy profile was created, it presented a quick overview of the changes and opportunity to visualise how the farm may look in the future. The corresponding survey answers were not changed to match the land use changes in the "new" plan as this was considered to theoretical and complex for this project, nevertheless it provides rudimentary insights into how the farm business may change over time.

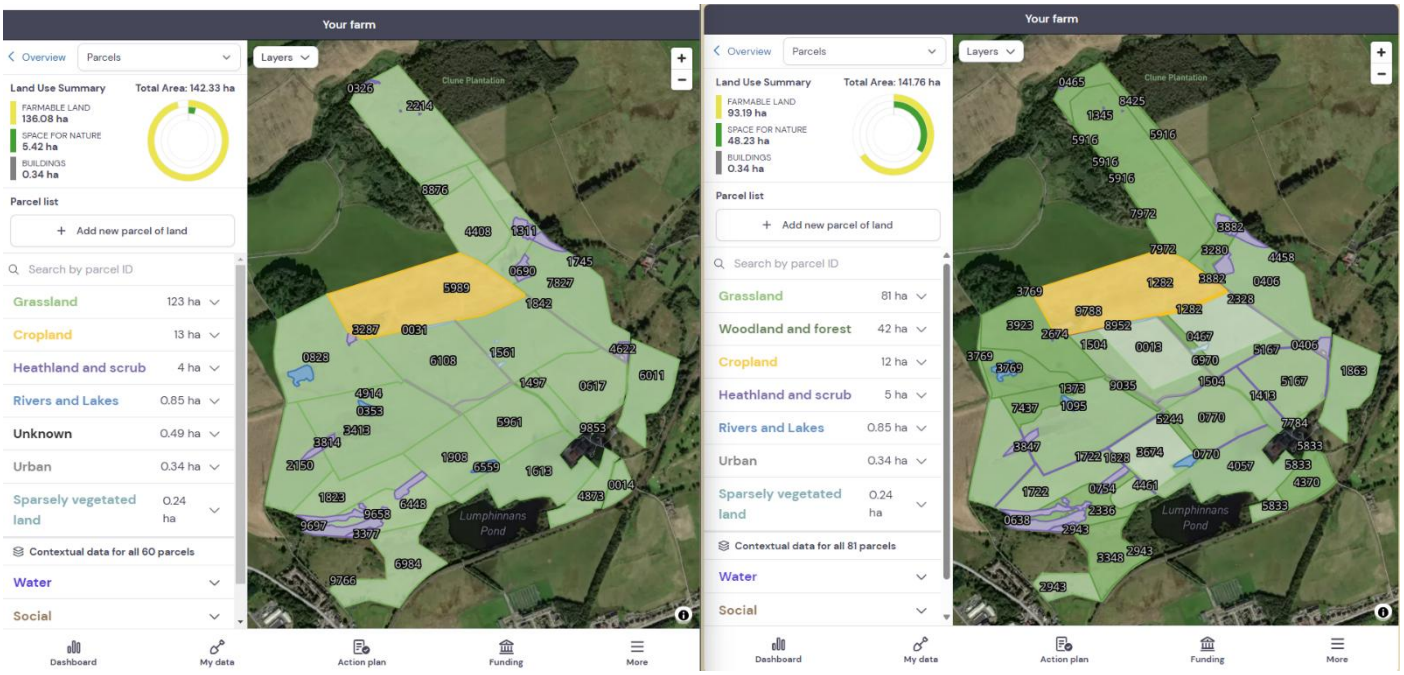


Figure 11: Screenshot with old (left) and new (right) farmland use, as a result of the whole farm natural capital plans on the SAE platform for Farm C.

Financial appraisal

Farm C whole farm approach generates 17,703 carbon units over the project life and has a project NPV of £798,602 (for detailed assumptions please refer to Annex materials), with two of the three habitats financially viable. With the highest carbon unit generation and revenues, Farm C woodland (NPV of £806,053) and agroforestry (NPV of £73,214) subsidise hedgerow (NPV of -£80,664). See Figure 12 for project cashflow over lifetime.

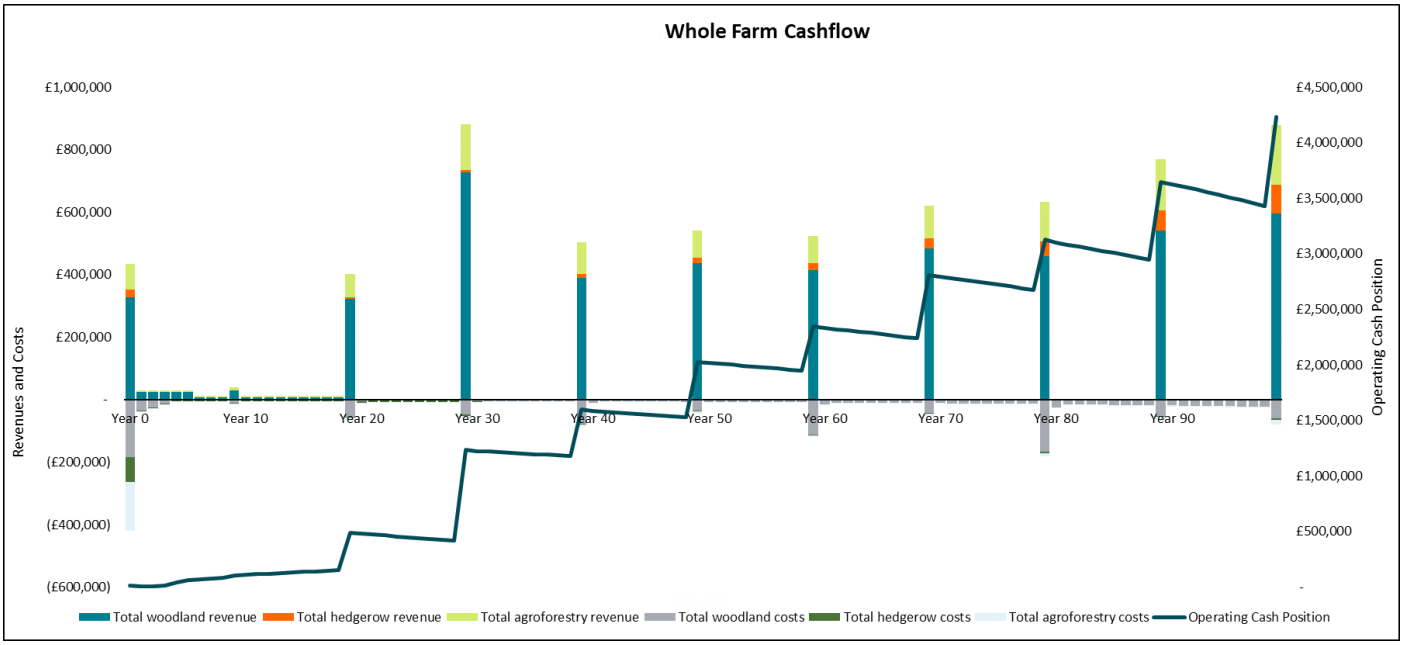


Figure 12: Farm C Whole Farm Cashflow

- Woodland has both the highest carbon unit generation (14,406 units, or 79% of the total) and

highest level of grant funding available (FGS capital and maintenance grants, with BPS included until Year 19). Woodland maintenance costs vary overtime due to inclusion of periodic higher costs, such as fence and gate costings (inflated).

- Farm C' hedgerows (3,850 m) generate 495 carbon units over the project life (~3% of Farm C total) but the revenues from carbon sales do not cover the life time costs. With capital grants not covering costs and only small maintenance grants available, hedgerows have a NPV of -£80,664.
- Farm C silvopastoral agroforestry is financially viable (£73,214 NPV), due to the comparably higher number of carbon units generated over the project life, 3,162 units (assumed as 100 years for silvopasture). The silvopastoral scheme meets the threshold for WCC (<5 m spacing / 400 stems per ha) and qualifies for FGS agroforestry grant, enabling income generated for agroforestry to be higher than costs.

Validation

The desk-based part of the validation assessed the aggregated key documents alongside supporting evidence provided from WT. Farm C also trialled inputting agroforestry data into the WCC cashflow and carbon calculators. This streamlined the assessment by reducing the number documents to analyse. Combining the agroforestry element into the WCC carbon calculator also reduced effort needed for the landowner and WT in gathering the data for the agroforestry calculator - a much more intensive process.

The costs for all interventions were combined in the WCC cashflow spreadsheet, also saving time during the validation process. However, the question was raised as to whether combined scheme costs would affect compliance - e.g. cost of deer fencing could be common to multiple intervention types which might impact additionality compliance. The assessment for Farm C also trialled the Aggregated Monitoring Sheet, which worked well as a separate document.

Farm C was also applying for FGS funding, and the draft operational plan provided useful in giving the necessary information to validate the PDD, cashflow and carbon calculation data. However, this again highlights the need for ensuring all interventions have management planning information where they are not grant funded, whilst ensuring effort isn't duplicated unnecessarily.

The site visit was conducted in October 2024. The site was walked over to see where the interventions would be located. This also gave the opportunity to assess soil conditions around the pond at Farm C to check the peat depth and eligibility under WCC criteria.

3.2.5. Farm D

Current farming system and future interests

Farm D is nine miles southwest of Aberdeen, bordering the Aberdeen Western Peripheral Route. While the entire area is classed as Severely Disadvantaged LFA, the LCA is mostly 3.2 with some 5.1 land to the south, indicating mixed tree productivity potential, mainly as shelter belts for livestock. Of about 46 ha of utilised agricultural area, most of the land is improved grassland. There are several areas of gorse scrub, with two hectares of five-year-old woodland and about 500 m of existing hedging (Figure 13). Four hectares are under scheduled monument (bronze age site) with Historic Environment Scotland. Farmed as a livestock (cattle/sheep) and arable (barley primarily) enterprise for 40 years, in the last few years, the land has been rented out seasonally to a neighbour for summer cattle grazing and sheep grazing in winter.

The landowner, who is re-entering farming and taking over the business from their father, has a strong interest in restoring biodiversity to the land, reinstating an arable system and potentially converting to organic. They have a good and long-standing relationships with the landowners to the East and West of their farm who have mutual interests in tree planting, which could expand the project area by about 20 ha.

Figure 13: View northeast, from highest point of Farm D, with hedgerows and old farmhouse visible to the left.

Natural capital plans

Net new planting: woodland 6.8 ha, hedgerows 2180m, silvoarable 0.21 (4.08 gross, since low density spacing of >5m spacing with rows of fruit trees), silvopasture 10.75 (see Figure 14)

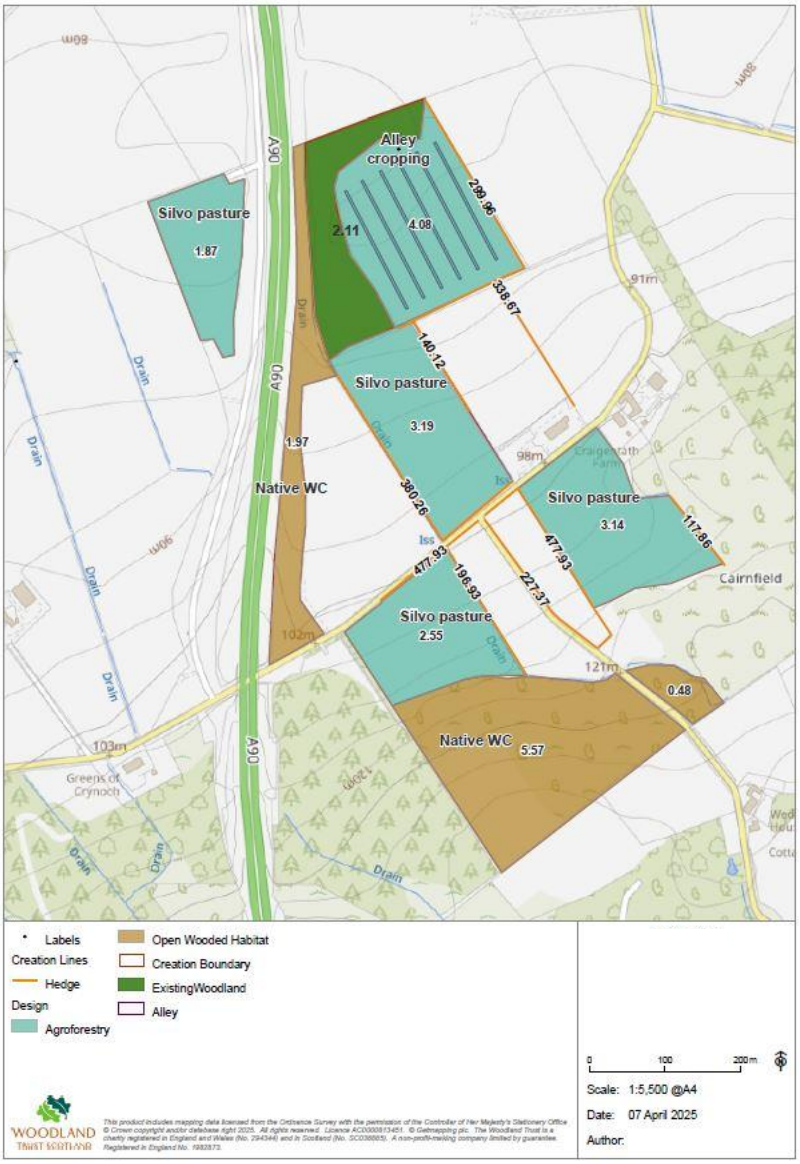


Figure 14: Natural capital plans for Farm D

The Woodland Trust first visited Farm D approximately 1 year ago, to look at tree integration potential on a family-owned farm. The long-term objectives were outlined as improving the biodiversity, habitat and ecological value of the farm, whilst also maintaining sustainable farming productivity. All these components were highlighted as being essential to the project, and tree integration in the form of new woodland (on less agriculturally productive pieces of land), hedgerows and agroforestry will aid this.

The current habitat on the farm consists primarily of semi-improved and rough grazing fields. There is a planted native woodland totalling approximately 2.1ha in the north of the site; planted in 2019. There are some good examples of existing hedgerows along the roadside that runs through the farm. The higher hill ground to the south is rougher ground, consisting mainly rushes and gorse. To the southeast is a scheduled monument, which restricts new tree planting in the immediate vicinity. There is mature commercial conifer plantations to the southwest. The A90 runs through the property in a north/south direction; alongside which there is opportunity to plant native woodland on unusable ground (outside the current farm ownership boundary). There is excellent opportunity to connect existing and new native woodland elements through hedging across the farm. Implementation of agroforestry systems (alley

cropping and silvo pasture) will further increase tree cover and biodiversity.

Soils are predominantly mineral gleys in the north and mineral podzols to the south. There are potentially some small areas of peaty soils, which will be surveyed, mapped, and excluded prior to any final designs.

Tree integration in the form of new woodlands, hedges, and agroforestry are key elements of this project (see map above at Fig 14) The Woodland Trust has been working with the landowner in developing concept plans incorporating these elements as part of the whole farm plan. The aim is to maintain farming output by utilising less used and underproductive land for woodland planting, and allocation of hedges along current field boundaries to reduce amount of new fencing required.

Woodland - Approximately 8ha (net 6.8 ha) of new native woodland is proposed, with initial suggestion to use tree shelters as opposed to deer fencing. This is due partly to the shape of some of the planting areas, but also due to extensive existing stock fencing network. Predominant ground prep will be inverted mounding. Areas of gorse are likely to be left where it is not too dense to create a mosaic of native habitats. It is worth noting that of the gross 8ha, the 1.97 ha of land intended for native woodland adjacent to the A90 has historically been in Farm D's ownership but is currently *not* owned by the farm.

Desk based ESC and soil studies suggest that W11 or W17 will be appropriate, with FGS allowable percentage of Scots pine included. following species to be suitable for this project:

Hedging - A total of 2,180m of new hedging is proposed, connecting to existing hedgerows, existing woodland, and new woodland creation. This will increase habitat connectivity across the farm, whilst also providing some shelter for livestock.

Agroforestry - A total of 14.8ha (gross) of agroforestry systems is suggested, with 4.08 being alley cropping with apples (although the farmer intends to diversify this should they go ahead with the plans), and 10.75ha being silvopasture. This silvopasture will include individual tree planting at an average density of 400/ha, and will include Silver birch, Wild cherry, Sessile oak, Rowan, and Aspen. Robust protection in the form of cactus guards will be used so that impacts to livestock grazing will be minimal.

To calculate carbon sequestration potential for apple trees specific to the site at Farm D, measurements of diameter-at-breast-height, "DBH", for apple trees from Aberdeenshire, notably from Pitmedden Orchard, were taken in November 2024. These were then entered into the spreadsheet developed by the Organic Research Centre in a NEIRF-funded project for agroforestry, according to their age, so that carbon sequestration could be modelled over a 30 year project lifetime[10].

Several different funding options have been explored for the project, including FGS, MOREwoods and MOREhedges. Challenges arise when looking at implementing hedges and agroforestry systems, as the grant options do not adequately cover the proposals to make it financially viable. Woodland Carbon has been explored, and the project will be registered, and a decision on if/how much to sell will be made as the financial models are finalised. Ultimately a holistic view of the tree integration will need to be taken to make sure that the project is financially viable and best suited for the overall aims of the farm. Furthermore, the neighbours' land to the East and West of Farm D, totalling an additional 20ha, has potential to be attached to project plans.

Whole farm impacts

In the proposals, a significant proportion (32.2%) of the grassland may be converted to silvopasture. This may lead to improved soil conditions for carbon and nitrogen, especially if livestock continue to be

[10] Soil Association & partners 'Investigating the feasibility for an Agroforestry Carbon Code' (2023) https://www.soilassociation.org/media/26902/acc-neirf-financial-appraisal-report-fe-31823.pdf [accessed on 13/02/2025]

integrated into the system, although the landowner has some intentions to reduce livestock numbers, whereas this would improve carbon balance. Further hedgerows and woodlands may increase biodiversity considerably (e.g. through roughly 6.5 ha dedicated to more space for nature).

Table 5: Description of results over six sustainable impact areas from the SAE platform. Information from relevant submetrics in italics.

	Baseline (current)	Potential (future) impact
Soils	Soils are predominantly clay to sandy loam and there are very good levels of *Soil Organic Matter* across the sampled fields (ranging from 12.3 to 13.3%). *Soil pH* is quite low (5.7) while *Bulk Density* data shows that soil is well aerated (0.9 kg/l). *Earthworm* counts were good (up to nine per pit sampled).	Hedgerows and agroforestry may lead to higher *Soil Organic Matter* and improved *Bulk Density* in or around farmed land, while *Earthworms* are expected to increase due to greater diversity of organic material from leaf litter.
Carbon	Most *Carbon Emissions* come from livestock (>95%) resulting in a positive *Carbon Balance*, in addition to minimal sequestration (1.8 t CO2e/year, from scrub, hedgerows and woodland). *Soil Carbon Stock* is below average (about 350 tCO2e/ha).	Additional wood features should lead to higher sequestration and overall improved *Carbon Balance*. Destocking would likely be necessary to reach net zero, and this fits with the landowner's future plans.
Biodiversity	There are very few supportive interventions named for *Habitat Management*. *Connectivity* between habitats is moderately good, owing to existing woodland and hedgerows, which is also linked to good *Space for Nature* (8.8% of total area). Only two species of livestock graze the land resulting in low *Crop and Livestock Diversity*. There are some amber and red *Bird Species* recorded on the farm, good diversity of *Flora* (29 unique species) and mostly dense and managed *Hedgerow Structure*.	Hedgerow extension should lead to higher *Connectivity*. The increase in woodland area implies more *Space for Nature,* whilst trees and hedges may also attract more *Bird Species* and more diversity of *Flora* in silvopasture plots.
Animal Welfare	No *Antibiotics* are used on livestock pre-emptively. *Welfare Outcomes for Beef and Sheep* are positive, with almost negligible cull, casualty and mortality rates.	Already high baseline score and natural capital plans are not expected to worsen this.
Water	*Water Runoff Management* is scored low due to absence of buffer strips, dams or flood storage features, although some area has been converted to woodland in the last five years. *Nitrogen, Phosphate* and *Potash Balance* are good (all slightly undersupplied). There are no *Water Storage* features on the land and no irrigation used.	*Water Runoff Management* should improve with the additional areas of tree planting. The *Nitrogen, Potash* and *Phosphate Balance* may improve in the silvoarable and silvopasture fields. Additional manure, for example through continued grazing in silvopasture fields or application for the silvoarable system, may further improve these balances.
Social	There is some *Community Engagement,* such as participating in this project and speaking with neighbouring farms, since the landowner is still transitioning from renting out the land to managing it themselves.	The landowner is already involved in this project, speaking with their neighbours and looking to farmers across Scotland for ideas, so this is likely to increase *Community Engagement* once the landowner begins starts taking over land management from their tenants. A silvoarable system with fruit trees would also diversify *Food Production.*

Financial appraisal
Not relevant.

Validation
Not relevant.

3.2.6. Farm E

Current farming system and future interests
Farm E is located in the Borders, six miles East of Biggar. The land has LCA between 4.2 and 6.1, all of which is classed as Severely Disadvantaged LFA, indicating good potential for livestock with trees, either as shelter belts or wood pasture. There is an Iron Age Fort on the farm's boundaries and the Biggar Water to the northeastern edge of the farm, forming part of the River Tweed system. Of 172 ha of utilised agricultural area, most of the land is permanent pasture with some temporary arable. Shelter belts already exist between some fields, amounting to 6.89 ha of wooded area in total, alongside 800 m of existing hedges. Other features on the farm include temporary water bodies and a significant area of exposed hill land (almost 58 ha; Figure 15). It is mainly a sheep-based farming enterprise, with some cattle and crop production for feed.

The landowner is keen to "future-proof" their business, acknowledging that nature-based payments could play an important role in securing the longevity of the farm for future generations. They are particularly interested in planting native trees for their biodiversity benefits, expanding habitat networks from existing tree stands and improved use of marginal areas.

Figure 15: View westwards from top of rough grazing hill land at Farm E.

Natural capital plans

Net new planting: woodland 12.65ha, 1710m hedgerows, silvopasture 1.35ha (see Figure 16)

Figure 16: Natural capital plans for Farm E

Woodland – The proposed planting comprises several blocks of native species (mostly at 1600 stems/ha), of differing sizes to increase natural shelter on the farm, that is fairly exposed winds given its location. Areas selected across the site aim to offer the most effective balance of livestock shelter with habitat connectivity. This means that the blocks largely will be focussed on the SW boundaries/corners of fields, creating linkages where possible to existing habitat or to other proposed interventions. Depending on the size of the individual blocks, early protection will be in the form of perimeter deer fencing for the larger blocks or individual tubes shelters for the smaller sites. Those areas within deer fences will also be protected individually using smaller guards for voles (and rabbits/hares?). Species selection has been determined given the relatively exposed conditions and so quick growing and hardy species will be planted to create as early a canopy/shelterbelt as possible.

Hedging – Up to 1710m has been proposed to create linear wildlife corridors, linking up existing habitats with a multi species mixture to maximise potential for pollinators and nesting opportunities for birds. Spacing is five stems/m, protected with spiral guards and aiming for a 2.5 x 2.5m cross sectional area

Agroforestry – Approx. 1.35 hectares of the site have been earmarked for an agroforestry scheme, using the FGS Agroforestry option. This will involve the planting of native/productive species at a density of 400 stems/ha using individual 1.8m wire mesh guards with a separate 1.2m tree shelter inside as protection. This is so the rest of the field can still be grazed under the stipulations of the grant scheme, in accordance with SGRPID. The average spacing between trees is 5m, this spacing per tree may be revised to allow better grazing practice, depending on the farmer's objectives.

Site work and project development for this scheme, as well as all the contributed admin has been fully worked up by the Border Forest Trust project officer.

Whole farm impacts

Farm E may experience benefits to their animals' welfare with further hedgerows and shelter belts (Table 6). The large area of hill ground to the south of the farm may appear as an ideal area for low density wood pasture, however the soil is very shallow, and the acidic, exposed conditions may make it challenging to plant. Nevertheless, there is the possibility to incrementally expand the woodland across this area over longer timescales. Since silvopasture is a new concept for this farmer, they will first trial a small plot and evaluate its success before committing more areas to this practice.

Table 6: Description of results over six sustainable impact areas from the SAE platform. Information from relevant submetrics in italics.

	Baseline (current)	Potential (future) impact
Soils	Soils are mostly loam and show good levels of *Soil Organic Matter* across the sampled fields (ranging from 5.4% to 8.6%). *Soil pH* is quite low (around 5.5) while *Bulk Density* is excellent (average around 0.8 kg/l). *Earthworm* counts were are good (up to 12 per pit sampled).	Soil around newly planted hedgerows and agroforestry may eventually lead to sites of higher *SOM.*
Carbon	Most *Emissions* come from livestock (>90%) resulting in a positive *Carbon Balance*. Woody biomass provides some sequestration, (18.75 t CO2e/year) and *Soil Carbon Stock* is below average (about 320 tCO2e/ha).	Additional woodland and hedgerow extension should shift *Carbon Balance* more towards net zero, but not entirely. If the landowner expands areas of silvopasture in the future, this can lead to improved carbon footprint and higher *Soil Carbon Stock*.
Biodiversity	There are very few supportive interventions named for *Habitat Management*. *Connectivity* between habitats is good, owing to existing woodland and hedgerows. The large hill field of acid grassland accounts for excellent *Space for Nature* (36% of total area). There are several species and breeds of livestock on the farm resulting in very good *Crop and Livestock Diversity* but *Flora* could be diversified (17 unique species). There are some amber and red *Bird Species* recorded on the farm and mixed quality of *Hedgerow Structure*.	Hedgerow extension and new woodland should lead to greater *Connectivity*. Reduced hedge cutting to 3-year cycles could improve *Habitat Management*. The increase in woodland area implies more *Space for Nature,* whilst trees and hedges may also attract more *Bird Species*.
Animal Welfare	*Welfare Outcomes for Beef and Sheep* are good, with cow and heifer culls and lamb losses from scanned to reared showing most potential for improvement.	New hedgerows and shelterbelts may provide shelter, in turn potentially reducing lamb and heifer mortality, as well as increase browsing variety.
Water	Owing to some fields retaining temporary water bodies, *Water Storage* on the land is excellent. However, there are very few actions for optimizing *Water Runoff Management*. *Phosphate* and *Potash* balances are excellent, while there is a slight oversupply of *Nitrogen*. *Water Usage* is very good, with 100% originating from abstracted groundwater. features on the land and no irrigation used.	*Water Runoff Management* should improve with the additional areas of tree planting.

Social	The landowner is well rooted in the community owing to multiple generations of farming in this area, and there is a good level of existing *Community Engagement,* online and in person.	The landowner is open to the idea of having a dialogue with the community about wider benefits from the proposed natural capital plans.

Financial appraisal

Not relevant.

Validation

Not relevant.

3.3. Key themes from Financial Appraisal

The analysis of each site demonstrates that woodland habitats are financially viable when combining carbon credits sales with available grants, but grant income does not cover capital costs. Hedgerow creation is unviable on a standalone habitat basis across all sites, but has little impact on overall whole farm project viability due to the small scale of planting across the sites. The viability of agroforestry varies by site, influenced by key factors including approach type, project maintenance costs, availability of grant payments, and carbon units generated. A summary of net cash flows across the habitats at each site is provided in Figure 17 below.

- Farm A's silvoarable agroforestry generates fewer carbon units than the silvopastoral systems at the other sites given the nature of the planting and lower density of trees (this is not WCC eligible). Whilst product sales from silvoarable systems could support long-term maintenance, agroforestry on a standalone basis at Farm A remains unviable. This indicates that income from sale of agroforestry carbon from silvoarable systems is insufficient to cover capital and Code costs.
- The silvopastoral systems at Farm C and Farm B generate more carbon units from agroforestry and qualify for the WCC (<5 m spacing). Farm C has a higher carbon yield (210 units/ha) than Farm B (133 units/ha), this reflects the land quality differences between the two sites.
- Carbon unit generation is a significant driver of the viability of Farm C agroforestry which receives higher BPS payments (£4,400/ha) based on arable land use compared to Farm B (£1,840/ha) based on land in a Less Favoured Area (LFA). These higher subsidies alongside increased carbon revenues offset higher capital costs at Farm C (£12,000/ha), compared to Farm B (£10,000/ha).

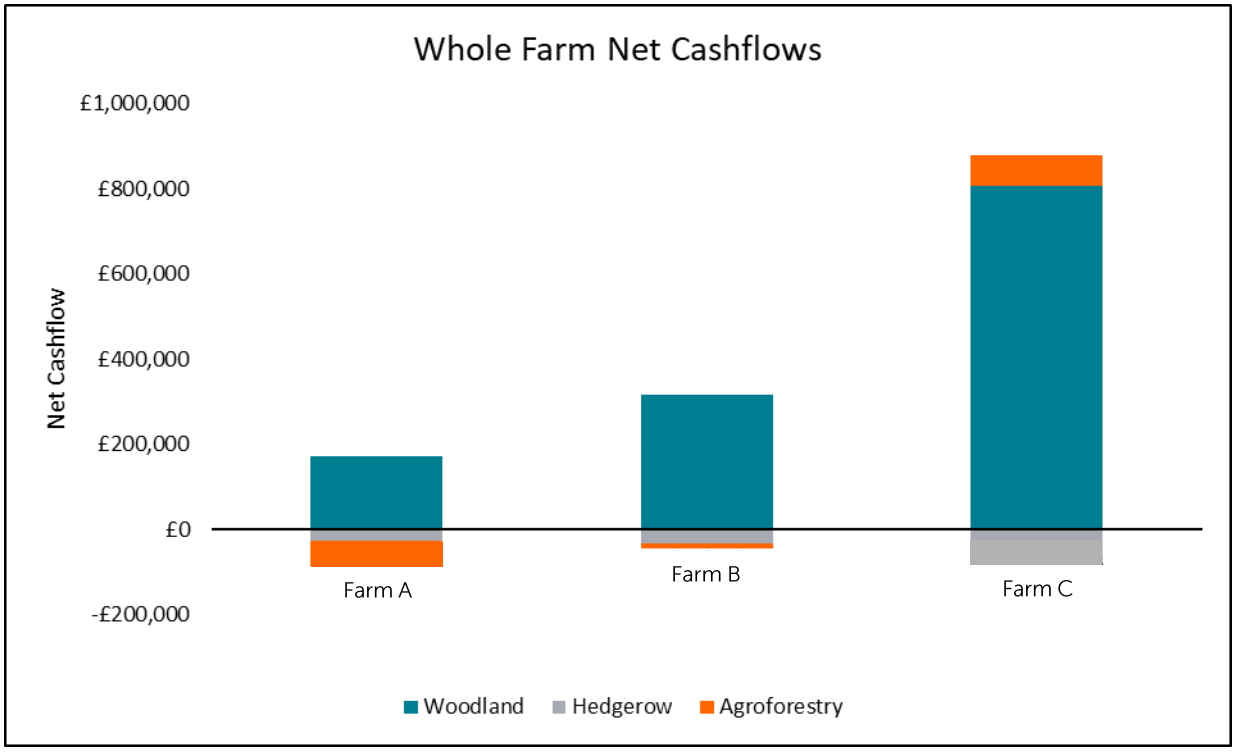


Figure 17: Whole Farm Net Cashflows (Farm A, Farm B, Farm C)

If the three habitats at each farm were certified on a standalone basis, fixed costs (registration, verification, validation and survey work) would be £16,000 (discounted) for the woodland, hedgerow and agroforestry (assuming first verification is in Y4 then every 10 years). If habitats were certified on a 'whole farm' basis, savings of 33% can be achieved through aggregation based on SACL assumptions. Combining the carbon certification across all the habitats at each farm improves the viability for all habitats due to cost savings achieved, but hedgerow remains unviable. The viability of agroforestry is determined by carbon unit generation and grant support at a level that offsets capital and maintenance costs.

- When certification costs are allocated to each habitat based on the proportion of carbon units generated, woodland certification costs account for 4% of associated carbon revenues, agroforestry costs 5% of carbon revenues, and hedgerow costs 9% (See Figure 18 below). However, aggregation requires all habitats to be validated and verified at the same time, which may not be aligned to the carbon unit generation profile of a habitat.
- Cost savings from certification need to be weighed with revenues received from carbon unit generation to identify financially advantageous times for verification. Aggregation also requires management to ensure documentation is prepared simultaneously.

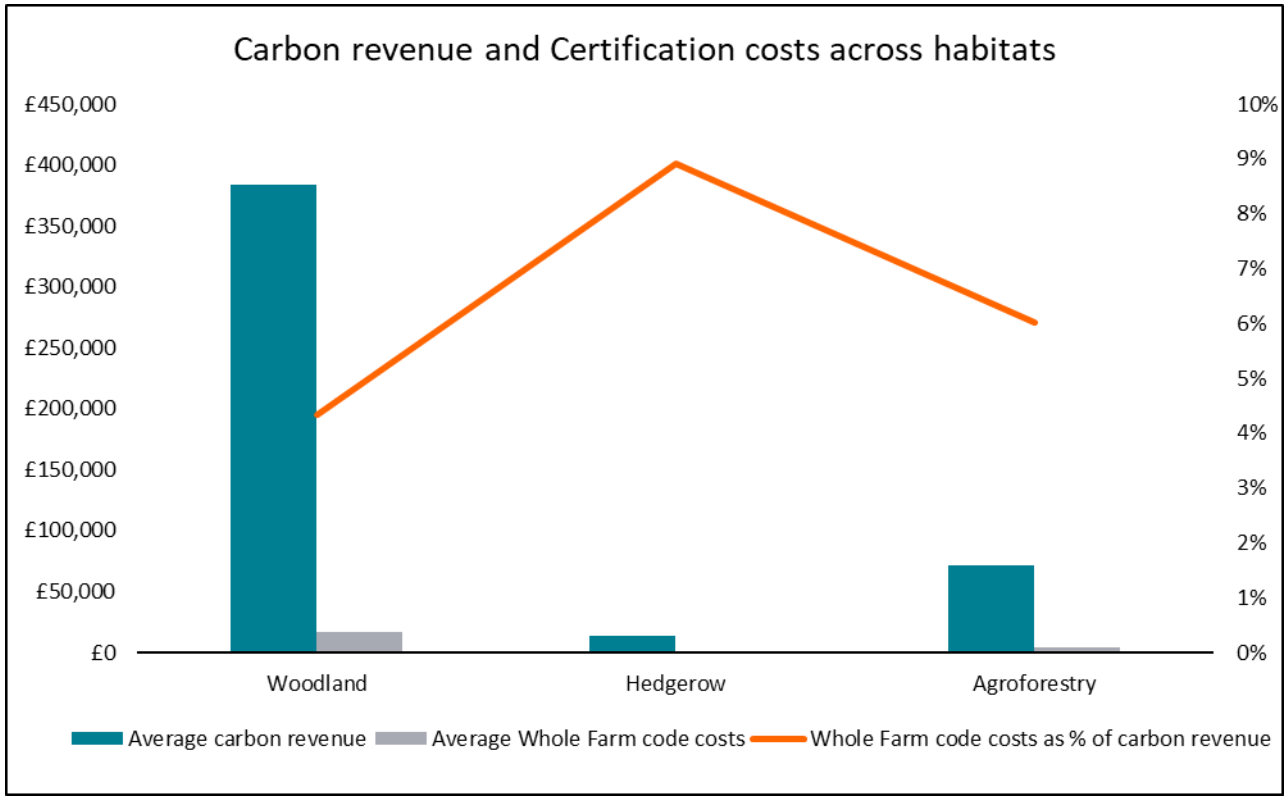


Figure 18: Carbon revenue and Whole Farm Certification costs across habitats

Across the sites, the modelled breakeven prices over a 100 year project timeline, are significantly above current market WCC Pending Issuance Unit values (assumed to be c.£30 for broadleaf woodland). A shorter project lifetime results in a significant reduction of the breakeven price across each habitat.

- Woodlands have an average breakeven price of £113 over the full project timeline of 100 years (see Table 7 below). Hedgerow breakeven prices and agroforestry breakeven prices are much higher, at c.£474 per unit and c.£311 per unit respectively, driven by site considerations discussed above, including carbon generation and grant availability.
- On an aggregated or bundled level (across all three habitats), the breakeven price falls to c.£122 (per bundled unit). Woodland is clearly a significant driver of the breakeven bundled price for each site however, there is a need for more grants to support the financial viability of agroforestry and hedgerow sites to reduce reliance on cross-subsidisation.

A key driver of the breakeven price is product duration, as inflation adjusted long-term maintenance, management and operational costs significantly impact breakeven rates, as shown in Table 7 below. Where shorter timelines are considered, such as 50 or 70 years, bundled prices are closer to current market pricing; Farm C has a woodland breakeven price that is less than current PIU assumptions. For all three sites the 50 year breakeven prices for woodland are closer to current WCC PIU prices, with an average of £32. The project did not test whether a 'bundled' unit could achieve a higher price in the market.

Table 7: Summary of Average Breakeven Prices

	100 yr breakeven price		70 yr breakeven price*		50 yr breakeven price*	
	Woodland	Bundled	Woodland	Bundled	Woodland	Bundled
Farm A	£110	£131	£65	£91	£43	£73
Farm B	£146	£147	£77	£84	£45	£57
Farm C	£83	£89	£33	£46	£9	£26
Average*	**£113**	**£122**	**£58**	**£74**	**£32**	**£52**

Policy support is needed to drive demand and increase carbon prices, even for projects with a shorter timeline. One suitable option could be the creation of a carbon guarantee mechanism in Scotland, similar to the Woodland Carbon Guarantee (WCaG) in England, with the Scottish Government agreeing to purchase verified carbon units at a guaranteed index-linked price that is agreed at the start of the project (Year 0). The latest round of WCaG (Round 8) achieved an average credit price of £25; at this level a Whole Farm project like Farm C, for example, could breakeven (as shown in Table 7 above), providing more certainty to enable the farmer to proceed with the project.

3.4. Key themes from Validation & Verification

3.4.1. Development of a validation framework for whole farm natural capital

Outputs from Round 1 were utilised and developed to create a validation checklist in accordance with ISO17029 (see Annex materials). The checklist incorporates all qualifying criteria from the PC (Version 2.1), the WCC (Version 2.2), and the Agroforestry Code (a non-published development Code). For hedgerow carbon, there is not yet a defined Code and so outputs from the carbon calculator developed by the Organic Research Centre were assessed as part of pilot validations. Key document templates were also amended to better accommodate use as part of an aggregated assessment. These changes have helped inform recommendations for further changes to key documents to best accommodate whole farm assessment.

Temporary changes trialled as part of pilot assessments included a combined PDD (all interventions), a combined risk assessment (all interventions), and the use of the WCC carbon and additionality calculators for woodland and agroforestry interventions (Farm B).

3.4.2. Limitations

Pilot assessments were undertaken in hypothetical scenarios (projects have not been formally validated as part of this project). Accordingly, assessments focussed on material aspects relating to greenhouse gas (GHG) assertions and did not require the submission of documentation/evidence in situations where its attainment would not be practicable by the WT (e.g., evidence of land ownership and tenure). In these situations, consideration has been given to how this would be validated (means of verification) and whether this might be affected by validating interventions collectively.

Unfortunately, the project team where not able to identify a site that had all interventions peatland, woodland, agroforestry, hedgerows) on site. As such, it has not been possible to undertake a pilot assessment that includes peatland. In the absence of a pilot site that included both woodland and peatland, an informal review was undertaken by aggregating datasets from a related WCC project and PC site on contiguous land. It is emphasised that this did not occur as a formal review and is not one of the three sites assessed to scope

3.4.3. Validation efficiencies identified

Validation efficiencies were most apparent where there are commonalities between Code criteria that enabled a single means of validation. These efficiencies are best realised via the aggregation of key documents to cover all interventions. This was most notable through the testing of a combined PDD, which consolidated and reduced the need for repetition in project developer responses. Similarly, the use of a combined risk assessment covering all interventions evidenced efficiency in reviewing compliance with Code criteria and reduced the need for further independent documentation. It was also identified that the landowner commitment statement could easily be tailored to cover all interventions in a single document.

For woodland and agroforestry interventions, pilot assessments evidenced validation efficiencies in using the WCC carbon calculator (where applicable based on stems/ha) and additionality calculator for both interventions. Although well designed and intervention specific, the agroforestry calculator developed by the Organic Research Centre requires high levels of project developer resource (e.g. attaining tree measurements from a local site) that would not always be practicable or cost efficient. Importantly, the efficiencies identified through the aggregation of key documents would be cascaded to project developers through reduced administration time, would result in fewer errors caused through reduced data handling, and enhance the visibility of aggregated outputs.

3.4.4. Incompatibilities identified for further development

There are multiple incompatibilities between Code criteria that would need to be overcome to efficiently facilitate whole farm validation assessments. Key areas for development include:

Permanence: project duration and timeline

Consideration would need to be given to how to best accommodate differing intervention start and end dates and how this may affect permanence and avoidance of reversals. Potential responses may include the use of a rolling crediting period, or the use of the existing WCC grouping mechanism approach which makes use of the latest start date. Fundamentally, project duration and timeline should not stop projects occurring if compliance is in place with other criteria.

Financial additionality

Each intervention has differing criteria relating to financial additionality. The nature of an aggregated project entails that costs are higher and cannot accurately be determined on a cost by intervention basis, making an assessment of compliance with financial additionality criteria of the Codes problematic. An approach unique to whole farm carbon across interventions would need to be developed.

Consultation requirements

Differing approaches are taken within the Codes necessitating differences in information submitted by project developers and how it is assessed by Validation and Verification Bodies (VVBs). Consideration is needed for a mechanism that enables project developers to undertake a single consultation but meet requirements of the Codes efficiently. Responses may include evidenced alignment with the Community Inclusion Standard (currently being developed under FIRNS by the Nature Finance Certification Alliance) or BSI Flex standards.

Carbon registry and scheme owner checks

The current process of Code scheme owners undertaking checks of all projects, even after external third-party validation by an accredited VVB, creates inefficiencies in the validation process. This may be further complicated by aggregated assessments. There is a need for efficiencies to be identified that reduce the burden on scheme owners to check all projects following validation assessments. Responses may include sampling to a defined threshold as part of an audit of the VVB by the scheme owner.

An absence of formalised Code criteria for both agroforestry and hedgerow carbon

As part of validation, we need to be confident that GHG assertions relating to agroforestry and hedgerow interventions are accurate, have followed 'best practice', and are supported by sufficient governance etc. Currently, there is no published criteria that is overseen by a scheme owner for either intervention. Consideration is needed of what approach is best suited to ensuring sufficient governance is in place for these interventions if carbon from these projects is to be marketed.

In their current iterations, the WCC and PC are not compatible as part of an efficient whole farm assessment. Although some responses have been identified in part for some of these incompatibilities and development needs, validation outputs suggest the need for more over-arching strategic changes to best facilitate whole farm assessments (see Conclusion 4 in section 6.1)

3.5. Farmer response to whole farm approach

In Autumn 2024, we held discussions with farmers about their experience using the whole farm approach. One of the key benefits identified for the map-based approach using the SAE platform was that it helped to identify missed opportunities, viewing the least productive or fertile land areas in relation to suitability for tree planting, rather than giving one precedence over the other. Visualisation through maps play a key part in helping farmers as well as project developers to understand how different habitats interact within a system. It also invited conversation around which areas might allow for greatest costs to be saved, in terms of enhancing animal welfare. Trees can provide shelter and respite for livestock during wind, rain or storms, improving livestock daily weight gain. During sunny weather they provide shade, reducing ruminant heat stress and associated animal health complications. Hedges between fields can also reduce the transfer of diseases, by stopping nose-to-nose contact between flocks or herds.[11] One farmer mentioned that viewing their land in this way led them to decide on a more deliberate location for trees as shelterbelts.

The farmers liked that the approach put their business at the heart of their decision-making, since the activities and features of the farm are considered in tandem, in an integrated way. This is a positive approach to making food production and farming operations work together to achieve future environmental and business resilience. As a result, all farmers perceived the planting plans to have no negative effects on their farm business in the future and were keen to implement at least some of their planting plans in the coming years (Table 8). This creates a win-win situation for various aspects, as evidenced in the whole farm impacts in section 3.2, notably for climate and farm business.

Table 8: Farmers' perceived effect of potential natural capital plans on farm operations.

Farm	Overall perceived effect of planting plans
Farm A	Some positive, some negative effects. Positive for soil health and biodiversity (anecdotal evidence only so far) but not been getting as much yield out of fruit trees in isolated rows as would be for an orchard of same tree number. However, despite the in-field apple rows, the value of barley crop or grass ley has stayed the same.
Farm B	Positive; is keen to start with planting some areas of agroforestry and hedging, affirming benefits, and then continue to develop this natural capital if there are no significant negatives.
Farm C	Positive, since the fields being planted with trees are lower quality anyway so it

[11] Soil Association 'Agroforestry Handbook' (2019) https://www.soilassociation.org/media/19141/the-agroforestry-handbook.pdf [accessed on 02/04/2025]

	wouldn't have any detrimental impact on food production but would bring a massive benefit for nature in terms of biodiversity and habitat connectivity, and shelter for livestock in those fields which continue to be grazed.
Farm D	Positive, since it would open new revenue streams as well as an opportunity to manage land himself in areas which interests them.
Farm E	Neither better nor worse, although there may be some long-term benefit from shelterbelts, but time will tell.

3.6. Croft case study

3.6.1. Introduction and context

Crofting is a form of land tenure which is unique to the former counties of Argyll, Caithness, Inverness, Ross & Cromarty, Sutherland, Orkney and Shetland (now Argyll & Bute, Western Isles, Highland and Moray councils). The Scottish Crofting Federation states that crofting was "designed to protect the people from exploitation by landlords in the 19th Century" and "has a proven track record of maintaining population and economic activity in remote rural areas".[12] Crofts are usually small landholdings consisting of in-bye and common land (or common grazings). A significant portion of common grazings in Scotland are designated as peatland (348,000ha[13]), accounting for 22% of the country's peat area. Given the scale and different legal basis for crofts in comparison to other agricultural businesses, we have included one croft as a case study, alongside the more in-depth work for the five core farms.

The case study croft is located on the western part of the Isle of Skye, within the Highland agricultural region, at the mouth of Loch Eynort (Figure 19 and map in Figure 20). While crofts average five hectares[14] in size, some crofts are considerably larger and Croft X is an example of this exception. The croft is owner-occupied, covering 15 ha of in-bye land and 185 ha hill ground, previously used for common grazing and now used for sheep grazing by the sole croft owner. The area in Glen Eynort is designated as Severely Disadvantaged LFA for agricultural production and Glen Brittle Forest covers an extensive area to the East of the croft. The soil is mostly slightly acidic brown earth, with average pH 5.6, and there are two Canmore/ Historic Environment Record sites. The crofter's main motivation for tree planting is for livestock shelter, followed by ecological benefits such as protection against soil erosion and carbon sequestration. They also have hopes that the woodlands will increase biodiversity and the aesthetic feel of the area.

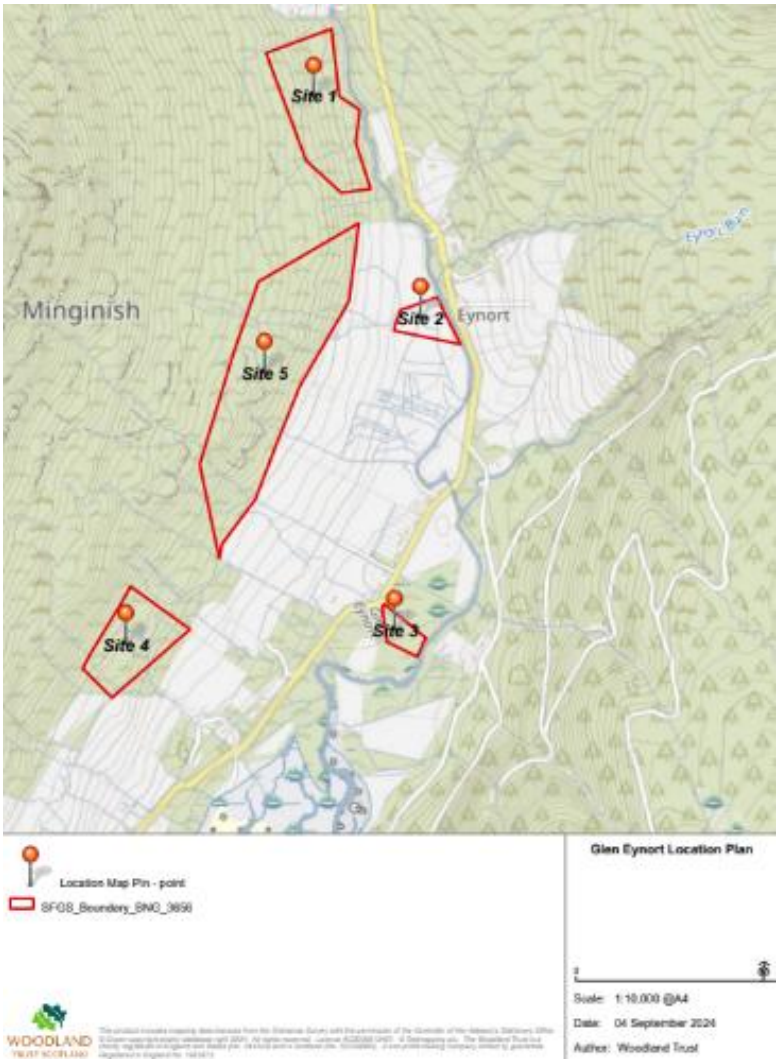
[12] Scottish Crofting Federation 'About crofting' webpage About crofting - Scottish Crofting Federation [accessed on 26/03/2025]
[13] Scotland's Rural College 'Protection of Peatlands and Wetlands – a potential new GAEC measure for Scotland ' (2023) protection-peatlands-wetlands-potential-new-gaec-measure-scotland.pdf [accessed on 25/01/2025]
[14] Scottish Crofting Federation https://www.crofting.org/about-scf/about-crofting/ [accessed on 25/01/2025]

Figure 19: Google Map view from April 2022 looking south towards Loch Eynort

3.6.2. Proposal and financing

Based on a preliminary project proposal, developed by the WT in September 2024 in collaboration with the crofter, five planting sites were identified (Figure 20). All sites are "very suitable" (based on ESC and FGS climate site suitability) for W4 (Native Upland Birch: Downy Birch with Purple Moor Grass on shallow peaty soils), W9 (Ash, Rowan with Dogs Mercury) and W18 (Native Scots Pine). Sites are also "suitable" for W11 (Sessile oak, Downy Birch with Bluebell/wild Hyacinth) and W17 (Sessile oak, Downy Birch with Bilberry/Blaeberry).

Site 1:



- 3.86ha, Small or Farm woodland (mixed)

Site 2:

- 0.94ha, Small or Farm woodland (mixed)

Site 3:

- 0.69ha, Small or Farm woodland (mixed)
- Wader habitat may interfere with planting possibility

Site 4:

- 2.69ha, Small or Farm woodland (mixed)

Site 5:

- 10.2ha, Native Broadleaves – extension onto 8.67
- Two Canmore/Historic Environment Record sites overlap

Figure 20: Location of Croft 3, Glen Eynort, with five proposed tree planting sites.

The total proposed planting area equates to 18.38 ha. All fences need to be replaced, which – after endorsement from a local NatureScot wildlife advisor – will be stock fences only, relying on monitoring and culling for deer control. The total infrastructure and input costs (including trees, vole guards, fertilisers, screefing, stock fencing and agent fees) for a project without deer protection are £62,000 with a net cost (after FGS subsidies) of £2,000, demonstrating that the crofter is committed to carrying out the project despite the deficit, in the hope that the croft will see improved animal welfare alongside other benefits.

3.6.3. Barriers to engaging with nature markets

At the start of this project, there were discussions about erecting stock or deer fences, since there are high deer numbers associated with a neighbouring Forestry and Land Scotland (FLS) site. Before the necessity for deer fencing was dropped after discussions with a NatureScot advisor, the project infrastructure costs would have gone beyond £100,000. The crofter considered these costs to be too high to implement, so the project size i.e. sites would have to be scaled back by 50% and the owner would have used existing boundary fences and upgraded them, acknowledging that this would be a cheaper but less effective option than new fencing.

The crofter has accepted the risk that if the project with stock fencing fails because of deer browsing of trees, they must absorb the costs of loss and replacement. For this reason, the crofter is committed to planting only two sites initially, as the costs and risk to plant all five together is too high. The crofter is also investing in training for deer management to reduce the costs of employing a stalker.

At first, the crofter was not aware of the WCC and somewhat sceptical of carbon payments, but since our meeting they have spoken with a carbon manager at the WT and they are now considering entering into the scheme. The crofter would like to minimise risks and costs associated with planting and is therefore prioritising two planting areas in a first stage with consecutive plantings of the other three sites in following years. This would not be eligible as part of the same planting project due to different planting windows, hence efficiencies and costs from WCC validation and verification would not be optimised for the crofter.

Scepticism around carbon finance is preventing some crofters engaging with carbon markets, however, a more general barrier amongst the crofting community is the mindset around tree planting, since trees have not been a prominent feature in the recent history of crofting and so many crofters find it difficult to connect with the idea of integrating trees into their landscape.

3.6.4. Solutions

Promotion and benefits of trees and crofting

While many crofters feel that trees have never had a place in the crofting landscape, there are other crofters who have other reasons for being against tree planting: they are wary of greenwashing and outsiders coming in who don't "understand" the landscape.

A need for more local demonstration sites and case studies was mentioned, where tree planting and carbon finance can be done together with trusted partners and to provide a proof-of-concept of the value added by trees to crofting systems. Phil Knott from the Nature Friendly Farming Network, for example, has been working as a Community Tree Grower with Broadford and Strath Community Hub on Skye, running workshops at a local tree nursery on how to access grants and which trees to choose.

Better communication around payment support for crofts with natural capital ideas

The croft in the case study also mentioned that as soon as something like a grant or scheme becomes nationally competitive, crofters have a feeling of being outcompeted by bigger players. However, as is the case with agri-environment climate scheme (AECS) payments, there are often several factors apart from scale that influence the likelihood of a project being funded. Some examples of projects associated with small farms or crofts which have successfully received funding and support have been the Flow Country Green Finance Initiative and the Spey Catchment Initiative, where location has been a more deciding factor than size.

Identifying significant stakeholders downstream and speaking with these – for example whisky distilleries who depend on a clean water source from peatlands on common grazings – can give leverage to crofters' natural capital projects. A portfolio of case studies showing a range of project sizes and locations, with examples of active crofts, could be pooled to help crofters feel motivated to engage with nature markets.

Improved governance for crofting groups and common grazing committees

The crofter has a share in common grazing land further North near Portnalong, but has found it easier to make decisions about land use change on their owner-occupied croft further south on the island, which has a large hill apportionment and so is not governed by a committee like common grazings are. This is indicative of the complexities associated with communication between common grazings shareholders and their landlords. There has been some work by Forest Carbon in a previous FIRNS project, investigating revenue-sharing models and governance/ legal arrangements for peatland restoration on common grazings in Scotland, that balance the interests of shareholders and landlords.[15]

[15] Forest Carbon 'Unlocking peatland restoration on crofting and common grazing land, part 2' (2024) https://www.forestcarbon.co.uk/news/peatland-restoration-crofting-common-grazing-land-pt2 [accessed on 26/03/2025]

Given the (often) complicated politics between neighbours, especially when they are spread over various townships or absent for much of the year, the croft case study suggested that the focus for crofter involvement in tree planting or peatland restoration should be on in-bye land in the first instance. There have been few examples of natural capital projects on common grazings with external intermediaries, but pooling lessons from existing studies would help in defining what is needed for mediation to be successful. (See section 4.3.4 for other ideas about common grazings from a discussion with a group of crofters.)

3.6.5. Conclusion

Although there may be some individual crofts like Croft X, where registration under the WCC to generate carbon units for potential sale may be a valid option, the priority should be continued extension and communication from government and eNGOs to demonstrate the value and benefits of integrating more trees and woodland into the croft farming system. In addition, the work to help restore peatland on common grazing areas and mechanisms to attract investment via the PC should likely be viewed as the key strategic natural capital opportunity for crofts and crofting more generally.

4. Aggregating farms for natural capital development (workstream 2)

4.1. Introduction and methodology

The second workstream of the project sought to explore the opportunities and challenges of aggregating individual farms into groups, cluster or networks to support natural capital project development and implementation. We examined this in three main ways:

Firstly, we explored attitudes towards different options and models for aggregating farms for the purpose of scaling up natural capital projects; from potential beneficiaries (farmers and landowners), as well as those involved in supporting existing clusters, groups or networks, and natural capital project developers. A discussion paper was developed (see materials in Annex) which set out different delivery models, as well as governance structures. These models and options formed the basis of an open to all survey, which was open for responses for a 6-week period in November to December 2024 and generated 40 individual contributions. The key results from each question are described and analysed in section 4.2 below, with more graphs available in the Annex materials.

The second key intervention was to develop a mechanism for more in-depth discussion with key natural capital actors to explore the opportunities and challenges of aggregating farms into clusters, groups or networks to help scale natural capital projects. The aim was to take a "360" approach, through semi-structured discussions with project developers, existing groups, clusters and networks in Scotland, voluntary Code managers and policy colleagues. From a long list of potential candidate stakeholders, sixteen discussions were scheduled. Each of these discussions lasted about an hour and were held between October and December 2024, with 22 individuals spoken to in total. In addition to this, we interviewed the five core farmers of the project and a group of crofters, including the crofter in the case study, to discuss the practical feasibility of these solutions from a whole farm and crofting perspective. The main themes from these discussions are presented and analysed in section 4.3.

Finally, financial and validation efficiencies were tested. The five core farms for which whole farm natural capital plans had been developed (reported in section 3) were used as a hypothetical group. FE analysed the financial opportunities and challenges of aggregating farms and SACL assessed the validation and verification opportunities and challenges. These results are reported in sections 4.4 and 4.5 respectively.

4.2. Key insights from survey

As noted in the introduction, the discussion paper on the different service models and governance options for aggregating the delivery of individual farms into natural capital groups, clusters and networks was used as the basis for developing a survey using Typeform. There were eleven questions in total, divided into four sections, with mostly closed questions and 40 completed, anonymous responses. Results were downloaded from the Typeform website in December, as a PDF and in spreadsheet format. Some questions (3, 5, 6 and 9; see figures in this section) could not be analysed in the Typeform PDF, so graphs for these were produced using the software R Studio. The spreadsheet permitted analysis of the responses by type of respondent, e.g. farmer or farm adviser. Details of each question as well as individual questions and answers can be found in the Annex while key insights are presented below.

In the first section, we asked three questions to understand the background and interest of the respondents. Based on question one, 21 (52.7%) respondents were farmers, landowners or crofters. Notably, there was also input from farm advisers and service providers (six respondents, 15.8%), as well as natural capital project developers (six, 15.8%). Based on question two, Half (20, 50%) had not engaged in natural capital projects or with nature markets before, with 19 (47.5%) who had; only one respondent was uncertain if they had or had not. Question three showed that most respondents were primarily interested in directly implementing natural capital projects to add value at the farm level or within their supply chain,

most likely owing to the majority of respondents being farmers, landowners or crofters (Figure 121). Farm advisers and service providers all stated their primary interest as being the 'direct support for delivery or implementation of natural capital projects'. Question four asked about interest in various funding options, where most respondents selected three out of five options, with 'Public funding' and 'Carbon or other credits' receiving the most interest.

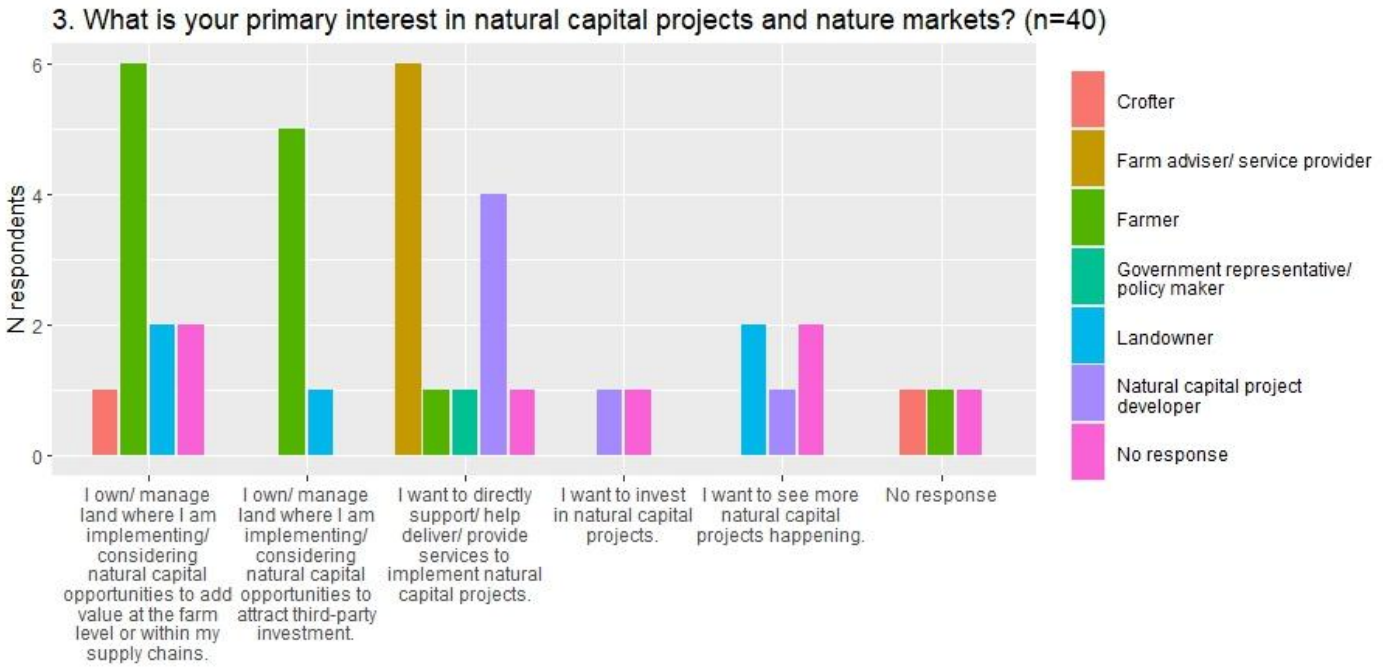


Figure 21: Bar chart showing answers to question three, according to respondent type.

Section two introduced two main aggregation options and asked questions about the importance and level of support required for various services from the land manager's perspective. 'Ecological baselining and evaluation' were recognised as the most important service combination which project developers should offer (24, 60%, of responses were 'very important' and the remaining 16, 40%, were important; question five in Figure 22). All other services had more mixed responses of importance, with legal services showing the lowest 'importance' score. Lower scores could mean that land managers feel they are in a good position to deliver the services themselves, they don't perceive it as relevant to their own project.

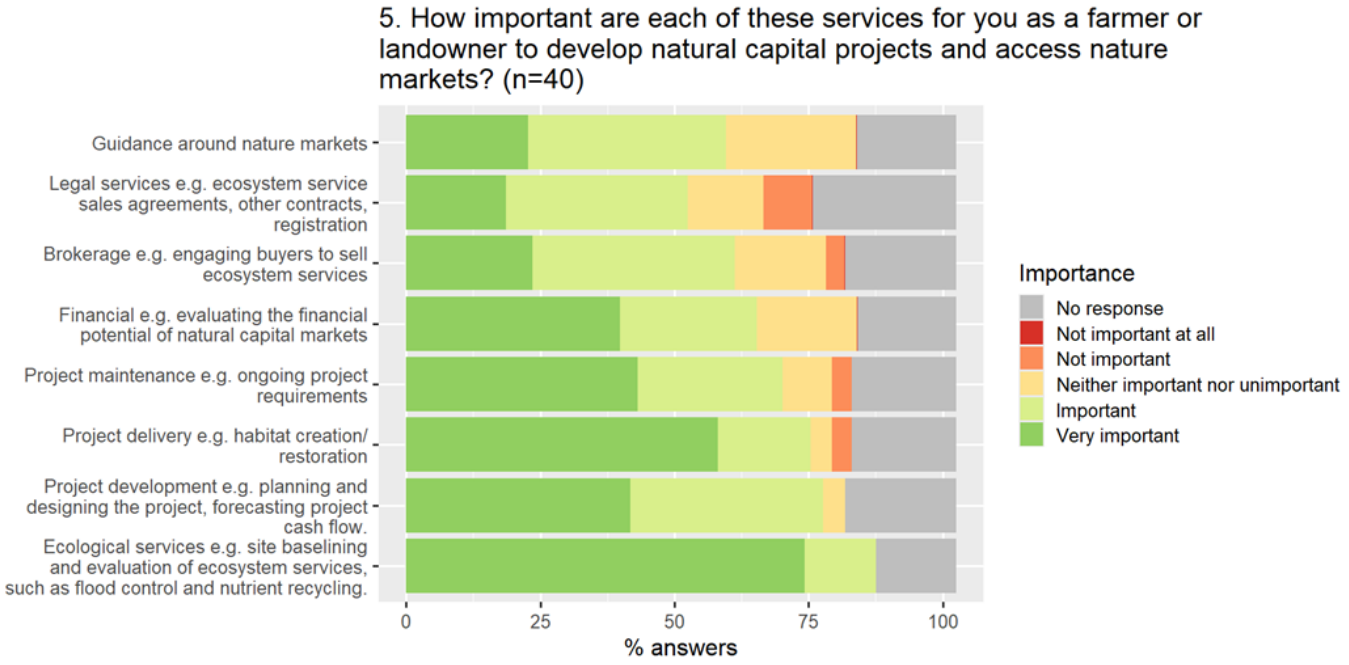


Figure 22: Bar chart showing answers to question five.

To understand more about the relationship between support level and the importance of various services offered by project developers, the question six asked to rank support required to deliver each service. Again, 'ecological baselining and evaluation' received high support scores, however services related to 'brokerage' and 'legal advice' scored highest (Figure 23). This suggests that while these 'brokerage' and 'legal advice' may not appear *important*, if they should become relevant, a high level of support would be required. When asked about the type of support preferred (question seven), most respondents chose 'financial' (23, 63.9%) over 'advisory' (8, 22.2%), with five individuals (13.9%) showing 'no preference'.

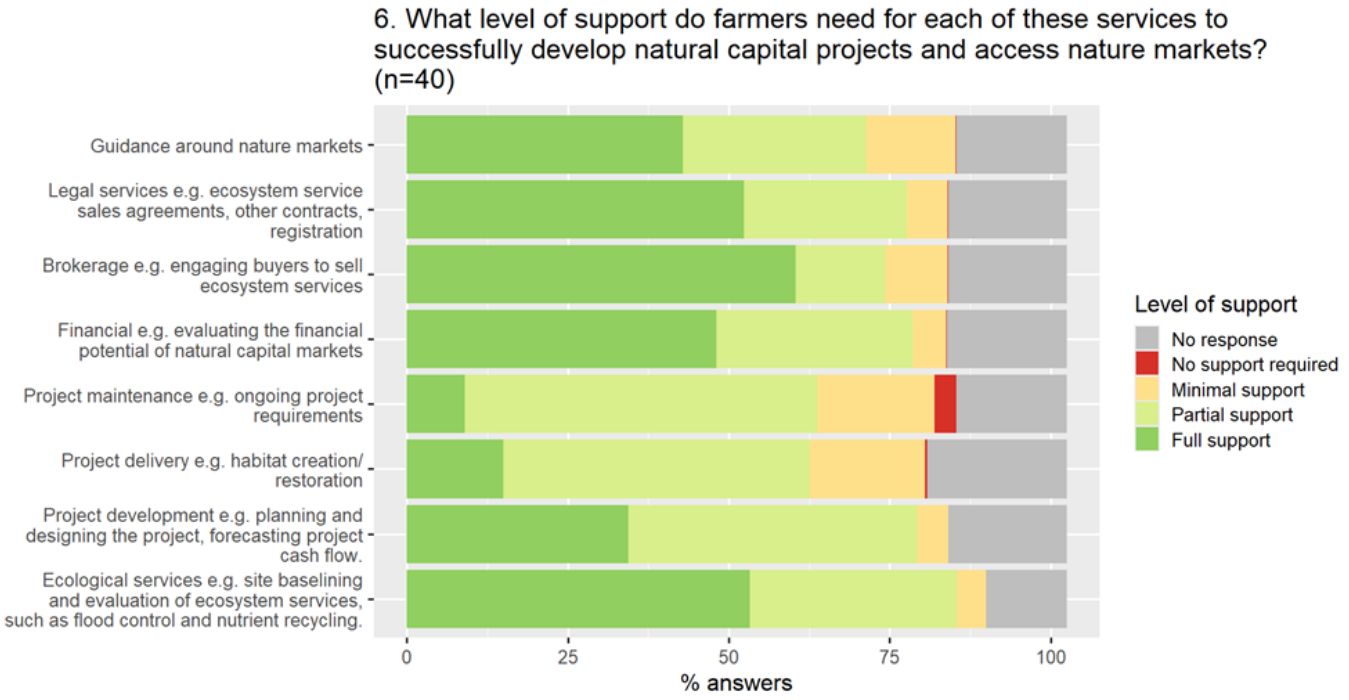


Figure 23: Bar chart showing answers to question six.

For question eight, 'cost-effectiveness' was ranked as the primary factor when considering aggregation options (11, 30.6% of respondents ranked this factor first), followed by 'long-term stability' (1, 27.8% of respondents ranked this factor first). The inclusion and awareness of community benefits and engagement was named several times as an 'Other' important choice factor.

Section three asked about which entities the respondents prefer to work with or advocate working with. For question nine, about 24 (60%) respondents said they were 'quite' or 'very' likely to work with a 'formal network or cluster' as an aggregation entity (Figure 24). In contrast, the 'least' likely entity to work with was the 'commercial' developer.

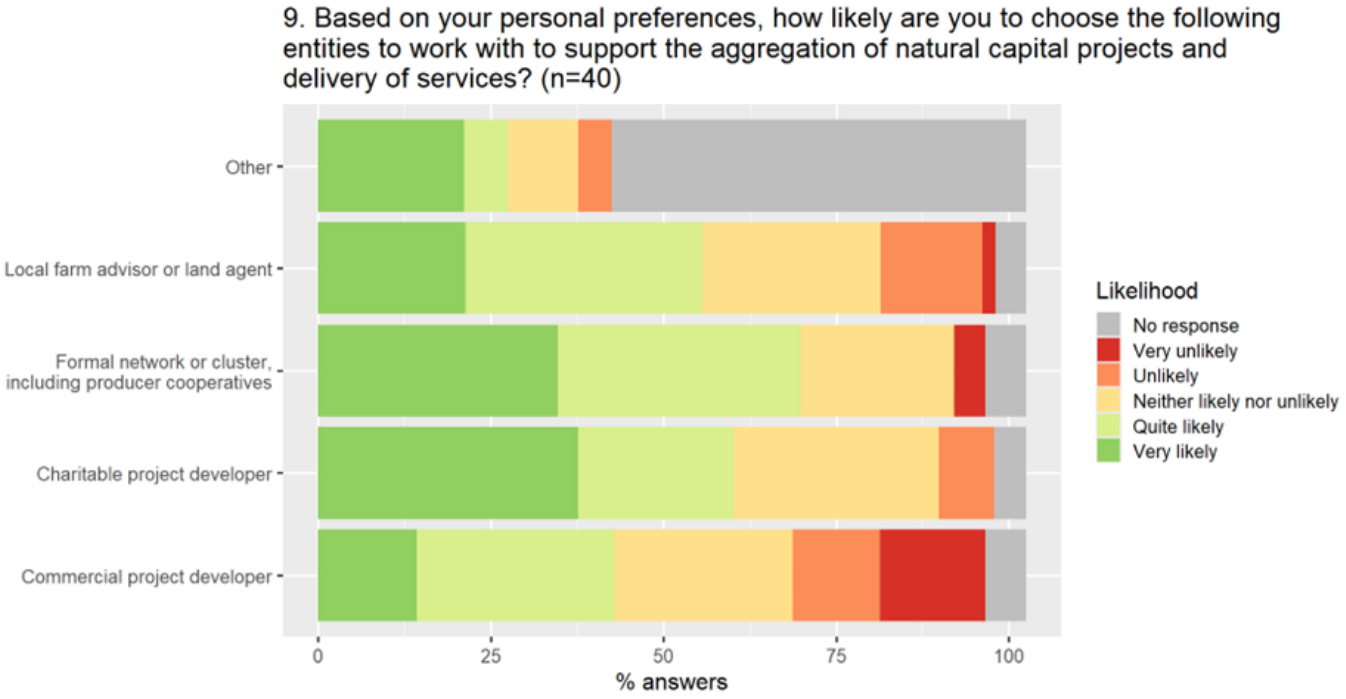


Figure 24: Bar chart showing answers to question nine.

The fourth section aimed to understand more about preferences for the future funding landscape. Question 10 included suggestions for blended finance mechanisms, partially lifted from the Natural Capital Market Framework[16]. Most (11) respondents prioritised the need for 'long-term funding from government' (29.7% of respondents ranked this factor first). A 'corporate ESG fund' was ranked lowest by 17 (45.9%) respondents. Question 11 asked about future business viability and was only asked of the farmers, landowners and crofters (19 responded). Engaging with 'nature markets' was ranked most highly by eight respondents (i.e. 42.1% of respondents ranked this factor first), with 'value adding' being ranked second highest (6 i.e. 31.6% of respondents ranked this factor first). Only one respondent was not sure about which activity might secure the financial viability of their farm business in the future – all others ranked this option last.

Follow-up responses to the survey were welcomed and some were received via email. These included the following:

1) **Survey fatigue among farmers**: This farmer mentioned that there seemed to be a lack of joined-up thinking, with several requests for farmer participation in surveys asking similar things, and frustration that it was not always clear how the results of surveys and audits lead to improvements in funding options and access.
2) **Shifting policy to focus more on formalising cooperatives**: Whilst not completely discounting

[16] Scottish Government 'Market Framework for Natural Capital - Engagement Paper' (2024) – Table 1, https://www.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2024/04/market-framework-natural-capital-engagement-paper/documents/market-framework-natural-capital-engagement-paper/market-framework-natural-capital-engagement-paper/govscot%3Adocument/market-framework-natural-capital-engagement-paper.pdf [accessed on 02/04/2025]

the role of nature markets, this respondent suggested that government could invest more resources in developing formal cooperatives, with members connected by geography or activity (Figure 25). An alternative to an investment-driven approach to cooperatives, as summarised in the Green Finance Institute's Investment Readiness Toolkit, could be a more collaborative approach between cooperative members. Instead, *cross-party agreements* – rather than contracts between beneficiaries and providers – can be made on certain activities, which are supported by a set of (amendable) regulations, which are in turn defined by the cooperative's (fixed) rules. Therefore, this approach "seeks to bring the parties together not through a series of binary inter-connected contracts, but through being members together of a collaborative endeavour along the lines set out above."[17]

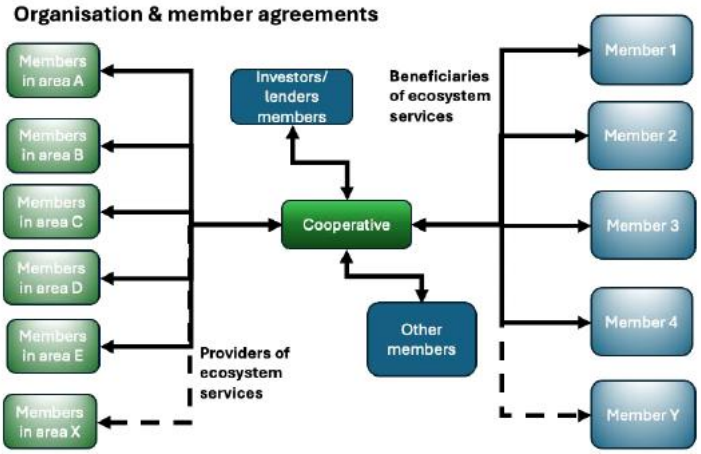


Figure 25: Schematic showing relationships between members in a cooperative (Leveson-Gower & Mills, 2024).

3) **"Warehousing" as an aggregation approach**: This approach is widely used for handling mortgages and similar consumer assets and has been suggested as a method for "originating" natural assets in a green investment report for Cumbria, which outlines a virtual warehouse's function in detail (Figure 26).[18] A warehousing facility or fund "would establish standardised metrics and monitoring of carbon sequestration in habitats (and avoided peatland emissions), nutrient reduction actions (e.g. field buffer strips), NFM [natural flood management] measures and potential biodiversity units under Biodiversity Net Gain."

[17] Leveson-Gower & Mills 'Delivering ecosystem regeneration and integrated water management: A Co-operative Approach to blending public and private funding to deliver more with less' (2024),https://economicpluralism.org/wp-content/uploads/HLG-CM-2024-Coop-concept-report.pdf accessed on 02/04/2025]

[18] Shannon *et al.* 'Investing in Climate Positive Cumbria' (2021) https://greenfinancecommunityhub.co.uk/wp-content/uploads/2021/12/cumbria-report-final-2.pdf [accessed 26/02/2025]

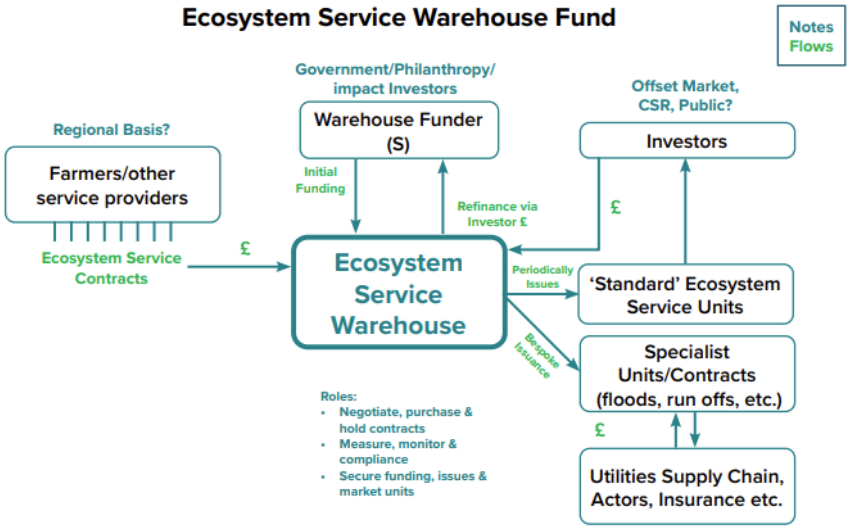


Figure 26: Schematic showing a potential Ecosystem Service Warehouse funding structure (Shannon et al.*, 2021).*

4) **Wider sector inclusion**: Multiple stakeholders are involved in ensuring high integrity carbon. It is important to keep different parts of the supply chain for natural capital policy development involved, so that they can provide and ensure assurance techniques which are fit-for-purpose.

4.3. Main themes from stakeholder 1:1 discussions

This section focuses on presenting the main themes and headline insights from the 1:1 discussions with the range of natural capital actors listed in the Appendix. As noted in section 4.1, the aim was to gain a "360" perspective from natural capital actors, meaning we met online with project developers, voluntary Code managers, natural capital policy colleagues as well as existing group, cluster and network representatives from across Scotland.

To guide the discussions, a paper was developed to set out different delivery models and governance structures and sent out in advance (see materials in Annex). The SA took a semi-structured approach to the discussions with some guiding questions, however, since all the stakeholders were experts in specific disciplines, the format remained open to facilitate focused contributions to certain topics. This resulted in explorative conversations which leaned into the specific expertise of the stakeholder.

4.3.1. Theme 1 – Low market demand for natural capital projects and consequent low prices, due to reliance on voluntary mechanisms for businesses to invest

Headline insights:

- Scottish and UK government to complement the current focus on supply side measures by putting in place measures that generate sustained and long-term demand
- As part of developing demand, consider incentive models for business to support natural capital projects
- Work with UK and other devolved governments, to review the regulatory options for generating demand for natural capital projects

This theme was cited by all actors as probably the key systemic issue facing the development of nature markets in the UK. This low demand, when combined with the high-transactional costs inherent in demonstrating high-integrity, mean that small-scale projects are generally unviable. The current reliance on voluntary mechanisms means that there is currently not enough incentive for companies to pay for the outcomes generated through nature restoration on farms and limited revenue streams beyond

voluntary carbon payments in Scotland. This limits the potential for farmers to diversify revenues beyond public funding schemes and carbon income (which is reliant on a fluctuating voluntary market).

Other points of discussion:

- An impact government could have in implementation of more natural capital projects is to put in place more compliance requirements, such as nutrient neutrality, NFM, Biodiversity Net Gain (BNG) etc. Landowners and projects would benefit from the introduction of a legal mandate to drive an operational business reason for nature market buyers to engage.
- Stakeholders interviewed perceived the main challenges to be on the demand side and voluntary markets will only get us so far as corporates are not prepared to sign off on funding at the highest level. Global net zero targets and mandatory financial disclosure requirements underpinned by the Task Force on Climate-related Financial Disclosures has meant companies were driven to purchase carbon credits and now need to disclose and manage risk around climate, leading to action. There is a need for more drivers like this for voluntary markets, to support them to become closer to compliance markets.
- Farmers also recognized a lack of buyers, observing that CSR is not enough to encourage action as there are no mandatory requirements to invest some profit share in carbon/ nature. They are therefore keen to see something like BNG for Scotland in future. Evidence shows that voluntary uptake of Task Force on Nature-related Financial Disclosures (TNFD) framework/ nature reporting does not encourage or drive businesses to adapt their practices for more nature[19], which suggests that there needs to be a legal requirement for corporates to adopt TNFD on a mandatory basis. These drivers could support much more supply chain financing to create resilient landscapes and more sustainable business practices.
- There is concern about the model being adopted by some investment funds, who are buying land directly, as it creates various challenges: a) land price speculation is often the primary motivation, meaning that natural capital development is a secondary activity, b) it is an inefficient use of capital as the land purchase absorbs large sums of capital, c) the emergence of green, "London-based lairds" creates major frictions with the local community. Another current speculation is that most farmers don't want to sell their carbon until there is more clarity in emerging government policies including Agricultural Reform policy. Farmers are worried about making long-term carbon commitments and are more interested in reducing short-term costs instead, as this has more immediate results for the balance sheet e.g. energy savings, reducing bought-in seed or feed.
- Future biodiversity credit markets were seen to be more attractive as a future funding option, but compliance will be required for the majority of private funders to engage. There should be checks and balances in place to make sure that the commercial sector is driving the work in the right direction: some organisations are solely focussed on uptake, while others encourage outcomes beyond this, e.g. biodiversity and community benefits. For example, investment to restore peatlands based on carbon credits alone is currently not financially feasible, which is why Peatland ACTION in Scotland supports a substantial part of the capital costs. Nature markets which focus on a single asset, such as carbon, may in fact risk disconnection with nature, since market-based

[19] Oxford Biodiversity Network, video recording on 'Making nature-markets work in the 21st century: evidence from England, Australia, and the EU' (2024) https://www.youtube.com/watch?v=0CLtfnpaGC4 [accessed on 02/04/2025]

mechanisms are typically driven by capital gain over holistic, place-based restoration[20].

- From the land managers' perspective (based on farmer and crofter discussions) multi-decade commitments paired with current carbon credit prices are not attractive enough for them to commit confidently to permanent land use change. Often disaffection begins with public funding, as is the case with the FGS, which does not cover the capital costs of tree planting or fencing.
- Farmers who have had engagement with the carbon registry have been intimidated by the mostly large-scale projects, especially when large corporates are paying for the carbon from these land use changes, making smaller projects seem impossible. A solution could be to give higher grants for smaller projects operating *in aggregation* with additional benefits.
- Project developers are supportive of the efforts to facilitate smaller projects to benefit from nature market funding but inherently the main barriers are the carbon price and uncertainty of demand. The current limitations on group size within WCC have not been an issue but rather the wider risk associated with managing bigger groups. For example, a reasonable portfolio is required to make planting years line up within these smaller groups (no more than four projects) which limits the cost efficiency savings and makes it challenging for small sites to join groups.
- With relatively small parcels of land and many nascent Codes and standards in the pipeline, committing to one of them now appears risky when, in a few years, these opportunities could turn into something more profitable. In several cases, land managers speculated that – on potential receipt of carbon certificates – they would hold onto them, choosing to offset *their own* emissions, as it may be worth more to add value to produce for marketing as "net zero" than selling them to third-party buyers looking to offset. Carbon pricing guarantee programmes could play a role in reducing this market uncertainty by providing a guarantee that farmers will receive a minimum price for their carbon credits if they choose to sell on the open market, whilst not crowding out private investment. This should be accompanied by price and inflation analysis, to identify if these might be inversely affected.
- The uncertainty of nature markets now and in the future is exacerbated by the need for sizeable upfront costs – farmers and especially crofters don't always have this capital to hand or it's too risky to base such an expenditure on forecasted yields and prices. Tenanted crofts, for example, have nothing to secure upfront payments since they own no property on their land. For landowners, banks could provide a "bridging loan" to alleviate risk, but it must be easy to apply and be repayable over several seasons to account for bad harvest years.
- A significant challenge in developing natural capital markets with external buyers is ensuring long-term protection against liabilities, such as guaranteeing proper maintenance during the lifetime of the woodland and replanting post-felling. One way of resolving this issue would be to establish an internalized "mutual" or core fund, as proposed by the Scottish Agricultural Organisation Society Ltd (SAOS) in the Scottish Farm Carbon (SFC) brochure over a decade ago. This fund, supported by a portion of its investment return, covers costs for audit checks, assurance for buyers (referred to as a "buffer" in the WCC), and payment to farmers or their contractors for maintenance work. The mutual fund ensures that revenue generated from carbon unit sales remains within the fund and is managed for distribution to farmers throughout the units' lifecycle, providing buyer confidence in the security of their carbon (or natural capital) assets.

[20] Chausson *et al.* 'Going beyond market-based mechanisms to finance nature-based solutions and foster sustainable futures' (2023) https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000169 [accessed on 02/04/2025]

- The WT has a mechanism to protect against long-term risks. The WT acts as a project developer and broker to third-parties, either on behalf of a landowner they have worked with or through own carbon projects on their own estates. Creating saleable carbon credits from their own estates is much easier, since they know and have easier access to all the necessary documentation. A carefully selected group of corporate partners exist as the third-party buyers of these credits, with 70% being bought in advance of verification, meaning the market already exists and carbon units are sold to trusted partners. While this ensures a good proportion of upfront payment, the unit price of carbon is below market price, to reflect the possible long-term risks of the project and the fact that WT cover the costs of managing the carbon for the (usually 100yrs) duration of the project. There is an opportunity to structure long-term offtake contracts with buyers to support projects to access higher potential future market prices and enable sales on verification of carbon units. Furthermore, verification requires further stratification and specific information that prohibits the use of remote sensing and drone technology, which could eventually make this process less labour intensive.

4.3.2. Theme 2 – Facilitation is the key common feature of all successful existing groups, clusters and networks

Headline insights:

- Facilitation of existing groups, clusters and networks provides crucial capacity for delivery
- Facilitation may support direct collaboration between farmers but this is not necessary, either spatially or as a community of interest, for groups to be effective. However, if this collaboration is 'bottom-up', then this would be positive and should be supported. Facilitation support to add capacity for delivery, is the key requirement
- There is no clear link between different governance mechanisms for existing groups, clusters or networks and delivery effectiveness

Farmers may come together to ensure group efficiencies for coordinated environmental land management in two main ways: i) a central entity which coordinates actions on behalf of the farmers, such as a facilitator-led group, or ii) a more collaborative approach, which typically is initiated by a group of farmers, is mostly farmer-led and involves more interaction between farmers. In each case, it is important that there is a facilitator leading the project, whether that be one of the participating farmers themselves or a separate entity. The discussions with existing groups, clusters and networks in Scotland that are supporting farmers through facilitation or provision of direct services via cooperative models, demonstrated that the central entity capacity for facilitation was the absolute requirement for successful delivery. Collaborative models usually have a greater potential for generating social capital value, because of the deeper connection between farmers and greater possibility for farmer-to-farmer exchange. However, many farmers find it easier working one-to-one with central entities to achieve mutually beneficial outcomes.

Other points of discussion:

- Ringfenced public funding for landscape-scale restoration would be helpful if it includes payment for a facilitator. The ideal facilitator for some stakeholders would be locally-based, with a background in ecology, who would lead on project delivery and be willing to work flexibly, possibly to coordinate various smaller groups of individuals. This is in line with comments from the farmer group, who recognized that there could be even more benefits for nature if projects were to be coordinated at catchment or local community level. They also mentioned the facilitator could be a landowner with 'skin in the game', who has the time and enthusiasm to coordinate efforts with their neighbours.

- A facilitator who is a farmer was seen as an advantage if they are transparent with the group, e.g. sharing what the funding is for, core budget etc. Individual members should have a good level of autonomy; the facilitator's core role is to coordinate the funding and administrative side. A facilitator should be adaptable and open to giving different kinds of support, depending on the group's needs. But keeping all the knowledge in house is expensive: this results in the facilitator having a high level of accountability and a group which expects wide-ranging expertise, which isn't always possible, due to time and cost, or replicable.
- While interest may be there, many farmers have little capacity for off-farm collaboration so there are varied responses to initiatives. For example, one farmer mentioned they do not imagine themselves collaborating directly with other farmers in their area for example, while another mentioned they would be more likely to participate in a catchment-style project which would allow like-minded farmers to be joined together spatially. This way, they could share knowledge and costs of some aspects, such as validation & verification and – as long as they don't live too far apart – for contractors to come and do work on the same day or week. From a policy perspective, the role of the facilitator (a single person or group in its own right) for a group or cluster of farmers or crofters considering entering an environmental scheme is a way to reduce uncertainty around options, and to discuss possible risks and benefits openly with individuals.
- Facilitators also act as relationship-builders and can capture hearts and minds: integrating trees and its benefits should be presented as a business case, rather than a policy goal. The Croft Woodlands project led by WT is a trusted brand and was commended for its open approach.
- Trees have not been part of the crofting landscape for several hundred years, so there needs to be some investment in changing mindsets. There needs to be a support system in place that can adapt to generational needs and outlooks, so that older generations are not left behind. More, better funded demonstration sites could be key. Several of the farmers in this project, for example, showed interest to be a "host" site for other farms, so enthusiasm is there, just support and communication are lacking.
- Crofters mentioned size of crofts (some are only a hectare) as an issue, so unless there is some form of grouping or aggregation, nature market access is difficult. However, even if projects were to go ahead, agreements can be tricky to manage, as is evidenced by common grazings committees. Crofters noted that if there were a few pioneering projects to show how a joint venture could be successful, this could improve interest and willingness for involvement. However, the main challenge identified was timing of the carbon schemes' deadlines and the coordination of shareholders or project participants.

4.3.3. Theme 3 – Leverage and build on existing networks to support delivery

Headline insights:

- Scotland has many existing farmer groups, clusters and networks, many with a track record of delivery – these could be viewed as a key delivery mechanism for natural capital projects by Scottish Government
- Existing groups, clusters and networks should be empowered with funding to make decisions about project character and location, within existing regulatory guard rails
- As part of the empowerment of groups, clusters and networks, consideration should be given to leverage mechanisms whereby private investment is rewarded with further empowerment to deliver, rather than a reduction in funding

Scotland is well positioned to capitalise on the current infrastructure of groups, clusters and networks.

These have all developed to facilitate a 'bottom-up' interest or demand and this could be leveraged to support the delivery of natural capital projects. However, this current infrastructure generally struggles to maintain funding, even when delivering policy priorities.

Other points of discussion:

- Individual or catchment-level approaches are very different and should determine the project design ("form follows function"). Tweed Forum tends to focus on issues such as NFM and diffuse pollution and then forms individual relationships with landowners and farmers where impact can be achieved. This is why Tweed Forum is less focused on grouping individual landowners and farmers into "clusters": they act as intermediaries and facilitators with many 1:1 relationships but there are few *direct* links between those that Tweed Forum support and work with. However, a more collaborative approach could be developed with more resources and if there was a clear operational rationale for this approach.
- Project facilitation is likely to be most successfully delivered via a trusted partner who knows and understands the farming community – this model needs to manage risk, provide flexible opportunities and handle transaction costs of project. A farmer cooperative, many examples of which can be found via SAOS, is a good example of this. To increase trust, it's best to start small and coalesce around a specific issue and build upon that – the Leven Landscape Enterprise Networks (LENs) does this well. Landscape-scale project and clusters work due to spatial and social connectivity. Another example is Scotland's first wildlife cluster, the Strathmore Wildlife Cluster. where farmers benefit from discussions on how others manage land to work more for wildlife habitat creation. Other initiatives don't go by the "cluster" label, such as the Clyde Valley Wader Group facilitated by the RSPB, which came together to work for the protection of lapwings, curlew and oystercatchers in the Clyde catchment. Existing networks such as the Regenerative Farming Network may be an entry point for finding farmers in a region with similar interests.
- Farmers can be suspicious of involvement by agencies and even eNGOs. Data ownership is another concern, with concerns in the farming sector over loss of data ownership (whether that be to private or public sector). SAC Consulting was named several times as a trusted point of contact for farmers and crofters, however, their advice on nature markets and private capital for natural capital projects is currently limited.
- To help drive whole farm approaches there is a need for the farming sector to champion tree-planting on farms, as well as farmer-to-farmer collaboration. Scottish Forestry's authority and competence covers forestry only, therefore it will be vital that the agricultural sector is involved in developing proposals and solutions. The work of the Integrating Trees on Farms Network was highlighted in this context. More systematic evidence is needed of the economic benefits from having trees on farms. Building this evidence base might help to gain more backing and understanding from farmers and farming representatives.

4.3.4. Theme 4 – Innovative ways forward

A number of innovate new ideas emerged during the discussions, all of which could help to support the delivery of natural capital projects:

National coordinating bodies

A national coordinating organisation, such as SAOS owned by farm cooperatives across Scotland, could

be the most effective way to provide organised and streamlined advice, support, and funding for time-constrained land managers dealing with emerging nature markets. Initial development of a specialised cooperative may require some government support, such as funding or potential guarantees related to project funding or carbon prices. However, it is considered important that ownership and control of credit utilisation and distribution remain with the cooperative.

Pooled natural capital schemes

- Many stakeholders were supportive of an "umbrella Code" for trees or a "UK Farm Tree Code" which encompasses all existing carbon schemes, similar to the Wilder Carbon scheme, which supports different methodologies for different habitats. If carbon uplift from existing woodland could be integrated into such a scheme this would open market access to many more farmers. There is currently very little or no income being generated for maintained or enhanced carbon stocks from existing treescapes, although the challenges of this approach to demonstrate additionality would be a material consideration.
- SFC was established by SAOS over a decade ago to facilitate the transfer and allocation of carbon credits between sellers and buyers, adhering to ISO standard 14064. With carbon prices now more accurately reflecting the risks and value associated with carbon sequestration, the SFC model may be viable for a relaunch.
- A risk and reward model, where carbon from woodland creation is pooled across landholdings was considered by SF, but the volume and interest in managing such a group was not high enough at the time to justify further exploration. Pooling carbon across different land uses such as peatland, woodland and agroforestry, could be favourable to farmers but riskier from an assurance and liability perspective, as risk profiles vary between land uses, and different skills (e.g. for planning & validation) are required . This may make it more difficult to maintain the integrity of a project, due to working across different Codes with different requirements.
- Any group carbon scheme for farmers, such as the SFC proposal, needs to recognise the established voluntary carbon Code landscape in the UK and ideally work alongside existing actors and partners to develop this model.
- Some interviewees were doubtful that this pooled, centralised option would be favoured by the farmers, unless they can demonstrate that there are some significant savings and that there is an open book approach. Farmers in group discussions mentioned that the ability to stack or package ecosystem services could ensure projects are more cost effective and viable.

Alternative private funding streams

- In terms of green finance options, farmers are naturally drawn to grants, given experience of the AECS and Sustainable Farming Incentive system but many acknowledged that the outlook for central funding is uncertain, influenced by politics, and the existing annual funding focus is too short-sighted for long-term agricultural planning. Private finance was recognised as being able to fill this gap by offering long-term payments and flexibility in project design.
- The opportunity for nature markets to provide funding through carbon credits is one approach which could be complemented by facilitating some level of private funding (5-20%) through wider approaches in support of guaranteed enhanced agri-environment payments. Water improvement objectives and water catchments are a good starting point for this sort of approach. AECS forming a basis to allow top-up from other private sources if a certain scale is reached may be preferable, but the AECS budget would have to increase overall and move away from a competitive approach to facilitate more uptake in the first place.
- Forest Carbon are launching supply chain 'sponsorship' to help fund small scale 'whole farm' projects (woodland/hedgerows/agroforestry). Funding is on a per tree basis and is not linked to a

specific carbon claim but can still be attractive to companies looking to improve their Environmental, Social, and Governance goals. The challenge would not be getting landowners onboard or developing a contract that is acceptable to landowners but rather signing up retailers or members of the supply chain to develop projects of this type, since the benefit to them might be uncertain (no carbon credit) or short-term (i.e. the landowner sells their produce to another retailer).

- Transparency within the supply chain is key in both directions. Businesses may be more interested and can generate more trust if they sponsor a specific uplift within a landscape relevant to them, e.g. dairies paying for dairy farmland improvement (similar to what Leven LENs has achieved with Diageo and malting barley).

More efficient processes

- Crofters suggested that coordination of a land use change on common grazings could be driven by an "opt-in by default" function: too often projects are held up by an absent crofter, and this could easily be resolved by requiring them only to make contact when they actively chose to opt-out.
- There are many other working parts to the WCC: for instance, a project often gets support funding through a grant, which has a separate documentation and validation process than the WCC's. Moreover, grant schemes work differently in devolved nations. Other factors such as the time of entry into the project, individual interests of project individuals and cashflow may also present barriers outside of WCC influence. A digested entry form and central mapping system, e.g. an SF-hosted GIS platform for the WCC, could be a good starting point for multiple entities to track data and make changes. There is currently a CivTech project running which could address some of these issues, by creating a central server through which all information can be deposited and processed by project developers, scheme owners and VVBs.[21]
- The WCC can develop further to facilitate uptake and reduce costs, especially in respect of Monitoring, Reporting and Verification (MRV) requirements e.g. measurements for above-ground biomass like woodland, agroforestry and hedgerow. Government could invest more money towards existing carbon Codes (e.g. technological fixes like satellite scanning for MRV, providing necessary national data to quantify changes over time) and new ones (e.g. voluntary biodiversity standard) and ease communication channels involved in planning (e.g. local archaeologists).

4.4. Financial opportunities and challenges

4.4.1. Methodology

Building on the detailed project cashflow and financial viability analysis for Farm A, Farm B and Farm C, FE conducted additional analysis on all five farms aggregated to identify savings based on fixed certification costs. FE and SACL agreed that a group scheme of whole farm projects should be assessed in line with the existing WCC Group Scheme approach. Combining the certification across the three habitats at each

[21]IUCN 'CiVTech innovators leading drive for advances within Peatland and Woodland Carbon Codes' (2025) https://www.iucn-uk-peatlandprogramme.org/news/civtech-innovators-leading-drive-advances-within-peatland-and-woodland-carbon-codes [accessed on 02/04/2025]

farm was assumed to cost twice the amount than to certify a single habitat. The costs to then aggregate farms are based on a SACL group scheme of five to nine members. SACL advised on savings via project costs of registration, validation and verification administration, and as well as surveying costs. The analysis assumed all paperwork and certification requirements were achievable across all sites however, SACL have highlighted the complexity around operating in a whole farm group scheme. Please see Annex materials for further information on assumptions.

4.4.2. Analysis

Where all five individual whole farm projects are grouped, cost savings could be achieved for each individual farm. After group scheme aggregation of whole farm projects, certification costs make up 3% of average revenues (in comparison to 5% when on an individual whole farm basis) and a whole farm grouped approach can achieve a 42% saving (costs as a % of revenues vary subject to the number of farms in each scheme and the total carbon unit size; see Figure 27). Cost savings are driven by reduced validation and verification costs in SACL group schemes, while other administrative and survey costs remain the same on a per farm basis. Hedgerow certification costs fall by 66% through a group scheme and agroforestry certification costs fall by ~46%. This highlights the benefits of a) group scheme operations and b) habitat aggregation (i.e. whole farm approach), however, both of these habitats are still not financially viable – despite the group scheme savings – due to the cost and potential income profile modelled.

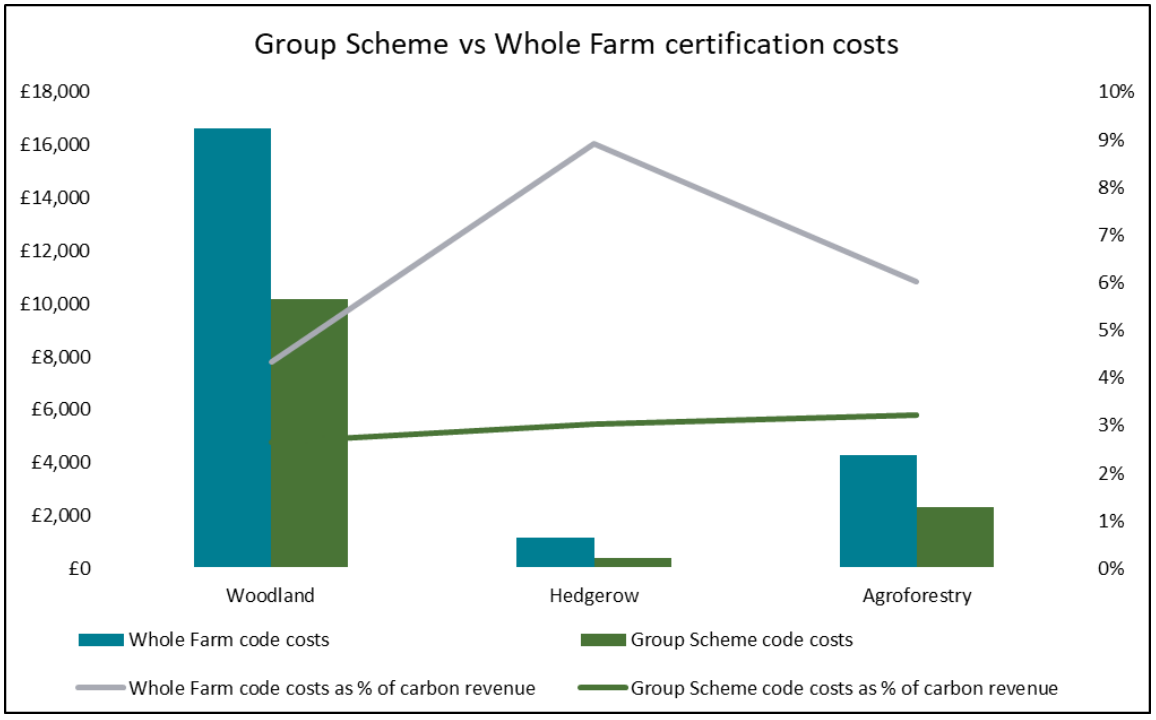


Figure 27: Costs savings from group scheme vs. individual farms' whole farm projects

In undertaking this analysis, FE noted that there are potential increased costs involved with coordination and auditing/ paperwork, as well as group expenses (e.g. group management fees) which may offset some of the cost savings. These additional costs were not incorporated into the modelling. The success of a group scheme is contingent on landowners/ farmers submitting documentation at the same time and is subject to practical constraints in terms of project development timings.

4.5. Validation and verification opportunities and challenges

In their current iterations, the PC and WCC are not broadly compatible for group validation and verification. This is due to differences in scheme approach to sampling as part of site visits. The PC requires that all projects within a group are included as part of on-site assessment. Alternatively, the WCC grouping mechanisms allows for site sampling. This discrepancy in approach would limit the practicability and affordability of grouping across the schemes. However, there is scope to undertake aggregated group assessments for woodland, agroforestry and hedgerow carbon. The assessment of these interventions collectively would be accommodated by the existing WCC group mechanism. Consideration should be given to whether carbon pooling between sites would create an issue for project developers or whether individual projects within the group are able to maintain the independence of carbon generated by the interventions specific to their site.

5. Integration with and support for other FIRNS projects

5.1. Community Benefits

5.1.1. Best Practice for Community Engagement

We tested the concept of engaging the community in the project design process with the five core farmers and crofter ("land manager" in this chapter). They highlighted that community can be place-based or interest-based e.g. neighbours, or like-minded people within a certain radius but not necessarily next door to each other. There was however some concern raised over conflicting interests between different community groups, for example the potential increase in birds of prey from new woodlands may be viewed as an asset by local ornithologists but a worry to local farmers with vulnerable livestock. Overall, there was a good level of awareness and appreciation of how a land manager might make space for the voice of the community in their respective locations.

Some land managers have already actively engaged with the community in previous projects, such as hiring local fencing contractors and inviting a local school group to help plant trees, recognizing that it strengthens local connections and the local economy. Another land manager observed that there are more walkers on their land since the latest trees were planted. Some of the proposed woodland plans are along popular long distance walking routes, so there may be an educational resource opportunity to provide for people here, for example through information boards.

Two land managers mention there has been commercial interest from nearby, as well as further afield, to do educational farm walks across the land or corporate volunteering days, which could act as improved networking for the land manager within and for the local community. Some of the land managers mentioned they would like their future woodlands to be walkable, acting as a place for people to find "green medicine" to improve mental health, as well as working with charities to engage young offenders. This would require that the community is included in the woodland design process, to ensure the users can have a say in how they would like to be included.

5.1.2. Community Benefits Route Map

In addition to being separately interviewed for input in October 2024, on 17th December 2024 project partners within the WT team and one partner from the SA participated in a workshop to discuss the draft version of a Community Benefits Route Map, developed and hosted by Aigas Associates and Scottish Land Commission. After an introduction on how the Route Map would ideally be used by project (land)owner, initiators or developers (collectively referred to as "project managers" in this section), the WT and SA chose to explore Route map option 1 in more detail. Various points were discussed which might affect the level of community engagement and assurance of community benefits from natural capital (whole farm) projects, including:

- Project visibility: The location of the project (whether it is on a B-road, out of site or next to a village) should have some influence over the degree of community engagement and benefits. It is also a parameter for defining who the community is i.e. who to include in the engagement process.
- Defining the spokespeople: It is important to establish a principal person who is responsible for engaging with the community from the project manager side, either the project owner themselves or the project developer on behalf of the owner, or perhaps even a different, trusted entity entirely. This should be decided based on the existing relationship with the community (once defined) as this eases communication between both parties. It is also helpful to identify a principal spokesperson from the community, who can coordinate various groups' interests and understands the local area well.

- List of possible community benefits: This can present a helpful, non-exhaustive guide for discussion between project managers and the community, to discuss the different kinds of impact the project could or aims to have on the local community.
- Written agreement is crucial for both sides: Three types of agreements may come out of discussions between project managers and the community, which may be used in conjunction with one another. For example, direct benefits should be included in a Community Benefit Agreement, e.g. a new building for the community to use, while indirect community benefits, e.g. locally reduced price for woodfuel, should be included in a Memorandum of Understanding.
- Satisfying the community in relation to project size: What may be good for the community may not necessarily be liked e.g. timber from productive, densely planted woodland, where the community may value an accessible woodland trail. However, there may be concerns from smaller projects who don't have the capacity to make such compensations for the community. Another concern is the amount of work involved from a project developer, who may be responsible for facilitating the engagement process and dealing with conflicts, tasks which are sometimes not within their expertise or remit. Ensuring benefits to the project owner without negative effect on the community seems most relevant in such cases.
- Generosity is not equal to benefit: If the community has no need for something although it is being offered in abundance, it cannot be beneficial. This is why, in tandem with the points above, there needs to be a two-way discussion and the reason the Route Map should be adaptive rather than prescriptive and the Community Benefit 'plug-in' remains voluntary.

There is still uncertainty and concern about the workload and administration involved in including community engagement in an already complex web of project design, involving various grant applications or other documentation for schemes. It is also uncertain what uplift the basic, enhanced level 1 or enhanced level 2 community benefit certification will have on the price of the nature unit. It is possible that once there is more clarity about how the voluntary add-on will affect the unit price of peatland or woodland carbon, project managers may be more willing to engage with the CBS.

The Route Map is to be published on the Scottish Land Commission website in conjunction with the close of FIRNS Round 2 project timeframes (April 2025). As a result of this bilateral FIRNS projects' partnership, Farm A will be included as a case study in the Routemap, as an example of best practice for community engagement and benefits from a private landowner perspective. This is an important addition, since (at the time of writing) it will be the only private landowner case study and will serve as an important reference for other private landowners, big or small, who are interested in providing community benefits and how it might work in the context of a working farm.

5.2. Biodiversity Crediting

During the timeline of this whole farm carbon project, a separate FIRNS funded project led by the IUCN and Scottish Forestry attempted to develop parallel biodiversity crediting methodologies for use as part of the PC and the WCC. Consideration was given to whether these methodologies might usefully be applied to the test farms in this project. However, after an initial meeting with the Biodiversity Crediting project lead from the IUCN on 11th July 2024, we both concluded that the methodologies for biodiversity credits in development would not be usable in practise to test with the five farms in our project. In Summer 2024, the Biodiversity Crediting project had opted to trial a novel approach to measure biodiversity uplift from WCC and PC projects, using the Operation Wallacea method. Since the Biodiversity Crediting team had already selected and partnered with larger landholdings for their project, there was little capacity to add an additional farm from our project to their study. Additionally, the method was still in a trial phase, and a draft protocol for measuring biodiversity credits was not produced from their project until early

2025, at which point our own data collection had finished. Notwithstanding these disparities in timelines, the costs incurred from surveying a farm against Operation Wallacea methods for biodiversity quantification were considered very high, and neither project had the budget to accommodate for this. Once the IUCN and Scottish Forestry have finalised their project, it may be useful to trial the feasibility of these methodologies on individual small or medium size farms applying a whole farm natural capital approach.

Nonetheless, some biodiversity metrics were collected using the SAE platform. While these measurements are limited, they provide a basic baseline, including indicators on bird species, flora, habitat types as well as hedgerow condition, collected at parcel-level. Although not officially linked to existing Codes, this data may provide some evidence of biodiversity uplift related to bundled carbon units, if measured in future, in relation to the reference scenario.

6. Key project conclusions

The results of all the individual activities of the project have been considered collectively and the project conclusions[22] for delivery are presented under three main themes:

1. Whole farm aggregation to scale natural capital projects
2. Whole farm group aggregation to scale natural capital projects
3. Nature market framework improvements to support small scale projects

The options for discussion to address the conclusions are then outlined.

A draft of these final conclusions and options were presented to the stakeholders that attended the project conclusions meeting in Edinburgh on 5 March 2025. There were 27 participants at this meeting including farmers from our core farms as well as project partners, and the inputs were used to finalise the project conclusions, options, recommendations and next steps outlined in this report.

6.1. Whole farm aggregation to scale natural capital projects

Conclusion 1: Whole farm natural capital project development can deliver benefits for farming and the delivery of government policy.

A whole farm approach, including baselining for specific metrics, can support holistic natural capital project development by considering future opportunities and risks for the farming enterprise. This includes environmental and social impacts, as well as potential financial or economic effects of planned changes. In summary, this means:

- Fewer farm-level trade-offs
- Holistic projects can deliver nature, climate, water and community benefits
- Projects can be better aligned and integrated with the interests of farming enterprise(s)

Conclusion 2: Whole farm natural capital projects can deliver cost savings through aggregation

- Adopting a whole farm habitat aggregation approach for validation and verification can reduce costs by a third compared to single habitat validation and verification and savings are even greater in a grouped scheme. However, this requires all habitats to be assessed at the same time.
- Efficiencies are most evident when there are clear common criteria across Codes which enable a single means of validation and is best achieved through the aggregation of key documents. This provides benefits to project developers and VVBs, through reduced administration and review of documents, reduced margin of error in data between documents (a common cause of validation delays), whilst also providing greater consolidation and visibility of whole farm project impacts.
- Although it is widely agreed that a single Code which covered a range of different natural capital habitat types and ecosystem service uplifts would support an aggregated whole farm approach, it is unclear which entity has the resources or mandate to develop and govern such a Code.

[22] These conclusions are applicable to all small and medium size farms including crofts.

Conclusion 3: For whole farm projects, WCC eligible components including eligible agroforestry typically provide >90% of the carbon units, with ineligible agroforestry and hedgerows providing <10%. Therefore, carbon income opportunities alone are unlikely to encourage a whole farm approach at an individual farm level.

- In reality, many agroforestry systems are already eligible under the WCC (e.g. shelterbelts, buffer strips, in-field planting up to five metre spacing) and this could be better communicated to farmers and practitioners.
- A mixed approach to public and private payments could incentivise the delivery of whole farm natural capital projects. To support the adoption of a whole farm approach, the government could provide guaranteed public payments for habitats (such as low-density agroforestry and hedgerows) that are not currently eligible under existing codes (such as WCC or PC) or do not have ecosystem services that can be monetised. These guaranteed public payments (to replace competitive schemes like AECS) could be leveraged by requirements to secure private investment in habitats eligible for WCC / PC.

Conclusion 4: At the scale of small and medium size farms, the opportunities to develop both peatland and woodland related carbon projects are rare. Therefore, there is no strong efficiency reason or cost-benefit for integrating such projects at this scale.

- In the scoping for this project, no opportunities were identified on small and medium size farms for peatland projects in combination with woodland projects.
- WCC and PC in their current iterations only offer marginal benefits for a whole farm and group/ cluster farm model due to the requirement of the PC to visit all sites within the group, whilst the WCC accommodates sampling of group/ cluster sites). Therefore, there would be limited potential for savings through grouping woodland and peatland schemes.

6.2. Whole farm group aggregation to scale natural capital projects

Conclusion 5: Aggregating farms has the potential to achieve natural capital financial benefits.

- The aggregation of whole farm projects in a Group Scheme Whole Farm approach provides additional validation and verification cost savings. Costs for the five core farms group could decrease by 42% on average when aggregated. This would best be facilitated by a single Code that covers a range of different natural capital habitat types and ecosystem service uplifts, and supports larger group schemes, enabling sampling requirements to be adopted by VVBs i.e. akin to the Forest Certification group mechanism developed by the Forest Stewardship Council.[23].
- Although untested, there may be a market opportunity in line with the trend for 'charismatic carbon', for a branded 'carbon unit' that is explicitly linked to the benefits of whole farm regenerative transition and food production (may appeal to food production corporate clients).

Conclusion 6: Local delivery partnerships can be highly effective in mobilizing delivery of natural capital projects, through centralized capacity, capability and facilitation.

[23] Forest Stewardship Council 'Forest management groups' (2020) https://uk.fsc.org/sites/default/files/2022-01/FSC-STD-30-005V2-0%20FM%20Groups%20Standard%20%281%29.pdf [accessed on 26/03/2025]

- There are many existing farming-focused groups, clusters and networks operating in Scotland, delivering natural capital improvements on farms. These mechanisms all operate differently but can be collectively characterized as local delivery partnerships.
- One of the key roles of LDPs for natural capital development is to support delivery through centralized and coordinated capacity and delivery. The role that some LDPs fulfil in connecting farmers can be important but is not always critical to delivery.

Conclusion 7: There is no clear link between different governance mechanisms for LDPs and delivery effectiveness. However, all LDPs are inconsistently supported for the core role of capacity, capability and facilitation.

- LDPs in Scotland operate along a spectrum of governance formality, from informal networks to registered and constituted organizations.
- Despite the ability to mobilise delivery, LDPs find it difficult to attract core funding, with the constant need to 'offer something new' rather than concentrating on core delivery.

Conclusion 8: Reviving previous initiatives to develop a cooperative model for aggregating farm level carbon projects should be supported.

- The work by SAOS to develop a cooperative model for managing multiple small scale carbon projects as a 'single entity' with a 'mutual fund' is worth updating in the context of 2025 to assess current viability and to reflect use of existing Codes, rather than adopting a standard setting role.

6.3. Nature market framework improvements to support small scale projects

Conclusion 9: Voluntary demand for carbon credits from corporates is currently insufficient and uncoordinated to drive supply side delivery from small scale projects.

- Most stakeholders experience challenges in accessing private investment for natural capital projects. Due to credibility challenges in the global carbon markets, there has been a contraction in demand over the last few years.
- In Scotland, natural capital markets operate on a voluntary basis, leading to fluctuations in demand based on market sentiment. This makes it challenging for small scale projects to access the market when demand is limited.
- In general, activity levels across nature markets are currently much greater on the supply side than the demand side in Scotland and the wider UK. This is also reflected globally, as recent years have seen reduced demand for carbon credits. This is clearly evidenced by the State of the Voluntary Carbon Market reports.[24]

Conclusion 10: As a result of low demand, the current carbon price is currently too low to support the high transaction costs to ensure high-integrity supply for nature market investment from small scale

[24] Forest Trends' Ecosystem Marketplace 'State of the Voluntary Carbon Market' (2024), https://www.ecosystemmarketplace.com/publications/2024-state-of-the-voluntary-carbon-markets-sovcm/ [accessed on 26/03/2025]

projects.

- Most project developers confirmed that unless individual projects are close to >10 ha. They generally become unviable for WCC registration due to the high transactional costs.
- Breakeven analysis on carbon unit pricing highlights significant variation in the breakeven prices across different projects and habitat types. The breakeven price is generally above the current market price for Pending Issuance Units for biodiverse woodland (£30) even when grants are available, limiting the financial viability of small-scale projects.
- The length of the project has a significant impact on the breakeven price due to the long-term inflation adjusted costs (i.e 50yr breakeven £52/ bundled unit vs 100yr £123 bundled unit).

Conclusion 11: New and additional high-integrity requirements can disproportionately impact small-scale projects.

- Although the WCC has a small project definition, Code owners could implement a specific risk-based framework to establish proportionate requirements for small and low impact projects for all current and future integrity requirements.
- The forests certification model of 'small and low intensity managed forests', (developed by the Forest Stewardship Council) may offer a blueprint for a more proportionate set of requirements for small projects but would work best within the framework of a single Code that covered a range of different natural capital habitat types and ecosystem service uplifts as a whole farm approach.

Conclusion 12: Implementation of voluntary Codes is complex between the roles and responsibilities of project developers, Code owners and third-party validators & verifiers

- Although not the specific focus of this project, many stakeholders commented on the complexity of the current process requiring Code owner involvement/endorsement for individual projects, in addition to the role of the third-party VVBs. There are expectations from the 'buyer side' that Code owners will provide this project endorsement, however there may be opportunities for Code owners to step back from project approval. This would better mirror the voluntary forest certification model, whereby standard setters are not involved in the approval/endorsement of individual projects and instead focus on standard setting and promotion only.

6.4. Options to help scale delivery of natural capital on small and medium size farms

From our project conclusions, we were able to identify potential options or solutions which we have grouped into four themes. Those that potentially help implementation of whole farm natural capital projects, those that support the integrity of whole farm projects and those that support the delivery of these projects. The final theme are more systemic nature market options that would support small scale natural capital projects more generally. These options were reviewed by the project team, with inputs from the stakeholders that attended the project conclusions meeting on 5 March 2025, and then used to develop our project recommendations and next steps set out in section 7.

6.4.1. Implementing whole farm natural capital projects

a) Carbon Code owner responses

- Business as usual – no change to WCC except better communication of current WCC eligibility for many agroforestry systems.

- Expanded WCC incorporating the methodology developed under the NEIRF funded agroforestry Code feasibility project to include trees outside woodland, with lower planting densities than 400 stems/ha. Although this methodology is time consuming in its current format, this could broaden uptake from supply side as well as demand, as well as minimise project developer's risk (on behalf of buyers), through government-backed support of carbon from agroforestry
- Development of a 'UK Farm or Land Natural Capital Code', bringing together all the relevant methodologies and interventions into a single Code, adopting and liaising with PC and WCC in full and including a wider set of natural capital opportunities beyond just carbon (e.g. biodiversity and community benefits linked to habitat creation).

b) Project developer responses

- Farmers and project developers to either voluntarily adopt a whole farm approach or in response to a market or policy incentive (see c). The market incentive could be a 'branded carbon unit' under the WCC that is explicitly linked to the benefits of whole farm regenerative transition and food production, which may support insetting within a supply chain. Also non-supply chain corporate clients, whose priorities are less focussed on generating "hard" carbon units and opt for a "softer" environmental approach). An example from abroad which works in this light-touch way – selling 'nature certificates' – is the AgoraNatura online marketplace in Germany[25], but improving demand must complement mechanisms like these.
- Work with landowners to provide opportunities for farm-level emissions reduction based on a whole farm approach, as inventory reporting with no sales within or outside of the supply chain, could rely on improved carbon calculators that better reflect tree habitat sequestration, rather than formal carbon Codes.

c) Policy responses

- Scottish Government to incentivize whole farm natural capital project development through further development of optional Whole Farm Plan (WFP) requirements for accessing basic payments. Digital, anonymised baseline data from WFPs could feed into advice, as well as help to identify gaps and opportunities for location- and sector-specific habitat improvement. The outcomes of the plans could also be used to remove barriers to private investment or nature markets, by way of granting exemption or increased eligibility for rewards.
- In support of whole farm natural capital projects, government could offer a guarantee of public payments to support whole farm natural capital projects for non-WCC agroforestry elements and hedgerows, in return for some leverage of private investment for any WCC or PC eligible elements.

6.4.2. Managing the integrity of whole farm natural capital projects

a) Business as usual - direct responses to any Carbon Code owner developments

- VVBs align their offer to any carbon Code developments (see 6.4.1.a)

b) Carbon scheme/Project developer responses

- Carbon scheme managers/project developers (e.g. WT, Forest Carbon, UK Carbon Code of Conduct etc.) provide reputational and transparency safeguards outside of a third-party validated Code, to offer high-integrity whole farm carbon offers direct to the market. Forest Carbon is already trialling a type of 'sponsorship' model to enable more small projects, using their experience and track-record as a form of integrity and assurance, as it might attract customers who are

[25] https://agora-natura.de/en/

seeking to deliver 'softer' environmental benefits, outside of formal responsibilities and reporting.[26]

- Carbon scheme managers/project developers work directly with a VVB to seek ISO assurance for whole farm projects outside of Code requirements.. Projects can make use of Code methodological approaches to inform GHG assertions, but would not be formally registered, overseen by Code governance structures, or be listed on the registry. Instead, VVBs can issue validation/verification statements for GHG assertions against ISO regulations at whole farm level for all interventions. This would result in reduced costs and quicker validations without the need for scheme owner and registry reviews but is only likely to besuited to an insetting model within a supply chain, where producers are incentivised to develop new natural capital but there is no formal sale of a credit.
- Carbon scheme managers/project developers work directly with a VVB to operate a blended approach, whereby carbon units that can be validated and verified under the WCC are blended with the additional carbon units that are not eligible under any Codes currently but are assured through ISO requirements.

6.4.3. Scaling delivery of natural capital projects by local delivery partnerships (LDPs)

a) Local Delivery Partnership (LDPs) responses

- Support the updating of the business case for a cooperative mechanism to 'pool' and manage small scale carbon projects (Scottish Farm Carbon proposal).
- Individual LDPs to develop capacity to support delivery of a whole farm approach to natural capital project development.

b) Policy responses

- Support LDPs to deliver Scottish Government schemes through core funding to provide capacity & capability plus facilitation.
- Consider allocating budgets to LDPs – possibly in return for leverage commitments i.e. for X public £ there will be £Y of nature market investment.

6.4.4. Improving nature market frameworks to benefit small scale natural capital projects

a) Policy responses

- Government to focus more on demand side compliance measures to scale the market.
- FIRNS and other government-backed funding to target demand side projects.
- Better communication on reframing buyer expectations: results are not immediate but cost savings further into the future can be massive if investment made now.
- Provide a carbon guarantee scheme and activate a Scottish alternative to BNG, as in England.

b) Carbon Code owner responses

- Scheme owners to implement a specific risk-based framework to establish proportionate

[26] Forest Carbon 'Accelerating small woodland creation: our new sponsorship model' (2024) https://www.forestcarbon.co.uk/news/accelerating-small-woodland-creation-sponsorship [accessed on 02/04/2025]

requirements for small and low impact projects for all current and future integrity requirements.

- Scheme owners to revert to a standard setting role only, with implementation governed by third-party VVBs.

7. Appendix

7.1. List of social media posts and project communications

Full project partner team meetings (all online bar one)

10 June 2024

15 July 2024

5 September 2024

28 October 2024

16 December 2024

27 January 2025

27 February 2025

5 March 2025 (in-person, with wider stakeholders)

19 March 2025

In-person events attendance, representing FIRNS project

FIRNS Community of Practice meeting, May 2024

Royal Highland Show 2024, June 2024

GO Falkland 2024 conference, July 2024

Sampling visits to Farm D & Farm C, July 2024

Farm C & Farm A validation site visit, October 2024

Apple tree diameter measurements for Farm D, November 2024

Workshop with Aiga Associates and Scottish Land Commission, December 2024

Whole Farm Plan event at Farm C, January 2025

Farm B site visit, January 2025

Research visit to Brodoclea Woodland Farm, February 2025

FIRNS project conclusions meeting, March 2025

Tweets

https://x.com/SoilAssocScot/status/1797587964425277868

https://x.com/SoilAssocScot/status/1797587966602498406

LinkedIn posts

https://www.linkedin.com/posts/soilassociationscotland_discover-typeform-where-forms-fun-activity-7265319322766528512-sxCc?utm_source=share&utm_medium=member_desktop&rcm=ACoAABWwMfcBAg27bL8BFYbfnMuv6oJWKjoVei4

https://www.linkedin.com/posts/johanna-norris-187a38a1_a-whole-farm-approach-to-natural-capital-activity-7303351237565927424-GRNZ?utm_source=share&utm_medium=member_desktop&rcm=ACoAABWwMfcBAg27bL8BFYbfnMuv6oJWKjoVei4

News items on webpage

https://www.soilassociation.org/our-work-in-scotland/scotland-news/2024/may/27/firns-

funding-for-whole-farm-approach-to-natural-capital-development/

https://www.soilassociation.org/our-work-in-scotland/scotland-news/2024/july/22/what-is-green-finance-and-what-does-it-have-to-do-with-farming/

https://www.soilassociation.org/our-work-in-scotland/scotland-news/2025/february/25/woolly-pigs-in-the-woods/

New webpage on Soil Association Scotland site

https://www.soilassociation.org/our-work-in-scotland/scotland-farming-programmes/natural-capital-in-scotland/

What's On newsletters

https://us19.campaign-archive.com/?u=97286687a04b1c3a90568693d&id=ee17ba02bf

https://us19.campaign-archive.com/?u=97286687a04b1c3a90568693d&id=f19933b8aa

https://us19.campaign-archive.com/?u=97286687a04b1c3a90568693d&id=c1eac2bcb3

https://us19.campaign-archive.com/?u=97286687a04b1c3a90568693d&id=4f2399f0ff

'Nature Finance Pioneers' Basecamp

Various activities by SA, e.g. https://3.basecamp.com/4322753/buckets/17971079/messages/7941850942#__recording_8091759938

7.2. List of 1:1 discussion stakeholders from workstream 2

Geoff Coates – Strathmore Wildlife Cluster

Luke Comins and Chris Spray – Tweed Forum

Representatives from Scottish Government agricultural directorate

Eck Gordon – Forest Carbon

William Hawes – Moray Farm Cluster

Renee Kerkvliet-Hermans – IUCN UK Peatland Programme

Phil Knott – Nature Friendly Farming Network

David McCulloch - CarbonStore

Abi Mordin - Propagate

Katrin Prager – University of Aberdeen

Alex Robinson _ Zulu Ecosystems

Stuart Shaw - NatureScot

Pat Snowdon and Vicky West – Scottish Forestry

Fred Swift – West Loch Ness farm Cluster

Nick Swinburn – Woodland Trust

Bob Yuill - SOAS

7.3. List of Annex materials (separate documents)

Annex 1 – Combined Assessment – Farm B

Annex 2 – Combined Assessment – Farm C

Annex 3 – Combined Assessment – Farm A

Annex 4 – Template – Combined Risk Assessment

Annex 5 – Template – Combined Project Design Document

Annex 6 – Template – Aggregated monitoring sheet

Annex 7 – Financial Analysis – whole farm and whole farm group

Annex 8 – Discussion paper – Developing and Aggregation Model for Natural Capital Project Groups and Clusters in Scotland

Annex 9 – Survey Responses

Annex 10 – Project Conclusions Workshop - Slides

Soil Association

Spear House, 51 Victoria Street

Bristol BS1 6AD

T 0300 330 0100

Company registration no. 00409726

Registered charity no. 206862

Soil Association Scotland

20 Potterrow

Edinburgh

EH8 9BL

T 0131 370 8150

Registered charity no. SC039168

www.soilassociation.org