# ART WP1 – Targeting Tree Planting for Ammonia Mitigation

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# Targeting Tree Planting for Ammonia Mitigation

- 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
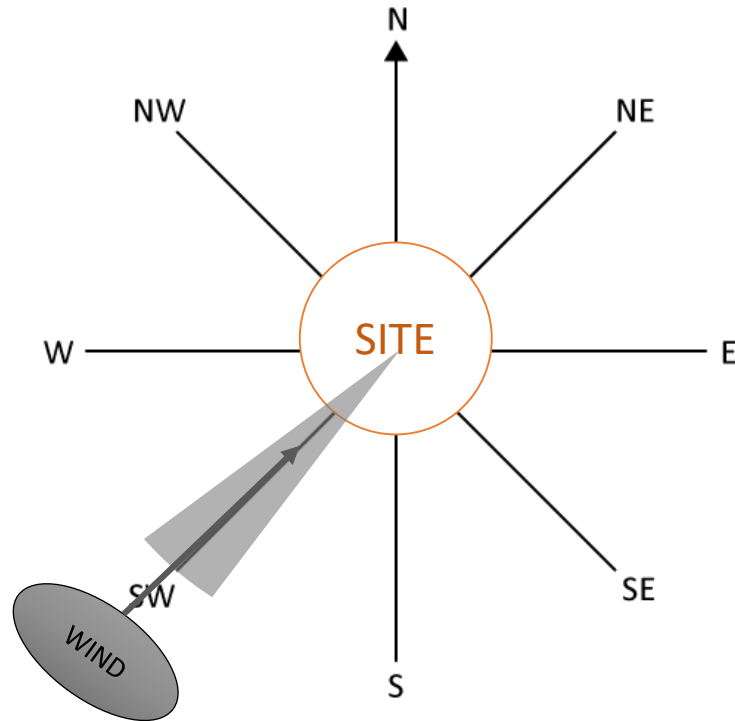- 16:15 - 16:30 - Report back from each breakout room and wrap up
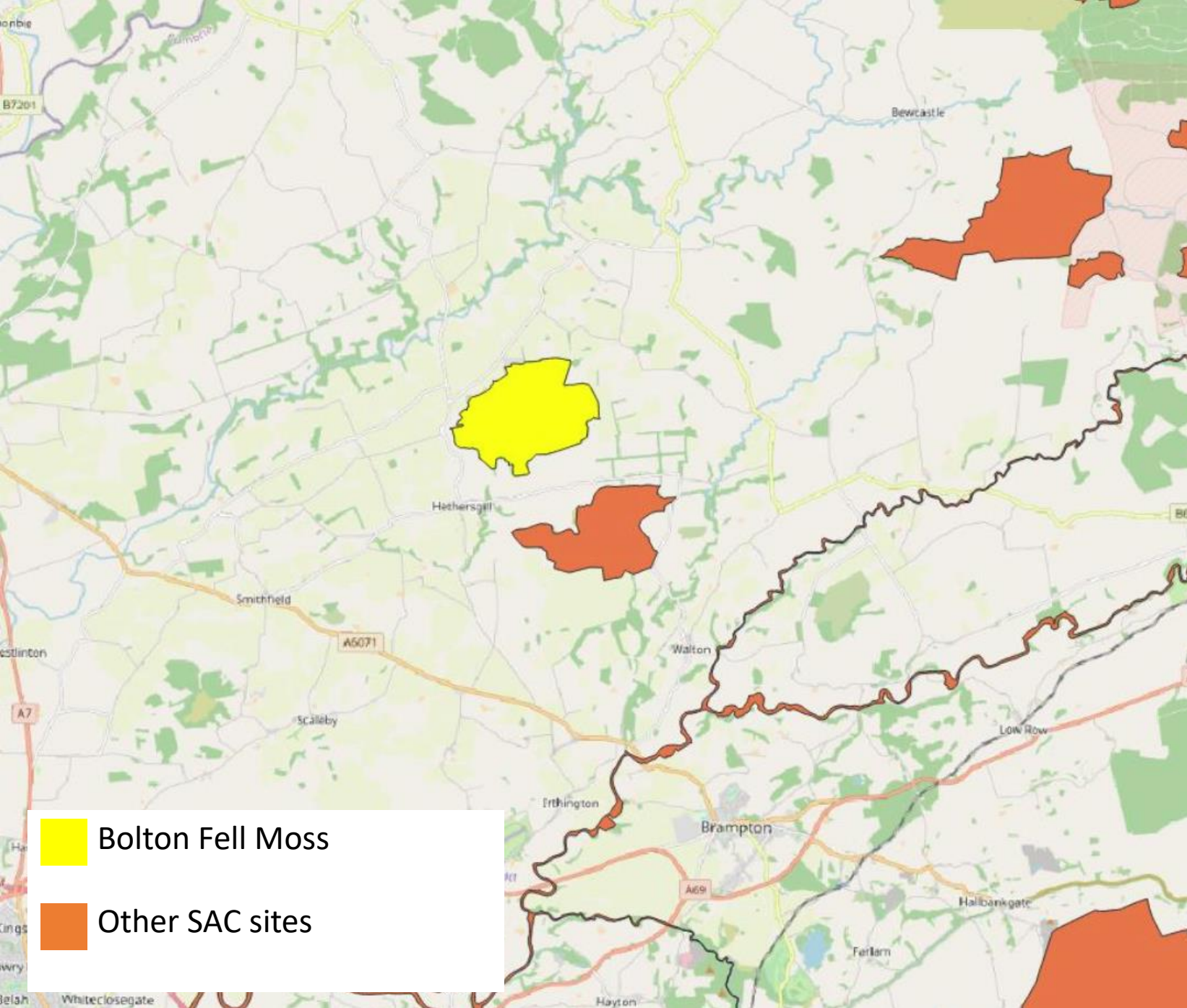
SCOPE: Target the best places to plant trees to 'protect' designated and semi-natural sites from ammonia.
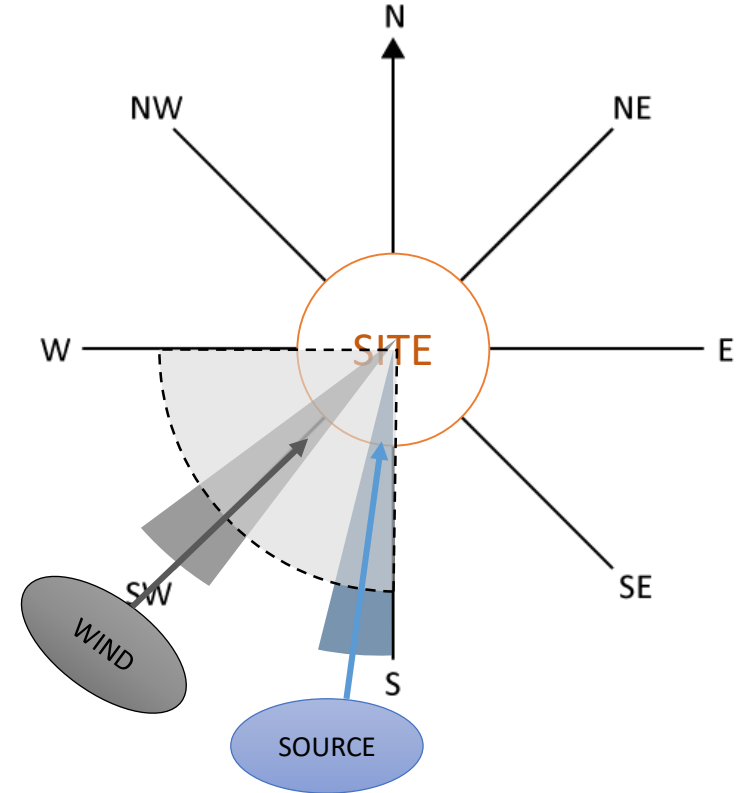
CRITERIA:
- Distance to Habitat
- Dominant Wind Direction (upwind/downwind)
- Emission Strength

Legend:
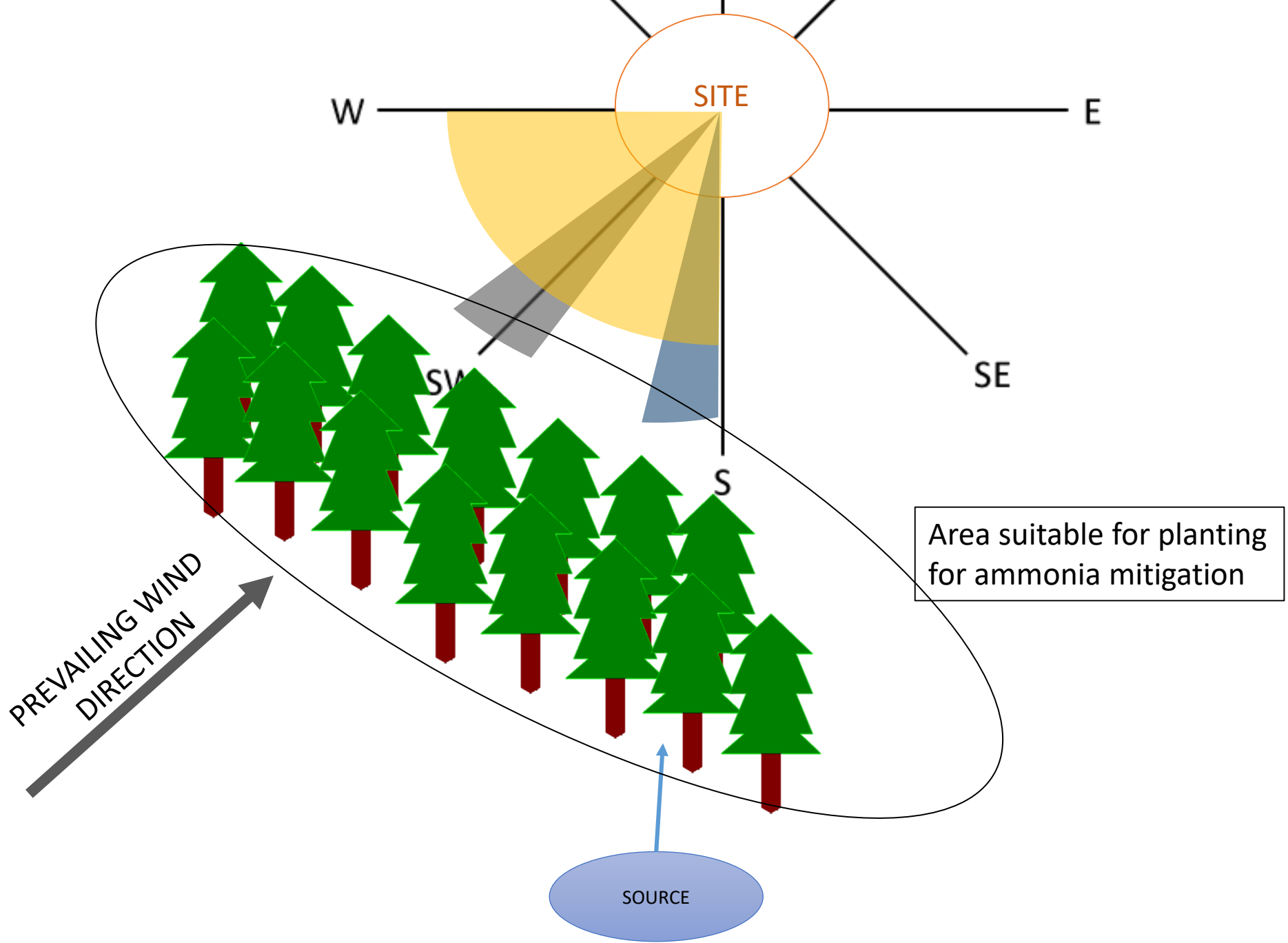- Bolton Fell Moss (yellow)
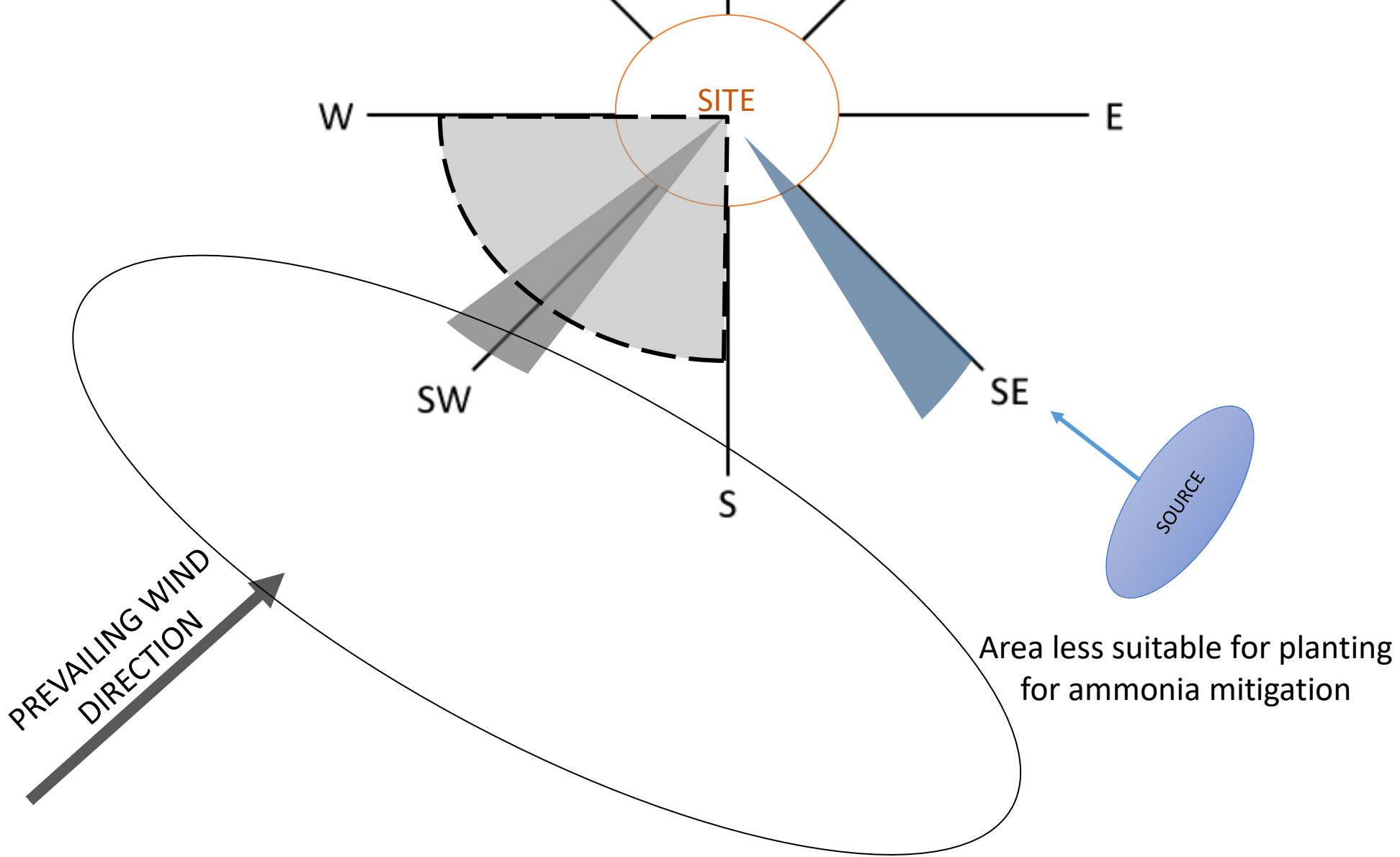- Other SAC sites (orange)
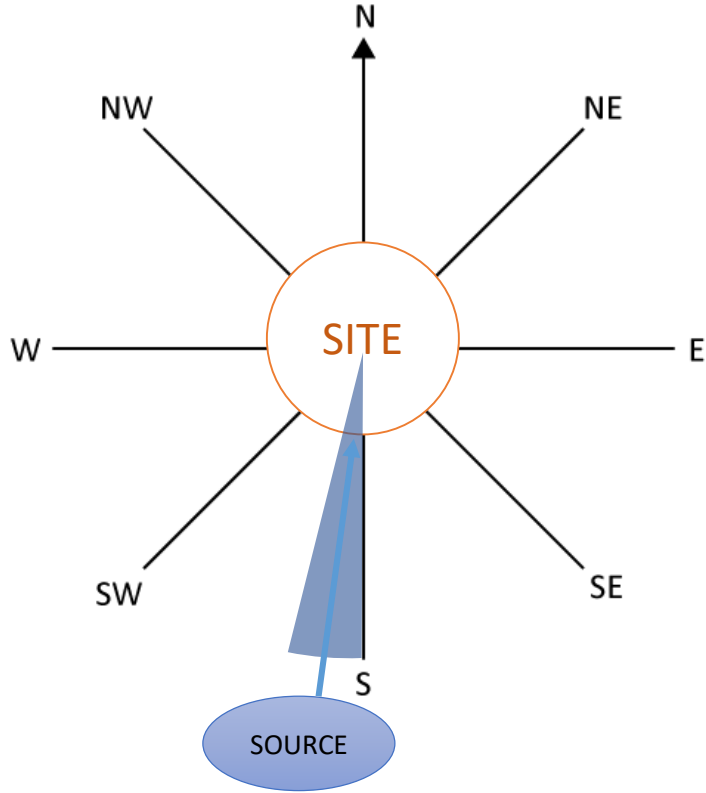
Direction from emission source to site

Wind direction

Threshold used to assess that a site is upwind of an emission source (within 45 degrees of the wind sector)

W — E

SITE

SE

SW

S

PREVAILING WIND DIRECTION

Area suitable for planting for ammonia mitigation

SOURCE

W

SITE

E

SW

S

SE

SOURCE

PREVAILING WIND DIRECTION

Area less suitable for planting for ammonia mitigation
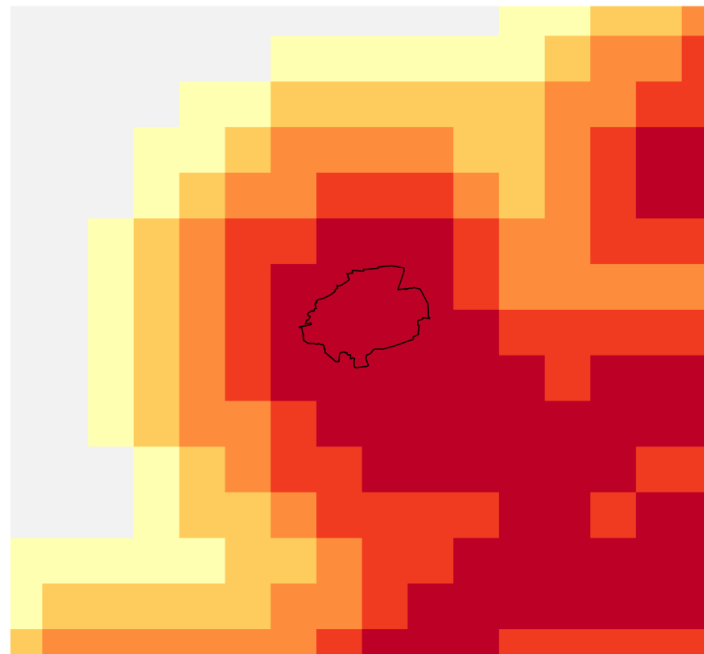
Distance Criteria

Minimum Distance to the centre of each cell to an SAC site boundary

Data used: SAC and SSSI shapefile
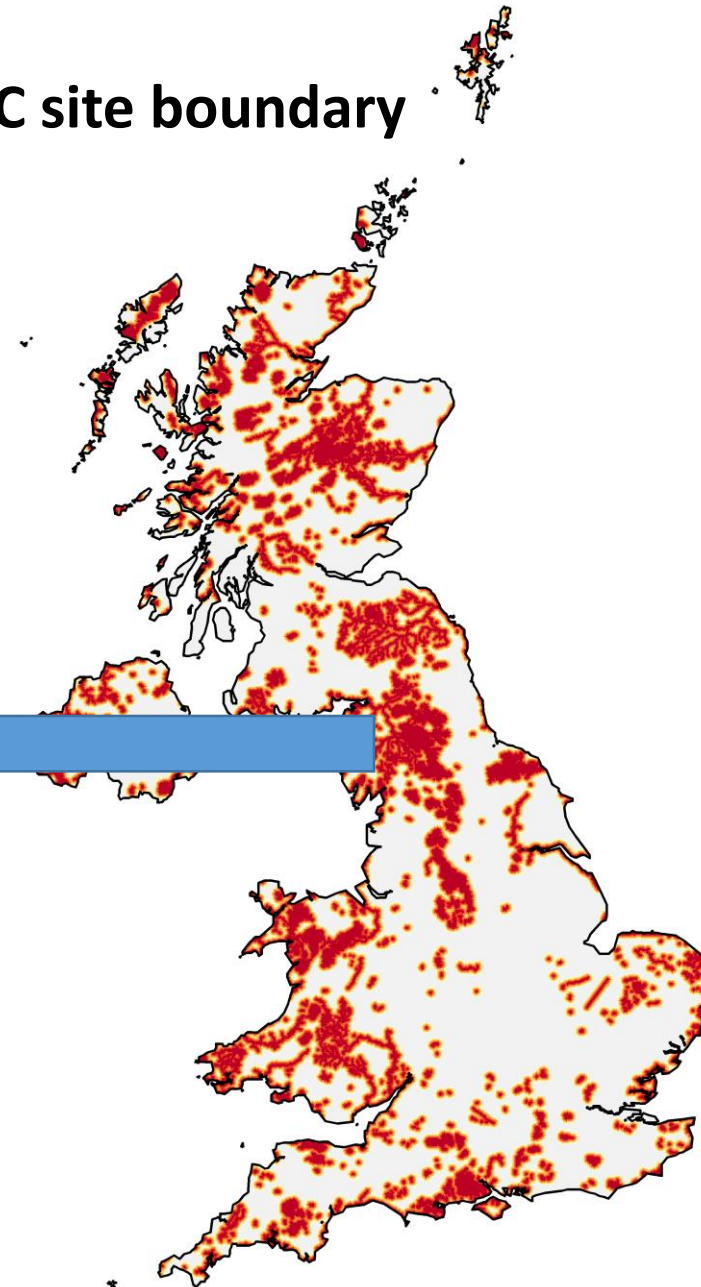
Raster with 1Km resolution

Not taking into account cells further than 5Km

away from the site

Bolton Fell Moss, SAC

Distance to site (km)
0 - 1
> 1 - 2
> 2 - 3
3 - 4
4 - 5
> 5

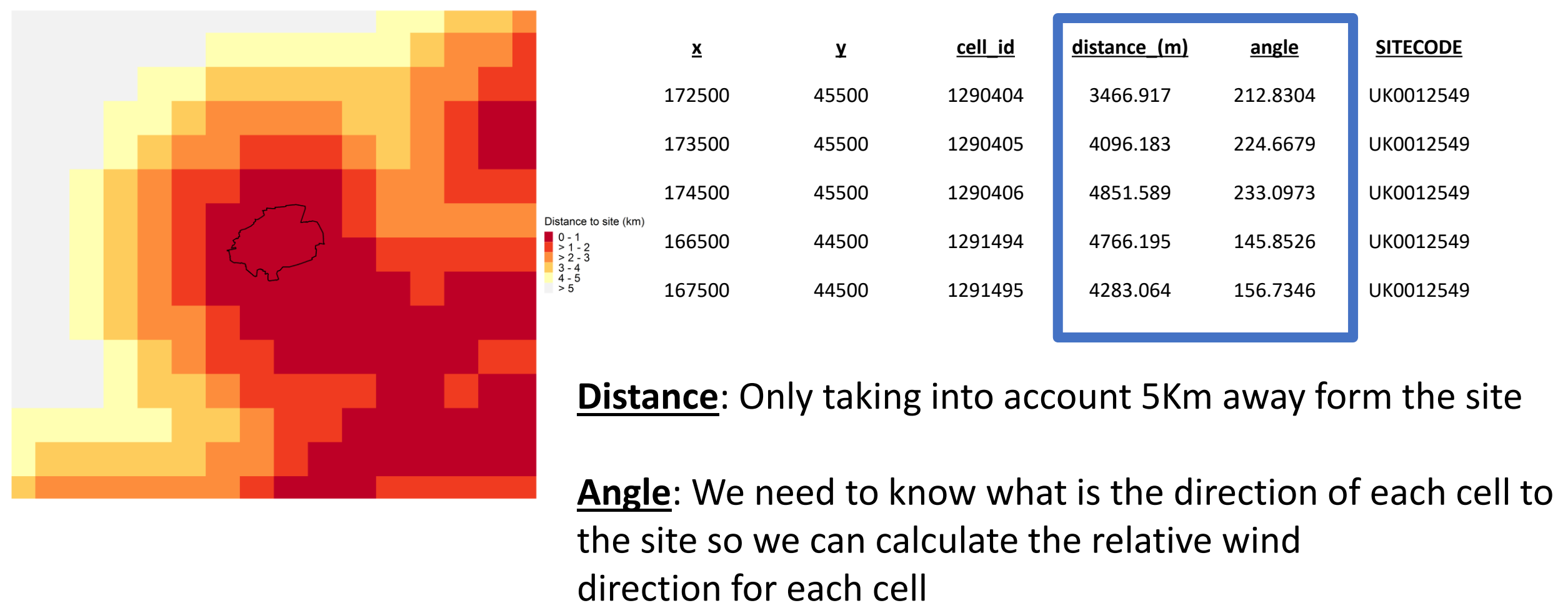Distance to site (km)
0 - 1
> 1 - 2
> 2 - 3
3 - 4
4 - 5
> 5

Distance Criteria

Minimum Distance to the centre of each cell to an SAC site boundary

x	y	cell_id	distance_(m)	angle	SITECODE
172500	45500	1290404	3466.917	212.8304	UK0012549
173500	45500	1290405	4096.183	224.6679	UK0012549
174500	45500	1290406	4851.589	233.0973	UK0012549
166500	44500	1291494	4766.195	145.8526	UK0012549
167500	44500	1291495	4283.064	156.7346	UK0012549

Distance: Only taking into account 5Km away form the site

Angle: We need to know what is the direction of each cell to the site so we can calculate the relative wind direction for each cell

Wind Dataset – wind direction sector

- UK meterological high resolution data from the UK Met Office operational NWP (Numerical Weather Prediction) Unified Model (UM). (wind speed, direction, temperature, RH etc)

- A post processed regional downscaled configuration of the Unified Model, covering the UK and Ireland, is used with hourly forecast data covering the period T+0 to T+120 hours is used.

- With a resolution of approximately 0.018 degrees (2km x 2km)

- This archive currently holds data from April 2016 onwards.

- The dataset is available here:

https://catalogue.ceda.ac.uk/uuid/f47bc62786394626b665e23b658d385f

viewble at:

http://dap.ceda.ac.uk/thredds/catalog/badc/ukmo-nwp/data/ukv-grib/catalog.html

Relative Wind direction for each cell

Bolton Fell Moss, SAC

% of time site is upwind
0 - 5
> 5 - 10
> 10 - 20
> 20 - 30
> 30 - 50
> 50
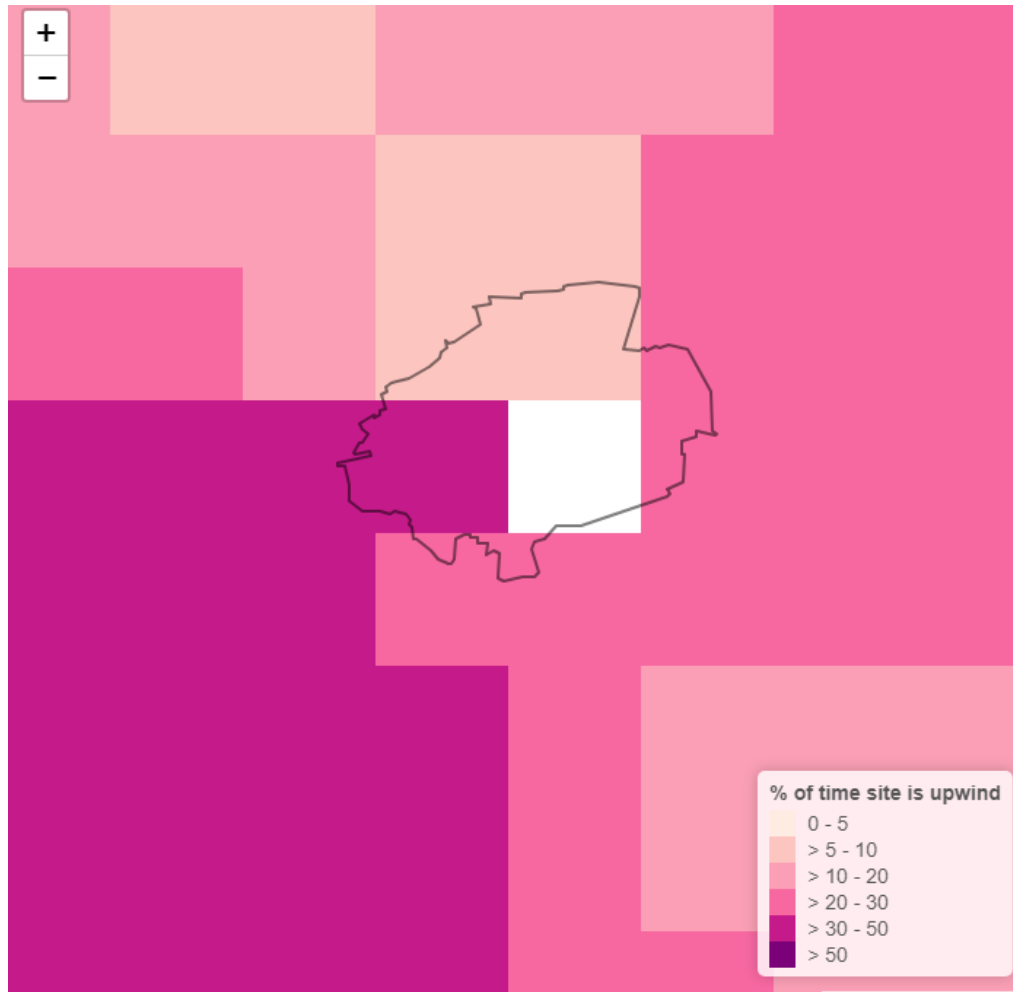
Map show the % of time a cell is upwind of the site.

Each cell will get a score, ie: mostly upwind to the site high score, mostly downwind low score
High Score = good for planting to mitigate ammonia
Low Score = less good for planting to mitigate ammonia
Cells are 1Km resolution

Relative Wind direction for each cell

Data used for this map:
- SAC shapefile

Things to consider:
- We only calculated the wind probability 5km away from the site
- We divided the wind rose in 8 sectors: N, NE, E, SE, S, SW, W, NW

% of time site is upwind
- 0 - 5
- > 5 - 10
- > 10 - 20
- > 20 - 30
- > 30 - 50
- > 50
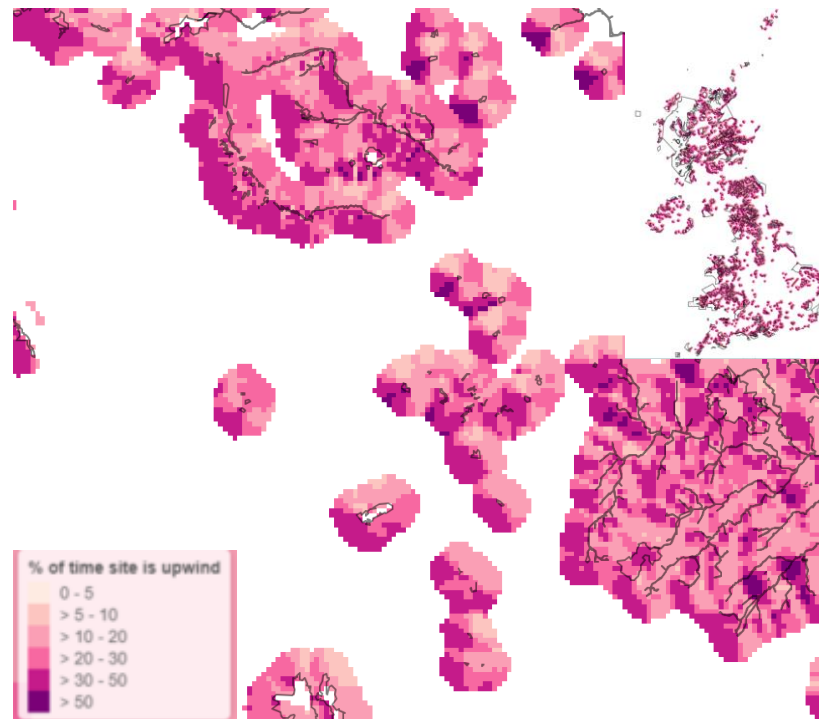
Emission Strength

Ammonia Agricultural emissions
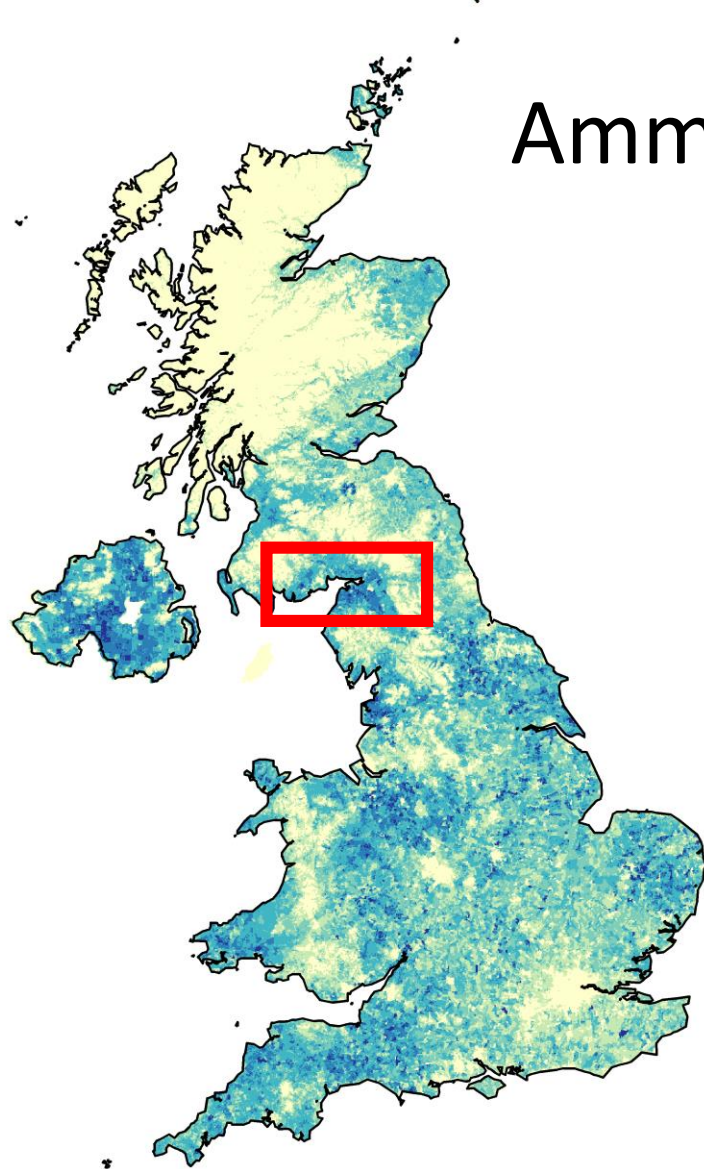
kg NH$_3$ ha^{-1} yr^{-1}

- 0 - 1
- > 1 - 5
- > 5 - 10
- > 10 - 25
- > 25 - 50
- > 50
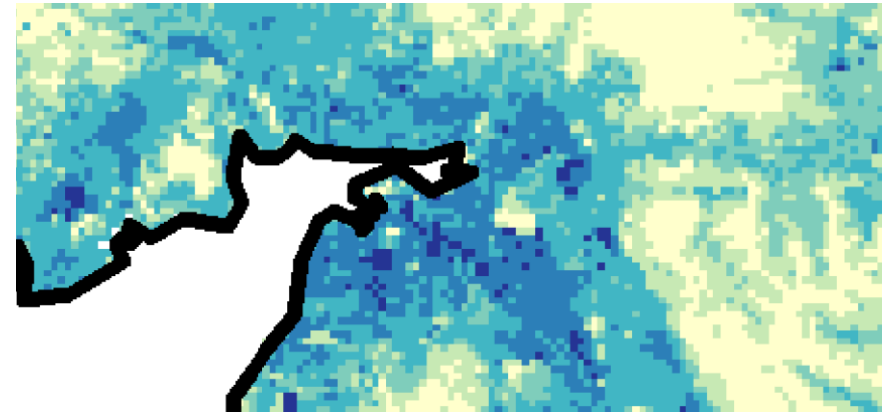
Each cell will get a score, ie: high ammonia emissions high score (more suitable for ammonia mitigation), low emissions low score
Source: https://naei.beis.gov.uk/

Scoring: equal weighting

Relative wind direction

% of time site is upwind
0 - 5
> 5 - 10
> 10 - 20
> 20 - 30
> 30 - 50
> 50

$+$
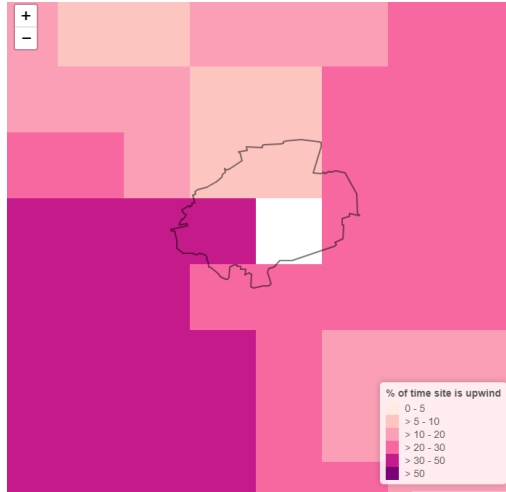
NH3emissions
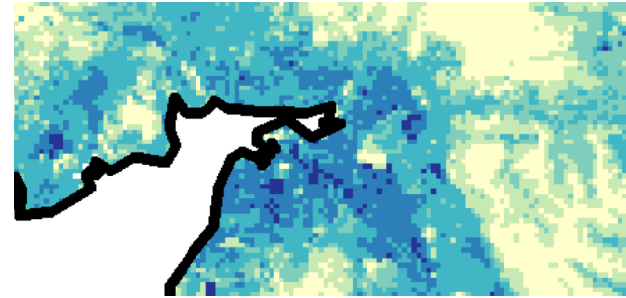
Suitability Score

Overview of workflow
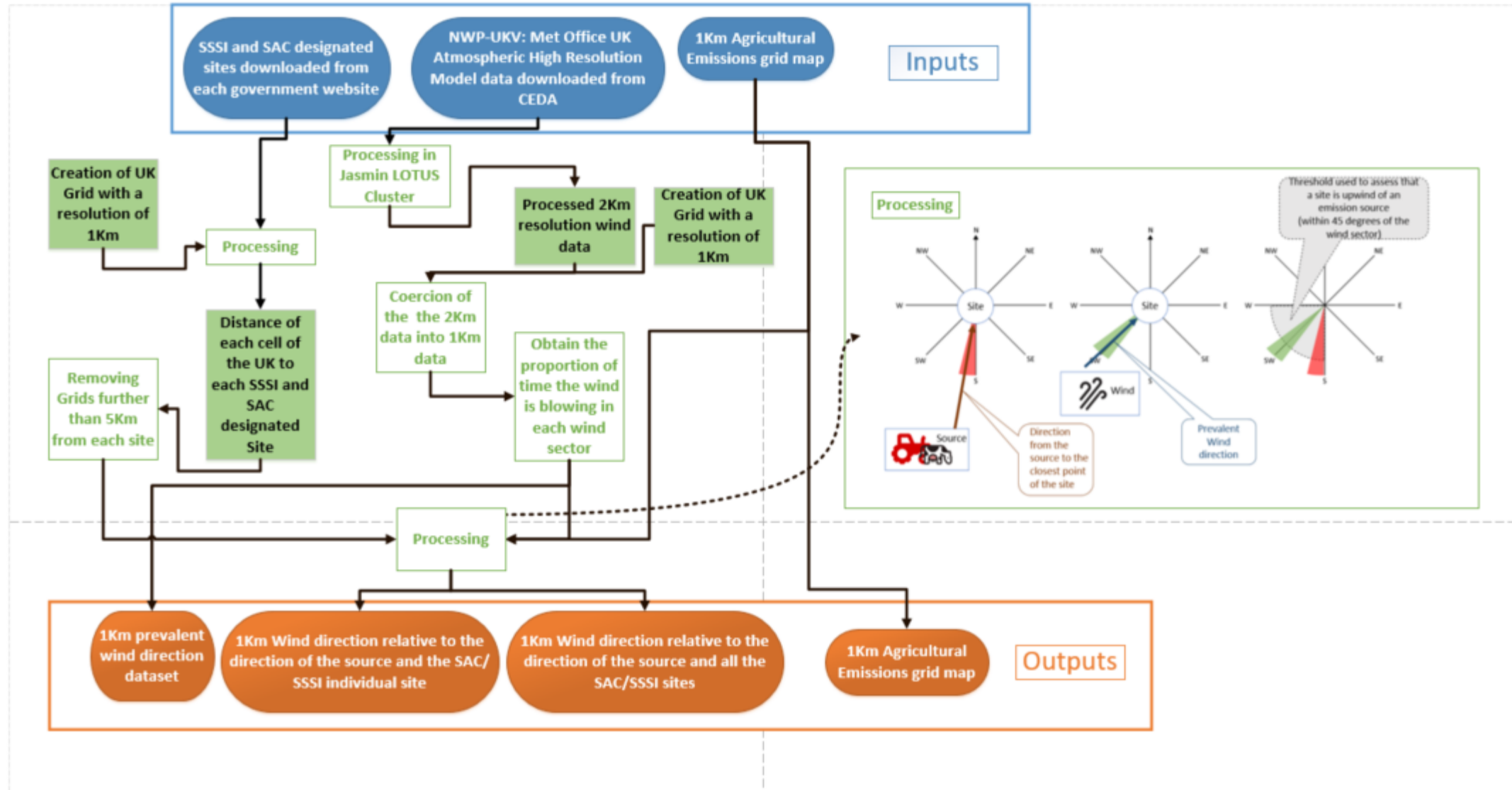
Overview: online tool

We will offer a way of identifying the most suitable areas for tree planting for mitigating ammonia: wind rose and a suitability score map for any clicked location