Easter Bavelaw Farm

SAC CONSULTING | Part of Scotland's Rural College (SRUC)

Farm Carbon Storage Network

Through the establishment of a Farm Carbon Storage Network, this project seeks to raise awareness of the value of carbon stored on farms. Funded by the Scottish Government's Knowledge Transfer and Innovation Fund (KTIF), five farms were selected to participate in the first phase of the project.

Why do the project?

Farmers are increasingly aware of their need to help tackle the climate crisis, through a combination of reducing greenhouse gas (GHG) emissions and increasing sequestration of carbon dioxide on farms. A farm's soils, trees and hedges act as a carbon sink, which can be difficult to quantify, however, technology can help us improve the accuracy of these estimated carbon stocks.

This project quantifies the value of these natural assets in terms of their carbon storage, establishing a baseline for future monitoring. The carbon stock on each representative farm was estimated by combining soil testing and LiDAR (Light Detection and Ranging) aerial surveys.

The network data delivers a better understanding of the impact and importance of certain farm habitats, identifying management strategies that could be employed to enhance them.

Easter Bavelaw Farm

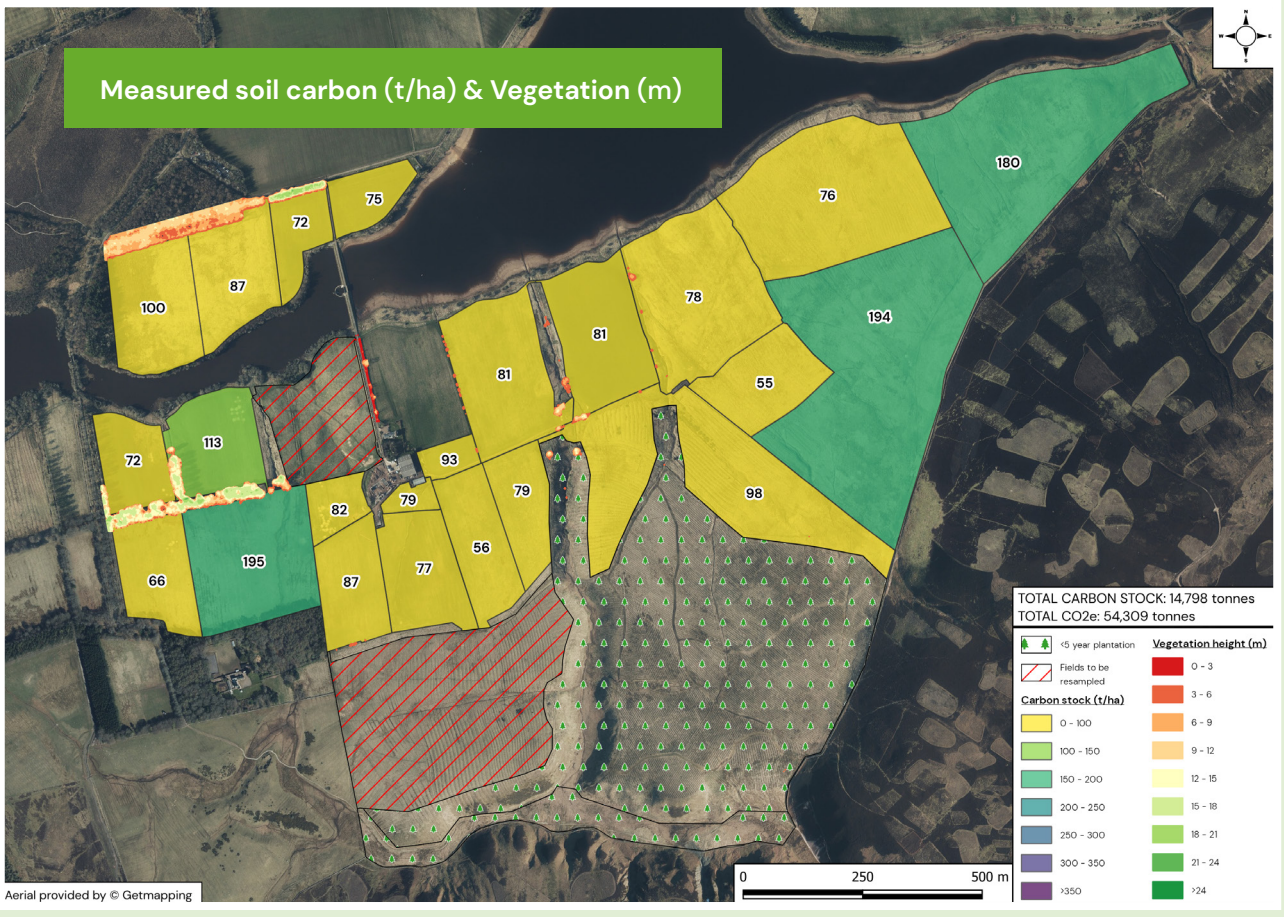
Located to the southwest of Edinburgh in the Pentland Hills, Easter Bavelaw was selected to represent a sheep system for the farm carbon storage network. Managed by Graham and Becci Barr, the site consists of a mixture of hill ground and improved pasture in the lower reaches. There are a variety of habitats on the farm from mature and new woodlands to rough hill grazing.

Carbon storage

At Easter Bavelaw, the project looked at quantifying the carbon stored within the topsoil and above-ground biomass in trees and hedges on the farm. These numbers are estimates, based on a snapshot of the carbon that was stored on the farm at the time of surveying.

It is important to note that there is a difference between carbon stored and carbon sequestration. **Carbon stored** is the carbon that is locked away in the soils, trees, and hedges at the moment of sampling, whereas **carbon sequestration** is the carbon that is actively being taken out of the atmosphere and stored in the farm's soils, trees, and hedges.

Carbon stored on site does not influence the estimated GHG emissions from the carbon footprint of the farm businesses. However, continuous monitoring can help to identify accurate sequestration across farms when action is taken to increase carbon stocks.



Trees and hedges

Since 2018, Easter Bavelaw has seen extensive Conifer and riparian woodland planting in its upland areas. The site also has areas of mature deciduous and coniferous woodland on the farm of over 40+ years, predominantly in shelter belts across the lowland areas.

There are small amount of mature hedgerow and a recently planted hedgerow along the access road. The newly planted woodland and hedges were not accounted for in our carbon stocks due to their immature nature. As this project progresses these areas will be incorporated into future calculations.

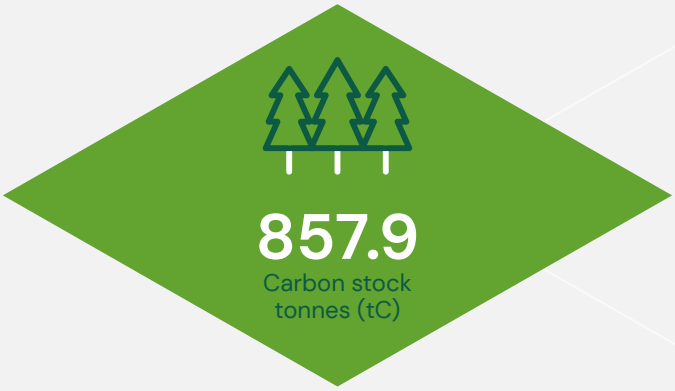
The total carbon that is stored in the above ground biomass was estimated to be 862 tonnes (tC).

Soils

The soils at Easter Bavelaw varied considerably between the actively managed fields and the extensively grazed hill ground. Soil organic carbon on the hill ground was considerably higher than the lower more intensively managed fields, this is likely due to the variation in plant life on the hill and the age of the ley. There is an active programme of reseeding being carried out currently, where multispecies swards are being incorporated.

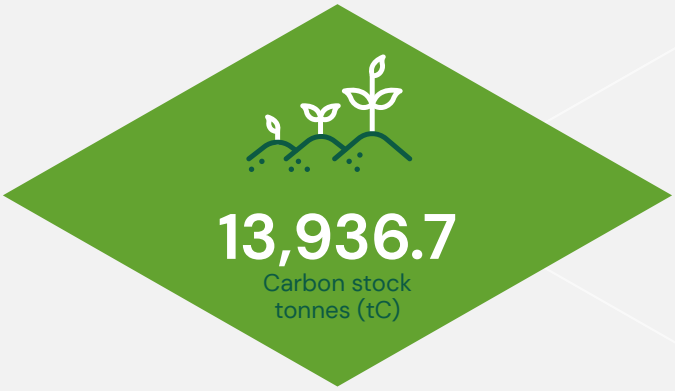
The total carbon stored in the soil at the time of sampling was estimated to be 13,937 tonnes (tC).

Total Tree Carbon Stock

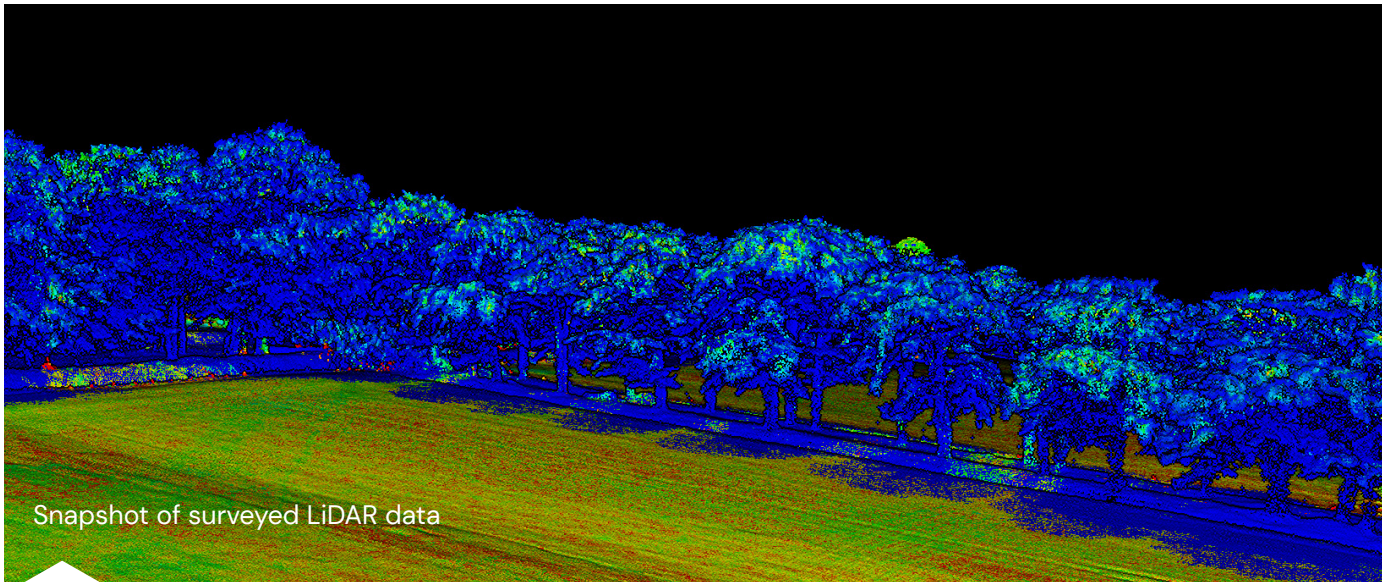


Total Hedgerow Stock

Total Soil Carbon Stock



Total Farm Carbon Stock



Snapshot of surveyed LiDAR data

Recommendations

Trees and hedges

To enhance and increase the above ground biomass of the trees on the farm there are a few different options:

Increase farm hedges: Increasing the length of hedges at Easter Bavelaw is actively being pursued on the farm. Continuing to grow the hedge network would help to ensure the hedges provide a sufficient field boundary and support shelter and shade for livestock. Filling hedge gaps with a diverse planting selection alongside extending the hedge network could help to create habitat bridges which link the mature woodlands and shelter belts with the more recent tree plantings, acting as a corridor for biodiversity.

Incorporate trees in pasture: Most of the trees on farm are in separate forestry plots or in field boundaries. Planting some native deciduous trees within fields could help to support shelter and shade for livestock. This could also be expanded to incorporate new tree planting within an extended hedge network, or perhaps creating more shelter belts for the more exposed part of the farm. This would provide shelter and shade for livestock, whilst having minimal impact on grassland productivity and potentially offering health benefits to sheep.

Agroforestry Silvo-Pasture System: Based on our survey, one field on the farm has the potential to incorporate an agroforestry silvo-pasture system. Planting trees at a density of between 100-400 stems per hectare would leave considerable light for grass growth. This could also be coppiced to produce firewood to be sold or utilised on farm. There have been many studies that identify positive benefits in terms of livestock health from agroforestry systems. The incorporation of a multi species sward prior to planting could improve grassland resilience under the tree canopy, reducing production loss whilst building resilience to climate change.

Soils

To improve soil carbon the following options could be implemented:

Multi species sward: There is an active reseeding strategy already in place. Fields are sown with fodder crops before being overwintered and then sown with a multispecies sward. This approach has resulted in no identifiable reduction in soil organic carbon due to reseeding. It is likely that the continuation of this will help to increase or maintain the soil organic carbon across the farm.