



**Botanical Survey of land adjacent to Rockwell Lane, Pant,
Shropshire.**



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A Botanical Survey of land adjacent to Rockwell Lane, Pant, Shropshire.

2022

Report Status: Finalised

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Summary

Llanymynech and Pant Parish Council commissioned *Arvensis Ecology* to undertake a botanical survey of land adjacent to Rockwell Lane.

This report quantifies the ecological value of the site by investigating the flora and its associated habitats present. By comparing the species found against current legislation, conservation status and native status, Shropshire Axiophyte list, and Ellenberg values a decision could be made on the importance or lack thereof of individual species and the habitats they comprise.

The site sits within the Oswestry Uplands National Character Area, a landscape dominated by limestone outcrops with hills, wooded valleys, streams, intermingled with farmland and woodlands. Within this area there are Sites of Special Scientific Interest (SSSI), and numerous local nature reserves.

This survey found that the site has a mixture of species rich neutral grassland, as well as large areas of marshy grassland, and stretches of hedgerows. All these habitats are Biodiversity Action Plan habitats and are of significance ecologically nationally, regionally, and locally. Generally, all these habitats are in good condition and with suitable management could be 'restored' to an even better state.

The combination of species present and the habitats they constitute makes this site, despite its small size, an important site within the area. It has similarities with several SSSIs nearby and with management along similar lines could become another gem within the Oswestry hills area.

Conserving this area would be of benefit to biodiversity in the region as well as providing ecosystem benefits including acting as a buffer for water movement downstream to the village of Pant.

Engagement with local conservation organisations, farmers and nearby residents would ensure the positive future management of this site.

This is an exciting opportunity to conserve and enrich this area.

Introduction

Llanymynech and Pant Parish Council commissioned *Arvensis Ecology* to undertake a botanical survey of land adjacent to Rockwell Lane, Pant, Shropshire. This report details the result of a botanical survey undertaken on the 25th of August 2021.

The purpose of this survey was to provide a detailed botanical species list for the site and assessment of habitats present, with a view to commenting on the ecology, conservation value and intrinsic value of the site. Utilising this survey and analysis of the data collected, comments on potential future management¹ and suggestions for the potential use(s) for the site are given.

No attempt was made to survey or record any non-botanical species, although the adjacent area of Llanymynech is known for its rich assemblages of amphibians, reptiles and invertebrates, particularly butterflies and moths as well as other organisms, and there is no reason to believe that some or all making use of this site.

Assessment of the ecological value of the plants and habitats found were compared against native status, current legislation, national and local conservation status, rarity, and axiophyte status to provide an empirical assessment of the site.

Location and general description of site

The survey site lies within the village of Pant, south of Oswestry in northwest Shropshire (vice-county 40, Shropshire). The site is accessed from Rockwell Lane (Postcode: SY10 9QR, Grid reference: SJ270220) and entered from a field gate in the north-western corner (Figures 1 and 2).

To the northwest, the site is bounded by the properties 'The Brambles' and 'Rockwell' with a third new house currently under construction between these two existing houses. To the east the site is bordered by a field belonging to Bryn Ffynnon with a small number of livestock (donkeys currently present). The south and west boundaries are formed of a fence and stream bordering a field and the Llanymynech Hill Local Nature Reserve (managed by Shropshire Wildlife Trust and Montgomeryshire Wildlife Trust). The stream is fed from a well that is situated adjacent to and west of the site, this may be the origin for the name of the nearby road 'Rockwell Lane'.

The site is approximately 0.4 ha in area, with a boundary of less than 250m. Elevation is approximately 110m.

The underlying bedrock to the north is limestone (which was extensively mined in this area), although the site sits on a strip on mudstone and sandstone, and to the south and east the rocks area a mix of glacial till. Soils are classified as free draining, medium to light, being slightly acid but base-rich (British Geological Society 2022; UKSO 2022).

The site is highest near the north, the ground generally falling to the south-eastern corner where the stream exits. The undulating contours of the shape with the associated hydrology give rise to the various plant communities present on the site, the lower lying land being wetter, with the land to the north and west being drier.

¹ A comprehensive site management plan is not included in this report, as this was not within the original tender remit.

The dominant vegetation habitats on the site are a mixture of grasslands, neutral grassland, marshy grassland, with surrounding hedges both semi-natural and of horticultural origin.



Figure 1: Location of survey site in relation to the village of Pant and Llanymynech Hill LNR. (located within two 1km² grid squares, SJ2721 and SJ2722). Surveyed field marked with red dot.

Source: Ordnance Survey

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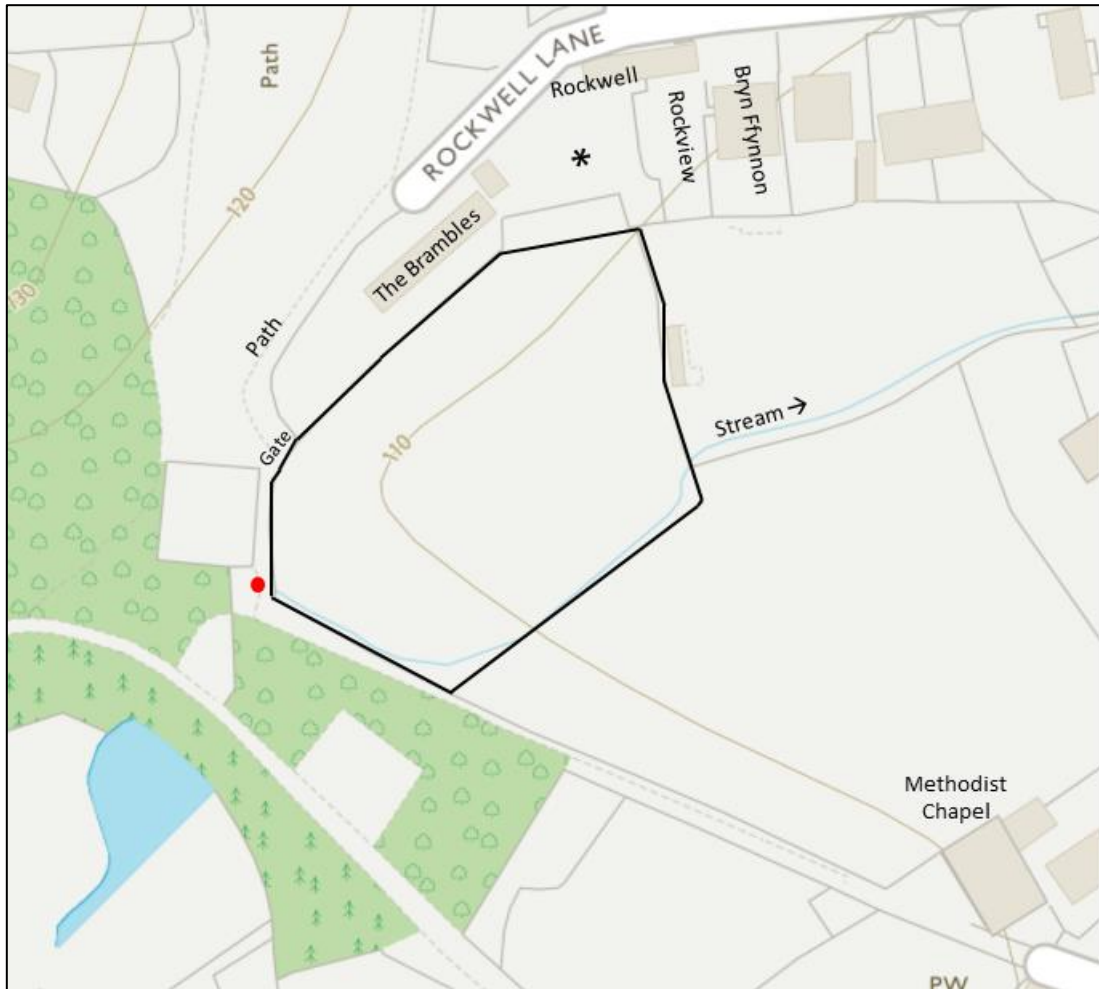


Figure 2: Location of survey site in relation to Rockwell Lane and adjoining properties. Survey site demarcated with black boundary line. The location of the stream, starting approximately where the red dot is positioned, then shown as blue line running along southern boundary of site. Asterisk indicates the site of the new development between The Brambles and Rockwell.

Source: Ordnance Survey

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History of the site and site integrity

It was outside the scope of this report to investigate the historical uses of the site other than consulting historical maps.

Apart from the recent sale of a small area of land to the new house under construction, which 'levels off' the northern edge of the site, the site boundaries look to have been little changed since 1875 (Figure 3). This shows the outline to the west, south and east to be consistent, with removal of a slight dogleg in the northern boundary on the line of 'The Brambles', presumably straightened with construction of that property.

Whilst surveying the site, we struck up a conversation with a local gentleman who suggested that the line of the stream has changed in his lifetime and that it used to run through the centre of the fields. Checking against the old Ordnance Survey map from 1901 (Figure 4) it is clearly shown that the current route is comparable to the historical route. It may be that in the past a new line had been dug across the field but this is not evident either from historical/current maps nor from the site visit.

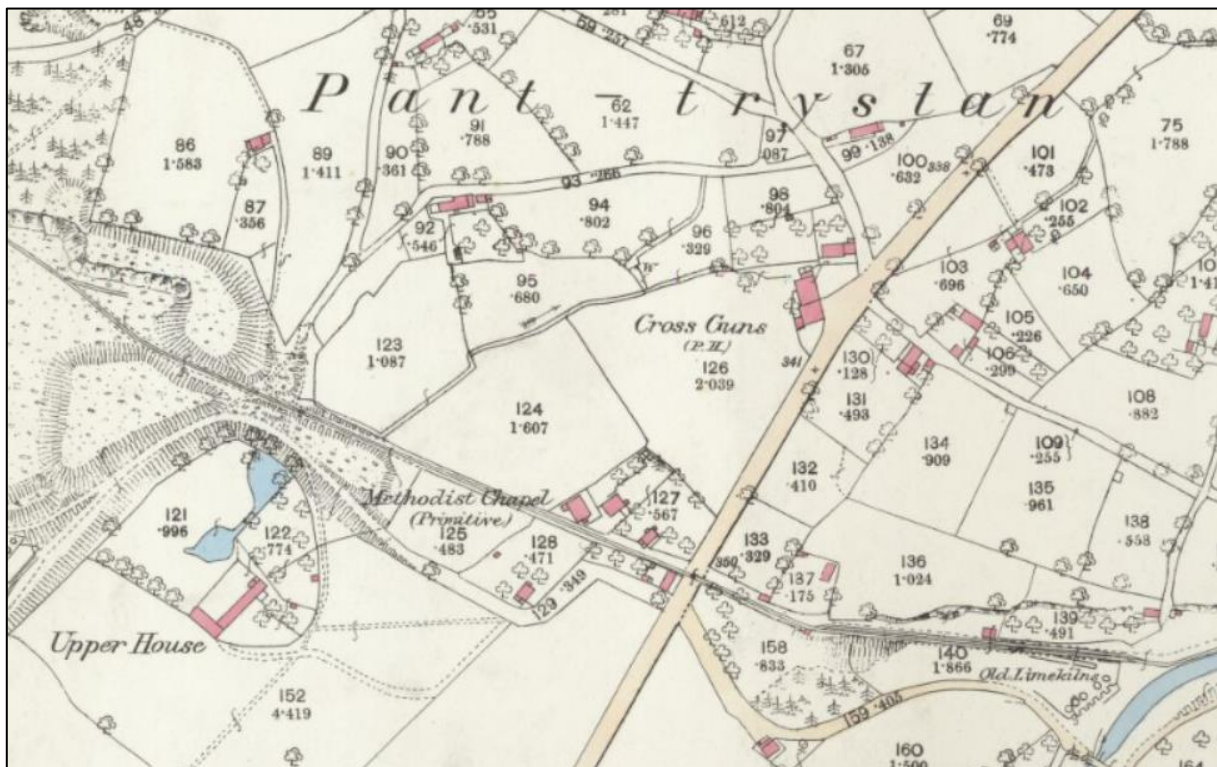


Figure 3: 1875 Ordnance Survey Map (surveyed 1874). The Cross Guns public house is visible, along with Rockwell Lane to its north. The raised embankment to the southwest of the site is shown with a railway line running from the quarry down past the Methodist Chapel to the Montgomery Canal (NLS, 2022a).

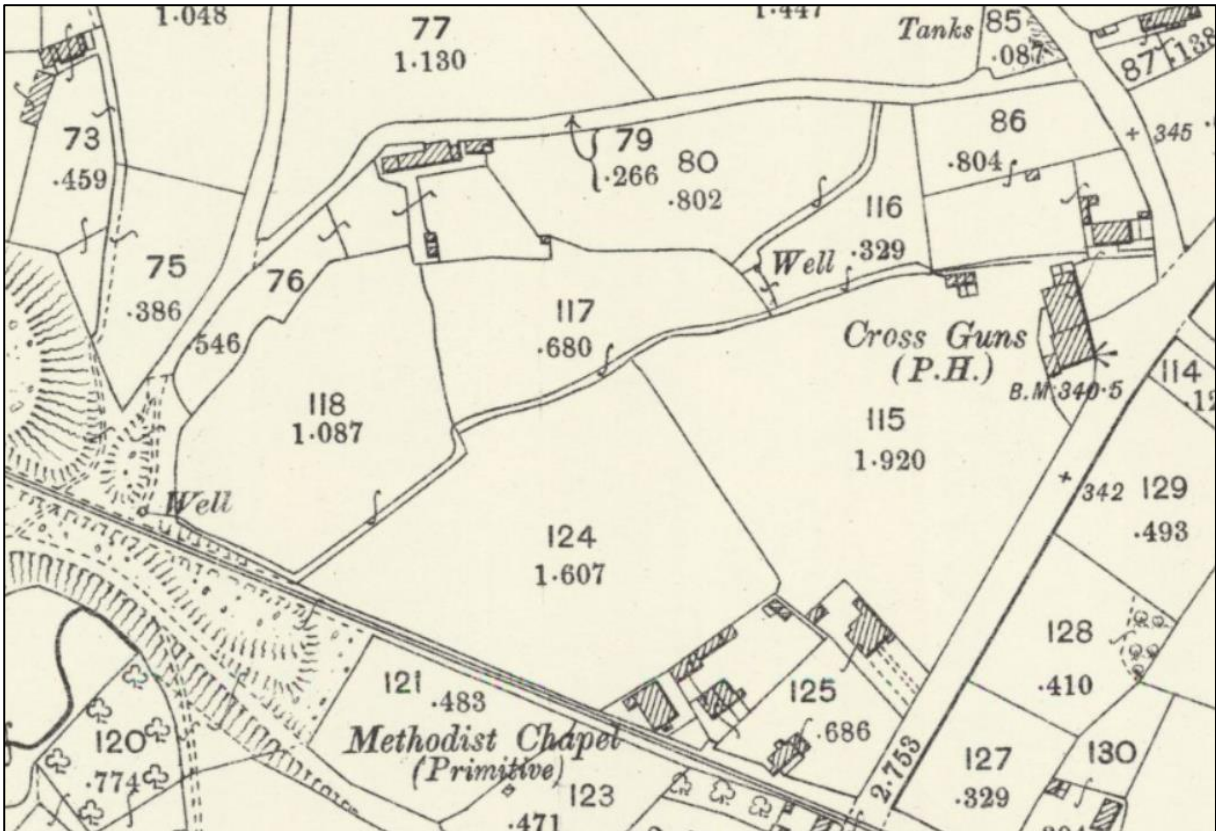


Figure 4: 1901 Ordnance Survey Map (surveyed 1900). Clearly shown is route of stream, from well outside of site, down the southwestern edge of the site, then turning north along the north-eastern side, and exiting the site on the eastern boundary. (NLS, 2022b).

Expertise of surveyors

Mark Duffell MSc (MD) of *Arvensis Ecology* undertook the survey as an expert botanical surveyor. All botanical identification was undertaken by MD. Field surveyors employed by *Arvensis Ecology* are all professional botanists with many years of field experience, with relevant degrees and regular CPD.

Accurate identification skills are paramount to *Arvensis Ecology*, and all surveyors have a recognised qualification in identification (*Botanical Society of Britain and Ireland* Field Identification Skills Certificate (FISC). Level 4 or higher). MD has a FISC 5 and *Arvensis Ecology* now run FISCs during which they act as the 'gold standard' botanical surveyor against which candidates are assessed. MD is up to date with current taxonomy and recording techniques and has undertaken numerous surveys requiring accurate mapping and recording of vegetation. MD runs training courses for a range of government and non-government organisations in botanical identification and surveying, as well as teaching on a leading MSc in biological survey techniques and species identification².

Survey Constraints and limitations

The survey was conducted on the 25th of August 2021, this timeframe means that later flowering species could be picked out readily but might cause some vernal and woodland species to have been missed or under-recorded (e.g., there may be Wood Anemone *Anemone nemorosa* growing on the bank forming the western boundary). Likewise, all the Orchid species present had finished flowering so precise identifications in some cases could not be made (e.g., determining if the larger Marsh Orchid *Dactylorhiza* species was a hybrid or Southern Marsh Orchid *D. praetermissa*).

No attempt was made to survey or record any non-botanical species or to quantify the site for its potential for fauna, although the surrounding area is known for its rich herpetological and lepidoptera interest as well as other organisms, these include several legally protected species. There is no reason to believe that some or all are making use of this site. Any actions on the site that could be damaging to these organisms would require further surveys to establish the location and extent of populations there.

In a couple of cases identifications were only made to an aggregate level:

- No attempt was made to identify Bramble *Rubus fruticosus* agg. and Dandelion *Taraxacum officinale* agg. beyond an aggregate level.

Otherwise, time of year, weather and surveyor skills did not impose any other constraints to the survey being carried out successfully.

² Manchester Metropolitan University MSc in 'Biological Recording and Ecological Monitoring'

Survey Methods: Botanical survey

The primary focus of this survey was to identify and record the botanical species present on site, along with the broad habitats that they form.

Records were made at the monad (1km x 1km) level, with a list for each individual compartment, in this case a list for monads SJ2721 and SJ2722. The list comprised all the vascular plants seen within each compartment using standard botanical recording techniques (Hill, Fasham *et al.*, 2005). Identifications were made using Hubbard (1992), Poland and Clement (2009), Rich and Jermy (1998) and Stace (1999, 2019).

Alongside this list, the abundance of each individual species was recorded in the field using the DAFOR Scale (DAFOR Scale; D = dominant, A = abundant, F = frequent, O = occasional, R = rare. Sometimes prefixed L = local e.g., LD for locally dominant).

Any unusual species or species of interest were recorded at the 10m level using a GPS (Garmin Etrex 10, accuracy 5m or better). All botanical and supplemental records will be submitted to the relevant vice-county recorder. Incidental records were made for non-plant species and these have been submitted via Irecord.

No historical botanical data is available for this site (searches via BSBI database or NBN database, 2021).

The site was visited by Mark Duffell on the 25th of August 2021.

Results and Discussion: Botanical Survey.

A total of 170 botanical records were collected comprising 115 different species and hybrids (Appendix 1). Only one species has any question over its identity, these are the large Marsh-Orchid growing at SJ27092199 alongside Common Spotted-Orchid *Dactylorhiza fuchsii*. Neither of these species were still in flower, but the plants were significantly larger than Common Spotted-Orchid, had different leaf markings and fitted with the surveyor's image of either Southern Marsh-Orchid *Dactylorhiza praetermissa* or the hybrid Tall Marsh-Orchid *D. x grandis* (the naturally occurring hybrid between *D. fuchsii* and *D. praetermissa*). It was decided on balance that these plants were Southern Marsh-Orchid, although a return visit during flowering season would confirm this identification.

Abundance of species within the separate fields was recorded using the DAFOR scale, dominant, abundant, frequent, occasional, and rare, also noting local if appropriate e.g., locally frequent (Appendix 1).

No sensible analysis could be undertaken of any gains or losses on the site given the lack of any historical botanical records.

The species found were assessed against the following criteria: Native status, Schedule 8 or 9 species, Conservation status, and if they are Axiophytes.

Native Status

In the UK flora plants are classified into three categories, Native, Archaeophyte and Neophyte (Table 1). Of the 115 species recorded 107 are Native, 2 are Archaeophytes and 6 are Neophytes.

Table 1: Native status of records from survey area.

Native Status	Definition (Preston <i>et al.</i> 2004).	No of species
Native	Present in study area, without intervention by man, whether intentional or unintentional, having come from an area in which it is native; or (having) arisen de novo in the study area.	107
Archaeophyte	A plant which was brought to Britain by man, intentionally or unintentionally, and became naturalized there between the start of the Neolithic period (c. 4000 bc) and ad 1500.	2
Neophyte	A plant introduced to the UK after 1500 (reproducing effectively by seed or vegetative means).	6
Total		115

The Archaeophytes and Neophytes records during this survey (Table 2) are for species not considered as being particularly harmful or invasive, and no invasive non-native species (Schedule 9 species) were present on the site. Many Archaeophytes are species considered attractive and desirable in our landscape e.g., Common Poppy *Papaver rhoeas*. The two examples found on site Hemlock *Conium maculatum* and Cut-leaved Crane's-bill *Geranium dissectum* are plants of

‘riverbanks, canal sides, roadsides and waste ground’ and ‘Field margins, roadsides, waste ground’ respectively (Lockton and Whild 2015). Hemlock was found on site near the stream, with Cut-leaved Crane’s-bill being found in the disturbed ground at the entrance to the site and nearby.

Most Neophytes are harmless (of 3769 species listed in the standard Flora of Britain and Ireland (Stace 2019), only 1475 are considered native), with only 41 plants considered harmful enough (invasive non-native species) that they are listed on Schedule 9 of the Wildlife and Countryside Act 1985 (as amended). See below for more details of Schedule 9 species.

None of the Archaeophyte or Neophyte species present are of conservation concern or considered deleterious to the site, all occurring at low amounts (DAFOR occasional to rare).

Table 2: List of Archaeophyte and Neophyte species recorded during current survey.

Scientific Name	Common Name	DAFOR	Native Status	Notes
<i>Acer pseudoplatanus</i>	Sycamore	Occasional	Neophyte	
<i>Conium maculatum</i>	Hemlock	Rare	Archaeophyte	
<i>Cupressus x leylandii</i>	Leyland Cypress	Rare	Neophyte	Planted as hedge bordering 'The Brambles'
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill	Rare	Archaeophyte	
<i>Juglans regia</i>	Common Walnut	Rare	Neophyte	Planted immediately below 'The Brambles'
<i>Pentaglottis sempervirens</i>	Green Alkanet	Rare	Neophyte	
<i>Ribes uva-crispa</i>	Gooseberry	Rare	Neophyte	
<i>Thuja plicata</i>	Western Red Cedar	Rare	Neophyte	Planted as hedge bordering 'The Brambles'

The only plant that has potential for ‘concern’ is Common Walnut *Juglans regia* which is known to have allelopathic activity against other plants. Allelopathy is the chemical inhibition of one plant by another, due to the release into the soil and environment by substances acting as germination or growth inhibitors. Walnuts are classic examples of this group of plants with all parts (leaves, stems, bark and fruits) apparently being allelopathic although other plant species are affected to variable amounts (e.g., inhibiting some species from germinating whilst not effecting other species) (Willis, 2000; Zubay *et al.*, 2021).

In its current location the Common Walnut, presumably planted by the occupiers of ‘The Brambles’ being adjacent to their boundary, is having little impact on the site, any water run off (with associated leachates) from adjacent areas to the north is unlikely to pass by the tree.

Common Walnut does seed in Shropshire, some years producing a bounty of walnuts, these are beloved by Squirrels and it may be that they could spread it throughout the site with resulting germination and growth of small trees elsewhere in the site. This would be potentially damaging to the site (along with the growth of other tree species), but a suitable regime of mowing and after-math grazing would remove any saplings before they become a nuisance. If no grazing or mowing regime is instigated (which would be deleterious to the site and its habitats anyway) then care needs to be taken to remove any sapling Walnuts before they become a problem.

Schedule 8 and 9 Species: (Protected and Invasive Non-native Species).

The Wildlife and Countryside Act of 1981, and its amendments in the Countryside and Rights of Way (CROW) Act 2000 created a list of animal and plant species which are either protected (Schedule 5, 6 and Schedule 8) or invasive non-native species that are considered harmful to the environment (Schedule 9).

For species listed on Schedule 8 it is an offence to “deliberately pick, collect, cut, uproot or destroy these wild plants”.

No Schedule 8 species were recorded in this survey.

With Schedule 9 species it is an offence to release or allow to release animals or plants into the wild (NE, 2011).

No Schedule 9 species were recorded in this survey. Care should still be taken to prevent deliberately or accidentally introduction of any Schedule 9 species from neighbouring land, or through dumping of soil and other material.

Species conservation status: national and local.

The national conservation status of all species was reviewed and all species are of Least Concern (BSBI, 2021a). This means that they are currently not a focus of conservationists, as they currently don't appear to be facing any imminent threats to their existence in the country. This does not entirely mean that there are no threats to these species, as counties are losing plant species from their flora at a rate of between 1 per decade to 1 per year (Burns *et al.*, 2013).

Lockton and Whild in their recent 'The Flora and Vegetation of Shropshire' (2015) compared the current distribution of plant records with those made in the 1970s-1980s for the 1985 Flora (Sinker *et al.*, 1985); this assessment makes it possible to check how widespread a species distribution is within the county, and if it has changed.

Most of the species found on the site are also found widely across Shropshire, with some 18 species being classified as Scattered or Local (Table 3 and Table 4), these species will be discussed further below.

Table 3: Distribution in Shropshire

Distribution in Shropshire	Example taxa found during current survey	No taxa
Common	Creeping Thistle <i>Cirsium arvense</i> , Goosegrass <i>Galium aparine</i>	4
Widespread	Common Knapweed <i>Centaurea nigra</i> , Common Spike-rush <i>Eleocharis palustris</i>	90
Scattered	Southern Marsh-Orchid <i>Dactylorhiza praetermissa</i> , Common Walnut <i>Juglans regia</i>	2
Local	Meadow Crane's-bill <i>Geranium pratense</i> , Common Fleabane <i>Pulicaria dysenterica</i>	16
Planted	Leyland Cypress <i>Cupressus x leylandii</i> , Western Red Cedar <i>Thuja plicata</i>	2
Total		114

Lockton and Whild classified species change as either stable (no change), increasing or decreasing. The distribution for the majority of species is stable (101), with 10 increasing (increase in part due to the increase in nutrients in the landscape and/or intensive farming e.g., Hedge Bindweed *Calystegia sepium*, Hemlock *Conium maculatum* and Perennial Rye-grass *Lolium perenne* and/or better recording) and 3 declining.

The three declining species (across Shropshire) are also some of the interesting and characteristic species of the site, Quaking Grass *Briza media*, Marsh Marigold *Caltha palustris* and Common Spotted-Orchid *Dactylorhiza fuchsii*.

Table 4: Species listed as Local and/or decreasing in Lockton and Whild (2015).

Scientific Name	Common Name	Main habitat(s) (Lockton and Whild 2015)
<i>Briza media</i>	Quaking Grass	Calcareous grassland, quarries and flushes
<i>Caltha palustris</i>	Marsh Marigold	Marshy grassland and wet woods
<i>Carex flacca</i>	Glaucous Sedge	Grassland, quarries, roadsides, upland flushes
<i>Carex nigra</i>	Common Sedge	Flushes, wet grassland, swamps and fens
<i>Carex otrubae</i>	False Fox-sedge	Damp grassland
<i>Carex panicea</i>	Carnation Sedge	Grassland and flushes
<i>Clematis vitalba</i>	Wild Clematis	Limestone quarries and urban areas
<i>Conium maculatum</i>	Hemlock	Riverbanks, canal sides, roadsides and waste ground
<i>Dactylorhiza fuchsii</i>	Common Spotted-Orchid	Grassland, quarries
<i>Dactylorhiza praetermissa</i>	Southern Marsh-Orchid	Grassland
<i>Geranium pratense</i>	Meadow Crane's-bill	Riverbanks and roadsides
<i>Hypericum perforatum</i>	Perforate St. John's-wort	Grassland, scrub and woodland
<i>Hypericum x desetangsii</i>	Des Etang's St. John's-wort	Grassland and scrub
<i>Isolepis setacea</i>	Bristle Club-rush	Marshy grassland, flushes and pool margins
<i>Jacobaea aquatica</i> (Syn. <i>Senecio aquaticus</i>)	Marsh Ragwort	Wet grassland, wet woods, margins of meres and riverbanks
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	Flushes, marshy grassland and ditches
<i>Polystichum setiferum</i>	Soft Shield-fern	Woodland and hedge-banks
<i>Pulicaria dysenterica</i>	Common Fleabane	Damp grassland, canal banks, woodland margins
<i>Rhinanthus minor</i>	Yellow Rattle	Grassland

Axiophytes

Axiophytes are useful indicators of a site's importance for conservation; they comprise species which are neither particularly common nor rare but only occur on sites of conservation importance (BSBI, 2015). Comparison of species present with the Shropshire Axiophyte list (BSBI, 2018) revealed there are 7 Axiophytes currently on site (Table 5). As no historical botanical data was available for this site no comparison could be made for any changes in Axiophytes numbers (losses and gains).

Table 5: List of Axiophytes found with their DAFOR abundance and main habitats they occupy within Shropshire

Scientific Name	Common Name	DAFOR	Main habitat(s) (based on Lockton and Whild 2015)
<i>Briza media</i>	Quaking Grass	R	Calcareous grassland, quarries and flushes
<i>Carex nigra</i>	Common Sedge	A	Flushes, wet grassland, swamps and fens
<i>Carex panicea</i>	Carnation Sedge	LA / F	Grassland and flushes
<i>Dactylorhiza praetermissa</i>	Southern Marsh-Orchid	R	Grassland
<i>Isolepis setacea</i>	Bristle Club-rush	R	Marshy grassland, flushes and pool margins
<i>Polystichum setiferum</i>	Soft Shield-fern	R	Woodland and hedge-banks
<i>Rhinanthus minor</i>	Yellow Rattle	R	Grassland

As can be seen the majority of these species are for damp habitats, such as marshy grasslands, wet meadows, flushes or fens. Soft Shield-fern *Polystichum setiferum* was found on the embankment in the hedgerow.

Comparing the axiophytes present at Sweeney Fen, which has similar habitats as at the study site, it is possible to give an indication of the **of the significance or otherwise of the axiophytes present on the study site.** Sweeney Fen is almost three times the size of the study site (1.14 ha versus 0.4 ha), the site is more diverse in habitats, with shaded areas and well-established hedgerows with woodland species prominent, and a large stream crosses the site providing a habitat for aquatic species.

A comparison purely on the number of species (227 versus 115) and number of axiophytes (43 versus 7) would appear to overly favour Sweeney Fen but this does not take into context the number of visits by prominent botanists and naturalists for well over 100 years, so there is a wealth of historical data, compared to one visit in late summer for the study site.

If the axiophyte list for Sweeney Fen is sorted to only include species that might occur on habitats present at the study site, as well as remove any species not seen in the last 20 years (post 2000) then the number of axiophytes drops to 16 species. Of these 16 species, five have been recorded at the study site. Several species not recorded at the study site are small and easy to overlook without the detailed study such as quadrat surveys, so may actually have been missed during the current survey.

Ellenberg values

Ellenberg Indicator Values (EIVs) provide a tool for understanding the ecology of a site and have four major scales for Light, Moisture, Reaction (pH), and Fertility (linked to nitrogen) (Hill *et al.* 2004). Each individual species has a value for each of these scales. EIVs were derived from the species list (using Ellenberg Explorer tool – Gardener, 2018) and are available Appendix 2 and summarised in Table 6. These values reflect the hydrology and geology of the site and did not contain any surprises, each EIV is dealt with separately below. Two species had no Ellenberg data available Leyland Cypress *Cupressus x leylandii* and Des Etang’s St. John’s-wort *Hypericum x desetangsii* and have been excluded from analysis.

Table 6: Summary table of Ellenberg Indicator Values for whole site.

Ellenberg value	Light	Moisture	Reaction	Fertility
Median	7	5.5	7	6
Range	4-8	3-10	4-8	2-9

Individual values are discussed below, but from the median values we can see the site has plants that require well-lit places (e.g., open grassland with no or little tree cover), with soils that are moist for the majority of the year, a pH around neutral to slightly basic and with only moderate fertility.

Ellenberg Light (L) values are showing the open nature of the site, with some shading present around the edges or near trees. The EIVs for light levels is relatively high, described as ‘Plant generally in well-lit places, but also occurring in partial shade’, though showing some variation (L = 4-8, median 7). A partial list of the Ellenberg Light values is contained in Table 7.

Table 7: Partial Ellenberg values for Light from PLANTATT (Hill *et al.*, 2004)

L Value	Definition	Example species (found during current survey Bold = DAFOR abundance of frequent or more)	N° of species
3	Shade plant, mostly less than 5% relative illumination, seldom more than 30% illumination when trees are in full leaf	None	0
4	Between 3 and 5	<i>Arum maculatum</i> , <i>Asplenium scolopendrium</i> , <i>Corylus avellana</i> , <i>Geum urbanum</i> , <i>Polystichum setiferum</i>	9
5	Semi-shade plant, rarely in full light, but generally with more than 10% relative illumination when trees are in leaf	<i>Acer campestre</i> , <i>Ajuga reptans</i> , <i>Dryopteris filix-mas</i> , <i>Geranium robertianum</i> , <i>Ilex aquifolium</i> , <i>Rumex sanguineus</i>	10
6	Between 5 and 7	<i>Agrostis capillaris</i> , <i>Carex otrubae</i> , <i>Clematis vitalba</i> , <i>Crataegus monogyna</i> , <i>Persicaria bistorta</i> , <i>Prunus spinosa</i> , <i>Tamus communis</i>	22
7	Plant generally in well-lit places, but also occurring in partial shade	<i>Alopecurus pratensis</i> , <i>Carex flacca</i> , <i>C. nigra</i> , <i>Centaurea nigra</i> , <i>Filipendula ulmaria</i> , <i>Lathyrus pratensis</i> , <i>Lotus pedunculatus</i> <i>Pulicaria dysenterica</i> , <i>Vicia cracca</i>	58
8	Light-loving plant rarely found where relative illumination in summer is less than 40%	<i>Briza media</i> , <i>Carex panicea</i> , <i>Dactylorhiza praetermissa</i> , <i>Eleocharis palustris</i> , <i>Juncus articulatus</i> , <i>Lolium perenne</i> , <i>Phleum pratense</i>	14
Total			113

Ellenberg Moisture (F) value: Given the undulating nature of the site, some variation in any moisture value across the site can be expected, from drier areas closer to the three dwellings, down the lower slopes to the stream. The range for the site was 3-10 with a median value of 5.5 (Table 6), describing species that are 'Moist site indicators, mainly on fresh soils of average dampness'. A partial list of the Ellenberg Moisture values is contained in Table 8.

Table 8: Partial Ellenberg values for Moisture from PLANTATT (Hill *et al.*, 2004)

F Value	Definition	Example species (found during current survey Bold = abundance of frequent or more)	N° of species
3	Dry-site indicator, more often found on dry ground than in moist places	<i>Malva moschata</i>	1
4	Between 5 and 8	<i>Crepis capillaris</i> , <i>Clematis vitalba</i> , <i>Medicago lupulina</i> , <i>Primula veris</i> , <i>Trifolium dubium</i>	9
5	Moist-site indicators; mainly on fresh soils of average dampness	<i>Alopecurus pratensis</i> , <i>Briza media</i> , <i>Carex flacca</i> , <i>Centaurea nigra</i> , <i>Cynosurus cristatus</i> , <i>Trifolium pratense</i> , <i>T. repens</i> ,	46
6	Between 5 and 7	<i>Anthoxanthum odoratum</i> , <i>Holcus lanatus</i> , <i>Lathyrus pratensis</i> , <i>Ranunculus acris</i> , <i>Vicia cracca</i>	24
7	Dampness indicator; mainly on constant moist or damp, but not on wet soils.	<i>Ajuga reptans</i> , <i>Juncus inflexus</i> , <i>Persicaria bistorta</i> , <i>Pulicaria dysenterica</i> , <i>Ranunculus repens</i>	10
8	Between 7 and 9	<i>Carex nigra</i> , <i>C. panicea</i> , <i>Dactylorhiza fuchsii</i> , <i>D. praetermissa</i> , <i>Equisetum palustre</i> , <i>Filipendula ulmaria</i> , <i>Jacobaea aquatica</i> , <i>Lotus pedunculatus</i> , <i>Mentha aquatica</i> ,	16
9	Wet-site indicators; often on water-saturated, badly aerated soils	<i>Caltha palustris</i> , <i>Isolepis setacea</i> , <i>Juncus articulatus</i> , <i>Silene flos-cuculi</i>	4
10	Indicator of shallow-water sites that may lack standing water for extensive periods	<i>Eleocharis palustris</i> , <i>Glyceria fluitans</i> , <i>Helosciadium nodiflorum</i>	3
Total			113

Ellenberg Reaction (R) value: The EIVs for Reaction (linked to pH value) shows the site to be relatively neutral in pH (R = 4-8, median 7) (Table 6), describing species between ‘indicator of moderately acid soils, only found on very acid or on neutral to basic soils’ and ‘Indicator of weakly acid to weakly basic conditions; never found on very acid soils’. A partial list of the Ellenberg Reaction values is contained in Table 9.

Table 9: Partial Ellenberg values for Reaction from PLANTATT (Hill *et al.*, 2004)

R Value	Definition	Example species (found during current survey Bold = abundance of frequent or more)	N° of species
3	Acidity indicator, mainly on acid soils, but exceptionally also on nearly neutral ones	None	5
4	Between 3 and 5	<i>Agrostis capillaris</i>, <i>Anthoxanthum odoratum</i>, <i>Carex nigra</i>, <i>C. panicea</i>	0
5	Indicator of moderately acid soils, only found on very acid or on neutral to basic soils	<i>Ajuga reptans</i> , <i>Cardamine pratensis</i> , <i>Deschampsia cespitosa</i> , <i>Isolepis setacea</i> , <i>Polystichum setiferum</i>	10
6	Indicator of moderately acid soils, only found on very acid or on neutral to basic soils	<i>Alopecurus pratensis</i>, <i>Carex flacca</i>, <i>Centaurea nigra</i>, <i>Filipendula ulmaria</i>, <i>Lathyrus pratensis</i>, <i>Persicaria bistorta</i>, <i>Rhinanthus minor</i>, <i>Trifolium repens</i>	38
7	Between 5 and 7	<i>Arrhenatherum elatius</i>, <i>Briza media</i>, <i>Dactylorhiza fuchsii</i>, <i>D. praetermissa</i>, <i>Potentilla reptans</i>, <i>Pulicaria dysenterica</i>, <i>Trifolium pratense</i>, <i>Tamus communis</i>, <i>Vicia cracca</i>	56
8	Indicator of weakly acid to weakly basic conditions; never found on very acid soils	<i>Clematis vitalba</i>, <i>Medicago lupulina</i>	3
Total			112

Ellenberg Fertility (N) value: The EIVs for fertility (linked to nitrogen) shows the site to be relatively nitrogen poor (N = 2-9, median 6), showing a range of fertility levels across the site with infertile to intermediate fertility and occasionally high fertility (Table 6 and 10). A list of the Ellenberg Nitrogen values is contained in Table 10, describing a reaction value of 4 as ‘between... indicators of more or less infertile sites... (and) Indicator of sites of intermediate fertility’.

Table 10: Ellenberg values for Nitrogen from PLANTATT (Hill *et al.*, 2004)

N Value	Definition	Example species (found during current survey Bold = abundance of frequent or more)	Nº of species
1	Indicator of extremely infertile sites	<i>None</i>	0
2	Between 1 and 3	<i>Carex flacca</i>, <i>C. nigra</i>, <i>C. panicea</i>, <i>Juncus acutiflorus</i>	4
3	Indicator of more or less infertile sites	<i>Anthoxanthum odoratum</i> , <i>Briza media</i> , <i>Dactylorhiza fuchsii</i> , <i>D. praetermissa</i> , <i>Isolepis setacea</i> , <i>Equisetum palustre</i> , <i>Juncus articulatus</i>	8
4	Between 3 and 5	<i>Agrostis capillaris</i> , <i>Cardamine pratensis</i> , <i>Deschampsia cespitosa</i> , <i>Ranunculus acris</i> , <i>Rhinanthus minor</i> , <i>Silene flos-cuculi</i>	20
5	Indicator of sites of intermediate fertility	<i>Ajuga reptans</i> , <i>Centaurea nigra</i>, <i>Festuca rubra</i>, <i>Filipendula ulmaria</i>, <i>Holcus lanatus</i>, <i>Lathyrus pratensis</i>, <i>Trifolium pratense</i>	21
6	Between 5 and 7	<i>Agrostis stolonifera</i>, <i>Carex hirta</i>, <i>Glyceria fluitans</i>, <i>Lolium perenne</i>, <i>Persicaria bistorta</i>	34
7	Plant often found in richly fertile places	<i>Alopecurus pratensis</i>, <i>Calystegia sepium</i>, <i>Geranium pratense</i>, <i>Helosciadium nodiflorum</i>, <i>Heracleum sphondylium</i>, <i>Ranunculus repens</i>	21
8	Between 7 and 9	<i>Conium maculatum</i> , <i>Galium aparine</i> , <i>Stachys sylvatica</i> , <i>Urtica dioica</i>	4
9	Indicator of extremely rich situations, such as cattle resting places or near polluted rivers	<i>Rumex obtusifolius</i>	1
Total			113

The Ellenberg fertility value (N=2-9, median 6), had the widest range of any Ellenberg values for the site, this can be explained by the differing habitats across the site, due in part to the topography and hydrology. The centre and majority of the marshy grassland was of lower nutrient requirement species e.g., Common Sedge *Carex nigra* (abundant), alongside Glaucous Sedge *C. flacca* and Carnation Sedge *C. panicea* (both locally abundant to frequent) having the site have the lowest Ellenberg N value of 3 (Table 10, Appendix 2).

The area with the highest nutrient values were some of the most disturbed habitats, particularly the under-grazed/mown areas adjacent to the conifer hedging (indicated by Common Nettle and Hedge Bindweed) and along the boundaries with the houses and field to the east. Other species with a Ellenberg N value of 7 e.g., Meadow Foxtail *Alopecurus pratensis* (abundant) and False-oat Grass *Arrhenatherum elatius* (locally frequent) could be found in areas of drier grassland with less management.

For species with a higher Ellenberg N Value (8 or 9), the majority of these made up relatively little of the sward being found at low cover values (Occasional or Rare) e.g., Broadleaved Dock *Rumex obtusifolius* has the highest N value of 9, yet it was rare throughout the site, and likely less than 10 individual plants. The only species with a high value that had a higher DAFOR value was Common Nettle *Urtica dioica* (locally abundant/frequent), being 'locally abundant' towards the boundaries of the three residential properties, otherwise it was 'frequent' within only parts of the rest of the site. This local abundance is in part due to nutrient enrichment encroaching from neighbouring land; and/or localised enrichment by previous livestock.

Habitats present on site and their importance regionally and locally

There are many species here which are not uncommon nor do they have any particular conservation value or protected status but which are of interest to the botanist and naturalist, both national and local. It is only by looking at 'the whole picture' of these species and the habitats or assemblages they form that we can ascertain the value of this site. This combination of species makes this site of interest to the experienced botanist, as the assemblages they form have either been lost, are still being lost, or are at risk in Shropshire and elsewhere in the region.

The site is dominated by species-rich grasslands, from the lower areas of wet grassland and rush pasture to the higher areas with its dry grassland. A National Vegetation Classification (NVC) survey was not undertaken, so only broad habitat classifications have been made, but some idea of the potential NVC communities are given, although it would require a full NVC survey to provide a definitive answer to the NVC habitats present.

The site can be divided into four key habitats: unimproved neutral grassland (both dry and marshy grasslands), marginal, and hedgerow/woodland vegetation. Each habitat and the species contained are dealt with individually.

GRASSLANDS

Other than the recent disturbance from vehicle activity near the gate, this site has the appearance of an unimproved pasture, there being few species indicative of agricultural improvement (see below), no signs of applications of manure, fertilisers, or herbicides. Neither is there any indication of past intensive grazing, drainage and the botanical species diversity is proportionally high.

The site has only a couple of species indicative of agriculture improvement (Perennial Rye-grass *Lolium perenne* and White Clover *Trifolium repens*), and these are only present with a DAFOR of frequent, suggesting that no recent over-seeding of these species has taken place, if at all. They were scattered throughout the site, although more prevalent in the dry grassland and exploiting the gaps created by the recently disturbed areas (near the entrance to the site and neighbouring construction site). These species are present in pristine sites such as Sweeney Fen in similar abundances.

The species present in the upper areas of grassland (the driest areas bordering the houses and Rockwell Lane) are indicators of **neutral grassland** (pH 5.5-7.0) e.g., Meadow Foxtail *Alopecurus pratensis* (abundant), Sweet Vernal-grass (occasional), False Oat-grass *Arrhenatherum elatius* (frequent), Crested Dog's-tail *Cynosurus cristatus* (occasional), Cock's-foot *Dactylis glomerata* (occasional), Red Fescue *Festuca rubra* (locally abundant) and Tall Fescue *Schedonorus arundinaceus* (rare). The presence of False Oat-grass and to a lesser extent Cock's-foot at these high abundances is connected to the recent lack of management and should reduce when a suitable grazing/mowing regime is implemented. Some of this area had been colonised and over-run with Hedge Bindweed *Calystegia sepium* which was locally abundant near the houses particularly 'The Brambles' for a width of around 1-2m. With suitable grazing/mowing regime this would decrease and held to just around the base of the conifer hedging.

Other features of this dry neutral grassland were a rich diversity of flowering herbs with Common Knapweed *Centaurea nigra* (abundant), Perforate St. John's-wort *Hypericum perforatum* (occasional), Des Etang's St John's-wort *H. x desetangii* (locally abundant/frequent), Meadow

Vetchling *Lathyrus pratensis* (frequent), Meadow Buttercup *Ranunculus acris* (frequent), and Red Clover *Trifolium pratense* (frequent). A couple of unusual grasses and herbs occurred here including occasional patches of Quaking Grass *Briza media* (rare), and lone plants of Meadow Cranesbill *Geranium pratense* and Musk Mallow *Malva moschata* (the latter typical of a very dry site with low nutrients).

Many of these species spread down the slopes intergrading with the marshy grassland and in some cases being dominant here as well e.g., Meadow Vetchling *Lathyrus pratensis* and Hard Rush *Juncus inflexus*.

Much of this habitat is suggestive of one of the MG5 *Cynosurus cristatus*-*Centaurea nigra* communities. Lowland species-rich grasslands are of local, regional and national importance with dramatic declines in these habitats (over 97% since the 1950s – Blackstock *et al.* 1999), conserving even small fragments can have biodiversity gains across the ecological network.

The lower areas of the site with the associated higher water table were good examples of **Marshy Grassland**, dominated by plentiful grasses, sedges and rushes including Glaucous Sedge *Carex flacca* (locally abundant/frequent), Common Sedge *C. nigra* (abundant), Carnation Sedge *C. panicea* (locally abundant/frequent), and Common Spike-rush *Eleocharis palustris* (locally abundant). Rushes including Sharp-flowered Rush *Juncus acutiflorus* (occasional), Jointed Rush *J. articulatus* (frequent) and Hard Rush *J. inflexus* (frequent) were commonplace. Interestingly a grass often dominating wet grassland, particularly those under-managed is Tufted Hair-grass *Deschampsia cespitosa* but at this site whilst present it was only rare. An additional plant of interest to be found in small numbers but widely scattered was Marsh Horsetail *Equisetum palustre*.

Studding the marshy grassland are a diversity of flowering herbs, and providing late summer flowering interest were stands of Meadowsweet *Filipendula ulmaria* (locally abundant), with other key species including Marsh Ragwort *Jacobaea aquatica* (syn. *Senecio aquatica*) (occasional), Greater Bird's-foot Trefoil *Lotus pedunculatus* (locally abundant/frequent) Water Mint *Mentha aquatica* (locally abundant/frequent), Common Fleabane *Pulicaria dysenterica* (locally abundant/frequent), Ragged Robin *Silene flos-cuculi* (occasional), Bittersweet *Solanum dulcamara* (occasional) and Tufted Vetch *Vicia cracca* (frequent).

Less prominent now but providing a show when in flower are Bugle *Ajuga reptans* (rare), Marsh Marigold *Caltha palustris* (rare), Cuckoo Flower *Cardamine pratensis* (rare) and Cowslip *Primula veris* (rare). Two orchids, Common Spotted-orchid *Dactylorhiza fuchsii* and Southern Marsh-orchid *D. praetermissa* were also present in small numbers (both rare).

On the north-western side bordering the stream (and continuing into the disturbed ground) are a couple of stands of Bistort *Persicaria bistorta* (rare), an interesting plant not as common as it used to be, although Lockton and Whild (2015) consider it widespread and stable. It is a species usually found in established grasslands, such as old hay meadows or land that has not been heavily grazed.

Much of this habitat is suggestive of an M22 *Juncus subnodulosus*-*Cirsium palustre* fen-meadow, although one of the constant species is absent; and it would require an NVC survey to define it further. This is a community found nearby at Sweeney Fen, for which the vegetation communities (including this one) were part of the reason for that site's designation as a SSSI.

In Shropshire as elsewhere in the UK there have been significant losses of wet grassland over the last 70 years, some regions having estimates of over 60% of the habitat being lost. Dargie (1993) estimated that there was as little as 654 hectares of wet grassland in Shropshire, with a cautious estimated loss of nearly 20% since 1979, it is likely that that figure has declined further since then.

MARGINAL

Forming the boundary to the west and south of the site is a small stream, this emerges as a spring just outside the site (< 10m away), entering in the west and following the southernmost boundary, separated from the embankment and hedgerow by an old wire fence line. The stream bed is sparsely vegetated with large pebbles forming the base. Where the stream turns a corner and heads east the surrounding vegetation is at its wettest with Meadowsweet *Filipendula ulmaria* abundant here. Sporadically along the line Floating Sweet-grass *Glyceria fluitans* (locally abundant) and Fool's Water-cress *Helosciadium nodiflorum* (syn. *Apium nodiflorum*) (locally abundant). The water clarity was clear, with little silt and algal growth (no testing of water quality was undertaken). The water quality influences the vegetation on site (wet and marshy grassland), with most species indicating an Ellenberg Nutrient value of low to moderate fertility.

HEDGEROW/WOODLAND

Hedges to the south comprise Field Maple *Acer campestre* (rare), Sycamore *Acer pseudoplatanus* (occasional), Hazel *Corylus avellana* (frequent), Hawthorn *Crataegus monogyna* (frequent), Ash *Fraxinus excelsior* (occasional), Holly *Ilex aquifolium* (occasional), Blackthorn *Prunus spinosa* (rare), and Wych Elm *Ulmus glabra* (rare). The understorey shrubs comprised Gooseberry *Ribes uva-crispa* (rare) and Elder *Sambucus nigra* (occasional). This hedge appears stock proof, although there is an additional wire fence between the hedge and the stream. It looks to have been a while since the hedgerow has been maintained and thought should be given to laying them in sections to reinvigorate them.

To the south and west is a raised embankment, formerly the line of an old light railway connected to the quarry at Llanymynech Rocks. The majority of the embankment is outside this site. This embankment provides a suite of woodland species (many immediately outside the fence line of this site) which includes Lords and Ladies *Arum maculatum* (rare), Hart's-tongue Fern, *Asplenium scolopendrium* (occasional), Broad-buckler Fern *Dryopteris dilatata* (rare), Common Male-fern *D. filix-mas* (rare), Herb Robert *Geranium robertianum* (rare), Wood Avens *Geum urbanum* (rare) and Soft Shield-fern *Polystichum setiferum* (rare).

DISTURBED AREA

Immediately below the new housing development, along sections of the stream (particularly eastern section) and partially along the boundary to the east with the donkey field are species indicative of disturbance and/or increased fertility with stands of Creeping Thistle *Cirsium arvense* (occasional), Spear Thistle *C. vulgare* (rare), Hairy Willowherb *Epilobium hirsutum*, Common Hogweed *Heracleum sphondylium* (locally frequent) and Common Nettle *Urtica dioica* (locally abundant/frequent).

By the site entrance and just to the south was another patch of disturbance with vehicle tracks present, this presumably in connection with the water works previously (early 2021?)³. The disturbance shows up on some recent aerial photographs, with several large vehicles parked on site. This poaching and disturbance have partially damaged the long-established vegetation and is slowly being recolonised, including with unusual early colonists such as Bristle Club-rush *Isolepis setacea* which is probably present amongst the wet marshy vegetation but at lower frequencies and less obvious. The more robust species of Hard Rush *Juncus inflexus* had formed extensive stands in this area, again likely here previously, it is frequent elsewhere on site, its tough rhizomes mean it can tolerate compaction and trampling from vehicles. In the long term this disturbance will become less apparent as the original vegetation re-colonises.

Until 2012 the UK had a list of UK Biodiversity Action Plan (BAP) and Habitat Action Plans, whilst these have now been incorporated into and replaced by the UK Post-2010 Biodiversity Framework they still provide a useful oversight of species and habitats of significance and should be considered within any future conservation planning and management of this site. A list of the major BAP habitats is presented in Table 10 with importance either nationally, regionally or locally.

Table 10: Summary of important ecological feature found at survey site.

Important ecological feature	UK Status	Local Status	Importance	Notes
Species-rich Grassland	UK BAP habitat	Shropshire BAP habitat	National, regional, local	Neutral and calcareous grasslands including MG5
Marshy grassland / Grazing Marsh	UK BAP habitat	Shropshire BAP habitat	National, regional, local	Marshy grassland or Grazing Marsh (including rush pasture)
Hedgerows	-	Shropshire BAP habitat	Local	
Axiophytes	-	Shropshire Axiophytes	Local	Seven species found

The site offers plenty of ecosystem benefits including:

- Supporting a rich variety of flora and fauna, including many rare or restricted species
- Supporting a wide variety of invertebrates, both pollinators and predators of crop pests.
- Carbon management, through retaining carbon in the soil.
- Low cost and effective flood mitigation, with the site acting as a buffer for water movement downstream to the village of Pant.
- Seed/green-hay source for local provenance seed, for potential habitat restorations locally.
- Organic high quality hay crop as potential feed for stock.
- Attractive landscape for local residents and visitors to the area.

³ Was an ecological survey completed before the work was undertaken? If so did it include utilising the survey site as a parking/storage area.

The Oswestry Uplands National Character Area

The site sits within the **Oswestry Uplands National Character Area** (NCA).

“National Character Areas (NCAs) Areas defined at the national level, which describe the geographical, ecological and historical variations in landscape character that make one area different from another. Their boundaries follow natural lines in the landscape rather than administrative boundaries, making them a good decision-making framework for the natural environment.” (Natural England, 2014a).

The Oswestry Uplands NCA (NE, 2014b) is approximately 10,000 ha, extending from Chirk in the north down through England (the Welsh border acting as the western edge) as far south as Llanyblodwel, with the A483/A5 acting as the eastern boundary. The survey site is in the south-eastern end of the NCA. The description for this NCA is of a *“distinct landscape of steep-sided, flat-topped hills mainly of limestone and narrow, wooded valleys and streams... Much of the area is deeply rural with small, irregular fields, copses, shelterbelts and woodlands.... Towards the south, extensive limestone quarries are present...”* (NE, 2014b).

The report highlights the importance of the region’s rare flora and fauna, in part due to the carboniferous limestone bedrock to be found in this area.

The NCA profile states *“There is great potential to significantly expand key woodland and calcareous grassland habitats, securing environmental benefits which will help to ensure ecological connections across administrative boundaries and to improve soil quality and climate regulation, as well as enhancing biodiversity, tranquillity and sense of place”* (NE, 2014b).

In the Statement of Environmental Opportunity (SEO 1 in NE, 2014b), it lists examples of how to protect and enhance the area’s landscape character, including enhancing the existing biodiversity networks. Some of examples which are particularly relevant for this study site are given below (bold highlights added by *Arvensis Ecology*):

- *“Reinforcing links between wildlife habitats by managing permanent pasture in upland areas in the west of the National Character Area (NCA), **to protect the landscape and ecological value of unimproved limestone soils and their flower-rich hay meadows**”.*
- *“In the lowlands, protecting the pattern of field boundaries by managing hedgerows and other boundary features so that they are retained in, or restored to, good condition”.*
- *“**Protecting from further loss key elements of the landscape mosaic, particularly those areas of semi-natural habitat such as calcareous grasslands, fen, ponds and woodland**”*

SEO 3: looked at the sustainable management of *“soils, productive farming, woodlands, streams, rivers and grasslands that contribute to the sense of place, maintaining viable long-term food production while enhancing water quality, water flow and climate regulation”.*

Key elements relevant to the study are:

- “Retaining and expanding areas of woodland habitat and scrub in appropriate locations and **encouraging land managers to refrain from cultivating areas of permanent pasture.**”
- **“Managing vegetation and soils to ensure that they remain in good biological condition, for example through sustainable grazing”.**
- **“Minimising this NCA’s risks of localised flooding by restoring into good condition areas of upland habitats; seeking to restore and extend grasslands, woodlands and hedgerows; and increasing cover of woodland/scrub to slow the speed of rainfall run-off.”**

Within the NCA there are several biologically designated Sites of Special Scientific Interest (SSSIs), no National Nature Reserves, and at least three Local Nature Reserves (LNRs) (local to the study site). Details of some of the closer sites of interest below.

Approximately 10% of the NCA is classed as being a semi-natural habitat, the following Priority Habitats (below) are contained in the report, those found on the study site are highlighted in bold.

- Broad-leaved mixed and yew woodland
- **Lowland calcareous grassland**
- Fen
- **Lowland meadows**
- Lowland dry acid grassland
- Lowland heathland

Whilst loss of biodiversity has slowed it continues, with many semi-natural habitats suffering either through destruction or neglect in the past and high-quality habitats are becoming more fragmented. (NE, 2014b).

The document notes some of the concerns for the future in particular the impact of climate change, reducing the available water resource for agriculture and other users.

Opportunities are highlighted including (bold highlights pertain to the study site):

- **“Protect the pattern of field boundaries and the narrow sunken lanes in the lowlands by managing hedgerows and other boundary features so that they are retained in or restored to good condition”.**
- **“Encourage and support land managers to retain permanent pasture, avoiding losses to cultivation”.**
- **“Manage vegetation and soils to ensure good biological condition, seeking opportunities for maintenance or enhancement, for example through sustainable grazing”.**
- **“Retain and expand areas of scrub and woodland habitat into a coherent habitat network, ensuring that calcareous grassland habitats are retained and expanded within the habitat mosaic”.**

- *“To minimise this NCA’s risks of localised flooding, restore upland habitats to good condition, **seek to restore and extend grasslands**, woodlands and hedgerows **to intercept and slow the speed of rainfall run-off**”.*
- *“Extended networks of species-rich hedgerows and lowland meadow will **maintain a diverse range of flora which flower over a prolonged period of time and provide a good habitat for pollinating invertebrates** to move through and between food crops. This will also aid biodiversity”.*
- *“**Seek opportunities to increase the area of semi-natural habitat, such as lowland meadow** and encourage the use of floristically diverse margins to arable field.”*
- *“**Encourage local management and planning for local wildlife sites as core parts of the habitat network**”.*

Surrounding important conservation sites and a comparison with the study site.

The most important local site adjacent to the study site is **Llanymynech and Llyncllys Hill Site of Special Scientific Interest (SSSI)**, which includes a number of sites spread throughout the Llanymynech and Llyncllys region to the north, west and east, totalling nearly 105 ha. These hills are an isolated group of carboniferous limestone, which has been quarried for stone and minerals. Covering the hills are extensive grasslands, scrub and woodland communities, alongside natural and manmade rock faces. The site is particularly important for its calcareous (limestone) flora, with many uncommon and local species in Shropshire (and in some cases nationally). The lepidoptera (butterfly and moth) fauna associated with these habitats is equally important locally and nationally (NE, 2022a).

The closest part of this SSSI is Llanymynech Rocks, managed by Shropshire Wildlife Trust and Montgomeryshire Wildlife Trust. Despite a couple of pools, the biggest part of the nearest area of Llanymynech Rocks is the calcareous grassland which bears little resemblance to the study site.

Llanymynech Heritage Area Local Nature Reserve (7.7 ha) is to be found to the south of the study site, containing a post-industrial landscape with old lime kilns, railway workings, and canals all associated with the quarrying at Llanymynech and nearby. Although parts of the site are wetter, and some of the flora overlaps with the study site, the habitats are generally distinct from the study site.

Less than a mile (1.6km) away to the north of Llanymynech near the village of Porth-y-waen is **Blodwel Marsh SSSI** (SJ264234), much smaller than the previously mentioned conservation sites at only 0.6 ha. The designation for the site describes it as ‘a small but exceptionally rich area of fen pasture on base-rich peat, in a low-lying area west of the limestone outcrop of Llyncllys Hill’.

It is worth repeating the main description for Blodwel Marsh habitats as these closely describe the vegetation found at the study site:

“Most of the vegetation consists of marshy grassland in which several species are equally prominent. These include grasses and sedges, such as **Red Fescue *Festuca rubra***, **Yorkshire fog *Holcus lanatus***, **Common Sedge *Carex nigra*** and **Carnation Sedge *C. panicea***, and a range of broad-leaved species, including **Knapweed *Centaurea nigra*** and **Meadowsweet *Filipendula ulmaria***. Wetter hollows⁴ support tall fen vegetation in which **Sharp-flowered Rush *Juncus acutiflorus***, **Common Reed *Phragmites australis*** and **Branched Bur-reed *Sparganium erectum*** are abundant. In common with certain other sites in north-west Shropshire, Blodwel Marsh supports a population of **Globe flower *Trollius europaeus***, a species which is absent from the rest of the county. Other plants present include **Sneezewort *Achillea ptarmica***, **Common Spotted-orchid *Dactylorhiza fuchsii***, **Common Twayblade *Neottia (Listera) ovata***, **Marsh Valerian *Valeriana dioica***, and the less common **Southern Marsh-orchid *Dactylorhiza praetermissa***, **Blunt-flowered Rush *Juncus subnodulosus*** and **Pale Sedge *Carex pallescens***” (NE, 2022b)

Species in bold above are also found on the study site, and several of the other species not in bold are also potentially present on the site, although they may have been missed during the current survey (in several cases e.g., Blunt-flowered Rush and Marsh Valerian a search was made for these

⁴ No area of the study site has deep enough hollows for Common Reed or Branched Bur-reed and neither is there a ready seed source for this site.

species. Other species may have been missed either due to them being present in small quantities and/or wrong season to be prominent). With the right management and further surveys earlier in the year it may be possible to encourage and relocate many of these species.

Another similar site to the study site almost directly north and just under 2 miles (3km away) is **Sweeney Fen Nature Reserve SSSI**⁵ (SJ275250) near Whitehaven, Treflach. A tiny gem (1.14 ha) within the many sites managed by Shropshire Wildlife Trust. This is one of the leading botanical sites within Shropshire, containing an exceptional range of species benefitting from the limestone stream which snakes through the site producing base-rich marsh and fen, as well as mature woodland borders and hedgerows. Many of the species found are replicated at the study site although that does not have quite the diversity (115 as opposed to 246 species at Sweeney Fen, although that site has been visited by hundreds of botanists since the first records were made in 1865 – more discussion on the differences and similarities with the study site can be found in the Axiophyte summary above). The hydrology and geography are similar to the study site along with many of the major habitats, also forming habitats for a suite of fauna including dragonflies and damselflies and a rare near threatened Whorled Snail *Vertigo lilljeborgi*. Sweeney Fen is an extremely successful green hay⁶ donor site for nearby fields belonging to or associated with Treflach Farm; a similar process could be employed at the study site, acting as a donor site for less diverse local fields.

⁵ Also spelt as Sweeny Fen

⁶ The sward is cut when most of the plants have set seed, but before it has fallen, this freshly cut hay is spread on recipient sites and seed (as well as mycorrhizae, bacteria, some invertebrates) fall and enrich the biodiversity of the recipient site.

Future management

What follows are brief suggestions for future management of the site, although this falls outside of the contracted remit of the survey.

Ideally this site should be maintained in its current state, with a suitable grazing and/or mowing regime.

Treflach Farm has a working relationship with Shropshire Wildlife Trust to harvest parts of a nearby site (Sweeney Fen) which is similar to the study site for use as green hay donor. If a similar link could be made then practical management costs could potentially be mitigated significantly, it may be other local sites could become green hay receptors.

Interpretation boards could be installed near the entrance, to educate and inform members of the public on the nearby footpath as to the uniqueness of the site and species it contains.

Community activities could include:

- Wildflower surveys
- Wildflower walks
- Scything days (hay making according to management plan).

The site could be heavily impacted with inappropriate drainage, manuring, fertilising, use of herbicides and over-seeding; this would damage the uniqueness of the site and lose biodiversity.

The scale of the site means any impacts in one area would likely have a significant impact elsewhere, leading to habitat fragmentation and eventual deterioration.

Care should be taken to avoid the following potentially damaging activities:

- Installation of hard standing and hard surfaces e.g., paths and bases for seating and structures, boardwalks etc.
- Bonfires (locally damaging but also the associated nutrient enrichment from the ash).
- Use of herbicides and pesticides, extreme care needs to be taken to avoid any use of these given the adjacent water sources and water percolating through the soil into the stream. If they are to be use then only by licensed professionals.
- Inappropriate management of 'pest species', concerns over Ragwort and other 'injurious weeds'. Currently there is no Ragwort *Jacobaea vulgaris* (syn. *Senecio jacobaea*) on the site, with limited disturbance to the site, and the associated moisture it is highly unlikely that this should become established and a pest. If concerns are raised then a check from a botanist to ascertain correct identification is desirable.
- Activities with large numbers of people, causing trampling and other damage to the flora and habitats present.
- Dog fouling and other non-grazing animals fouling, apart from health and cosmetic issues, the added nutrients will be detrimental in the longer term.
- Planting of trees on the site; given the size and integrity of this site it is not appropriate to plant any number of trees, particularly within the centre of the site (it may be appropriate to plant a very small number of trees to infill hedgerows, but this must be done with care and under instruction from a conservationist or ecologist to select suitable species).

- Vehicular access (excepting machinery used for hay cutting/mowing).
- Digging or disturbance of soils, re-routing of stream or digging deeper stream bed.
- The deliberate or accidental introduction of invasive non-native species. Care should be taken to prevent their encroachment from neighbouring land, or through dumping of soil and other material.
- Lack of management – leaving the site unmanaged can be just as damaging as inappropriate management

Further studies/surveys

Within this survey, individual National Vegetation Classification (NVC) communities were not identified but it would be useful to conduct a full NVC survey to classify and map the site. The fine scale botanical surveying involved in such a survey would surely also unearth more species for the site. This would help with interpreting and influencing future management of the site.

It will be fascinating to see if, with a management scheme in place, how the botanical diversity of the site will increase; it is likely that several species were missed during this current survey either as the plants are currently in such small populations/amounts or due to the date of the survey.

Summary and Conclusion

The site has no statutory or non-statutory designations or protection, but it supports habitats that are nationally and regionally important BAP Habitats (species rich neutral and marshy grasslands, and hedgerows).

Despite its small size, the combination of diverse wildflowers including orchids delights both the casual visitor and keen naturalist. The assemblage of species forming these distinct habitats (species rich neutral and marshy grasslands), outside of conservation areas such as nature reserves and SSSIs are locally and regionally becoming scarce within the wider landscape.

This is an exciting opportunity to conserve and enrich this area and this surveyor would like to see this site (perhaps named Rockwell Meadows) kept as an example of a grazing marsh for future generations to enjoy.

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Appendix 1: Species list for site with presence in monads and abundance (DAFOR score).

Scientific Name	Common Name	DAFOR	SJ2721	SJ2722
<i>Acer campestre</i>	Field Maple	R	1	0
<i>Acer pseudoplatanus</i>	Sycamore	O	1	1
<i>Achillea millefolium</i>	Yarrow	O	0	1
<i>Agrostis capillaris</i>	Common Bent	F	0	1
<i>Agrostis stolonifera</i>	Creeping Bent	D	1	1
<i>Ajuga reptans</i>	Bugle	R	0	1
<i>Alopecurus pratensis</i>	Meadow Foxtail	A	1	1
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	O	0	1
<i>Anthriscus sylvestris</i>	Cow Parsley	R	0	1
<i>Arrhenatherum elatius</i>	False Oat-grass	F	1	1
<i>Arum maculatum</i>	Lords and Ladies	R	1	1
<i>Asplenium scolopendrium</i>	Hart's-tongue Fern	O	1	1
<i>Briza media</i>	Quaking Grass	R	0	1
<i>Caltha palustris</i>	Marsh Marigold	R	1	1
<i>Calystegia sepium</i> ss.	Common Bindweed	LA	1	1
<i>Cardamine flexuosa</i>	Wavy Bittercress	O	1	1
<i>Cardamine pratensis</i>	Lady's-smock	R	0	1
<i>Carex flacca</i>	Glaucous Sedge	LA / F	0	1
<i>Carex hirta</i>	Hairy Sedge	LA	0	1
<i>Carex nigra</i>	Common Sedge	A	1	1
<i>Carex otrubae</i>	False Fox-sedge	O	1	1
<i>Carex panicea</i>	Carnation Sedge	LA / F	1	1
<i>Centaurea nigra</i>	Common Knapweed	A	1	1
<i>Cerastium fontanum</i>	Mouse-ear Chickweed	O	0	1
<i>Cirsium arvense</i>	Creeping Thistle	O	0	1
<i>Cirsium vulgare</i>	Spear Thistle	R	0	1
<i>Clematis vitalba</i>	Wild Clematis	LA	1	1
<i>Conium maculatum</i>	Hemlock	R	0	1
<i>Corylus avellana</i>	Hazel	F	1	1
<i>Crataegus monogyna</i>	Common Hawthorn	F	1	1
<i>Crepis capillaris</i>	Smooth Hawk's-beard	R	0	1
<i>Cupressus x leylandii</i>	Leyland Cypress	R	0	1
<i>Cynosurus cristatus</i>	Crested Dog's-tail	O	1	0
<i>Dactylis glomerata</i>	Cock's-foot	O	1	1
<i>Dactylorhiza fuchsii</i>	Common Spotted-Orchid	R	1	1
<i>Dactylorhiza praetermissa</i>	Southern Marsh-Orchid	R	1	0
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	R	1	0
<i>Dryopteris dilatata</i>	Broad Buckler-fern	R	1	0
<i>Dryopteris filix-mas</i>	Common Male-fern	R	1	0
<i>Eleocharis palustris</i>	Common Spike-rush	LA	1	1
<i>Elytrigia repens</i>	Couch	R	0	1
<i>Epilobium hirsutum</i>	Hairy Willowherb	LA	1	1

<i>Epilobium montanum</i>	Broad-leaved Willowherb	LA	1	1
<i>Epilobium obscurum</i>	Short-fruited Willowherb	R	0	1
<i>Equisetum arvense</i>	Field Horsetail	O	1	1
<i>Equisetum palustre</i>	Marsh Horsetail	R	0	1
<i>Festuca rubra</i>	Red Fescue	LA	1	1
<i>Filipendula ulmaria</i>	Meadowsweet	LA	1	1
<i>Fraxinus excelsior</i>	Ash	O	1	1
<i>Galium aparine</i>	Cleavers	R	0	1
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill	R	0	1
<i>Geranium pratense</i>	Meadow Crane's-bill	R	0	1
<i>Geranium robertianum</i>	Herb Robert	R	1	1
<i>Geum urbanum</i>	Wood Avens	R	1	1
<i>Glechoma hederacea</i>	Ground Ivy	R	0	1
<i>Glyceria fluitans</i>	Floating Sweet-grass	LA	1	1
<i>Hedera helix</i>	Ivy	O	1	1
<i>Helosciadium nodiflorum</i> (Syn. <i>Apium nodiflorum</i>)	Fool's Water-cress	LA	1	1
<i>Heracleum sphondylium</i>	Common Hogweed	LF	1	1
<i>Holcus lanatus</i>	Yorkshire Fog	A	1	0
<i>Hypericum x desetangsii</i>	Des Etang's St. John's-wort	LA / F	0	1
<i>Hypericum perforatum</i>	Perforate St. John's-wort	O	0	1
<i>Ilex aquifolium</i>	Holly	O	1	1
<i>Isolepis setacea</i>	Bristle Club-rush	R	1	0
<i>Jacobaea aquatica</i> (Syn. <i>Senecio aquaticus</i>)	Marsh Ragwort	O	1	0
<i>Juglans regia</i>	Common Walnut	R	0	1
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	O	1	1
<i>Juncus articulatus</i>	Jointed Rush	F	1	1
<i>Juncus inflexus</i>	Hard Rush	F	1	1
<i>Lathyrus pratensis</i>	Meadow Vetchling	F	1	1
<i>Lolium perenne</i>	Perennial Rye-grass	F	1	1
<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil	LA / F	1	1
<i>Malva moschata</i>	Musk Mallow	R	0	1
<i>Medicago lupulina</i>	Black Medick	F	1	1
<i>Mentha aquatica</i>	Water Mint	LA / F	1	1
<i>Pentaglottis sempervirens</i>	Green Alkanet	R	0	1
<i>Persicaria bistorta</i>	Bistort	R	1	0
<i>Phleum pratense</i>	Timothy	LA / F	1	1
<i>Plantago lanceolata</i>	Ribwort Plantain	F	0	1
<i>Plantago major</i>	Greater Plantain	R	0	1
<i>Poa trivialis</i>	Rough-stalked Meadow-grass	F	1	1
<i>Polystichum setiferum</i>	Soft Shield-fern	R	1	0
<i>Potentilla anserina</i>	Silverweed	O	1	1
<i>Potentilla reptans</i>	Creeping Cinquefoil	F	0	1
<i>Primula veris</i>	Cowslip	R	1	0
<i>Prunella vulgaris</i>	Selfheal	O	1	1
<i>Prunus spinosa</i>	Blackthorn	R	1	0

<i>Pulicaria dysenterica</i>	Common Fleabane	LA / F	1	1	
<i>Ranunculus acris</i>	Meadow Buttercup	F	1	1	
<i>Ranunculus repens</i>	Creeping Buttercup	A	1	1	
<i>Rhinanthus minor</i>	Yellow Rattle	R	0	1	
<i>Ribes uva-crispa</i>	Gooseberry	R	1	0	
<i>Rosa arvensis</i>	Field Rose	R	1	0	
<i>Rubus fruticosus agg.</i>	Bramble	R	1	1	
<i>Rumex crispus</i>	Curled Dock	F	0	1	
<i>Rumex obtusifolius</i>	Broad-leaved Dock	R	1	1	
<i>Rumex sanguineus</i>	Wood Dock	O	1	1	
<i>Salix caprea</i>	Goat Willow	R	1	0	
<i>Sambucus nigra</i>	Elder	O	0	1	
<i>Schedonorus arundinaceus</i>	Tall Fescue	R	1	0	
<i>Silene flos-cuculi</i>	Ragged Robin	O	1	1	
<i>Solanum dulcamara</i>	Bittersweet	O	1	1	
<i>Sonchus asper</i>	Prickly Sowthistle	R	0	1	
<i>Stachys sylvatica</i>	Hedge Woundwort	O	1	1	
<i>Tamus communis</i>	Black Bryony	R	1	0	
<i>Taraxacum officinale agg.</i>	a Dandelion	O	0	1	
<i>Thuja plicata</i>	Western Red Cedar	R	0	1	
<i>Trifolium dubium</i>	Lesser Trefoil	R	0	1	
<i>Trifolium pratense</i>	Red Clover	F	0	1	
<i>Trifolium repens</i>	White Clover	F	0	1	
<i>Ulmus glabra</i>	Wych Elm	R	1	0	
<i>Urtica dioica</i>	Common Nettle	LA / F	1	1	
<i>Vicia cracca</i>	Tufted Vetch	F	1	1	
<i>Vicia sativa</i>	Common Vetch	R	0	1	
<i>Vicia sepium</i>	Bush Vetch	R	0	1	
Total for site		115			
			Total	73	
				Total	96

Appendix 2: Ellenberg values for species found during current survey.

Scientific Name	L	F	R	N
<i>Acer campestre</i>	5	5	7	6
<i>Acer pseudoplatanus</i>	4	5	6	6
<i>Achillea millefolium</i>	7	5	6	4
<i>Agrostis capillaris</i>	6	5	4	4
<i>Agrostis stolonifera</i>	7	6	7	6
<i>Ajuga reptans</i>	5	7	5	5
<i>Alopecurus pratensis</i>	7	5	6	7
<i>Anthoxanthum odoratum</i>	7	6	4	3
<i>Anthriscus sylvestris</i>	6	5	7	7
<i>Arrhenatherum elatius</i>	7	5	7	7
<i>Arum maculatum</i>	4	5	7	7
<i>Asplenium scolopendrium</i>	4	5	7	5
<i>Briza media</i>	8	5	7	3
<i>Caltha palustris</i>	7	9	6	4
<i>Calystegia sepium ss.</i>	7	8	7	7
<i>Cardamine flexuosa</i>	5	7	6	6
<i>Cardamine pratensis</i>	7	8	5	4
<i>Carex flacca</i>	7	5	6	2
<i>Carex hirta</i>	7	7	7	6
<i>Carex nigra</i>	7	8	4	2
<i>Carex otrubae</i>	6	8	7	7
<i>Carex panicea</i>	8	8	4	2
<i>Centaurea nigra</i>	7	5	6	5
<i>Cerastium fontanum</i>	7	5	5	4
<i>Cirsium arvense</i>	8	6	7	6
<i>Cirsium vulgare</i>	7	5	6	6
<i>Clematis vitalba</i>	6	4	8	5
<i>Conium maculatum</i>	8	5	7	8
<i>Corylus avellana</i>	4	5	6	6
<i>Crataegus monogyna</i>	6	5	7	6
<i>Crepis capillaris</i>	7	4	7	4
<i>Cupressus x leylandii</i>	Not available	Not available	Not available	Not available
<i>Cynosurus cristatus</i>	7	5	6	4
<i>Dactylis glomerata</i>	7	5	7	6
<i>Dactylorhiza fuchsii</i>	7	8	7	3
<i>Dactylorhiza praetermissa</i>	8	8	7	3
<i>Deschampsia cespitosa</i>	6	6	5	4
<i>Dryopteris dilatata</i>	5	6	4	5
<i>Dryopteris filix-mas</i>	5	6	5	5
<i>Eleocharis palustris</i>	8	10	6	4
<i>Elytrigia repens</i>	7	5	7	7

<i>Epilobium hirsutum</i>	7	8	7	7
<i>Epilobium montanum</i>	6	6	6	6
<i>Epilobium obscurum</i>	6	8	5	5
<i>Equisetum arvense</i>	7	6	6	6
<i>Equisetum palustre</i>	7	8	6	3
<i>Festuca rubra</i>	8	5	6	5
<i>Filipendula ulmaria</i>	7	8	6	5
<i>Fraxinus excelsior</i>	5	6	7	6
<i>Galium aparine</i>	6	6	7	8
<i>Geranium dissectum</i>	7	5	7	6
<i>Geranium pratense</i>	7	6	7	7
<i>Geranium robertianum</i>	5	6	6	6
<i>Geum urbanum</i>	4	6	7	7
<i>Glechoma hederacea</i>	6	6	7	7
<i>Glyceria fluitans</i>	7	10	6	6
<i>Hedera helix</i>	4	5	7	6
<i>Helosciadium nodiflorum</i>	7	10	7	7
<i>Heracleum sphondylium</i>	7	5	7	7
<i>Holcus lanatus</i>	7	6	6	5
<i>Hypericum perforatum</i>	7	4	7	5
<i>Hypericum x desetangsii</i>	Not available	Not available	Not available	Not available
<i>Ilex aquifolium</i>	5	5	5	5
<i>Isolepis setacea</i>	7	9	5	3
<i>Jacobaea aquatica</i>	7	8	6	5
<i>Juglans regia</i>	6	4	8	7
<i>Juncus articulatus</i>	8	9	6	3
<i>Juncus inflexus</i>	7	7	7	5
<i>Lathyrus pratensis</i>	7	6	6	5
<i>Lolium perenne</i>	8	5	6	6
<i>Lotus pedunculatus</i>	7	8	6	4
<i>Malva moschata</i>	7	3	7	4
<i>Medicago lupulina</i>	7	4	8	4
<i>Mentha aquatica</i>	7	8	7	5
<i>Pentaglottis sempervirens</i>	6	5	6	7
<i>Persicaria bistorta</i>	6	7	6	6
<i>Phleum pratense</i>	8	5	7	6
<i>Plantago lanceolata</i>	7	5	6	4
<i>Plantago major</i>	7	5	6	7
<i>Poa trivialis</i>	7	6	6	6
<i>Polystichum setiferum</i>	4	5	5	6
<i>Potentilla anserina</i>	8	7	7	6
<i>Potentilla reptans</i>	7	5	7	5
<i>Primula veris</i>	7	4	7	3
<i>Prunella vulgaris</i>	7	5	6	4
<i>Prunus spinosa</i>	6	5	7	6
<i>Pulicaria dysenterica</i>	7	7	7	4
<i>Ranunculus acris</i>	7	6	6	4

<i>Ranunculus repens</i>	6	7	6	7
<i>Rhinanthus minor</i>	7	5	6	4
<i>Ribes uva-crispa</i>	5	5	7	6
<i>Rosa arvensis</i>	6	4	7	5
<i>Rubus fruticosus agg.</i>	6	6	6	6
<i>Rumex crispus</i>	8	6	7	6
<i>Rumex obtusifolius</i>	7	5	7	9
<i>Rumex sanguineus</i>	5	7	7	7
<i>Salix caprea</i>	7	7	7	7
<i>Sambucus nigra</i>	6	5	7	7
<i>Schedonorus arundinaceus</i>	8	6	7	6
<i>Silene flos-cuculi</i>	7	9	6	4
<i>Solanum dulcamara</i>	7	8	7	7
<i>Sonchus asper</i>	7	5	7	6
<i>Stachys sylvatica</i>	6	6	7	8
<i>Tamus communis</i>	6	5	7	6
<i>Taraxacum officinale agg.</i>	7	5	7	6
<i>Thuja plicata</i>	4	5	5	4
<i>Trifolium dubium</i>	7	4	6	5
<i>Trifolium pratense</i>	7	5	7	5
<i>Trifolium repens</i>	7	5	6	6
<i>Ulmus glabra</i>	4	5	7	6
<i>Urtica dioica</i>	6	6	7	8
<i>Vicia cracca</i>	7	6	7	5
<i>Vicia sativa</i>	7	4	7	4
<i>Vicia sepium</i>	6	5	6	6
	7	5.5	7	6
	4-8	3-10	4-8	2-9

Appendix 3: Photographs of site and species present.



Figure 6: By fence to Donkey field looking due east, with the 'Brambles', visible on the right, with the Common Walnut *Juglans regia* visible in front. The change in topography is visible, showing the majority is marshy grassland



Figure 7: In the middle of the Marshy grassland looking east, the botanical diversity across this area is consistent.



Figure 8: The eastern most point of the site, is where the stream exits the site. The stream currently didn't flow overground here, but seeps through the soil to emerge on the other side.



Figure 9: Vegetation present in stream at eastern most end near where it exits the site, prominent here are Fools Watercress *Helosciadium nodiflorum* (syn. *Apium nodiflorum*), Creeping Buttercup *Ranunculus repens* and Common Nettle *Urtica dioica*.



Figure 10: Vegetation present in stream at eastern most end near where it exits the site, looking along the southern boundary.



Figure 11: Vegetation present in stream at eastern most end near where it exits the site, prominent here are Fools Watercress *Helosciadium nodiflorum* (syn. *Apium nodiflorum*), Creeping Buttercup *Ranunculus repens* and Common Nettle *Urtica dioica*.



Figure 12: Looking northwest, to the right are the various properties. To the left stream following southern boundary. Vegetation here is coarser with Hedge Bindweed *Calystegia sepium* and Common Nettle *Urtica dioica* dominating. Beyond that fringe of vegetation is the marshy grassland.



Figure 13: Looking back southeast to where the stream exits the site. Vegetation here is coarser with Hedge Bindweed *Calystegia sepium*, Common Hogweed *Heracleum sphondylium* and Common Nettle *Urtica dioica* dominating.



Figure 14: Standing in the southern corner of the site, looking due north.



Figure 14: Looking along the line of the stream from the southern corner towards the eastern side. Open stream bed visible, with sparse flora, denser coarser vegetation visible adjacent to stream.



Figure 15: The southern corner of the site, with the stream and an additional source into the site from behind the fence. Ferns and other woodland species are present on the banks.



Figure 16: Looking north-northwest along the stream. The marginal vegetation is less coarse here, showing the reduction in soil nutrients.



Figure 17: Bistort *Persicaria bistorta* one of the unusual species found in the streamside vegetation along the southwestern border.



Figure 18: Looking south along the stream, this is the location of the Bistort *Persicaria bistorta* (fore-mid ground).



Figure 19: Looking northeast across the site, with signs of disturbance in the foreground, and then the drier grassland (to the left) and marshy grassland (to the right).



Figure 20: The majority of the site had well maintained fences and boundaries, but in some cases as here, repair work needs to be undertaken, this is near to where the stream enters the site. The rubbly nature of the embankment is apparent, presumably made of waste material from quarrying and household material.



Figure 21: View of several Marsh Orchids *Dactylorhiza* species, as well as Common Fleabane *Pulicaria dysenterica* and Tufted Vetch *Vicia cracca*



Figure 22: View looking north from the lower section of site, showing marshy grassland, with zonation of vegetation apparent due to topography and hydrology



Figure 23: Typical view of the marshy grassland sward with Hard Rush *Juncus inflexus*, Common Fleabane *Pulicaria dysenterica*, Common Knapweed *Centaurea nigra* prominent. This view was taken from the centre of the marshy grassland looking towards the new construction site.

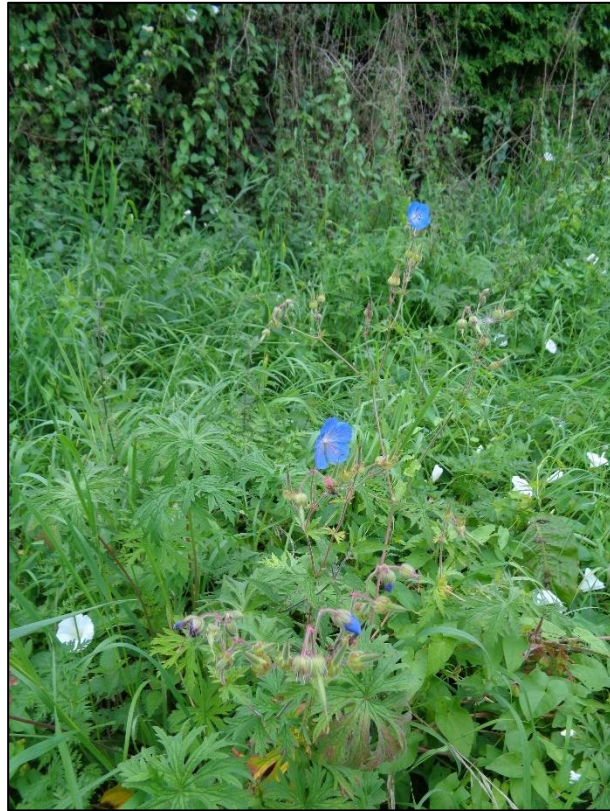


Figure 24: Vegetation by the conifer hedge belonging to the 'Brambles' was swamped in places with Hedge Bindweed, little of botanical interest here apart from Meadow Crane's-bill *Geranium pratense*.



Figure 25: View looking south-southeast. In foreground is grassland with higher nutrient status, signs of under grazing/mowing with lower down dry grassland and marshy grassland at the bottom. The stream is in the distance by the treeline.



Figure 26: By the entrance looking due east, with houses and school in far distance. The topology and changes in vegetation are visible, the more disturbed areas indicated by Docks.



Figure 27: View from gate way to site, beyond docks on left foreground is drier grassland, with light green showing marshy grassland in distance. Disturbance is visible in the mid ground.



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