

# ARCZero

ACCELERATING FARMING TOWARDS CARBON NEUTRALITY

## THE ROAD TOWARDS NET ZERO FARM WALK

Casement Farm, Ballycastle, Co. Antrim



ARCZERONI.ORG



Department of  
**Agriculture, Environment  
and Rural Affairs**

[www.daera-ni.gov.uk](http://www.daera-ni.gov.uk)



The European Agricultural Fund  
for Rural Development: Europe  
investing in rural areas



# The journey towards Net Zero



**John Gilliland**  
ARCZero Chair

**Whether these are your first tentative steps, or part of an ongoing journey towards NetZero I want to thank you for taking some valuable time out to join us at this ARCZero Farm walk.**

With the Climate Change bill now law, it's essential that we understand, not only what greenhouse gases are emitted on farm, but just as importantly how farms capture carbon too, ensuring a balanced future for the current and

next generation.

The recently implemented Soil Health & Nutrient Scheme will provide some of the information you'll see here today and will be an essential tool to help every farmer in the country to improve both their environmental and production efficiency. We hope today will help you understand just how powerful having such detailed information at your fingertips can be.

I would like to take this opportunity to thank the speakers from Queen's University and CAFRE who have given up their time to be a part of today's walk. Expertise such as theirs has been invaluable during this project.

ARCZero is a farmer-led European Innovation Project co-funded by the European Agricultural Fund for Rural Development (EAFRD)

## **ARCZero Farmers**

**Roger &  
Hilary Bell**  
Co. Antrim

**Simon Best**  
Co. Armagh

**Patrick  
Casement**  
Co. Antrim

**John Egerton**  
Co. Fermanagh

**John Gilliland**  
Co. Londonderry

**Hugh Harbison**  
Co. Londonderry

**Ian McClelland**  
Co. Down



**Professor John Gilliland with members of ArcZero**

# ArcZero Update

**Accelerating Ruminant Carbon Zero (ARCZero) is a farmer led European Innovation Partnership project.**

The project is led by John Gilliland of Brook Hall Estate and Queens University Belfast, alongside six other N. Ireland farms. Partners include Agrisearch, Birnie Consultancy, Devenish and Queen's University Belfast,

supported by AFBI, CAFRE, NRM, RPS and SRUC

ARCZero is designed to accelerate the pathway to Net zero farming by measuring and managing carbon flows at individual farm level, and empowering farmers with more detailed information, allowing them to make more positive change. The project aims to deliver actual individual

net farm GHG footprints, carbon stocks and highlight the potential for further annual carbon sequestration. It also has used twice, whole farm and enterprise specific life-cycle analysis (LCA) calculators, and a whole farm carbon asset register through the precise measurement of the on-farm carbon stocks within soils, trees and hedges.

The project is designed to enable participating farmers to better informed, make better quality of decisions which change practice and accelerates their farm's progress to net zero, through a science driving process of integrity and transparency, from the bottom up

To date, the project has conducted two sets of soil sampling for each farm, the first to obtain information on pH (in water, 1:2.5 volume ratio of soil to water), Phosphorus (Olsen) (1:20 volume ratio of soil to sodium bicarbonate), Potassium (1:5 volume ratio of soil to ammonium acetate or ammonium nitrate), Magnesium (1:5 volume ratio of soil to ammonium acetate or ammonium nitrate) and Organic Matter by Loss on Ignition (LOI).

The second sampling was a Soil Carbon Audit, sampled to 30cm with information on Bulk Density, Inorganic Carbon, Total Carbon, Total Nitrogen, C:N Ratio, Organic Matter, Soil Organic Carbon, Active Carbon (mg/kg) and Active Carbon (% of SOC). Alongside soil sampling, an aerial LiDAR survey was conducted when leaves were off the trees, from which carbon stocks of all the trees and hedgerows on each farm was calculated. The same LiDAR data was subsequently used, alongside the soil fertility survey to create unique "run off risk" maps to aid the improvement of water quality in the neighbouring streams and rivers .



**Dr Sam Strain speaking about Johne's Disease at the McClelland Farm Walk**



**Today's host Patrick Casement speaking at the Egerton Farm Walk**



**ARCZero members fact-finding at the Harbison Farm during 2022**

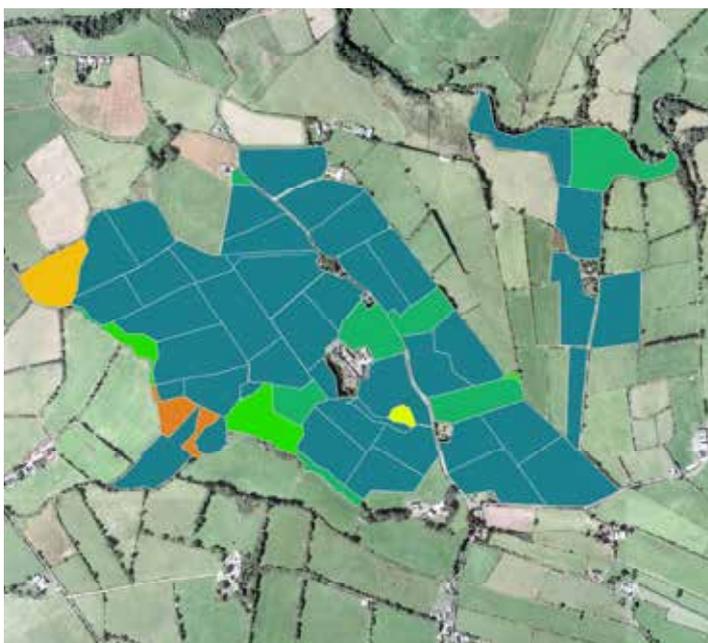
## Accelerating 7 NI Farms towards Net Zero



- Roger & Hilary Bell** *Sheep*
- Simon Best** *Arable & Beef*
- Patrick Casement** *Sheep & Sucklers*
- John Egerton** *Suckler Beef*
- John Gilliland** *Willow & Dry Stock*
- Hugh Harbison** *Dairy*
- Ian McClelland** *Dairy*



## Welcome to the Casement Farm



- **87 hectare farm**
- **Mixed enterprise**
  - Suckler cows
  - Blackface ewes producing mule lambs from Blue Leicester tups
  - Pedigree Blue Leicester flock

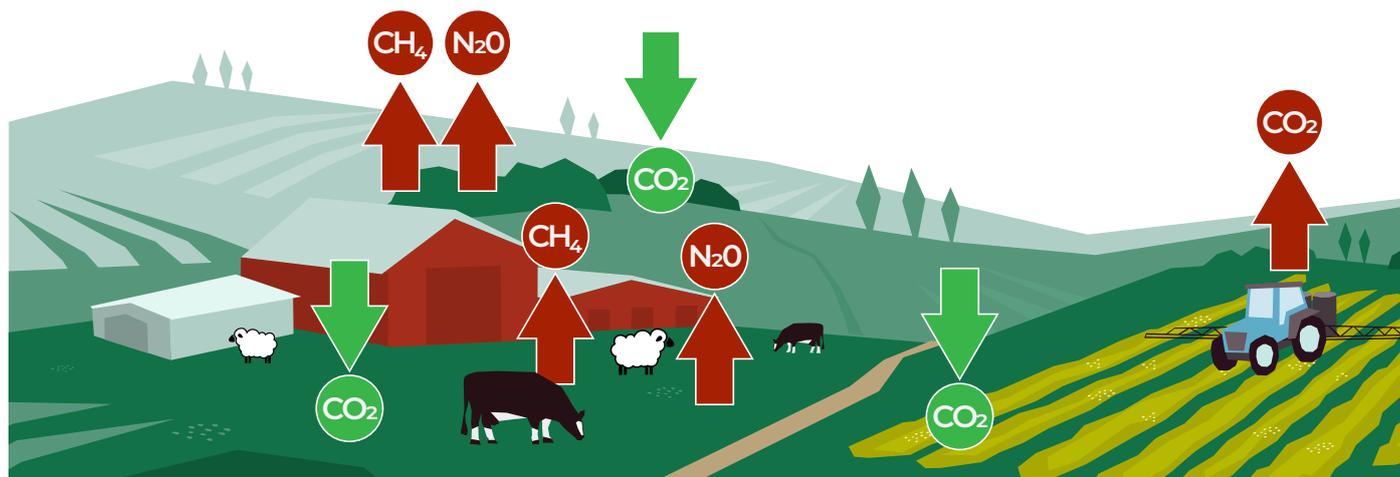


## Carbon Farming

If you can't measure, how can you manage?

Gross Annual GHG Emissions  
Less Gross Annual Carbon Sequestration  
= Net Farm Carbon

Using "Net" not "Gross" Emissions  
to get a complete picture  
of carbon footprint



# Keep up to date with ARCZero

# arczeroni.org



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## Moving Towards Net Zero Mitigation tools



**Genomics & Genetic Selection**



**Feed Additives**



**Slurry Additives & Amendments**



**Renewable Energy**



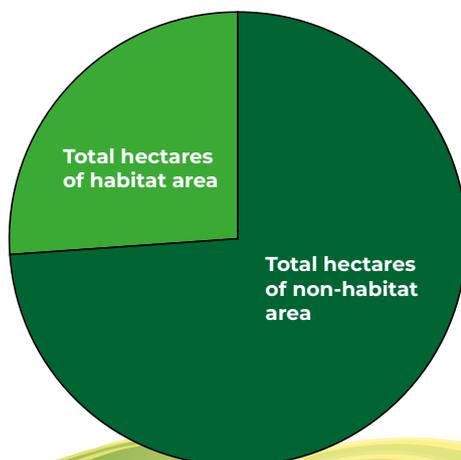
**Alternative Fuel Vehicles**



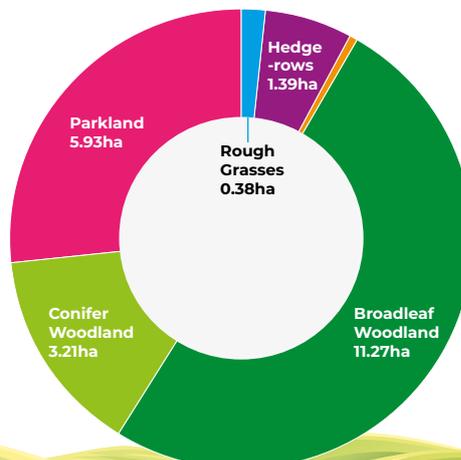
## Nature Based Solutions

to Reduce and Off-Set Carbon Footprint at Magherintemple

*Percentage of farm habitat area versus non-habitat area*



*Areas of Habitat*

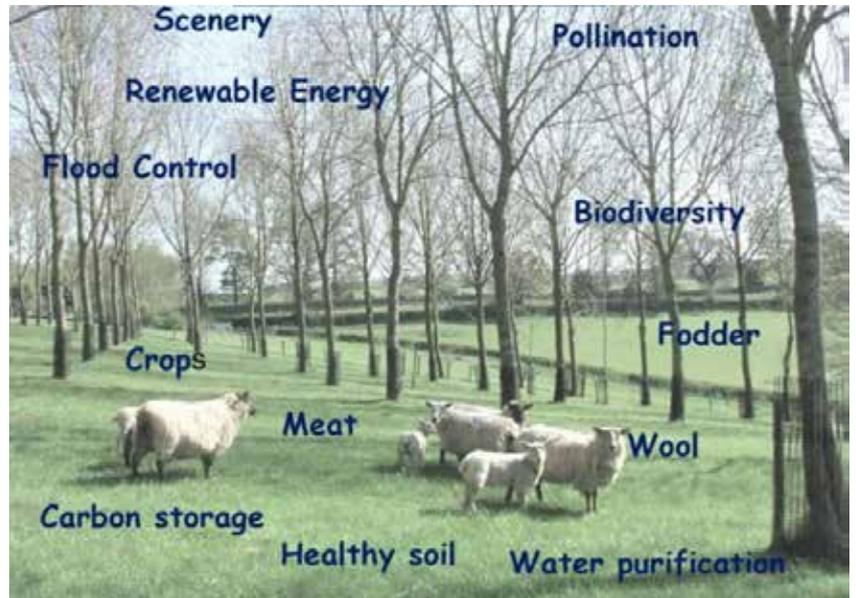


# Benefits of Silvopasture on Farm

## Sequestration rates

|   | Tonnes of CO <sub>2</sub> e/ha/yr |
|---|-----------------------------------|
| Broadleaf woodlands                     | 9.20                              |
| Conifer forest                          | 15.96                             |
| Agroforestry (5m spacing, 400 trees/ha) | 13.50                             |
| Hedgerows                               | 1.04 CO <sub>2</sub> e/km/yr      |
| Grassland soils (no slurry)             | 1.28                              |
| Grassland Soils (with slurry)           | 3.16                              |

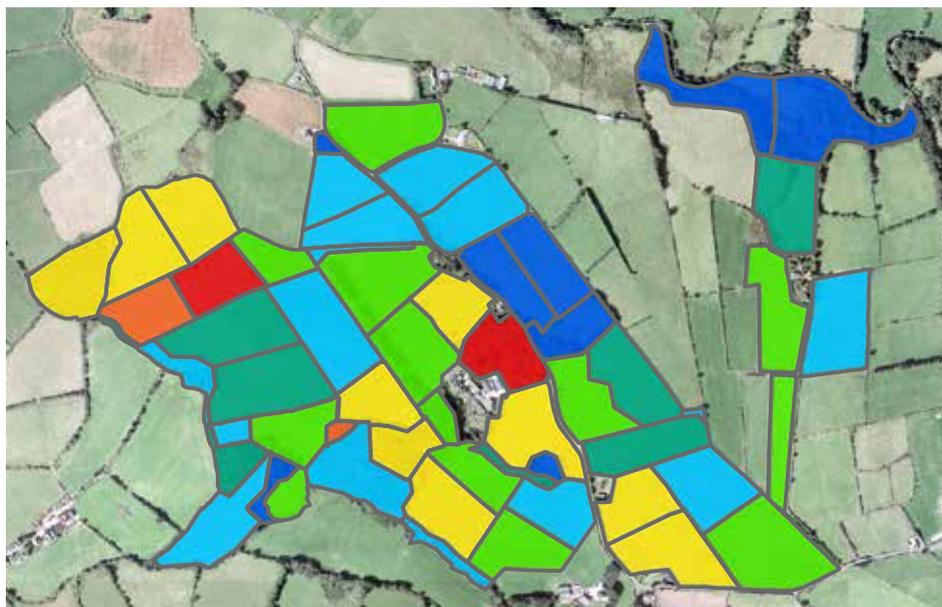
Source: CAFRE



Source: Jim McAdam



# Casement Phosphorous Maps



▨ No Recommendations

**Olsen P**

- Index 0
- Index 1
- Index 2-
- Index 2+
- Index 3
- Index 4
- Index 5



0 0.1 Km

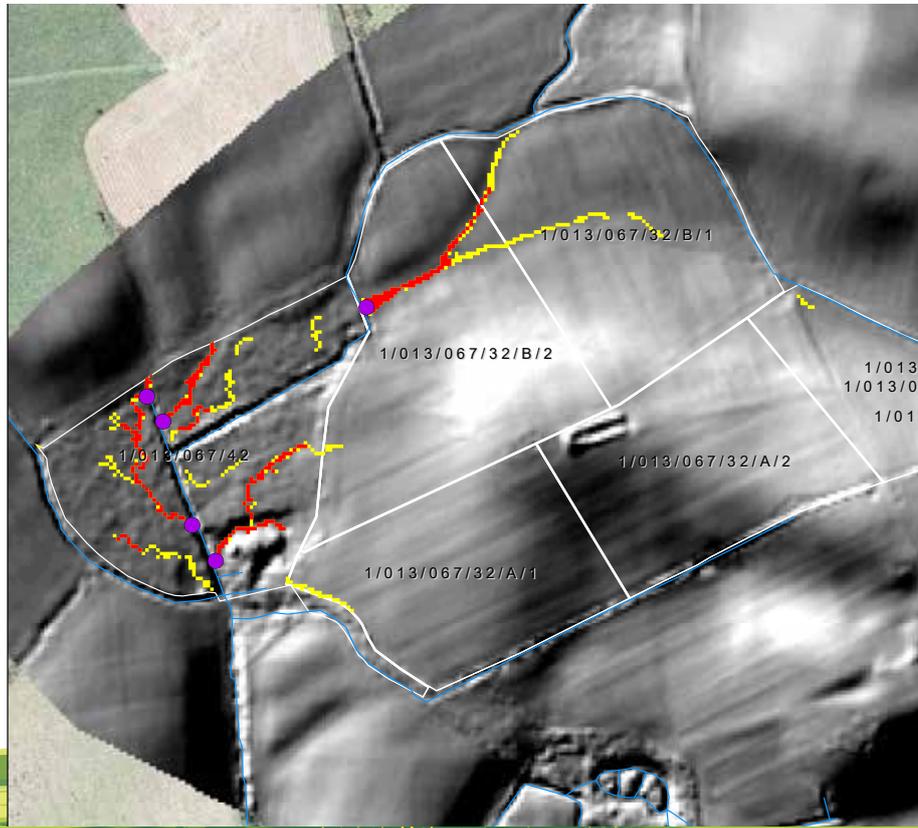
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# Improving Water Quality

## Run off risk maps, Casement Farm



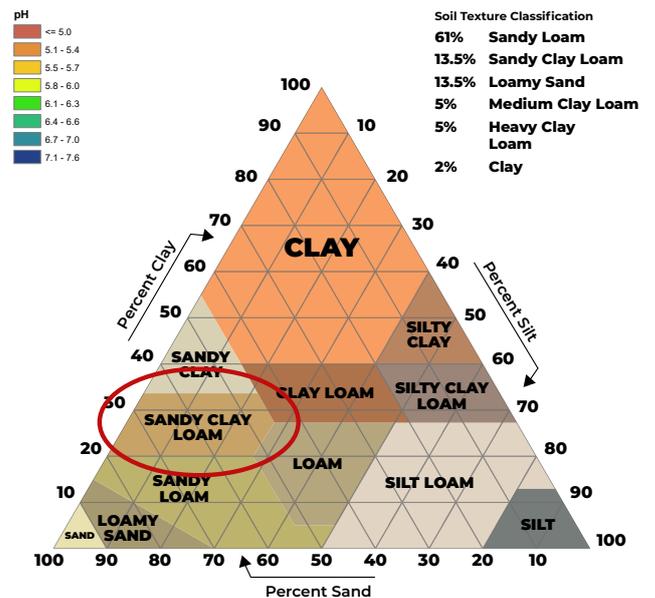
- Runoff discharges to waterbody
  - Waterbody Lines
  - Critical Source Areas - high soil Olsen P in these fields means these areas have elevated risk of P loss to water
  - Hydrologically Sensitive Areas for runoff generation and loss of nutrients\*, sediment and other applied substances.
- \* applied nutrients including slurry, manure and chemical fertiliser.

Rachel Cassidy, 2021

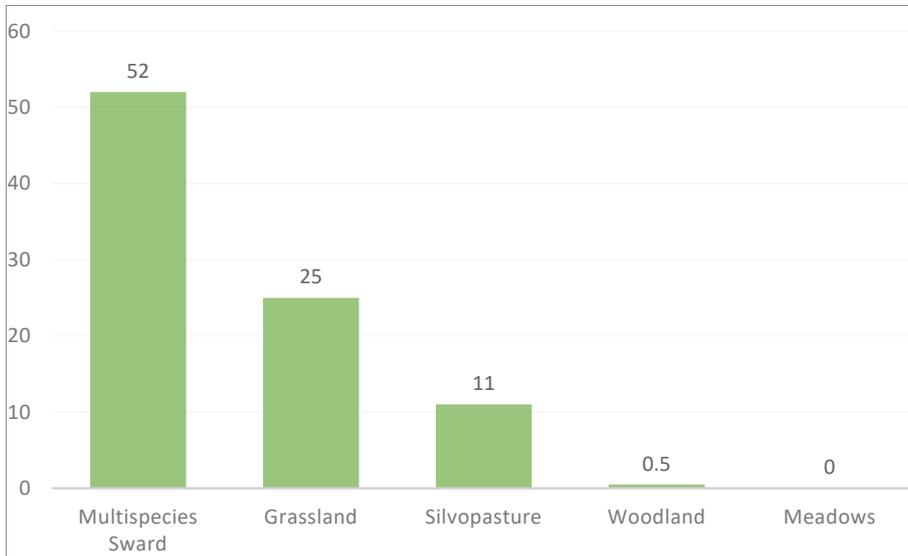
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# Casement Farm pH & Soil Classification



## Average Earthworm Population



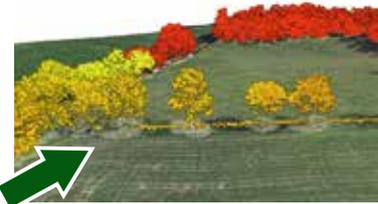
**Multispecies Sward**



**Woodland**



## Measuring On-Farm Biomass Carbon Stock using LiDAR



### Carbon Totals:

|                      |                      |
|----------------------|----------------------|
| Top 30 cm Soil       | 14,906 tonnes        |
| Above Ground Biomass | 924 tonnes           |
| Below Ground Biomass | 175 tonnes           |
| <b>TOTAL</b>         | <b>16,005 tonnes</b> |

(Alex Higgins, 2021)



# ARCZero

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## **CLOSE-OUT CONFERENCE & FARM WALK**

**Brook Hall, Derry/Londonderry**

**20th June 2023**

**Conference & Farm Walk 9:45am**

**Second Farm Walk 4:30pm**

**BOOK NOW**  
**[arczeroni.org](https://arczeroni.org)**

# FORTHCOMING EIP EVENTS

**20th June 2023**

***ArcZero Close out Conference & Farm Walk***

Gilliland Farm, Derry/Londonderry

**26th June 2023**

***Parasite Control:***

***A whole farm approach***

John Martin's Farm, Greyabbey

**28th June 2023**

***Multi-Species Swards for Beef & Sheep***

***- Final Conference & Farm Walk***

Glenavon House Hotel, Cookstown  
& Wayne Acheson's Farm, Sandholes

