

**Minimum Standards for the UK Farm Soil Carbon Market  
FAQ (DRAFT)**

A. About the work

**1. Why is there a need for the Farm Soil Carbon Code project?**

Across the UK, a marketplace is emerging that pays farmers to introduce farming practices that will store carbon in soils and/or reduce the emissions of greenhouse gases from soils. There is a diversity of market schemes available, all of which currently operate according to their own rules and standards, with different approaches to the measuring, reporting and verification (MRV) of farm soil carbon, as well as to some of the critical 'principles' at stake, such as requirements for permanence in carbon or additionality rules.

This lack of consistency between different schemes, standards and projects is confusing for farmers and investors alike. There are concerns that some of these schemes may not yield additional or permanent climate mitigation benefits and may not provide adequate protection to buyers and sellers. Put simply, a unit/credit of carbon achieved on one farm might not be equivalent – or even comparable with a unit from another.

This is where our work steps in. Our aim is to bring some much-needed clarity, consistency, fairness and integrity to the marketplace while maximising the environmental and economic impact of soil carbon sequestration.

**2. How are you going to bring clarity, consistency, fairness and integrity to the marketplace?**

Since the start of the project, we have consulted extensively with farmers, businesses and other experts to better understand what they feel is needed to improve the marketplace. In particular we wanted to address the confusion and uncertainty caused by the variety of different schemes in existence, help both farmers and investors decide which scheme to engage with and provide peace of mind about what outcomes will be achieved – whether economic, social or environmental.

This is important because farmers don't want to over-promise soil carbon that doesn't actually materialise through no fault of their own, and investors don't want to pay for management changes that would have happened anyway, or for carbon storage that is only short-term, for example where subsequent management changes result in soil carbon sequestered through investment being re-released back to the atmosphere.

We reached the conclusion that the swiftest and most effective way to add value to the marketplace was through the creation of 'Minimum requirements', against which existing codes/projects could be evaluated and which projects should be able to meet in order to function in the UK marketplace. These Minimum requirements will address the following three elements:

- a) The Evidence Base that underpins them, including the quality of the evidence demonstrating the likelihood of carbon sequestration or emissions reduction in eligible project types/locations,
- b) The Code Requirements, their approach to some of the critical principles at stake – additionality, permanence, leakage etc, and
- c) The Monitoring, Reporting and Verification (MRV), how they use data to establish change over time, including soil testing, analytical, sampling and modelling methods used and approaches determining the reliability and accuracy of these methods.

It is our hope that these Minimum Requirements, summarised in the report: **Report and recommendations on minimum requirements for high-integrity soil carbon markets in the UK** will achieve a "levelling up" of the marketplace, and shine a spotlight on less scrupulous players, encouraging them to raise their game.

### 3. How was the work funded?

The work was funded by a grant from the Environment Agency's Natural Environment Investment Readiness Fund which seeks to create a pipeline of nature projects ready to operate on private sector investment and support innovation and development of high integrity ecosystem service markets.

The project was led by a consortium led by FWAG South West and managed by the Sustainable Soils Alliance. Other Consortium members included SRUC, University of Leeds, The James Hutton Institute, Agricarbon, Sierra View Consulting and others.

Additional financial support was provided by the Esmee Fairbairn Foundation alongside individual research components including the UK Resilient Dairy Landscapes project as part of the UK Food System Programme funded by BBSRC, ESRC, NERC, and Scottish Government, the NERC Yorkshire Integrated Catchment Solutions Programme and the NERC-RETINA project.

### 4. What new research underpins your work?

The Consortium carried out a review of 12 MRV method protocols and associated soil carbon programmes from around the world. This comprehensive comparison has been published as an open access paper in the scientific journal Carbon Management; Black et al 2022, *What makes an operational Farm Soil Carbon Code? Insights from a global comparison of existing soil carbon codes using a structured analytical framework* Article ID: TCMT 2135459. Available [here](#).

This research was not intended as a performance review but guide people in comparing between difference does and to help in establishing the evidence-based principles needed for the development and operation of high-integrity agricultural soil carbon markets in the UK.

The work was also informed by new research into farmer opinions on the agricultural soil carbon market and two recent studies carried out in UK, also based on interviews with farmers (Hewson, MSc Dissertation RAU, 2022 and Jones, MSc Dissertation CISL, 2022).

The code development also gained useful insights from the application of MRV methods across the real-life setting of 20 fields in a FWAG Gloucestershire Pilot. The field sampling has produced new information about soil carbon stocks across contrasting farming systems. The pilots also aimed to collect the different types of data required to support both baselining and credit quantification using a "hybrid approach" which combines modelling and measurement to quantify soil carbon stocks and soil derived GHG emissions. The process of working through the necessary data requirements provided useful insights into the practicalities around data gathering and collation at a project scale.

### 5. Why 'Minimum Requirements' and not a Farm Soil Carbon Code?

As explained above, we didn't feel that a single, commercially operated and independent code along the lines of those that exist for woodland and peatland – i.e. with its own fully defined rules, methodologies and approaches to MRV is what the marketplace needs right now – or would add a great deal of value to either farmers or investors.

There are other reasons why a new, independent code would not be practicable at this stage:

- A UK Farm Soil Carbon Code would have to be run by a registered company with the necessary resources needed to set-up, operate, promote, market and maintain a code with an affiliated registry as a commercial entity into the foreseeable future, even if not-for-profit. We do not have those considerable resources at our disposal.
- As a stand-alone Code, a new code would only serve to add more competition and complexity to the global market-place where there are well-established codes already operating. A UK Farm Soil Carbon Code would only offer something different to the market-place if the code was operated as part of a suite of ecosystem market-place codes under the umbrella of the UK Land Carbon Registry. This would

limit investment to UK organisations but in turn could help reduce the operating costs to more affordable levels for smaller projects. Even though our work is supported by the Environment Agency, there would be no formal requirement for UK farmland projects to comply with any code that we develop.

- MRV techniques and technologies in field testing, laboratory analyses, remote sensing and modelling are rapidly developing. The Code requires effort to finalise a universally applicable protocol suitable for use across all UK farmland to ensure that 1 t CO<sub>2</sub>e is comparable across all land uses, management practices and projects.

## **6. Did you consult on the report's creation?**

Yes, during the course of the project we consulted extensively with stakeholders from farming, academia, policy and investment communities, both informally and via a series of [four public workshops](#). We also consulted with a number of businesses already active in this market place.

Finally the report has been prepared with input from the Environment Agency and in consultation with the policy officials from the UK and Devolved Governments to maximise policy relevance.

The decision – that a Code should not be the critical output from our work - was reached following extensive stakeholder engagement. The approach that we are proposing was presented to a Workshop in April 2022, and endorsed by participants on the day and via a subsequent poll.

## **7. How will these Minimum Requirements be established and governed?**

The Minimum Requirements include a governance framework which will demonstrate how the evaluation of codes, standards and schemes will be managed, decisions reached, support given and the principles underpinning the evaluation process kept up-to-date.

## **8. Will the Evaluation Framework evolve over time?**

Yes. As the governance framework in the Minimum Requirements explains, we envisage establishing an expert group that will be able to keep standards under review so they can adapt to the latest evidence and policy developments as they become available.

This expert group might also be responsible for drafting guidance on the range of appropriate methods for monitoring, reporting and verification, minimum permanence periods for soil carbon projects and requirements that will safeguard the additionality of carbon.

This approach might be duplicated by other nature-based carbon markets, i.e. an expert group could be established for e.g. hedgerows, saltmarsh etc, and each group would develop an evaluation framework based on evidence-based principles for the development and operation of high-integrity carbon markets in their domain, with an accompanying governance framework to ensure transparency and accountability.

There will be full transparency – the governance framework will ensure the independence and expertise of the group, and an appeals process for codes, standards and schemes that are not happy with any decisions made.

## **9. What are the next steps for the project?**

The Minimum Requirements we have developed provide one piece of critical market infrastructure needed to scale up high-integrity farm carbon markets across the UK. However further barriers– relating to policy, educational and financial remain that will restrict the potential growth of this market. The Consortium will look to identify and, where appropriate, address these obstacles.

For example, to incorporate all the learnings from the review of codes and the development of the Minimum Requirements, the Consortium may develop a 'Minimum Viable Community Code' (MVCC) in the future.

The MVCC would be created to address the particular needs of UK soil carbon projects that would not be viable or are not served by the existing codes and/or marketplace. It would be built around UK specific needs - as the Woodland and Peatland codes were - and include clearly defined approaches to specific challenges - e.g.

how to integrate them with other ecosystem services and the thorny issue of additionality - how to successfully blend public and private income sources.

As it stands, we are unsure about the exact scope and detailed content of an operational version of the MVCC, but will look to establish this once we are clearer about issues over financial and operational viability, constraints to using existing codes, alternate objectives are better understood e.g. wider policy benefits, alternate commercial objectives. It will also require some degree of subsidy/contribution from public/private funding for its operation - (similar to woodland and peatland codes, managed in kind by Forestry Commission and IUCN, respectively).

## B. Market and policy context

### i. *Domestic Policy*

#### **10. How does your work fit into the broader policy framework in this area?**

Policy is evolving rapidly in this space – at International, UK and devolved level, and it is intended that the Minimum Requirements can integrate into this process and support the delivery of a series of policy objectives. Our report doesn't refer to these policies in detail because they are evolving/moving as fast as the marketplace, and the Minimum Requirements need to be adaptable for whatever policy comes.

#### **11. Is there not a legal framework for the farm soil carbon marketplace?**

Not yet. However, all four UK countries are working on policy frameworks for investing in nature recovery built around high-integrity markets for ecosystem services.

For example, Scotland have published Interim Principles for Responsible Investment in Natural Capital, while in England, Defra is currently looking to develop a set of overarching principles and minimum requirements that codes must adhere to, that will ensure the integrity of markets for multiple services across most of the UK's major habitats and land uses.

To underpin these overarching principles, there is a need for guidance that is tailored to specific habitats and land uses in which different markets are developing, to ensure the integrity of these markets. This is where we envisage our work will fit in - alongside existing codes (woodland, peatland) and new codes (hedgerow, saltmarsh).

#### **12. What role do international standards currently play?**

In the absence of a formal policy framework, most of the codes, standards and schemes currently operating in the UK have been informed by, or align to relevant ISO standards, however few of them have been independently 'accredited' to these standards e.g. by UKAS (used by the Woodland Carbon Code and Peatland Code).

Compliance with ISO standards may increase the integrity of carbon code design and operation. However, although UKAS already accredits individual codes and verification bodies against ISO standards in the UK, these standards provide little guidance on key operational components of Codes in the contexts that they operate within.

For example, the models that are used to quantify carbon gains during the project and the depth at which soil samples are taken may significantly affect the integrity of monitoring, reporting and verification in agricultural soil carbon markets (Black et al., under review).

#### **13. How might the Minimum Requirements feed into national carbon accounting?**

The approach outlined above (overarching principles, underpinned by landscape-specific guidance) could potentially be used to enable existing codes to register voluntary carbon credits with the UK Land Carbon

Registry, and therefore support a comprehensive ecosystem carbon marketplace, with existing peatland and woodland codes plus other habitat codes in development.

Alternatively, these codes could be aligned with a different registry that allows overseas investment - enacting the relevant corresponding adjustments (so that we don't double count). These would then be taken off our own UK commitments set under the Paris Agreement – this might unlock further investment.

#### 14. What about the GHG inventory?

As it stands, only changes in land management that lead to significant change in soil carbon are included in the GHG inventory. Currently they include inputs of organic materials including manures and crop residues. But evidence did not support others.

If there was evidence to determine a carbon stock change factor then these could be added to the inventory if there was also supporting activity data (how much area the practice was applied to). However, evidence on e.g. minimal tillage found that the stock change factor was not significantly different from 1. Since carbon stock is calculated by stock change factor, *not significantly different from 1* means no change to include.

#### 15. Will your standards be applicable for all players in the farm soil carbon market-place?

It is important to understand that there is not one single soil carbon marketplace, but in fact several different ones driven by different environmental and business objectives. These include the Voluntary Carbon Marketplace whereby businesses can reduce the net carbon balance of their own emissions through off-setting, the insets marketplace where food and drink businesses can reduce their Scope 3 emissions through their supply chain and the eco-systems marketplace where investors pay land managers for the environmental benefits that certain practices generate – biodiversity increases, water regulation and quality improvement, as well as increased soil carbon.

It is important to note that, the MRV elements (soil carbon stocks and soil derived GHG emissions) are the same whether in-setting or offsetting, and so the MRV elements should be applicable across the board. However, this is not the case currently. Our Minimum requirements could be used to help “level up” the market-place so that all soil carbon MRV protocols produces comparable results for climate mitigation from soil carbon sequestration - i.e. 1 t CO<sub>2</sub>e = 1 t CO<sub>2</sub>e irrespective of MRV protocol used.

#### 16. How do international initiatives influence this work?

When we began this work, our attention was focused on the VCM, and there are a number of international initiatives that influence the voluntary trade in carbon credits.

- We have looked to align in particular with the work of the **Integrity Council for the Voluntary Carbon Market** (part of the Task Force on Scaling Voluntary Carbon Markets, a global private-sector led initiative initiated by Mark Carney). because it is the body responsible for generating credits.
- The **Voluntary Carbon Markets Integrity Initiative** focuses more on the buyer side of carbon markets. – i.e. the claims that corporations make (although the two are aligning).

These are broad however, for example, providing additionality principles or pushing markets from avoided emissions towards GHG removals. Our work looks to ground these principles in a national (UK) context.

Increasingly significant are scope 3 markets which operate to different dynamics. Here two, recent initiatives are particularly relevant:

- **The Science Based Targets initiative (SBTi)**—the leading guidance on Paris agreement-aligned net-zero goal-setting published in September guidance for companies to set targets that account for land-based emission reductions and removals – including soil in their scope 3 emissions.
- **The GHG Protocol Land Sector and Removals Guidance** which explains how companies should account for and report GHG emissions and removals from land management etc in GHG inventories. A draft has been published for external consultation.

In the UK, this will be reflected in the work undertaken by WRAP which published in May its *Scope 3 GHG Measurement and Reporting Protocols for Food and Drink*. These look to translate the global recommendations from the GHG Protocol into simpler terms and interprets the information specifically for the UK food and drink sector.

We are especially interested in the impact of these policies because of the growing interest among food and drink businesses looking to reduce their scope 3 emissions throughout their supply chain.

**17. What advice do you have for farmers who are considering getting involved in a farm soil carbon project further down the line?**

Farmers can start baselining their soils now if they wish with UK and Devolved Government funds that can be used to help finance measurement of soils, as long as they keep accurate and up-to-date farm and field management records e.g. crop yield, fertiliser types, application rates and dates. That way even if they delay, farmers will be able to benefit from the work they are doing now as most codes will accept baselining from within a reasonable timeframe e.g. 5 years.

**18. In the development of this document did you find that any of the existing farm soil carbon payments wouldn't stand up if these requirements were applied?**

We haven't reviewed any existing commercial projects as part of this project, but existing projects have been a crucial part of the development of these minimum requirements showing willingness for integrity in the marketplace. It is certainly the case that at present MRV requirements for VCM codes are generally more stringent than those widely available for use under Scope 3 reporting, since the former principally follow IPCC guidance for soil testing and soil process modelling.

**19. What impact do you hope your MR will have on investment?**

Based on feedback from the investment community, one of the key drivers of price is supply and demand – and what is currently suppressing demand is a lack of market confidence.

We hope that the Minimum Requirements will address this by sending some strong market signals i.e. that codes/standards/schemes that meet them are 'high integrity'. We hope they will also create a market incentive to raise the integrity of these markets.

We are hoping for a positive feedback loop. By demonstrating that the market is rigorous and high integrity, demand will be unlocked, and with it the payment for the additional rigour.

We are hoping that these will help to "harmonise" across the now diverse soil carbon market-place which ranges from carbon credits, across Scope 3 reporting to personal net zero ambitions.

**20. Are the Minimum Requirements legally binding?**

In the short term, there are not going to be any legal or regulatory requirements for the private companies that own/operate codes and trade carbon in this space to accredit to these Minimum Requirements. However, it is our hope that in due course they will be integrated into formal policy mechanisms (see above).

**21. How do you envisage your Minimum Requirements operating in practice?**

Our intention is that soil carbon companies, scheme operators, and code and project owners will submit their standards and operating procedures to us review against the evaluation criteria.

Where there is insufficient evidence to demonstrate that the criteria have been met, owners will be provided with feedback and (where possible support) on the remedial actions necessary to meet these criteria in a re-application. Once updates are completed, codes would need to revise their protocols, and resubmit for accreditation.

In due course, we hope that the majority of codes/schemes will be able to get accredited to the Minimum Requirements we have outlined.

**22. How would the MR apply to projects that are already underway?**

We appreciate that this might mean a divergence between legacy projects (with the original protocol) and new projects (with the upgraded protocol). Where projects are unable to adapt to new protocols, legacy projects would still be able to sell their carbon, assuming buyers remain happy to purchase it.

**23. If a farmer is already using one of the GHG emissions calculators/footprint measurements, can they use that to measure their carbon?**

As it stands, no. VCM quantification (based on international guidance) uses soil carbon measurements to get accurate calculations to generate credits.

Foot-printing tools are simplified versions of these models. Only a few incorporate soil carbon and where they do, they generate information on GHG emissions and increasingly stock, but don't have the same integrity as those used in the VCM

Carbon calculators do not comply with Tier II or III IPCC guidelines for GHG reporting for soil.

C. Minimum Standards Content

i. MRV

**24. The MR address both carbon sequestration and GHG emission reduction. What is the difference?**

Soil management influences the biogeochemical cycles of both carbon (C) and nitrogen (N), meaning its significance for climate change is twofold - greenhouse gases (GHGs) emittance and soil carbon sequestration.

Our MR ensure that all projects deliver an overall 'net reduction' in GHG emissions – or net carbon abatement. They need to reflect an increase in carbon stocks, a reduction in soil derived GHGs or a combination of the 2.

**25. In situations where farmers practicing e.g. Minimal Tillage are using more herbicides to control weeds. i.e. a potentially beneficial soil management change could have some unintended GHG-emitting consequences. Would that be accounted for in reporting?**

Yes, these should / must be accounted for in the quantification of credits, and therefore reflected in the MRV across the project period.

**26. Why the recommended sampling frequency of 5 years?**

The projects we are looking at (mainly arable on mineral and organo-mineral soils) need a period over which they can quantify change on for credit purposes and 5 years is reasonable for this. The challenge on any soil is showing that change is measurable against the noise of a dynamic – for both the measurement and the model. We need to strike a balance in the minimum requirements between how often you measure, what is going to be cost effective and the different methods that you can use to reduce costs – including the potential to use model data in combination with real empirical sample data.

However, these are minimum requirements - this does not preclude more intensive sampling.

**27. Why don't the MR prescribe how many samples are required per hectare?**

Because farms, soils and regions are heterogeneous, a fixed number of samples would be inappropriate. Different environments will require different density of testing.

How many samples will be required for the baseline will need to be sufficient to capture the heterogeneity of the area being quantified (whether that be field, farm or across a region), be sufficient to allow for change in carbon to be detected at the relevant monitoring periods and be suitable for modelling purposes. There is a wealth of scientific literature that can be used to support the design of a sampling strategy and to establish how many samples will be needed.

A key piece of information is the expected change in soil carbon stocks as a result of the new management. This information can be used with the local soil carbon stock data to determine how many samples will be needed over 3, 5, 10+ years to establish that increases in soil carbon stocks are as expected.

Most codes require projects to design and implement an appropriate sampling strategy that will produce a reliable baseline to address these requirements.

**28. If I am using measured data, do I need a model?**

It would be very difficult to calculate soil-derived GHG emissions to achieve net abatement without a model - although accurate measurements further down the line might be possible. When you are designing your project, to be eligible you need to be able to demonstrate that you have a practice that is going to lead to a net carbon abatement in this particular soil context.

**29. Is the soil sampling demanded statistically sound if the number of samples is over a specific number and the samples are then analysed as a composite sample?**

Sampling design has to be able to give statistically significant, representative results. So, yes – if a project can establish a reliable baseline, measure uncertainty accurately and detect change over time.

Existing VCM requirements go into some detail on sampling design – the majority very similar, i.e. there is consistency between them. Our minimum requirements reflect these.

**30. Why aren't the MR prescriptive about how to build a baseline?**

There are many different approaches to establishing a baseline that are valid, with new innovations coming down the line, so we wouldn't want to be overly prescriptive on the specific methods, other than highlighting those which are clearly inappropriate and provide guidance around sampling and measurement standards to ensure representativeness and accuracy.

When it comes to measurement/baselining, the minimum requirements are there to ensure that any project adopts an approach that is capable of demonstrating what is needed. One method might work for one approach, but not for another. It is not for the MS to be too specific.

**31. Can the AHDB and the RB209 be used to validate stock measurement?**

AHDB and the RB209 monitoring guidelines are for very different purposes than quantification of soil carbon stocks and GHG emission. These sampling approaches would not be appropriate for crediting approaches because they don't measure stock. That being said, these different methods of measurement should be aligned, (for the benefit of farmer clarity), and to ensure a holistic understanding of soil – including chemical indicators and microbial activity. AHDB and RB209 could be the starting point and where appropriate 'topped up' for crediting purposes.

**32. If soil testing is every 5 years will there be some standards set to monitor accredited practices are happening?**

Monitoring at 5 years should verify that practices have been implemented as proposed, and if not or deviated from then why and how has this been accounted for. This sort of detail should be outlined in the requirements for verification in individual codes.

### **33. Are their particular models you believe are accurate and local enough?**

There are models available that are acceptable for use in the VCM. We have followed the guidance of the IPCC in that models should be process or empirical models that have been widely used to predict the impacts of management and land use change on soil GHG emissions and soil carbon stocks. We have not specified which models as we are well aware that this is an evolving area where there needs to be the opportunity for new / improved models to come into use. The key is to demonstrate that any model is reliable with known uncertainty.

### **34. Will you specify an approach to soil carbon measurement?**

The existing codes generally have their own MRV documents that indicate the requirements for soil carbon measurement. These generally align with the standard methodologies for measuring soil organic carbon, inorganic carbon, bulk density etc. However, these are not necessarily applied consistently according to prescribed quality control/analytical standards across laboratories. Users should request information about methods from labs they are using to understand the uncertainties around the measurement of soil organic carbon content and soil bulk density, since these uncertainties should be expressed in the quantification of soil carbon stocks.

### **35. What is the difference between verification and validation?**

Validation is the initial process by which proposed projects are evaluated and validated as suitable for registering as a carbon project. This means the project meets all the eligibility and other rules for a code with the predicted carbon credits considered to be achievable.

Verification is part of the monitoring, reporting and verification (MRV) process which is performed at regular intervals by independent verifiers. This process determines that the project has achieved the expected soil carbon gains and that a project is still meeting all the requirements of a code.

### **36. How is sequestered carbon currently verified?**

Most codes use their own internal standards to verify their carbon credits, with suitable independent verifiers contracted by projects to perform verification

Although most standards are somewhat rigorous, they are not entirely independent and not transparent which means that it is difficult to fully understand the verification processes or to compare between codes.

#### ii. Additionality

### **37. How do the MR address additionality?**

There are five main types of additionality test, and most codes require some combination of these. Common tests include the requirement that funded projects and/or their practices:

- Were not already legally required;
- Were not already widely adopted in the region (and so likely to have been adopted in due course in the project area);
- Would not have been financially viable without carbon funding
- Carbon finance enabled the project to become economically viable compared to alternative land uses (sometimes referred to as the “economic alternative” or “investment test”)

We have looked to reflect these tests in the MR, whilst accounting for the UK’s distinctive farming environment. Given that public finance is a significant and evolving factor in UK agriculture, the ‘Investment test’ was the most problematic. Any UK code must enable public and private finance to complement each other.

**38. If a farmer is receiving money from the government – e.g. through the Sustainable Farming Incentive Soils Standards, would that disqualify them from being able to benefit from private schemes on the grounds of additionality?**

That will depend on the financing of the individual project. Only where a government scheme (whether it is paying explicitly for soil health or soil carbon) covers the full implementation costs of the management proposed for a soil carbon project, would any project fail the investment additionality test.

However, where public funding does not fully cover the costs of the intervention or it would not be possible to apply the intervention with that funding alone for other reasons, it may be possible to combine public and private funding. There is a precedent here - the Woodland Carbon Code and Peatland Code stipulate a minimum level of carbon finance for projects to be considered additional.

Public money should not crowd out private funding, but be used to de-risk projects and leverage funding to achieve the maximum possible income. The UK government (for farming in England) has made it clear that it has no problem with farmers receiving public and private investment for soil improvement practices on the same land – in fact it wants to encourage dual income.

iii. Permanence

**39. Does permanent mean permanent?**

Our research revealed that there are many different approaches to permanence in existing codes – some up to 50-100 years. Permanence needs to be understood as permanent change (and not simply permanent storage), and any code should look to support the immediate transition to lower GHG/high carbon farming that can be maintained long-term.

There are a number of different contractual mechanisms for achieving permanence – including payments and credits issuance, buffer pools and risk sharing – including regional circumstances where farmers might have to change practices. The focus needs to be on getting farmers to increase their carbon stocks until saturation – and what role the marketplace can have in achieving this.

**40. Does the buffer pool do the job of clawing back credit/money in the event of a deliberate reversal? What keeps projects ‘honest’ once they have secured every credit available to them?**

The quantification process (which is verified throughout the project) should also take into account potential reversals and leakage during the permanence period – no one should be credited with every potential gain throughout a project.

Different projects take different approaches to this – some use a risk management tool, some use buffer pools – but quantification should always hold something back.

Monitoring (even remote sensing) can identify reversals – in which case projects may need to pay something back.

**41. Why 10 year permanence? Some might consider this is a short period of time – e.g. biodiversity net gain is looking at 25 years. Would buyers of credits see this as a limitation?**

We are looking to strike a balance here. Some buyers (e.g. Microsoft) are talking about a ‘durability’ of 1000 years. However we have come across resistance amongst landowners to signing contracts longer than 10 years – which entail making decisions for the next generation. This might lead to a significant issue with supply of projects to market.

However, this is a minimum requirement so codes/ schemes could require longer periods if they wanted – and market forces might drive the figure higher – if investors are unwilling to buy shorter-term projects – e.g. because they want to align with IPCC standards of 100 years.

We are seeing more interest in a 'rolling period' i.e. creating the incentive to bring farmers to a new equilibrium – adopting and maintaining practices over a long period – by rewarding them appropriately. We want to help break the cycle of practices passed down through the generations and accelerate the rapid transition to more sustainable, maintained practices.

It is important to recognise that carbon is not expected to replace astute business and farm economics. Ideally funding farmers to transition they will become more resilient and not want to return to a system whereby they were degrading their own asset base. The incentive will be seeing results for themselves on their own farms.

#### **42. What about the use of insurance for a project?**

Buffers and insurance are different mechanisms for ensuring permanence, and we understand that some insurance companies are already looking into this space, although more in the demand than the supply side of the equation. We are not proposing projects need insurance within the MR but it is something that projects could consider to mitigate risks from reversals, as long as the relevant code permits insurance.

#### **43. How should I baseline on a mixed farm?**

Any baselining should take the historical management cycle into account. i.e it is not based on a single static point, but should take into account the rotational cycle.

It is also important to consider how you define your project area. If your project area is simply a field, this will be more of a challenge than if your project area includes several fields or several farms because you can then quantify within a project area - and a degree of movement around the project can be accounted for.

#### **44. Do the MR outlaw tillage altogether?**

No, the MR are not specific about particular practices, especially since there might be instances where significant tillage i.e. ploughing is needed to maintain overall soil health. A recent GWCT study shows ploughing after a 10-15 year period might be needed to break up compaction resulting from min till (inversion plough).

We want to ensure an overall net increase over time. The MR don't outlaw tillage, however any resulting soil carbon loss needs to be accounted for – in measurement or modelling.

#### **45. What is the difference between the crediting and permanence period?**

The crediting period is the period during which credits are issued – i.e. can be issued to other parties and the practices are implemented.

The permanence period is the amount of time the carbon has to remain in the soil in order to be considered permanent. For example, a 10 year crediting period 'locks in' those practices for that period of time - preventing e.g. deep tillage (releasing carbon) after a period of no tillage. Every year of credits will have a permanence requirement – how long that practice must be maintained for.

Permanence periods can then be renewed – e.g. for another 10 years, however second period might have to adapt to a higher standard – to reflect learnings over the course of the project.

There can be a break between crediting periods, however in those circumstances a new baseline would need to be established (new costs).

Although we have indicated a permanence period, in reality the objective of carbon finance is to achieve permanent reductions in atmospheric concentrations of carbon dioxide, and other GHGs, therefore permanence should be viewed as a long-term commitment to achieve these reductions.

#### **iv. Leakage**

**46. Can you explain what is meant by 'do not increase livestock emissions'? People practicing regenerative agriculture introduce livestock and increased stocking (e.g. mob grazing) into an arable rotation - which accelerates the increase in soil carbon stock.**

It is important that any project takes whole system emissions into account. The objective is to achieve an overall net gain and ensure the practices being used to sequester and store carbon in soils aren't outweighed by additional associated GHG emissions from livestock, leading to a net source of emissions from the project (i.e. leakage).

**47. It's hard to measure nitrous oxide and methane. Market is not fully developed when it comes to these gases. Can they be separated out?**

For the majority of mineral and organo-mineral agricultural soils, nitrous oxide is the primary GHG derived from soils with methane emissions negligible from soils. Modelling can be used to predict reductions in nitrous oxide emissions from soils as a consequence of management changes which alter nutrient inputs e.g. reduce N fertiliser use, or change soil drainage conditions, for example. Modelling would address the uncertainties generated in these predictions. There is increasing interest in the use of monitoring systems such as flux towers, remote sensing or insitu chambers to directly monitor GHG emissions from soils and farming systems. The current costs of such equipment are probably beyond the scope of carbon projects but if they have been deployed e.g. for research purposes, these could provide valuable data to support carbon projects.

Methane emissions from soils only become significant consideration where there are organic peat soils that are waterlogged. In this context the peatland code would be more appropriate to address reductions in GHG emissions from rewetted peat soils.

Both gases are represented in terms of a standard unit - CO<sub>2</sub> equivalent.

v. Saturation

**48. Is it true that soils can reach a point of 'saturation'?**

In theory, there is an ultimate point of saturation where soil carbon stocks will not increase further as they have reached the "capacity" of that soil type i.e. an equilibrium between inputs and outputs of carbon from the soils. The process of soil carbon stocks increasing to this point is not linear with the rate of sequestration declining as the point of saturation is reached. However, there is growing scientific evidence that reaching equilibrium for soil carbon stocks in agricultural soils can take far longer than had previously been assumed. Evidence from long term experiments indicates that saturation still hasn't been reached even after 100 years. There is no one answer to saturation timescales since this will reflect many things, including the baseline conditions, soil type and nutrient status, weather and climate, and historical as well as future management. This emphasises the importance of modelling alongside measurement to help the quantification process – to predict what the trajectory of soil carbon stock gains are likely to be including how long it will take to achieve a given target.

We don't want to restrict ourselves by thinking these should be short-term projects – especially given that we are looking at both stocks and GHGs.

vi. Look-back

**49. How can the historic review period be verified? Farm records are inconsistent – especially on e.g. tillage and not guaranteed to be accurate while remote sensing is not yet reliable enough for a historic look-back. This generates potential for disputes and fraud.**

Under existing codes, a record of management practices is required and it is incumbent upon the project developer, with the project farmers, to supply the evidence for this review period. In the UK, farmers who have been involved with public subsidy schemes and / or precision agriculture will have recorded a great deal of this information, although the effort to collate this for soil carbon project should not be underestimated.

vii. High Quality evidence

**50. Has the Consortium done an evidence review? Or is it up to project developers to do provide their own evidence?**

It is for individual projects to provide the project-specific evidence for soil carbon gains rather than upon more generic reviews. One Consortium member, Leeds University, is currently undergoing a review of management practices, focusing on arable, but the results of this are not yet available. The results from this would help projects identify what evidence is available as a starting point for projects. .

D. Contracts/Eligibility

**51. The Minimum Requirements does not address contracts. Why not?**

Contracts are complex and can be constructed in many, creative ways. In earlier versions we included contract-specific language but removed it out of concern that we were unnecessarily binding/constricting the marketplace. Our focus is on the practical and scientific aspects.

Contracts between buyers/sellers/intermediaries are outside the scope of most codes (including Peatland Code and Woodland Carbon Code). Organisations such as Kana are developing standard contracts that could work across multiple codes.

**52. What about tenant farmers?**

There are examples from peatland and woodland codes as to how tenant farmers can be brought into a carbon contract – whereby the permanent contract is with the landowner (ownership rights), but the project contract is with the tenant. There are also a range of benefit sharing contracts being used in the voluntary carbon market that enable tenants to share in some of the longer-term profits from the sale of verified carbon. Owners will not be able to achieve outcomes without support from tenants and therefore care is required when establishing contractual arrangements around soil carbon projects. For example, carbon agreements should not supersede existing agreements and tenants should be careful of obligations that may extend beyond the term of their tenancy, for example risk of any reversals once they no longer hold management of the land used to generate the credits.

**53. Does a farmer already need to have reached Net Zero in their all-farm operations in order to be eligible for soil carbon payments from the private sector?**

Our MR don't specify this, however some project owners will require farmers to be Net Zero from the beginning.

E. Scope

**54. Are the MR applicable for all soil types?**

When it comes to farming types, the Consortium is working 'module by module' starting with arable. In this context, the MR are applicable to most arable soil types, with the exception of lowland peats (see point 56. below). We recognise that the MR may need to be adapted to address grassland and mixed-farming systems where there will be the need to include the contributions of livestock to soil carbon stocks and GHG emissions. At present, the modelling of these systems for quantification is less well advanced than that for arable.

**55. Do the codes account for permanent crops, e.g. Orchards, or miscanthus?**

We are not prescriptive on the different practices that can and can't be introduced. Most agricultural soil carbon codes focus on management changes within arable or grassland rather than changes to permanent or perennial biomass crops. Although, in theory, these codes could be adapted to include these crops, it maybe that the agroforestry code (in development) would be more applicable.

**56. Are peat soils covered by your work?**

The vast majority of codes currently in the market (globally) exclude organic soils, and are currently not included in VCM protocols. This reflects, in part, that these codes were developed for regions of the world where organic soils are not commonly in agricultural use.

However, in the UK, we have a lot of organic and organo-mineral soils that are in agricultural use, particularly in grassland fields where soils can range from mineral to organic over a short distance

For classic peat soils, there is an outstanding requirement to determine how to detect and reward change in these (e.g. lowland peats of NW and SE England). The Peatland Code is considering a protocol for deep peats in lowland arable systems, which it is hoped will be included in version 2.0 of the Code).

However shallow organic soils and organo-mineral soils are not covered by the Peatland Code. These could, in theory, be included in agricultural soil carbon codes with careful consideration of the soil testing and modelling requirements. For existing codes, the inclusion of shallow and organo-mineral soils would appear to be a gap that needs filling.

#### F. Fairness

#### **57. How do the MR ensure that those farmers who have been farming regeneratively for many years (and so whose soil already has high carbon content) can get rewarded through the marketplace?**

The MR allow for a 5 year look-back period, (as long as a baseline is in place) which will enable farmers to be rewarded for their good practice over this period. 5 years is a typical figure used across international soil carbon markets. However the challenge of rewarding historic good practice over a longer period is a major problem for all ecosystem markets. It is generally the case that the direct beneficiaries of schemes to improve ecosystems by changing management are often those who have been unable or unwilling to invest time, money or other resources into changing practices.

There are examples of rewarding good practice through benefit-sharing across project area. For example, a soil carbon project may gain valuable local knowledge, data and experience from local good practice which could be recognised by payments from the project.

Ultimately, the broader principle of fairness is out of the scope of these MR – and we envisage that one solution could come from wider Government policies, i.e. that SFI/equivalent schemes could reward historic good management that demonstrates substantial soil carbon stocks with minimal GHG emissions.

#### **58. How do the MR guard against deliberate degradation of land by land managers/owners to 'game the system' – i.e. maximise the potential for improvement?**

The report includes a recommendation that all projects include a do-no-harm clause to prevent deliberate degradation prior to a soil carbon project e.g. deliberate ploughing up of land to maximise possible gains. The detailed information required on management prior to a project being established would indicate whether deliberate management to degrade had been used: *A Code must establish a historic review period (no less than [5] years) wherein prior land use and / or management change practices were implemented and then reversed.*

There could be a role for earth observation technology to oversee/enforce this.

	Policy framework	Description	Example
Generalisable	Core carbon principles and guidelines	Minimum requirements for the design and operation of high-integrity carbon markets and corporate reporting in a given jurisdiction (or internationally)	Core carbon principles developed by BSI for England might stipulate that all carbon codes must include legal additionality tests, and may choose to include financial (or contribution of carbon finance), investment (or economic alternative), barrier or common practice tests. UK Environmental Reporting Guidelines might only allow corporate reporting against codes that meet these principles, the requirements of the relevant expert groups and are independently accredited to ISO standards
	Independent accreditation to relevant ISO standards	Individual codes and standards are checked to ensure they comply with relevant ISO standards	UKAS accreditation of the Peatland Code to ISO14065
	Independent expert groups on standards for each habitat and land use with carbon markets	Expert groups set minimum requirements (e.g. for additionality and permanence), list approved methods (e.g. carbon models and MRV sampling regimes) and evaluate codes and standards	An independent soil carbon expert group (convened by e.g., JNCC) stipulates a minimum permanence period for all soil carbon codes and standards, states the minimum soil sampling depth, approves models that can be used to estimate likely carbon gains in project design documents, and uses these criteria to evaluate soil carbon codes e.g., for future inclusion in UK Environmental Reporting Guidelines
Land use or habitat-specific	Individual codes and standards	A document, or set of documents, that set out the requirements and rules to establish and run a project that aims to generate verifiable carbon or other ecosystem credits	The Woodland Carbon Code
	Verification bodies	Organisations that validate projects and verify their carbon claims over the course of the project, against the requirements of individual codes	OF&G is a verification body for the Peatland Code and Woodland Carbon Code which is accredited by UKAS to ISO 14064/3 and 14065
	Project developers, intermediaries and brokers	Organisations that may develop projects under codes, sourcing both buyers (e.g. offsetters) and sellers (e.g. landowners)	Forest Carbon Ltd develops peatland and woodland projects and sells or retires credits via the UK Land Carbon Registry
	Climate change mitigation projects	Interventions undertaken in a geographically defined area to sequester carbon, avoid emissions and/or deliver other ecosystem services that adhere to a relevant code.	Carrick Peatland (restoration project) developed by Tillhill Forestry