16 April 2025

ACCU Secretariat
Emissions Reduction Division | Carbon Crediting Branch | Emissions Reduction Assurance Committee Secretariat
Department of Climate Change, Energy, the Environment and Water
By the consultation website: https://consult.dcceew.gov.au/periodic-review-of-the-soil-organic-carbon-method-2021/new-survey

Dear ACCU Secretariat,

RE: ERAC's periodic review of the *Carbon Credits (Carbon Farming Initiative - Estimation of Soil Organic Carbon Sequestration using Measurement and Models) Methodology Determination 2021*

Thank you for the opportunity to provide feedback as part of ERAC's periodic review of the *Carbon Credits (Carbon Farming Initiative - Estimation of Soil Organic Carbon Sequestration using Measurement and Models) Methodology Determination 2021* ('the 2021 Soil Carbon Method').

Climate Friendly is a profit-for-purpose company with a vision for a productive, sustainable land sector that contributes to a zero net emission Australia by 2050. We achieved our first target to support 20 million tonnes of greenhouse gas reductions at the end of 2020, and our purpose is to scale up to establish partnerships by end 2025 that will deliver 150 million tonnes over the project lifetime. Our growing team of 100+ expert staff support around 200 carbon projects under the ACCU Scheme. This includes 24 registered soil carbon projects over 40,000 hectares. Scaling up our activities under the soil carbon method is an important contributor to supporting our vision for a sustainable Australian agriculture sector, both as a standalone method, and as part of the forthcoming Integrated Farm and Land Management (IFLM) method.

Contribution to Australia's climate mitigation, adaptation and food security objectives

The soil carbon method forms an important tool in achieving Australia's net zero ambitions. According to CSIRO, Australian soils have the technical potential to sequester up to 115 Mt per annum, or between 5 – 29 Mt per annum when economic factors are taken into account.[1]

The soil carbon method is fundamental in supporting climate adaptation in the land sector. Each 1% increase in soil carbon is estimated to increase soil water holding capacity by 2%.[2] This allows farmers to make better use of rainfall when it occurs, which is critical under increasingly erratic climate conditions.

In additional to increased rainfall use efficiency, soil carbon sequestration also enhances nutrient holding capacity. Together these two co-benefits build food security. This helps ensure we can continue to feed our nation while maintaining our global position in exporting highest quality, low emissions agricultural produce.

[1] Fitch P, Battaglia M, Lenton A, Feron P, Gao L, Mei Y, Hortle A, Macdonald L, Pearce M, Occhipinti S, Roxburgh S, Steven A (2022). Australia's sequestration potential, CSIRO. A report to the Climate Change Authority. Available at: https://www.csiro.au/en/research/environmental-impacts/emissions/carbon-dioxide-removal/carbon-sequestration-potential

[2] Department of Primary Industries and Regional Development WA (2021). Soil organic matter - frequently asked questions (FAQs). Webpage accessed 8 April 2025. Available at: https://www.agric.wa.gov.au/soil-carbon/soil-organic-matter-frequently-asked-questions-faqs

Impact of rainfall on soil carbon sequestration

We understand the fluctuating nature of soil carbon stocks, which can be highly correlated with rainfall impacts, as described recently in Mitchell et al (2024).[3] In the short term, we understand this can make it difficult to discern the impact of management from the impact of rainfall.

In the long term, the passing of time is the ultimate test of whether sequestration gains are due to management or climatic drivers. Any controls to address risk of climatic driven gains should be limited to the medium term (e.g ten years), to fill the gap before the project has moved through more or more climatic cycles. Application of rolling discounts on an ongoing basis would stifle long term innovation.

We support an update to the method with a new approach based on a Net Primary Productivity (NPP) cap, aligned with the proposal by the CMI ILFM Taskforce Technical Working Group. The NPP cap provides a more nuanced control for localised climatic effects, and it should replace the existing 25% first issuance discount approach, which is a blunt instrument that excessively penalises projects within reasonable bounds.

ACCU Scheme stability is important

Stability of the carbon sector is paramount to encourage critical investment in land management practice changes and uptake of carbon farming projects at the scale required to tackle climate change. In recent years method and policy stability in the ACCU Scheme has been disrupted, creating hesitancy to act and invest in critical practice changes. While we support constructive and incremental reform of the carbon farming framework to respond to emerging technologies, scientific updates and to safeguard integrity of the ACCU Scheme, we also ask for timely and comprehensive consultation, full consideration of operational datasets and learnings from scheme participants, and stability where changes do not advance policy objectives.

The note that the 2021 Soil Carbon Method went through a thorough and recent co-design process. While we understand the need for regular ERAC reviews, we believe the overall method remains sound and continues to meet the Offsets Integrity Standards. We support some targeted and incremental updates to the method, but would be strongly opposed to any consideration of the suspending the method.

We welcome the opportunity to discuss our submission with you in more detail.

Yours sincerely,

Zoe Ryan

Chief Innovation Officer, Climate Friendly

[3] Mitchell, E., Takeda, N., Grace, L., Grace, P., Day, K., Ahmadi, S., … Rowlings, D. (2024). Making soil carbon credits work for climate change mitigation. Carbon Management, 15(1). https://doi.org/10.1080/17583004.2024.2430780

1 Summary of recommendations & findings

A summary of Climate Friendly's recommendations and findings are provided below.

Key finding 1: *The 2021 Soil Carbon method is likely conservative.*

Key finding 2: *Management practices that favour soil carbon sequestration in are not standard practice in Australia. Many Australian farm businesses face cashflow constraints and high levels of farm debt. This can force land managers to make decisions that prioritise short term cashflow over soil health.*

Key finding 3: *Regenerative farmers are a highly motivated and passionate group of individuals driven by principles of sustainability. There is great potential for this cohort of farmers to contribute to Australia's national food security and net zero goals. Lessons learned from the organic industry show that Government must provide viable incentive structures (for example, the Soil Carbon Method), or else these climate-smart practices will not scale up, and could in fact be discontinued.*

Key finding 4*: Soil carbon sequestration under the standalone soil carbon method, as well as soil as a module under IFLM, meet the definition of eligible carbon abatement.*

Key finding 5: *The establishment of paddock trees, or regeneration of forested cover on land that has been continuously grazed pasture, continuously cropped or degraded land, aligns with a permanent increase in soil carbon.*

Recommendation 1: *The existing 25% first issuance discount should be replaced with the Net Primary Productivity discounting approach put forward by the CMI ILFM Taskforce Technical Working Group.*

Recommendation 2*: Time is the ultimate test of whether sequestration gains are due to management or climatic drivers. Any discounting designed to address climatic effects should be a medium-term approach, designed to fill the gap before longevity of storage is fully tested by the project moving through different climatic cycles.*

Recommendation 3: *Climate Friendly supports science-based reforms to the 2021 Soil Carbon Method that balance objectives under the Offsets Integrity Standard (i.e. additionality, evidence-based) with the objectives of the Carbon Farming Initiative Act which include "to create incentives for people to carry on certain offsets projects."*

Recommendation 4*: Data sharing from soil carbon projects could be further enhanced by a commitment to develop and facilitate a national environmental data sharing platform.*

Recommendation 5: *The inclusion of Schedule 2 in the 2021 Soil Carbon Method is a science-based and high integrity way to reduce sampling costs. This approach should be applied for woody biomass under the Integrated Farm and Land Management method (IFLM).*

Recommendation 6*: Eddy covariance flux towers should be added as a new measurement approach under Schedule 1 and Schedule 2. To allow for compatibility between flux measurements and stock data, the flux measurements should be anchored with a singular baseline measurement using the traditional coring approach at the outset of the project.*

Recommendation 7*: Emissions from leakage under the Soil Carbon Method are likely to be immaterial. The potential for soil carbon loss in drought reserve paddocks could be reported and monitored in the Land Management Strategy.*

Recommendation 8: *The IFLM method should mirror the requirements of the standalone soil carbon method. It should not replace the standalone soil carbon method. The definitions and parameters should be harmonised between IFLM and sub-component modules to allow interoperability of methods and equations.*

Recommendation 9: *We recommend expanding the newness in lieu requirement in the method, allowing the full set of eligible management changes to commence after submission of project registration forms, but before project declaration.*

Recommendation 10: *Post sampling re-stratification should be permitted. This would allow strata boundary to be revised based on information obtained during the sample. This approach would significantly reduce sampling variabilty and cost, without compromising the independence and statistical power of the random sample points.*

Recommendation 11: *The treatment of non-synthetic fertilizers in the method could be better aligned with how non-synthetic fertilizers impact soil health, and with the composition of typical composts.*

2 Operating context of the soil carbon method

In this Section, we summarise our experience of the operating environment for soil carbon projects in the context of the Offsets Integrity Standards (*shown as bracketed text in italics*), as well as the second objective of the CFI Act, which is "to create incentives for people to carry on certain offsets projects."(*shown as bracketed text in italics*).

2.1 Conservative method

The 2021 Soil Carbon method already has a series of checks and balances inherent within it. These account for measurement uncertainty, first issuance risk, scheme risk and permanence. For example, the first (expected) issuance for one of our soil projects has been reduced down to 40% of the original stock change measurement.

Climate Friendly benchmarked the soil carbon sequestration results for one of our soil carbon projects, against modelled Net Primary Productivity data[4] to assess whether they were within reasonable bounds. We found that the measured sequestration rates were equivalent to 22% of modelled Net Primary Productivity over the reporting period (or 15% after consideration of discounts for sampling variance). This suggests that the sequestration rates are aligned with the long term biophysical potential for carbon sequestration, where rates above 30% of NPP might be considered beyond reasonable expectations for long term storage.

The fact that the NPP benchmarking exercise suggests that the measured sequestration rates were within reasonable bounds, and the fact that the first issuance has been reduced down to 40% of the original stock change measurement, suggests that the method is likely conservative.

Key finding 1: *The 2021 Soil Carbon method is likely conservative.*

2.2 Net primary productivity as reasonable bounds for sequestration

We support an update to the method with a new approach based on a Net Primary Productivity (NPP) cap, aligned with the proposal by the CMI ILFM Taskforce Technical Working Group (Appendix 1). The NPP cap provides a more nuanced control for localised climatic effects, and it should replace the existing 25% first issuance discount approach, which is blunt instrument that excessively penalises projects within reasonable bounds.

[4] Source NPP data: MOD17A3HGF.061: Terra Net Primary Production Gap-Filled Yearly Global 500m, available at: https://developers.google.com/earth-engine/datasets/catalog/MODIS_061_MOD17A3HGF

The CMI ILFM Taskforce approach is based on recommendations in the Mitchell et al (2024) paper. Our testing shows that the approach appears to be effective in identifying sequestration that is within reasonable bounds.

An additional benefit of the proposed NPP cap is the ability to ensure greater consistency in forecast abatement estimates by different project service providers, with NPP analysis providing an upper limit on potential so that prospective proponents have a benchmark to judge realistic returns from any soil project when they are considering project feasibility.

Recommendation 1: *The existing 25% first issuance discount should be replaced with the Net Primary Productivity discounting approach put forward by the CMI ILFM Taskforce Technical Working Group.*

2.3 Long term sequestration rates driven by management

It is true that in the short term, soil sequestration rates during good seasons might be partially rainfall driven. However, time is the ultimate test of whether sequestration gains are due to management or climatic drivers. If sequestration gains occurring during high rainfall periods were mostly climatic driven (rather than caused by management), then those gains will likely be reversed during dry times.

We are concerned that ERAC may be overly fixating on short term sequestration impacts during high rainfall periods without focussing on the other side of the equation – what happens to soil carbon during low rainfall periods? This is the time when any gains in soil carbon can easily be lost unless hard decisions are made to preserve ground cover.

We agree that in the short term (i.e. less than one typical climatic cycle), it is not possible to be sure about the attribution of sequestration from climate variability relative to management change (*evidence-based*).

Recommendation 2*: Time is the ultimate test of whether sequestration gains are due to management or climatic drivers. Any discounting designed to address climatic effects should be a medium-term approach, designed to fill the gap before longevity of storage is fully tested by the project moving through different climatic cycles. For example, the NPP approach could be applied on a rolling basis over the first ten years of the project, which should be sufficient time for the project to have experienced at least one full climatic cycle.*

We note that even short term sequestration during favourable climatic conditions, still requires the land to have sufficient ground cover in order to turn the rainfall into pasture/crop growth. In other words, capitalising on favourable climatic events still involves an inherent decision on behalf of the land manager. A good soil carbon project makes the most of rainfall during good seasons, and avoids going backwards in bad seasons. The end result will be reflected in the long term soil carbon levels. In other words, management, not climate is the long term driver of soil carbon stocks, and short term gains still require a level of management skill (*additionality*).

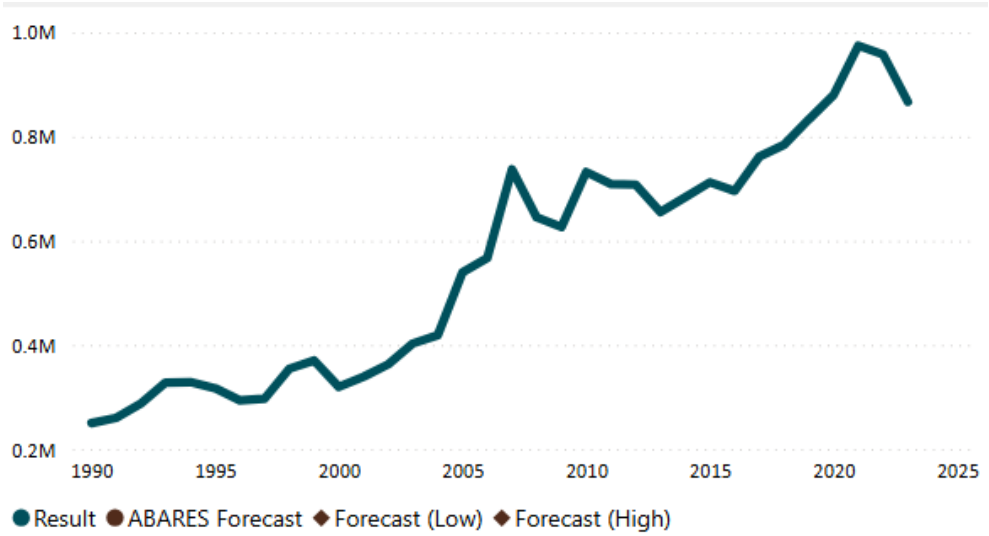
2.4 Highly skilled management change constrained by cashflow

There is a high level of agricultural skill involved in consistently building and storing soil carbon, under increasingly erratic climatic conditions. The ability to consistently implement management changes that build soil carbon in the absence of a carbon project is constrained by knowledge/skills, labour shortages and short-term farm cashflow objectives (*additionality*).

In particular, building and sustaining long term increases in soil carbon requires the land manager to sometimes set aside short-term cash flow objectives in favour of the long term health of the soil (*additionality*). For example, a grazier might intentionally over-graze to avoid selling during periods of unfavourable prices. Land managers with high levels of

farm debt are more likely to draw down on farm natural capital such as soil carbon stocks (Guthrie, 2024).[5] Data from ABARES shows that the average level of business debt in Australian farms is currently around $900,000 per farm (Figure 1), relative to an average farm profit of $200,000 (ABARES Farm Survey, 2025).[6]

Figure 1 Average farm business debt of broadacre farms in Australia since 1990



Source: ABARES Farm Survey (2025). Graph shows data for all broadacre farm types.

The financial data provided by ABARES suggests that farm debt is likely a significant driver of decision-making for many Australian farmers. This view is supported by a survey conducted by the National Farmers Federation, who found that 96.2% of farmers citing rising costs as having a 'high' or 'medium' impact on their business.[7]

When decisions are made that prioritise short term cashflow over soil health, any soil carbon sequestered due to a temporary management change can easily be lost again. This means that soil carbon sequestration that is purely driven by climate is likely to only ever be a short-term phenomenon, unless supported by a long term management change.

The data also shows that the current financial conditions faced by farmers in Australia are unlikely favourable for independently building soil carbon year on year in the absence of a market based incentive. The soil carbon project provides such an incentive – encouraging the farm manager to stay the course – building soil carbon through good times and bad (*incentives*).

Key finding 2: *Management practices that favour soil carbon sequestration in are not standard practice in Australia. Many Australian farm businesses face cashflow constraints, and high levels of farm debt. This can force land managers to make decisions that prioritise short term cashflow over soil health.*

[5] Guthrie, G. (2024). Farm debt and the over-exploitation of natural capital, *Resource and Energy Economics*, Volume 77, 2024. https://doi.org/10.1016/j.reseneeco.2024.101439.

[6] Available at: https://www.agriculture.gov.au/abares/data/farm-data-portal

[7] National Farmers Federation (2024). National Farmer Priorities Survey. August 2024. Available at: https://nff.org.au/wp-content/uploads/2024/08/NationalFarmerPrioritiesSurvey_2024_FINAL_RESULTS.pdf

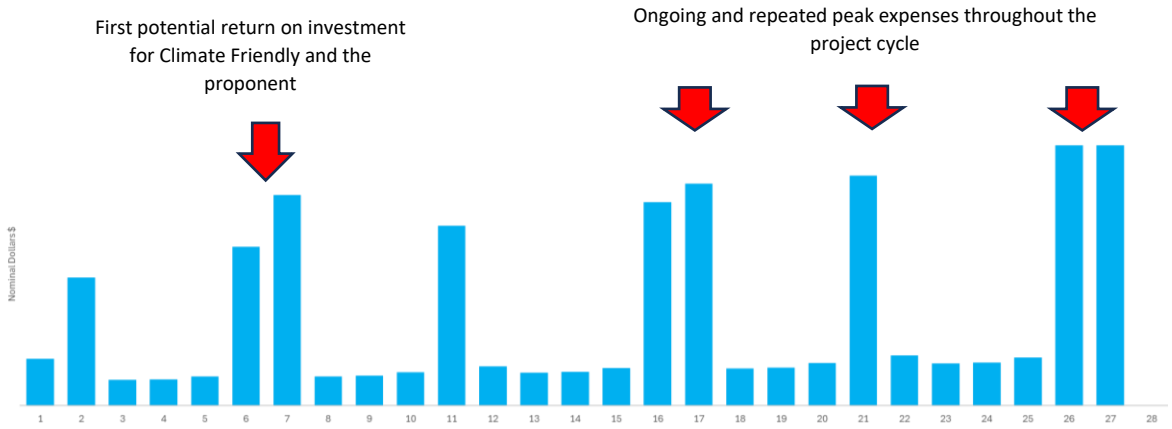
2.5 Transaction costs are high & upfront, revenue is deferred

In Climate Friendly's view, the primary commercial impediments to implementing the 2021 Soil Carbon Method are:

- The inherent cost structure of the projects (i.e. high upfront and ongoing cost involved in soil carbon measurement, deferred revenue); and
- The inability to reliably forecast ACCU delivery from the outset of the project, which creates a high risk profile for the projects.

Figure 2 provides a generalised profile of project development costs for a soil carbon project. The graph shows all costs associated with administering and auditing the carbon project, but does not include costs associated with soil carbon sampling, and implementing the management change.

Figure 2 Cost profile of project development costs for a typical soil carbon project



The data shows that it can take up to 6 – 7 years from the time of initial contact, through to the point of first potential return on investment, noting this is variable depending on specific project implementation costs not fully captured here. This is a very long lead time for investments to receive a return, and there is no certainty of a positive result at this point. There are regular ongoing monitoring payments and peak expense periods (associated with sampling events) throughout the project lifetime. This kind of capital intensive, 'upfront cost with deferred revenue' structure is high-risk for all parties involved. The ERAC should be mindful of this sensitive cost structure when considering reforms to the method. Excessive discounting on top of an already conservative method could easily render the projects commercially unviable, failing to provide much needed incentives for carbon management activities (*incentives*).

Recommendation 3: *Climate Friendly supports science-based reforms to the 2021 Soil Carbon Method that balance objectives under the Offsets Integrity Standard (i.e. additionality, evidence-based) with the objectives of the Carbon Farming Initiative Act which include "to create incentives for people to carry on certain offsets projects."*

2.6 Highly motivated client base

Climate Friendly has observed that typical participants in soil carbon projects are those inclined to adopt 'regenerative agriculture', which essentially means farm practices that build soil carbon and restore ecosystem health. Currently, the soil carbon project represents one of the few, if only, quantifiable market-based mechanism to reward regenerative

farmers for their sound ecosystem management (*incentives*). There is great potential for this cohort of farmers to contribute to Australia's national food security, climate mitigation and adaptation goals. It is important that the Australian Government gets behind this cohort of farmers, by providing viable incentive structures in the form of the Soil Carbon Method.

The current status of regenerative agriculture has been likened to the early days of organic agriculture (Lemke et al, 2024).[8] Research from the organic industry in the US offers a cautionary tale for the regenerative agriculture movement, where the number of organic certified farms has been in decline over the period 2008 to 2019. Among the reasons attributed to the decline in organic certification includes insufficient profit drivers and poorly standardised regulatory support. This shows that goodwill and passion can only take a business practice so far – at some point it must be profitable or the practice will be discontinued.

Key finding 3: *Regenerative farmers are a highly motivated and passionate group of individuals driven by principles of sustainability. There is great potential for this cohort of farmers to contribute to Australia's national food security and net zero goals. Lessons learned from the organic industry show that Government must provide viable incentive structures (for example, the Soil Carbon Method), or else these climate-smart practices will not scale up, and could in fact be discontinued.*

2.7 Potential to support a national integrated environmental database

There is a need for more investment in research on which management practices can successfully build soil carbon on Australian farms, and by how much. Data collected under the Soil Carbon Method represents a significant body of scientifically robust data that is currently privately held (noting there are mandatory data sharing arrangements as part of the Independent ACCU Review Recommendations).

There is a significant opportunity to share this data to support ongoing research, continuous improvements of national carbon, environmental and agricultural monitoring systems; and to provide information to land managers to aid decisions on managing their property.

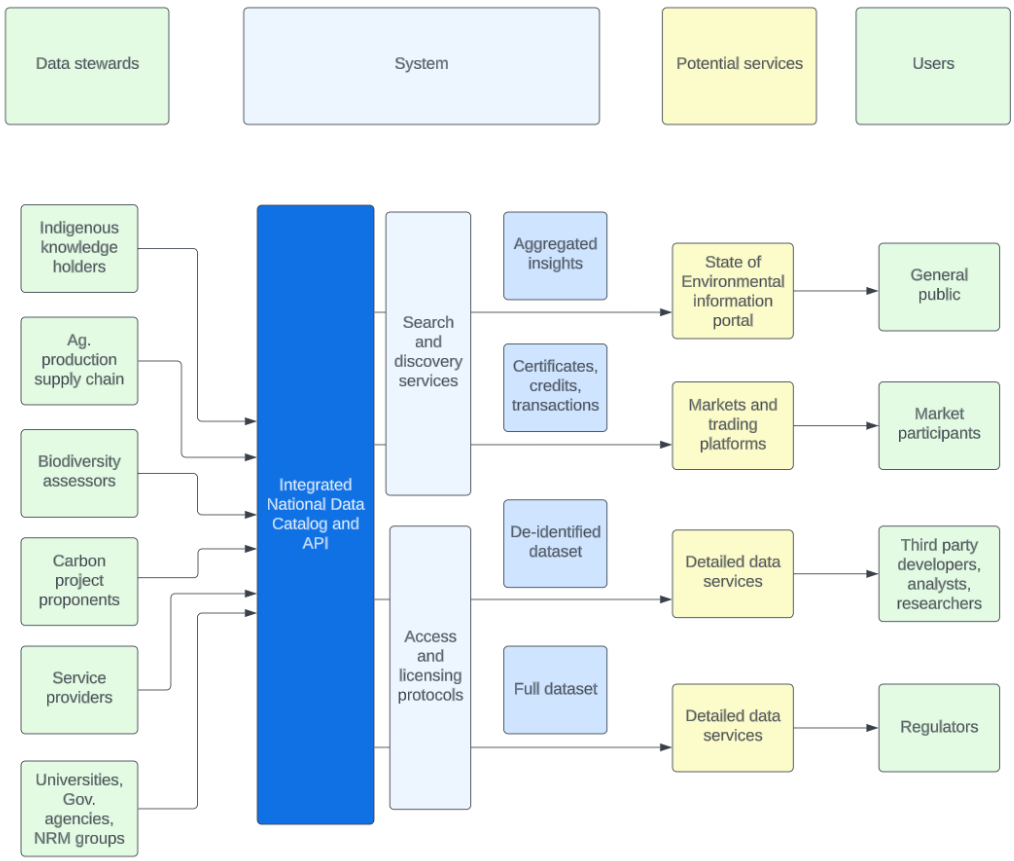
In the case of carbon farming projects, this data is tightly linked to privacy laws and the livelihoods of individual land managers. Therefore, there are careful legal, ethical and technological considerations in enabling access to this information which would provide multiple benefits while also protecting confidentiality.

Advances in data infrastructure technology mean it is now possible to develop a national land data platform with a data discovery portal. This would give access to agreements and usage licenses with private organisations or individuals able to opt-into sharing their information to achieve multiple environmental, carbon and agricultural benefits. A proposed structure is to consider an adaptation of the National Water Data Hub[9] design. Figure 3 below outlines a potential structure for such a data sharing system for environmental and land data.

[8] Lemke, S., Smith, N., Thiim, C., & Stump, K. (2024). Drivers and barriers to adoption of regenerative agriculture: cases studies on lessons learned from organic. International Journal of Agricultural Sustainability, 22(1). https://doi.org/10.1080/14735903.2024.2324216

[9] Figure 5, *Water Market Reform Roadmap* (2022), Department of Climate Change, Energy, Environment & Water, accessible here: https://www.dcceew.gov.au/sites/default/files/documents/water-market-reform-final-roadmap-report.pdf

Figure 3 Environment and land information in a Federally coordinated decentralised system



***Recommendation 4**: Data sharing from soil carbon projects could be further enhanced by a commitment to develop and facilitate a national environmental data sharing platform.*

3 Response to specific consultation questions

Climate Friendly's responses to the ERAC's specific consultation questions are provided below.

3.1 Additionality

1. Are current approaches to estimating sequestration adequately distinguishing sequestration driven by climate variability rather than project activities.

We are not convinced the proposal by Mitchell et al (2024) to extend the minimum measurement period to five years is warranted. As mentioned above, the passing of time does provide assurance that soil carbon gains (or losses) are more likely to be permanent rather than temporary responses to rainfall drivers. However inflexible restrictions on timing of measurements increases the likelihood that sampling will not occur in similar seasonal conditions to the previous measurement. Instead, we believe the NPP cap approach, implemented on a rolling basis over the first ten years of the project, provides suitable guardrails against the risk of issuance based on climatic drivers instead of management change.

2. Whether new requirements such as paired control sites, minimum time periods between sampling events, or the reinstatement of a regression approach to estimating net carbon abatement, should be considered?

Paired control sites attempt to provide a counterfactual by comparing the project site to an identical site where the project was not implemented, with the objective of separating the proportion of sequestration driven by management. However, while we can draw comparisons with adjacent sites that do not implement project activities, truly controlled conditions cannot exist in environmental systems. Environmental systems are open systems where multiple processes operate simultaneously across different scales, external influences cannot be eliminated, and historical effects persist and interact with current conditions. Once we begin managing a landscape differently, we cannot observe both the "with project" and "without project" scenarios in the same place at the same time.

Limitations in establishing direct causation are recognized in current IPCC guidance (2019), which uses estimates of emissions and removals on managed land as a proxy for anthropogenic emissions and removals. Attempts to construct a counterfactual must rely on assumptions and comparisons that are difficult to regulate and cannot be truly verified. In addition, paired samples are highly vulnerable to gaming. Research trials involving paired samples would be useful, but it is not practical to include such a requirement in the method itself.

3. How might project costs and uptake be affected if new requirements such as those listed above were adopted?

As mentioned earlier in the document, soil carbon projects are highly cost-sensitive, particularly during the time leading up to first issuance. The level of inherent discounts in the method are already quite high. We believe that the proposed NPP discounting approach provides an appropriate balance, ensuring conservatism, providing science-based controls on early issuances, while also ensuring project costs and uptake are manageable.

3.2 Measurement and verification

4. Are the method's provisions for measuring and verifying abatement estimates are fit for purpose.

The introduction of Schedule 2 in the 2021 Soil Carbon Method created a robust and science-based approach allowing a cost-effective estimation approach to complement field-based soil core sampling. Schedule 2 provides a flexible framework for introducing calibrated models in a non-prescriptive manner, with sufficient model-agnostic criteria to satisfy the Offsets Integrity Standards. In the medium term, this will help drive down costs of participation as the volume of available data increases.

Following the introduction Schedule 2 into the 2021 Soil Carbon method, anecdotally we observed significant investment and interest in modelling of soil carbon in Australia, thanks to the clear market signal provided by Schedule 2 in the 2021 Soil Carbon Method. Whilst Climate Friendly has not yet utilised Schedule 2 of the Soil Carbon method, we fully intend to make use of this Schedule once we have a sufficient body of data to calibrate a model. Climate Friendly would like to see the same 'measure-model-measure' approach rolled over to sequestration in woody biomass carbon projects, under the Integrated Farm and Land Management (IFLM) method.

Recommendation 5: *We continue to support the inclusion of Schedule 2 in the 2021 Soil Carbon Method as an science-based and high integrity way to reduce sampling costs. This approach should be applied for woody biomass under the Integrated Farm and Land Management method (IFLM).*

5. Are there new technologies or measurement approaches, which should be considered in potential amendments to the SOC Method 2021

Climate Friendly is supportive of allowing eddy covariance flux towers for measurement of soil carbon fluxes. Flux towers have been used for research purposes since the 1950s, with data published in numerous peer reviewed journal

papers.[10] To enable flux towers to be used, the method could require baseline measurement of soil carbon using the traditional coring approach at the outset of the project. This would anchor the flux measurements to a stock measurement at a single point in time (i.e. at the outset of the project). Thereafter the flux measurements would be sufficient for reporting under Schedule 1, or for validation of models under Schedule 2.

Flux towers are particularly suitable for measurement of sequestration in an IFLM context. This is because:

- Under IFLM the proponents are more likely to be reporting sequestration in both the woody biomass and soil carbon pools. The flux tower is capable of measuring sequestration in both pools at the same time;
- Flux towers solve the problem of site access constraints faced by soil corers in heavily wooded landscapes. A single flux tower can measure Net Ecosystem Exchange in both trees and soil across a 50km+ radius around the tower, whereas traditional soil corers may have difficulty driving a sampling rig between trees, or getting the corer down into thick tree roots.

***Recommendation 6**: Eddy covariance flux towers should be added as a new measurement approach under Schedule 1 and Schedule 2. To allow for compatibility between flux measurements and stock data, the flux measurements should be anchored with a singular baseline measurement using the traditional coring approach at the outset of the project.*

3.3 Eligible carbon abatement

6. Whether changes to the method should be made regarding eligible carbon abatement that can be counted in Australia's National Greenhouse Accounts

The National Greenhouse Gas Inventory[11] models soil carbon losses and gains using FullCAM, in the following categories:

- Forest land remaining as forest land (including the categories of harvested native forests, plantations, and other native forests – (Chapter 6.4);
- Forest land converted to other land uses (Chapter 6.1)
- Cropland remaining as cropland (Chapter 6.5);
- Grassland remaining as grassland (Chapter 6.6).

It seems that all sources of abatement envisioned under both the standalone soil carbon method, as well as soil as a module under IFLM, would meet the definition of eligible carbon abatement, as the sequestration "is capable of being used to meet Australia's mitigation targets under the Kyoto Protocol and Paris Agreement."

***Key finding 4**: Soil carbon sequestration under the standalone soil carbon method, as well as soil as a module under IFLM, would meet the definition of eligible carbon abatement.*

[10] For example, Takeda, N., Rowlings, D., Parton, W., Grace, L., Day, K., Nguyen, T., & Grace, P. (2025). Soil carbon sequestration potential in subtropical grasslands estimated by DayCent-CABBI. Soil Science Society of America Journal, 89, e70003. https://doi.org/10.1002/saj2.70003

[11] References used in this Section refer to: National Inventory Report 2022 Volume 1 The Australian Government Submission to the United Nations Framework Convention on Climate Change Australian National Greenhouse Accounts April 2024

3.4 Project emissions and leakage

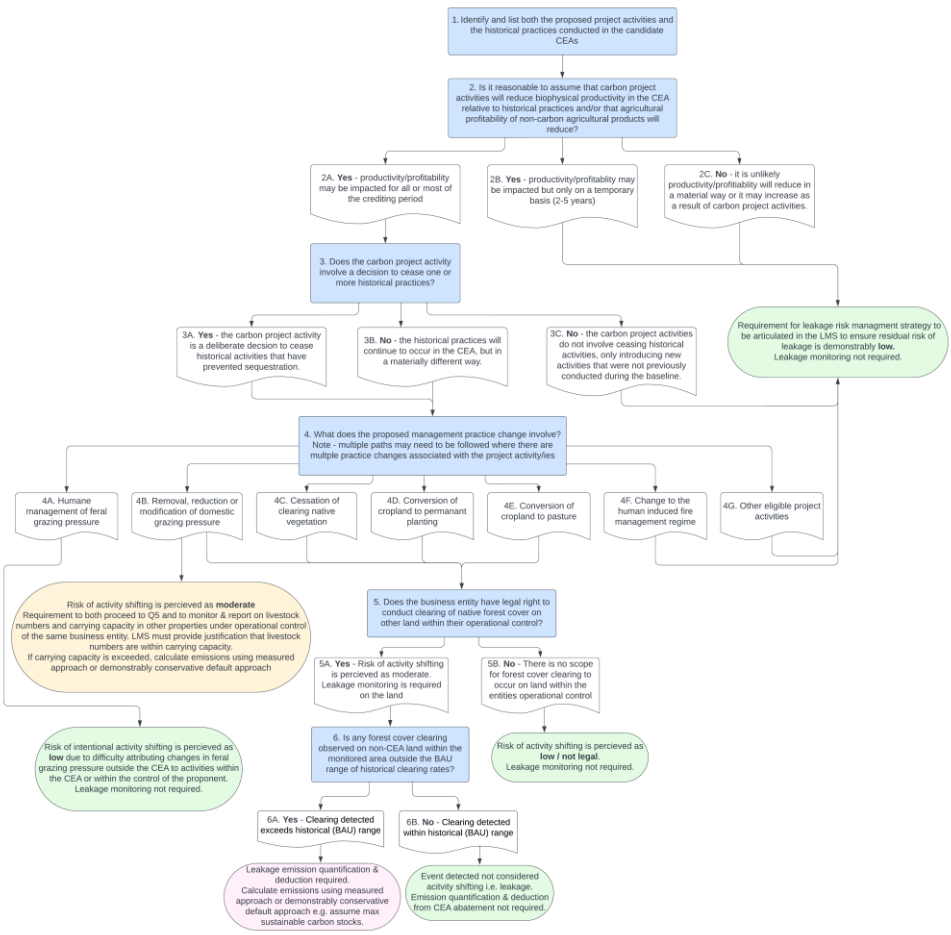
7. Whether the method sufficiently accounts for material greenhouse gas emissions directly resulting from carrying out the project

Leakage

Climate Friendly supports the risk-based leakage assessment approach developed by the CMI IFLM Taskforce Technical Working Group (Figure 4). This approach uses a decision tool to identify activities with a greater risk of leakage. Using this tool, the major leakage risk identified was the displacement of mechanical/chemical suppression activities (i.e. shifting of land clearing). Leakage from soil carbon projects was not identified as a major risk of leakage, because the management activities generally increase long term agricultural productivity. Therefore the proponent would be less inclined to shift emitting activities elsewhere.

The Taskforce Technical Working Group also considered the risk of deliberately drawing down soil carbon in exclusion areas, in order to build soil carbon in the CEA. It was concluded the risk is restricted to the concept of 'drought reserve paddocks' and emissions are likely immaterial as these are generally only a small area on the property. However this activity could be specifically monitored in the Land Management Strategy.

Figure 4 Risk based leakage assessment tool developed by the CMI ILFM Taskforce Technical Working Group



***Recommendation 7**: Emissions from leakage under the Soil Carbon Method are likely to be immaterial. The potential for soil carbon loss in drought reserve paddocks could be reported and monitored in the Land Management Strategy.*

Other emissions factors

The following minor updates to default values and emissions factors should be implemented:

- Update default GHGe values in the Supplement. The GHGe defaults in the Soil Carbon 2021 Method Supplement have not been updated since July 2020. Default values should be based on the most recent National Inventory Report at the time of offsets report preparation and submission.
- Update crop- and pasture-legume residue emissions. In the 2021 Method Supplement crop residue defaults have broad categories that introduce inaccuracies into the emissions calculations e.g. one default for 'pulse' residue and no pasture-legume default values for crop residues (relevant if cover cropping or green manuring etc).
- The default values for poultry emissions are missing from the Supplement
- The GHGe (e.g. NOx) for 'non-synthetic' fertilisers is missing from the Supplement
- The default carbon stock for unrestricted non-synthetic fertilizers is missing from the Supplement.
- GHGe associated with soil disturbance from site preparation for facilitated regeneration activities should be included, similar to existing EMAs in the Soil Carbon Method 2021

3.5 Conservatism

8. Are the existing measures, such as permanence discounts, and the temporary withholding of ACCUs at the first measurement period, sufficiently conservative for estimating abatement?

The 2021 Soil Carbon Method assumes that baseline carbon stock is stable (i.e. not declining or increasing). This approach requires that project proponents sequester sufficient soil carbon to exceed the carbon stocks measured at the time of project registration (the 'baseline' carbon stocks). The State of the Environment (2016) is one of many reports demonstrating the general trend of declining soil carbon stocks in Australia, highlighting the difficulty project proponents may face in building soil carbon stocks above baseline levels that are already declining. This sets a high bar, in that project proponents must reverse a general trend of losses before beginning to generate eligible abatement.

As mentioned earlier in the document, Climate Friendly's first soil carbon project to go through audit has a 60% discount on measured soil carbon stock changes (for first issuance). While conservativism is important, the current approach may be overly aggressive in contexts where science-based parameters such as NPP caps are aligned with results. We recognise public concerns about the impact of rainfall and temporary increases in soil carbon, and we recommend that the existing 25% first issuance discount be replaced by a 30% NPP cap to better address this challenge as proposed by the CMI ILFM Taskforce, and reproduced in Appendix 1.

9. Should the SOC method 2021 should be varied to include additional measures such as, further discounts, caps on the rate of conversion of plant biomass to soil carbon or reasonable upper limits on the rate of increase in soil carbon to ensure conservativeness?

The 2021 Soil Carbon Method assumes that baseline carbon stock is stable (i.e. not declining or increasing). This approach has attracted some concerns that some sequestration could be driven mostly by rainfall patterns, rather than the management change. As mentioned earlier in the document, we support creating reasonable bounds for soil carbon sequestration (as suggested in Mitchell et al 2024), via the discounting approach based on NPP articulated in Appendix 1.

4 Relationship to the proposed Integrated Farm and Land Management method

Climate Friendly has conducted a review of the 2021 Soil Carbon Method, and identified areas that might need to be revised to ensure compatibility with the IFLM. As a general comment, the method requires relatively few changes for it to become functional as a module of IFLM.

4.1 General structure to allow both standalone and modular use

We support the soil carbon method continuing to function as a standalone method, and to also function as a module under IFLM. To enable this, we recommend that:

- The IFLM method should mirror the requirements of the standalone method, with any difference limited to the extent necessary due to the framework nature of IFLM and intersection with other modules.
- The IFLM method and standalone soil method should use the same technical guidelines.
- The definitions and parameters should be harmonised across IFLM, the soil method, and other methods with potential to form IFLM modules, including but not limited to EP, Avoided Clearing and any livestock methods. This would enable interoperability of methods and equations.

Recommendation 8: *The IFLM method should mirror the requirements of the standalone soil carbon method. It should not replace the standalone soil carbon method. The definitions and parameters should be harmonised between IFLM and sub-component modules to allow interoperability of methods and equations.*

4.2 Soil sequestration under woody biomass

Under the ILFM method, it is proposed that proponents could claim abatement from increases in soil carbon, woody biomass and other pools affected by the management change, on the same land.

There is evidence that land use change from pasture, cropping and degraded land; to forested cover via facilitated regeneration (ie environmental plantings) can increase soil carbon, and distribution of soil carbon throughout the soil profile. As with many practice changes, literature indicates that changes in soil carbon stocks following afforestation is affected by initial SOC, land condition, soil type, previous land use and climate.

The primary drivers of increased soil organic carbon under trees are attributed to increasing the amount of organic matter (OM) input through plant litter, roots and root exudates, as well as greater retention of soil OM through reduced soil disturbance (if previously under disturbance regimes, such as cultivation), increased soil aggregation and buffered soil temperature and moisture. These components assist in improving water infiltration and retention, an important component of soil carbon sequestration.

Planting trees in pasture paddocks can reduce evapotranspiration and soil erosion by slowing surface water runoff, increasing surface roughness and reducing wind velocity across a site.

Changes to plant biodiversity and root structure through afforestation also positively impacts soil microbial communities, supporting the growth of mycorrhizal fungi which in turn may increase soil carbon sequestration rates and improves carbon stability.

Key finding 5: *The establishment of paddock trees, or regeneration of forested cover on land that has been continuously grazed pasture, continuously cropped or degraded land, aligns with permanent increase in soil carbon.*

There can be logistical constraints to soil core sampling in areas with high tree density. This can generally be dealt with using mobile sampling units, but if trees occur at very high density, access constraints could occur. There can also be difficulties of sampling within thick tree roots.

5 Other potential improvements to the method

5.1 Newness in lieu

Agricultural sowing, grazing and fertilization activities are highly seasonal, and optimal management windows can be narrow and require significant planning lead times. Noting that the CER can take up to 90 days (or more) to declare a project, this could lead to up to twelve months delay in commencement of a management change. In a method that is already characterized by lengthy delays, this temporal specificity introduces yet another barrier to project implementation. Similar to the newness in lieu requirements introduced into the 2024 Environmental Plantings methodology, a newness in lieu requirement permitting time-sensitive management changes to be implemented after submission of the project registration form, but prior to declaration, would remove the temporal sensitivity of this issue.

Recommendation 9: *We recommend expanding the newness in lieu requirement in the method, allowing the full set of eligible management changes to commence after submission of project registration forms, but before project declaration.*

5.2 Post sampling re-stratification

The 2021 Soil Carbon method does not allow re-stratification after sampling has occurred. Instead, re-stratification is permitted in the next sampling event. This rule seems unusual, as post-sampling re-stratification is common practice in sampling woody biomass and other pools (for example, this practice was allowed under the avoided deforestation method). Post-sampling re-stratification allows the information collected from the field sample to be used to ensure that strata are grouped according to like-characteristics (such as having similar carbon stocks). The baseline soil carbon sample is often the first time that detailed information is known about the soil characteristics, so it seems unusual not to use this data to inform the stratification. Re-stratifying after the sampling event is not 'gaming', nor does it compromise the independence or statistical power of the randomly allocated sample points. It simply allows the strata to be re-drawn based on newly acquired information obtained during the sample. Allowing post-sampling re-stratification would make a significant difference in reducing sampling uncertainty, and in doing so would significantly reduce sampling cost.

Recommendation 10: *Post sampling re-stratification should be permitted. This would allow strata boundary to be revised based on information obtained during the sample. This approach would significantly reduce sampling uncertainty and cost, without compromising the independence and statistical power of the random sample points.*

5.3 Treatment of non-synthetic fertilizers

The definition of non-synthetic fertilizers should be changed as follows:

- The allowable organic carbon content should be increased above 5%, as many non-synthetic fertilizers have higher carbon content than this;
- The list of intended functions of non-synthetic fertilizers should expanded to include 'improve soil structure or function' (or similar)

The definition of 'restricted non-synthetic fertilizers' should be revised as follows:

- Straw should be defined as a waste product under the definition of 'designed waste stream'. This would enable products containing purchased straw to be classified as unrestricted non-synthetic fertilizers. Straw is common component in the production of high-quality compost, and it is in fact a by-product from the cropping process.
- Section 12(7) of the method should be revised to allow for higher input rates (up to 3-5 tonnes per hectare) of restricted non-synthetic fertilizers (currently restricted to 100kg of carbon per hectare per year). Given that the carbon stock of any restricted non-synthetic fertilizer applied in the two years prior to sampling must be deducted from measured carbon stock changes, this is a natural disincentive to apply too much compost. However the current rate of 100kg of carbon per hectare is potentially too low to have the desired effect.

Recommendation 11: *The treatment of non-synthetic fertilizers in the method could be better aligned with how non-synthetic fertilizers impact soil health, and with the composition of typical composts.*

5.4 Other reforms

Other minor reforms to the method could include:

- **Definition of organosol:** The organic carbon content of organosols should be increased above 10% to align with internationally agreed definitions of peat soils. At 10% organic carbon content, the soil in some CEAs risks become ineligible throughout the lifetime of the project.
- **Definition of tillage**: The definition is too broad, and captures activities with minimal amounts of soil disturbance. Specifically, we propose that disc seeding be excluded from the definition of tillage. Disc-seeding is typically conducted during a pasture renovation only exposes the soil to sunlight and oxygen to a very small extent. Therefore, the emissions that would result from this activity are negligible. Classification of disc seeding as tillage triggers application of a default emissions factor applicable for intensive tillage, which results in significant exposure of the soil to sunlight and oxygen, encouraging high levels of microbial activity and respiration of CO_2.
- **Expand the list of items permitted for Project area variation**: Section 9(4) of the method is overly restrictive. It disallows project area variations after the first offsets report, except in very limited circumstances. This seems quite naïve given the broad range of non-carbon related reasons why a project area might need to be varied. The list should be expanded at a minimum to include changes to cadastral boundaries, property sales and transfers, and exceptional circumstances as agreed by the Regulator. Variations should be permitted at any time, not just before the first offsets report.
- **Cross-reference existing legislation**: The method makes various references to Paragraph 20AA of the CFI Rule (i.e. restrictions on clearing in the 7 / 5 years prior to project registration). We recommend that the method cross-references paragraph 20AA of the CFI Rule, rather than reproducing the requirements. This future-proofs the method in case paragraph 20AA of the CFI Rule is varied in future (which we hope it will, as it includes a very odd definition of forest, among other things).
- **Review of terminology used for 'project area' and 'CEA'** – at times the method refers to project area when we think it means CEA (example Section 15, box in Section 19)

- **Assumptions for livestock monitoring Section 39(2):** The assumed birthdate of animals in each livestock should be changed from the current assumption of 'the first day of summer', to either 'the first day of autumn or spring', based on the season when calving/lambing normally occurs. This better aligns with the dates that most calving / lambing actually occurs. Under the current arrangement, if animals are actually born in autumn, this will result in a large discrepancy in calculated emissions versus real emissions. It also complicates the cross-referencing of animal numbers in the calculations with the evidence because there will be discrepancies due the birthdate assumption. Generally most farmers, at least in more intensively managed agricultural areas, are very aware of how old their animals are.

6 Appendix 1: CMI ILFM Taskforce Discounting Proposal

6.1 Purpose of this document

- This document outlines a revised soil carbon discounting proposal from the CMI IFLM Taskforce, for consideration and discussion. The revised concept directly responds to feedback from workshop participants at the IFLM Technical Workshop (June 2024, Canberra), regarding rainfall variability and the potential for over crediting in the short term.

6.2 Summary

- To provide high confidence in the additionality and permanence of projects that undertake soil carbon sequestration activities under the IFLM method, the CMI IFLM Taskforce proposes the inclusion of a temporary discount on ACCU issuance based on modelled Net Primary Productivity in the Project Area, to replace the existing 25% discount in the 2021 soil carbon method.
- The approach involves comparison of reported sequestration in the CEAs, to modelled Net Primary Productivity in the CEAs. Any measured sequestration beyond a proposed cap of [30%] of Net Primary Productivity is potentially due to favourable climatic influences and not management changes, and thus at risk of not being maintained in subsequent sampling or reporting rounds (i.e. may not be additional or long term soil carbon sequestration). Carbon sequestered in excess of this cap would be held in reserve for up to ten years after the baseline measurement, after which time it would be released if the sequestered soil carbon is sustained.
- The approach is intended to reduce the potential for over issuance of ACCUs due to favourable climate, and/or timing of baseline and remeasurement. It is intended to lead to longer-term stability of increases in soil carbon, particularly beyond the first 10 years of a 25-year project (permanence).
- The proposed approach would replace the existing conservative discounts included in the soil methods to date including:
    - The 25% temporary discount for the first issuance under the 2021 Method, which can be claimed back at the T2 reporting period
    - The 50% temporary discount previously for the first issuance under the 2018 Method

6.3 Proposed concept under IFLM

In its IFLM discussion paper circulated in May 2024, the CMI IFLM Taskforce recommended mirroring the 2021 soil carbon method and Supplement as much as possible. The Taskforce is of the view that the 2021 Soil Carbon Method and Supplement were legislated relatively recently following an extensive co-design process led by the Clean Energy Regulator, and largely remain fit-for-purpose.

Nevertheless, outlined below are some options to address some concerns in the scientific community regarding permanence of sequestered carbon, and attribution of sequestered carbon to the management change as opposed to climatic variation. This is particularly important to meet the requirement of conservatism under the Offsets Integrity Standard. The approach proposed in this document aim to improve the integrity of credits issued from eligible increases in soil carbon over time, while enabling participation in Soil Carbon Projects under the IFLM.

The Taskforce proposal is that soil carbon credits under IFLM are issued:

- Based on the 2021 Soil Carbon Method, and

- Instead of a temporary discount (25%) applicable at the first issuance, credits would be issued up to a project-defined (or regionally specific) science-based cap on soil carbon sequestration.
- The cap could be based on a percentage of the modelled Net Primary Productivity (NPP) in the Project Area or region. This approach is based on the reality that photosynthesis by plants is the ultimate source of most carbon additions to soil,[12] and therefore NPP is the theoretical maximum of carbon inputs to the soil.
- The NPP cap would require an assumption of the amount of NPP (expressed in t C) that could theoretically be converted to soil carbon, recognising that soil is only one pool of carbon in the landscape, and that it takes time for carbon in organic matter from plants (above- and below-ground) to enter the soil organic carbon pool (defined as total organic carbon in the fine-earth fraction; <2mm).
- Options for the initial proposed cap could be: a universal fixed percentage, say [30%] of the total NPP across all regions in Australia; or a variable cap informed by plant root:shoot ratios and potentially also climatic conditions.
- Any sequestration occurring above the cap would be held over and ultimately released if the soil carbon increases are sustained for the following time periods:
    - Five or more years from the baseline measurement, providing there have been three or more measurement events, and the subsequent measurements are taken within the same NPP quantile as the baseline period, or
    - [at 10 years from baseline] to coincide with the minimum sampling frequency for soil CEAs under the 2021 soil carbon method (a sampling frequency also proposed under IFLM).
- This approach would ensure that soil carbon sequestration is sustained through at least one climatic cycle (i.e. a low and high rainfall period) prior to full issuance, and it would incentivise measurement during the same climatic conditions if possible.
- This approach would apply to all issuances within the first ten years, and would not be applicable thereafter.

A key consideration in this approach is the assumed percentage NPP conversion to soil carbon. While NPP indicates the amount of photosynthetically fixed C that can *potentially* be sequestered in SOM, in reality the proportion of annual carbon input to soil from NPP depends on plant C allocation coefficients, such as shoot:root ratios. This is termed 'belowground NPP' (or BNPP), and includes inputs from roots, exudates, and other root-derived organic material from root-turnover. There is some uncertainty regarding these coefficients largely due to the influence of plant type and agroecosystem factors, however, there are some shoot:root ratios for common crops and pastures in FullCAM, e.g. ~50% cereals and ~75 % perennial pastures. A further conversion factor for OM making into the <2mm fine-earth fraction may need to be considered also.

6.4 Potential data sources

Options to calculate NPP could include:

1. TERN Data Discovery Portal (GPP, NPP and Carbon mass datasets are created on every 16 days from 2001 January to Dec 2018)
2. MOD13Q1.061 Terra Vegetation Indices 16-Day Global 250m | Earth Engine Data Catalog | Google for Developers

[12] With the exception of rock weathering or other processes that occur over geological time periods, or the physical addition of carbon to soil such as via compost.

3. MOD17A3HGF.061: Terra Net Primary Production Gap-Filled Yearly Global 500m | Earth Engine Data Catalog | Google for Developers (Annual NPP from 2001-2023)
4. Alternatively, measurements of NPP could be supplied from locally applicable flux towers, or similar high-quality measurements in comparable ecosystems. Flux towers could provide continual recordings of ecosystem drawdown and respiration and may provide more appropriate data on local biophysical conditions.