Proposed Bardon Hill Quarry Extension
Coalville, Leicestershire

Phase II Grassland and Heathland Surveys

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Appendix 1 **Community Constancy Tables**
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1.0 INTRODUCTION

1.1 Background

In August 2008 SLR was commissioned by Aggregate Industries to carry out detailed botanical surveys of a number of meadows and pasture fields, in support of a planning application to extend the working area of Bardon Hill Quarry. The fields had been identified as supporting important grassland types during an earlier Ecological Survey of Aggregate Industries landholding at Bardon Hill carried out in September 2007 and August 2008[1]. Additional surveys of Field 62 and Ratchett Hill were conducted in summer 2009.

1.2 Proposed Works

The development proposal is described in full in the Environmental Statement.

1.3 Scope of Study

This report describes the results of a detailed botanical survey of these fields that was carried out in order to place the grassland resource within the scheme of the National Vegetation Classification system (NVC), and to more precisely evaluate its nature conservation importance. 2008 surveys were carried out on behalf of SLR by Dr Phil Eades, an independent ecological consultant, 2009 surveys were conducted by Bob Edmonds CEnv MIEEM, Chris Mitchell AIEEM and Julian Vulliamy.

2.0 SURVEY METHODOLOGY

The survey was carried out using the standard NVC survey methodology[2]. For each field this involved an initial walk through the field, delineating on a site map approximate boundaries of different vegetation types. Quadrats were sited in representative and homogeneous stands of each vegetation type, and vegetation data were recorded for each quadrat. A minimum of three quadrats was sampled per vegetation type, unless vegetation stands were very small. Quadrat size was dependent upon the complexity of the vegetation, but was usually 2 x 2 metres; a 4 x 4 metres quadrat was used for dense and species-poor vegetation.

For each quadrat representative photographs were taken using a digital camera, and geographical coordinates were recorded using a handheld global positioning system (GPS). A standard NVC quadrat card was filled in for each vegetation type in each field, including a written description of the vegetation. For each quadrat sample, all species (including bryophytes) were identified and listed on the quadrat card, and the percentage cover for each species was recorded using the Domin scale (see Appendix 1). Additional species found outside the quadrats were also noted.

Plant species names follow Stace[3]. Bryophyte species names follow Smith[4].

All surveys were conducted in calm, clear and mild weather.

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[1] SLR Consulting Ltd (2009) Extended Phase 1 Survey Ref: 403.0275.00089Ph1

[2] Rodwell, J.S. (2006). *National vegetation classification, users' handbook*. Joint Nature Conservation Council, Peterborough.

[3] Stace, C. (1997). *New flora of the British Isles* (2nd edition). Cambridge University Press, Cambridge.

[4] Smith, A.J.E. (2004). *The moss flora of Britain and Ireland*. Cambridge University Press, Cambridge.

3.0 SURVEY RESULTS

The quadrat data that were collected during the survey have been used to produce constancy tables for each plant community (see Appendix 1). These provide a summary of the frequency and abundance of each species within each vegetation type in each field or group of fields, and were used to work through the vegetation keys and community descriptions within the relevant NVC guides[5], in order to assign each vegetation type to an NVC class. The results were verified by inputting the constancy table data into the computer program MATCH[6].

A summary list of species and their overall abundance within each plant community is provided in Appendix 2. Copies of each NVC quadrat record card are provided in Appendix 3.

The NVC survey results are described below. Fields are numbered according to a pre-existing field numbering system, as shown in Drawing D1.

3.1 Field 32

This field supports the following communities (see Drawing D2):

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland.

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland

A narrow strip of degraded MG4 grassland is present at the lower end of a derelict meadow. The vegetation is dominated by Yorkshire fog *Holcus lanatus*, red fescue *Festuca rubra*, sweet vernal grass *Anthoxanthum odoratum*, black bent *Agrostis gigantea,* and common bent *Agrostis capillaris*. Within this there is a scattering of great burnet *Sanguisorba officinalis*, betony *Stachys officinalis*, devil's-bit scabious *Succisa pratensis*, and hare-bell *Campanula rotundifolia*.

[5] Rodwell, J.S. (*ed.*) (1991 *et seq.*). *British plant communities, Volumes 1-5*. Cambridge University Press, Cambridge.

[6] University of Lancaster (2000). *MATCH 2.16 for WINDOWS 95/NT.* Unit of Vegetation Science, University of Lancaster.



Plate 1. Degraded MG4 grassland in Field 32.

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland

The majority of this derelict sloping meadow supports tall, species-poor vegetation typical of permanently moist soils. The community is dominated by a mixture of tufted hair-grass *Deschampsia cespitosa* and soft rush *Juncus effusus*, with an abundance of Yorkshire fog, red fescue, tormentil and common sorrel *Rumex acetosa*. The dominance of tufted hair-grass and soft rush may indicate that this field has in the recent past been subject to heavy grazing, as both species are unpalatable and their seeds grow well on trampled soil.



Plate 2. Species-poor MG9 grassland in Field 32.

3.2 Field 30

This field supports the following communities (see Drawing D3):

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

MG6 *Lolium perenne – Cynosurus cristatus* grassland (unsampled).

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland.

MG10 *Holcus lanatus – Juncus effusus* grassland.

OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland

A large proportion of Field 30 is occupied by this plant community, on both sides of a small stream that flows through the full length of the field. The stream appears to have been straightened and deepened, but it probably still floods the field in very wet winters. The vegetation is quite species-rich, and is visually dominated by great burnet, in association with a range of frequent to abundant grasses: tufted hair-grass, Yorkshire fog, red fescue, sweet vernal grass, common bent, creeping bent *Agrostis stolonifera*, and crested dog's-tail *Cynosurus cristatus*. A wide variety of frequent to occasional forbs contribute to the overall diversity of this grassland community: devil's-bit scabious, common sorrel, knapweed *Centaurea nigra*, ribwort plantain, betony, meadow buttercup, self-heal, hairy sedge *Carex hirta*, glaucous sedge *Carex flacca*, common yellow sedge *Carex viridula* subsp. *oedocarpa* and bird's-foot trefoil. The field appears to have only recently become un-managed, and prior to this it is likely to have been managed in a traditional manner as a hay meadow.



Plate 3. Species-rich MG4 grassland in Field 30.

MG6 *Lolium perenne – Cynosurus cristatus* grassland

A small area close to the northern entrance into this field supports a disturbed form of MG6 grassland, with a species-poor mix of Yorkshire fog, white clover *Trifolium repens*, red fescue, common bent, creeping buttercup *Ranunculus repens* and common sorrel.

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland

A broad swathe of Field 30 supports tall grassland vegetation that is dominated by a mixture of tufted hair-grass and soft rush, with a scattering of other grasses and forbs such as black bent, sweet vernal grass, red fescue, common bent, tormentil, common sorrel, marsh thistle *Cirsium palustre*, sharp-flowered rush *Juncus acutiflorus*, marsh bedstraw *Galium palustre*, lesser stitchwort and devil's-bit scabious. The presence of occasional great burnet within this community may be an indication that it has expanded at the expense of a once greater area of MG4 grassland.



Plate 4. Species-poor MG9 grassland in Field 30.

MG10 *Holcus lanatus – Juncus effusus* grassland

A small section of the south-west margin of the field supports very species-poor grassland that is dominated by Yorkshire fog, with clumps of soft rush and a few associated species such as broad-leaved dock *Rumex obtusifolius*, creeping buttercup, common sorrel, nettle *Urtica dioica* and black bent.

OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

A narrow strip of tall herbaceous vegetation lines the stream that flows through the field, consisting of a mixture of frequent angelica *Angelica sylvestris*, great willowherb *Epilobium hirsutum*, greater bird's-foot trefoil, meadow sweet *Filipendula ulmaria* and soft rush, and scattered species such as hoary willowherb *Epilobium parviflorum*, nettles, hard rush, water plantain *Alisma plantago-aquatica*, Yorkshire fog and water mint *Mentha aquatica*.



Plate 5. Tall herbaceous stream-edge vegetation in Field 30.

3.3 Field 31

This field supports the following communities (see Drawing D4):

MG5c *Cynosurus cristatus – Centaurea nigra* grassland, *Danthonia decumbens* sub-community.

MG1 *Arrhenatherum elatius* grassland (unsampled).

W23 *Ulex europaeus – Rubus fruticosus* scrub (unsampled).

MG5c *Cynosurus cristatus – Centaurea nigra* grassland, *Danthonia decumbens* sub-community

A narrow strip of derelict dry hay meadow is situated on a gentle slope along the northern margin of this field. The remnant hay meadow sward is fairly diverse, with abundant knapweed, devil's-bit scabious, sweet vernal grass, common bent and red fescue, while a wide variety of other species are frequent or occasional, e.g. tormentil, bird's-foot trefoil, ribwort plantain, self-heal, harebell, betony, spring sedge *Carex caryophylea*, pignut *Conopodium majus*, red clover *Trifolium pratense*, and lady's mantle *Alchemilla vulgaris* agg.



Plate 6. Species-rich MG5 grassland in Field 31.

MG1 *Arrhenatherum elatius* grassland

Above the slope that supports MG5 *Cynosurus cristatus – Centaurea nigra* grassland, the majority of the field is occupied by tall, species-poor grassland that is dominated by false oat-grass *Arrhenatherum elatius* and cocksfoot *Dactylis glomerata*.

W23 *Ulex europaeus – Rubus fruticosus* scrub

Two large stands of dense common gorse *Ulex europaeus* are situated on the slope within the remnant hay meadow.

3.4 Field 29

This field supports the following communities (see Drawing D5):

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland

Field 29 is a long, narrow unimproved meadow running alongside the stream immediately downstream of Field 30. The field has the appearance of having been unmanaged for some years, as it is now dominated by extensive stands of bramble *Rubus fruticosus* agg. that are spreading in from the margins of the field. Between patches of bramble are several large areas that support remnant MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland. Great burnet is abundant, as is tufted hair-grass and angelica. Trailing tormentil *Potentilla anglica*, cleavers *Galium aparine*, common sorrel and creeping thistle *Cirsium arvense* are frequent, and there is occasional knapweed, lesser stitchwort, red fescue, bird's-foot trefoil, betony and marsh thistle.



Plate 7. Derelict MG4 grassland in Field 29.

OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

A short open section of the stream supports a band of tall herbaceous vegetation that is dominated by great willowherb, with abundant nettles, and frequent hard rush *Juncus inflexus*, meadow vetchling *Lathyrus pratense*, angelica, meadow sweet, greater bird's-foot trefoil and false oat-grass.

3.5 Fields38 & 50

These fields support the following communities (see Drawings D6 & D7):

U2 *Deschampsia flexuosa* grassland.

MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* subcommunity.

OV27b *Epilobium (Chamaerion) angustifolium* community, *Urtica dioica – Cirsium arvense* subcommunity (unsampled).

W23 *Ulex europaeus – Rubus fruticosus* scrub (unsampled).

U2 *Deschampsia flexuosa* grassland

On the south-east side of the application area, a series of low rocky knolls support small patches of species-poor unimproved acid grassland. The acid grassland is dominated by wavy hair-grass *Deschampsia flexuosa,* with frequent to locally abundant sheep's fescue *Festuca ovina*, common bent, and creeping soft-grass *Holcus mollis*. Heath bedstraw *Galium saxatile*, sheep's sorrel *Rumex acetosella*, common sorrel and foxglove *Digitalis purpurea* are occasional or rare.



Plate 8. Unmanaged U2 grassland in Fields 38 & 50.

MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* subcommunity

Surrounding the rock outcrops is an uncultivated belt of land that supports a mosaic of different vegetation types. The most widespread is tall unmanaged grassland that is dominated by false oat-grass, with frequent red fescue, common sorrel and nettles, and a scattering of bramble, spear thistle *Cirsium vulgare*, creeping buttercup, black bent, ragwort *Senecio jacobaea*, broad leaved dock, cleavers and common hemp-nettle *Galeopsis tetrahit*.



Plate 9. Unmanaged MG1b grassland in Fields 38 & 50

OV27b *Epilobium (Chamaerion) angustifolium* community, *Urtica dioica – Cirsium arvense* subcommunity

Within the uncultivated belt around the rock outcrops are several large dense stands of rosebay willowherb *Chamaerion angustifolium*, mixed with patches of nettles, false oat-grass and brambles.

W23 *Ulex europaeus – Rubus fruticosus* scrub

Several large stands of gorse scrub have developed around the bases of the rocky knolls, mingled with occasional young hawthorn *Crataegus monogyna* and silver birch *Betula pendula* scrub.

3.6 Field 50

This field supports the following communities (see Drawing D8):

MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* subcommunity.

MG4 *Alopecurus pratensis* - *Sanguisorba officinalis* grassland.

MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* subcommunity

This field lies just to the south of the stream where it flows past a group of old farm buildings that have been converted for use as offices. The field is unmanaged, and supports tall, rank grassland. Much of this is dominated by false oat grass, with a few scattered associates such as common sorrel, broad-leaved dock, creeping thistle, nettles and cleavers.



Plate 10. Unmanaged MG1b grassland in Field 50.

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland

The south-west third of the field supports a stand of very degraded MG4 grassland, with patchily abundant great burnet amongst tussocks of tufted hair-grass, cock's-foot, red fescue, black bent and Yorkshire fog. Other species are at best occasional, e.g. ribwort plantain, common sorrel, dandelion, lesser stitchwort, hairy sedge and silverweed *Potentilla anserina*.



Plate 11. Derelict MG4 grassland in Field 50.

3.7 Fields 60 & 61

These fields support the following community of interest (see Drawing D9):

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland

A narrow band of very degraded MG4 grassland lines the gently sloping banks of the stream as it flows through Fields 60 & 61. The fields themselves have been heavily improved to provide permanent cattle pasture. The stream banks support scattered clumps of great burnet, amongst abundant cocksfoot, Yorkshire fog and false oat-grass, and frequent patches of nettles and marsh thistles.



Plate 12. Remnant MG4 grassland follows the stream edge in Fields 60 & 61.

3.8 Fields 65, 64 & 63

These fields are currently grazed all year by ponies, but still retain a quite diverse patchwork of the following communities (see Drawings D10, D11 & D12):

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

MG6 *Lolium perenne – Cynosurus cristatus* grassland

M27 *Filipendula ulmaria – Angelica sylvestris* mire

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland

Large sections of Fields 65 and 64, and a smaller part of Field 63, support MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland. Great burnet is frequent to abundant throughout the community, with knapweed, Yorkshire fog, ribwort plantain, red fescue, meadow vetchling, meadowsweet and meadow foxtail *Phleum pratense*. A wide variety of other species is scattered throughout the grassland, including lesser stitchwort, greater bird's-foot trefoil, sweet vernal grass, hard rush, hairy sedge, trailing tormentil, marsh ragwort *Senecio jacobaea*, ragged robin *Lychnis flos-cuculi*, and tufted vetch *Vicia cracca*. The ponies appear to graze less vigorously on wetter ground, and here flowering spikes of great burnet are abundant. However, where MG4 grassland is found on drier ground, heavy grazing has produced a short tufted sward, and great burnet is only visible as a few basal leaves.



Plate 13. Lightly grazed MG4 grassland in Field 65.

MG6 *Lolium perenne – Cynosurus cristatus* grassland

Areas of dry or damp ground throughout the three fields support a moderately diverse but closely cropped grassland sward of creeping buttercup, meadow buttercup, white clover, red clover, ragwort, marsh ragwort, great plantain *Plantago major*, ribwort plantain, self heal, bentgrasses *Agrostis* spp., Yorkshire fog, perennial ryegrass *Lolium perenne*, knapweed and meadow vetchling. Other species are scattered at low cover throughout. The presence of abundant ragwort is an indication of heavy grazing and trampling.



Plate 14. Heavily grazed MG6 grassland in Field 65.

M27 *Filipendula ulmaria – Angelica sylvestris* mire

Dense patches of M27 *Filipendula ulmaria – Angelica sylvestris* mire occupy the damp low-lying ground that runs along the central axes of these fields. It appears that the stream once would have meandered through these sections, but it has been straightened and canalised to flow along the northern edge of the fields, and it now seems unlikely that it ever floods into the fields.

In these areas meadowsweet is dominant, although in many places it has been heavily grazed. It is accompanied by abundant Yorkshire fog and meadow foxtail, and frequent hairy sedge, great willowherb, and red fescue. Other species such as amphibious bistort *Persicaria amphibia*, silverweed, hard rush, lesser stitchwort, meadow vetchling and greater bird's-foot trefoil are scattered and locally abundant through the community.



Plate 15. Grazed M27 mire in Field 64.

3.9 Field 62

This field is adjacent to and immediately to the east of Field 63, and lies outside the land ownership of Aggregate Industries.

This field was not formally surveyed in 2008, but observations were made from the edge of Field 63 which indicated the field to be of botanical value. The field was formally surveyed on 6th August 2009 by Chris Mitchell (AIEEM) and Julian Vulliamy, using the same methodology as described above for other fields.



Plate 16. Derelict MG4 grassland in Field 62 in 2008.

A stream of approximately 1m wide divides the field. Occasional semi-mature alder trees (*Alnus glutinosa*) are present on the stream banks, together with marginal and emergent plant species which include common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), meadowsweet (*Filipendula ulmaria*), yellow flag iris (*Iris pseudacorus*) and water figwort (*Scrophularia nodosa*).

To the north of the stream, a mosaic of blackthorn scrub and tall herbaceous fen is the dominant habitat.

To the south of the stream, a more open sward contains a range of grassland plant communities, with meadowsweet mire becoming dominant towards the east. Stands of bramble (*Rubus fruticosus agg.*) scrub, rosebay willowherb (*Chamerion angustifolium*) and nettle (*Urtica dioica*) also occur within the field, although primarily adjacent to the hedgerow boundaries. The presence of these tall ruderal species, together with encroaching bramble scrub, indicates the field has fallen out of a traditional hay meadow management regime.

This field supports the following communities, as shown on Drawing NVC 12:

- MG4 *Alopecurus pratensis – Sanguisorba officinalis* grassland;
- M27 *Filipendula ulmaria – Angelica sylvestris* mire;
- OV27 *Epilobium angustifolium*[7] community;
- S26 *Phragmities australis – Urtica dioica* tall-herb fen; and
- W22 *Prunus spinosa – Rubus fruticosus* scrub.

[7] *Chamerion angustifolium*.

MG4 Alopecurus pratensis – Sanguisorba officinalis grassland

A large proportion of this field supports this plant community, although the vegetation is transitional towards a more ruderal sward as nettle becomes a frequent component. This can almost certainly be attributed to an inappropriate management regime, as cut vegetation is smothering plant growth and causing soil enrichment.





Plate 17 & 18 – MG4 in Field 62

Great burnet (*Sanguisorba officinalis*) has a scattered distribution, although occasionally becomes a dominant sward component. Meadow foxtail (*Alopecurus pratensis*), false oat grass (*Arrhenatherum elatius*), cock's foot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*) and nettle are also frequent species. Species with a less frequent distribution include tufted hair-grass (*Deschampsia cespitosa*), betony (*Stachys officinalis*) and angelica (*Angelica sylvestris*).

M27 Filipendula ulmaria – Angelica sylvestris mire

Lower-lying ground to the east of field 62 supports this plant community, where meadowsweet (*Filipendula ulmaria*) dominates the sward. Occasional species include rushes (*Juncus effuses* and *J. acutiflorus*), amphibious bistort (*Persica amphibia*), brooklime (*Veronica beccabunga*) and marsh marigold (*Caltha palustris*) and brown sedge (*Carex disticha*).



Plate 19 – M27 within Field 62

OV27 Epilobium angustifolium community

The main stands of this plant community occur on higher ground near the southern boundary of the field. Rosebay willowherb (*Chamerion angustifolium*) dominates this community, with occasional nettle (*Urtica dioica*) and bramble (*Rubus fruticosus*).



Plate 20 – OV 27 within Field 62.

S26 Phragmities australis – Urtica dioica tall-herb fen

This community occurs either side of the stream in the western and central sections of the field, and largely comprises of a monoculture of common reed, although in places becomes co-dominant with nettle. Additional species include angelica, great willowherb (*Epilobium hirstum*) and meadowsweet.

A remnant pocket of MG4 grassland occurs in the north-east of this community, where great burnet and betony are locally frequent.



Plate 21 – Stand of common reed (S26) within Field 62

W22 Prunus spinosa – Rubus fruticosus scrub

Localised stands of blackthorn dominated scrub occur in peripheral areas of the field, most likely due to encroachment from the adjacent unmanaged hedgerows. This species-poor scrub community is partially fringed with bramble and grades to either tall herb fen or grassland plant communities.

3.10 Field 66

Field 66 lies within the landholding of Aggregate Industries, but it was not identified as supporting important grassland vegetation until Phase 1 Habitat Survey was conducted in September 2008. Whilst September is too late in the season to undertake a detailed NVC survey, the following observations were made.

Field 66 is a continuation of the broad habitat types supported by Fields 62, 63, 64, 65 & 66, lying immediately to the west of them, but it has recently been separated from them by the construction of a road. As with Field 62, it is unmanaged and derelict, and as a consequence tall grasses and herbs are swamping the remnant MG4 vegetation *Alopecurus pratensis* - *Sanguisorba officinalis* grassland. However, great burnet remains locally abundant, with occasional devil's-bit scabious, betony, spear thistle, meadow vetchling, hard rush, greater bird's-foot trefoil, red fescue and lady's bedstraw. Creeping thistle, nettles, brambles, tufted hair-grass and great willowherb are all abundant. The stream runs through the centre of the field, but it has been greatly deepened and now flows approximately 2-3 metres below the level of the meadow.



Plate 22. Derelict MG4 grassland in Field 66.

3.11 Ratchett Hill

2009 botanical survey at Ratchett Hill identified <1 ha of open heathland habitat, with the majority of the area supporting secondary birch woodland and bracken.

H9d - *Calluna vulgaris – Deschampsia flexuosa* heath, *Gallium saxatile* sub-community



Plate 23 – H9d heathland at Ratchett Hill

The heathland areas at Ratchett Hill typically support between 20-35% cover of dwarf shrubs; heather (*Calluna vulgaris*) and bilberry (*Vaccinium myrtillus*). The ericoid shrubs recorded were all in the pioneer phase (young plants with limited woody growth) and the open grass/heathland areas are obviously grazed quite extensively by ponies. Other plants typical of the heathland areas are wavy hairgrass (*Deschampsia flexuosa*), sheep's sorrel (*Rumex acetosella*), heath bedstraw (*Gallium saxatile*), tormentil (*Potentilla erecta*) and occasional foxglove (*Digitalis purpurea*), the sward often supports a high proportion of bryophytes and lichens, including *Campylopus introflexus*, *Hypnum cuppresseforme*, and *Polytrichum* sp. Lichens, such as *Cladonia floerkeana* were also recorded in areas of open turf.

W16 – Quercus spp. – Betula spp. – Deschampsia flexuosa woodland

The site is dominated by secondary woodland, mostly closely described as a species-poor example of W16 Oak-Birch-Wavy hair grass wood. The wood is typically an open canopy of single-aged birch trees with an understorey dominated by bracken (*Pteridium aquilinum*) and frequent grasses, such as Yorkshire fog (*Holcus lanatus*) and common bent (*Agrostis capillaris*) and occasional wavy hairgrass. Occasional plants of bilberry were noted in the sward, especially near the woodland edge. Along the southern edge of the site are occasional mature oak (*Quercus robur*) trees which are likely to pre-date the recent birch invasion.



Plate 24 - Secondary birch woodland at Ratchett Hill

MG5 – *Cynosurus cristatus - Centaurea nigra* grassland



Plate 25 – Heavily grazed and disturbed neutral pasture

The site also supports a relatively species-poor, heavily grazed and disturbed semi-improved dry neutral pasture which appears transitional between MG5 and MG6, which is probably a result of the intensive grazing regime it is experiencing. This pasture is the primary grazing, dunging and feeding area for ponies which currently manage the site and supports a very short turf, highly modified by the intensive grazing it supports. The sward is dominated by white clover (*Trifolium repens*), self heal (*Prunella vulgaris*), creeping buttercup (*Ranunculus acris*) and Yorkshire fog (*Holcus lanatus*), with occasional sweet vernal grass (*Anthoxanthum odoratum*). There are large patches of nettle (*Urtica dioica*), ragwort (*Senecio jacobeae*) and broadleaved dock (*Rumex obtusifolia*).

3.12 Species-richness of Hay Meadow Communities

A summary of the quadrat sampling data for the two hay meadow communities that were present on the site, MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland, and MG5c *Cynosurus cristatus – Centaurea nigra* grassland, *Danthonia decumbens* sub-community, is presented in Table 1, below.

Table 1
Summary species-richness data for MG4 and MG5c grasslands at Bardon Hill Quarry (BHQ), in relation to published NVC data.

Plant community	Number of species listed in NVC tables	Total number of species at BHQ	Number of species at BHQ occurring in NVC tables	Mean number of species per sample in NVC tables	Mean number of species per sample at BHQ
MG4	72	65	40	28	14
MG5c	59	26	23	22	16

These data show that the Bardon Hill Quarry MG4 grassland samples approximate the overall diversity of the national dataset as listed in the National Vegetation Classification community descriptions, although the mean number of species per quadrat sample was much lower at Bardon Hill Quarry than in the published dataset. In addition, many of the actual species present at Bardon Hill Quarry are not typical of MG4 grassland. While most of these 'non-MG4' species are very infrequent associates, a few are indicative of either dereliction (e.g. tree seedlings) or heavy grazing and trampling (e.g. ragwort or various rush species).

MG5c grassland at Bardon Hill Quarry had much lower overall diversity than the national dataset, but this may be explained by the fact that it is based on a very small sample size (only 3 quadrat samples in a single small patch of grassland). In fact, most of the species recorded at Bardon Hill Quarry were typical of the MG5c community, and the mean species-richness per quadrat was relatively high for such a small dataset, suggesting that this grassland, though small, is of reasonably good quality.

4.0 DISCUSSION

The NVC survey at Bardon Hill Quarry was undertaken across a series of fields that were believed to support types of grassland vegetation of nature conservation value. The majority of the surveyed vegetation was grassland of one form or another, but there were a few areas of mire vegetation, scrub, and also patches of ruderal vegetation typical of disturbed, productive but unmanaged soils.

The focus of the NVC survey was upon species-rich hay meadow communities, which are becoming increasingly uncommon in the British lowlands. However, several other grassland or mire types were also found to occupy parts of each field, and these were surveyed in order to provide the context within which to describe the targeted hay meadow communities.

The two hay meadow grassland communities of nature conservation value that were identified during this survey were:

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

MG5c *Cynosurus cristatus – Centaurea nigra* grassland, *Danthonia decumbens* sub-community.

4.1 MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland

This community type has been observed in Fields 29, 30, 31, 32, 59, 60, 61, 62, 63, 64, 65 & 66. (Drawing 1).

This grassland type is very rare at a national level and was found to be quite widespread within the survey area, being located in eleven of the fourteen fields that were surveyed. It was typically found on damp ground adjacent to a small stream that flows through or close to the fields that were surveyed, but in many cases it was restricted to small patches.

This plant community is typically quite species-rich, and one of its defining features is the consistent presence, and often dramatic abundance, of great burnet, a tall and distinctive flowering plant. The examples of this community surveyed here varied considerably, from diverse hay meadows that appear to have been managed in a traditional manner until fairly recently, to long derelict meadows dominated by tall and robust grasses and herbs, and heavily grazed fields with a short sward.

Consistent management is essential to maintain this community and its complement of species. Whilst detailed information on past and current management of these fields was not available, it appears from the current survey that all examples of this community would benefit from a change in the current management to maximise, or in most cases prevent further degradation, of their nature conservation value. Further details regarding management are presented in Section 4.4

4.2 MG5c Cynosurus cristatus – Centaurea nigra grassland, Danthonia decumbens sub-community

This community type has been observed in Field 31.

MG5 grassland is a nationally uncommon grassland type and is typically a species-rich community of well-drained soils, usually supporting a wide variety of colourful flowering plants. This community was only found to occupy a small strip of one field within the survey area. While it is beginning to suffer from a lack of management, it remains fairly species diverse with a good complement of flowering plants typical of the community.

4.3 *H9d - Calluna vulgaris – Deschampsia flexuosa* heath*, Gallium saxatile* sub-community

This community is the typical heathland vegetation that develops upon thin acidic and impoverished soils that occur across the midlands and north of England. It is a common habitat in the cool, wet north-western hills, but becomes more scattered and fragmented in the lowland areas of the Midlands. Although there are large tracts in Sherwood and Cannock Chase, it is sparsely distributed in Leicestershire. Detailed heathland survey was only conducted at Ratchett Hill, but similar community types may also occur within Bardon Hill SSSI.

4.4 Other Vegetation Types

Other plant communities identified during the survey were:

MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* subcommunity.

MG6 *Lolium perenne – Cynosurus cristatus* grassland.

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland.

MG10 *Holcus lanatus – Juncus effusus* grassland.

U2 *Deschampsia flexuosa* grassland.

M27 *Filipendula ulmaria – Angelica sylvestris* mire.

W23 *Ulex europaeus – Rubus fruticosus* scrub.

OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

OV27b *Epilobium (Chamaerion) angustifolium* community, *Urtica dioica – Cirsium arvense* subcommunity.

4.4.1 MG1b Arrhenatherum elatius *grassland,* Urtica dioica *sub community*

Fields 31, 38, 50 & 59.

This is a very widespread and common plant community in the UK, typical of unmanaged productive fields and road verges. The vegetation is tall and dominated by common and robust plants such as false oat-grass, cocksfoot, nettles, thistles and docks. The examples surveyed here were found in derelict and improved hay meadows or on unmanaged land marginal to arable fields.

4.4.2 MG6 Lolium perenne – Cynosurus cristatus *grassland*

Fields 30, 63, 64, 65.

This is an exceedingly common grassland community in the UK, one that dominates lowland cattle pastures and has often developed from other types of grassland as a result of the regular addition of fertilisers and heavy grazing. The examples surveyed at Bardon Hill Quarry were quite species-poor, tended to be found on drier ground adjacent to the MG4 grassland communities, and were clearly quite heavily grazed where livestock were present.

4.4.3 MG9 Holcus lanatus – Deschampsia cespitosa *grassland*

Fields 30 & 32.

A very widespread and common grassland community of the British lowlands, MG9 grassland is typical of permanently wet, productive soils, and it can often spread into other grassland communities, such as MG4 grassland, as a consequence of changes to the grazing regime, e.g. late spring grazing or a lack of winter grazing. Two large areas were found during the present survey, and it is possible that they are spreading into the adjacent MG4 grassland, because tufted hair-grass was found to be present in some quantity in the latter community.

4.4.4 MG10 Holcus lanatus – Juncus effusus *grassland*

Field 30.

In many respects similar to the previous community, this can also invade more species-rich grasslands where permanently damp ground experiences trampling from livestock. A very small patch of this community was located on the margin of one field within the survey area.

4.4.5 U2 Deschampsia flexuosa *grassland*

Fields 38 & 50.

U2 grassland has a widespread but local distribution in the British lowlands, but is quite common in the upland fringes. It requires acidic, damp but free-draining soils, and supports a naturally species-poor flora dominated by wavy hair-grass. The examples within this survey were found on and around the base of a series of small rocky outcrops.

4.4.6 M27 Filipendula ulmaria – Angelica sylvestris *mire*

Fields 62, 63, 64 & 65.

This is a wetland community that is widespread throughout lowland Britain, being found on permanently moist, nutrient-rich soil that is protected from heavy grazing. It can be quite species-rich, supporting a range of wetland plants, but is generally dominated by robust species such as meadowsweet, angelica, common valerian, nettle and common sorrel. The examples identified during the present survey in three fields were being affected by an apparent increase in grazing levels over recent years. In many places the wetland plants were heavily browsed while grasses appeared to be expanding their cover. Field 62 was ungrazed and here the community remained tall and robust.

4.4.7 W23 Ulex europaeus – Rubus fruticosus *scrub*

Fields 31, 38 & 50.

This plant community is a frequent invader of derelict or lightly managed grasslands, typically on free-draining and moderately acidic soils. Dense stands of common gorse were found within the MG5c grassland of Field 31, while gorse, bramble and scattered young trees were growing up around the rocky knolls of Fields 38 & 50.

4.4.8 OV26c Epilobium hirsutum *community,* Filipendula ulmaria – Angelica sylvestris *sub-community*

Fields 29 & 30.

This is another common and widely distributed plant community of the British lowlands, being found typically on ungrazed damp ground alongside streams and in fen meadows, and characterised by abundant tall herbaceous plants such as great willowherb, nettles, meadowsweet, soft rush and greater bird's-foot trefoil. The examples seen here were identified along unmanaged sections of the stream that flowed through the survey area.

4.4.9 OV27b Epilobium (Chamaerion) angustifolium *community,* Urtica dioica – Cirsium arvense *subcommunity*

Fields 38, 50 & 62.

This community is widespread in Britain, and is characteristic of disturbed, damp and fertile soils in many habitats. It is dominated by rosebay willowherb, often with patches of bramble, nettles or bracken. Within this survey it was found in large patches around the base of the rocky outcrops in Fields 38 and 50, and was also visible on the margins of Field 62.

4.5 Management

4.5.1 Lowland Grassland Management

The overwhelming feature that is evident from the surveys carried out on these fields is that the examples of old hay meadow communities (MG4 and MG5 grasslands) that are present on the site are no longer being managed in a fashion conducive to the maintenance of their botanical interest. These types of grassland have typically developed over many centuries of traditional management, which usually involves a mixture of light grazing, taking a hay crop in summer, and the application of small quantities of organic manures [8] [9]. Currently, those parts of the survey area that support old hay meadow communities are either heavily grazed all year round, or are totally unmanaged. The former treatment leads to the loss of flowering plants other than grasses and common creeping plants such as buttercups and clovers, while the latter results in the loss of less robust plants and a decline in species diversity, and ultimately will lead to the development of woodland or scrub.

A further problem of particular concern for the examples of MG4 grassland, which as a community requires a regular input of base-rich silt from winter flooding, is the finding that the stream that flows through these fields appears to have been deepened and straightened, and in most fields it probably floods only in exceptional conditions. This is likely to be contributing to a general decline in the botanical interest of this plant community.

It was apparent during the field survey of Field 62, that a degree of habitat management has taken place within this field. It is understood that the vegetation had been 'topped' earlier in the 2009 growing season[10] in an attempt to suppress the growth of nettles and brambles.

[8] Rodwell, J.S. (ed.) (1992). *British plant communities, Volume 3, Grasslands and montane communities*. Cambridge University Press, Cambridge.

[9] JNCC (2007). *Second report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006.* Joint Nature Conservation Committee, Peterborough.

[10] *Pers comm*. Mr Beck, landowner.

Whilst cutting vegetation is an important tool in managing grassland habitats of conservation importance, the current regime is considered to be inappropriate for restoration of a species-rich meadow sward for the following reasons;

- Vegetation has been cut early in the growing season before 'desirable' plant species have set seed; and
- Vegetation cuttings have been left in-situ, resulting in smothering and, in the longer term, soil enrichment. This encourages growth of competitive species such as nettle and smothers less competitive plants such as many of those which characterise this community type.

In order to maximise the botanical richness of unmanaged fields, it would be desirable to implement a structured grassland management regime to bring them into favourable condition in terms of habitat quality and presence and abundance of characteristic plant species.

It is recommended that all floodplain grasslands within the headwaters of the River Sence are managed as traditional hay meadows. In summary this comprises of the vegetation being cut for hay late in summer, with the hay being removed. If possible, a light grazing for up to eight weeks, until approximately the end of October, would be appropriate.

4.5.2 Lowland Heathland Management

The restoration management of Ratchett Hill would involve the selected clearance of birch trees to reduce shading and controlling the spread of bracken, either through mechanical means, e.g. increased grazing/trampling pressure or through chemical control. Direct intervention to reduce bracken cover could be backed up by a change in grazing management, which may hold back the spread of bracken. Changing grazing may also reduce pressure on the existing pasture.

5.0 NATURE CONSERVATION EVALUATION

5.1 Nature Conservation Evaluation of Species

At a national level, botanically-rich examples of MG4 *Alopecurus pratensis – Sanguisorba officinalis* grassland and MG5 *Cynosurus cristatus – Centaurea nigra* grassland support both a wide variety of plant species, and a number of scarce or rare plants, such as the fritillary *Fritillaria meleagris* (Nationally Scarce and listed as 'Vulnerable' in the Red Data List[11]), and meadow saffron *Colchicum autumnale* (listed as 'Near Threatened' in the Red Data List). Whilst none of the meadows sampled at Bardon Hill Quarry hold any rare species, they do support a number of plants that have suffered widespread but localised losses in the UK, particularly in lowland areas, usually as a result of agricultural improvement, drainage, or habitat destruction[12]. These include: great burnet, devil's-bit scabious, betony, ragged robin, pignut, brown sedge, common yellow sedge, oval sedge, spring sedge, wavy hair-grass and heath bedstraw.

5.2 Nature Conservation Evaluation of Plant Communities

5.2.1 Damp hay meadows supporting MG4 grassland

Within the landholding of Aggregate Industries a series of damp hay meadows adjacent to the upper reaches of the River Sence support MG4 *Alopecurus pratensis – Sanguisorba officinalis* grassland.

This plant community is listed on Annex 1 of the EU Habitats & Species Directive[13], and comprises species-rich hay meadows on moderately fertile soils of river and tributary floodplains (equivalent to the EU plant community type H6510 Lowland hay meadows, *Alopecurus pratensis, Sanguisorba officinalis*). Most examples in the UK have traditionally been cut annually for hay with light aftermath grazing. Typically, seasonal flooding maintains an input of nutrients and sub-surface water flows maintain aerated, but wet, rooting zones during the early growing season.

Within the UK and mainland Europe, MG4 grassland is considered to be in decline, both in quality and area, because many sites have been lost or damaged during the 20th century as a result of agricultural intensification or dereliction, improved river drainage, and sand and gravel extraction. There are very few good quality sites remaining, and the majority of British examples are small fragments that are isolated amongst intensively managed agricultural or urban land. They are greatly at risk of further loss or fragmentation as a consequence of development, mineral extraction, and continued agricultural intensification[14].

As a consequence of the scarcity and importance to nature conservation of this plant community, five sites in the UK have been designated as Special Areas of Conservation

[11] Cheffings C.M. & Farrell L. (Eds) (2005). *Vascular Plant Red Data List for Great Britain*. Joint Nature Conservation Committee, Peterborough.

[12] Preston C.D, Pearman D. & and Dines T.(2002). *New Atlas of the British and Irish Flora*. Oxford University Press, Oxford.

[13] Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora.

[14] Joint Nature Conservation Committee. 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC.

(SACs) primarily because they support good examples of MG4 grassland[15]. In addition, approximately 95% of the remaining examples of MG4 grassland sites have been designated as Sites of Special Scientific Interest (SSSIs)[16].

MG4 grassland is also a Priority Habitat within the Lowland Meadows Habitat Action Plan, which forms part of the UK Biodiversity Action Plan[17]. This plan has the following objectives and targets (amongst others):

- Arrest the depletion of unimproved lowland meadow throughout the UK.
- For stands outside SSSIs and ASSIs, wherever biologically feasible, secure favourable condition over 100% of the resource by 2015.
- Attempt to re-establish 500 ha of lowland meadow of wildlife value at carefully targeted sites by 2010.

There is considerable variation in the botanical value of the individual fields that support MG4 grassland at Bardon Hill Quarry (see Drawing D13). The most diverse and least degraded example is found in Field 30. Fields 63, 64 & 65 are also botanically diverse, but they are currently subject to the damaging effects of long-term heavy grazing. Most of the other fields are either derelict (Fields 32, 29, 59, 62 & 66) or very heavily grazed (Fields 61 and 60).

Despite the variation in botanical quality and the currently differing management of the individual fields, it is best to consider all the MG4 grassland examples at Bardon Hill Quarry as a single resource, as they are all remnants of a once continuous and probably more extensive feature. Following the criteria used in '*A Nature Conservation Review*'[18] to evaluate the conservation value of semi-natural habitats, the national and international rarity, fragility, diversity, naturalness, and relatively large extent of this lowland grassland resource mean that it should be considered to be of at least Regional, and probably of National[19], value.

5.2.2 Dry hay meadows supporting MG5 grassland

A small strip of dry hay meadow within the application area at Bardon Hill Quarry supports good quality MG5 *Cynosurus cristatus – Centaurea nigra* grassland. While this plant community is not of European importance, it has also suffered a dramatic decline in area and quality throughout the UK during the 20th century as a consequence of agricultural intensification, abandonment and eutrophication.

In order to safeguard the remaining unimproved dry hay meadow resource in the UK, a large proportion (approximately 50%) has been designated as SSSIs[20]. This plant community is

15 http://www.jncc.gov.uk/protectedsites/sacselection/SAC_List_features.asp?Unitary=&Feature=H6510

16 Holmes P., Pinches C. & Jefferson R. (2005). *National assessment of lowland neutral grassland.* Unpublished report, English Nature, Peterborough.

17 http://www.ukbap.org.uk/UKPlans.aspx?ID=10

18 Ratcliffe D.A. (1977). *A nature conservation review*. Cambridge University Press.

19 Using criteria defined by IEEM (2006) Guidelines for Ecological Impact Assessment

20 Holmes P., Pinches C. & Jefferson R. (2005). *National assessment of lowland neutral grassland.* Unpublished report, English Nature, Peterborough.

also included as a Priority Habitat within the Lowland Meadows Habitat Action Plan (see above).

Although this vegetation type is nationally important, the small size of the example within the application area at Bardon Hill Quarry greatly reduces its overall nature conservation value. When considered in the context of the surrounding grassland, it is defined as being of District or County value.

5.2.3 Lowland Heathland

Lowland heathland is a UK BAP priority habitat due to recent declines in the quality and extent of the community, lowland heathland has been particularly affected by fragmentation as the land use of former heaths is improved of developed.

Ratchett Hill is included on the Natural England Lowland Heathland Inventory, which maps habitats of particular nature conservation value. Whilst inclusion on this inventory does not confer any formal designation, due to the relative scarity of this habitat in lowland England, it is considered to be of county ecological value. =

5.3 Evaluation Using Local SINC Criteria

The surveyed fields and Ratchett Hill support several features that would meet the Leicestershire SINC (Sites of Importance for Nature Conservation) criteria[21]. The surveyed fields within the landholding of Aggregate Industries meet the SINC criteria on the grounds of both Habitat Quality and Habitat Diversity, because they support:

- Mesotrophic grasslands that meet the primary criteria for this habitat.
- Wet grasslands that meet the primary criteria for this habitat.
- Acid grasslands that meet the primary criteria for this habitat.
- Heathlands meet the secondary criteria for this habitat.

5.4 Evaluation Using SSSI Guidelines

Guidelines for the selection of biological Sites of Special Scientific Interest[22] state that suitable examples of MG4 grassland should be of at least 0.5 ha in area, and should include the best example(s) of the community in an Area of Search. Any single feature of appropriate quality covering 5 ha or more would be suitable for designation. The examples of MG4 grassland within the landholding of Aggregate Industries appear to cover approximately 5 ha of this habitat type in total, and support a good complement of the typical species listed in the published National Vegetation Classification guides. It is also probable that additional remnants of MG4 grassland exist further downstream of the survey area, outside Aggregate Industries ownership.

A more recent assessment of the lowland meadow resource in England[23] emphasizes that the great scarcity of unimproved lowland hay meadow communities provides an argument for notifying all existing sites that are of equivalent or better quality than those already

[21] Leicestershire & Rutland SINC Working Group (2001). *Guidelines for the selection of Sites of Importance of Nature Conservation in Leicester, Leicestershire & Rutland*.

[22] NCC (1989). *Guidelines for selection of biological SSSIs*. Nature Conservancy Council, Peterborough.

[23] Holmes P., Pinches C. & Jefferson R. (2005). *National assessment of lowland neutral grassland.* Unpublished report, English Nature, Peterborough.

designated as SSSIs. MG4 grassland sites that meet the SSSI guidelines criteria for quality and size are a priority for notification as SSSIs, and any such site that is under direct threat of destruction would be considered to be of the highest priority for notification as an SSSI.

5.5 Summary Evaluation

Because of the national and international rarity and fragility of MG4 *Alopecurus pratensis – Sanguisorba officinalis* grassland, and also because of the diversity, naturalness, and relatively large extent of the examples of this community at Bardon Hill Quarry, this resource must be considered to be of at least Regional value, and probably of National value.

Although MG5 *Cynosurus cristatus – Centaurea nigra* grassland is also nationally rare and fragile, the small size of the example found within the Bardon Hill Quarry application area means that this resource should probably be best considered as being of High Local or County importance.

The unimproved and semi-improved fields that were surveyed at Bardon Hill Quarry support mesotrophic grasslands, wet grasslands and acid grasslands of a quality that meets the criteria of the Leicestershire and Rutland Sites of Importance for Nature Conservation Working Group. Heathland habitats at Ratchett Hill would also meet these criteria.

It is possible that the examples of MG4 grassland at Bardon Hill Quarry are of a suitable size and quality to meet the criteria for selection as a biological Site of Special Scientific Interest, although this would need to be verified by the Grassland Specialist of Natural England.

6.0 SUMMARY

In August 2008 SLR was commissioned by Aggregate Industries to carry out detailed botanical surveys of a number of meadows and pasture fields, in support of a planning application to extend the working area of Bardon Hill Quarry.

The survey was carried out using the standard National Vegetation Classification (NVC) survey methodology. The botanical data collected during the survey have been used to classify the different vegetation types according to the NVC. Quadrat data, species lists and constancy tables are presented in Appendices 1 –3.

The most extensive plant community of nature conservation value present in the survey area was MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland, and, to a lesser extent, MG5c *Cynosurus cristatus – Centaurea nigra* grassland, *Danthonia decumbens* sub-community.

Other plant communities that were identified during the survey were:
MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community;
MG6 *Lolium perenne – Cynosurus cristatus* grassland;
MG9 *Holcus lanatus – Deschampsia cespitosa* grassland;
MG10 *Holcus lanatus – Juncus effusus* grassland;
U2 *Deschampsia flexuosa* grassland;
M27 *Filipendula ulmaria – Angelica sylvestris* mire;
W23 *Ulex europaeus – Rubus fruticosus* scrub;
OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community;
OV27b *Epilobium (Chamaerion) angustifolium* community, *Urtica dioica – Cirsium arvense* sub-community.

The survey identified approximately 5 hectares of the MG4 grassland community within the survey area. Individual stands varied considerably in nature and quality, from diverse hay meadows that appear to have been managed in a traditional manner until fairly recently, to long derelict meadows and heavily grazed fields. MG5 grassland was found to occupy only 0.5ha of a single field within the survey area. Though small and beginning to suffer from a lack of management, the stand remains fairly botanically diverse.

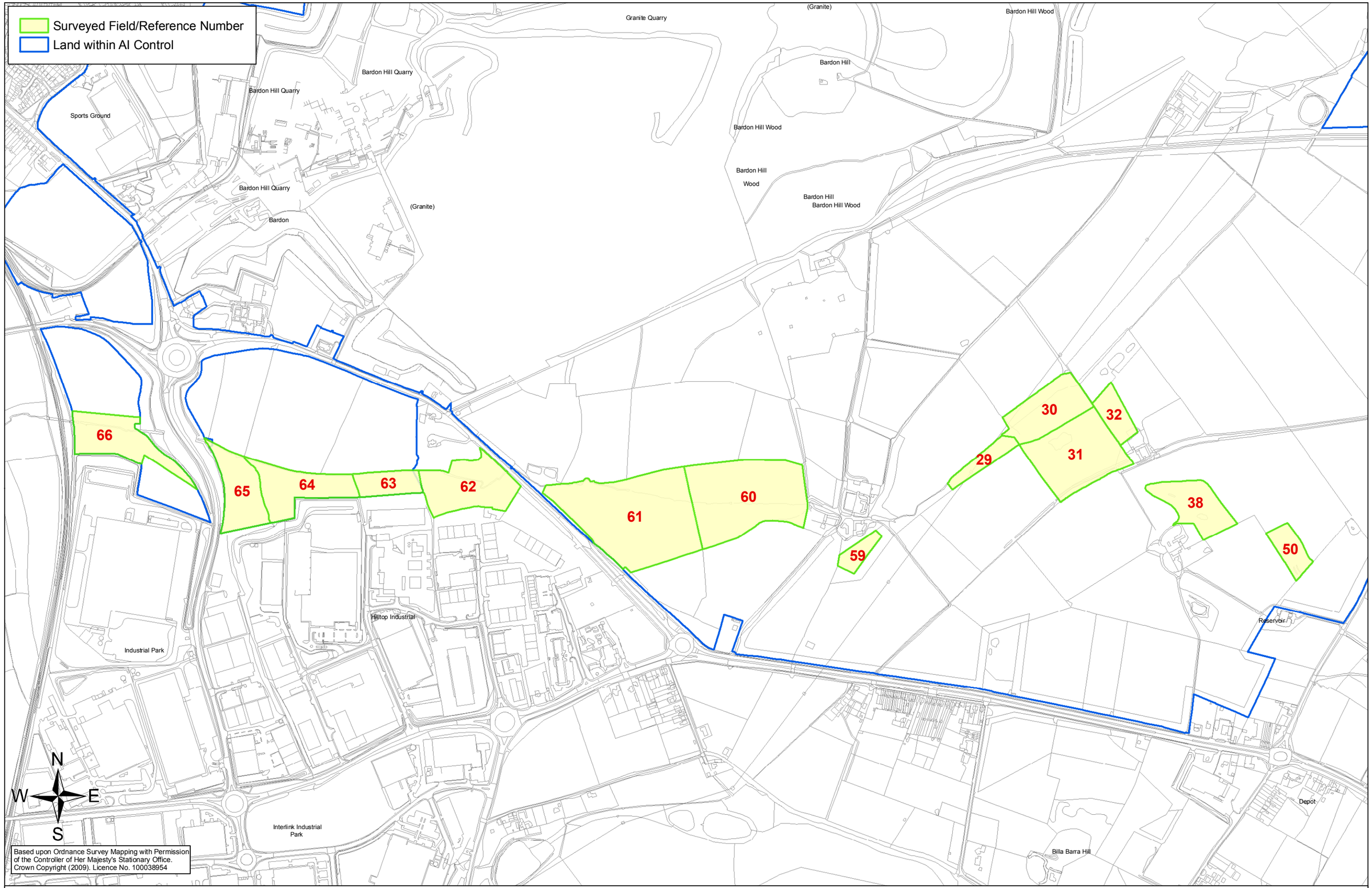
The survey did not identify any nationally rare or scarce plant species within the grassland communities surveyed, although they did support a number of species that have suffered widespread declines throughout the UK during recent decades.

MG4 grassland is listed on Annex 1 of the EU Habitats & Species Directive, and approximately 95% of the remaining examples of MG4 grassland sites in England have been designated as Sites of Special Scientific Interest. Roughly 50% of MG5 grassland sites in England have been designated as SSSIs. Both plant communities are Priority Habitats within the UK Biodiversity Action Plan.

The MG4 grassland resource at Bardon Hill Quarry should be considered to be of at least Regional value, and probably of National value. The MG5 grassland resource is likely to be at most of County value.

The surveyed fields would meet the Leicestershire and Rutland Sites of Importance for Nature Conservation criteria, on the grounds of both Habitat Quality and Habitat Diversity.

This survey has confirmed that examples of MG4 grassland within the landholding of Aggregate Industries are of a suitable size and quality to meet the criteria for selection as a biological Site of Special Scientific Interest. This conclusion would need to be verified by the Natural England Grassland Specialist.



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:8K (A3)	BARDON HILL QUARRY	NVC GRASSLAND STUDY SURVEYED FIELDS
Drawing Number	**Revision**	**Drawn By**	**Project**	
NVC1		ABW	PROPOSED EXTENSION	



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 32
Drawing Number	**Revision**	**Drawn By**	**Project**	
NVC2		ABW	PROPOSED EXTENSION	



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 30
Drawing Number	**Revision**	**Drawn By**	**Project**	
NVC3		ABW	PROPOSED EXTENSION	



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 31
Drawing Number	**Revision**	**Drawn By**	**Project**	
NVC4		ABW	PROPOSED EXTENSION	



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 29

Drawing Number	Revision	Drawn By	Project
NVC5		ABW	PROPOSED EXTENSION

Quadrant Sample Number
Field Boundary

NVC Grassland Survey

Class

MG1b
OV27b
U2
W23

43
40
41
44
42
45

N
W
E
S

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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 38
Drawing Number	**Revision**	**Drawn By**	**Project**	
NVC6		ABW	PROPOSED EXTENSION	



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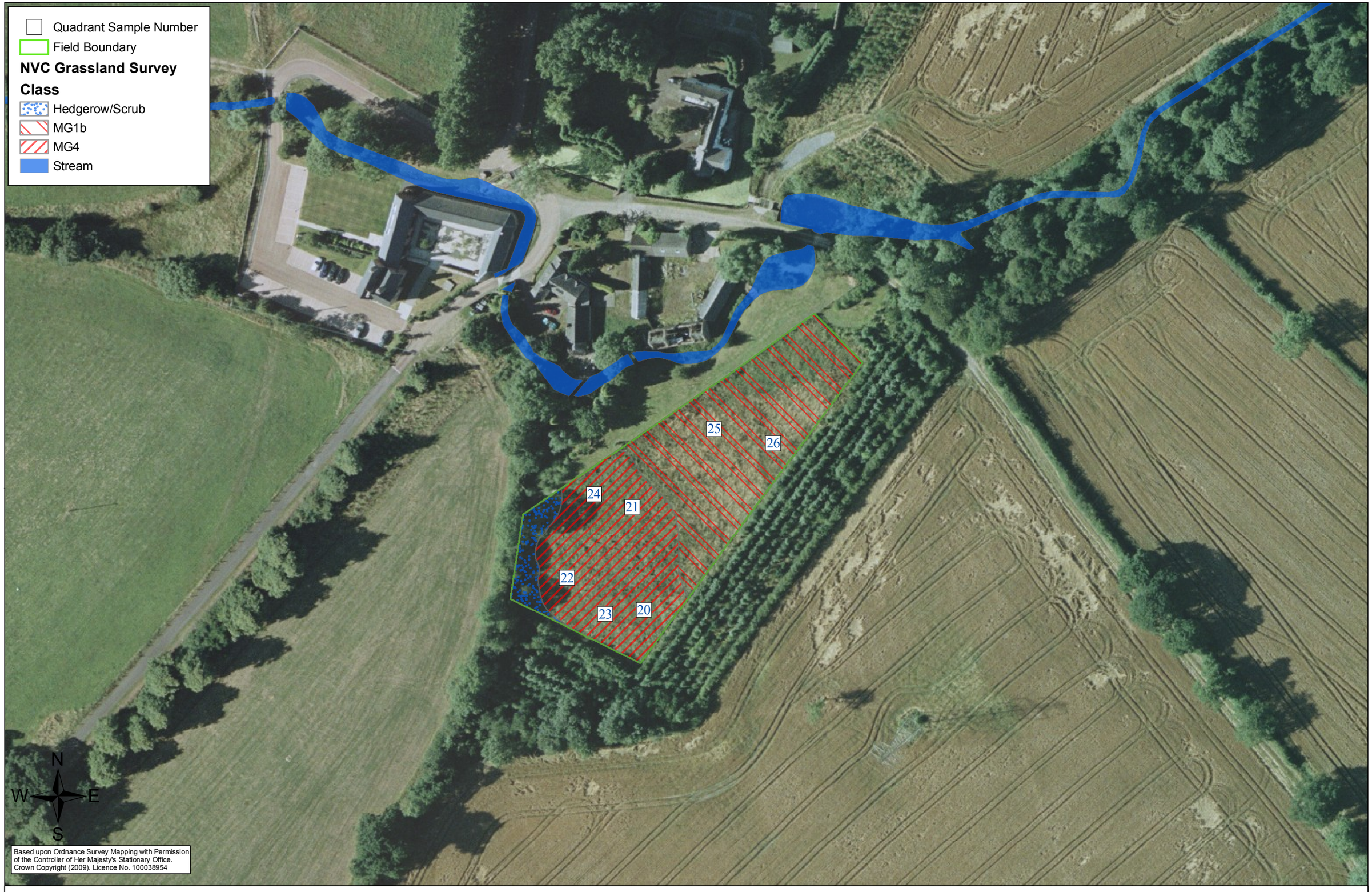
Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 50

Drawing Number	Revision	Drawn By	Project
NVC7		ABW	PROPOSED EXTENSION



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 59

Drawing Number	Revision	Drawn By	Project
NVC8		ABW	PROPOSED EXTENSION



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:2K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELDS 60 AND 61

Drawing Number	Revision	Drawn By	Project
NVC9		ABW	PROPOSED EXTENSION



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	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 65
Drawing Number	**Revision**	**Drawn By**	**Project**	
NVC10		ABW	PROPOSED EXTENSION	



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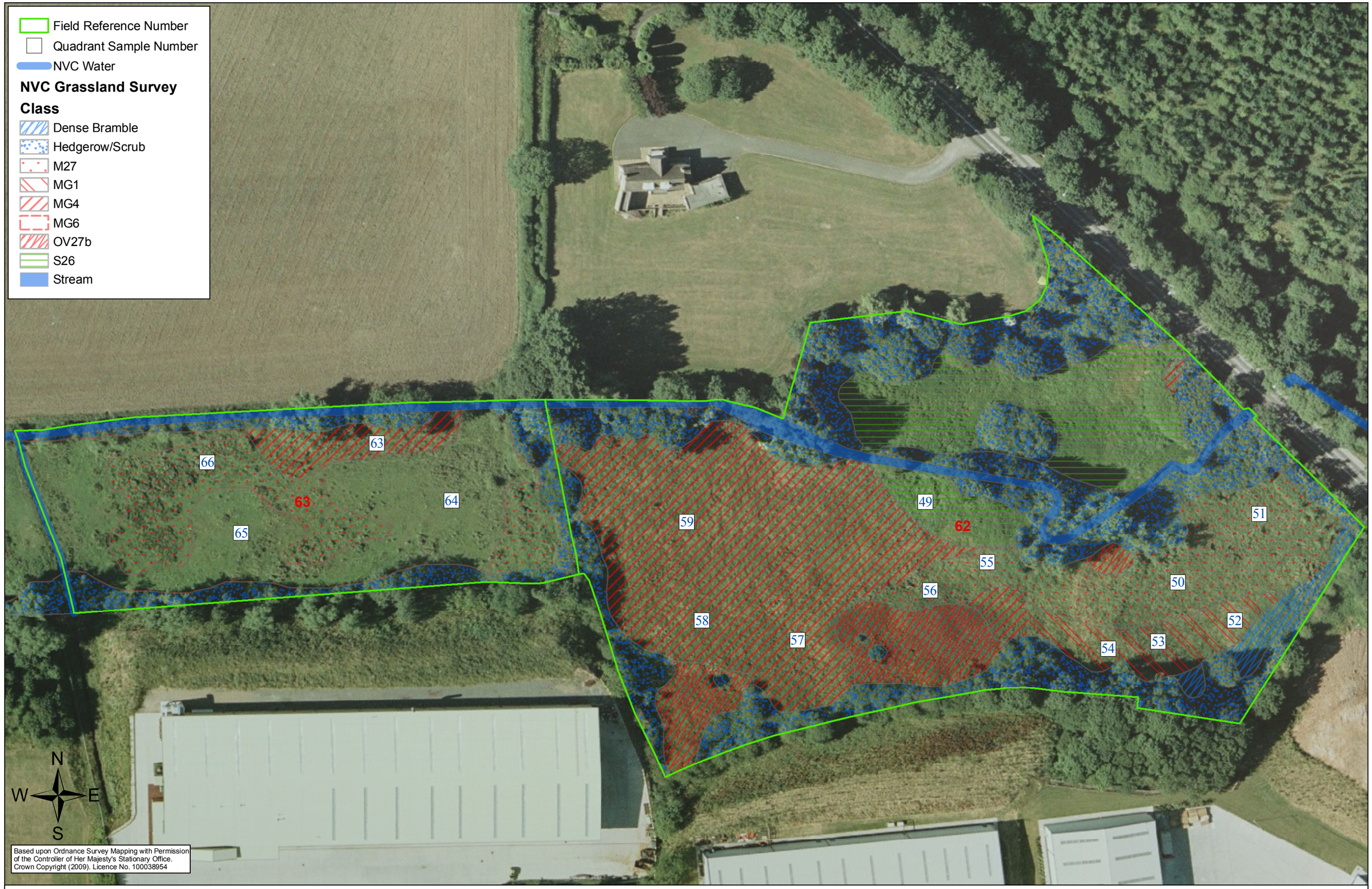
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELD 64

Drawing Number	Revision	Drawn By	Project
NVC11		ABW	PROPOSED EXTENSION



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY FIELDS 62 AND 63

Drawing Number	Revision	Drawn By	Project
NVC12		ABW	PROPOSED EXTENSION

Botanical Value
Summary Value

- High
- Low
- Medium
- Field Reference Number
- Land within AI Control

Bardon Hill
Granite Quarry
Bardon Hill Quarry (Granite)
Bardon Hill Wood
Bardon Hill Quarry
Bardon Hill Quarry
Sports Ground
Bardon Hill
Bardon Hill Wood
Bardon Hill
Wood
Bardon Hill
Bardon Hill Wood
Bardon Hill Quarry
(Granite)
Bardon
66
65
64
63
62
61
60
59
30
32
31
29
38
50
Hilltop Industrial
Industrial Park
Reservoir
Depot

N
W
E
S

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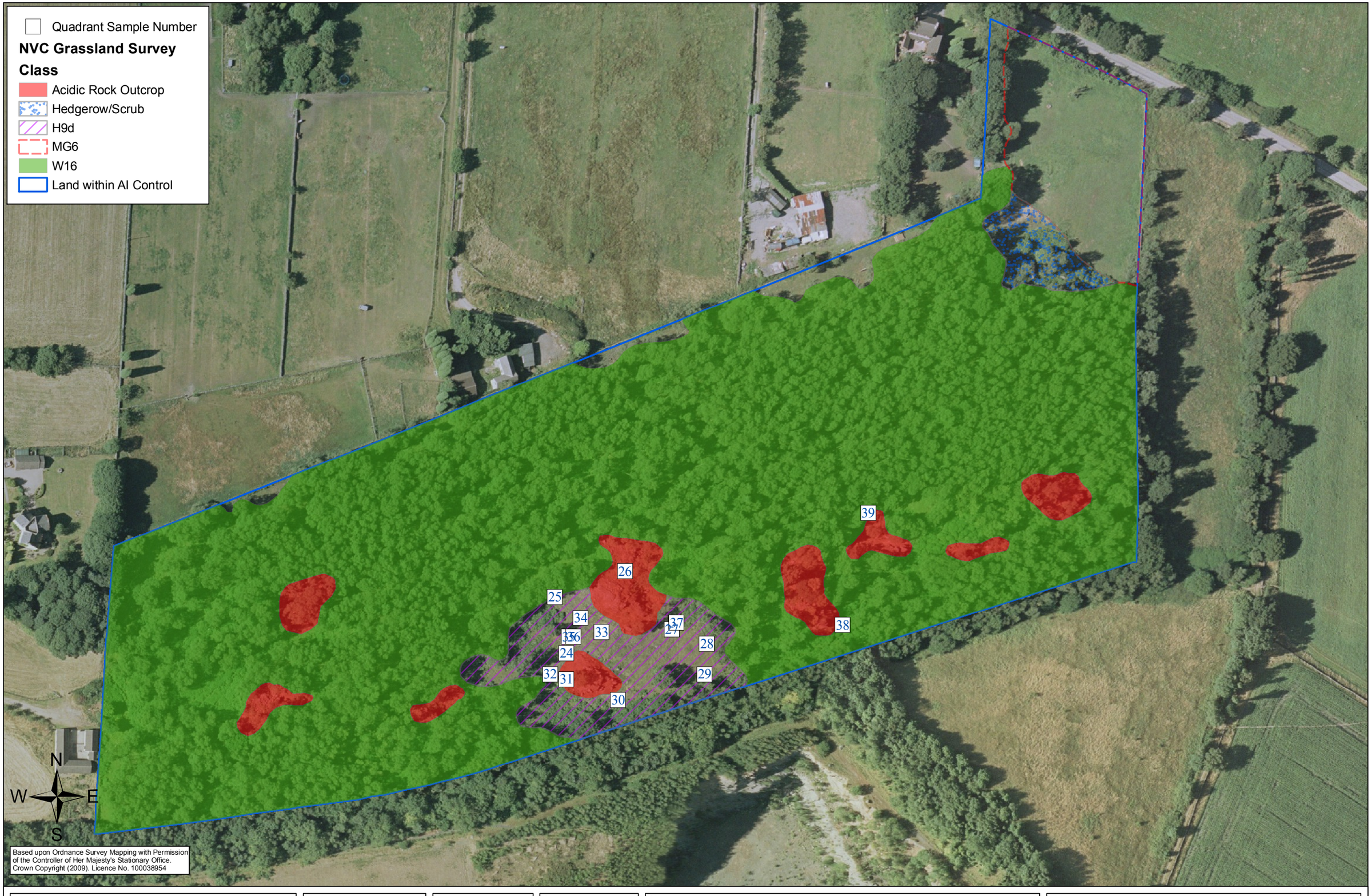
Project Number	Date	Scale	Site	Title
	OCT 2009	1:8K (A3)	BARDON HILL QUARRY	NVC GRASSLAND SURVEY BOTANICAL SUMMARY
Drawing Number	**Revision**	**Drawn By**	**Project**	
NVC13		ABW	PROPOSED EXTENSION	



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Project Number	Date	Scale	Site	Title
	OCT 2009	1:1.5K (A3)	BARDON HILL QUARRY	PHASE II (NVC) SURVEY RATCHETT HILL

Drawing Number	Revision	Drawn By	Project
RAT/1		ABW	PROPOSED EXTENSION

KEY TO NATIONAL VEGETATION CLASSIFICATION COMMUNITIES

Field Reference Number

Quadrant Sample Number

NVC Water

NVC Grassland Survey

Class

Acidic Rock Outcrop

Dense Bramble

Hedgerow/Scrub

Stream

H9d - Calluna vulgaris – Deschampsia flexuosa heath, Gallium saxatile sub-community

MG1 - Arrhenatherum elatius grassland

MG1b - Arrhenatherum elatius grassland, Urtica dioica sub-community

MG4 - Alopecurus pratensis - Sanguisorba officinalis grassland

MG5c - Cynosurus cristatus - Centaurea nigra grassland, Danthonia decumbens sub-community

MG6 - Lolium perenne - Cynosurus cristatus grassland

MG9 - Holcus lanatus - Deschampsia cespitosa grassland

MG10 - Holcus lanatus - Juncus effusus rush-pasture

M27 - Filipendula ulmaria - Angelica sylvestris mire

OV26c - Epilobium hirsutum community, Filipendula ulmaria - Angelica sylvestris sub-commumity

OV27b - Epilobium angustifolium community, Urtica dioica - Cirsium arvense sub-community

S26 - Phragmites australis-Urtica dioica tall-herb fen

U2 - Deschampsia flexuosa grassland

W16 - Quercus spp. – Betula spp. – Deschampsia flexuosa woodland

W23 - Ulex europaeus - Rubus fruticosus scrub

APPENDICES

APPENDIX 1. COMMUNITY CONSTANCY TABLES

Species abundance data were recorded using the Domin scale (*sensu* Dahl & Hadac 1941[24]):

Domin Scale

Score	Percentage Cover
1	< 4%, few individuals
2	< 4%, several individuals
3	< 4%, many individuals
4	4 – 10%
5	11 – 25%
6	26 – 33%
7	34 – 50%
8	51 – 75%
9	76 – 90%
10	91 – 100%

A1.1. Field 32

(See Drawing D2.).

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland.

(Samples 34-38).

SPECIES NAME	Frequency	Abundance
Holcus lanatus	V	4-8
Festuca rubra	V	3-6
Potentilla erecta	V	3-6
Deschampsia cespitosa	V	3-5
Rumex acetosa	V	3-4
Anthoxanthum odoratum	IV	3-4
Juncus effusus	IV	3-4
Agrostis capillaris	III	4-6
Stellaria graminea	III	3-4
Agrostis gigantea	III	2-3
Rhytidiadelphus squarrosus	II	3-4
Juncus conglomeratus	II	3
Conopodium majus	I	3
Dactylis glomerata	I	3
Eurhynchium praelongum	I	3

[24] Dahl E & Hadac E (1941). Strandgesellschaften der Insel Ostøy im Oslofjord. Eine Pflanzensoziologishe Studie. in ***Nytt Magasin for Naturvidenskapene B*** **Vol. 82** pp. 251-312.

SPECIES NAME	Frequency	Abundance
Juncus acutiflorus	I	3
Plantago lanceolata	I	3
Ranunculus repens	I	3
Stellaria alsine	I	3
Succisa pratensis	I	3
Agrostis stolonifera	I	2
Lotus pedunculatus	I	2
Ranunculus acris	I	2
Cardamine pratensis	I	1
Epilobium obscurum	I	1

MG4 *Alopecurus pratensis* - *Sanguisorba officinalis* grassland (heavily degraded).

(Sample 39).

SPECIES NAME	Frequency	Abundance
Holcus lanatus	V	7
Festuca rubra	V	6
Anthoxanthum odoratum	V	5
Agrostis gigantea	III	5
Agrostis capillaris	II	4
Deschampsia cespitosa	II	4
Potentilla anglica	II	4
Stachys officinalis	II	4
Succisa pratensis	II	4
Centaurea nigra	II	3
Plantago lanceolata	II	3
Sanguisorba officinalis	II	3

A1.2. Field 30

(See Drawing D3).

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

(Samples 1-8).

SPECIES NAME	Frequency	Abundance
Deschampsia cespitosa	V	4-9
Sanguisorba officinalis	V	5-8
Holcus lanatus	V	3-6
Festuca rubra	V	2-6
Potentilla anglica	V	3-5
Centaurea nigra	IV	2-5
Anthoxanthum odoratum	IV	3-4
Succisa pratensis	IV	3-4
Agrostis capillaris	IV	2-4
Rumex acetosa	IV	2-3
Juncus effusus	III	1-5
Agrostis stolonifera	III	2-4
Agrostis gigantea	III	2-3
Calliergonella cuspidata	III	2-3
Plantago lanceolata	III	2-3
Ranunculus acris	II	3-4
Juncus conglomeratus	II	2-3
Stachys officinalis	II	2-3
Cynosaurus cristatus	II	3
Carex flacca	I	3-4
Stellaria graminea	I	3-4
Cerastium fontanum	I	2-3
Juncus acutiflorus	I	2-3
Lotus corniculatus	I	2-3
Prunella vulgaris	I	1-2
Brachythecium rutabulum	I	2
Carex hirta	I	3
Carex ovalis	I	1
Carex viridula subsp. oedocarpa	I	3
Galium palustre	I	3
Juncus articulatus	I	2
Leontodon autumnalis	I	3
Lotus pedunculatus	I	2
Quercus petraea seedling	I	1
Ranunculus repens	I	3
Rhytidiadelphus squarrosus	I	2
Senecio jacobea	I	2

OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

(Samples 9, 10 & 33).

SPECIES NAME	Frequency	Abundance
Epilobium hirsutum	V	3-8
Angelica sylvestris	V	4-6
Lotus pedunculatus	V	3-6
Urtica dioica	V	2-6
Filipendula ulmaria	V	3-5
Juncus inflexus	V	3-4
Juncus effusus	III	6-7
Senecio aquaticus	III	3-4
Holcus lanatus	III	2-3
Lathyrus pratensis	III	2-3
Rumex crispus	III	2-3
Cirsium palustre	III	2
Mentha aquatica	I	4
Alisma plantago-aquatica	I	3
Arrhenatherum elatius	I	3
Cirsium arvense	I	3
Epilobium parviflorum	I	3
Dactylis glomerata	I	2
Galium aparine	I	2
Galium palustre	I	3
Rumex obtusifolius	I	3
Stellaria graminea	I	3

MG9 *Holcus lanatus – Deschampsia cespitosa* grassland.

(Samples 11-15).

SPECIES NAME	Frequency	Abundance
Juncus effusus	V	7-8
Deschampsia cespitosa	V	5-8
Lotus corniculatus	III	4-6
Agrostis gigantea	III	3-5
Potentilla erecta	III	3-4
Anthoxanthum odoratum	III	2-4
Galium palustre	III	2-3
Juncus acutiflorus	III	2-3
Cirsium palustre	III	1-2

SPECIES NAME	Frequency	Abundance
Sanguisorba officinalis	III	1-2
Festuca rubra	II	3-5
Agrostis stolonifera	II	3
Holcus lanatus	II	3
Rumex acetosa	II	3
Agrostis capillaris	II	2
Poa pratensis	I	5
Carex viridula subsp. *oedocarpa*	I	4
Brachythecium rutabulum	I	3
Calliergonella cuspidata	I	3
Lotus pedunculatus	I	3
Potentilla anserina	I	3
Rhytidiadelphus squarrosus	I	3
Stellaria graminea	I	3
Holcus mollis	I	2
Plantago lanceolata	I	2
Ranunculus repens	I	2
Senecio aquaticus	I	2
Stellaria alsine	I	2
Succisa pratensis	I	2
Myosotis laxa	I	1

MG10 *Holcus lanatus – Juncus effusus* rush pasture.

(Sample 16).

SPECIES NAME	Frequency	Abundance
Holcus lanatus	V	9
Juncus effusus	III	4
Rumex obtusifolius	III	4
Holcus mollis	II	3
Ranunculus repens	II	3
Urtica dioica	II	3
Agrostis gigantea	I	2
Rumex acetosa	I	2
Stellaria graminea	I	2
Alopecurus pratense	I	1

A1.3. Field 31.

(See Drawing D4).

MG5c *Cynosurus cristatus – Centaurea nigra* grassland, *Danthonia decumbens* sub-community.

(Samples 17-19).

SPECIES NAME	Frequency	Abundance
Agrostis capillaris	V	4-6
Anthoxanthum odoratum	V	3-5
Centaurea nigra	V	5-7
Festuca rubra	V	5-6
Holcus lanatus	V	3-4
Plantago lanceolata	V	3-4
Potentilla erecta	V	3-4
Succisa pratensis	V	3-7
Trifolium repens	V	2
Dactylis glomerata	III	4
Agrostis stolonifera	III	3-4
Lotus corniculatus	III	3-4
Prunella vulgaris	III	3
Senecio jacobea	III	1-3
Calliergonella cuspidata	I	3
Campanula rotundifolia	I	3
Carex caryophyllea	I	3
Conopodium majus	I	3
Rhytidiadelphus squarrosus	I	3
Stachys officinalis	I	3
Cerastium fontanum	I	2
Hypochaeris radicata	I	2
Rubus fruticosus agg.	I	2
Stellaria graminea	I	2
Trifolium pratense	I	2
Alchemilla vulgaris agg.	I	1

A1.4. Field 29

(See Drawing D5).

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland (degraded). (Samples 27-32).

SPECIES NAME	Frequency	Abundance
Deschampsia cespitosa	V	5-8
Sanguisorba officinalis	V	4-7
Potentilla anglica	V	2-4
Angelica sylvestris	IV	2-8
Cirsium arvense	IV	3-5
Galium aparine	IV	3-4
Eurhynchium praelongum	IV	1-3
Rumex acetosa	IV	1-3
Juncus effusus	III	3-5
Festuca rubra	II	3-7
Centaurea nigra	II	3-4
Stellaria graminea	II	3
Cirsium palustre	II	1-3
Epilobium obscurum	II	1-3
Achillea millefolium	II	2
Calliergonella cuspidata	II	1
Rhytidiadelphus squarrosus	I	4
Lotus pedunculatus	I	3
Rubus fruticosus agg.	I	3
Agrostis gigantea	I	2
Dactylis glomerata	I	2
Galium palustre	I	2
Holcus lanatus	I	2
Stachys officinalis	I	2
Lotus corniculatus	I	1

OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

(Samples 9, 10 & 33).

SPECIES NAME	Frequency	Abundance
Epilobium hirsutum	V	3-8
Angelica sylvestris	V	4-6
Lotus pedunculatus	V	3-6
Urtica dioica	V	2-6
Filipendula ulmaria	V	3-5
Juncus inflexus	V	3-4
Juncus effusus	III	6-7
Senecio aquaticus	III	3-4
Holcus lanatus	III	2-3
Lathyrus pratensis	III	2-3
Rumex crispus	III	2-3
Cirsium palustre	III	2
Mentha aquatica	I	4
Alisma plantago-aquatica	I	3
Arrhenatherum elatius	I	3
Cirsium arvense	I	3
Epilobium parviflorum	I	3
Dactylis glomerata	I	2
Galium aparine	I	2
Galium palustre	I	3
Rumex obtusifolius	I	3
Stellaria graminea	I	3

A1.5. Fields 38 & 50

(See Drawing D6).

U2 *Deschampsia flexuosa* grassland

(Samples 43-45).

SPECIES NAME	Frequency	Abundance
Deschampsia flexuosa	V	4-9
Agrostis capillaris	V	3-6
Festuca ovina	III	3-8
Holcus mollis	III	2-6
Rumex acetosella	III	3
Galium saxatile	I	3
Rumex acetosa	I	3
Digitalis purpurea	I	1

MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community.

(Samples 40-42).

SPECIES NAME	Frequency	Abundance
Arrhenatherum elatius	V	8
Festuca rubra	V	4
Rumex acetosa	V	3-4
Urtica dioica	III	5-6
Cirsium arvense	III	2
Rubus fruticosus agg.	I	4
Agrostis gigantea	I	3
Holcus mollis	I	3
Cirsium vulgare	I	2
Galium aparine	I	2
Ranunculus repens	I	2
Achillea millefolium	I	1
Galeopsis tetrahit	I	1
Rumex obtusifolius	I	1
Senecio jacobaea	I	1

A1.6. Field 59

(See Drawing D7).

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland (degraded). (Samples 20-24).

SPECIES NAME	Frequency	Abundance
Festuca rubra	V	4-7
Holcus lanatus	V	3-7
Sanguisorba officinalis	V	4-6
Deschampsia cespitosa	V	3-6
Stellaria graminea	V	3
Dactylis glomerata	IV	3-5
Agrostis gigantea	IV	3-4
Cerastium fontanum	IV	2-3
Rumex acetosa	IV	1-3
Arrhenatherum elatius	III	3-5
Cirsium arvense	III	1-4
Phleum pratense	II	2-5
Carex hirta	I	3
Juncus conglomeratus	I	3
Potentilla anserina	I	3
Senecio jacobaea	I	3
Veronica chamaedrys	I	3
Brachythecium rutabulum	I	2
Plantago lanceolata	I	2
Potentilla anglica	I	2
Ranunculus repens	I	2
Angelica sylvestris	I	1
Fraxinus excelsior seedling	I	1
Taraxacum agg.	I	1

MG1b *Arrhenatherum elatius* grassland, *Urtica dioica* sub-community. (Samples 25-26).

SPECIES NAME	Frequency	Abundance
Arrhenatherum elatius	V	8-9
Cirsium arvense	III	3-5
Rumex acetosa	III	3-4
Rumex obtusifolius	III	3-4
Galium aparine	II	3
Urtica dioica	II	3

A1.7. Fields 60 & 61

(See Drawing D8).

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland (degraded). (Samples 46-48).

SPECIES NAME	Frequency	Abundance
Agrostis capillaris	V	3-5
Dactylis glomerata	V	4-8
Plantago lanceolata	V	3-4
Ranunculus repens	V	3
Rumex acetosa	V	3
Sanguisorba officinalis	V	3-6
Festuca rubra	III	3-4
Holcus lanatus	III	4-5
Taraxacum agg.	III	3
Anthoxanthum odoratum	I	4
Arrhenatherum elatius	I	5
Centaurea nigra	I	2
Cirsium arvense	I	3
Cirsium palustre	I	3
Cynosaurus cristatus	I	3
Galium verum	I	3
Hypochaeris radicata	I	2
Lotus corniculatus	I	3
Stachys officinalis	I	3
Stellaria graminea	I	3
Succisa pratensis	I	3

A1.8. Fields 63, 64 & 65

(See Drawing D9).

MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

(Samples 52-54, 59, 63 & 68).

SPECIES NAME	Frequency	Abundance
Holcus lanatus	V	4-6
Sanguisorba officinalis	V	3-6
Centaurea nigra	V	3-5
Lathyrus pratense	V	2-4
Festuca rubra	V	1-4
Plantago lanceolata	IV	2-6
Ranunculus repens	IV	2-5
Filipendula ulmaria	IV	1-5
Ranunculus acris	IV	2-3
Carex hirta	III	3-6
Phleum pratense	III	3-6
Dactylis glomerata	III	2-5
Agrostis gigantea	III	3-4
Trifolium repens	III	3
Stellaria graminea	III	2-3
Lotus corniculatus	III	1-3
Cynosaurus cristatus	II	2-3
Juncus acutiflorus	II	2-3
Lotus pedunculatus	II	2-3
Rumex conglomeratus	II	2-3
Potentilla anglica	II	1-3
Juncus inflexus	II	4
Lolium perenne	II	4
Agrostis capillaris	II	3
Senecio aquaticus	II	3
Vicia cracca	I	4
Anthoxanthum odoratum	I	2
Rumex acetosa	I	2
Cerastium fontanum	I	1
Cirsium arvense	I	1
Lychnis flos-cuculi	I	1
Rumex crispus	I	1
Trifolium pratense	I	1

MG6a *Lolium perenne – Cynosurus cristatus* grassland, typical sub-community (Samples 49-51, 55-57, 64, 65 & 67).

SPECIES NAME	Frequency	Abundance
Ranunculus repens	V	3-8
Plantago lanceolata	V	2-7
Trifolium repens	V	2-7
Holcus lanatus	V	3-5
Ranunculus acris	V	1-4
Agrostis sp.	IV	2-6
Prunella vulgaris	IV	1-5
Senecio jacobaea	IV	1-3
Lolium perenne	III	2-7
Senecio aquaticus	III	1-5
Plantago major	III	2-3
Filipendula ulmaria	III	1-3
Rumex conglomeratus	II	4-5
Rumex crispus	II	2-5
Carex caryophyllea	II	3-4
Dactylis glomerata	II	2-4
Centaurea nigra	II	1-3
Rumex acetosa	II	1-3
Taraxacum agg.	II	1-2
Trifolium pratense	II	1-2
Carex hirta	I	2-3
Cirsium arvense	I	1-3
Lathyrus pratensis	I	1-2
Potentilla anserina	I	6
Bellis perennis	I	4
Festuca rubra	I	3
Brachythecium rutabulum	I	3
Phleum pratense	I	3
Sagina procumbens	I	3
Juncus articulatus	I	2
Leontodon autumnalis	I	2
Alchemilla vulgaris agg.	I	1
Cerastium fontanum	I	1
Heracleum sphondylium	I	1
Potentilla reptans	I	1

M27c *Filipendula ulmaria – Angelica sylvestris* mire, *Juncus effusus – Holcus lanatus* sub-community.

(Samples 58, 60-62, 66).

SPECIES NAME	Frequency	Abundance
Filipendula ulmaria	V	6-8
Holcus lanatus	V	4-6
Phleum pratense	V	3-5
Carex hirta	V	2-5
Epilobium hirsutum	V	1-2
Festuca rubra	IV	2-3
Ranunculus repens	III	2-5
Juncus inflexus	III	2-3
Rumex conglomeratus	III	3
Carex disticha	II	1-3
Juncus acutiflorus	II	1-3
Juncus effusus	II	1-2
Potentilla anserina	II	3
Persicaria amphibia	II	2
Arrhenatherum elatius	II	1
Sanguisorba officinalis	II	1
Agrostis stolonifera	I	3
Lathyrus pratensis	I	3
Lotus pedunculatus	I	3
Rumex acetosa	I	3
Juncus articulatus	I	2
Trifolium repens	I	2
Agrostis gigantea	I	1
Cerastium fontanum	I	1
Galium palustre	I	1
Ranunculus acris	I	1
Stellaria graminea	I	1

APPENDIX 2. COMMUNITY SPECIES LISTS

A summary of the community species data is provided using the DAFOR scale (see below), which provides an overall estimate of cover and frequency of each plant species.

DAFOR Scale

D – Dominant
A – Abundant
F – Frequent
O – Occasional
R – Rare

L – Locally
CD – Co-dominant

A2.1. MG1b Arrhenatherum elatius *grassland,* Urtica dioica *sub-community*.

(Aggregated data from Fields 31, 38, 50 & 59)

SPECIES NAME	DAFOR
Arrhenatherum elatius	Dominant
Festuca rubra	Abundant
Cirsium arvense	Frequent
Rumex acetosa	Frequent
Rumex obtusifolius	Frequent
Urtica dioica	Frequent
Galium aparine	Occasional
Achillea millefolium	Rare
Agrostis gigantea	Rare
Cirsium vulgare	Rare
Galeopsis tetrahit	Rare
Holcus mollis	Rare
Ranunculus repens	Rare
Rubus fruticosus agg.	Rare
Senecio jacobaea	Rare

APPENDIX 2

A2.2. MG4 *Alopecurus pratensis - Sanguisorba officinalis* grassland.

(Aggregated data from Fields 29, 30, 31, 32, 59, 60, 61, 63, 64, 65).

SPECIES NAME	DAFOR
Festuca rubra	Abundant
Holcus lanatus	Abundant
Rumex acetosa	Abundant
Sanguisorba officinalis	Abundant
Deschampsia cespitosa	Frequent – Locally Abundant
Agrostis capillaris	Frequent
Agrostis gigantea	Frequent
Anthoxanthum odoratum	Frequent
Centaurea nigra	Frequent
Dactylis glomerata	Frequent
Plantago lanceolata	Frequent
Potentilla anglica	Frequent
Ranunculus repens	Frequent
Stellaria graminea	Frequent
Angelica sylvestris	Occasional
Arrhenatherum elatius	Occasional
Brachythecium rutabulum	Occasional
Calliergonella cuspidata	Occasional
Carex hirta	Occasional
Cerastium fontanum	Occasional
Cirsium arvense	Occasional
Cirsium palustre	Occasional
Cynosaurus cristatus	Occasional
Eurhynchium praelongum	Occasional
Filipendula ulmaria	Occasional
Galium aparine	Occasional
Juncus effusus	Occasional
Lathyrus pratensis	Occasional
Lotus corniculatus	Occasional
Lotus pedunculatus	Occasional
Phleum pratense	Occasional
Ranunculus acris	Occasional
Rhytidiadelphus squarrosus	Occasional
Stachys officinalis	Occasional
Succisa pratensis	Occasional
Taraxacum agg.	Occasional
Trifolium repens	Occasional
Achillea millefolium	Rare
Agrostis stolonifera	Rare

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SPECIES NAME	DAFOR
Carex flacca	Rare
Carex ovalis	Rare
Carex viridula subsp. oedocarpa	Rare
Epilobium obscurum	Rare
Fraxinus excelsior seedling	Rare
Galium palustre	Rare
Galium verum	Rare
Hypochaeris radicata	Rare
Juncus acutiflorus	Rare
Juncus articulatus	Rare
Juncus conglomeratus	Rare
Juncus inflexus	Rare
Leontodon autumnalis	Rare
Lolium perenne	Rare
Lychnis flos-cuculi	Rare
Potentilla anserina	Rare
Prunella vulgaris	Rare
Quercus petraea seedling	Rare
Rubus fruticosus agg.	Rare
Rumex conglomeratus	Rare
Rumex crispus	Rare
Senecio aquaticus	Rare
Senecio jacobaea	Rare
Trifolium pratense	Rare
Veronica chamaedrys	Rare
Vicia cracca	Rare

A2.3. MG5c *Cynosurus cristatus – Centaurea nigra* grassland, *Danthonia decumbens* sub-community.

(Field 31).

SPECIES NAME	DAFOR
Agrostis capillaris	Abundant
Anthoxanthum odoratum	Abundant
Centaurea nigra	Abundant
Festuca rubra	Abundant
Holcus lanatus	Frequent
Plantago lanceolata	Frequent
Potentilla erecta	Frequent
Succisa pratensis	Frequent
Trifolium repens	Frequent
Agrostis stolonifera	Occasional
Dactylis glomerata	Occasional
Lotus corniculatus	Occasional
Prunella vulgaris	Occasional
Senecio jacobea	Occasional
Alchemilla vulgaris agg.	Rare
Calliergonella cuspidata	Rare
Campanula rotundifolia	Rare
Carex caryophyllea	Rare
Cerastium fontanum	Rare
Conopodium majus	Rare
Hypochaeris radicata	Rare
Rhytidiadelphus squarrosus	Rare
Rubus fruticosus agg.	Rare
Stachys officinalis	Rare
Stellaria graminea	Rare
Trifolium pratense	Rare

A2.4. MG6a *Lolium perenne – Cynosurus cristatus* grassland, typical sub-community.

(Aggregated data from Fields 63, 64 & 65).

SPECIES NAME	DAFOR
Agrostis sp.	Abundant
Holcus lanatus	Abundant
Plantago lanceolata	Abundant
Prunella vulgaris	Abundant
Ranunculus acris	Abundant
Ranunculus repens	Abundant
Senecio jacobaea	Abundant
Trifolium repens	Abundant
Filipendula ulmaria	Frequent
Lolium perenne	Frequent
Plantago major	Frequent
Senecio aquaticus	Frequent
Carex caryophyllea	Occasional
Centaurea nigra	Occasional
Dactylis glomerata	Occasional
Rumex acetosa	Occasional
Rumex conglomeratus	Occasional
Rumex crispus	Occasional
Taraxacum agg.	Occasional
Trifolium pratense	Occasional
Alchemilla vulgaris agg.	Rare
Bellis perennis	Rare
Brachythecium rutabulum	Rare
Carex hirta	Rare
Cerastium fontanum	Rare
Cirsium arvense	Rare
Festuca rubra	Rare
Heracleum sphondylium	Rare
Juncus articulatus	Rare
Lathyrus pratensis	Rare
Leontodon autumnalis	Rare
Phleum pratense	Rare
Potentilla anserina	Rare
Potentilla reptans	Rare
Sagina procumbens	Rare

A2.5. MG9 *Holcus lanatus – Deschampsia cespitosa* grassland.

(Aggregated data from Fields 30 & 32).

SPECIES NAME	DAFOR
Deschampsia cespitosa	Co-Dominant
Juncus effusus	Co-Dominant
Anthoxanthum odoratum	Abundant
Festuca rubra	Abundant
Holcus lanatus	Abundant
Potentilla erecta	Abundant
Rumex acetosa	Abundant
Agrostis capillaris	Frequent
Agrostis gigantea	Frequent
Agrostis stolonifera	Occasional
Cirsium palustre	Occasional
Galium palustre	Occasional
Juncus acutiflorus	Occasional
Lotus corniculatus	Occasional
Rhytidiadelphus squarrosus	Occasional
Stellaria graminea	Occasional
Brachythecium rutabulum	Rare
Calliergonella cuspidata	Rare
Cardamine pratensis	Rare
Carex viridula subsp. *oedocarpa*	Rare
Conopodium majus	Rare
Dactylis glomerata	Rare
Epilobium obscurum	Rare
Eurhynchium praelongum	Rare
Holcus mollis	Rare
Juncus conglomeratus	Rare
Lotus pedunculatus	Rare
Myosotis laxa	Rare
Plantago lanceolata	Rare
Poa pratensis	Rare
Potentilla anserina	Rare
Ranunculus acris	Rare
Ranunculus repens	Rare
Sanguisorba officinalis	Rare
Senecio aquaticus	Rare
Stellaria alsine	Rare
Succisa pratensis	Rare

APPENDIX 2

A2.6. MG10 *Holcus lanatus – Juncus effusus* rush pasture.

(Field 30).

SPECIES NAME	DAFOR
Holcus lanatus	Dominant
Juncus effusus	Abundant
Rumex obtusifolius	Abundant
Holcus mollis	Frequent
Ranunculus repens	Frequent
Urtica dioica	Frequent
Agrostis gigantea	Occasional
Rumex acetosa	Occasional
Stellaria graminea	Occasional
Alopecurus pratense	Rare

A2.7. U2 *Deschampsia flexuosa* grassland.

(Fields38 & 50).

SPECIES NAME	DAFOR
Deschampsia flexuosa	Dominant
Agrostis capillaris	Abundant
Festuca ovina	Abundant
Holcus mollis	Abundant
Rumex acetosella	Frequent
Galium saxatile	Occasional
Rumex acetosa	Occasional
Digitalis purpurea	Rare

A2.8. M27c *Filipendula ulmaria – Angelica sylvestris* mire, *Juncus effusus – Holcus lanatus* sub-community.

(Aggregated data from Fields 63, 64, 65).

SPECIES NAME	DAFOR
Filipendula ulmaria	Dominant
Holcus lanatus	Abundant
Phleum pratense	Abundant
Carex hirta	Abundant
Epilobium hirsutum	Frequent
Festuca rubra	Frequent
Ranunculus repens	Frequent
Juncus inflexus	Occasional
Rumex conglomeratus	Occasional
Carex disticha	Occasional
Juncus acutiflorus	Occasional
Juncus effusus	Occasional
Potentilla anserina	Occasional
Persicaria amphibia	Occasional
Arrhenatherum elatius	Occasional
Sanguisorba officinalis	Occasional
Agrostis stolonifera	Rare
Lathyrus pratensis	Rare
Lotus pedunculatus	Rare
Rumex acetosa	Rare
Juncus articulatus	Rare
Trifolium repens	Rare
Agrostis gigantea	Rare
Cerastium fontanum	Rare
Galium palustre	Rare
Ranunculus acris	Rare
Stellaria graminea	Rare

APPENDIX 2

A2.9. OV26c *Epilobium hirsutum* community, *Filipendula ulmaria – Angelica sylvestris* sub-community.

(Aggregated data from Fields 29 & 30).

SPECIES NAME	DAFOR
Angelica sylvestris	Abundant
Epilobium hirsutum	Abundant
Filipendula ulmaria	Abundant
Juncus effusus	Abundant
Lotus pedunculatus	Abundant
Urtica dioica	Abundant
Juncus inflexus	Frequent
Senecio aquaticus	Frequent
Cirsium palustre	Occasional
Holcus lanatus	Occasional
Lathyrus pratensis	Occasional
Rumex crispus	Occasional
Alisma plantago-aquatica	Rare
Arrhenatherum elatius	Rare
Cirsium arvense	Rare
Dactylis glomerata	Rare
Epilobium parviflorum	Rare
Galium aparine	Rare
Galium palustre	Rare
Mentha aquatica	Rare
Rumex obtusifolius	Rare
Stellaria graminea	Rare

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