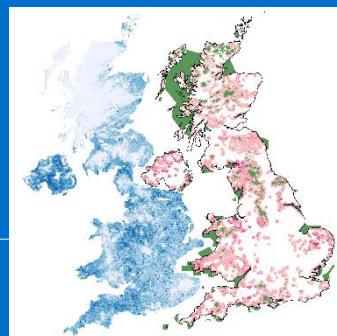




UK Centre for  
Ecology & Hydrology

# Ammonia Reduction by Trees (ART)



## ART Workshops January 2022 Summary Report

June 2022

**Title** ART Workshops January 2022 - Summary Report

**Client** Natural England

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**UKCEH reference** 08155

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Environment  
Agency



Forest Research



Cumbria  
Farm  
Environment  
Partnership

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## 1 Workshops content

The Ammonia Reduction by Trees (ART) project hosted a series of stakeholder meetings in January 2022. These events included an overview of the project as a webinar, and was followed by three other more in depth workshops:

- i. Webinar: Overview of the Ammonia Reduction by Trees (ART) project.
- ii. Workshop 1: What motivates farmers to plant trees?
- iii. Workshop 3: Field work – ammonia monitoring in farms woodlands in Cumbria.
- iv. Workshop 4: Targeting Tree Planting for Ammonia Mitigation

This report summarises all workshops that took place over that time.

## 2 Why engage in these Workshops

So the stakeholders can have an understanding of how to use the online tool and the meaning of the map layer output. The attendees now know how to use this layer for their desired location as we showed them various case scenarios so they could have a better understanding of how this tool works.

## 3 Who did we target?

The attendees registered via an online form on the ART project website page. There were a total of 112 respondents with a breakdown of organisation type in Table 1, and a breakdown of those that attended each event is provided in Table 2.

Table 1: Registrants by grouping

Organisation/Grouping	Registrants
Commercial (farmer)	7
DAERA	13
DEFRA/BEIS	10
Devolved Governments	2
Environment Agency	7
Environmental Consultant	4
Farm Woodland Advisor	4
Forest Research	3
Forestry Commission	4
Forestry England	2
JNCC	6
Natural England	34
Nature Scot	1
NFU	2
Others/Unknown	1
Scientific Researchers	7
SEPA	2
Supermarkets	2
Woodland Trust	1

Table 2:

Webinar	Workshop 1	Workshop 2	Workshop 3
79	50	54	51

## 4 Workshops

### 4.1 Webinar on Project Overview

The webinar took place on the 14th January 2022 and provided an overview of the Ammonia Reduction by Trees project. This webinar introduced the project in the context of air quality and tree planting on farms and provided a summary of key findings of the Ammonia Reduction by Trees (ART) project. The full recorded video and slides can be found on the [ART project pages](#).

### 4.2 Workshop 1: What motivates farmers to plant trees?

The workshop took place on the 14th January 2022. This workshop reported on farmers' views on tree planting on their farms for ammonia mitigation, gathered from farmer interviews and surveys as part of the Ammonia Reduction by Trees (ART) project. The attendees had a chance to discuss the findings and future approaches to tree planting incentives for farm business and environmental benefits. A full report on the workshop can be found [here](#) while the recorded video and slides can be found on the [ART project pages](#).

### 4.3 Workshop 2: Field work – ammonia monitoring in farms woodlands in Cumbria

The workshop took place on the 28th January 2022. Field work – ammonia monitoring in farms woodlands in Cumbria. In this workshop the lead researchers reported on the key findings from the ammonia monitoring on 5 farms in Cumbria, including free range poultry and dairy farms with woodland ranging areas and mature woodland, and different ammonia monitoring methods, meteorological records, tree measurements and modelling work comparing areas with and without trees around the farms. There was an opportunity to ask the researchers questions about the fieldwork, discuss the implications of the results and further research needs. The recorded video and slides can be found on the [ART project pages](#).

### 4.4 Workshop 3: Targeting Tree Planting for Ammonia Mitigation

In this workshop UKCEH experts presented the modelling work on targeting tree planting to capture ammonia emissions from farming to protect sensitive SSSIs. The presentation focused on explaining as simple as possible the complex data processing of the Tree targeting map layer. The presentation was divided into four sections:

- Overview: a brief overview of the aim of the work package using several diagrams with different simple scenarios (see Fig 2).

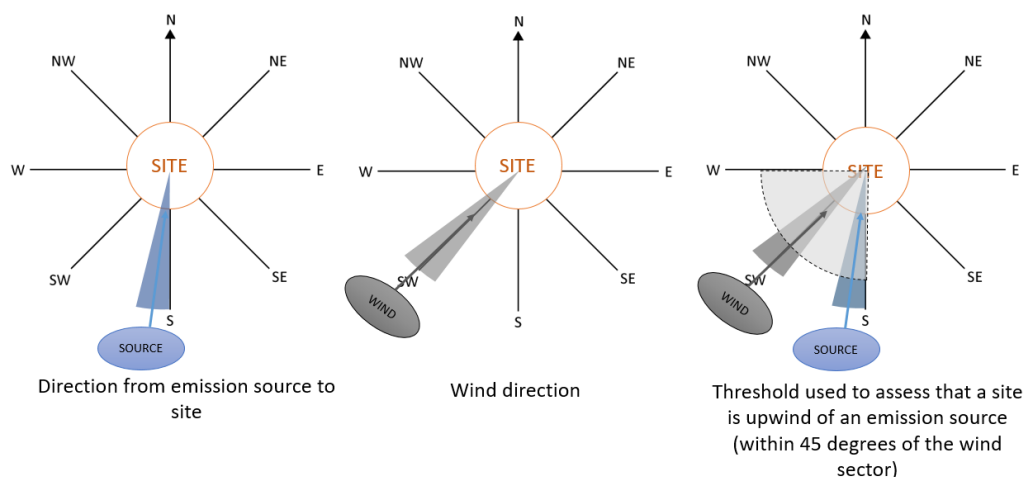


Figure 2 diagram showed in the presentation

- Layering: presenting the different layers that made the output; emission strength, cell distance and angle, wind data and GIS files with the geometry of the protected sites (see Fig 3 for an overview of the layering used).

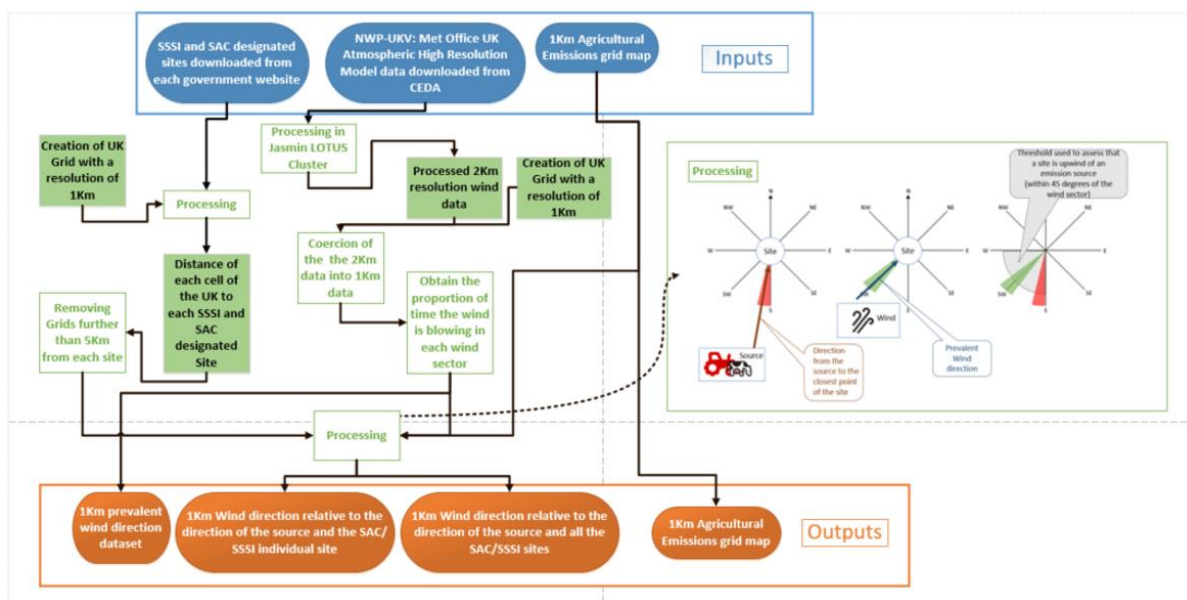


Figure 3 Overview of inputs and outputs

- Online tool presentation: A presentation of the online tool with a wind rose and other functionalities.
- Bolton Fell Moss SAC example: an example of an SAC site was given. The aim of this was for the attendees to have better understanding on how it will work in reality.

#### 4.4.1 Breakout room

There were three breakout rooms with one facilitator and one reporter from UK CEH in each. Each breakout room had a different protected site as a case study:

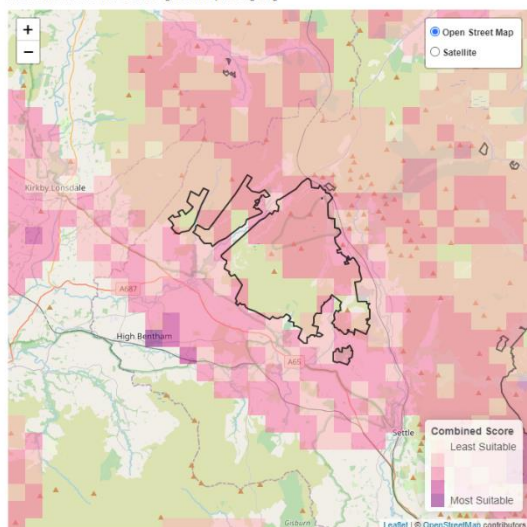
- Ingleborough Complex SAC Room: facilitator Bill Bealey, reporter Philippa Mansfield.
- Breckland SAC Room: facilitator Ed Carnell, reporter Ulli Dragosits.

- Ashdown forest SAC Room: facilitator Cristina Martin Hernandez, reporter Sim Tang.

Combined score (all SACs)

Relative wind + NH<sub>3</sub> emissions

N.B. Each indicator has been assigned an equal weighting



Interactive maps were used with a satellite base map to spot possible ammonia sources. Then, the facilitators showed the prevalent wind direction for the site, and after that, the ammonia emission map and the ammonia concentration background map. The attendees were shown how to extract the background ammonia concentrations from [APIS tool](#) for their desired locations. Finally, the facilitators showed the final scoring map (image left) for tree planting, and calculated in the web tool the most suitable tree species to plant near the site (originally extracted from [Forest Research ESC](#) database), the wind rose for the site, and the calculated ammonia recapture.

One of the aims of this breakout room was to gain feedback in the farmtreestoair tool and

gather thoughts about the map layers. Feedback and comments were as follows:

- ...the colour coding on the maps as demonstrated... would make it much easier to identify the best place to plant. This would be great for when environmental permitting is extended to dairy and intensive beef farms. [I] would want to click over areas where the farm is.
- The ammonia-tree tool shows progressive improvement of ammonia capture over time – as the canopy grows. For free range poultry/poultry ammonia emissions then there is a need for immediate improvement, but the trees take 10-15 years to have an effect. Agencies are not looking for long term protection, so shelter belts are only for the big picture landscape improvements. How do we get a long term mitigation measure like treebelts accepted by the agencies?
  - Response (UKCEH) - ammonia reduction and mitigation priorities should be for reducing emissions first by using known techniques in housing systems, manure storage and spreading first but treebelts provide additional ammonia mitigation and there are wider benefits of tree planting (carbon storage, screening, animal welfare, flood protection, wood fuel).
- Woodland planting suggestions and the maps in the tool are great. I like the combined score. Could this be available as a data layer or layers to make it easier to compare with other data layers including FC data layers or Forestry England maps of suitability to see overlap of suitable planting areas?
  - Response (Natural England) - yes we are intending to add to the Magic website as well as the Natural England Webmap system.
- How does topography and elevation affect the ammonia capture effectiveness of trees? For example if the trees or designated site were at a higher elevation than the farm?
  - Response (UKCEH) - to some extent this is taken account of in the met data – as this will affect wind direction and speed changes caused by the elevation, but the model behind the tool does not take into account elevation.
- How could we combine with area unsuitable for tree planting such as peatland, species rich grassland or water scarcity areas? Could compare with other data layers and do site check. Also need to consider the location of private water

supplies that may not be mapped. There is an issue with these drying up as trees draw up more and don't always know where water is coming from on the farm.

- Response (UKCEH) – the plan is to make the data layer available for the combined scoring layer and then other tools like MAGIC or the FC maps can import it in (e.g. via a web map service).
- Economic perspective of planting trees and costs and carbon - tree guards, fencing, maintenance etc. Could these be added in to the guidance or tool?
  - Response (UKCEH) - Yes we could add these if we have figures, although prices change over time. Carbon sequestration estimates over 50 years could be given or links given to the Woodland carbon Code.
- To what extent is the 1km resolution emissions data useful for targeting tree planting?
  - Response (UKCEH) - emissions data at finer scale are non-disclosive even though data is gathered at parish levels – confidentiality issues in publishing data at higher resolution. These data are aggregated into a 1 km square emission figure so farms are not easily identified in the landscape.
- [The] maps are useful for identifying sensitive areas most at risk – then a user can zoom in and target tree planting with local knowledge, e.g. identify locations of livestock buildings from google maps.
- Soil Type – is that a data layer?
  - Response (UKCEH) – No, this is a user selected parameter which introduces an area of difficulty. Future plans may be to incorporate a soil layer map but this can be constrained by resolution and a user selection may be preferred.
- Is it possible to model what is captured by the trees already, then add in more trees and model again?
  - Response (UKCEH) – Yes this is possible for existing woodlands. Remember the estimate of ammonia capture is based on treebelts planted close to sources like livestock buildings (<50m).

#### **4.4.2 Wrap-up session**

After the breakout rooms all participants and facilitators came back to the main room. The facilitators made a summary of the comments.

## **5 Appendix 1 : Agendas**

### **Webinar : 14 January 2022: 13.30 – 15.00**

- Introduction – Philippa Mansfield 10 min
- Environmental land management schemes, tree planting benefits. ART project, linking to Natural Capital Assessments – Elena to email a few line to Philippa to include in presentation
- Introduction - David Vowles 10 mins
- Clean air strategy, ammonia impacts,
- Touch on NUE (Nitrogen Use Efficiency) – incorporate into ELMs to encourage farms to improve efficiency in use of fertilisers
  
- Farmer context – David Brass 10 mins
- Motivation for planting trees and getting involved in the project
- Project overview: Bill Bealey 30 mins

- Overview of ART project
- Q & A 30 mins

**Workshop 1 : 14 January 2022: 15:10 – 16:30**

- 15:10 – 15:25 : Presentation of farm surveys (Bill Bealey, UKCEH)
- 15:25 – 15:35 : Quick Questions (hand raise or chat window)
- 15:35 – 16:15 : Breakout Groups x4
  - England 1 (Philippa Mansfield)
  - England 2 (Vera Barbosa - Environment Agency)
  - Scotland (Jan Dick UKCEH)
  - Wales (Bill Bealey)
  - Northern Ireland (Sim Tang UKCEH)

16:15 – 16:30 : Plenary: Rapporteur Feedback & Discussion (Jan Dick)

**Workshop 2 : 28 January 2022: 13.30 – 15.00**

- 13.30 Welcome (Philippa Mansfield)
- 13.35 – 13.50 Field set up, ammonia monitoring and modelling (Sim Tang & Bill Bealey)
- 13.50 – 14.00 Tree measurements, lichen survey (Elena Vangelova)
- 14.00 – 14.10 Intensive measurements (Christine Braban)
- 14.10 – 14.20 Directional Passive ammonia sampling (Roger Timmis EA)
- 14.25 – 14.30 Summary and Conclusions
- 14.30 - 14.55 Q & A
- 14.55 – 15.00 Wrap up and Close

**Workshop 3 : 28 January 2022: 15:10 – 16:30**

- 15:10 - 15:15 - Joining and Introduction
- 15:15 - 15:30 – How we did it and tool demo
- 15:30 - 15:35 - Walkthrough the data
- 15:35 - 15:45 - Q & A and introduce breakouts
- 15:45 - 16:15 - Breakout room
- 16:15 - 16:30 - Report back from each breakout room and wrap up



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