

Natural England Peatland Restoration Discovery Grant

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SUSTAINABILITY | OPPORTUNITY | INNOVATION | LEARNING

Building from local peat knowledge

- Local soil knowledge (LSK) has been broadly recognised for its importance and contribution to the sustainability of soil management in farming practices especially in developing countries
- LSK is defined as “the knowledge of soil properties and management possessed by people living in a particular environment for some period of time” (Winkler, 1999, p.151).
- The role of LSK in sustainable soil management has rarely been included as a core component of soil assessment or land-use management. However, mounting evidence from a number of countries has indicated that that integration of LSK into participatory soil surveys provides appropriate solutions to address practical issues in a local context
- It has also been reported that the exclusion of local knowledge from land evaluation systems often results in the failure of scientific interventions to improve land use, especially where detailed scientific studies are lacking.

Quick scoping visits – early July 2020; what data are held on farm?



e.g. One field, one farm

- Mainly shallow peat 0.5- 1m depth
 - Silt seam and roddon (*rodham...*) present
 - Soil sampling @ 1 sample per ha since 1988 (pH, P, K, Mg)
 - EC scanned
 - Topography at 5 cm height resolution
 - Drainage maps
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- Cropping and management history
 - Has been flooded to manage potato cyst nematode (PCN)

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- Over 130 fields with similar detail on this farm alone
 - Blue clay and gravel subsoils at fen edge
 - Deep peat c. 1/3; also shallow peats and mineral soils
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- Many (but not all) farms hold very detailed records and a long-family memory

Fast growing; small amounts of N used (30-40 kg) at planting only; lettuce / celery; potatoes (60 kg)

No N for sugar beet, onions

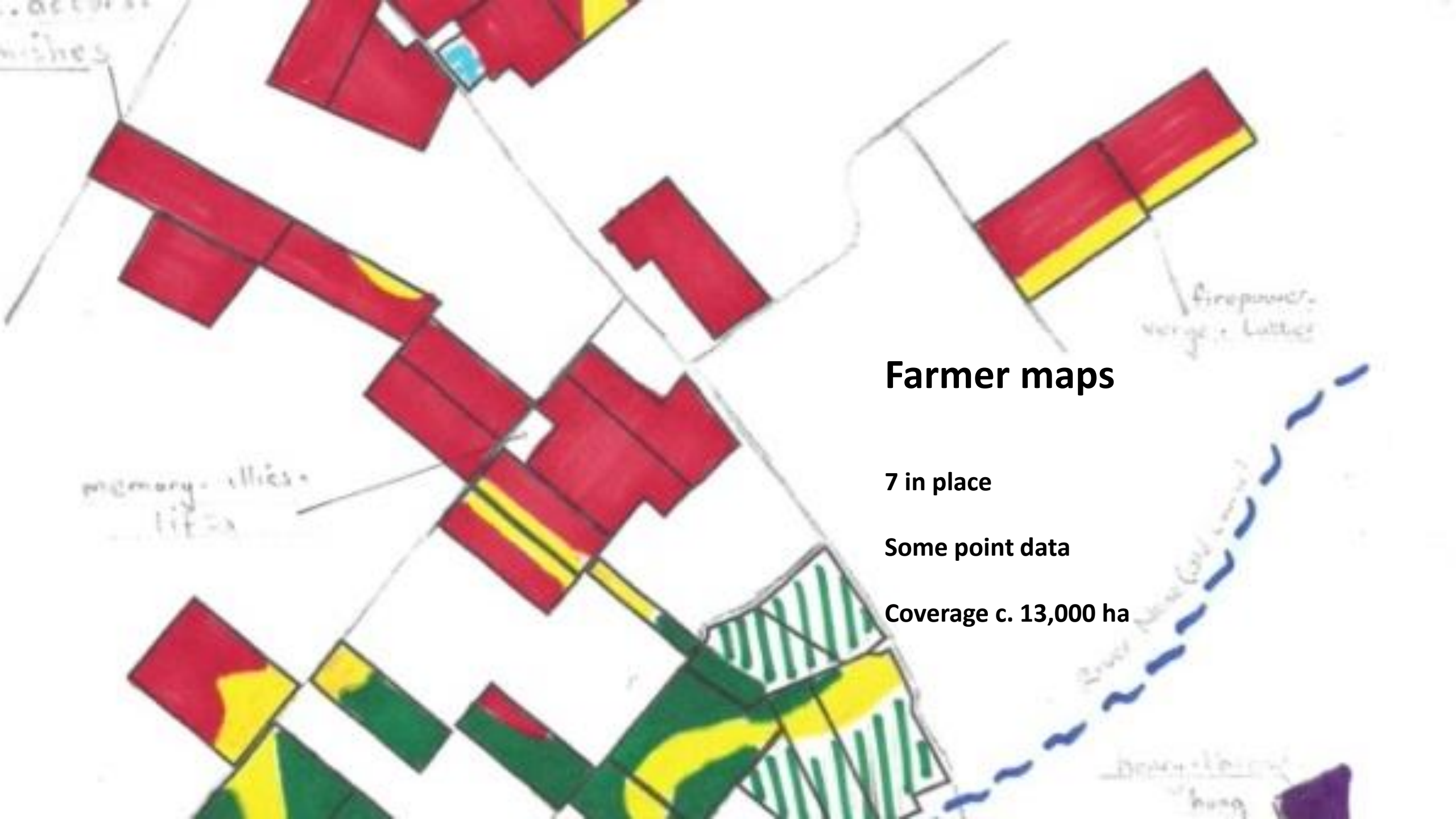
Assess all fields and adjust N used – reduced from these on higher OM (Rosdene)

Name	Description
1. Deep black peat over clay	High OM (>70%), – Rosdene was Greens ; over impermeable clay (Gault) subsoil; holds water table well, can lay wet. Lower altitudes, frost prone, can be humid in summer. Occasional rodden (one through middle). 1-3 m deep; bog oaks especially where it touches the Greensand
2. Deep black peat over sand	High OM 50-60%; Greensand substratum, free draining ; drier land easier to plant in wet times; water feeds into land first from River Wissey (2 m above land level); 1-2 m
3. Peat over chalk	Beside New Cut River; chalky subsoil – higher pH water input; 50% OM; care needed on inputs / crop choice; chalk in-mix 1-2 m deep
4. Chalk	Right next to New Cut River; very chalky -high pH
5. Clay	Clay outcrops, too heavy for most crops, in stewardship schemes
6. Rodden	Sometimes left – infertile; sandy/silt
7. Fen edge	10% OM; mineral soil – sandy loam; skirt fen
8. Mineral soils over chalk	None on G's land
9. Mineral land	Mineral – sandy loam Southery; over Greensand hill – small area on farm
10. The otherside!	10% OM; roddens clear through; mixed peat and mineral

Farmer lexicon

11 in place

Now aligned and co-ordinated



Farmer maps

7 in place

Some point data

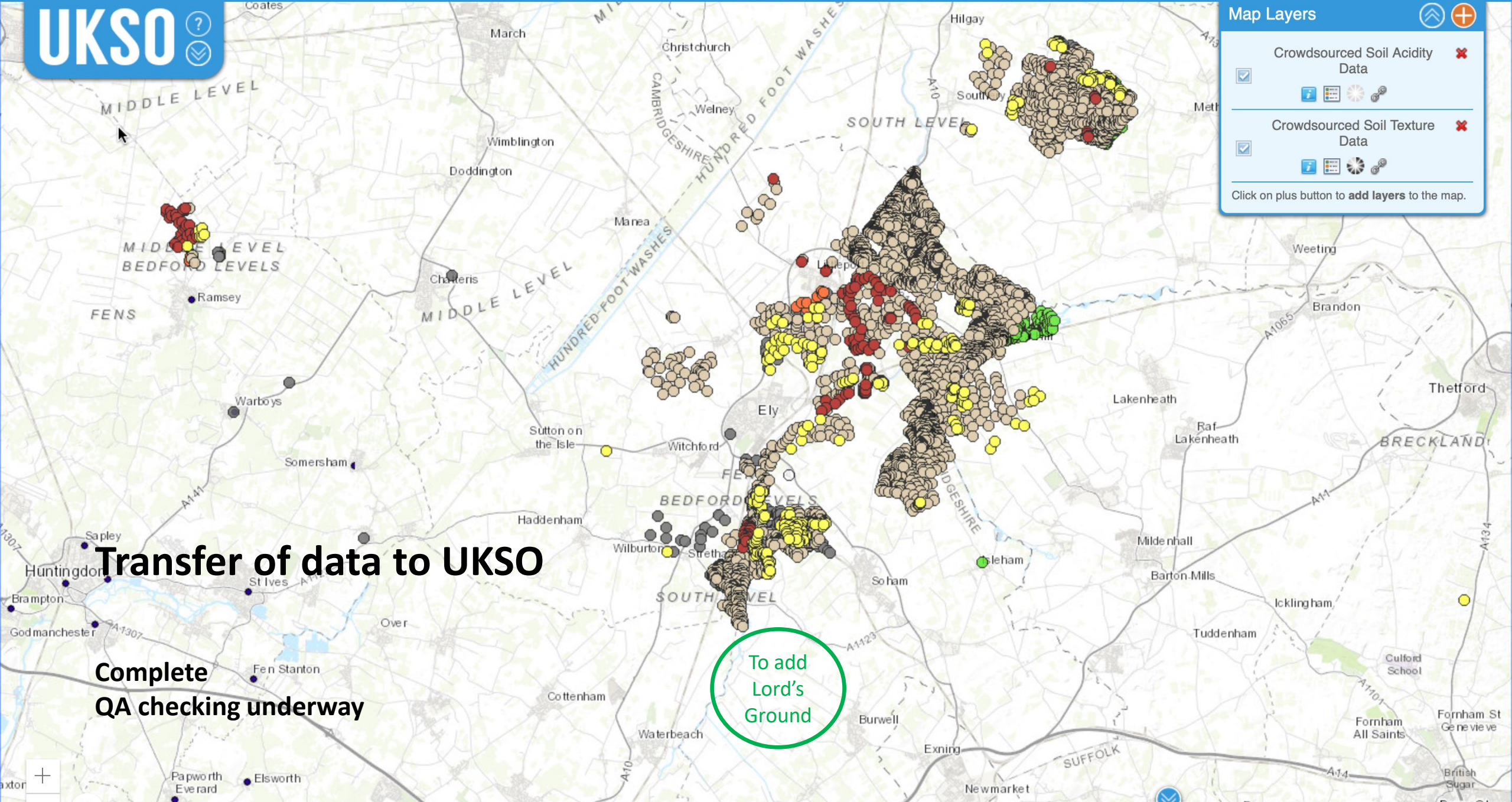
Coverage c. 13,000 ha



Map Layers

- Crowdsourced Soil Acidity Data
- Crowdsourced Soil Texture Data

Click on plus button to add layers to the map.



Transfer of data to UKSO

Complete QA checking underway

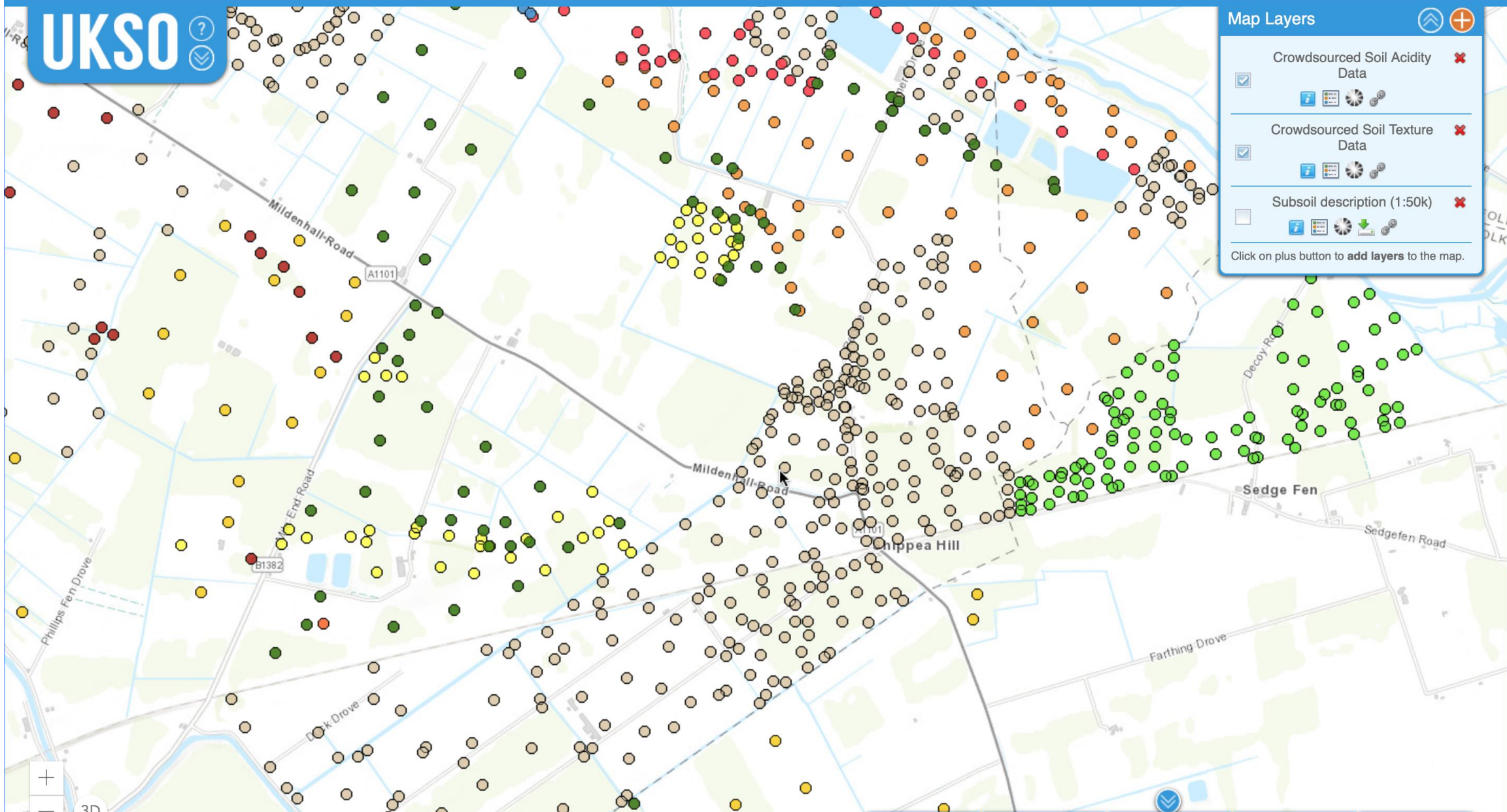
To add Lord's Ground

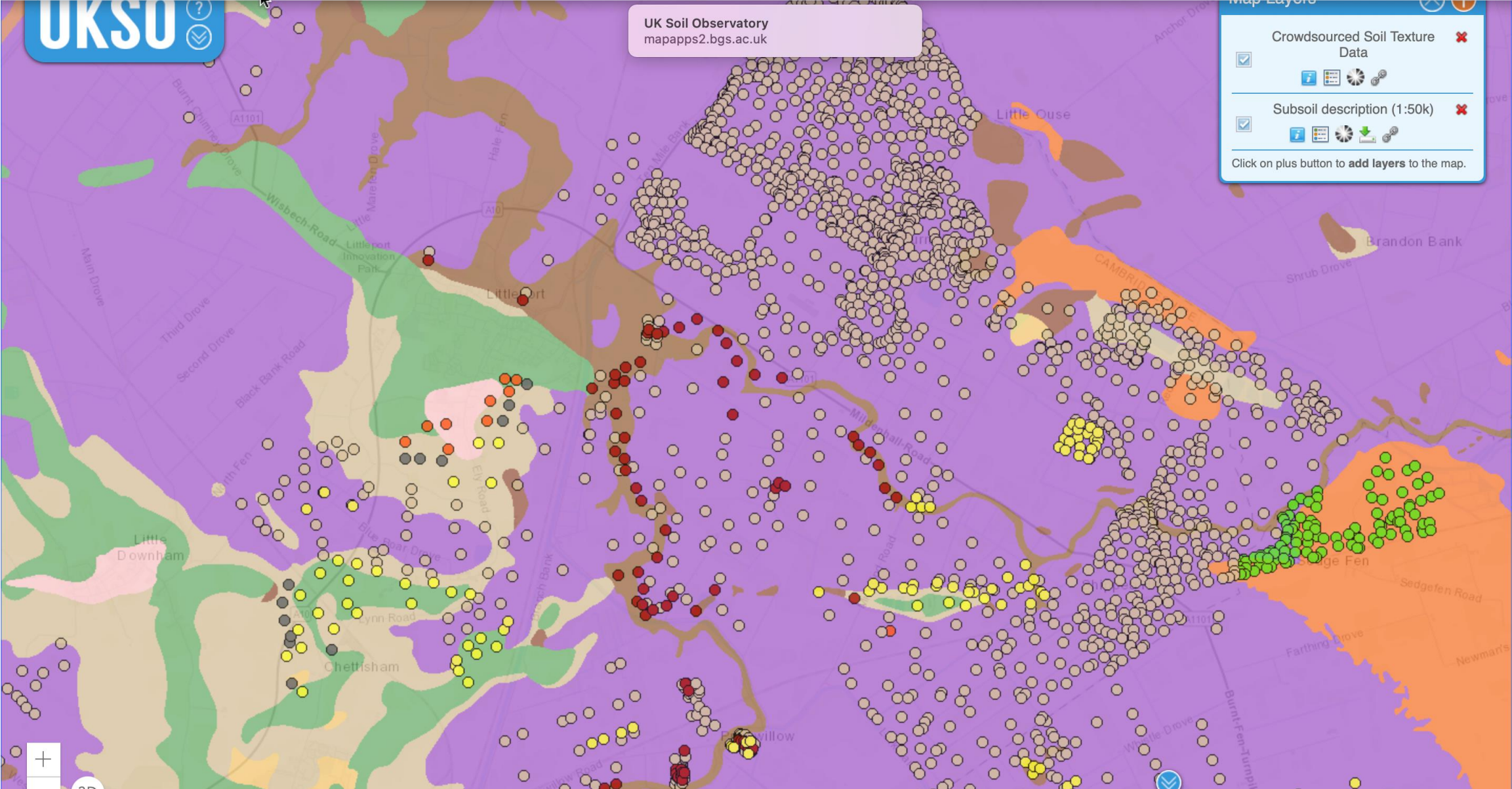


Map Layers

- Crowdsourced Soil Acidity Data ✖
- Crowdsourced Soil Texture Data ✖
- Subsoil description (1:50k) ✖

Click on plus button to **add layers** to the map.





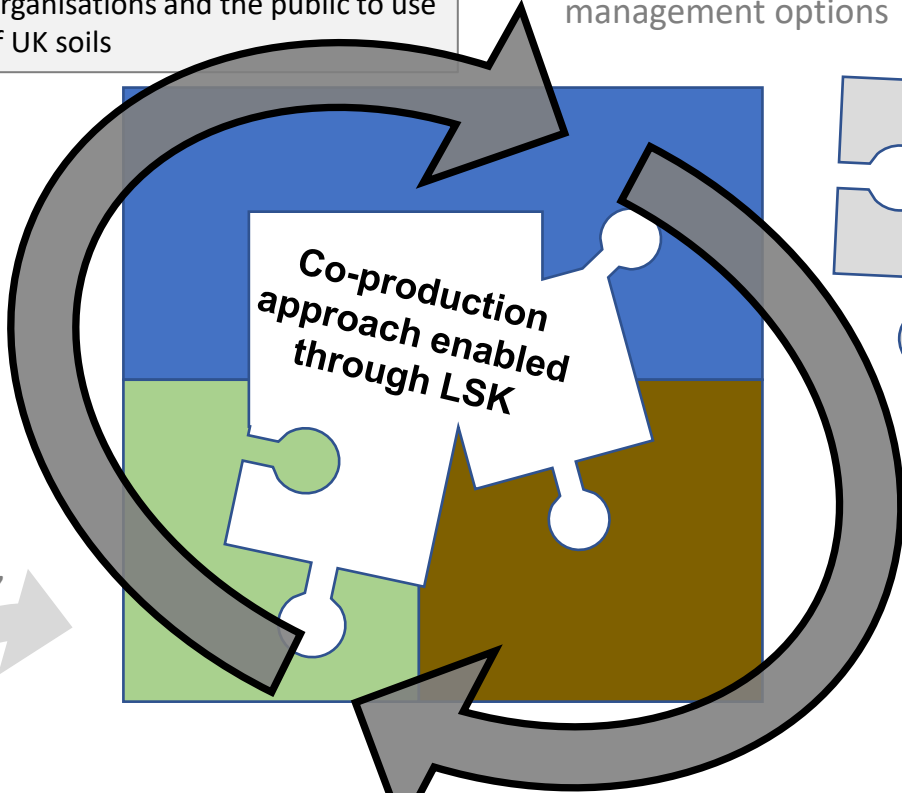
BGS-managed UKSO open platform:

- Enables simple access to soil data, knowledge and expertise from across a wide range of institutions
- Supports academia, commercial organisations and the public to use data to develop sustainable use of UK soils

Land manager knowledge
Peat location, quality, use,
management options

Feb 2021

Pilot project



Scientist knowledge
Peat location, quality,
management options,
impacts

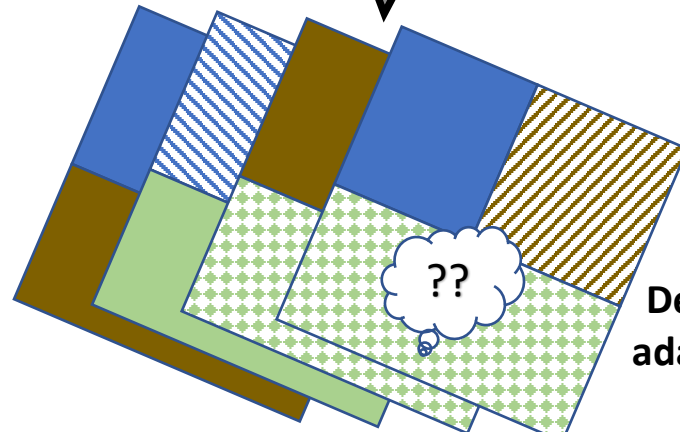
Autumn 2021

Workshop - Evaluation & co-
development of next steps
?

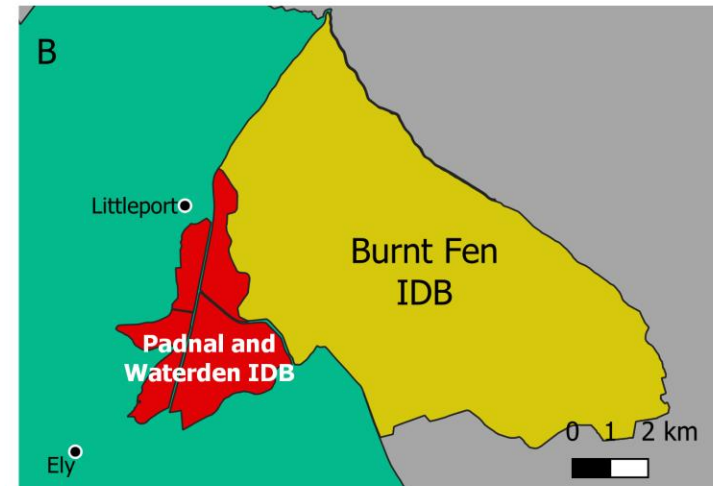
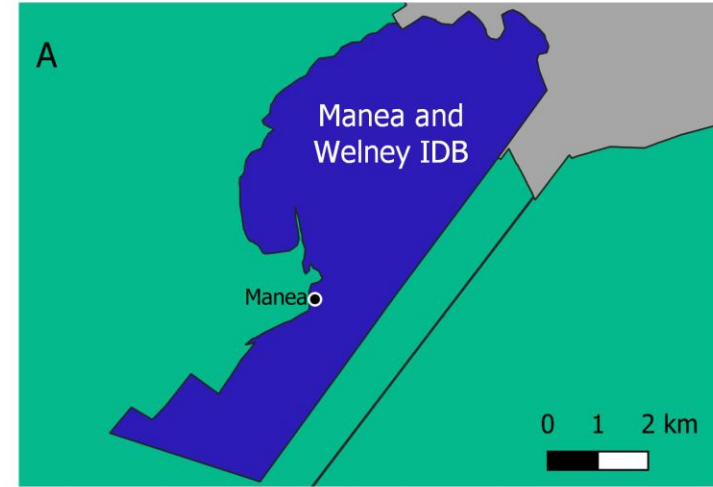
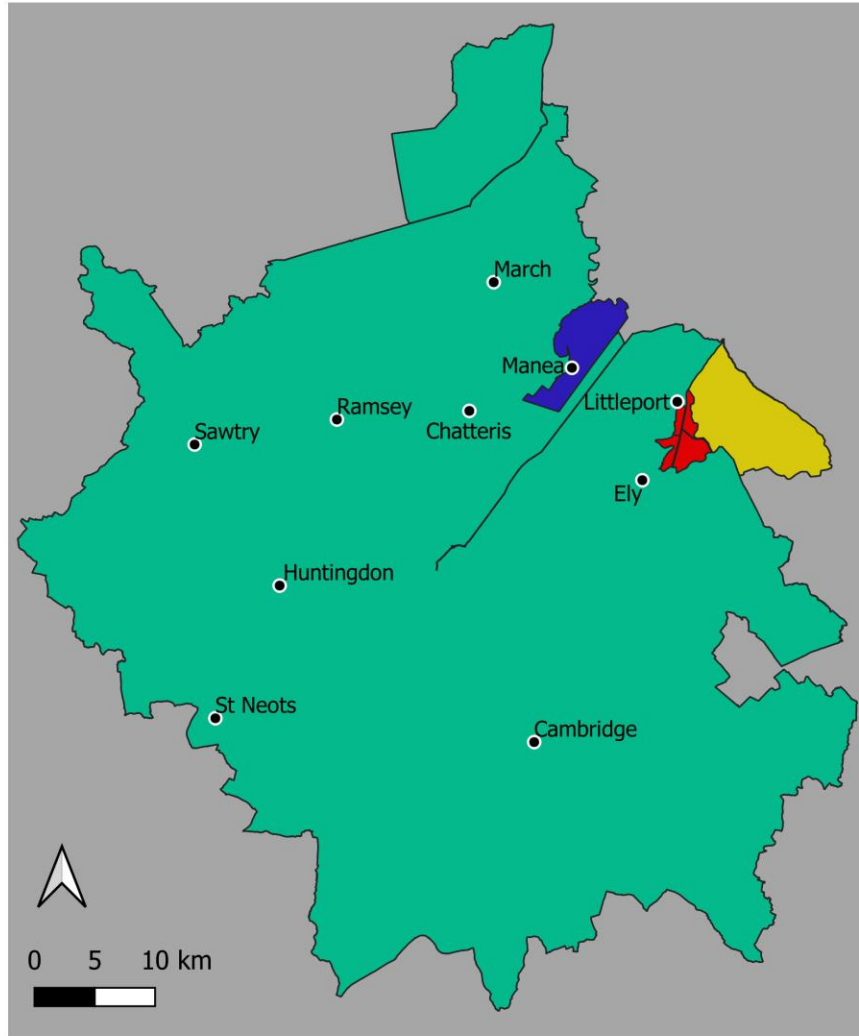
Rolling out mapping
NE Peat Map

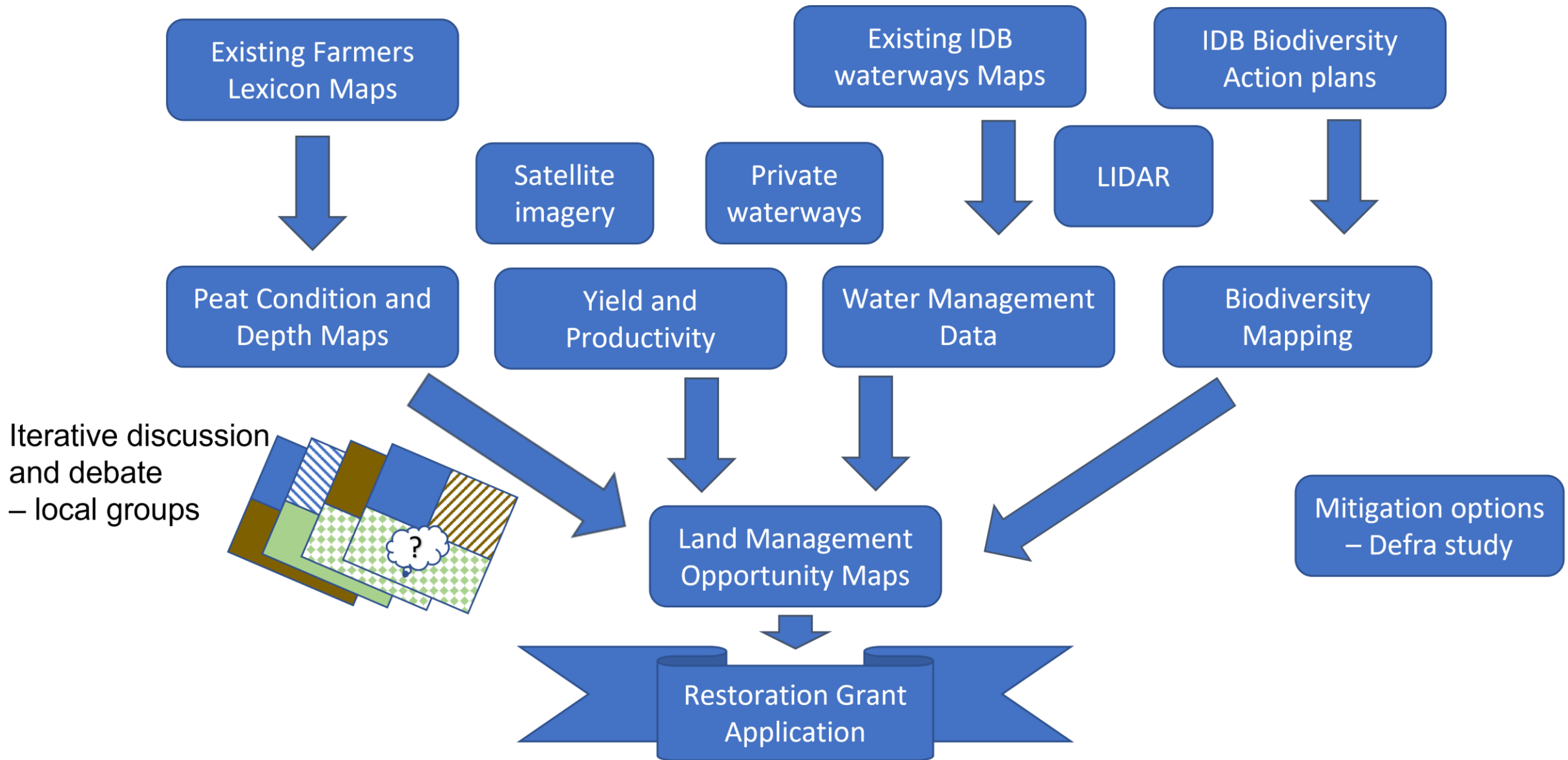
DISCOVERY GRANT

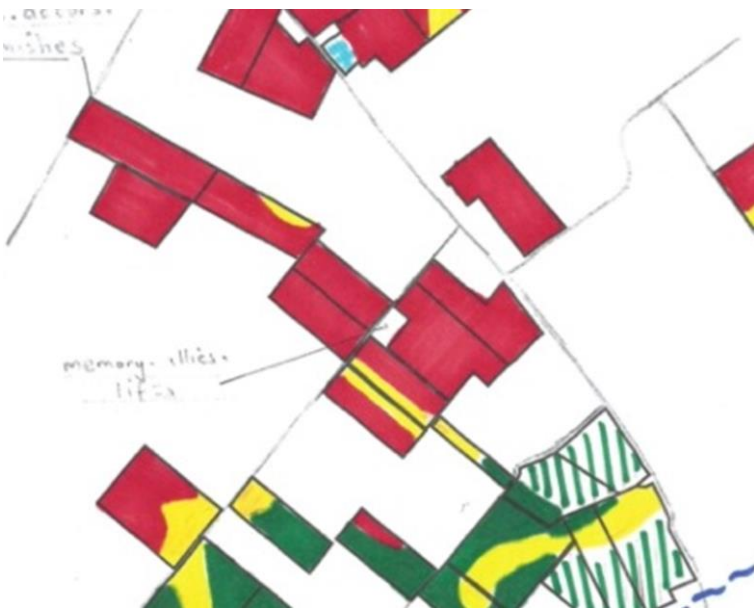
Generating new
hypotheses



Developing locally-
adapted site-specific
management







Soil Mapping

Our team of farmers also mapped their soils using our common Fens lexicon and their own local expert knowledge.

This has allowed us to generate new soil maps for the 3 internal drainage boards to field scale.



Mapping Water Management

Farmers scored every field in the farm against the following metrics:

- Water Table Management
- Drainage
- Irrigation water/license availability

Total for each field – separated into bins that created a water score.

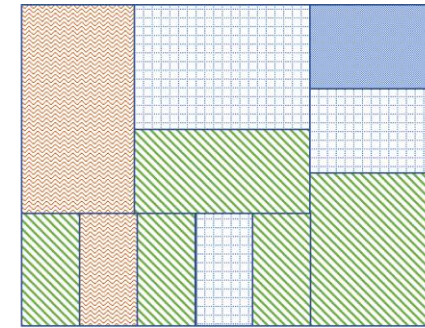


Biodiversity Day

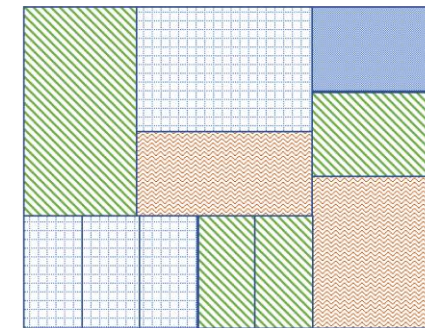


Creation of Opportunity Maps

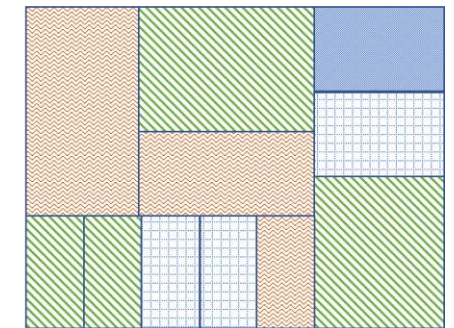
	Clay	Sand	Silt	Chalk	Gravel
Deep (partly) fibrous peat over 50% OM (handles a bit like a traditional growbag) >1m (water table still in peat), may be Bear's Muck present, over ...	Deep black fibrous over clay (1)	Deep black fibrous over sand (2)	Deep black fibrous over silt (3)	Deep black fibrous over chalk (4)	Deep black fibrous over gravel (5)
Deep humified (sooty) peat may be over more fibrous layers > 1m (water table in peat), over 50% OM, surface blows easily when dry, over...	Deep sooty black over clay (6)	Deep sooty black over sand (7)	Deep sooty black over silt (8)	Deep sooty black over chalk (9)	Deep sooty black over gravel (10)
Humified (light/sooty peat) 0.4 - 1m over ... (some mineral material mixed into peat, peat below plough depth, but drains, if present, are in mineral material) With clay, when mixed in, giving structure to the peat (in contrast to 11)	Light black over clay (11); <i>also as complex mix with roddens.</i> Medium black over clay (15)	Light black over sand or gravel (12)	Light black over silt (13)	Light black over chalk (14)	Light black over sand or gravel (12)
Mixed black (mineral and peat mixed) or very shallow peat layer (organo-mineral soil); drains in mineral material	Heavy peat (16); <i>also as complex mix with roddens</i>	Black sand (17)	Black silt (18)	Chalky black (19)	Gravelly black (20)
Rodden (also rodhams)	Clay roddens (21)		Rodden - mainly silt (22)		
Mineral soils	Heavy clay soils (23)	Sandy loam (24)	Silty soils (25)	Mineral over chalk (26)	Gravelly soils (27)
	Disturbed soils - post-copralite mining (28)	Pure sand (29)		White over black (30) - chalk and shells over peat	
Mineral soils associated with watercourses	Old river bed - clay (31)	Old river deposits - fine black sand (32)			
		Old river bank - sandy loam over clay (33)			
	Drain cleanings - commonly strips, deposition over many years (34)	Old shorelines; stone lines - narrow strips at zero a.o.d (35)			



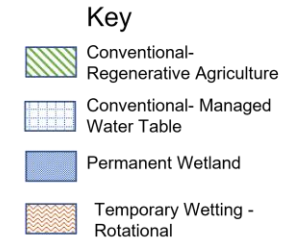
Year A



Year B



Year C



$$\text{Soil Score} + \text{Productivity Score} + (\text{Water Score} \times 2) = \text{Opportunity Score}$$