



UKCCC Land Use Activity Measure Reporting and Verification (MRV) V 1.2 1st March 2022

Impact Quantification Methodologies

All UKCCC MRV protocols have been developed with a view to future approval to ISO 14064-2 and to align with the Voluntary Council for the scaling of voluntary offset markets (ICVCM) Core Carbon Principles. Only UKCCC approved MRV protocols may be used to determine the outcome of UKCCC approved projects.

The UKCCC Validation and Verification Body (VVB) function is verified by UKAS to ISO 17065. All Greenhouse Gas Removal (GGR+) credits can be bought and retired by companies to count towards net zero claims provided they have followed all UKCCC claims guidelines.

Learning By Doing

The methodologies will be subject to change as the UKCCC Commissioner and the UKCCC technical panel update the UKCCC through the Version approval cycle.

Project developers help farmers and landowners through the issuance of UKCCC approved GGR+ credits to develop practices that are known to sequester and store CO₂e into timber, increased soil carbon and other natural products and processes, these practices will be verified by the UKCCC through an initial project approval process followed by an annual light touch verification and 5 yearly full verification process, conducted by a UKCCC commissioner and or appointed VVB.

The 4 Pillars of UKCCC Projects:

- Assured additionality
- Assured permanence
- Avoidance of leakage
- Avoidance of negative outcomes

These 4 Pillars are ensured through the UKCCC approval and verification process and only after the UKCCC commission has been satisfied of a projects protection of these pillars will UKCCC GGR+ credits be issued.

The first tranche of credits issued must be used to ensure the project host is at net zero emissions before any excess are traded.

Issuance is no guarantee of ongoing acceptance in the scheme, as such the UKCCC Commissioner reserves the right to de list any projects that do not adhere to the standards of the code.

This set of protocols is to be used alongside the UKCCC GGR+ Credit requirements.



Typical approval and verification process:

Step	When	By whom	With whom	Notes
Complete Regenerative Farming Toolkit (for all soil and regen ag based projects)	Project Planning	Project Host	Project developer	Required to establish if the project host has the desire to fully immerse into the project
Establish Host Net CO2 position	Project Planning	Project Host	Project developer/external contractor + approved carbon calculator	Required to understand the net GGR+ credits that can be sold
Project development document inc. Annual project plan approval	Project Planning	Project developer	Project Host	Project length decided
Baseline Established	Project Planning	Project Host	Project developer	Quantification methodology established
Project Approval	Project planning	VVB & UKCCC Commissioner	Project developer	
First GGR+ credits issued	Project approval	UKCCC Registry	UKCCC Commissioner	Discount factor applied
Annual Monitoring report	Before first anniversary of project start date	Project developer	Project Host	Report to UKCCC Commissioner via Annual monitoring report
UKCCC 5th year verification	Before fifth anniversary of project start date	VVB & UKCCC Commissioner	Project developer and Project Host	Discounted GGR+ credits released or cancelled.



Soil, regenerative agriculture projects

Soil and regenerative agriculture projects are viewed by the UKCCC as a highly important project type that can be rapidly deployed to draw down atmospheric CO₂ into soils on a continual basis. Just 2 tonnes of CO₂ per hectare drawdown across all UK agricultural land can help reduce overall atmospheric CO₂ by over 34 million tonnes per year in the UK. Although some critics feel that soil organic matter increases can only be seen as a temporary measure as it can be reversed, a widescale adoption of regenerative agriculture can reduce atmospheric CO₂ concentration whilst the rest of the economy de-carbonises. In climate change mitigation there is no substitute for reducing emissions.

The continuation of regenerative agricultural production will lead to continued atmospheric CO₂ sequestration and storage and deliver a range of co benefits including cleaner air, water, more climate resilient soils able to withstand drought shocks and lead to the production of healthier crops, less reliant on artificial input

An ongoing move towards regenerative practices will continue to sequester and store significant levels of atmospheric CO₂ over the life of the project thus ensuring permanence.

The aim of a regenerative agriculture project is to help farmers finance the transition to practices that may in the short term reduce their income.

The establishment of a baseline

A baseline is essential to ensure that it can be demonstrated that the change in management practices has led to an increase in soil carbon levels. Before the start of any project that leads to UKCCC approval, soil carbon levels will be established, determined by the UN Standard operating procedure for total soil carbon using the DUMAS dry combustion method.

At the start of the project the project proponent shall establish the current soil testing regime of the project host. The project proponent shall attempt to use current data where it exists and discuss with the host to add SOC testing to this regime to save cost.

UKCCC Soil Sampling Methodology

A set of GIS algorithms are used to create soil sampling zones within all grassland, arable and permanent crop (e.g. vineyard) land across a farm. Zones are 18 metres or more away from each field's outer edge to mitigate the potential effect of boundary features such as leaf-fall from hedges and trees, soil compaction near gateways, and nutrient concentrations from middens etc.

Where conditions allow, Soil cores are taken at 0-30, 30-60 and 60-90 centimetre depth are collected within each soil sampling zone at a rate of two cores per hectare. Where conditions do not allow, then cores are taken as deep as possible. The location of each soil core is randomly generated and geocoded to its what3words address, i.e. a unique named 3 metre by 3 metre grid square. Soil core locations are spaced 9 metres or more apart from each other.

Soil samples from fields are then mixed together to create 3 composite samples per field to be sent for testing to an appropriately accredited soil lab (UKAS 17075 or equivalent) for Dumas dry combustion analysis and reporting. Each soil sample is given a unique reference using the soil sampling zone's what3words address.

To maximise the size of the soil sampling zone for fields which are less than 1 hectare in size, a 3 metre distance from the boundary edge is used (reduced from 18 metres from boundary edge). Soil cores are taken from two randomly generated what3word locations (spaced 9 metres or more apart from each other), and the soil samples are then mixed together to create a single soil sample for lab analysis.

Fields within Less Favourable Areas a standard W soil sampling methodology is used. Soil samples are then mixed together to create a single soil sample for lab analysis.

Samples should be mixed in a clean container with 300gms selected and placed in a bag to be sent to the lab for testing.

Taking samples at the same time of year is recommended and before any artificial fertilizer or manures/ composts or at least 3 months after application.



Approved labs will present the result as Total Carbon stocks per hectare in tonnes. The report should state the following metrics:

- Bulk Density kg/l
- Sample depth cm
- Stone content %
- Carbonate class
- Soil inorganic carbon (SIC) %
- Total carbon %
- Total nitrogen %
- C:N ration
- Organic matter %
- Soil organic carbon (SOC) %
- Active carbon mg/kg
- Active carbon % of SOC
- Total carbon stock t/ha

The total CO₂ sequestration shall be calculated by multiplying the carbon stock per hectare by 3.67.

The average total carbon stock per hectare shall be established and used as the baseline figure. It is recognised that organic matter levels vary from year to year and crop to crop but that with a move to regenerative farming practices the trend in soil carbon stocks should always be increasing.

Loss of ignition (LOI) tests shall be permitted for use with historic calculations but the UN SOP Dumas method must be adopted in all future tests. A higher discount factor shall be applied where LOI are to be used as the baseline, typically applying a further 20% discount.

Soil analysis tests shall be conducted in labs operating to UKAS 17025 or international equivalent using the UN Food and Agriculture Organisation (UNFAO) Dumas soil organic matter methodology.

The UKCCC reserves the right to change the required testing regime as new techniques are developed. The aim is to establish a remote monitoring system to increase verification frequency and accuracy. All real data is to be made available to approved remote modelling systems to help enhance the accuracy of models.

For tree planting or carbon cropping projects the same soil baseline tests are taken PRIOR to planting.

Ongoing project monitoring

Each year before the anniversary of the project start date the project proponent shall visit the project host to complete a light touch Annual Monitoring Report as per the Annual Monitoring Plan, as laid out in the Project Plan Template.

This shall include the completion of an audit of the project hosts activities that may influence the status and validity of the project. The findings will be recorded on the Annual monitoring report. Ongoing regenerative agriculture practices will be discussed, and the project plan updated to reflect any changes that have been identified as current best practice.

Every 5th year a verification soil test will be conducted to determine the carbon stocks at that point. The test will be conducted by the DUMAS method, unless the UKCCC deem a different methodology is required due to technological advances.

Tree planting and above ground biomass projects

It is assumed that new traditional mixed woodland plantations shall be approved and verified by the Woodland Carbon Code.

Where new woodlands are created with a view to harvesting the timber, the UKCCC will approve and verify projects and enable the issuance of carbon credits, the full MRV for this is in development and will be released in Q4 2023, it will be developed along the following lines:



Where trees are grown in full afforestation or agroforestry systems for timber production and harvested when they have reached maturity the timber must be sent for processing into construction and manufacturing materials and not to biomass plants or other fuel uses. It is permitted to turn brush wood into chip for use in biomass plants or composting. As the methodology and infrastructure is developed chip could be diverted to biochar production.

There shall remain a full chain of custody for the materials sent for construction and manufacturing and details entered onto the UKCCC Carbon Tracking system.

When trees are planted there shall be a conservative estimate of their growth to determine the total likely carbon storage capability. The estimate shall be determined using peer reviewed documentation and industry standards. GGR+ credits will be issued from year 1 of planting where actual growth rates can be quantified.

UKCCC GGR+ credits shall be issued on the estimated basis with 20% of issued credits held in the UKCCC Registry reserve until successfully verified.

Verifying CO₂ stored in timber will be calculated calculated quantitatively when harvested, the additional organic carbon stocks in the soil shall be verified using the approved UKCCC Land use MRV protocol soil methodology.

Biomass that is turned into products shall have a full life cycle analysis (LCA) carried out by the project proponent and submitted to the UKCCC for approval. UKCCC GGR+ credits shall be issued upon approval of the LCA and process.

Each year the project proponent shall produce a mass balance calculation to determine the total CO₂ embedded in the products. UKCCC GGR+ credits shall be issued on an annual basis. Satellite imagery and LIDAR tree biomass assessments will be permitted for use as long as there has been a documented ground truthing calibration exercise carried out and submitted to the UKCCC for approval.

Carbon Cropping methodology

Carbon crops are those grown in an arable rotation or permanent field scale crops that are grown specifically to produce high levels of biomass with an aim to increase soil organic carbon stocks and to improve long term soil fertility and climate resilience. Carbon crops can include but not restricted to the following:

- Lucerne
- Grass and clover mixes
- Mixed species temporary cover crops
- Clover
- Hemp
- Miscanthus
- Short rotation coppice (for biochar or construction materials production)

Methodology:

- Fresh yield, converted to a dry matter yield
- 50% dry matter estimated to be carbon
- Multiply each tonne carbon by 3.67 gives the total amount of CO₂ incorporated into the soil.
- Minus calculated losses.
- For example, A 30 tonne hectare fresh weight lucerne crop has a dry matter yield of 15 tonnes per hectare.
- 7.5 tonnes per hectare carbon incorporated.
- Multiply by 3.67 = 27.52 tonnes CO₂ sequestered.
- CO₂ losses estimated at 3.0t/CO₂/ha/yr gives a final amount that commands a carbon credit issuance of 25.52 tonnes CO₂
- A further discount factor shall be applied and gross, process emissions deducted

UKCCC GGR+ credits shall be issued on the estimated tonnage of CO₂ sequestered into soils, reported as soil carbon stock increases, biomass and timber yields less a buffer. The buffer is determined by the project type and perceived risk



the deducted credits shall be held in the UKCCC Registry reserve and paid upon successful UKCCC approved carbon stock verification every 5 years.

Where SOC stocks have not risen as planned, the discount factor credits held in reserve will be permanently deleted from the register.

The project proponent can apply to the UKCCC Commissioner to increase the annual discount factor should the project host give reason at the annual monitoring visit to believe that the target issuance of GGR+ offsets may not be achieved.

Discounting Factor tables

Uncertainty discounting approach

Project Type	Uncertainty buffer discount
Regenerative agriculture	20%
Mixed indigenous species woodland	10%
Wetland Creation	30%
Habitat creation	20%



Land Use MRV protocols in development:

- BioChar production and use.
- Arable reversion to permanent pasture.
- Wetland creation.
- Wildlife habitat creation/reversion statutory Biodiversity net gain (BNG) and voluntary BNG areas.
- Miscanthus production.
- Enhanced weathering on land and sea.