

# Managing land for arable plants: Farm Decision-making Activity

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**Objectives:**

- To consider factors and management practices that are favourable for arable plants.
- To work as a team to select and justify farmland management practices.

**Context:**

Payment for ecosystem services is becoming increasingly important in current and future agri-environment schemes. This is currently calculated using profit foregone in 2019. Cultivation of arable land is particularly favourable for rare arable plant species, many of which are in decline or endangered. The plants require annual cultivation, low nutrient status, and reduced or no herbicide. They may be conserved on conventional farmland in margins or plots, or using a whole field approach in low-intensity or organic production. A number of suitable agri-environment options are available. The plants have a value in their own right, but have further benefits in terms of promoting pollinators, beneficial predators, and farmland birds.

Land managers have to balance a range of factors such as: crop prices; agri-environment payments; cost of agro-chemicals; fuel and machinery; food supply; pernicious weed management; environmental benefits; type of crop; sowing season, local soil and climatic factors; legislation and designations; visual appeal of arable plants; personal interests and preferences.

**Activity:**

- Form a farm management team with groups of around 3-5.
- Use either the example farm information on the following pages, or any other farm you have permission to use.
- You may be set objective(s) to enhance arable plant populations, or you may be asked to devise your own objectives.

Note management objective(s) here:



Annotate your map to indicate land management, crop choice, and agri-environment options for arable plants. Base your decision-making on the map and data, plus the principles from your pre-reading and/or taught session. Be prepared to present your map and justify your decisions.

**Results of arable plant survey**

Top margin of field E:  
 Spreading Hedge-parsley (*Torilis arvensis*)  
 Shepherd's-needle (*Scandex pectin-veneris*).

Corner of Field C:  
 Red Dead-nettle (*Lamium purpureum*)  
 Fat Hen (*Chenopodium album*)  
 Common poppy (*Papaver rhoeas*)  
 Field Madder (*Sherardia arvensis*)

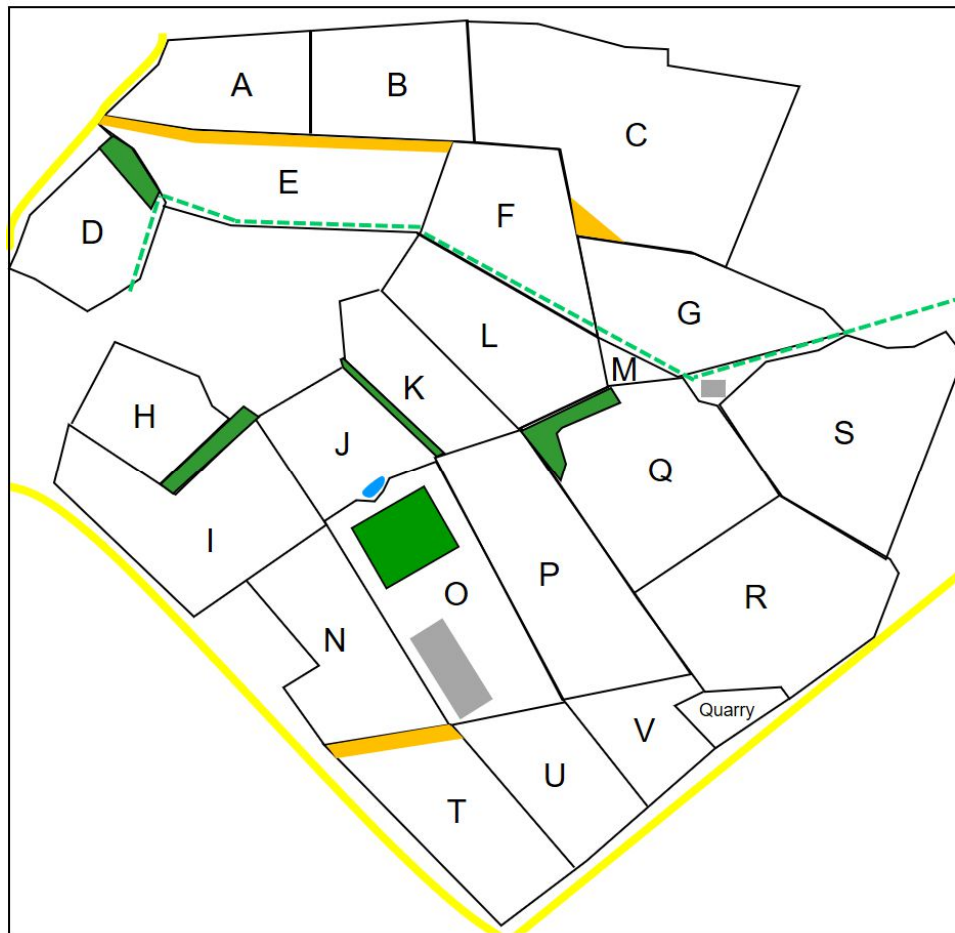
Top margin of field T:  
 Red Hemp-nettle (*Galeopsis angustifolia*)  
 Narrow-fruited Cornsalad (*Valerianella dentata*)  
 Night-flowering catchfly (*Silene noctiflora*)

**Results of farmland bird survey**

Grey partridge (*Perdix perdix*)  
 Skylark (*Alauda arvensis*)

**Results of rare mammal survey**

Field C: Harvest mouse (*Micromys minutus*) nest



**Field map**

General farm information:  
 Altitude: 115-140 m.a.s.l  
 Aspect: gentle SE-facing  
 Location: Cotswolds, UK  
 Annual rainfall: 690mm  
 Mean annual temp.9.4 °C  
 Nitrate Vulnerable Zone  
 Soil: Cotswold brash, can be shallow and prone to drought

**Key**

- = Field boundary
- - - = Public footpath
- = Road
- = Arable plant community
- = Woodland
- = Building
- = Pond

N

200m

Figure 1. Farm field map and biodiversity survey results

Table 1. Field data to correspond with Figure 1. Area measured in hectares (ha).

Field area	Field use	Crop	Type	Field area	Field use	Crop	Type
A 8.40 ha	Arable	Winter rapeseed	Conventional	L 8.97 ha	Arable	Winter rapeseed	Conventional
B 7.55 ha	Arable	Winter rapeseed	Conventional	M 0.90 ha	Permanent pasture	Permanent pasture	Conventional
C 23.26 ha	Arable	Winter wheat	Conventional	N 9.80 ha	Grass ley	Grass ley	Conventional
D 3.89 ha	Permanent pasture	Permanent pasture	Conventional	O 6.18 ha	Arable	Winter wheat	Conventional
E 12.21 ha	Arable	Winter rapeseed	Conventional	P 13.97ha	Arable	Winter wheat	Conventional
F 9.90 ha	Arable	Winter rapeseed	Conventional	Q 14.09 ha	Arable	Spring barley	Conventional
G 10.56 ha	Arable	Winter wheat	Conventional	R 15.35 ha	Arable	Spring barley	Conventional
H 5.98 ha	Arable	Winter rapeseed	Conventional	S 15.81 ha	Arable	Spring barley	Conventional
I 12.94 ha	Arable	Winter rapeseed	Conventional	T 10.02 ha	Arable	Spring barley	Conventional
J 5.94 ha	Permanent pasture	Permanent pasture	Conventional	U 8.09 ha	Arable	Winter wheat	Conventional
K 5.96 ha	Arable	Winter rapeseed	Conventional	V 5.35 ha	Arable	Fallow	Conventional

Table 2. Recent gross margins for crops grown on the farm described in Figure 1 and Table 1. For the latest market prices: <https://www.fwi.co.uk/prices-trends#/>

Winter milling wheat	Spring malting barley	Winter rapeseed
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	£/ha	£/ha	£/ha
<b>Turnover</b>			
Yield	1420.80	689.60	1254.00
Straw	60.00	60.00	-
<b>Total</b>	<b>1480.80</b>	<b>749.60</b>	<b>1254.00</b>
<b>Variable costs</b>			
Seed	80.68	66.82	102.51
Fertiliser and digestate	175.12	31.59	117.82
Spray	213.45	58.89	185.83
Lime/ trace elements	0.00	0.00	0.00
Sundries	0.00	0.00	0.00
<b>Total</b>	<b>469.25</b>	<b>157.30</b>	<b>406.16</b>
Yield (tonnes/ ha)	8.88	4.31	3.30
Average price (tonne)	160.00	160.00	380.00
<b>Gross margin</b>	<b>1011.55</b>	<b>592.30</b>	<b>847.00</b>

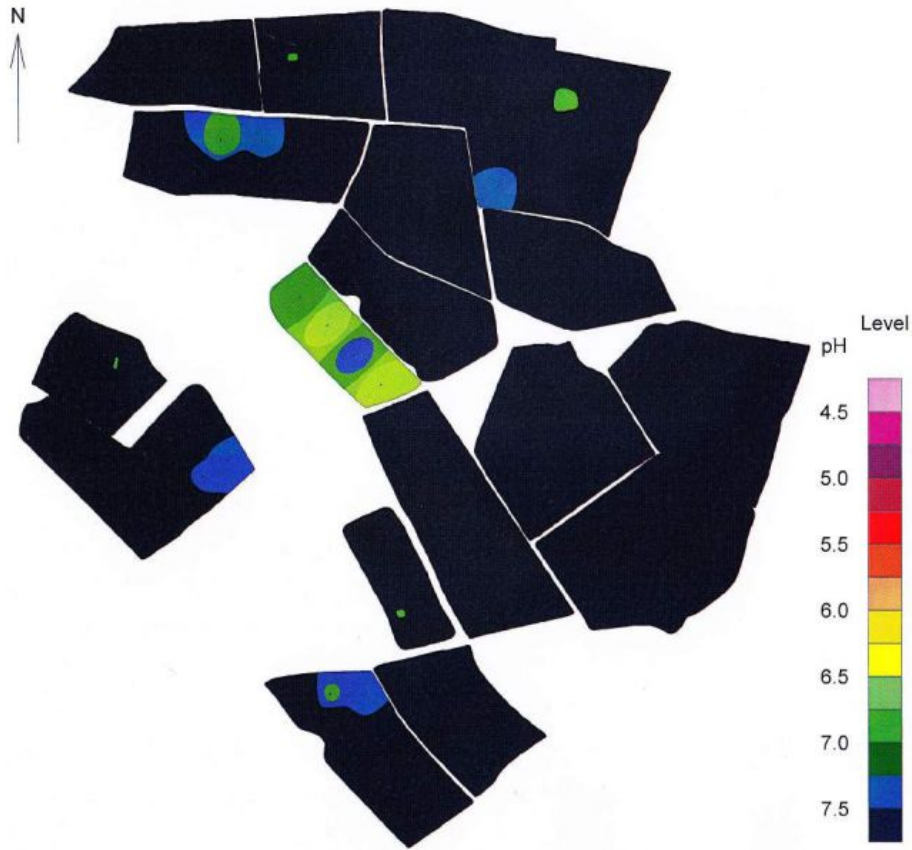


Figure 2. pH map for fields under arable production

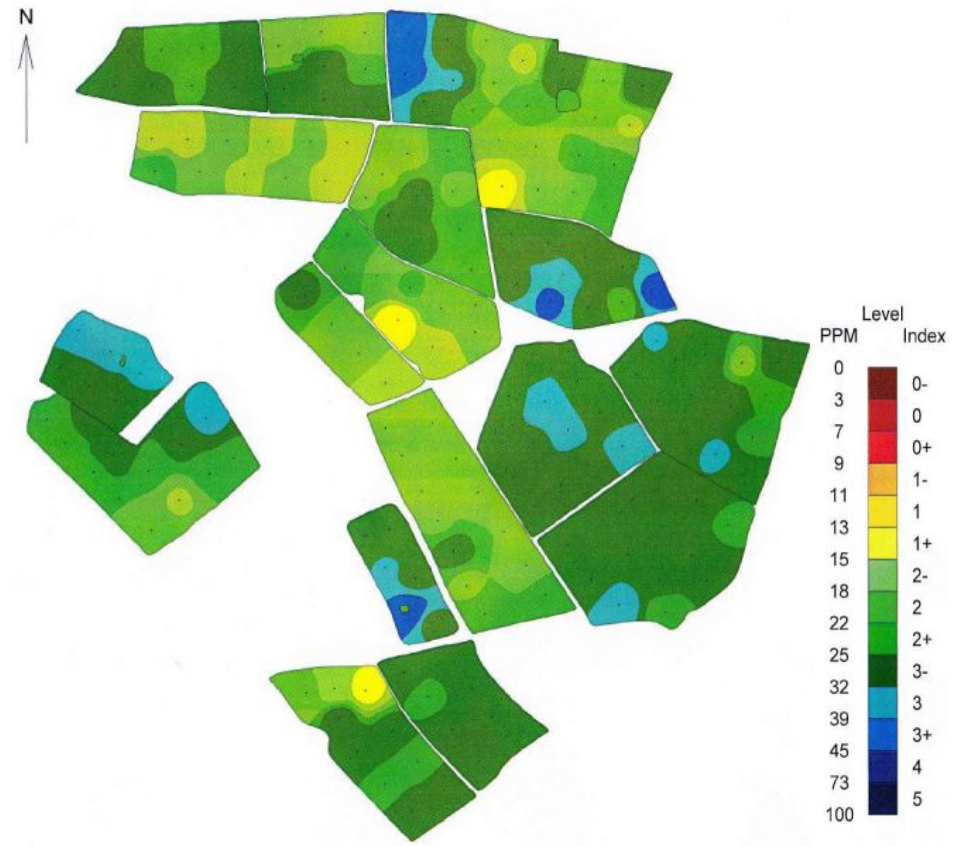


Figure 3. Phosphorus map for fields under arable production

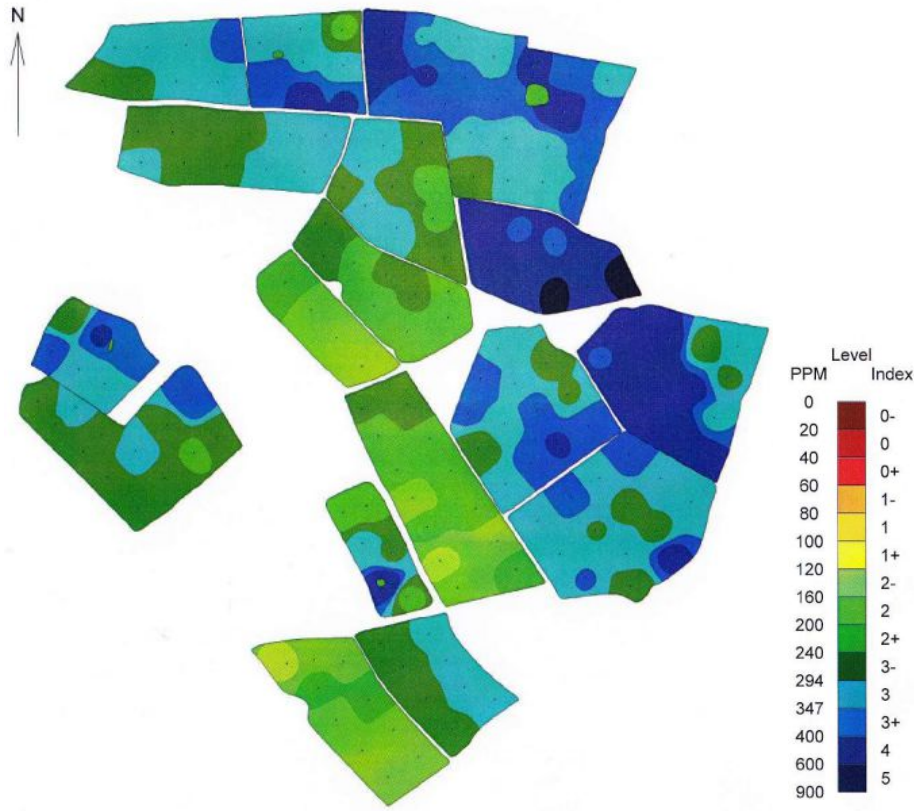


Figure 4. Potassium map for fields under arable production

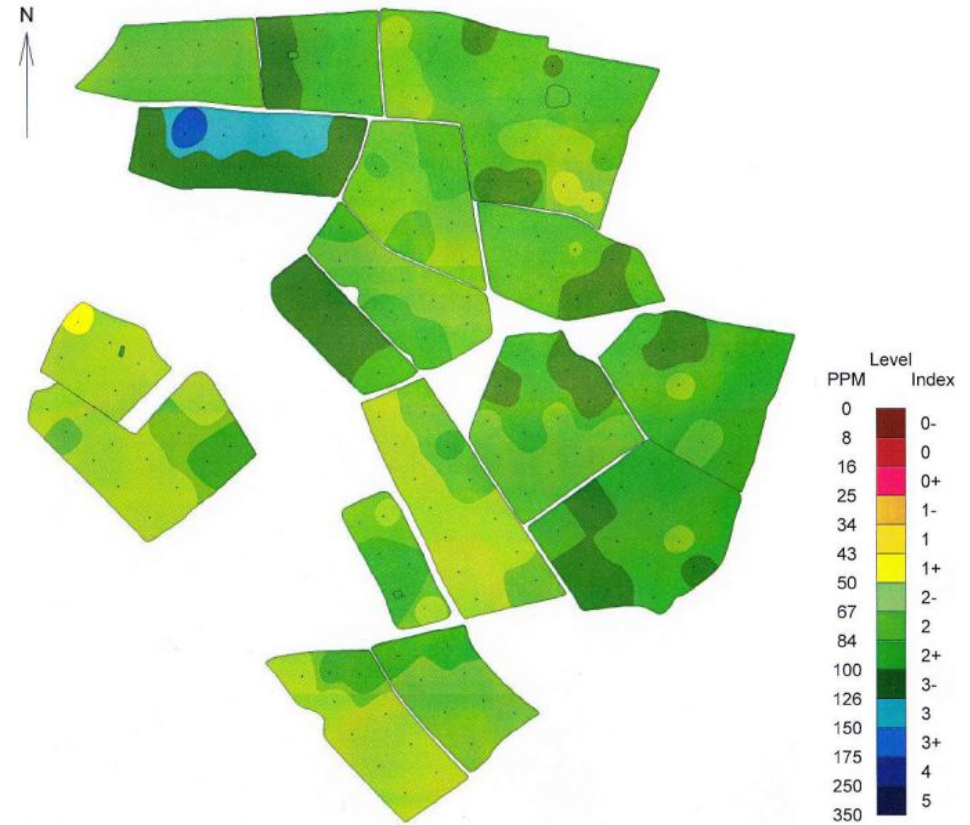


Figure 5. Magnesium map for fields under arable production

Table 3. Agri-environment options suitable for arable plant conservation. Payments correct for 2019.







Option	Payment £/ha	Value for arable plants	Land in/ out of production
AB2 Basic overwinter stubble	84	★★★ for spring germinating plants; Unsuitable for winter germinating plants	In
AB4 Skylark plots	18	Unsuitable for spring germinating plants; ★★★ for winter germinating plants	Out
AB5 Nesting plots for lapwing	524	Unsuitable for spring germinating plants; ★★★ for winter germinating plants	Out
AB7 Whole crop cereals (specifies spring cultivation)	495	★★★★ for spring germinating plants; Unsuitable for winter germinating plants	In
AB9 Winter bird food	640	★★	Out
AB10 Unharvested cereal headlands	640	★★★★	Out
AB11 Cultivated areas for arable plants	532	★★★★★	Out
AB13 Brassica fodder crop	100	★★★	In
AB14 Harvested low-input cereal	266	★★★★★	In
OP2 Wild bird seed mixture	640	★★	Out
OR3 Organic conversion – rotational	175	★★★ depending on presence of arable plants	In
OT3 Organic land management - rotational	65	★★★ depending on presence of arable plants	In

**Use these resources to find out more about each option:**

Plantlife (2019) Land management for arable plants and agri-environment schemes. Available from: <https://www.plantlife.org.uk/uk/discover-wild-plants-nature/habitats/arable-farmland/land-management-for-arable-plants-agri-environment-schemes>

Rural Payments Agency and Natural England (2019) Countryside Stewardship Grants. Available from: <https://www.gov.uk/countryside-stewardship-grants>

Table 4. Arable plant, farmland bird, and rare mammal habitat and food preferences.  
Great Britain (GB) Red List. Natural Environment and Rural Communities Act (NERC).

<p><b>Fat Hen</b> <i>Chenopodium album</i></p>  <p>© Kelly Swallow</p> <p>Prefers autumn-sown crops. Germinates Apr and Aug. Flowers Jul-Sep. Prolific seed producer. GB Red List: least concern</p>	<p><b>Red Hemp-nettle</b> <i>Galeopsis angustifolia</i></p>  <p>© Cath Shellswell</p> <p>Prefers spring-sown crops. Germinates Feb-Apr. Flowers Jun-Oct. GB Red List: critically endangered <a href="https://naturebftb.co.uk/wp-content/uploads/2019/06/Galeopsis-angustifolia-Red-hemp-nettle.pdf">https://naturebftb.co.uk/wp-content/uploads/2019/06/Galeopsis-angustifolia-Red-hemp-nettle.pdf</a></p>	<p><b>Red Dead-nettle</b> <i>Lamium purpureum</i></p>  <p>© Kelly Swallow</p> <p>Germinates all year round, but particularly Mar-May and Jul-Oct. Flowers Mar-Oct. GB Red List: least concern <a href="https://www.plantlife.org.uk/uk/disc-over-wild-plants-nature/plant-fungi-species/red-dead-nettle">https://www.plantlife.org.uk/uk/disc-over-wild-plants-nature/plant-fungi-species/red-dead-nettle</a></p>
<p><b>Common poppy</b> <i>Papaver rhoeas</i></p>  <p>© Kelly Swallow</p> <p>Spring or autumn-sown crops. Germinates Feb-Apr and Sep-Dec. Flowers Jun-Aug. GB Red List: least concern <a href="https://naturebftb.co.uk/wp-content/uploads/2019/06/Papaver-rhoeas-Common-poppy.pdf">https://naturebftb.co.uk/wp-content/uploads/2019/06/Papaver-rhoeas-Common-poppy.pdf</a></p>	<p><b>Shepherd's-needle</b> <i>Scandex pecten-veneris</i></p>  <p>© Cath Shellswell</p> <p>Prefers autumn-sown crops. Germinates Oct-Dec. Flowers Apr-Jun. GB Red List: critically endangered <a href="https://www.plantlife.org.uk/uk/disc-over-wild-plants-nature/plant-fungi-species/shepherds-needle">https://www.plantlife.org.uk/uk/disc-over-wild-plants-nature/plant-fungi-species/shepherds-needle</a></p>	<p><b>Field Madder</b> <i>Sherardia arvensis</i></p>  <p>© Kelly Swallow</p> <p>Spring or autumn-sown crops. Germinates Feb-Apr and Oct-Dec. Flowers Mar-Sep. GB Red List: least concern</p>
<p><b>Night-flowering catchfly</b> <i>Silene noctiflora</i></p>	<p><b>Spreading Hedge-parsley</b> <i>Torilis arvensis</i></p>	<p><b>Narrow-fruited Cornsalad</b> <i>Valerianella dentata</i></p>





(Creative Commons, 2008)

Prefers spring-sown crops.  
Germinates Mar-May, sometimes  
Sep-Oct.  
Flowers Jul-Sep.  
GB Red List: vulnerable



© Simon Williams/ Plantlife

Prefers autumn-sown crops.  
Germinates Oct-Dec.  
Flowers Jun-Sep.  
GB Red List: endangered  
<https://naturebftb.co.uk/wp-content/uploads/2019/06/Torilis-arvensis-Spreading-hedge-parsley.pdf>



© Terry Swainbank/ Plantlife

Prefers spring-sown crop.  
Germinates Feb-Apr.  
Flowers June-Aug.  
GB Red List: endangered

**Skylark**  
*Alauda arvensis*



© Hughes/ Natural England

Eats seeds and invertebrates.  
Ground nesting.  
Open countryside, farmland, and  
woodland habitats.  
NERC act: bird of conservation  
concern.  
<https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/skylark/>

**Grey partridge**  
*Perdix perdix*



(Creative Commons, 2012)

Eats leaves, seeds, and invertebrates.  
Ground nesting.  
Scrub and grassland habitats.  
GB Red List: vulnerable  
<https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/grey-partridge/>

**Harvest mouse**  
*Micromys minutus*



© Kathy Friend/ Natural England

Eats seeds, berries, and  
invertebrates.  
Nests in tall grass habitat e.g.  
cereals, verges, hedgerows.  
GB Red List: near threatened  
<https://www.mammal.org.uk/species-hub/full-species-hub/discover-mammals/species-harvest-mouse/>

Creative Commons (2008). Night-flowering Catchfly. Available from: [https://commons.wikimedia.org/wiki/Silene\\_noctiflora#/media/File:Silene\\_noctiflora\\_by\\_Homer\\_Edward\\_Price.gif](https://commons.wikimedia.org/wiki/Silene_noctiflora#/media/File:Silene_noctiflora_by_Homer_Edward_Price.gif)  
Creative Commons (2012) Grey Partridge. Available from: [https://commons.wikimedia.org/wiki/Perdix\\_perdix#/media/File:Perdix\\_perdix\\_Turvey\\_1.jpg](https://commons.wikimedia.org/wiki/Perdix_perdix#/media/File:Perdix_perdix_Turvey_1.jpg)

<b>Extinct (EX)</b>
<b>Extinct in the Wild (EW)</b>
<b>Critically Endangered (CR)</b>
<b>Endangered (EN)</b>
<b>Vulnerable (VU)</b>
<b>Near Threatened (NT)</b>
<b>Least Concern (LC)</b>
<b>Data Deficient (DD)</b>
<b>Not Evaluated (NE)</b>

Figure 6. Red List categories indicate the likelihood of extinction.

Keep up to date with species' conservation status here: <https://jncc.gov.uk/our-work/conservation-designations-for-uk-taxa/>. This includes numerous measures of conservation concern such as: GB and regional Red List Status; Natural Environment and Rural Communities Act; Wildlife and Countryside Act; Priority Species.

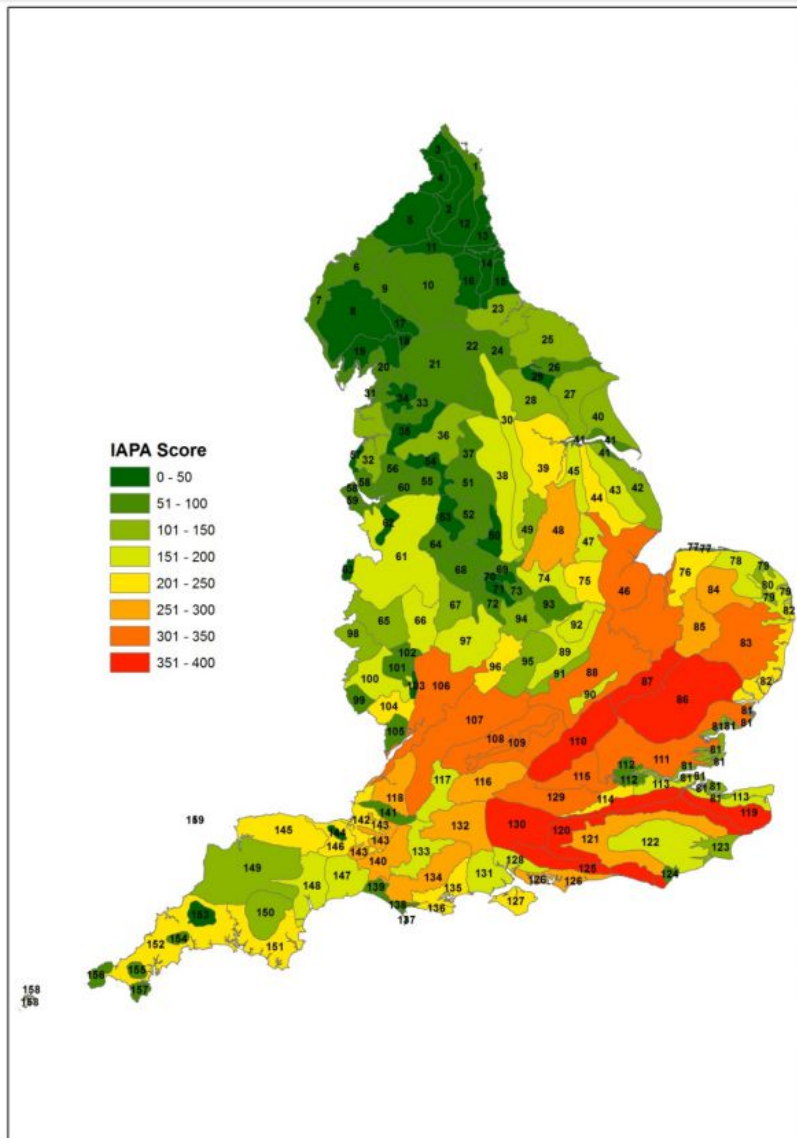


Figure 7. Important Arable Plant Areas (IAPA) by National Character Areas in England (Plantlife, 2015).

Important Arable Plant Areas (IAPAs) are scored based on the rarity and number of arable plants.

Find out about individual species and the full scoring system here: <https://www.plantlife.org.uk/uk/discover-wild-plants-nature/habitats/arable-farmland/important-arable-plant-areas>

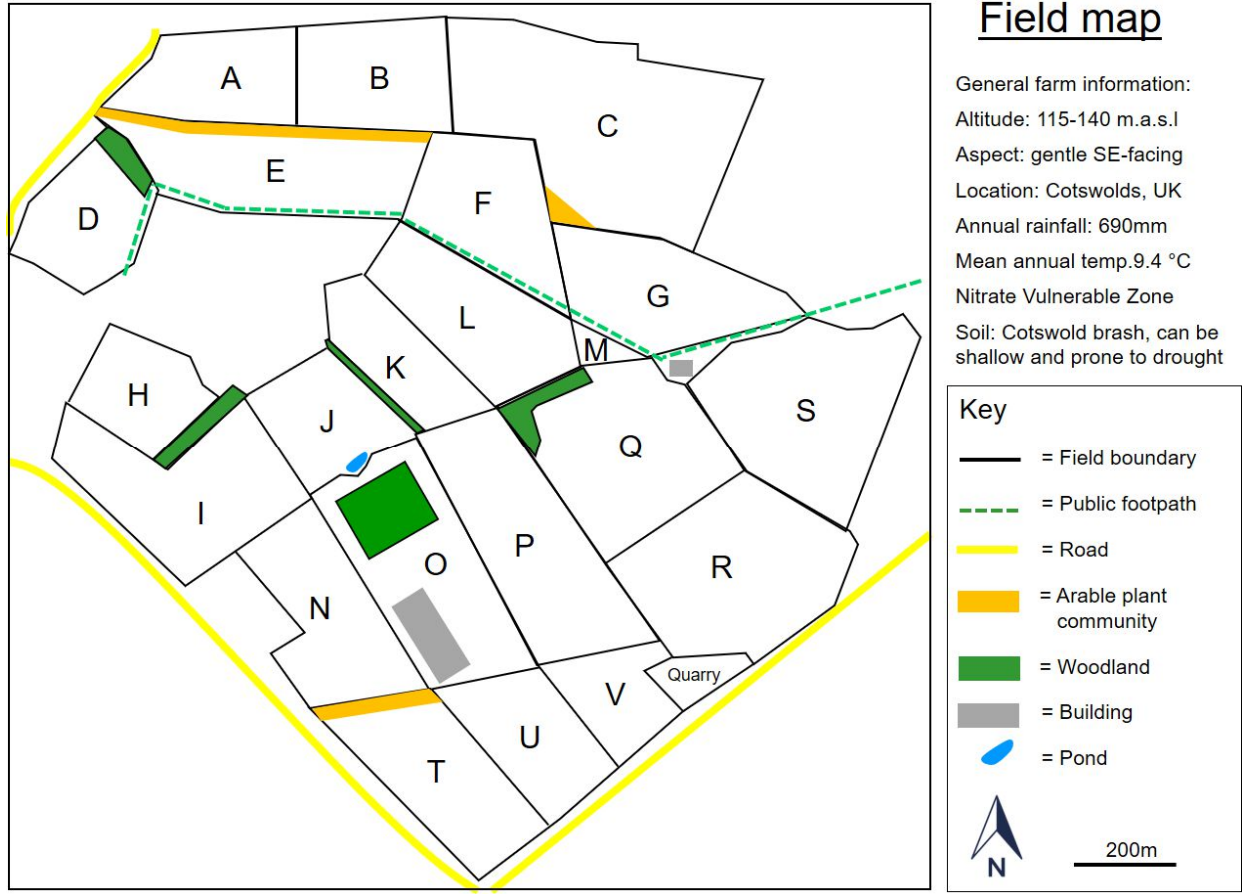


Figure 8. Farm map for annotation