



Trial of the Natural Capital Protocol for land-based businesses

Overview Report for

Crown Estate Scotland

on behalf of a coalition
of organisations*

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1.0	20/02/2018	Draft Report	Paul Silcock Petrina Rowcroft Esther Kieboom Rosie Dunscombe Charlie Russ	Paul Silcock Petrina Rowcroft
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Cumulus Consultants Ltd
1 Gainsborough House, Campden Business Park
Battle Brook Drive
Chipping Campden
Gloucestershire GL55 6JX

Telephone: +44 (0)1386 277970
Email: info@cumulus-consultants.co.uk
Web: www.cumulus-consultants.co.uk

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1 Executive Summary

Aim and approach

1.1 The overall aim of the project was to explore the degree to which the Natural Capital Protocol (the Protocol) is applicable and useful to land-based businesses in Scotland.

Specific objectives were:

- To identify whether the Protocol is a practical and cost effective way of helping land-based businesses better understand their impacts and dependencies on the natural environment and apply this understanding in useful and practical ways.
- To identify clear and specific benefits associated with, for example, the profitability and long-term resilience, of three types of land-based businesses in Scotland from applying the Protocol.
- To promote the benefits associated with applying the Protocol and use these to encourage its uptake by land-based businesses across Scotland.
- To develop practical guidance to help land-based businesses apply the Protocol.
- To inform other work that will collect and make data available to enable widespread application of the Protocol by land-based businesses in Scotland.

1.2 The approach involved desk-based preparation, trialling the Protocol with three land-based businesses – a lowland mixed farm, an upland cattle and sheep farm, and an upland mixed estate – analysis and reporting.

1.3 This overview report forms one deliverable of the project, alongside three business reports (each including a case study), a summary guide for land managers and advisors, and a presentation.

Key findings/conclusions

1.4 The Protocol can be applied to land-based businesses

The trial demonstrated that the Protocol can be applied to land-based businesses although there were challenges experienced in terms of integrating the business overview and generic assessment, gauging the most useful impacts to assess, and obtaining data. It was easier to apply the Protocol at the farm-scale than the estate level, and easier to apply it to a specific project or activity than more broadly.

1.5 The Protocol is useful for land-based businesses.

The Protocol was particularly useful in *improving understanding* of natural capital assets and ecosystem services, business dependencies and impacts and broader benefits to society. It was also helpful in understanding inter-dependencies between enterprises at the estate level. Linked to this, being able to articulate what the farm/estate's wider benefits are (and quantify and value them) will be enormously helpful for securing *future public payments and revenue streams*.

Other benefits should include more *informed decision-making, enhanced economic and environmental performance, greater resilience* and a better understanding of *risks and opportunities* relating to natural capital. The businesses involved with the trial were progressive in relation to the natural environment and natural resources.

Farms and estates which are less progressive in this way could potentially benefit more.

1.6 **Potential costs of the process and resources involved.**

The trial has, unsurprisingly, consumed more time than it would do in the event that the process was repeated. Looking ahead, it is anticipated that the process would involve around 3.5-4.5 days per business from a consultant (say, £2-3,000) and 2-2.5 days (say, £500-1,000) for the farmer. More resources would be required for larger, more complex estates, and/or undertaking additional baseline work such as soil analysis or a biodiversity survey. This assumes a similar scope and access to a streamlined process, generic templates and training for advisors. Repeat applications on the same farm / estate would require less time as the natural capital asset register will already be in place and may only need updating.

1.7 **Roll-out of the Protocol**

The findings and experience from the trial would suggest that **the Protocol does have potential to be of real benefit to farms and estates across Scotland** given the points outlined above. We would suggest two functions/applications for the Protocol which would help land-based businesses:

1. **Assessing change over time and informing actions.** A natural capital asset register would record current extent and condition and assess change over time. An assessment of business impacts and dependencies would highlight key business impacts. Both would inform action and provide the context for landlord and tenant collaboration and future public payments.
2. **Informing decisions on significant projects or land use change.** Using the Protocol would provide a more rounded appraisal of impacts associated with bigger projects or land use change to inform decisions / investments, taking account of the wider environmental and societal cost and benefits in addition to financial aspects of an investment. It would also enable different options or scenarios to be tested.

In these ways, the Protocol would help influence thinking, stimulate changes on the ground and enhance outcomes.

Recommendations

1.8 A number of recommendations are made for consideration:

1. **Progress the specific actions outlined in the business reports**

The actions outlined for Glenlivet Estate have broader applicability in relation to internal data and reporting, working with partners and stakeholders, and funding and investment.

2. **Introduce a series of natural capital metrics**

Metrics are suggested for the extent and condition of natural capital assets, linking to the natural capital asset register. Extent metrics relate to habitat area whereas condition metrics focus on soil health and biodiversity, which we believe are probably the two main attributes affecting many of the ecosystem services flowing from farm/estate assets.

3. Roll out the Protocol on the basis of two key functions/applications

As noted above, the two key functions/applications proposed are: assessing change over time and informing actions; and informing decisions on significant projects or land use change. A roll-out of the Protocol along these lines could involve the development of a number of resources including templates, guidance, case studies and a tool to streamline the process. Part of the roll-out should include consideration of the most relevant datasets and their accessibility for land managers and advisers. Key stages for the roll-out would include: trial dissemination and liaison; a pilot scheme to test the Protocol at area level; and national roll-out.

4. Communicate the benefits

Communicating the concept and value of natural capital and the Protocol with land managers should aim to improve understanding and awareness and convey the commercial benefits as well as the environmental/societal benefits. It should make the connection to existing schemes and initiatives and future policy. It should also signpost templates, guidance, case studies and tools.

Implications for policy

- 1.9 The vision for Scottish agriculture is a greener, innovative and profitable agriculture industry¹. Future agricultural policy and schemes post-Brexit – while uncertain – are likely to include a strong focus on public payments for public goods and integrate a natural capital approach. They are also likely to encourage improving the long-term productivity of farmland through sustainable management of soils, water and pollinators, enhanced resource efficiency and greater resilience to shocks and challenges.
- 1.10 Scotland's second Land Use Strategy² recognises the need for practical action by land-based businesses to help realise the vision for Scottish agriculture outlined above. It promotes the use of an 'ecosystems approach' to managing natural capital. Such an approach considers natural systems, takes account of the services that ecosystems provide and involves both those who benefit from ecosystem services and those who manage them in decisions that affect them.
- 1.11 By providing a framework within which land managers can record and, depending on the scope of the assessment, measure and value, their impacts and dependencies on natural capital and ecosystem services, the application of the Protocol may help land-based businesses to operationalise this approach. It has the potential to contribute to the vision for Scottish agriculture by:
- Driving more profitable and sustainable business and land management
 - Informing investment decisions and, where required, planning and other assessments.

¹ The Scottish Government (2015) The Future of Scottish Agriculture: A Discussion Document [online] available at <http://www.gov.scot/Resource/0047/00479616.pdf> (last accessed 20/02/2018)

² The Scottish Government (2016) Getting the best from our land: A Land Use Strategy for Scotland 2016-2021 [online] available at <http://www.gov.scot/Resource/0049/00497086.pdf> (last accessed 20/02/2018)

- Encouraging future agri-environment scheme participation and informing option selection
 - Working alongside and integrating the use of existing tools, calculators and advice
 - Influencing and enhancing existing standards across the supply chain
- 1.12 Monitoring changes in the extent and condition of natural capital at the farm or estate-level may also complement, or even contribute to, the Scotland-wide Natural Capital Asset Index, if the Protocol is widely implemented across the country.
- 1.13 Consideration should also be given to the management of natural capital as an integral part of Landlord and Tenant relations. There may be opportunities to better reflect this in Records of Condition and waygoing. Having regard to the Tenant Farming Commissioner's recently published Code of Practice for the Maintenance of the Condition of Tenanted Agricultural Holdings, the management of natural capital might benefit from similar joint-industry guidance on best practice.

2 Introduction

Context

- 2.1 Farming and other land-based businesses face significant changes following the decision to leave the European Union. There will be a new agricultural policy framework and schemes post-Brexit and future spend on farming and land management will need to be justified and deliver better value for money. Increasing emphasis is being put on “public money for public goods” and the provision of natural capital and ecosystem services by farmers and land managers. This anticipated direction of travel has been accelerated by Brexit.
- 2.2 Alongside refining existing mechanisms (such as agri-environment schemes), now is a good time to consider the potential of other approaches to help land-based businesses improve their environmental (and economic) performance.
- 2.3 One such approach is natural capital assessment using the framework set out in the Natural Capital Protocol (the Protocol)³. Developed by the Natural Capital Coalition⁴ in 2016, the Protocol aims to support better decisions by focusing on how businesses interact with nature. It seeks to help businesses measure, value and integrate natural capital (see Box 1) into business processes by providing a standard framework through which businesses can structure their thinking about natural capital.

Box 1: Natural capital

Natural capital can be defined as the stock of renewable and non-renewable natural resources (e.g. plants, animals, air, water, soils, minerals) which combine to yield a flow of benefits to people [and businesses].

Natural capital is a broad term that includes many different components of the living and non-living natural environment, as well as the processes and functions that link these components and sustain life.

Natural Capital Coalition, 2016



- 2.4 The Natural Capital Coalition has provided some guidance as to how the Protocol can be applied to different sectors, including the Food and Beverage Sector Guide⁵, Apparel Sector Guide⁶ and draft Forest Products Sector Guide⁷. However to date, there have been few publicised applications of the Protocol to agricultural businesses.
- 2.5 There is a real need to test and apply the Protocol in more detail, in a UK context, and demonstrate the process and the benefits for farmers and land managers. It needs, amongst other things, to be put into the context of existing land-based schemes and initiatives and developments in natural capital accounting.

³ http://naturalcapitalcoalition.org/wp-content/uploads/2016/07/Framework_Book_2016-07-01-2.pdf

⁴ <http://naturalcapitalcoalition.org/>

⁵ http://naturalcapitalcoalition.org/wp-content/uploads/2016/07/NCC_FoodAndBeverage_WEB_2016-07-12.pdf

⁶ <http://naturalcapitalcoalition.org/protocol/sector-guides/apparel/>

⁷ <https://naturalcapitalcoalition.org/projects/forest-products-sector-guide/>

2.6 There is a particular opportunity and value in taking forward such a project in Scotland given that:

- Farming, forestry and land management are particularly important to the country's economy
- Farms and estates in Scotland are rich in natural capital assets and deliver a wide range of valuable ecosystem services.
- Scottish farm businesses are, on average, more dependent on public payments than those in other UK countries⁸ and are therefore particularly vulnerable to changes in support.
- The Scottish Government and its partners (including those collaborating in this project) have been particularly active in taking a strategic approach to land use and management and applying the natural capital concept⁹.

Project aim and objectives

2.7 The overall aim of the project was to explore the degree to which the Natural Capital Protocol is applicable and useful to land-based businesses in Scotland.

2.8 Specific objectives were:

- To identify whether the Protocol is a practical and cost effective way of helping land-based businesses better understand their impacts and dependencies on the natural environment and apply this understanding in useful and practical ways.
- To identify clear and specific benefits associated with, for example, the profitability and long-term resilience, of three types of land-based businesses in Scotland from applying the Protocol.
- To promote the benefits associated with applying the Protocol and use these to encourage its uptake by land-based businesses across Scotland.
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Project scope

2.9 The project focused on trialling the Protocol with three land-based businesses – a lowland farm, an upland farm and an upland estate (see Chapter 3 for details).

2.10 With each business, the scope of the assessment was limited to the farm/estate boundaries only. It excluded natural capital impacts and dependencies up and down the supply chain, although account was taken of risks and opportunities beyond the 'farm gate' where relevant.

⁸ Cumulus Consultants (2017) Mapping the potential impacts of Brexit on farmers and farmland wildlife in the UK. Report for the RSPB.

⁹ For example, Crown Estate Scotland's Corporate Plan 2017-2020

Project approach

2.11 The project approach included the following tasks:

- Inception meeting to agree the aim, context and scope of the trial and the proposed approach.
- Preparation including desk-based review of evidence, initial application of the Protocol to land-based businesses, design and production of materials and collation of resources (including public datasets).
- Implementation including engagement with the three businesses selected, a series of three meetings taking each business through the Protocol, together with a review of farm/estate documents and data, analysis and assessment.
- Analysis and synthesis of results.
- Reporting and presentation.

Project outputs

2.12 The project outputs were as follows:

- Overview report (this report).
- Three land-based business reports – natural capital assessments – together with case studies, supporting frameworks and maps.
- Summary guide for land-based businesses and their advisors/agents wishing to use the Protocol.
- Presentation for land managers and their advisors/agents.

Structure of the report

2.13 The remainder of this report is split into three parts:

- Chapter 3 introduces the businesses involved and outlines the way in which the Protocol was applied.
- Chapter 4 summarises the findings from the business reports and captures the feedback from the businesses and ourselves as the consultants.
- Chapter 5 sets out the conclusions and recommendations for consideration and implications for policy.

3 Businesses involved and Protocol application

Businesses involved

3.1 A summary of the three businesses and enterprises included in the trial is set out in Table 3-1. The businesses were selected to illustrate a range of farm/estate types and enterprises. Glenlivet Estate includes both in-hand and let enterprises.

Table 3-1: Businesses and enterprises

Business (location)	Farm/estate type	Area (ha)	Enterprises
Den Farm (Fochabers Estate, Moray)	Lowland mixed farm	128	Crop production (spring barley, winter wheat) Livestock production (suckler cows and sheep)
Ruthven Farm (Glenlivet Estate, Moray)	Upland cattle and sheep farm	300	Livestock production (hill/upland sheep, suckler cows) Crop production (stubble turnips)
Glenlivet Estate (Moray)	Upland mixed estate	23,350	Crop production Livestock production Whisky distilling Water bottling Forestry Tourism Shooting Fishing

Protocol application

3.2 The Protocol stages and steps – which formed the basis for the natural capital assessment and report for each business – together with details of how it was applied in practice, are outlined in Table 3-2.

3.3 The key outputs of the assessment are highlighted in bold in Table 3-2 and described in Table 3-3.

Table 3-2: Natural Capital Protocol – stages, steps, application and outputs


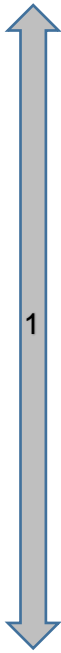
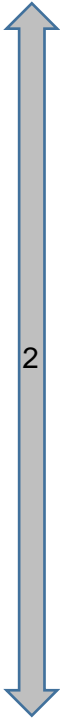
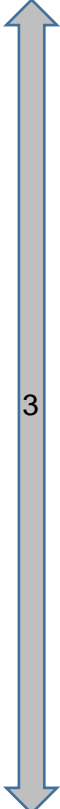



Stage	Step	Application / outputs	Meetings involved
 FRAME: Why?	1. Get started	Introduced natural capital (NC) as a concept, the protocol and the project/trial Gathered information on the business/enterprises, and became familiar with farm/estate.	  
 SCOPE: What?	2. Define the objective	Discussed/agreed objectives for the farm/estate and anticipated business benefits.	
	3. Scope the assessment	Agreed scope of the assessment including organisational focus (farm/estate enterprises and activities) and boundaries (farm/estate boundaries).	
	4. Determine the impacts and/or dependencies	Produced NC asset register and ecosystem services (ESS) delivered by assets, integrating relevant public data. Brainstormed/reviewed key/material impacts and dependencies of farm/estate.	
 MEASURE AND VALUE: How?	5. Measure impact drivers and/or dependencies	Used data gathered to complete qualitative assessment of dependencies and gross impacts of enterprises on NC and ESS using colour-coded scoring.	
	6. Measure changes in the state of natural capital	Produced similar assessment of impacts of enterprises on NC and ESS over time/tenancy period . Prepared dependency and impact pathway diagrams for key farm/estate activities.	
	7. Value impacts and/or dependencies	Produced a case study focused on specific project/intervention, including quantification of changes in NC and ESS, and valuation as far as possible with data available.	
 APPLY: What next?	8. Interpret and test the results	Identified risks and opportunities associated with farm/estate dependencies and impacts. Reviewed and refined NC assessment with farmer / estate staff.	
	9. Take action	Proposed actions for consideration of farmer /estate staff.	

Table 3-3: Natural capital assessment – description of key outputs

Output	Description
Natural capital asset register	Lists extent of assets (e.g. hectares of land) and condition, and identifies changes over time period (e.g. 2007-2017).
Assessment of dependencies of enterprises on NC and ESS	Scores the extent to which different enterprises are dependent (reliant) on NC and ESS.
Assessment of gross impacts of enterprises on NC and ESS	Scores the gross impacts (compared to a 'no management' situation) of different enterprises on NC and ESS.
Assessment of impacts of enterprises on NC and ESS over time/tenancy period	Scores the impacts of different enterprises on NC and ESS over a defined time period or tenancy period.
Dependency pathways	Illustrates how different enterprises depend on NC and ESS and how changes in these may impact positively or negatively on the business.
Impact pathways	Shows the 'logic chain' from business activity to impacts on NC and ESS and the costs and benefits associated with these impacts.
Case study	Demonstrates application of the Protocol to a specific project or intervention.
Risks and opportunities	Identifies business risks and opportunities related to NC and ESS dependencies and impacts.
Actions for consideration	Suggests actions for consideration to build on the assessment and realise benefits for the business.

4 Key findings

Business reports

- 4.1 The three business reports set out the full findings of the natural capital assessment for each business. Key or ‘headline’ findings are set out below.
- 4.2 A summary of the key natural capital asset trends on the farms over their tenancy periods, and the estate over the past ten years, is shown in Table 4-1; the trend is stable where not otherwise indicated. This shows a generally positive picture in terms of natural capital extent and condition, although deteriorating water quality is highlighted as an issue for Ruthven Farm (by definition this would also apply to at least part of Glenlivet Estate).

Table 4-1: Key natural capital asset trends

Business (tenancy/time period)	Key NC asset trends over tenancy/time period
Den Farm (2016-2017)	Increase in extent of temporary pasture; decrease in extent of arable land Improving condition of temporary pasture and arable land
Ruthven Farm (2006-2017)	Increase in extent of pasture, hedgerows, woodland and moorland; decrease in extent of arable land. Improving condition of pasture, hedgerows and arable land. Deteriorating condition of water.
Glenlivet Estate (2007-2017)	Increase in extent of broadleaved woodland. Improving condition of most assets (habitats), mixed picture with broadleaved woodland.

- 4.3 Both farms and the estate are highly dependent on the provisioning services of crop and livestock production, with other enterprises on the estate (e.g. shooting, whisky distilling and forestry) also dependent on wild foods, water supply and timber. The farm and estate enterprises are also dependent on a range of regulating services (climate, water quality, soil quality and erosion, disease and pest regulation) and cultural services (cultural heritage); other estate enterprises are dependent on wild species diversity, recreation and education.
- 4.4 Against a benchmark of the natural state of the land (‘gross impacts’), most farm and estate enterprises cause some negative ecosystem service impacts, particularly on regulating services such as climate, flood, water quality, soil quality and disease and pest regulation. This is to be expected, since the primary focus of most farm enterprises is, and always has been, food production (‘provisioning services’). The exception is forestry at Glenlivet Estate which has predominantly positive impacts.
- 4.5 By contrast, the impacts on natural capital and ecosystem services of farm/estate enterprises and activities over the tenancy periods /past ten years have been generally positive. The key impacts (those scored ‘high’ in Tables 8 and 9 of the assessments in the business reports) are shown in Table 4-2; these are all positive.

Table 4-2: Key impacts of farm/estate enterprises on natural capital and ecosystem services over tenancy/time period

Business (tenancy/time period)	Key impacts of farm/estate enterprises on NC/ESS over tenancy/time period
Den Farm (2016-2017)	Improved crop and livestock production Improved soil quality and erosion regulation
Ruthven Farm (2006-2017)	More/enhanced pasture and hedgerows Improved local climate, soil quality & erosion regulation Improved wild species diversity and education
Glenlivet Estate (2007-2017)	More/enhanced woodland and peatland habitats Improved climate, flood, water quality, soil quality & erosion regulation Improved wild species diversity, recreation and education

- 4.6 A range of risks and opportunities relating to the natural capital on the farms and estate were identified. They include risks and opportunities related to global/national drivers (e.g. climate change, and changes in schemes and trading arrangements associated with Brexit) through to site-specific issues (e.g. development of metrics for the estate/farm and the provision of a variety of 'public goods').
- 4.7 Similarly a range of actions were suggested for consideration including those relating to: internal data and reporting; working with partners and stakeholders; and funding and investment (see 5.18)
- 4.8 Three case studies have been produced as part of the business reports. These apply the Protocol to a variety of specific projects and activities:
- Improving soil (Den Farm)
 - Woodland planting /wetland restoration (Ruthven Farm)
 - Peatland restoration (Glenlivet Estate)

The case studies all show a positive cost-benefit ratio when taking into account market and non-market values. A variety of valuation approaches have been used, depending on the ecosystem services covered and availability of data.

Farmer and estate staff feedback

4.9 Farmer and estate staff feedback on the trial of the Protocol was obtained through a series of evaluation questions discussed during the third meetings with the businesses.

Understanding and awareness

4.10 All those involved said that they now had an improved understanding and awareness of natural capital and the linkage between their businesses and natural capital. One farmer said it widened his awareness of how his business affects other people/businesses. Another said that he now had a benchmark and record for what he's been doing that he didn't have before; this will be useful in telling the story of the farm and useful in terms of discussions / negotiations with the landowner, suppliers and customers. One member of the estate staff said:

"Yes. The tables, impacts and dependences made me think about the linkage between businesses and inter-dependencies. Also ways to save money."

4.11 The three businesses indicated however that the trial had not changed their 'mind-set' in terms of making future decisions. They were aware of the issues and were undertaking relevant actions already, on the whole. This was probably mainly due to the fact that businesses selected are already forward-thinking and/or nature-friendly.

"We are doing it, but we don't call it natural capital"

4.12 When asked whether any new risks or opportunities had been flagged up, the businesses did not really think so; this is likely to be linked to the business approach/thinking (outlined above) and/or current condition of the farm/estate. The assessment did however capture the risks and opportunities in a structured way and raised awareness of less familiar risks. The farmers also said:

"What we don't have is an understanding what we've got [i.e. an environmental audit]"

"Puts your mind-set on what you've got, where you need to go"

Process

4.13 The Protocol process made sense to the farmers and estate staff. Two businesses said that that the process was a bit opaque to begin with but much clearer at the end. This is likely to be a function of the evolving application of the Protocol to land-based businesses through the trial. A further factor was the size and complexity of the Estate and time required for all those involved to consider issues at a whole estate level, including both in-hand and let enterprises.

4.14 Challenges with the process identified by estate staff included finding relevant data for the estate (with some kept in-hand and other data held by the land agents, and more limited data available for let enterprises). The farmers had no real challenges with the process, but one commented that this might be different for older farmers.

4.15 Suggested improvements to the process included knowing what data was needed for the application of the Protocol at the outset and having this data centrally held. In relation to the first suggestion, the 'net was cast wide' at the start of the trial, not least to support familiarisation with the Estate. In future, data captured by the

questionnaire/process could be streamlined. A simple, applied process/flow diagram could also help to guide farms/estates so that they have a better understanding not only of what they're working towards ('the prize') but also what they're doing (and why) in order to get there. The farmers commented:

"Putting an example down in front of someone at the beginning – a case study such as this would be really helpful"

"Three meetings, face-to-face works. Can't do it over email".

Outputs

- 4.16 When asked whether the report/framework adequately captures the value added to natural capital assets by the farms and the estate, the respondents broadly agreed.
- 4.17 All three businesses felt that the business report, case study and framework were clear and useful. One farmer commented on the overlap between the report and the case study; this is fair enough given the farm size and focus of both the assessment and case study (soil quality).
- 4.18 The businesses generally felt that the outputs were good and the visuals including the tables, dependency/impact pathways and maps were helpful. Comments included:

"Reads well, made sense, not too long."

"... may be do a visual like a pie chart [in the Executive Summary] showing mostly green then a small red area showing the risk areas that need attention in the short term."

Outcomes (business)

- 4.19 There was a mixed response when businesses were asked whether they would do anything differently in light of the assessment. One estate staff member and one farmer said not really, with the other farmer saying yes, with security of tenure. Comments included:

"...not sure we would, already doing things e.g. creating diversity."

"Need certainty to move onto those two focus areas (woodland and river)."

- 4.20 It is worth noting that tenant farmers may not necessarily respond to opportunities unless they provide short to medium term returns. Any opportunities that would only realise benefits over the longer term (i.e. beyond the end of the tenancy) would not be attractive to /a priority for the tenant (woodland planting and peatland restoration would be prime examples).
- 4.21 All three businesses felt that the Protocol will help in terms of improving economic and environmental performance, and resilience. Two businesses said this would be mainly by helping with thinking going forward, and getting ready for new public policy/schemes which are likely to integrate natural capital / natural environment. The other business commented:

"Has increased my awareness and potential effects on the business. You are subconsciously heading that way anyway, but quantifies and formalises it."

- 4.22 The three businesses recognised that the Protocol dovetails with existing tools and schemes such as farm assurance schemes and agri-environment schemes. One farmer said that it would give him evidence to support future agri-environment scheme applications. There was not much enthusiasm, however, for linking the Protocol more directly to the schedules/formats/terminology used in Basic Payment Scheme (BPS) submissions citing the need to retain flexibility and likely changes with schemes in the future.
- 4.23 The businesses generally felt that the Protocol had delivered the benefits identified at the beginning. One business had a desire for more information in relation to future public payments and another highlighted a need for a biodiversity/environmental audit. With additional resources, these aspects could be covered off, although the former is challenging given the uncertain nature of future policy and schemes presently.

Outcomes (wider application)

- 4.24 When asked whether they would recommend the Protocol to a friend, two businesses agreed that this would be valuable. The third was less sure.

“Yes, good process to go through, influences thinking...but they would need to know ‘what’s in it for me’ ... and how it links to changes in subsidies.”

“Certainly would to anyone on a limited duration tenancy, as it shows the work you’ve done on the ground and the value you’re leaving behind.”

“Not sure ...may be something a bit simpler that records the environmental features.”

- 4.25 On the wider application of the Protocol, one business was enthusiastic, another said ‘yes’ if the benefits/gains can be shown and it can be targeted, whilst the third suggested that an environmental audit might be better (linking to the third comment above).

Overall experience

- 4.26 When asked to rate the experience of the trial on a scale of 1-10 (1 = very poor; 10 = very good), the businesses ranged in their scores from 7.5 to 10. A good summary of one farmer’s experience, written up by one of the project team after the third meeting, is set out in Box 2 below.

Box 2: Summary of one farmer’s experience

“I had a very positive visit today – in essence he thinks the report is very useful to lay out and evidence all the work they have done since the start of the tenancy. It puts their ‘natural’ approach to farming in a formal framework and will help with communicating the investment in and benefits provided by the land to Crown Estate Scotland as well as any future tenancy and grant applications. It also highlights areas of risk and opportunity that they were aware of, but hadn’t necessarily focussed on to date. Key to them taking action on these areas is certainty over their tenancy going forward, as they are coming towards the end of their tenancy term (~3 years left) they will need security of tenure going forward before investing in big projects such as the degrading woodland and river erosion issues.”

Rosie Dunscombe, AECOM

Consultants' feedback

- 4.27 Feedback from the consultancy team involved with delivering the trial of the Protocol was obtained through an internal discussion building on thoughts and notes captured over the period of the project.

Process and outputs

- 4.28 The importance of the scoping stage of the assessment should not be overlooked. It is critical to define, at the outset, the specific objectives of the assessment (i.e. what questions does the land manager / farmer want to answer or what types of decisions is he/she seeking to inform?). Having clearly defined objectives will then make it easier to determine the appropriate spatial and temporal scope of the assessment.
- 4.29 As an observation, the Protocol was developed for organisations with industrial processes to understand the impact that they have on natural capital, whether locally or far away, in their upstream and/or downstream supply chain. However the scope of the trial was limited to the 'farm gate' (i.e. physical boundary of the farm or estate) (Step 03 of the Protocol). It did not look at the consumption of raw materials in the 'upstream supply chain', such as fertiliser and energy inputs and the impact they these have on natural capital elsewhere. Nor did it look at any impacts of the downstream supply chain (e.g. meat processing), such as consumption, pollution and waste. Additionally the trial did not get into the level of detail of farm/estate carbon footprint calculations or water use analysis. This would have required additional resources or resulted in a restriction on the analysis which was undertaken. At Den Farm, a carbon footprint assessment will in any case, shortly be undertaken by QMS (Quality Meat Scotland Assurance Scheme).
- 4.30 Applying the Protocol to land-based businesses necessitated a business overview and a generic assessment of the farm/estate's natural capital assets and ecosystem services provided. There was no obvious place for these elements within the Protocol stages and steps. In the end, the business overview was included in Step 03 and the natural capital asset register was included in Step 04.
- 4.31 The assessment was complicated by looking at both (a) the natural capital assets and *their* ecosystem services, and (b) the specific enterprises and *their* natural capital and ecosystem service dependencies and impacts. In future, a streamlined approach might include just the natural capital asset register – which farmers and estate staff like and understand – and then the enterprises' dependencies and impacts on the ecosystem services that flow from these natural capital assets. This would preclude the need for 'Table 3' from the assessments which was both general in content and challenging to compile.
- 4.32 The materiality assessment (included in Step 04) – which identifies where there are impacts / dependencies that are worth spending time measuring and valuing because they are significant or likely to be significant – broadly worked. However this was somewhat easier to apply on farm, given the smaller scale and narrower range of enterprises, than on the estate with its wide range of enterprises and impacts. It is also worth noting that, while the farm business may have certain material impacts (e.g. linked to crop and livestock enterprises), there are often third parties with rights over the holding (e.g. shooting) which would have additional material impacts. A

decision on 'narrow' or 'broad' scope is required; the latter is more helpful from a landlord's perspective.

- 4.33 The dependency/impact pathway diagrams were helpful, and were appreciated by the businesses. However there was a limit as to how many could be included in the report, especially for the Estate. Only a few were included to illustrate key (or different) dependencies and impacts.
- 4.34 It was quite difficult to measure the impact of a farm/estate on its natural capital assets and ecosystem services (included in Steps 05 to 07). The measurements we used are mainly on a relative scale, i.e. positive or negative, high/medium/low, rather than economic valuations. Sometimes the scoring was based on several counter-acting factors, e.g. a reduction in arable acreage reduces the amount of crop production, but the cropland might become more productive as a result of improving the soil quality. Had the scope of work included an environmental footprint, then it would have been relatively easy to quantify water use, energy use and carbon and value these.
- 4.35 The qualitative scoring of dependencies and impacts – outlined above – was based on imperfect data; it was undertaken using a combination of our own knowledge and experience, feedback from the farmer/estate staff and where relevant/available public data (see 4.44 below). The dependencies and impacts on regulatory services were particularly challenging to score. One specific point is that it is easy to assume that a cropping enterprise adds value to cropland, however over a period of time it is possible that the enterprise could be having a negative impact on the cropland asset.
- 4.36 In some instances – and for crops and livestock in particular – we found it difficult to distinguish between impacts and dependencies. If crops / livestock are considered an output / outcome of farming activity, then these would be 'impacts' but one could equally say that the farm enterprise itself is dependent on crop and livestock productivity. Given that crops and livestock would not be produced without farming activity, the logical approach is to see them as 'positive impacts' of farming activity while acknowledging that there could be adverse impacts on the habitat (so in effect we see a positive ecosystem service flow but potentially a deteriorating trend in habitat condition). This perhaps highlights the need to get the logic pathways clear from the outset: Enterprise → Activities (impact drivers) → impacts on habitat(s) / ecosystem(s) → impacts on ecosystem services → impacts on the business / wider society.
- 4.37 The guidance provided in the Protocol around impact pathways clearly has more industrial/supply chain focussed businesses in mind (as indicated in 4.29) and does not strictly work for land based businesses. In our work we found impact drivers were not necessarily inputs bought into the business - they are more likely to come directly from the land, or be activities undertaken by the land manager. However, that said, it is easy enough to take a practical approach to what should be considered impact drivers. This is shown in the three case studies.
- 4.38 The dependency and impact tables are likely to be fairly generic i.e. they would be 80% the same as a similar enterprise on other farms or estates, but 20% locally specific. This opens up the possibility of producing generic templates for common farm types and/or project/decision types, in future.

- 4.39 Using a benchmark of 'no management / natural state' - for assessing the 'gross impacts' of farm/estate enterprises – was not necessarily very useful. It rests on big assumptions about the type of habitat that the land would revert to, and it is a hypothetical exercise given that mankind has been modifying Scotland's ecology for millennia, and even our most valuable habitats are a product of particular land use decisions and historic farming practices. It is more instructive to refer back to a point in time as a baseline (see following point). This underlines the importance of establishing the baseline (extent and condition) and ongoing monitoring.
- 4.40 Two businesses – Glenlivet Estate and Ruthven Farm – wanted to understand the impacts of their work to date, over a 10 year period and the period of their tenancy respectively; this required additional analysis compared to assessing the 'gross impacts' only. There was limited benefit/value in trying to assess the impacts to date at Den Farm, given that the tenancy had only started in 2016.
- 4.41 The risks and opportunities identified included those likely to affect farms and estates across Scotland, as well as those specific to the farm/estate in question. It was easier to pull out more detailed, local risks and opportunities with the farms. The assessment of risks and opportunities for the estate was, by definition, more 'high level'.
- 4.42 The project-specific case studies worked well. It was easier to assess changes in natural capital and ecosystem services with specific interventions, than more broadly: there was more detail in relation to the activity and the impacts tended to be focused on a smaller number of natural capital assets and ecosystem services. That said, lack of baseline and other data meant that there was a limit to the type and extent of economic valuation that could be undertaken.

Data

- 4.43 There was a lack of readily available data on the natural capital assets and ecosystem services specifically relating to the farms and estate. For natural capital assets, this applied particularly to condition data, but also in the case of the Estate, extent data. Lack of baseline data also limited the assessment of changes over a time period. Data on ecosystem services and/or their impact drivers was not readily available.
- 4.44 Most data used came directly from the business concerned. In the case of the estate, this included data held by Crown Estate Scotland at the Estate Office and in Edinburgh, and by Savills in Fochabers. The dispersed nature of the data, combined with the scale/complexity of the estate, multiple people involved with different aspects of the estate's management and lack of data about certain let enterprises made data collation (and the assessment) challenging.
- 4.45 Relevant public datasets were scoped and data sourced where possible, see Appendix 1 (data was used from the datasets highlighted in green in the spreadsheet). This provided quantitative data which we extracted using GIS analysis and integrated to the assessment where possible. This public data contributed to the natural capital asset register (extent and condition), alongside data provided by the farm/estate. However public data did not add significantly to the assessment of enterprise dependencies and impacts.
- 4.46 Data which was available online *without* specialist GIS support would have been limited to mainly map data – as opposed to quantitative data – sourced principally via Scotland's environment web <https://www.environment.gov.scot/>.

5 Conclusions, recommendations and implications for policy

Conclusions

The Protocol can be applied to land-based businesses

- 5.1 The trial has demonstrated that it is possible to apply the Protocol to land-based businesses.
- 5.2 The process has, however, been challenging in a number of ways:
- Integrating the business overview and generic assessment. It was useful to provide a business overview and generic assessment of the natural capital assets and ecosystem services provided on the farm/estate to inform the subsequent analysis. However these elements did not fit naturally into the Protocol stages and steps.
 - Gauging which impacts to assess. Assessing the gross impacts of farming on natural capital and ecosystem services highlighted general issues to be aware of, but was not particularly helpful for individual businesses. Assessing the impact over a defined time period was more useful for a specific business/enterprise.
 - Impact or dependency? In some instances – and for crops and livestock in particular – it was difficult to distinguish between impacts and dependencies.
 - Obtaining the data. There was limited readily available data on natural capital condition in particular, and minimal data on ecosystem services. Collation of available data was time-consuming, particularly with the estate.
- 5.3 It was much easier to apply the Protocol at the farm-scale than at the estate level, particularly with an estate the size of Glenlivet. Aside from the issues already mentioned, assessments of habitat condition could easily mask wide variations across an estate.
- 5.4 Similarly, it was much easier to apply the Protocol to a specific project or activity, as set out in the case studies, than more broadly. The logic and Protocol stages and steps worked better for the case studies.
- 5.5 It is worth re-iterating that the Protocol is intended to be a flexible framework. The Natural Capital Coalition recognises that it cannot be rigidly applied to all circumstances and so expects it to be tailored to the nature / scale of the business and its application to be proportionate to the outcome at stake (i.e. the level of detail and extent to which quantification and valuation is undertaken depends on the significance of the decision(s) that the outcomes are intended to inform).

The Protocol is useful for land-based businesses

- 5.6 The Protocol's usefulness for land-based businesses can be assessed with reference to the business benefits anticipated at beginning of the trial.

Understanding of natural capital assets and ecosystem services

- 5.7 The trial has certainly helped the farmers and estate staff involved gain a better understanding and awareness of natural capital and ecosystem services, the dependencies and impacts of their business on natural capital and ecosystem

services, and the benefits (and dis-benefits) of their business and its activities to wider society. At an estate level, the process also improved understanding of the linkage between different enterprises and their inter-dependencies from a natural capital perspective.

Decision-making and environmental/economic performance and resilience

- 5.8 Based on the feedback received, the Protocol should result in more informed decision-making although this may not necessarily equate to new or different activities with the businesses involved. There is a range of factors that will influence future direction and investment, including market forces, government funding and, with a let farm, security of tenure. With farms or estates that are less environmentally friendly, the Protocol may have greater impact in terms of influencing activities.
- 5.9 Enhanced economic and environmental performance and greater resilience is likely to be supported by improved understanding and awareness. This will strengthen links across to existing agri-environment and assurance schemes, guide future thinking and actions, and help farms and estates get ready for a new policy and schemes and new trading arrangements post-Brexit.

Natural capital risks and opportunities

- 5.10 Natural capital risks and opportunities – global, national and local - have been structured, formalised and recorded. New risks and opportunities are likely to be flagged up with less environmentally friendly farms and estates. A natural capital perspective is likely to strengthen any existing SWOT¹⁰ analysis for a business

Future public payments and revenue streams

- 5.11 Improved understanding of natural capital and a structured assessment and baseline are likely to be really useful for farms and estates wishing to access public funds. Being able to articulate what the farm/estate's wider benefits are (and quantify and value them) would be enormously helpful for securing future public and private income streams.

Potential costs of the process and resources involved

- 5.12 The trial has, unsurprisingly, consumed more time than it would do in the event that the process was repeated. It tested different approaches and data collation and analysis was not as streamlined as it would be second time around.
- 5.13 Looking ahead, it is anticipated that the process would still involve advice/facilitation including two or ideally three visits. Assuming 3 visits at ½ day per visit, plus 2-3 days analysis and reporting, this would suggest around 3.5-4.5 days per business from a consultant (say, £2-3,000) and 2-2.5 days (say, £500-1,000) for the farmer. This assumes a similar scope and access to a streamlined process, generic templates and training for advisors. More time would be required for larger, more complex estates. Additional resource may also be required for soil analysis and a biodiversity survey to know what is there at the outset. Repeat applications on the same farm / estate would require less time as the natural capital asset register will already be in place and may only need updating.

¹⁰ Strengths, Weaknesses, Opportunities and Threats.

- 5.14 Informed farmers or estate managers could potentially undertake the assessment themselves, with guidance and access to resources, but it is anticipated that many would turn to advisors (as they do for BPS and agri-environment scheme applications).

Roll-out of the Protocol

- 5.15 Potential roll-out of the Protocol would depend on an assessment of need and demand. This – together with the results from this trial – would inform what was rolled out, how best to do it, and priorities for targeting.
- 5.16 Putting that to one side, the findings and experience from the trial would suggest that **the Protocol does have potential to be of real benefit to farms and estates across Scotland** given the points outlined above.
- 5.17 We would suggest two functions/applications for the Protocol to benefit land-based businesses:
1. **Assessing change over time and informing actions.** A natural capital asset register would record current extent and condition and assess change over time. An assessment of business impacts and dependencies would highlight key business impacts. Both would inform action and provide the context for landlord and tenant collaboration and future public payments.
 2. **Informing decisions on significant projects or land use change.** The Protocol process would provide a more rounded appraisal of impacts associated with bigger projects or interventions to inform decisions / investments taking account of the wider environmental and societal cost and benefits in addition to financial aspects of an investment. It would also enable different options or scenarios to be tested.

In these ways, the Protocol would help influence thinking, stimulate changes on the ground and enhance outcomes.

Recommendations

5.18 Drawing on the findings and conclusions, a number of recommendations are made for consideration:

1. Progress the specific actions outlined in the business reports

The Glenlivet Estate actions are summarised in Table 5-1 below as we believe that they have broader applicability.

Table 5-1: Actions for consideration

Internal data and reporting:

- Improve natural capital and ecosystem service data for the Estate
- Identify a few, key indicators/metrics to track natural capital
- Develop natural capital accounts for the Estate and integrate into reporting.

Working with partners and stakeholders:

- Raise awareness of natural capital and ecosystem services amongst tenants, communities and other stakeholders
- Incorporate natural capital into land use decisions
- Engage with partners/buyers to identify win-wins from integrating natural capital into production, supply chain and marketing.

Funding and investment:

- Identify priorities for natural capital investment.
- Incorporate natural capital into investment decisions.
- Engage with public and private buyers to secure funding for natural capital maintenance and enhancements.

2. Introduce a series of natural capital metrics

Metrics for monitoring natural capital at farm/estate level could be useful, as outlined in Table 5-2 below. These metrics relate to the extent and condition of natural capital assets, and would link across to the natural capital asset register. The condition metrics focus on soil health and biodiversity, which we believe are probably the two main attributes affecting many of the ecosystem services flowing from farm/estate assets.

Table 5-2: Suggested natural capital metrics

	Extent	Condition	
Assets (habitat types)	ha	Soil	Biodiversity
Enclosed farmland:		Soil Organic Carbon; pH; Bulk Density; Earthworm counts; Cu / Zn; N / P / K / Mg ¹¹	Condition assessment using FEP methodology or similar; area under agri-environment schemes
Cropland (arable & horticultural)			
Temporary pasture (temporary improved grassland)			
Permanent pasture (permanent improved grassland)			
Permanent unimproved pasture (semi-natural grasslands)			
Hedgerows		N/A	UK BAP hedgerow condition assessment (based on attributes including species composition, integrity and continuity of vegetation, etc.)
Woodland (includes farm woodlands)		N/A	Diversity indicator; area of native woodland; area verified under sustainable management marques; Woodland Carbon Code accreditation
Mountains, Moorlands and Heaths		Soil Organic Carbon; Peatland Condition category (near natural / modified / drained / actively eroding)	Area under legally protected status; percentage of BAP species and habitats which are stable or increasing; SSSI Condition category
Water (Open Waters, Wetlands & Floodplains)		N/A	SEPA condition assessment of ecological status

3. Roll out the Protocol on the basis of two key functions/applications

The two functions/applications - (i) assessing change over time and informing actions, and (ii) informing decisions on significant projects or land use change - are described in 5.17 above. A roll-out of the Protocol along these lines could involve the development of a number of resources, as outlined in Table 5-3.

Table 5-3: Resources for roll-out

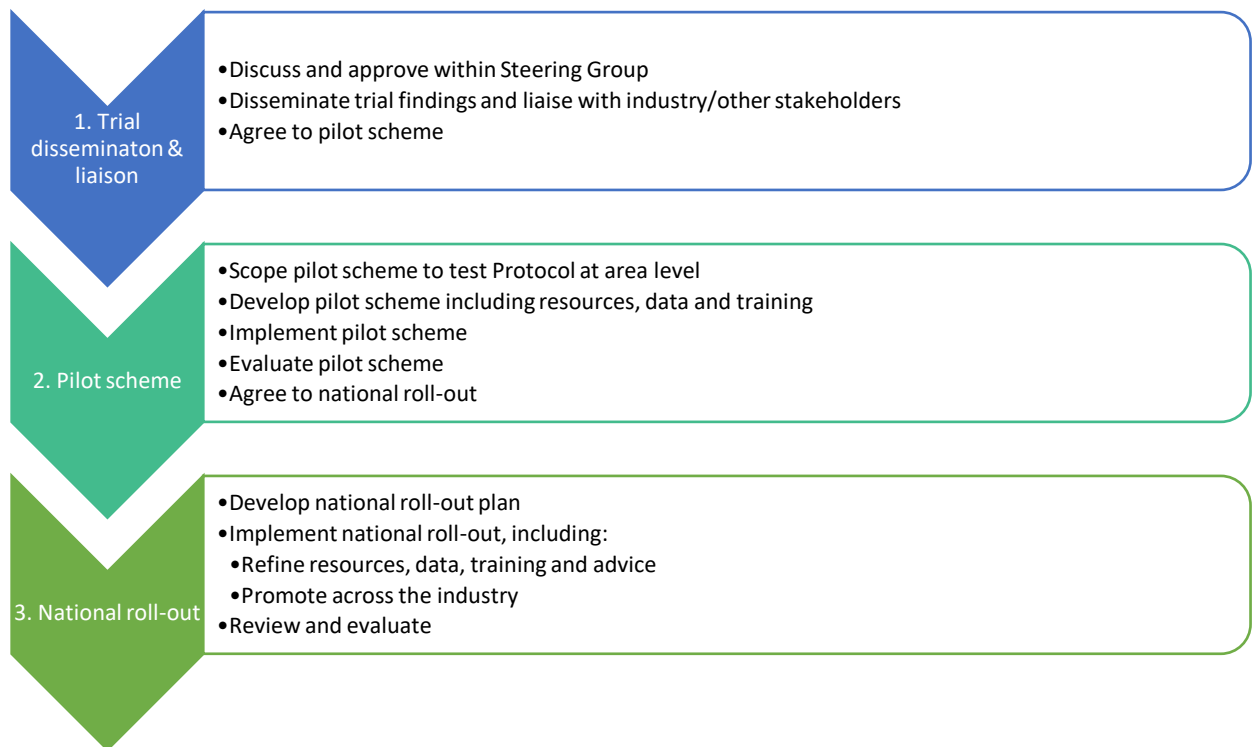
<p>A. Generic templates and guidance for:</p> <ul style="list-style-type: none"> a. Natural capital asset register b. Enterprise impact and dependency assessment <p>[Differentiated templates could be developed for different farm/estate types]</p> <p>B. Case studies covering different types of project / land use change together with a template and guidance.</p> <p>C. A tool for advisors/land managers to streamline the process in relation to both the above applications. This could include links to available datasets and even look-up tables for unit values.</p>
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¹¹ One mechanism to help assess soil condition is SRUC's VESS (Visual Evaluation of Soil Structure) tool: https://www.sruc.ac.uk/info/120625/visual_evaluation_of_soil_structure

Part of the roll-out should also include consideration of the most relevant datasets and their accessibility for land managers and advisers. More quantitative data would be beneficial alongside map-based data.

An indicative flow chart for the potential roll-out of the Protocol – including the key stages of: trial dissemination and liaison; a pilot scheme to test the Protocol at area level; and national roll-out – is set out in Figure 5-1.

Figure 5-1: Indicative flow chart for roll-out



4. Communicate the benefits

Communicating the concept and value of natural capital and the Protocol with land managers should aim to improve understanding and awareness of the assets themselves as well as the terminology used. It should also set out the commercial benefits in addition to the environmental/societal benefits. Making the connection to existing schemes and initiatives and future policy is important, as is signposting relevant guidance, templates, case studies and tools.

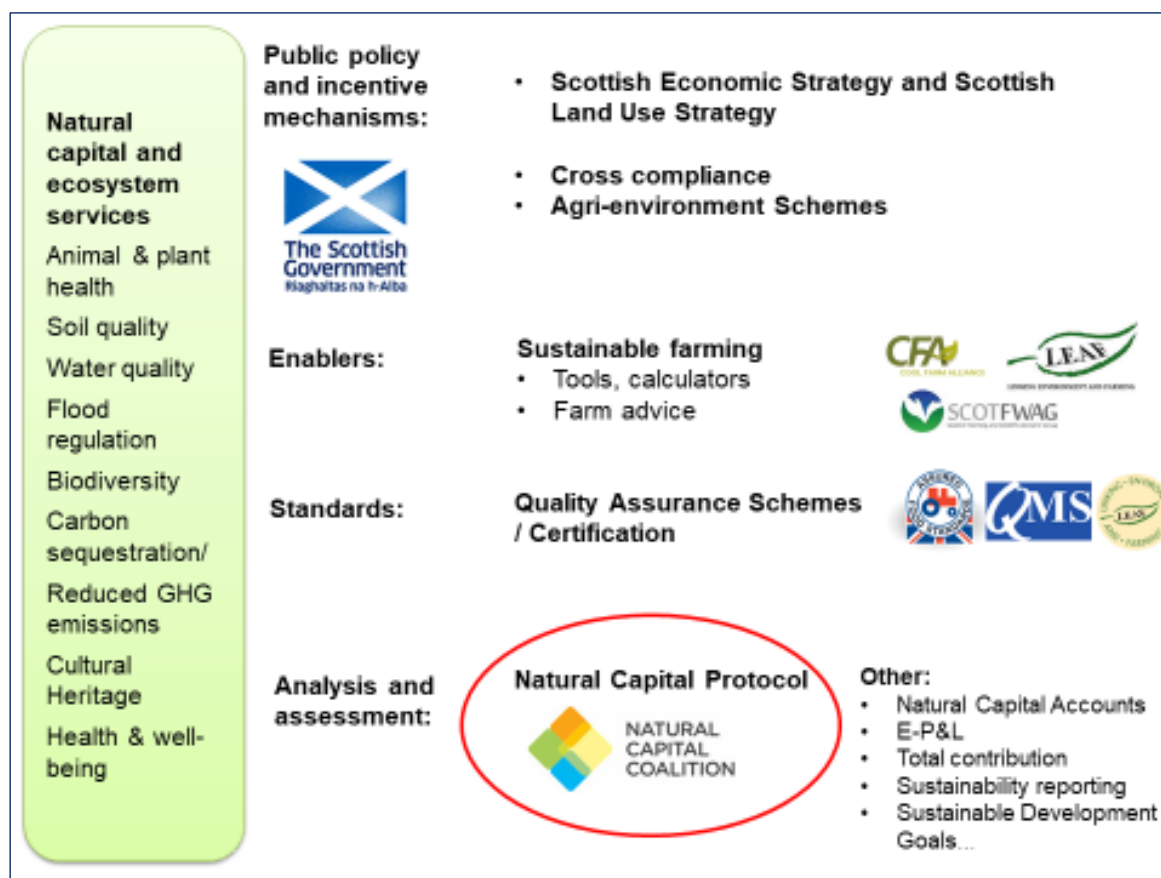
Implications for policy

- 5.19 The Vision for Scottish Agriculture is a greener, innovative and profitable agriculture industry¹². In particular, it identifies the need for:
- farmers to work with nature, protecting and enhancing the benefits (natural capital and ecosystem services) it provides, and embrace their role as custodians of the natural environment
 - a low carbon agriculture industry
 - halting the loss of farmland biodiversity
 - achieving good water quality in water bodies affected by diffuse pollution
 - farmers and the climate to benefit from the efficient use of energy feed and fertiliser
 - farms to combine food production with other land uses, including farm woodlands, renewables, flood management, etc. to make the best use of their land.
- 5.20 Future agricultural policy and schemes post-Brexit – while uncertain – are likely to include a strong focus on public payments for public goods and integrate a natural capital approach. They are also likely to encourage improving the long-term productivity of farmland through sustainable management of soils, water and pollinators, enhanced resource efficiency and greater resilience to shocks and challenges.
- 5.21 Scotland's second Land Use Strategy¹³ recognises the need for practical action by land-based businesses to help realise the vision for Scottish agriculture outlined above. It promotes the use of an 'ecosystems approach' to managing natural capital. Such an approach considers natural systems, takes account of the services that ecosystems provide and involves both those who benefit from ecosystem services and those who manage them in decisions that affect them.
- 5.22 By providing a framework within which land managers can record and, depending on the scope of the assessment, measure and value, their impacts and dependencies on natural capital and ecosystem services, the application of the Protocol may help land-based businesses to operationalise this approach.
- 5.23 The potential role of the Protocol alongside policy and incentive mechanisms, enablers and standards, which together can help promote the management and enhancement of natural capital and ecosystem services by land-based businesses, is illustrated in Figure 5-2.

¹² The Scottish Government (2015) The Future of Scottish Agriculture: A Discussion Document [online] available at <http://www.gov.scot/Resource/0047/00479616.pdf> (last accessed 20/02/2018)

¹³ The Scottish Government (2016) Getting the best from our land: A Land Use Strategy for Scotland 2016-2021 [online] available at <http://www.gov.scot/Resource/0049/00497086.pdf> (last accessed 20/02/2018)

Figure 5-2: The potential role of the Natural Capital Protocol within the current policy framework for land-based businesses



- 5.24 The Protocol has the potential to contribute to the vision and other elements by:
- Driving more profitable, sustainable business and land management.
 - Informing investment decisions and, where required, planning and other assessments.
 - Encouraging future agri-environment scheme participation and informing option selection.
 - Working alongside and integrating the use of existing tools, calculators and advice.
 - Influencing and enhancing existing standards across the supply chain.
- 5.25 Monitoring changes in the extent and condition of natural capital at the farm or estate-level may also complement, or even contribute to, the Scotland-wide Natural Capital Asset Index, if the Protocol is widely implemented across the country.
- 5.26 Consideration should also be given to the management of natural capital as an integral part of Landlord and Tenant relations. There may be opportunities to better reflect this in Records of Condition and waygoing. Having regard to the Tenant Farming Commissioner’s recently published Code of Practice for the Maintenance of the Condition of Tenanted Agricultural Holdings, the management of natural capital might benefit from similar joint-industry guidance on best practice.

Appendix 1 – GIS datasets

See separate Excel spreadsheet

Glossary

BAP	Biodiversity Action Plan
BPS	Basic Payment Scheme
ESS	Ecosystem services
FEP	Farm Environment Plan
GIS	Geographic Information System
JHI	James Hutton Institute
NC	Natural Capital
QMS	Quality Meat Scotland
SEPA	Scottish Environment Protection Agency
SFNC	Scottish Forum on Natural Capital
SNH	Scottish Natural Heritage
SRUC	Scotland's Rural College
SSSI	Site of Special Scientific Interest
SWOT	Strengths, Weaknesses, Opportunities, Threats