

ROYAL ORDNANCE, BISHOPTON

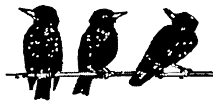


OUTLINE PLANNING APPLICATION FOR THE REGENERATION
OF THE SITE TO FORM A MIXED USE COMMUNITY GROWTH AREA

APPENDICES TO THE ENVIRONMENTAL STATEMENT

APPENDIX 14.10
ECOLOGICAL SURVEY
(INCLUDING LICHEN DETERMINATION) (2005)

May 2006



Starling Learning



ROYAL ORDNANCE BISHOPTON FACTORY

Ecological Survey

Report Prepared for Cass Associates



Liz Parsons
Starling Learning
December 2005

ROYAL ORDNANCE BISHOPTON FACTORY

1. Introduction

1.1 Starling Learning, an ecological survey agency, was commissioned by Cass Associates to carry out some ecological survey work within the Bishopton Royal Ordnance Factory site. The work commenced in autumn 2005.

1.2 Keith Watson carried out botanical and habitat survey work. Ornithological survey work was undertaken by Liz Parsons, Joe Greenlees and James Manners. The mammal survey was co-ordinated by Joe Greenlees assisted by Liz Parsons and James Manners as was the amphibian and reptile survey work. David Mellor carried out the butterfly survey and the majority of the invertebrate survey. The fish survey was contracted to the *Clyde River Foundation*. The results of this survey are contained within a separate report.

1.3 Table 1. below outlines the scope of the survey work carried out during this survey.

Habitats
Update Phase 1 Habitat Surveys for the site and the buffer zone
Identify Habitat Types followed by Phase 2 Habitat Survey in selected areas of each habitat type Site Only
Select representative compartments from the Phase 2 Habitat Survey and sample plant species to compile a characteristic plant list. Site Only
Watercourses/Waterbodies
River Habitat Survey of the Dargavel Burn, and other site watercourses Site plus 500m up and downstream outside the site if access is possible
Pond Habitat update including preliminary invertebrates and flora Site Only
Birds
Habitat assessment for birds giving an idea of bird populations likely to use the site To include a look at a selection of buildings for Barn Owl and also for Swallow nests
Autumn and Winter bird survey Site and appropriate areas of the buffer zone This will include a study of the corvid roost, monitoring of wildfowl on ponds and monitoring of the adjacent fields for geese and for Whooper Swans
Collection of records form Scottish Ornithologists Club, Clyde Branch
Mammals
Badgers – check the northern part of the site for new badger activity Continue to monitor existing setts
Badgers – <i>survey of the buffer zone followed by baitmarking if necessary</i>
Water Voles – Survey to be re-done including 600m up and downstream of the watercourses

entering the site.
Otters – Survey to be re-done including 500m within appropriate areas of the buffer zone
Other Small Mammals – survey including trapping in selected sample areas. Liaison with SNH as regards species to be included in the survey. Site only with habitat assessment of the buffer zone
Amphibians and Reptiles
Use of scoping data for the Dec EIA Site only
Use existing data and results of scoping to give a preliminary assessment of reptile interest for the 1 st Issue EIA
<i>Reptile Survey of areas based on scoping data, particularly from Formakin Estate</i> <i>Site only</i>
Survey of site for amphibians and reptiles during other survey work.
Butterflies
<i>Full survey required in selected characteristic compartments</i> <i>Site only</i>
Invertebrates
<i>Surveys required in representative areas, and would include aquatic invertebrates in ponds and burns. Needs consultation with SNH with regard to priority groups or species</i> <i>Site only.</i>
Fungi
Sampling undertaken in selected compartments to identify a characteristic list Site Only
Bryophytes
Sampling undertaken in selected compartments or areas to identify a characteristic list Site Only
Lichens
Gathering of lichens to be passed on to Albert Henderson via Cass Associates

1.4 Timings of survey

September 2005	Butterflies Other invertebrates Bird assessment Start mammals Start fish survey Start habitat and bryophytes
October	Continue fish survey

Continue mammals
Continue invertebrates
Continue habitat survey
Fungi survey
Start winter bird survey

November

Continue winter bird survey

December

Continue winter bird survey

2. Habitats and Botany

2.1 Introduction

The following text is based on recent site visits but also draws on previous survey visits by the author in 1996 and 1999. The former visit focused on the southern area, whereas the latter visited much of the remaining area (except much of the then active northwest). A Phase 1 habitat map of the site was produced based on the field visits and helped by use of aerial photographs. The current survey has revisited most of the area with more attention directed on the previously unvisited areas.

The complex layout of the site and its complicated history, linked to evolving and secondary nature of the vegetation, have created an extremely intricate and complicated habitat mosaic, which is difficult to map and code accurately. However it is considered that the 1999 habitat maps (and associate target notes) represents a good description of the habitats found at the site.

The survey also looked at the botanical interest of the site. Species lists have been produced for higher plants, bryophytes (mosses and liverworts), lichens and fungi. The seasonality of the visits (the most recent in autumn, earlier ones in February and April) have allowed for a good inspection although prime summer time (May to September) has been missed, so this will mean for some groups (of higher plants) some species will have been missed or under-recorded.

A summary of the general range of habitats is provided below with more local details in the extensive target notes. The target notes are made up from a mix of current site visit notes or older target notes, updated where possible.

2.2 Habitat Summary

Woodlands

Woodlands are well represented at the site and cover quite large areas, however virtually all of the cover is either from secondary scrub woodland or conifer plantation blocks. The woodlands have developed (or been planted) at various stages in the site's history, with the mature secondary woodland being better represented in the south and locally to the west.

There are a few areas of mature woodland: notably about Dargarvel House (various policy types), locally along the Dargarvel Burn (alder and willows), small hill near Reilly Quarry and nearby rocky outcrop (oak, ash, hazel) and occasional block to the extreme south (oak and birch); additionally there are scattered mature individuals or lines presumably relating to former field boundaries or avenue plantings.

Conifer Plantation

Most of the conifer plantations are dominated by larch with locally spruce. The Scot's pine on the peaty soils are also presumably planted but are noted below. The conifer blocks usually have some broad leaved trees present (young invasives) such as sycamore, birch, willow, elder, beech and rarely holly or rowan. The ground flora is generally very limited due to shade although there can be areas of higher diversity where open (often from windthrow); typical species are nettle (*Urtica dioica*), broad buckler fern (*Dryopteris dilatata*), blackberry (*Rubus fruticosus*), various short grasses (e.g. *Agrostis capillaris*, *Holcus* spp.) and bryophytes (e.g. *Eurhynchium praelongum*, *Hypnum cupressiforme*, *Thuidium tamariscinum*, *Lophocolea bidentata*, *Dicranum scoparium* and *Plagiothecium undulatum*

Secondary Woodland

Birches (*Betula pendula*, *B. pubescens* and intermediates) are the main pioneer canopy formers comprising much of the woodlands in the south and west, although there are areas with willow (*Salix caprea* – or *S. cinerea* where damper) and elder (*Sambucus nigra*); the latter now appears to be suppressed compared with earlier visits. Sycamore (*Acer pseudoplatanus*) is also quite a common associate (and likely to become more so) occurring as young invasives but also often found as resprouting multi-trunked individuals.

The ground flora varies but in general there appear to be few true woodland colonists (or ancient indicators). There are various, usually short, grasses (*Agrostis capillaris*, *Holcus* spp.) present, and tufted hair-grass (*Deschampsia cespitosa*) where damp, plus nettle (*Urtica dioica*), broad buckler fern (*Dryopteris dilatata*), male fern (*Dryopteris filix-mas*), local bracken (*Pteridium aquilinum*), blackberry (*Rubus fruticosus*), rosebay willowherb (*Chamerion angustifolium*), wild strawberry (*Fragaria vesca*) and usually diverse mosses (*Eurhynchium praelongum*, *Brachythecium rutabulum*, *Thuidium tamariscinum*, *Lophocolea bidentata*, *Polytrichum commune*, *Atrichum undulatum*, *Mnium hornum* and *Rhynchostegium squarrosus*). The flora indicates neutral soil types with some nutrient enrichment.

A couple of areas of young birch on fly ash have been noted for their well developed lichen 'heath' ground cover, notably for shrubby *Cladonia* spp, and *Racomitrium lanuginosum*, vegetation more typically associated with upland areas (see target notes NS4268.5 and NS4468.10).

Birch – Pine wood

This woodland occurs on the relic deep peat to the southeast (and also on the adjacent Barochan Moss) and is characterised by often mature Scots pine (*Pinus sylvestris*) and birch (*Betula pubescens*) with few others; the ground cover includes broad buckler fern (*Dryopteris dilatata*), bracken (*Pteridium aquilinum*), wavy-hair grass (*Deschampsia flexuosa*), wood sorrel (*Oxalis acetosella*), heath bedstraw (*Galium saxatile*) and various bryophytes (*Hypnum cupressiforme*, *Dicranum scoparium*, *Mnium hornum*, *Eurhynchium praelongum*, *Plagiothecium undulatum*, *Lophocolea bidentata* and *Polytrichum commune* – but very rarely any *Sphagnum*). Open peat (mire) vegetation is absent in the core site, but the peat is linked to that of adjacent mosses at Barochan and East Fulwood.

Burnside Woodland

The usually narrow woodland fringe to the burn is worthy of note. In the extreme west – and locally elsewhere - there are several mature trees (ash, alder, sycamore) and a ground flora (usually very narrow) typical of valley (ash-elm) woodlands (e.g. with *Mercurialis perennis*, *Silene dioica*, *Hyacinthoides non-scripta*, *Stellaria holostea* etc.). Throughout much of the western half of the burn the canopy cover is provided by alder (*Alnus glutinosus*) and some willows (*Salix* spp.) with the ground cover typically including nettle (*Urtica dioica*), tufted hair-grass (*Deschampsia cespitosa*), red campion (*Silene dioica*), wood stitchwort (*Stellaria nemorum*), ground-ivy (*Glechoma hederacea*), herb-robert (*Geranium robertianum*), northern bittercress (*Cardamine amara*), avens (*Geum* spp.), lesser celandine (*Ranunculus ficaria*), marsh marigold (*Caltha palustris*), meadowsweet (*Filipendula ulmaria*), germander speedwell (*Veronica chamaedrys*), opposite-leaved golden saxifrage (*Chrysosplenium oppositifolium*), nipplewort (*Lapsana communis*), hedge woundwort (*Stachys sylvatica*), occasionally Skunk-cabbage (*Lysichiton americanus*), plus often diverse ferns, mosses and liverworts.

Other woodlands

The relic woodlands on the hill adjacent to Reilly Quarry and the ridge near the burn at Boghall, have indicators of ancient woodland (oak, ash, hazel, rowan, birch, hawthorn – some old) with frequent bluebell (*Hyacinthoides non-scripta*), greater stitchwort (*Stellaria holostea*), dog's-

mercury (*Mercurialis perennis*), wood sorrel (*Oxalis acetosella*), honeysuckle (*Lonicera periclymenum*), ferns (including bracken stands) and bryophytes.

There is also an area of immature oak with birch, sycamore and beech in the extreme southeast but the ground flora does not include any ancient woodland indicators (see target notes).

Grasslands

Open grasslands represent the largest habitat on the site, although scrub and tall herbs are often present, presumably increasingly so. The grasslands vary in composition but this seems to reflect mainly time and lack of management and to a certain extent ground conditions. Virtually all the grassland can be classed as neutral and variations range from short stressed areas to coarse or rank grasslands, with other variants reflecting poor drainage.

The earlier surveys describe areas of short grassland that were cut (or formerly cut) especially in the northern half of the site. It is apparent that after a further six years or more that with the cessation of cutting regimes, the grasslands have become much coarser and dominated by a few usually tall grasses with few herbs.

Short Grasslands

These are typified by low growing grasses: common bent (*Agrostis capillaris*), red fescue (*Festuca rubra*) and Yorkshire fog (*Holcus lanatus*) with herbs such as sorrel (*Rumex acetosa*), ribwort plantain (*Plantago lanceolata*), buttercups (*Ranunculus* spp.), clovers (*Trifolium* spp.), field woodrush (*Luzula campestris*), ragwort (*Senecio jacobaea*), bird's-foot trefoil (*Lotus corniculatus*), yarrow (*Achillea millefolium*), mouse-ear (*Cerastium fontanum*), meadow vetchling (*Lathyrus pratensis*), knapweed (*Centaurea nigra*) and the moss *Rhytidiadelphus squarrosus*. These areas now appear to be rare or restricted (e.g. track edges)

Areas of more stressed grassland (and see ephemeral below) support various elements of the short grassland (and readily intergrade) but are characterised by red fescue (*Festuca rubra*), ox-eye (*Leucanthemum vulgare*), clovers (*Trifolium* spp.), St John's-wort (*Hypericum perforatum*), eyebright (*Euphrasia officinalis* agg.), fairy flax (*Linum catharticum*), mouse-ear hawkweed (*Pilosella officinalis*), pearlwort (*Sagina procumbens*), self-heal (*Prunella vulgaris*) and various other more casual herbs and mosses. These are still to be found along the numerous trackbeds and roadsides or other hard surfaces and gravels now partially colonised.

Acid grassland is virtually absent from the site apart from a few areas of bent-fescue grasslands (classed as acidic) which share some species of the short grassland but typically include sheep's fescue (*Festuca ovina*), sweet vernal-grass (*Anthoxanthum odoratum*), tormentil (*Potentilla erecta*), heath bedstraw (*Galium saxatile*) and mosses such as *Pleurozium schreberii*. The main area is associated with the small hill adjacent to Reilly Quarry and other pockets at glades in the conifer plantations.

Coarse / Rank Grassland

Coarse or rank grasslands are characterised by the domination by a small number of tall growing grasses: false oat-grass (*Arrhenatherum elatius*), cock's-foot (*Dactylis glomerata*), couch grass (*Elymus repens*), with shorter common bent (*Agrostis capillaris*), creeping soft-grass (*Holcus mollis*) and Yorkshire fog (*Holcus lanatus*); where wetter tufted hair-grass (*Deschampsia cespitosa*) tends to dominate. Herbs are usually scarce with the exception of creeping thistle (*Cirsium arvense*) and more local nettle (*Urtica dioica*), docken (*Rumex* spp.) or vetches (e.g. *Vicia cracca*). The low diversity grassland is now common at the open ground between the bunkers and buildings throughout the north and south-central area.

Tufted hair-grass (*Deschampsia cespitosa*) occurs in several areas generally reflecting poor drainage or frequent inundation – notably near to the burn but also at several other areas in the south. Associates are often few with Yorkshire fog (*Holcus lanatus*), sorrel (*Rumex acetosa*), creeping buttercup (*Ranunculus repens*), marsh thistle (*Cirsium palustre*), sneezewort (*Achillea ptarmica*), hairy sedge (*Carex hirta*), silverweed (*Potentilla anserina*), tufted vetch (*Vicia cracca*) and meadow vetchling (*Lathyrus pratensis*).

Marshy grassland

Local depressions in the extensive grasslands support marshy species typically marked by the presence of soft-rush (*Juncus effusus*); associates include tufted hair-grass (*Deschampsia cespitosa*), curled dock (*Rumex crispus*), angelica (*Angelica sylvestris*), short-fruited willowherb (*Epilobium obscurum*), cuckooflower (*Cardamine pratensis*), marsh thistle (*Cirsium palustre*), sharp-flowered rush (*Juncus acutiflorus*), articulate rush (*J. articulatus*) and a few mosses, notably *Calliergon cuspidatum*.

Swamp

There are only a few locations of more permanently wet ground where the swamp code has been used, although there are a few broad areas along the burnside, particularly to the south and east of the site, and also as a narrow fringe to the lagoons. Reed canary-grass (*Phalaris arundinacea*) is the commonest swamp species with local reedmace (*Typha latifolia*), Spike-rush (*Eleocharis palustris*) and bur-reed (*Sparganium erectum*) plus common reed (*Phragmites communis*) along tidal reaches of burn in the southeast.

The *Phalaris* swamp along the (open) burn margins appears to have limited associates but often found are nettle (*Urtica dioica*), thistle (*Cirsium arvense*), marsh woundwort (*Stachys palustre*), common comfrey (*Symphytum officinale*) and meadowsweet (*Filipendula ulmaria*).

Open Water

There are only a few areas of open water. The lagoons are the largest areas but botanical interest of the open water was not apparent; the emergent fringe is also very narrow or non-existent. A few other areas of open water are associated with old tanks or flooded hollows of buildings and species records include broad-leaved pondweed (*Potamogeton natans*), small pondweed (*P. berchtoldii*), star-wort (*Callitriche stagnalis*), spike-rush (*Eleocharis palustris*), bur-reed (*Sparganium erectum*) and water plantain (*Alisma plantago-aquatica*).

Tall Herbs

Areas dominated by tall herbs are quite frequent in the long abandoned grassland areas, usually associated with the slopes of silos or bunkers. Typical stands include rosebay willowherb (*Chamerion angustifolium*), creeping thistle (*Cirsium arvense*), nettle (*Urtica dioica*), blackberry (*Rubus fruticosus*), raspberry (*Rubus idaeus*), local comfrey (*Symphytum officinalis*) and rarely foxglove (*Digitalis purpurea*) and Japanese knotweed (*Fallopia japonica*).

Ephemerals

The open waste ground along numerous tracksides and about building or store bases, are important areas increasing the botanical diversity. The shallow substrate, some are base or lime rich, often lack of water and are stressful habitats which encourage specialist plants. Species include clovers (*Trifolium* spp.), St John's-wort (*Hypericum perforatum*), eyebright (*Euphrasia officinalis* agg.), fairy flax (*Linum catharticum*), pearlwort (*Sagina procumbens* and *S. apetala*), common century (*Centaureum erythraea*), viper's bugloss (*Echium vulgare*), mulleins (*Verbascum* spp.), pale toadflax (*Linaria repens*), pepperwort (*Lepidium heterophyllum*), parsley piert (*Aphanes* spp.) and as noted elsewhere bryophytes can be very well represented but only a few lichens are to be found.

2.3 Botanical Notes

Flowering Plants

In total 303 species of flowering plants and ferns have been recorded from the site (based on the current survey and including many records from the previous visits). The grasses and trees that cover most of the ground at the site are discussed above, as were some of the ephemeral species of open waste ground. Species of conservation interest include:

Woodland species found along the burn (including Dargarvel House) and at other woodland relic areas, including typical 'old woodland' species such as bluebell (*Hyacinthoides non-scripta*), dog's-mercury (*Mercurialis perennis*) and ramson's (*Allium ursinum*) plus wood stitchwort (*Stellaria nemorum*), primrose (*Primula vulgaris*), wood speedwell (*Veronica montana*), lords-and-ladies (*Arum maculatum*), moschatel (*Adoxa moschatellina*), giant bellflower (*Campanula latifolia*) and alternate-leaved golden saxifrage (*Chrysosplenium alternifolium*).

Grassland species or ephemerals of open ground (some aliens) which are locally uncommon include: fairy flax (*Linum catharticum*), common century (*Centaurium erythraea*), viper's bugloss (*Echium vulgare*), mulleins (*Verbascum* spp.), pale toadflax (*Linaria repens*), Smith's pepperwort (*Lepidium heterophyllum*), parsley piert (*Aphanes* spp.), bronzy willowherb (*Epilobium komarovianum*), spiked sedge (*Carex spicata*), trailing tormentil (*Potentilla anglica*) and trailing St John's-wort (*Hypericum humifusum*).

Other interesting finds include slender tufted-sedge (*Carex acuta*) in a small wetland in the south-east.

Ferns are well represented at the site and most of the commoner species have been noted. Maidenhair spleenwort (*Asplenium trichomanes*), hart's-tongue (*Phyllitis scolopendrium*) and polypody (*Polypodium vulgare*) have colonised a few buildings, the first two favouring mortar. Of local note is the population of northern buckler fern (*Dryopteris carthusiana*) in a marshy area to the north. The calcifuge hard fern (*Blechnum spicant*) is rare at the site, reflecting the lack of acidic soils. There is also an unlocalised older record for brittle bladder fern (*Cystopteris fragilis*).

Bryophytes

In total 112 species of mosses (91) and liverworts (21) have been recorded at the site. They are most conspicuous along gravely track edges or similar waste ground, but can be a feature of woody growth where not too shaded. They can be classified into several types:

Epiphytes on mature trees or old elder shrubs: these include various common species (e.g. *Dicranoweisia cirrhata*, *Orthotrichum affine*, *Brachythecium rutabulum*, *Ulota crispa*, *Amblystegium serpens*, *Hypnum mammilatum* and *Metzgeria* spp.) but also a few less well recorded species such as *Cryphaea heteromalla*, *Orthotrichum pulchellum*, *O. diaphanum*, *Zygodon viridissimus*, *Z. conoideus* and *Ulota phyllantha*.

Stumps and litter in older woods and plantations: more acidic elements occur such as *Dicranum scoparium*, *Plagiothecium undulatum*, *Dicranella heteromalla*, *Orthodontium lineare*, *Mnium hornum*, *Campllyopus pyriformis*, *Hypnum cupressoforme*, *Racomitrium loreus*, *Tetraphis pellucida*, *Polytrichum formosum*, *Pleurozium schreberii*, *Lophocolea bidentata* and *Lepidozia reptans*.

Shaded woodland outcrops or burnside banks: with woodland elements including *Thamnobryum alopecurum*, *Isothecium myosuroides*, *Eurhynchium praelongum*, *Amblystegium tenax*, *Fissidens* spp., *Plagiomnium undulatum*, *Plagiothecium nemorale*, *Heterocladium heteropterum*, *Plagiochila porelloides*, *Porella cordeana* and *Diplophyllum albicans*.

Waste ground fine gravels and ash: numerous species found here including several under-recorded species such as *Barbula recurvirostra*, *Dicranella varia*, *Pohlia annotina*, *P. wahlenbergii*, *Racomitrium canescens* var. *ericoides*, *R. lanuginosum* and *Tortula ruralis*, plus the liverworts *Blasia pusilla*, *Fossombronia wondraczekii*, *Cephaloziella divaricata*, *Scapania irrigua* and *Jungermannia gracillima*.

Concrete and mortar of walls support typical species such as *Grimmia pulvinata*, *Tortula muralis*, *Schistidium* spp., *Orthotrichum anomalum* and *Homalothecium sericans*.

Lichens

Lichens in general are not highly visible at the site, except for on some open trees or shrubs, especially near to water. However closer inspection of old stonework – especially where concrete or mortar and of woody growth reveals a fairly promising diversity. In total 62 species of lichens have been recorded from the site; some names have been expertly verified but others are tentative.

Old trees usually associated with Dargarvel House and approach roads, but also along local burn-sides and near old farm buildings can support varied lichens growths. Some trees are acidic (e.g. oaks) while others such as sycamore or ash are more basic. Species include *Lepraria incana*, *Lecanora* spp., *Porina aenea*, *Lecidella elaeoachroma*, *Candeleriella reflexa*, *Physcia* spp., *Parmelia* spp., and *Pertusaria pertusa*.

Epiphytes on scrub or trees branches are scattered throughout site, but often well represented to the edge of burns or lagoons (especially on old willows), where more foliose types are found, species include: *Arthonia radiata*, *Ramalina farinacea*, *R. fastigiata*, *Usnea subfloridana*, *Evernia prunastrii*, *Hypogymnia* spp., *Platismatia glauca*, *Physcia* spp., *Parmelia* spp., and *Xanthoria* spp.

Mortar and concrete of old buildings attract a characteristic flora of calcicoles e.g. *Lecanora* spp., *Caloplaca* spp., *Collema crispa*, *Physcia dubium* and *Phaeophyscia orbicularis*.

Old stonework, mainly about Dargarvel House and old bridges, support mainly crustose species (but not well sampled) e.g. *Ochrolechia androgyne*, *Acarospora fuscata*, *Lecidea lithophylla*, *Lecidella scabra*, *Lecanora intricate* and *Porpidia tuberculata*.

Open gravels of track sides or wasteground areas occasionally support cup or branched lichens (*Cladonia* spp.) and dog-lichens (*Peltigera* spp.); the local lichen 'heath' areas, with various *Cladonia* species are noted in target notes.

Fungi

The fungal flora of the site has only been tentatively explored during the current survey and expert determinations are lacking; however despite a few queried names a reasonable list, totalling 63 species, has been recorded, but no doubt there are many more to be recorded (e.g. *Russula*, *Hygrocybe* and *Cortinarius* species). Fungi though were not commonly seen during the survey visits of early and late October and often they had to be searched for. A few areas were productive such as the amenity grasslands near the entrance to the site where various *Hygrocybe* spp. were seen, plus *Inocybe rimosa*, *Hygrophoropsis aurantiaca*, *Geoglossum cookeianum* and *Clavulina cristata*. Other grassland areas appear to be too coarse to reveal fungi although some areas where short grazed by rabbits supported a few species e.g. *Hygrocybe* spp. (including *H. pratensis*), *Entoloma porphyrophaeum* and *Cystoderma amianthinum*.

More fungi were found associated with woodland areas (on ground or epiphytes). The birch woodland were not very productive but records include *Scleroderma citrinum*, *Lycoperdon perlatum*, *Paxillus involuta*, *Piptoporus betulinus*, *Laccaria laccata*, *Pluteus cervicornus*, *Polyporus varius*, *Xylaria hypoxylon*, *Russula ochroleuca*, *Amanita* spp. and *Lactarius* spp. Conifer plantations supported similar species although notable at time of survey were *Tricholoma saponacea* and various *Mycena* spp. Locally mature frondose trees (e.g. about Dargarvel House and avenues) supported small corticolous *Mycenas* such as *M. pseudocorticola*, *M. olida* and *M. hiemalis*.

2.4 Target Notes

The following target notes combine the earlier survey comments (amalgamated for the 1999 report) and the modern survey. Some of the earlier target notes have been updated following the recent visit. The target notes are laid out in the normal Phase 1 style of bottom left to right of ascending grid squares, with grid references helping to aid location (shown on Target Notes map).

NS4169

1 416699 Extensive area of rough grassland (some short grazed) and local tall herbs with scattered scrub, the latter (with *Rubus* and tall herbs) becoming dense to old mounds, creating a good habitat mosaic. An old hedgerow strip is of note for relic woodland associates including patches of *Primula vulgaris*, *Mercurialis perennis* and *Viola riviniana*; also to east is a poorly draining area (but not really marshy) with *Filipendula ulmaria*, *Urtica dioica*, tussocky *Carex remota*, *Juncus conglomeratus*, *Cirsium palustre* and *Phalaris arundinacea*.

2 416699 Drain with marginal alders (linking to Dargarvel Burn) over *Caltha palustris*, *Carex remota*, *Filipendula ulmaria*, *Athyrium filix-femina*, *Mentha aquatica*, *Valeriana officinalis* etc.; much adjacent scrub (some tall herb stands) and new conifer blocks about old mounds, all generally difficult to map and orientate.

3 417697 Perimeter road lined by well developed secondary scrub of willow and birch (plus ash, elder sycamore) over *Urtica dioica*, *Rubus idaeus*, *Fragaria vesca*, *Geum urbanum*, grasses, ferns and mosses; birch with bracken occurs to the east. Several broad areas of open waste ground occur supporting varied ephemeral flora (locally large stands of *Verbascum thapsus* and *Echium vulgare*) and some populations of *Epilobium komarizantum*.

4 417699 Disturbed ground between bunkers or tanks although these can support some lush grass, tall herb or scrub (and various stages in between). Lush grass extends to deep drain (south to fence) where increased tall herb (*Rubus* spp., *Urtica dioica* etc. plus some *Filipendula ulmaria* and *Valeriana officinalis*) and some scrub.

5 418696 Secondary scrub about old tracks and buildings supporting much birch and willow over various grasses, *Geum urbanum*, *Fragaria vesca*, *Epilobium montanum*, *Chamerion angustifolium*, *Rubus fruticosus*, *Dryopteris filix-mas*, *Urtica dioica* and frequent mosses.

NS4170

1 411704 Small ridge to the south of the burn (with new planting) but some old hawthorn hedges, scrubby regrowth (including ash, sycamore and blackthorn) plus steep embankments supporting abundant bluebell (under older sycamore). Below (to south) is an old dam with developing wet woodland in depression but surrounded by mature trees (ash, alder and sycamore) and scrubby regeneration – some blackthorn, hawthorn and elder. The ground cover appears diverse with *Silene dioica*, *Geum urbanum*, *Veronica montana*, *Chrysosplenium oppositifolium* and *Allium ursinum*.

- 2 412702 Boghall dump area with large areas of short grazed grassland and patches of taller herbs (*Cirsium arvense*, *Urtica dioica*, *Rumex obtusifolius* etc.) and some scrub.
- 3 412704 Wooded burn with some mature ash, sycamore and alder over a good but narrow woodland ground flora fringe: *Mercurialis perennis*, *Silene dioica*, *Stellaria nemorum*, *S. holostea*, *Glechoma hederacea*, *Chrysosplenium oppositifolium*, *Geranium robertianum*, *Geum urbanum* and ferns; bryophytes are well represented and include *Porella cordeana*, *Eurhynchium* spp., *Isothecium myosuroides*, *Rhynchostegium riparioides*, *Thamnobryum alopecuroides*, *Plagiochila porelloides*, *Pogonatum aloides* and *Atrichum undulatum*. The burn channel is open to the boundary fence and supports large stands of *Ranunculus 'aquatilis'* plus *Cardamine amara* and *Oenanthe crocata*.
- 4 413705 Boundary ridge with neutral grassland recently planted with broad-leaves.
- 5 414700 Hill and gentle slope to south supporting generally coarse grass – much *Arrhenatherum elatius* but some herb diversity (*Veronica chamaedrys*, *Viola riviniana*, *Centaurea nigra*, *Rumex acetosa*, *Silene dioica* - some bluebell more so above towards the crest) but generally of low frequency. Scattered scrub now becoming dense (mostly hawthorn - rare oak and planted conifers - plantation like to the south).
- 6 414701 Long band of rock outcrop or embankment to north side of hill generally supporting much scrub (much blackthorn) but also some old ash, plus oak, rowan and hazel (especially to east where ground cover includes abundant bluebell plus *Silene dioica*, *Mercurialis perennis*, *Oxalis acetosella*, ferns and bryophytes (e.g. *Porella cordeana*, *Plagiothecium nemorale*, *Isothecium myosuroides*) – extending below and down towards burn; rock outcrops with much *Polypodium vulgare*, *Deschampsia flexuosa* (and other grasses), *Digitalis purpurea*, *Lonicera periclymenum*, *Corydalis claviculata* and diverse bryophytes. Diverse grassland extends to the hillcrest (where much scrub and some new planting) but also with some *Hyacinthoides non-scripta* and *Stellaria holostea* etc. still present
- 7 414702 Burn lined by alders (and extending a long way from it locally), mostly young growth but multiple-based, with some ash, sycamore (mature to west) and hawthorn. The burn canalised with stonework to sides (and old weir) but locally more semi-natural, and generally supporting a diverse woodland flora to the sides (although some disturbed areas). Ground flora very diverse with *Hyacinthoides non-scripta*, *Mercurialis perennis*, *Silene dioica*, *Urtica dioica*, *Geum rivale*, *Stellaria holostea*, *S. nemorum*, *Adoxa moschatellina*, *Chrysosplenium oppositifolium*, *Filipendula ulmaria*, *Ranunculus ficaria*, *Rumex sanguineus*, *Cardamine* spp., *Lysichiton americanus*, ferns and mosses; channel with *Ranunculus 'aquatilis'* and *Callitriche stagnalis*
- 8 415702 Broad strip of mostly scrub dominated ground (or patchy waste ground, some areas recently disturbed - access or viewing difficult) between burn side track (broad recently disturbed strip) and conifers up slope. Old silos with dense scrub (hawthorn, willow, ash - some alder) with shaded herb layer (*Veronica chamaedrys*, *Poa trivialis*, *Geum urbanum*, *Silene dioica*, *Epilobium montanum*, *Dryopteris* spp. etc.) - some marshy elements to centre.
- 9 414706 Western boundary with broad band of scrubby birch wood with cherry, willow, hawthorn and much rhododendron.
- 10 416701 Burn continues east with narrow fringe of alders plus some ash, sycamore and hawthorn. Generally diverse side flora with various woodland elements and some marshy edge species (e.g. *Filipendula ulmaria*, *Urtica dioica*, *Chrysosplenium oppositifolium*, *Oenanthe crocata*). North edge badly disturbed by recent track construction.

11 417705 Ridge (to west of improved pasture) with scrub (much hawthorn plus birch and some alder) and rough grassland, with below a small inundation marsh and pool: much *Agrostis stolonifera*, *Ranunculus repens*, *Juncus effusus*, *Rumex crispus*, *Stachys palustris* and *Iris pseudacorus*.

12 418705 Old track lined by some oak, horse chestnut, hawthorn etc. plus various shrubs (lilac, privet, broom and some conifers); various herbs including garden species e.g. *Polygonatum x hybridum*, *Narcissus* spp., *Galanthus nivalis*, *Urtica dioica*, *Geum urbanum*, *Lysimachia punctata*, *Primula* sp. and *Iris* sp. Some local areas of grassland.

NS4268

1 423688 Corner with local scrub and some trees but mostly coarse grassland (*Deschampsia cespitosa* with *Urtica dioica*, *Rubus idaeus* and some *Dryopteris filix-mas*, *Cirsium arvense*, *Silene dioica*) and local marshy area with *Juncus effusus* and *Phalaris arundinacea* plus *Deschampsia cespitosa* and associates include *Juncus acutiflorus*, *Filipendula ulmaria*, *Equisetum palustre*, *Galium palustre*, *Rumex sanguineus*, *Stachys palustris* and *Stellaria uliginosus* etc. Scrub to west (fence) of open birch over stressed moss and lichens.

2 423689 Steep sided ridge (artificial?) with diverse woodland to south including birch, ash, sycamore, hawthorn, elder over various grasses, ferns and herbs include *Urtica dioica*, *Viola riviniana*, *Silene dioica*, *Geum urbanum*, *Dryopteris filix-mas*, *Fragaria vesca*, *Galium aparine* etc. To the north is an area of neglected plantation with many fallen trees and much regrowth (or survival) of sycamores (occasional rowan); ground flora patchy but includes some *Hyacinthoides non-scripta* and *Circaea lutetiana*.

3 424689 Grassland about and between mounds tending to be coarse but locally more diverse, particularly near paths and where shallow soils; diverse species include *Trifolium* spp., *Leucanthemum vulgare*, *Bellis perennis*, *Veronica chamaedrys*, *Plantago lanceolata*, *Alchemilla glabra*, *Hieracium pilosella*, *Lathyrus pratensis*, *Potentilla anglica*, *P. sterilis*, *Fragaria vesca* and some *Listera ovata*.

4 425688 South of the drain mature birch woodland (some younger growth though, and rare rowan) occurs on damp peaty soils, presumably linked to the adjacent moss (but isolated by track and disturbed infill ground). The ground cover includes much moss (e.g. *Dicranum scoparium*, *Plagiothecium undulatum*, *Polytrichum* spp., *Pleurozium schreberii* and *Mnium hornum*), with *Dryopteris dilatata*, *Oxalis acetosella*, *Silene dioica*, *Rubus fruticosus*, *Digitalis purpurea*, *Deschampsia flexuosa* and rare *Lonicera periclymenum* and *Hyacinthoides non-scripta*. To the north of the ditch there can be locally large areas of birch scrub which has invaded the adjacent wasteground.

5 429689 Disturbed area (ash tipping) with developing birch forming an open canopy over an unusual lichen heath with diverse *Cladonia* spp. (*C. impexa*, *C. furcata* and *C. 'bellidiflora'*), *Peltigera lactucifolia*, *Polytrichum* spp., *Pleurozium schreberii* and *Racomitrium lanuginosum*; herbs and grasses sparse but developing. Maturer scrub and grass (plus wood and marshy herbs) to north side about deep drain.

NS4269

1 421695 Relic oak woodland associated with ridge (no old trees though) but oak, rowan, hazel, ash, hawthorn, blackthorn and birch regeneration to north slope and locally to crest, also large areas of bracken with bluebell, *Oxalis acetosella*, *Silene dioica*, *Fragaria vesca*, *Lonicera periclymenum* and other woodland elements (but some open *Holcus mollis* 'grassland' with bluebell, *Stellaria holostea*, *Viola riviniana*, *Veronica chamaedrys*, etc.). Summit crest with

some open, slightly acidic grassland, but south slope becoming coarser with scrub invasion and much *Chamerion angustifolium*.

2 421697 Extensive area to the south of burn of disturbed and coarse grasslands (much *Deschampsia cespitosa* and also *Phalaris arundinacea*) in a scrub mosaic (willow, hawthorn some broom). Some open water in the old tank pools: one supporting large stands of *Typha* (some *Alisma plantago-aquatica* and *Lemna trisulca*).

3 422698 Alder lined burn, but canalised with steep sides, but with a fairly good diversity of woodland herbs: *Urtica dioica*, *Deschampsia cespitosa*, *Silene dioica*, *Stellaria nemorum*, *S. holostea*, *Geranium robertianum*, *Geum urbanum*, *Veronica chamaedrys*, *Chrysosplenium oppositifolium*, *Lapsana communis*, *Stachys sylvatica*, ferns and mosses.

4 422699 Area neglected for a longer time (than that to east) and supports a diverse mosaic of grassland (with some short grazed glades and ephemeral or stressed areas) or tall herbs and ferns with some mature or younger scrub blocks (hawthorn, willow, rose, ash, alder, sycamore etc.), creating a good habitat mosaic.

5 423693 Prominent hill with larch plantation to summit but south-east area dominated by bracken (with much bluebell) and frequent birch or relic pine. To the centre-south side there are burning areas now supporting developing birch scrub and blackberry.

6 423696 A broad to narrow strip of wet or marshy grassland occurs between the hill and the alder lined burn. *Juncus effusus* is locally common (but not very marshy) with more *Phalaris* towards the burn; associates are limited but include *Filipendula ulmaria*, *Angelica sylvestris*, *Deschampsia cespitosa* and *Cirsium palustre*.

7 424690 Open area of neutral rough grassland with some patches of scrub, mainly about old buildings or silos; some greater herb and moss diversity about tracks and disturbed areas.

8 424694 North facing slope with above some open, short, slightly acidic grassland (birch invading) but the embankment below the hawthorn fringe with woodland. Canopy of birch with some oak, rowan plus old beech and Scot's pine (plantation relics); ground cover with abundant bluebell plus *Dryopteris* spp., *Oxalis acetosella*, *Silene dioica*, *Holcus mollis*, *Digitalis purpurea* and grasses. Further east is an open area of acidic grassland (with some scrub) supporting *Potentilla erecta*, *Galium saxatile*, *Rumex acetosa* and *Carex pilulifera*, plus the mosses *Pleurozium schreberii*, *Rhytidiadelphus squarrosus* and *Pseudoscleropodium purum*; bracken occurs to the east below (some bluebell) grading to scrub about disturbed area.

9 424694 Burn with narrow fringe of alders and locally frequent willows. Some woodland and marshy elements to side including *Urtica dioica*, *Stellaria nemorum*, *Cardamine amara*, *Caltha palustris*, *Filipendula ulmaria*, *Geum rivale*, *Athyrium filix-femina* and *Oenanthe crocata*. South margin of burn (below slope) presumably formerly rough grass with much swampy *Phalaris arundinacea* and marshy elements (e.g. *Urtica dioica*, *Filipendula ulmaria*, *Ranunculus repens*, *Valeriana officinalis*) but recently disturbed with much bare soil. Local stands of scrub and rosebay willowherb also present.

10 427694 To the west of the open rough grassland (or burning sites) are areas of mature scrub to the margins of the ridge (bracken) and about long abandoned tracks. The scrub is comprised of willow and birch (some old) over grasses, *Urtica dioica*, *Fragaria vesca*, *Rubus* spp., etc. The east boundary is marked by an old drain line with some trees and in the corner there is a small depression supporting a wetland with *Sparganium erectum* and *Iris pseudacorus* plus *Typha latifolia*, *Filipendula ulmaria*, *Stachys palustris*, *Angelica sylvestris* and *Lemna minor*.

11 428695 Burn with marginal (north side) alder with willows (including osiers) making a broad fringe. Associate herbs include *Urtica dioica*, *Deschampsia cespitosa*, *Phalaris arundinacea*, *Rumex obtusifolius*, *Silene dioica*, *Stellaria nemorum*, *Chrysosplenium oppositifolium*, *Lapsana communis*, *Lysichiton americanus*, ferns and mosses; actual channel with some *Sparganium erectum* and *Lemna minor*. To the south *Phalaris* is common with *Urtica dioica* and patchy scrub.

12 429696 Extensive area of coarse grassland much dominated by *Deschampsia cespitosa* but also local *Agrostis capillaris*, *Holcus lanatus*, *Dactylis glomerata*, *Elymus repens* etc.; herbs are limited: *Rumex acetosa*, *Vicia cracca*, *Cirsium arvense*, *Centaurea nigra*, *Lathyrus pratensis* and *Vicia cracca*.

NS4270

1 420700 Extensive area of waste ground about old building plots - some often marked by dense older scrub, but generally difficult vegetation to map or categorise due to variable patchwork and transitional states. Some areas of coarse grassland occur with gradation to scrub (via *Rubus* and tall herbs), the scrub of various species but only few old shrubs or trees present, but large areas also recently disturbed. Some diverse ephemeral vegetation about old paths (or stressed waste areas) with *Myosotis* spp., *Erophila verna*, *Cerastium* spp., *Sagina procumbens*, *Hieracium* spp., *Aphanes* sp., *Sedum acre* etc. Also short stretch of old drain with *Juncus* spp., *Filipendula ulmaria*, *Glyceria fluitans* and *Callitriche stagnalis*.

2 420705 Large area of mature larch plantation heavily shaded with little ground cover (*Dryopteris dilatata*, *Urtica dioica*, *Galium saxatile*, grasses and mosses). To the centre (above) it is more open (windthrow) and grass covered, with scattered scrub (some beech). Good range of mosses, lichens and fungi noted including *Rhytidadelphus loreus*, *Hylcomium splendens*, *Thuidium tamariscinum*, *Plagiomnium undulatum*, *Cladonia* spp. and *Usnea subfloridana*.

3 421703 Old sheds (some with epiphytic growth, notably of polypody fern) surrounded by conifer blocks or local scrub (hawthorn, willow, ash, elder) or occasional old tree (some oak) and grassland; the latter becoming coarse but a few shorter areas occur e.g. marked by *Lotus corniculatus* and *Centaurea nigra*. Greater species diversity can be found to the path edges where herbs include *Sagina procumbens*, *Senecio jacobaea*, *Veronica chamaedrys*, *Hypochoeris radicata*, *Myosotis arvensis*, *Leontodon autumnalis*, *Prunella vulgaris*, *Cardamine pratensis* and large patches of mosses (*Calliargon cupsidatum*, *Racmitrium canescens* and *Rhytidadelphus squarrosus*).

4 421706 Area of old buildings with some developing scrub and neutral grassland; some of the latter areas retain shorter turf with a few herbs e.g. *Galium verum*, *Lotus conrinculatus*, *Achillea millefolium* but in general becoming coarse and grass dominated. The ditch supports some scrub and ferns (nearby *Phalaris arundinacea* stand) but is piped to the east (but mature alders here).

5 423706 Marshy area below bunker (28/100D) with abundant *Juncus effusus* plus *Stachys palustre*, *Achillea ptarmica*, *Angelica sylvestris*, *Ranunculus repens*, *Epilobium obscurum*, *Calliargon cupsidatum*, *Eurhynchium praelongum* and *Brachythecium rivulare*. Similar, larger, patch occurs nearby (28/101C) with abundant *Juncus effusus* plus *Carex hirta*, *Angelica sylvestris* and *Rumex crispus*.

6 424704 Larch strip with elder and birch but apparently bare beneath (some *Dryopteris dilatata*, *Urtica dioica* and *Rubus fruticosus* – mainly to edges).

7 424705 A few areas of short grassland occur about the buildings (with *Agrostis capillaris*, *Anthoxanthum odoratum*, *Festuca rubra*, plus *Trifolium repens*, *Senecio jacobaea*, *Plantago lanceolata*, *Prunella vulgaris* and moss *Rhytidiadelphus squarrosus*) but generally it is becoming coarse.

8 425705 Area of mature broad-leaved scrub with old willows, hawthorns, elder, ash, beech (and some spruce and pine) over mossy ground cover although limited herbs (moss abundant) and below is an open area with *Phalaris arundinacea* 'swamp'.

9 425707 Diverse habitats about the scrubby railway embankments. There are short grazed (rabbits) areas where the cropped turf has various grasses, *Trifolium repens*, *Potentilla erecta*, *Ranunculus acris*, *Ranunculus repens* and the mosses *Rhytidiadelphus squarrosus* and *Pseudoscleropodium purum*. To the raised, level areas (plateaux) there are small marshy areas marked by *Juncus effusus* plus *Carex nigra*, *C. hirta*, *Lotus uliginosus*, *Epilobium obscurum* and *Potentilla anserina*. The actual railway (cutting) embankments support thick scrub (hawthorn, willow, birch, rose and some cherry) over grazed grassland. There are also several mature trees scattered about here or in small relic woods (with oak, ash, poplar, lime, beech and cherry) creating a good mosaic.

10 426706 Old earthbank by the broad ditch marked by mature oak and pine (old boundary) and well colonised by mosses: *Thuidium tamariscinum*, *Polytrichum formosum*, *Pseudoscleropodium purum* and *Dicranum scoparium* plus some acidic grassland species.

11 427702 Large larch plantation on high ground (than adjacent bunkers and tracks) but heavily shaded with little ground cover (mosses or bare litter, and only a few fungi seen: *Mycena* spp., *Xylaria hypoxylon*).

12 427706 Larch plantation with much fallen timber but with little diversity (some *Urtica dioica*, *Rubus fruticosus* and beech) although to the margin there are *Silene dioica*, *Viola riviniana* and *Dryopteris filix-mas*.

13 427706 Old building bases now flooded with stands of *Eleocharis palustris*, *Typha latifolia*, *Juncus effusus*, and some *Alisma plantago-aquatica*, *Lemna minor* and *Potamogeton natans*. Lichens on stonework include *Physcia dubia*, *Xanthoria parietina* and *Phaeophyscia orbicularis*. Adjacent outflow ditch with *Callitriche stagnalis*, *Lemna minor* and *Sparganium erectum*.

14 427709 Tracksides gravels with diverse mosses and some lichens (*Ceratodon purpureus*, *Barbula convoluta*, *B. vinealis*, *Pogonatum urnigerum*, *Calliargon cuspidatum*, *Racomitrium canescens*, *Tortula ruralis*, *Cladonia fimbriata* and *C. furcata*) but also various herbs including *Pilosella officinarum*, *Linum catharticum*, *Trifolium repens*, *Senecio jacobaea*, *Plantago lanceolata*, *Veronica serpyllifolia*, and *Cerastium glomeratum*. The nearby buildings with some scrub but mostly coarse grass (*Dactylis glomerata* prominent).

15 429706 Two rectangular tanks with shallow, but clear water; the southern tank with very little pondweed (rare *Potamogeton berchtoldii* and *P. natans* and *Callitriche stagnalis*) but *P. berchtoldii* quite common in the northern tank; the margins of both tanks support little emergent vegetation (a few rushes, although various grassland species occur to the stonework).

NS4271

1 423710 Scrubby area about old ruin with much hawthorn, elder, sycamore, ash and rose with open grass glades (plus nettle, blackberry, *Galium aparine*, *Vicia cracca*, *Myosotis arvensis*, *Aegopodium podagraria*, *Anthriscus sylvestris* etc.)

2 427710 Open area of short grassland (concrete and disturbance) but diversity generally limited: much *Festuca rubra* with *Holcus lanatus*, grading to rank grass towards farm field (*Agrostis capillaris*, *Arrhenatherum elatius*, *Dactylis glomerata*, *Cirsium arvense* etc.). A small basin is flooded and supports wetland species: *Eleocharis palustris*, *Typha latifolia* and *Alisma plantago-aquatica*.

3 426710 Large larch plantation heavily shaded in places but with some open areas to the centre where more grassy; associate scrub includes ash, sycamore, elder and holly. Ground flora limited with mainly grasses (*Holcus* spp. and *Agrostis capillaris*) plus *Urtica dioica*, *Rubus fruticosus*, *Dryopteris dilatata* and various mosses; fungi limited.

NS4367

1 432677 An isolated block, physically separated from the main site or army camp area by the fences. The area has a superficial pasture appearance with scrubby woodland to the north end. There are some relic old structures and the pasture can be uneven or poorly drained in places, indicating past disturbance. The pasture is short but species poor being dominated by thick *Agrostis capillaris* and *Holcus lanatus* (with *Rhytidiadelphus squarrosus*, *Ranunculus* spp., *Cerastium fontanum*, *Cirsium arvense*) with some *Juncus effusus* tussocks and local rose or hawthorn (some old stumps).

A deep central ditch (with *Glyceria fluitans*) separates the northern area, where the pasture continues but is very uneven and birch increases (as older trees and grazed scrub); blackberry can be common (open or shaded) but in general the ground flora is limited. To the north-west boundary is a curved old ditch (some *Juncus* spp., *Holcus lanatus*, *Agrostis stolonifera*, moss etc.) with an adjacent grass dominated mound.

2 433675 Scrubby woodland of birch with willow, and to the north at least, a grassy ground cover with much *Deschampsia cespitosa*, *Holcus mollis*, (plus ferns, blackberry and mosses); the mosses include local hummocks of *Polytrichum commune*, which extend into the local central glade, forming a large 'lawn' (the glade itself mostly of *Holcus* - *Agrostis* grassland with increasing *Deschampsia cespitosa* and marginal rosebay willowherb stands).

3 436677 South of the large central drain (draining to the east) is a continuous area of scrub, less disturbed (in recent years) than that to the north side. To the west end the canopy is quite scrubby with young birch, willow and some sycamore and hawthorn over leaf litter, mosses, *Dryopteris dilatata*, *Rubus fruticosus* and some rosebay willowherb. There are some stumps and the occasional spruce, and the scrubby growth of the trees can be multiple (but not very broad based). To the east the canopy is a little more mature but still of birch (plus scarce oak, willow and some spruce) with a similar ground cover. A few open glades occur (rosebay willowherb and grasses).

To the extreme west is a block of older wood with spruce plantation. There are some oaks (more so the south) with birch, sycamore and hawthorn (some broad-based) with *Dryopteris dilatata* and mosses (*Mnium hornum*, *Eurhynchium praelongum*, *Atrichum undulatum*).

4 437679 Open stress area with young spindly birch and open vegetation of predominantly mosses (*Racomitrium* spp., *Polytrichum* spp., *Schistidium apocarpum*, *Dicranum scoparium* and other acrocarps) but limited herbs showing (some *Epilobium komarovianum*); *Juncus* can be frequent at some poorly drained central zones. To the south and east the canopy differs from that to the west, with mostly birch over *Dryopteris dilatata* (some rowan and sycamore) with bryophytes (some acidic - *Polytrichum commune*, *Dicranum scoparium*, *Mnium hornum* etc.).

5 438674 Birch woodland along the south edge; locally there are increases in rosebay willowherb frequency (reflecting shade), some in open glades. There are some areas of sycamore or beech (plus willow) about the more obvious artificial structures.

6 438676 Mixed block with more 'typical' birch woodland to the east end and also similar to the west edge, but with a series of old structures colonised by suppressive beech. To the central area the vegetation is more open and scrubby with large areas of poorly drained *Juncus effusus*, grading to *Holcus* grassland or stands of rosebay willowherb (in turn grading to scrub).

NS4368

1 432680 Relic area of deep peat, with a rise of c. 1-2 metres, onto the surface which is dominated by mature *Betula pubescens*. Ground flora includes *Dryopteris dilatata* with *Deschampsia flexuosa* with mosses such as *Hypnum cupressiforme*, *Plagiothecium undulatum*, *Mnium hornum*, *Dicranum scoparium* and *Pleurozium schreberii*. Old surface drains visible ('run-rig').

Some *Juncus effusus* marsh (plus *Epilobium* spp., *Cirsium palustre*, *Agrostis* spp.) to north edge pasture (overgrown - seemingly low herbs - much *Arrhenatherum elatius* and *Holcus lanatus*).

2 433689 Burn with large areas of *Phalaris* swamp or *Deschampsia cespitosa* wet grassland to the sides but also open tall herbs to the banks: much *Urtica dioica*, *Phalaris arundinacea*, *Deschampsia cespitosa* plus *Epilobium hirsutum*, *Filipendula ulmaria*, *Angelica sylvestris*, *Symphytum officinale*, *Anthriscus sylvestris* and some *Sparganium erectum* to the channel; however scrub is developing (alder, crack willow, osier and hawthorn). Further north the woody cover is better developed with old ash, crack willow, hybrid osier, alder, goat willow and hawthorn over *Urtica dioica*, *Stellaria nemorum*, *Silene dioica*, *Chrysosplenium oppositifolium*, ferns and mosses; lichens well developed on willows (*Usnea subfloridana*, *Ramalina farinacea*, *Evernia prunastrii*, *Parmelia* spp. and *Fuscidea lightfootii*).

3 434685 Scrub to fence of birch but local blocks to interior with elder, willow and hawthorn; rough grassland with much *Chamerion angustifolium* and *Rubus* spp., and some poorer drainage with *Deschampsia cespitosa* (or *Juncus effusus*).

4 434687 Extensive area of coarse grass with local stands of rosebay willowherb (some blackberry) on formerly (recently) drained ground. Grasses vary from short types through to taller *Deschampsia cespitosa*, *Elymus repens* and *Dactylis glomerata*. Herbs are poorly represented (*Cirsium arvense*, *Senecio jacobaea*, *Ranunculus repens*, *Lathyrus pratensis* etc.) plus pleurocarps mosses.

5 434687 Burn with local patches of willows (some crack) and also scrub of hawthorn, elder, sycamore etc. Rough grass to margins grade to swampy *Phalaris arundinacea* with *Urtica dioica*, *Filipendula ulmaria*, *Deschampsia cespitosa* and local *Juncus effusus*.

Short, locally diverse (due to cutting?) grassland occur to the tracksides to the east (and probably throughout the old mound tracks); species include *Festuca rubra*, *Poa pratense*, *Anthoxanthum odoratum*, *Hieracium pilosella*, *Leucanthemum vulgare*, *Plantago lanceolata*, *Lotus corniculatus*, *Trifolium* spp., *Luzula campestris* and *Senecio jacobaea*.

6 438681 Open grassland and patchy scrub (much hawthorn) to the west side of the burn; some tall herbs and alluvial species also present. To the extreme north edge is a pasture-like grassland with limited herbs and moss but quite common recent hawthorn regeneration.

7 438682 Woodland forms a narrow fringe to the burn with alder and crack willow (some dieback) plus grey willow and other marginal scrub (hawthorn, blackthorn etc.). Herb associates are locally diverse with *Urtica dioica*, *Phalaris arundinacea*, *Chrysosplenium oppositifolium*, *Stellaria nemorum*, *Silene dioica*, *Lapsana communis*, *Glechoma hederacea*, *Stachys sylvatica*, *Geranium robertianum*, ferns and mosses. To the north are a few mature ash trees (good lichen and moss epiphytes: *Orthotrichum pulchellum*, *Brachythecium populeum*, *Porina aenea*, *Lecidella elaeachroma*, *Lecanora chlarotera*, *L. expallens*, *Ramalina farinacea*), frequent scrub including an unusual dense plum thicket.

8 438686 Extensive area of open grassland amid bunkers mainly dominated by low diversity grassland: *Agrostis capillaris*, *Elymus repens*, *Arrhenatherum elatius*, *Dactylis glomerata* and local *Deschampsia cespitosa*; herbs are rare but include *Lathyrus pratensis*, *Centaurea nigra*, *Plantago lanceolata*, *Ranunculus acris*, *Rumex acetosa* and *Lotus corniculatus* and *Cirsium arvense* (also rare *Carex spicata*). There are a few damper depressions with *Juncus effusus*, *Deschampsia cespitosa*, *Carex hirta*, *C. nigra* and *Achillea ptarmica*. The actual bunkers have coarse grass but also developing scrub (plus *Rubus fruticosus*, rose and *Chamerion angustifolium*). Higher species diversity occurs to the tracks (e.g. *Festuca rubra*, *Hypochoeris radicata*, *Trifolium* spp., *Leucanthemum vulgare*, *Achillea millefolium* and *Linum catharticum*).

9 43683 Extensive area of low diversity grassland with prominent *Deschampsia cespitosa* (grading to *Phalaris* nearer to the burn) but also other tall grasses such as *Elymus repens*, *Dactylis glomerata*, *Arrhenatherum elatius* and *Holcus lanatus*; herbs appear limited but include *Rumex acetosa*, *Vicia cracca*, *Urtica dioica*, *Rumex obtusifolius* and *Filipendula ulmaria*. Occasional marshy areas marked by *Juncus effusus* with species such as *Angelica sylvestris*, *Cirsium palustre*, *Potentilla anserina*, *Rumex crispus* and *Achillea ptarmica*. The west side of the burn (not visited) also has a large *Deschampsia cespitosa* area but there are also patches of dense scrub (hawthorn, blackthorn and willows).

NS4369

1 432693 West side of house with policy plantation (oak, sycamore and ash) but with dense, impenetrable scrub of snowberry, yew, rhododendron, elder and willow; ground flora generally suppressed but some marginal areas of note (e.g. to north - *Symphytum tuberosum*, *Mercurialis perennis*, *Hyacinthoides non-scripta*, *Geum urbanum* etc.).

Small scrubby extension block to north with some herbs (*Symphytum tuberosum*, *Allium ursinum*, *Hyacinthoides non-scripta* plus hybrid?, *Arum maculatum* and *Ranunculus ficaria*); much blackberry and some Japanese knotweed.

2 433691 Dargavel House with policy estate woodlands about the burn course with beech, sycamore, lime, maple, cherry, horse chestnut, oak and ash with various understorey scrub (some elm), much rhododendron, elder, snowberry, red currant and privet. Species diversity of the banks is quite high with *Mercurialis perennis*, *Tolmeia menziesii*, *Narcissus* sp., *Geum urbanum*, *Stellaria nemorum*, *Glechoma hederacea*, *Ranunculus ficaria*, *Rumex sanguineus*, *Aegopodium podagraria*, *Cardamine amara*, *Tolmeia menziesii*, *Campanula latifolia*, *Fragaria vesca*, *Urtica dioica*, *Chrysosplenium* spp., *Rubus idaeus*, ivy, ferns and mosses. Some of the mature trees support good lichens and bryophytes e.g. *Orthotrichum pulchellum*, *O. affine*, *Zygodon conoideus*, *Metzgeria fuciculosa* and *Cryphaea heteromalla*.

3 433693 East side of house with lime avenue and policy woodland (lime, sycamore, oak, beech, ash, elm, yew, elder, whitebeam and frequent rhododendron); locally suppressed ground cover, but other areas diverse with *Symphytum tuberosum*, *Allium ursinum*, *Circaea lutetiana*, *Primula vulgaris*, *Urtica dioica*, *Cardamine flexuosa*, *Tellima grandiflora*, *Dryopteris*

spp. etc. By the house are ancient sprawling hornbeam and yew (the former with *Bulgaria inquinans* on branches).

4 433695 Roadside strip of beech and lime with short grass or dense rhododendron (avenue extends east but is lined by mature oaks).

5 435692 Ridge to the east of the house with old bunkers supporting dense scrubby woodland and some mature (policy) trees; the latter include beech, horse chestnut, Norway maple, sycamore, oak and ash with younger birch, hawthorn and willow. Several woodland elements noted including *Geum urbanum*, *Fragaria vesca*, *Silene dioica*, *Viola riviniana*, *Veronica chamaedrys*, *Urtica dioica*, *Epipactis helleborine*, *Rumex sanguineus*, *Carex remota*, ferns and mosses.

6 438693 Large area of deciduous scrubby (policy) woodland of birch and sycamore (some old or multi-trunked) and, further west, with regeneration of sycamore, ash, elm, beech and hawthorn (and some young lime). The ground flora includes various grasses, *Urtica dioica*, *Rubus fruticosus*, ferns, *Deschampsia cespitosa*, *Ranunculus repens*, Galium aparine, *Symphytum tuberosum*, *Fragaria vesca* and mosses are well represented (*Mnium hornum*, *Eurhynchium praelongum*, *Brachythecium rutabulum* and *Thuidium tamariscinum*).

To the southeast across the ditch (with *Juncus effusus* and *Deschampsia cespitosa*) the woodland continues with birch and sycamore plus some oak and alder (and rhododendron); the ground cover with much *Dryopteris dilatata* and bracken plus *Rubus fruticosus*, *Oxalis acetosella*, *Urtica dioica* and mosses.

NS4370

1 430705 Burning area with marginal birch and willow over patchy grass, *Urtica dioica* or moss cover. The central area is open and subject to inundation but with a mainly mossy cover (*Pohlia nutans*, *Ceratodon purpureus*, *Bryum* spp.) and various ephemeral herbs.

2 431704 Avenue lined by immature trees: cherry, horse chestnut, Norway maple, Scottish laburnum, lime etc.

3 431705 Species poor grassland with much *Agrostis capillaris* and *Arrhenatherum elatius* but few herbs seen; there are a few local marshy depressions marked by *Juncus effusus* and *Elymus repens* with *Carex hirta*, *Potentilla anserina* and *Juncus acutiflorus* to the centre.

4 431707 Steep-sided and shaded ditch with scattered privet, willow and ash plus herbs including *Filipendula ulmaria*, *Athyrium filix-femina*, *Juncus effusus* and *Urtica dioica*. The ditch continues to the northwest but is steep sided and shaded with limited associates (hawthorn and privet over *Urtica dioica*, ferns and *Rubus fruticosus*).

5 431707 Shed (26/08) with walls well colonised by ferns: *Dryopteris filix-mas*, *Phyllitis scolopendrium*, *Asplenium trichomanes* plus some *Chamerion angustifolium* and various mosses (e.g. *Tortula muralis*, *Grimmia pulvinata* and *Brachythecium rutabulum*).

6 432704 Mature ash and dead elm in area of coarse grassland (near old farm): *Agrostis capillaris*, *Holcus lanatus*, *Elymus repens*, *Dactylis glomerata*, *Arrhenatherum elatius* and few herbs (*Cirsium arvense* and *Urtica dioica*). The bark of elm and ash with some varied lichens (*Parmelia glabrata*, *Physcia tenella*, *Pertusaria pertusa*, *Lecania erysibe*, *Lecidella elaeoachroma*, *L. chlarotera* and *Lepraria incana*).

- 7 432705 Extensive area of long grass with much *Elymus repens*, *Dactylis glomerata*, *Arrhenatherum elatius* and *Cirsium arvense* prominent; occasional shorter areas but still dominated by *Agrostis capillaris* or *Festuca rubra* with only a few herbs noted (mainly *Rumex acetosa* and *Cirsium arvense*).
- 8 432706 Series of bunkers emerge from the grassland, which extends to the base and usually up the embankment slopes. Rough grass species typically include tall *Agrostis capillaris*, *Arrhenatherum elatius*, *Dactylis glomerata*, *Elymus repens* and limited herbs apart from *Cirsium arvense* and *Rumex obtusifolius*. Local damp areas with inundation species: *Juncus articulatus*, *J. tenuis*, *J. effusus* *Trifolium repens*, *Prunella vulgaris*, *Rumex crispus*, *Sagina procumbens*. Some bunkers support more scrub: hawthorn, *Rubus fruticosus* (locally dense) and some with large *Digitalis purpurea* stands.
- 9 431707 Area of tall, coarse grass (much *Arrhenatherum elatius* and *Agrostis capillaris*) with little herb diversity – or occasional stand of broom or *Rubus fruticosus*. To the north the birch scrub follows the line of an old railway and supports some open ephemeral ground; the scrub to the west of the buildings includes mature willows.
- 10 432702 Large area of monotonous grassland with *Agrostis capillaris*, *Holcus lanatus*, *Arrhenatherum elatius*, *Dactylis glomerata*, *Elymus repens* and local *Deschampsia cespitosa* and sparse herbs (*Centaurea nigra*, *Lathyrus pratensis*, *Rumex acetosa*, *Ranunculus acris*). Greater species diversity occurs to the various small tracks that criss-cross the grasslands: *Linaria repens*, *Taraxacum* spp., *Equisetum arvense*, *Lotus corniculatus*, *Plantago lanceolata*, *Linum catharticum*, *Pilosella brunneocroceum*, *Trifolium* spp. and *Juncus tenuis*.
- 11 433704 Wasteground between the sheds (and locally to track edges) with an ephemeral flora including much moss (*Calliergon cuspidatum*, *Rhytidiadelphus squarrosus*, *Polytrichum juniperum*, *Philonotis fontana*, *Ceratodon purpurea*, *Pohlia annotina*, *Barbula convoluta*) and the liverwort *Fossombronina wondraczekii* and herbs include *Sagina procumbens*, *Euphrasia* sp., *Senecio jacobaea*, *Trifolium repens*, *Reseda luteola*, *Digitalis purpurea*, *Verbascum thapsus* and *Hypericum humifusum*. To the south edge is mature scrubby birch woodland with willow and elder over sparse *Urtica dioica* and moss.
- 12 433705 Short stretch of ditch with a marginal tall hawthorn hedge (plus rose and elder) over *Urtica dioica*, *Rubus idaeus*, *Rubus fruticosus* and *Dryopteris dilatata*; below, where wetter, species include *Juncus effusus*, *Solanum dulcamara*, *Filipendula ulmaria*, *Athyrium filix-femina*, *Veronica beccabunga* and *Callitriche stagnalis*.
- 13 433705 Path edges with *Festuca rubra*, *Trifolium repens*, *Sagina procumbens*, plus various other species and usually a broad moss fringe which includes *Racomitrium canescens*, *Tortula ruraliformis*, *Calliergon cuspidatum*, *Ceratodon purpurea*, *Bryum* spp (including *Bryum bicolor*) and *Barbula vinealis*. The open fringe grades to a turf of short grasses (*Agrostis capillaris*, *Holcus lanatus*, *Festuca rubra* etc.) with *Rumex acetosa*, *Lotus corniculatus*, *Trifolium repens*, *Trifolium pratense*, *Ranunculus acris*, *Plantago lanceolata*, *Senecio jacobaea*, *Lathyrus pratensis*, *Vicia cracca* but mosses are scarcer except for *Rhytiadelphus squarrosus*; the grassland soon becomes long and coarse with taller *Arrhenatherum elatius* and *Dactylis glomerata* (but still much *Agrostis capillaris*).

The brick building appears to be mainly bare except for the occasional *Dryopteris filix-mas*, *Chamerion angustifolium*, elder or willow colonist. To the base of walls there is often *Rubus fruticosus*, various colonising scrub species (birch, elder, willow) and various herbs and grasses (also mosses on hard, stressful surfaces).

14a 434701 (SW Lagoon) Marginal scrub of white willow, crack willow and some grey willow with ash, hawthorn and blackberry overtopping a very narrow fringe of *Phalaris arundinacea* with *Stachys palustris* and *Urtica dioica*.

Central burn with stands of *Phalaris arundinacea* and *Urtica dioica* plus *Filipendula ulmaria*. *Athyrium filix-femina*, *Deschampsia cespitosa* and with some *Callitriche stagnalis* and *Elodea canadensis* in the channel (access difficult).

14b 434702 (NW Lagoon) Marginal scrub of crack willow, white willow, grey willow, alder, ash and rose with male fern and *Urtica dioica*, and below a mostly narrow swamp fringe of *Phalaris arundinacea* (with *Stachys palustris*, *Angelica sylvestris* and *Urtica dioica*). The water appears clear but no aquatic vegetation seen (access difficult).

14c 435701 (NE Lagoon) Marginal scrub with crack willow, white willow, grey willow, ash and hawthorn with narrow fringe of *Phalaris arundinacea* (unless shaded) and only rare stand of iris.

15 437700 Bunkers surrounded by rough grass with local tall herbs (*Cirsium arvense*, *Centaurea nigra*); and coarse grasses (*Elymus repens*, *Arrhenatherum elatius*, *Deschampsia cespitosa*, *Dactylis glomerata*, *Cirsium arvense* etc.). A few local marshy areas occur below marked by *Juncus effusus* but limited associates. There is greater species diversity to the various tracks e.g. with *Lotus corniculatus*, *Euphrasia officinalis*, *Linum catharticum*, *Trifolium* spp. and mosses.

16 437702 Large area of waste ground with *Hypericum perforatum*, *Juncus tenuis*, *Centaureum erythraea*, *Potentilla anglica*, *Leucanthemum vulgare*, *Fragaria vesca*, *Geranium molle*, clovers and mosses.

17 437702 Ridge with fenced-off mature plantation of sycamore, beech, hawthorn and elder over much ivy plus *Ranunculus ficaria*, *Galanthus nivalis*, *Symphytum tuberosum* and *Rubus fruticosus*.

18 438700 Larch plantation with spruce and locally with windblow damage but generally dense and hard to penetrate; ground flora appears limited: *Dryopteris dilatata*, *Urtica dioica*, mosses and bare ground.

NS4371

1 431711 Old track (outside site boundary) with dense scrub (willow plus privet, elder, birch, plum, bridewort) and coarse grass or tall herb to embankment. Various herbs present including many garden outcasts: *Lupinus polyphyllus*, *Hyacinthoides hispanicus*, *Narcissus* spp., *Paeonia* sp., *Centaurea montana*, *Sidalcea malviflora* *Ornithogalum umbellatum* and *Aster* sp.

2 431710 Mature larch plantation with birch, elder, sycamore, rowan, holly over sparse ground flora with *Dryopteris dilatata*, *Urtica dioica*, honeysuckle and mosses. To the south us a large area of recently felled plantation marked now by relic sycamore and elder, and some beech, over short grasses, *Dryopteris dilatata*, *Rubus fruticosus* and local bracken; mosses frequent some indicating more acidic soils e.g. *Polytrichum commune*, *P. formosum*, *Plagiothecium undulatum*, *Hypnum cupressiforme*, *Ceratodon purpureus*, *Campylopus introflexus*, *C. pyriformis* and *Lophocolea bidentata*. The central area is poorly draining with open *Juncus effusus* marsh although with limited marshy associates (much *Ranunculus repens*) but of note is the fern *Dryopteris carthusiana*.

NS4467

- 1 441675 Fenced off area of extensive developing secondary woodland with birch and willow plus sycamore, ash and rowan over *Urtica dioica*, *Fragaria vesca*, *Stachys sylvatica*, *Rubus idaeus*, *Rubus fruticosus*, ferns and mosses (not visited).
- 2 441679 Burn by the bridge with narrow wooded banks supporting *Deschampsia cespitosa*, *Chrysosplenium oppositifolium*, *Stellaria nemorum*, *Ranunculus repens*, *Urtica dioica*, *Myosotis scorpioides*, *Cardamine amara*, *Lysichiton americanus*, ferns and mosses etc. *Phalaris* forms large swamp area with associates such as *Symphytum officinale*, *Stachys palustris*, *Filipendula ulmaria*, *Cirsium arvense*, *Angelica sylvestris* and *Deschampsia cespitosa*.
- 3 442676 Burn with large areas of *Phalaris arundinacea* swamp with *Symphytum officinale* and *Urtica dioica* (but rare *Phragmites*) and patchy willow scrub. To the actual banks there is usually shade from the conifer plantation but a marginal fringe of broad-leaves also occurs: alder, willows (grey, goat and hybrid osier - *Salix x sericans*), ash and birch; ground cover (more diverse where shaded) typically includes *Urtica dioica*, *Rubus fruticosus*, *Silene dioica*, *Athyrium filix-femina*, *Dryopteris filix-mas*, *Glechoma hederacea*, *Poa trivialis*, *Lapsana communis*, *Chrysosplenium oppositifolium*, *Stellaria nemorum* and mosses.
- 4 442677 The west side of the burn supports a strip of rosebay willowherb, grading to *Phalaris arundinacea* towards the burn. A disturbed ridge parallels the burn (of dredged material - much *Juncus effusus*). Alluvial species occur by the burn (*Urtica dioica*, *Symphytum officinale*, *Galium aparine*); also some alder and willow. Local areas of *Phragmites* narrowly line the burn to the south.
- 5 442679 Depressed area with willow, birch, sycamore and elder over a shaded mossy ground cover (plus *Ranunculus repens*, *Urtica dioica*, *Dryopteris dilatata* etc.); some dead sycamores to the edge.
- 6 443679 Damp area of willow and birch scrub (some sycamore) over *Deschampsia cespitosa*, *Juncus effusus*, *Ranunculus repens*, ferns and mosses. The marshy habitat extends to the open areas below the stores where *Deschampsia cespitosa* occurs (locally *Iris pseudacorus*, *Filipendula ulmaria*, *Typha latifolia*, *Juncus acutiflorus* occur), grading to rosebay willowherb tall herb stands.
- 7 444675 Open tall herb or swamp vegetation by the burn with stands of *Urtica dioica*, *Phalaris arundinacea* and *Filipendula ulmaria*. A small meander channel supports dense bur-reed (*Sparganium erectum*) separating a ridge with hawthorn and alder.
- 8 445676 Dargarvel burn in a broad to narrow corridor between the conifer plantation (to southside) or relic fringes of older broad-leaved trees (alder, sycamore, oak – but some old spruce). The sides support abundant *Phalaris arundinacea* plus *Deschampsia cespitosa* and *Urtica dioica* and with some *Sparganium erectum* to the channel (some submerged – but presume not *S. emersum*); associates include *Symphytum officinale*, *Filipendula ulmaria*, *Stachys palustris*, *Athyrium filix-femina* and *Glechoma hederacea*. Further east *Phragmites australis* dominates (tidal) with some *Phalaris arundinacea* and *Urtica dioica* (and occasional alder).
- 9 445678 Depressed marshy areas of *Juncus effusus* with local *Filipendula ulmaria*, rare *Typha latifolia*; grades to stands of *Phalaris arundinacea* or *Chamerion angustifolium*.
- 10 446674 South edge of the burn corridor formed by a broad strip (old railway route) of willow and birch (some oak) separating the track and fence; ground cover of mosses, blackberry, nettle, rosebay willowherb etc.

To the burn are some alders with alluvial herbs. Open water supports *Sparganium erectum* and *Fontinalis antipyretica*.

11 446678 Open area of monotonous *Deschampsia cespitosa* - *Holcus lanatus* grassland (some *Ranunculus repens*, *Cirsium palustre*, mosses); local marginal areas of *Juncus effusus* or rosebay willowherb stands.

12 448679 Complicated and disturbed area of scrubby woodland and open vegetation (former plantation?). In the north elder previously dominated (extension of adjacent scrub) with typical associates, but now other scrub has grown more dense.

To the south-west side the vegetation is open with large stands of rosebay willowherb (and moss) plus *Deschampsia cespitosa* and/or *Holcus* spp. grassland with *Brachythecium rutabulum* and *Rhytidiadelphus squarrosus*. Scattered birch, elder and spruce remain.

East side (of a central raised, disturbed strip) appears to be poorly drained (either under scrub or open). Open areas support *Deschampsia cespitosa* and *Holcus lanatus* grassland with some more obvious *Juncus effusus* marsh and rare *Phalaris arundinacea* swamp; associates include *Cirsium palustre*, *Ranunculus repens*, *Epilobium obscurum* and mosses. Wet scrub/woodland areas are indicated by increased willow.

NS4468

1 441681 Grassland becomes coarser to the west, running parallel to the recently cleared ditch (some *Filipendula ulmaria* and *Juncus effusus*). The coarse grass include *Elymus repens*, *Holcus lanatus*, *Dactylis glomerata* and *Agrostis capillaris*; rosebay willowherb is common to the mounds.

2 442683 Wedge-shaped area of relic deep peat with birch over *Dryopteris dilatata* with *Deschampsia flexuosa* and mosses (plus some rowan, *Galium saxatile*).

3 443682 Extensive area of bunkers some with open but coarse grassland, but also with well developed scrub (elder, sycamore, hawthorn, *Urtica dioica*, *Rubus fruticosus* and ferns) on the embankment slopes and surrounding ground. Some mature sycamores appear to mark old boundaries but elsewhere the scrub woodland is of birch with sycamore and elder over grasses, *Urtica dioica*, *Rubus fruticosus*, *Ranunculus repens*, *Fragaria vesca*, *Viola riviniana*, ferns and mosses.

4 443687 Conifer plantations densely shaded but to the east is birch woodland (with pine) locally over much *Sphagnum* (but also *Deschampsia flexuosa* and *Dryopteris dilatata* and other mosses etc.). To the south is tangled mass of scrub and fallen conifers (not visited!).

5 445684 Scrubby woodland with some old sycamore but generally comprising immature birch, sycamore, and elder over grasses (much *Deschampsia cespitosa* especially were damper), *Dryopteris dilatata*, *Rubus idaeus* and mosses.

6 445686 Extensive area (separated from the wood to the south by a raised rim of elder and birch) of species poor *Deschampsia cespitosa* with local *Juncus effusus*, but few associates (*Cirsium palustre*, *Solanum dulcamara*, *Brachythecium rutabulum*); stumps are frequent. To the west there is a distinctly marshy (inundation) area with some open water and prominent *Typha latifolia* (associates include *Carex rostrata*, *Agrostis stolonifera*, and *Eleocharis palustris*).

7 446683 Large area of birch woodland (quite mature - some multi-based) over *Dryopteris dilatata*, blackberry, *D. filix-mas* and various mosses. To the north there are some distinctly poorly drained areas marked by increased willow with a sparse, shaded ground cover (*Ranunculus repens*, *Cardamine pratensis*, *Urtica dioica*).

To the south the vegetation contrasts by having an open canopy or comprising scrub (birch, willow, oak, sycamore - and spruce) and open areas (rosebay willowherb, nettle, grasses, blackberry etc.). The ground shows more signs of past disturbance and the peaty soils are presumably enriched.

8 446685 Eastern strip of scrubby birch and willow (sycamore to the west edge), disturbed with past dumping. Ground cover of grasses (*Deschampsia cespitosa* *Agrostis capillaris*), *Urtica dioica*, *Rubus fruticosus*, *Fragaria vesca*, ferns and mosses; locally there is much birch over *Polytrichum commune* (where wetter). A shaded pool also occurs supporting a large *Typha* swamp (some *Solanum dulcamara* and *Agrostis stolonifera*). Further to the south, the strip has been planted with spruce but scrub is encroaching.

9 448680 Extensive area of scrubby woodland with birch and willow (occasional stunted spruce) over grasses (including *Deschampsia cespitosa* reflecting inundation), *Dryopteris dilatata*, *Rubus fruticosus*, *Urtica dioica* and moss. *Deschampsia cespitosa* is quite common locally reflecting marshy conditions and near to road there are marshy or swampy stands of *Phalaris* or *Juncus effusus* (and one stand with *Carex acuta*).

10 448682 Young birch woodland over grasses and mosses along the perimeter fence. A local area occurs of sparsely colonised ground supporting an unusual area of *Cladonia* lichen 'heath': *Cladonia impexa*, *C. furcata*, *C. polydactyla*, *Racomitrium lanuginosum*, *Dicranum scoparium* and *Polytrichum* spp. Adjacent roadsides with a fairly diverse mix of ephemerals and mosses including much *Verbascum nigrum*, *Fragaria vesca*, *Aira praecox*, *Myosotis arvensis* and *Lepidium heterophyllum*.

NS4469

1 440690 Distinct rise onto old peat area (some birch, rowan and oak) dominated by dense bracken (virtually no associates - rare *Corydalis claviculata*). To the east the birch increases but also frequent Scot's pine with increasing *Dryopteris dilatata* to ground cover. The pines can be old and locally common and there is some rowan and rare oak; ground associates limited but with local *Oxalis acetosella*, *Deschampsia flexuosa* (locally common), *Holcus mollis* and mosses include *Polytrichum commune*, *Mnium hornum*, *Dicranum scoparium*, *Plagiothecium undulatum*, *Eurhynchium praelongum*, *Lophocolea bidentata* and *Hypnum cupressiforme* (*Sphagnum* appears rare).

To the south is a large area of conifer plantation apparently on less peaty soils (slight slope?). Ground cover with grasses, mosses and increasing *Dryopteris dilatata* to middle (not visited).

2 440693 Large area of birch woodland presumably on deep peat (several now obscure drains). Canopy of birch (some distinctly pendulous to west - where spaced, but denser to east), occasional rowan, over dense *Dryopteris dilatata* and bracken but few associates (*Holcus mollis*, *Corydalis claviculata*, *Rubus fruticosus*) and mosses (*Mnium hornum*, *Eurhynchium praelongum*, *Plagiothecium undulatum*, *Lophocolea bidentata*, *Lepidozia reptans*, *Hypnum cupressiforme* and rarely *Sphagnum palustre*). Local area with mature Scots pine and birch and oak.

The area to north and east is isolated by a large exclusion fence but with areas of scrub, *Deschampsia cespitosa* wet grassland or fairly open wasteground (not visited but previously

recorded as open area of an old lagoon (acid with sulphate treatment) with cracked mud and sparse colonists including some grasses, mosses and the alien *Epilobium komarovianum*).

NS4567

1 450677 Area of older woodland including much oak (with sycamore, beech, birch, hawthorn and willow) although many of the oaks are immature; the ground cover though appears limited but with some *Urtica dioica*, *Dryopteris dilatata*, *Agrostis capillaris*, *Deschampsia cespitosa*, *Veronica chamaedrys*, *Fragaria vesca* and the mosses *Mnium hornum*, *Eurhynchium praelongum*, *Atrichum undulatum* (or bare).

2.5 Discussion

Development of the proposed village extension will involve the loss of various habitats. The following habitats found within the development area are shown on one kilometre squares NS4271, NS4270, NS4269, NS4371, NS 4370 and NS4369. Target notes for these include grassland, scrub, mature Larch plantation, mature Oak and pine, flooded old building bases, avenues of mature Oaks and other deciduous trees, birch woodland, lagoons, burn and old buildings recently colonised by bryophytes and ferns. These habitats are all found on other parts of the site. Some of these habitats can be incorporated into the development plan such as the avenues of mature oaks. It is hoped that the improvement of the areas outside the village extension will help compensate for their loss.

The following habitat are recommendations for the village extension area and its margins:

- Improvement of Dargavel burn and creation of wetland areas. The proposed incorporation of a sustainable urban drainage scheme plus reedbed and open water would be beneficial.
- Leave areas of woodland and scrub to be incorporated into the new proposed village
- Planting of native shrubs attractive to wildlife in the designated greenspace areas.
- Leave burn side vegetation as wild as possible and not manicured.

Improvements outside the village extension area could include the farmland within the planning application site:

- Improvement of deciduous woodland and scrub
- Maintenance of grasslands
- Improvement of Dargavel burn and creation of wetland areas
- Improvement of Barochan Moss
- Improvement of surrounding farmland

Habitat Action plans for Renfrewshire include Mires, unimproved grassland, rivers and streams, standing open water, urban and broad-leaved and mixed woodland. All of these could be incorporated into the management plan for the site.

Ornithology

3.1 Introduction

Starling Learning carried out a bird assessment of the site in order to establish a baseline of the bird population of the survey area, to identify any concentrations of significant species and to provide recommendations for avoidance of disturbance of any significant species.

3.2 Methodology

The entire site was walked by surveyors marking all birds recorded on maps using *British Trust for Ornithology* symbols. The survey took place in autumn and winter and therefore an accurate assessment can be made of birds over-wintering on the site. However, no breeding bird survey has been carried out and therefore an assessment of the likely breeding populations has been estimated by considering the birds present in winter, the type of habitats and by studying data collected by previous surveyors.

The results list all birds recorded during the duration of the survey and also birds that are highly likely to breed with consideration of their population size and status.

3.3 Results

3.3.1 A total of 63 species were recorded during the duration of the survey. A further five species are known to have been present in autumn and winter, recorded during previous surveys. It is estimated that approximately 65 species breed on site.

3.3.2 The Species

Little Grebe *Tachybaptus ruficollis*

One bird recorded feeding on ponds in winter 2004/2005. May breed in very low numbers on the ponds.

Cormorant *Phalacrocorax carbo*

One bird recorded feeding in ponds winter 2004/2005. Likely to be present in winter in low numbers feeding on site.

Grey Heron *Ardea cinerea*

Regularly recorded feeding at the ponds, maximum count 26 birds. Heronry still active in a conifer plantation just behind the ETF at NS 43956 68871 with approximately 35 nests (egg shells at most of these). This makes this a significant heronry and one of the largest in the Clyde area. This heronry was previously sighted on Barochan Moss but was disturbed by the paintballing activities.

Mute Swan *Cygnus olor*

A pair on the pond on most visits, Ordnance Factory staff have said they breed most years.

Whooper Swans *Cygnus cygnus*

Winter visitors to the Inchinnan area. Have used fields near to the factory for feeding in winter. Are unlikely to come into the site due to their need for large open spaces.

Greylag Goose *Anser anser*

Small numbers recorded flying over the site in October and November.

Teal *Anas crecca*

Forty-seven Teal were recorded flying in at dusk to feed on the pond to the north of the site at NS 41737 70625.

Mallard *Anas platyrhynchos*

Present in small numbers feeding on the ponds on most visits. Will probably breed around the ponds.

Tufted Duck *Aythya fuligula*

Present in small numbers on Dargavel ponds. Up to 28 birds in winter 2004/2005.

Goldeneye *Bucephala clangula*

Up to 11 birds recorded feeding on ponds in winter 2004/2005

Sparrowhawk *Accipiter nisus*

Recorded fairly frequently during the survey, will undoubtedly be a common breeder on site nesting in the woodlands.

Buzzard *Buteo buteo*

Very common on site, several birds recorded on every visit, with possibly five breeding pairs. This appears to be a significant population of Buzzards. The combination of woodland and grassland makes this an ideal habitat for this species. There are high numbers of rabbits and voles as prey species.

Kestrel *Falco tinnunculus*

Recorded fairly frequently hunting on the site over the grassland. Highly likely that this species breeds here. May use the buildings as nest sites.

Peregrine *Falco peregrinus*

Recorded feeding on site, nest in nearby quarry. Probably uses site as part of its breeding territory.

Pheasant *Phasianus colchicus*

Low numbers of birds present on each visit

Moorhen *Gallinula chloropus*

One adult and one juvenile recorded in 2002 at the fire ponds and two birds on the pond at NS 41737 70625 in 2005. Probably breed around the ponds.

Coot *Fulica atra*

Sightings on pond in previous years, probably breeds around the ponds in low numbers.

Ringed Plover *Charadrius hiaticula*

Possibly nest on site.

Snipe *Gallinago gallinago*

A few birds have been flushed from wet areas including six birds from NS429691 and 13 from NS441684.

Woodcock *Scolopax rusticola*

Birds frequently flushed from the woodland and scrub, this species will breed.

Black-headed Gull *Larus ridibundus*

Low numbers feeding around ponds.

Herring Gull *Larus argentatus*

Low numbers occasionally on ponds and flying over site.

Lesser Black-backed Gull *Larus fuscus*

Low numbers on ponds and flying over site.

Stock Dove *Columba oenas*

A few birds flying over, probably feed in adjacent fields.

Woodpigeon *Columba palumbus*

A common species, recorded feeding across the entire site. Will breed in the woodland areas.

Collared Dove *Streptopelia decaocto*

A couple of records near the site entrance.

Barn Owl *Tyto alba*

Previously known roost sites were visited and owl pellets were found in several of these. Obviously still several pairs present.

Tawny Owl *Strix aluco*

Heard calling during the survey, will undoubtedly breed on the site.

Long-eared Owl *Asio otus*

Probably breed on site.

Kingfisher *Alcedo atthis*

Two birds recorded in previous years. Unlikely to breed on site.

Green Woodpecker *Picus viridis*

Occasional records of birds on previous surveys, one heard in 2005.

Great Spotted Woodpecker *Dendrocopos major*

Several birds recorded in the woodland in various parts of the site. Will breed in quite good numbers.

Skylark *Alauda arvensis*

Small flocks recorded flying over the site. Possibly breed.

Swallow *Hirundo rustica*

Many birds were still present in autumn, a very common breeder onsite. Birds nest in the buildings.

House Martin *Delichon urbica*

A couple of feeding birds in September. Possibly breed.

Meadow Pipit *Anthus pratensis*

Probably breed on site in the grassland areas.

Grey Wagtail *Motacilla cinerea*

Occasional records of birds feeding near watercourses, probably breed.

Pied Wagtail *Motacilla alba*

Occasional records of feeding birds, probably breed. May also use the buildings for nesting.

Wren *Troglodytes troglodytes*

A very common bird throughout the site nesting in woodland and scrub. Will breed in high densities.

Dunnock *Prunella modularis*

Birds recorded frequently in the scrub areas, will be a common breeder.

Robin *Erithacus rubecula*

Birds holding territory in woodland and scrub throughout the site. Very common.

Fieldfare *Turdus pilaris*

Low numbers feeding in scrub in October. Numbers increased into late October early November falling away to lower numbers using the site by the end of the month. They will probably increase again in late spring.

Blackbird *Turdus merula*

Present in good numbers in woodland and scrub throughout the site. Will be a very common breeding bird.

Song Thrush *Turdus philomelos*

Birds recorded on each visit, this will probably be a significant site for this species.

Redwing *Turdus iliacus*

Large numbers feeding in the scrub especially in the north and west of the site. As with Fieldfares, their numbers are highest late October early November.

Mistle Thrush *Turdus viscivorus*

A few birds recorded feeding in Whitebeams near site entrance and elsewhere on site. Will breed in low numbers.

Grasshopper Warbler *Locustella naevia*

One bird recorded singing in a marsh in September. Probably breed in small numbers on site.

Sedge Warbler *Acrocephalus schoenobaenus*

Possibly breed in marsh areas in small numbers.

Whitethroat *Sylvia communis*

Probably a common breeder in scrub areas.

Garden Warbler *Sylvia borin*

Possibly breed on site in small numbers.

Blackcap *Sylvia atricapilla*

Probably breed in quite high densities in scrub.

Chiffchaff *Phylloscopus collybita*

Probably breed on site in mature deciduous woodland. Previous records exist.

Willow Warbler *Phylloscopus trochilus*

A few birds still present in September in scrub, undoubtedly a very common breeder throughout the site.

Spotted Flycatcher *Muscicapa striata*

Possibly breed, most likely in mature deciduous trees near the entrance and around Dargavel house.

Goldcrest *Regulus regulus*

Present in high numbers in conifer woodland and also in other woodland and scrub throughout the site. Will be a common breeder.

Long-tailed Tit *Aegithalos caudatus*

Present in good numbers on each visit in woodland and scrub. Will breed in good numbers.

Coal Tit *Parus ater*

Recorded in good numbers in conifer woodland.

Blue Tit *Parus caeruleus*

Recorded frequently in woodland and scrub often in mixed flocks with other tits. Will be a common breeder.

Great Tit *Parus major*

Recorded frequently in the woodland and scrub through the duration of the survey, will be a common breeder.

Treecreeper *Certhia familiaris*

Birds recorded in deciduous woodland. Undoubtedly breed.

Dipper *Cinclus cinclus*

Recorded in 2002 west of the site where the Dargavel Burn enters the site. A nest was found below one of the bridges at the north end of the site near where the Dargavel enters the site.

Jay *Garrulus glandarius*

A locally significant population (only known breeding population in Renfrewshire)
Recorded feeding mainly to the north and west of the site. The mature Oaks will be significant to this species. An estimate of perhaps ten breeding pairs.

Magpie *Pica pica*

Recorded across the site during the survey, will breed.

Jackdaw *Corvus monedula*

Small flocks of Jackdaws recorded flying over and feeding on the site on each visit.
Together with other corvids; Crow and Rook over 2,000 birds recorded roosting in woodland to south of Dargavel house.

Rook *Corvus frugilegus*

A rookery was recorded in 2004/2005. This is located beside the two old houses at the site entrance (27 nests in 2001)

Carrion Crow *Corvus corone*

Recorded feeding on each visit. Will nest on site.

Raven *Corvus corax*

Recorded flying over the site on most visits. Probably breed in nearby Reilly Quarry.

Starling *Sturnus vulgaris*

Small numbers recorded on most visits. Will breed on site.

House Sparrow *Passer domesticus*

Birds recorded near site entrance, probably breed in buildings near to the village of Bishopton and near the entrance.

Chaffinch *Fringilla coelebs*

Large numbers present in woodland and scrub. Will breed in high densities.

Bullfinch *Pyrrhula pyrrhula*

Birds recorded on most visits in scrub. This appears to be a significant habitat for this species and it is estimated that they breed in regionally important numbers.

Greenfinch *Carduelis chloris*

Small flocks recorded on each visit, probably a common breeder in woodland.

Goldfinch *Carduelis carduelis*

Recorded feeding in flocks up to 70 birds on Creeping Thistle in grassland areas. Will breed.

Siskin *Carduelis spinus*

Flocks recorded feeding and flying over, mainly in conifer woodland areas and birch woodland. Will breed on site.

Linnet *Carduelis cannabina*

Small flocks recorded in scrub, probably breed.

Lesser Redpoll *Carduelis flammea*

Flocks recorded in birch woodland on most visits. Will breed in high densities.

Crossbill *Loxia curvirostra*

Small flocks recorded feeding in conifer woodland. Will probably breed in quite good numbers.

Reed Bunting *Emberiza schoeniclus*

Possibly breed in small numbers in marshy areas.

3.4 Species of Conservation Concern

3.4.1 Designations

RSPB Red and Amber Lists

Birds of Conservation Concern in the UK, Channel Islands and Isle of Man.

RSPB, Birdlife International, WWT, GCT, HOT, Wildlife Trusts, National Trust (2002).

UK Biodiversity Action Plan

Bird species, which qualify as *Priority Species of Conservation Concern* or as *Species of Conservation Concern*.

Local Biodiversity Action Plan (LBAP), Renfrewshire

Action plan species and Habitat Action plan key species in the Renfrewshire LBAP are included.

3.4.2 Breeding species of conservation concern

There have been three Schedule I species recorded on site, Barn Owl, Peregrine and Kingfisher. Barn Owl has been shown to be breeding on site, perhaps up to three breeding pairs. They are present all year, roosting in the buildings and feeding on site. The suitable hunting ground together with the large choice of roost and nest sites and the lack of traffic make this a significant site for this species. The status of Barn Owl in the adjacent area is largely unknown. The nearest records for Barn Owls is Erskine (Clyde Birds)

Peregrine has not been shown to nest on site but the possibility must be borne in mind due to the suitability of some of the buildings as nest sites. These buildings also have the possibility of acting as a roost site. Although the adjacent Reilly Quarry is noisy during the day, at night it has the possibility of acting as a roost site. The nearest known breeding pair is just across the river on the north side of the Clyde. The main use of the site is probably as a hunting ground. Kingfisher, also a Schedule I species has been recorded in the past, however it is in the opinion of Starling Learning that it is more likely to nest on the River Gryfe. There is a known nest site near where the Dargavel joins the Gryffe outside the site. Part of the bird's breeding territory may be inside the site.

There are up to nine possible red-data species breeding on site: Song Thrush, Spotted Flycatcher, Skylark, House Sparrow, Starling, Grasshopper Warbler, Bullfinch, Linnet and Reed Bunting. It is in the opinion of Starling Learning that the site is of particular significance for Song Thrush and Bullfinch.

Species	Status	Red/Amber status	UKBAP status
Peregrine	Schedule I	Amber listed: SPEC 2 or 3	UK BAP Species of conservation concern
Barn Owl	Schedule I	Amber listed: BDMr SPEC 2 or 3	UK BAP Species of conservation concern
Song Thrush	-	Red listed: BDp	UK BAP Priority species of conservation concern
Spotted Flycatcher	-	Red listed: BDp	UK BAP Priority species of conservation concern
Skylark	-	Red listed: BDp	UK BAP Priority species of conservation concern
House Sparrow	-	Red listed: BDp	-
Starling	-	Red listed: BDp	-
Grasshopper Warbler	-	Red listed: BDp	UK BAP Species of conservation concern
Bullfinch	-	Red listed: BDp	UK BAP Species of conservation concern
Linnet	-	Red listed: BDp	UK BAP Species of conservation concern
Reed Bunting	-	Red listed: BDp	UK BAP Species of conservation concern
Mute Swan	-	Amber listed: BI	UK BAP Species of conservation concern
Teal	-	Amber listed: WI	UK BAP Species of conservation concern
Kestrel	-	Amber listed: BDMp and SPEC 2 or 3	UK BAP Species of conservation concern
Sparrowhawk	-		UK BAP Species of conservation concern
Snipe	-	Amber listed: BDMp	UK BAP Species of conservation -

			concern
Woodcock	-	Amber listed: BDMp	UK BAP Species of conservation concern
Willow Warbler	-	Amber listed: BDMp	UK BAP Species of conservation concern
Meadow Pipit	-	Amber listed: BDMp	UK BAP Species of conservation concern
Swallow	-	Amber listed: SPEC 2 or 3	UK BAP Species of conservation concern
House Martin	-	Amber listed: BDMp	UK BAP Species of conservation concern
Dunnock	-	Amber listed: BDMp	UK BAP Species of conservation concern
Goldcrest	-	Amber listed: BDMp	UK BAP Species of conservation concern
Lesser Redpoll	-	Amber listed: BDMp	UK BAP Species of conservation concern
Mallard	-	-	UK BAP Species of conservation concern
Tawny Owl	-	-	UK BAP Species of conservation concern
Long-eared Owl	-	-	UK BAP Species of conservation concern
Great Spotted Woodpecker	-	-	UK BAP Species of conservation concern
Green Woodpecker	-	-	UK BAP Species of conservation concern
Dipper	-	-	UK BAP Species of conservation concern
Pied Wagtail	-	-	UK BAP Species of conservation concern
Grey Wagtail	-	-	UK BAP Species of conservation concern
Treecreeper	-	-	UK BAP Species of conservation concern
Sedge Warbler	-	-	UK BAP Species of conservation concern
Mistle Thrush	-	-	UK BAP Species of conservation concern
Redwing	-	-	UK BAP Species of conservation concern
Fieldfare	-	-	UK BAP Species of conservation concern
Whitethroat	-	-	UK BAP Species of conservation concern
Chiffchaff	-	-	UK BAP Species of conservation concern
Blackcap	-	-	UK BAP Species of conservation concern
Coal Tit	-	-	UK BAP Species of conservation concern

Blue Tit	-	-	UK BAP Species of conservation concern
Great Tit	-	-	UK BAP Species of conservation concern
Goldfinch	-	-	UK BAP Species of conservation concern
Greenfinch	-	-	UK BAP Species of conservation concern
Siskin	-	-	UK BAP Species of conservation concern

3.5 Significant bird habitats

Bird species of conservation concern designations are given in brackets after the bird species.

3.5.1 Scrub woodland

The Hawthorn and Blackthorn scrub are significant for breeding scrub species such as Bullfinch (red and LBAP), Willow Warbler (amber and LBAP) and Blackcap (LBAP) and also for winter flocks of thrushes. An area to the northwest appeared to be particularly good.

3.5.2 Birch woodland

Significant for other scrub species such as Lesser Redpoll (amber and LBAP)

3.5.3 Deciduous woodland

For breeding woodland species such as Song Thrush (red and LBAP) Blue Tit, Great Tit, (both LBAP) Great Spotted Woodpecker (LBAP), Jay, Woodcock (amber and LBAP), Tawny Owl (LBAP)

3.5.4 Conifer plantation

Significant for heronry (local and probably regional significance), Crossbills, Goldcrest (amber and LBAP), Siskin, Long-eared Owl and Coal Tit (all three LBAP)

3.5.6 Grassland

The previously mown grassland provides a home for and thus a supply of small mammals for Barn Owl, Tawny Owl (LBAP), Long-eared Owl (LBAP), Buzzard ((LBAP) and Kestrel (amber and LBAP). Also provides feeding area for flocks of small birds such as Goldfinch (LBAP).

3.5.7 Buildings

For nesting and roosting birds, mainly Barn Owl and Swallow (amber and LBAP). Other nests have included Jackdaw and possibly Song Thrush and Robin. Although the quarry is the most likely place for the Peregrine to nest, landfill operations may disturb them and there is the possibility of them nesting in one of the many tall buildings on site.

3.5.8 Marshy areas

There are small areas of marsh within the site providing a breeding habitat for Grasshopper Warbler and Reed Bunting, both red and LBAP species. Snipe have also been recorded here (amber).

3.5.9 Ponds and streams

Low numbers of wildfowl including Mute Swan (amber) and Mallard (LBAP) in the ponds. Grey Wagtail and Dipper (LBAP) nest along the burn.

3.5.10 Sedimentation Lagoons

To the east of the site there are various lagoons with crusts on them (Pictrite lagoons). This looks like the habitat likely to hold nesting Ringed Plover.

3.6 Discussion

The variety and extent of the habitats make this site significant to high numbers of birds. The loss of bird species within the development area has been concentrated on below. The Schedule One species most likely to be affected within the development area is Barn Owl. There will be loss of hunting grounds, nest sites and roost sites.

Schedule I species are protected under Section 4 of the Protection of birds (amended) 1967 Act and a license is necessary if disturbance is likely to occur. All buildings should be checked thoroughly before burning or demolition or any other change to them occurs. This work should be carried out during the period from August to March outside the breeding season. Checks to the buildings should be carried out at any time of year as the buildings may be used by roosting Barn Owls (and also bats). If Barn Owls are found to be breeding in any building, any disturbance within 300 metres of the nest site must cease. Maintaining the grassland will help to retain the population of Barn Owl and other birds of prey. Loss of habitat for this species could be compensated for by possible improvement of farmland within the planning application site. Advice could also be given by the RSPB who are due to appoint a farmland wildlife advisor in January 2006 to the Glasgow office.

Although no Kingfisher nest has been located, it must be borne in mind that there is a possibility of this occurring. If a nest is located near to a work area, a 300 metre exclusion zone should be implemented to avoid disturbance. It is unlikely to be a problem as the Kingfisher territory is mainly outwith the development area.

There will be some loss of hunting habitat for Peregrine but again improvement of the farmland should help compensate for this.

Development of the site will result in the loss of mainly woodland and scrub species such as Song Thrush, Bullfinch, Woodcock, Lesser Redpoll and Willow Warbler.

Within the development area there will be loss of habitat for various red and amber listed and UKBAP species. It is recommended that as much of the woodland and scrub should be retained as possible. In the farmland hedgerow improvement is recommended with some woodland and scrub planting in some of the fields.

Outwith the development area, as much of the deciduous woodland should be retained as possible as it hold good numbers of woodland birds. Some of the conifer plantation should also be retained as an additional habitat for Crossbill and other species. It is considered especially important to try to retain the plantation containing the heronry.

As well as avoiding disturbing Barn Owl and Peregrine, it is important to consider all nesting species and disturbance to buildings should be limited from the period March to August subject to prior examination by an ornithologists.

The marshy areas are small but do hold Snipe in winter and possibly a small breeding population of Grasshopper Warbler, Sedge Warbler and Reed Bunting. It is recommended that these are left undisturbed.

The ponds hold low numbers of wildfowl breeding and over wintering. The river provides a nesting habitat for Grey Wagtail and Dipper. The picrite lagoons may hold a breeding population of Ringed Plover.

Improvements to the Dargavel burn and development of wetland areas will greatly improve the site for wetland species. It is recommended that no large open pools are created in order that large numbers of wildfowl are not attracted to the site thus creating concerns for Glasgow Airport. Instead, marshy areas with small pools are recommended designed to attract Snipe, Reed Bunting, Sedge Warbler and Grasshopper Warbler.

Improvements to farmland also has the possibility of increasing the number of other species such as Yellowhammer, Linnet and Tree Sparrow.

Within the development area nest boxes for Starling and House Sparrow could be erected. Any planting within the designated green areas could be planted up with trees and shrubs that are attractive to birds.

4. Mammals

4.1 Introduction

A mammal survey of the survey area was carried out to ascertain the presence of animals using the site with targeted surveys for protected species Otter *Lutra lutra*, Water Vole *Arvicola terrestris* and Badger *Meles meles*.

4.2 Methodology

Evidence of all mammals using the site was recorded.

4.2.1 Otters

During the survey, all signs of Otter were recorded: tracks, spraints and couches and also possible Otter holts. Particular attention was paid to the islands and large boulders in mid-stream, as these are the usual sites to find Otter spraints and feeding remains. A good deal of time was also spent looking for areas suitable for a holt such as under large tree roots near to the waters edge. Periods of heavy rainfall and high water levels were avoided.

4.2.2 Badgers

The majority of the site was walked and possible pathways made by Badgers in and out of the grassland, wood and scrub were looked for, as were all mammal droppings, footprints and evidence of setts. The site is known to have Badgers and the aim of the survey was to produce a map showing all details of Badger activity. Locations of setts were identified using a GPS system. All Badger Activity is shown on Figure 14.2

Survey work involved checking the northern part of the site for new Badger activity and monitoring of existing setts. The perimeter fence of the site was also thoroughly searched from the main gate heading north and finishing at the Georgetown road in the south west. The boundary fence presents no obstacle to the Badgers and they dig under the boundary fence wherever they feel this is appropriate. This helps give an indication of interaction between groups on and off site.

4.2.3 Water Vole

The banks of the Dargavel Burn and all other watercourses and bodies were searched for signs of Water Vole presence using methodology described in the *Water Vole Conservation Handbook* (Strachan 1998). All signs including droppings, latrines, feeding stations, burrows, runways in vegetation and footprints were looked for.

4.3 Results

4.3.1 Otter signs are common around the ponds and on the watercourses on the whole site. Areas, which are well used, include the three Dargavel ponds, which have a good food supply, fish, amphibians and waterfowl. The tree lined bankings and large amounts of dead wood and debris make this an ideal location for a holt, although one was not found but spraints around all three ponds show regular Otter presence. Two well-used Otter slides were found on the Craigton burn and this is the exit point for Otters travelling in the east of the site. The Dargavel burn shows signs of Otters along its entire length. Starting in the north of the site Otter spraints were found under the bridge on Nethermill road NS411 704. At NS41469 70242 an Otter spraint was found under the bridge and an area worn smooth where an Otter has been lying up. A slide and spraints were located at the next bridge on the

Dargavel burn at building 28/304D. Another slide was found on the burn at 28/353A. Dargavel house is the next area showing activity with spraints under the two-pipe bridge within the grounds and also a lying up area higher up on the bridge. From the building 24/235 to the bridge at 28/264C the Dargavel shows many signs of Otter with spraints at three points and an Otter slide the thickly vegetated sides of this area and the thick tree cover in the grounds of Dargavel house make this area ideal Otter habitat. The bridges at 28/214A and 28/239E also have Otter spraints present. The bend in the river at 16/008 has an Otter couch on it and the bridge at 28/229C has a slide, spraints and a large pile of debris which, is used as a holt or a couch by Otters. At the bottom of the Dargavel burn east of Netherfield station there is a large pier structure made of sleepers and metal with a couch under it and a possible holt in tree roots 100 metres down stream followed by a slide approximately 150 metres downstream. Outside the factory there is a peninsula where the Dargavel meets the river Gryfe this had three distinct sprainting areas. Other areas of interest for Otters include the bridge at 28/135B, which has spraint and two slides. The lined ponds 25/107 are being used by Otters, as is the small pond and marsh area at 28/240. Evidence and sites located are detailed on the Table 5. below and shown on the Otter map.

Otter evidence	Site Grid Ref or Nearest Building
Spraint	NS 411 704 NS 414 702 Building 28/304D Building Dargavel house Dargavel pond A Dargavel pond B Dargavel pond C Building 24/235 Building 40/201B Building 28/264C Building 28/214A Building 28/239E Building 28/229C Building 28/240 NS 453 673 Building 28/135B
Couch	NS 414 702 Building Dargavel house Building 16/008 Building 28/229C ? NS 442 675
Slide	Building 28/304D Building 40/203 Building 28/229C NS 444 675 Building 28/135B
Holt	Building 28/229C ? NS 443 675 ?

4.3.2 All of the main setts from the original Badger survey John Derbyshire 2003 were checked and all still had Badgers in residence, it is most likely that they are still the main setts for each social group, the group of Badgers on the raised road seemed particularly active diggers with 48 holes dug from the banking this may be due to the poor nature of the digging substrate leading to tunnel collapses in their sett. The data collected so far suggests that there are four other social groups of Badgers who have there main setts within the

factory fence or consider the site a large part of their territory and at least three other groups of Badgers have regular paths leading into the factory for foraging. The first group of Badgers is located on the Newton road and their main sett is NS 427 712 they have two smaller setts at NS 4267 710 and they may also be the group in charge of two outlying setts at NS433 712 but it could also belong to a group from outside fence. The second main sett is at the perimeter fence where West Glenshinnoch meets Nethermill road NS 41737 70625 a sub sett for this group is NS 41813 70588, this group may also have the outlier setts at NS 419 706 and NS 421 706. A sett lies off the Craigton road at NS 423 705. A group of Badgers has a sett at the Northbrae station NS 423 695 but it is not possible to say what the status of the sett is at this time, it could be an outlier for another group. Barochan moss has a main sett at NS 424 684 with a number of outliers at up to six locations. Badgers are also coming in to the site from the Riley road at NS 414 696. The Badgers from the Formakin Estate are entering the site at NS 41137 70556. A final group of Badgers is entering the site from the north and is foraging in the Birch road area. The site now seems to be saturated with Badgers with nine setts on site and four on the outside forming the core of the Badger population. The small amount of traffic and undisturbed nature of the site suits them perfectly. This large site will have more small setts still to be found and the Badgers will move around their core areas in response to changes in the local habitat

Results are detailed in the table below and shown on the Badger map.

Details of evidence	Grid Ref	Sett category	Entrances	Status	Notes
West Glenshinnoch Sett	NS 41737 70625	Likely Main	6	Active	Hair, latrine, many paths
Sett	NS 41813 70588	Sub	2	Active	Hair.
Sett	NS 419 706	outlier	2	Active	Hair, latrine
Sett	NS 421 706	outlier	1	Active	Hair
Newton Road sett	NS427 712	Likely Main	18 holes	Active	Hair, latrine, banging ?
Sett	NS 426 710	sub	6 holes	Active	Hair, sharing with rabbits
Sett	NS 433 712	outlier	2 holes	Active	Paths lead on and off site may belong to Newton road sett or outsiders
Craigton road sett	NS 423 705	Main ?	4 holes	Active	Hair, latrine paths
Northbrae station sett	NS 423 695	Outlier ?	2 Holes	Active	Hair, latrine
Barochan moss sett	NS 424 684	Main	12 holes	Active	Hair, Latrine, paths into factory and pasture
Sett	NS 425 686	sub	3 holes	Active	
Sett	NS 424 684	sub	4 holes	Active	Hair, latrine
Sett	NS 424 683	Disused sett	5 holes	Inactive	
Sett	NS 424 682	outlier	1 hole	Active	Hair
Sett	NS 424 687	outlier	1 hole	Active	Hair
Dargavel sett	NS 435 692	Main	13 holes	Active	Hair, latrine, active paths
Picrite sett	NS 439 698	Main	11 holes	Active	Hair, latrine, paths

Grey clay sett	NS 449 681	Main	9 holes	Active	Possible disturbance sticks placed over entrance.
Raised road sett	NS 447 677	Main	48 holes	Active	Hair, latrine, extensive collapse due to substrate.
Building sett	NS 437 678	Main	13 holes	Active	Badgers tail found.
Path	NS 43260 70810				Path leading off-site to birch road, possible sett offsite?
Path	NS 43222 70889				Linked to NS 43185 70853
Feeding area	NS 43185 70853				
Trails, feeding signs	Building 25/104				Extensive trails
Sett	NS 43251 71117	Outlier	1 or 2	Active	Path follows fence Building 37/024
Path	At building 24/141				
Sett	NS 42631 71153	Main	18 holes	Active	Hair found, latrine. Extensive digging, possible rabbit warren taken over by Badgers
Sett	NS 42678 71000	Main/sub?	6 holes	Active	Sharing with rabbit warren in old building digging into roof
Possible sett	NS 42678 71000	Possible sub sett	2 holes	Active	One Badger dropping and lots of digging but may be just digging up rabbits.
Sett	NS 43328 69226		2 holes	Active	Under yew tree
Latrine	NS 43304 69211				
Sett	NS 43483 69275	Partial use			Possibly used by rabbits
Sett	NS 34381 69255		13 holes	Active	Connected to 43483 69275 by tracks. Latrine southwest of sett
Sett	NS 43468 69163	Partial use	5 holes	Active	
Sett	NS 43522 69221		4 holes	Active	
Latrine	NS 43101 69797				Large latrine
Latrine	NS 43997 68871				Large latrine under Larch tree
Sett	NS 42252 69425			Active	Hairs, bedding and latrine also found
Sett	NS 42165 69432			Active	Sharing with rabbits
Hole in perimeter fence and Badger path	NS 41477 69718				
Path	NS 41231 69925				Very well used path at side of spruce plantation.
Dropping,	NS 41896				Lots of trails, smell strongly

Badger hairs	70178				of Badger, suspect sett is nearby
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This is a significant population of Badgers which is probably still on the increase as the habitat improves for them. The lack of disturbance and quiet roads have been significant contributors to this large population.

4.3.3 Despite the habitat appearing to be very suitable in much of the site and previous records existing, evidence of Water Voles was found only at two sites. Burrows, runs and a latrine were found at NS427706, one of the ditches leading into the Dargavel. The other two sites had burrows and runs which appeared to be that of Water Vole at NS 428691 and NS 430700. These are shown on the Water Vole map. This was not an ideal time of year for this survey, however it has shown that this species is still present within the site in small numbers.

4.4 Other Mammals

Roe Deer *Capreolus capreolus*

Very common throughout the site, females often recorded with young.

Fox *Vulpes vulpes*

Droppings, tracks and paths common throughout the site. Several animals seen.

Mink *Mustela vison*

Several droppings recorded along the course of the Dargavel burn.

Rabbit *Oryctolagus cuniculus*

Very common on site. There are many rabbit warrens often in the banks surrounding some of the buildings. Some are adjacent to Badger setts.

Mole *Talpa europaea*

Mole hills are common throughout the site.

Grey Squirrel *Sciurus carolinensis*

Recorded fairly frequently at the site entrance and in woodland on several parts of the site.

Bank Vole *Clethrionomys glareolus*

Very common in banks alongside the Dargavel burn and other watercourses. Very large colonies in some banks and ditches.

Field Vole *Microtus agrestis*

Very common in grassland and scrub areas. Commonest skull found in Barn owl pellets.

Brown Rat *Rattus norvegicus*

Droppings found along watercourses

Wood Mouse

Skulls found in pellets.

Common Shrew *Sorex araneus*

Skulls found in owl pellets, several sightings, common on site in grassland.

Pygmy Shrew *Sorex minutus*

Skulls found in owl pellets. Common on site.

4.5 Discussion

The implications for the Badgers on the site as a whole are very significant, not just from the development area but from the proposed remediation of the wider site. The proposed village extension area will most directly affect three of the Badger setts: the sett near the current entrance, those on the Newton Road and those within the centre of the development area.. The options for the Newton Road Badgers include:

- Change the boundary of the development area leaving the area of Larch plantation untouched.
- The Badgers could perhaps be encouraged to move to an artificial sett in the pasture adjacent to the north, however but most of their current foraging area will be under developments.
- Develop better foraging areas to the north and west of the site in the farmland within the planning application site. The Badger Sett just south of the development area is very close to the proposed housing and employment zone. More worrying is the fact that there is a new road proposed very close to this sett. Options include:
 - Moving the proposed road further to the north entering the site closer to the actual development zone.
 - Improving the foraging areas to the south to encourage the Badgers to move south to feed rather than towards the development and the road.
 - The Badger sett within the development zone would be difficult to re-locate outside the site. It would be preferable to try to keep it within the site.

There is little room for manoeuvre outwith the site, as this area already has badgers in residence. If there is a real need to move the badgers, areas beyond the periphery of the site will have to be examined as the surrounding farmland and woodlands have no more carrying capacity for this species. If it is concluded that groups of badgers have to be relocated, there are a number of different options, including the construction of new setts adjacent to the disturbed sett, with possible translocation of shrubs to provide cover, and allowing the badgers to relocate themselves.

The most damaging feature of the proposed development will be the main access roads, which dissect two of the core badger areas, tunnels and fences will help but there still may be road casualties. Mitigation methods for badgers on roads include tunnels and fencing which can be incorporated into road designs.

As more of these areas become covered with scrub it should be anticipated that certain groups e.g. (Raised road badgers) will move their sett to buildings round 35/004P. These buildings should either be cleaned in anticipation of the badgers arrival or continue to have the vegetation cut on their slopes to prevent colonisation and un-necessary disturbance/cost.

The clearing of the site will make the badgers more mobile and they will move to the quieter areas within each territory making it harder to keep track of them. The site could be improved for badgers outside the village extension area. A greater diversity of planting to provide more seasonal fruit, areas of pasture and grassland to forage on and more woodland edge in the thickest conifer areas would all be

beneficial. Some of the grassland in the development area will be good feeding habitat for badgers but they must have reasonable cover in order to access it. This site is unique in the area in terms of lack of disturbance. Humans and dogs cause disturbance and vehicles are their main cause of death and therefore it is recommended that no traffic should be allowed through the rest of the site and that access is minimised to pedestrians.

Large-scale demolition of the site may cause the Otters to abandon the site in the short term. Of greater importance will be the effect on water quality both onsite and down stream, which could affect the otters directly or indirectly through the contamination or destruction of their food supply. Areas of bankside vegetation like bramble blackthorn, hawthorn and tall herb meadow are important in giving Otters confidence to move freely around the site. Areas of the Dargavel burn could hold a richer food supply if they had dams small side ponds and flood meadows which would hold more fish and amphibians, this would also increase water vole habitat. The thick bankside vegetation around Dargavel house should be retained and extended wherever possible. The Dargavel ponds are vital to the otters in terms of food and shelter. The thick vegetation should be retained on the banks and the dead trees retained in the water, tidiness should be avoided the current areas of mown grass around the waters edge should be left to grow brambles and scrub. Access around the ponds should be curtailed as much as possible. The existing pathways through the ponds could be severed and turned into islands to deter fishermen and dogwalkers. Recreation on the ponds should be discouraged or be of low impact e.g.(birdhide).

The population of Water Voles is in a state of flux. There is an uncertainty to the exact population present and whether it is in serious decline or not. It should be assumed that there are Water Voles present within the development area and that an intense search is made of all watercourses prior to development. There is scope for improving Water Vole habitat within the rest of the site thus hopefully increasing the population of this species.

5. Invertebrates

5.1 Butterflies

It was too late in the year for recording any meaningful results. The following butterflies were recorded:

Satyridae (the Browns)

Meadow Brown *Maniola jurtina*

Nymphalidae

Red Admiral *Vanessa atalanta*
 Painted Lady *Vanessa cardui*
 Small Tortoiseshell *Aglais urticae*
 Peacock *Inachis io*

Lycaenidae (Blues, Coppers and Hairstreaks)

Common Blue *Polyommatus icarus*
 Small Copper *Lycaena phlaeas*

Piridae (the Whites)

Large White *Pieris brassica*
 Small White, *Pieris rapae*
 Green-veined white *Pieris napi*

5.2 Species which may be present include; Orange-tip *Anthocharis cardamines*, Small Pearl-bordered Fritillary *Boloria selene*, Grayling *Hipparchia cretica*, and Purple Hairstreak *Quercusia quercus*. These are species with restricted distributions and their presence on these sites would have been noteworthy. However it was too late in the season to record these species.

The species recorded (those perhaps expected in *italics*), their status and their larval food plants are listed below in the table below.

Species	Local Status	Larval Food Plants
Meadow Brown	Very common all over	Various grasses
Grayling	Distributed throughout UK. In central Scotland normally coastal areas but occasional colonies exist in old industrial sites so it is a possibility	Grass species
Red Admiral	Frequent in varied habitats	Nettles
Painted Lady	Late summer migrant to this area	Nettles, thistles
Small Tortoiseshell	Very common, widely distributed	Nettles
Peacock	Frequent and widely distributed	Nettles
Common Blue	Widely distributed, on flower rich grasslands	Clovers etc.
Small Copper	Fairly widespread	Dock, sorrel and knotgrass

Purple Hairstreak	Mature oak and ash woodlands Would be worth checking mature Oaks at right time of year	Oak
Large white	Occasional in the wider area, prefers garden situations	Domestic cruciferous plants e.g. cabbage
Small White	Frequent in the wider area	Cruciferous plants
Green- veined White	Common in grasslands, especially damp meadows	Cruciferous plants e.g. Garlic mustard, cuckoo flower
Orange-tip	Recently spread throughout Scotland, now common and widespread, especially in damp meadows	Cuckoo flower
<i>Small Pearl-bordered Fritillary</i>	Widely distributed but in scattered sites of right habitat	Dog violet

Most of these butterfly species are dependant on grassland. It is therefore important to maintain and improve this habitat.

5.3 Other terrestrial invertebrates

5.3.1 Methodology

This involved the use of sweep nets, pitfall traps and turning over logs.

This is by no means a comprehensive list of the invertebrates at the survey site but an indication of the types of species using the site in the autumn. Due to the varied nature of the site a mixture of grassland, woodland, tall herb vegetation and wetland invertebrates were recorded. These are outlined in the table below. All are common species and widely distributed.

	Order	Invertebrate	Located
Roundworms	Nematoda	Nematode Worm <i>Mesenchytraeus armatus</i>	Under logs/stones
Annelid Worms	Annelida	Common Earthworm <i>Lumbricus terrestris</i>	Under logs/stones
		Earthworm <i>Dendrodilus rubidus</i>	Under logs/stones
Molluscs	Gastropoda	Great Black Slug <i>Arion ater</i>	Under logs/stones
		White-lipped Snail <i>Cepaea hortensis</i>	On vegetation
		Glass Snail <i>Vitrina pellucida</i>	Under logs/stones
		Garlic Snail <i>Oxychilus alliarium</i>	Under logs/stones
		Garden Snail <i>Helix aspersa</i>	In walls, under logs/stones
		Keeled Slug Great Grey Slug	Under logs/stones
Crustaceans	Isopoda	Smooth Woodlouse <i>Oniscus asellus</i>	Under logs/stones
		Woodlouse <i>Porcellio scaber</i>	
Arachnids	Acarina	Velvet Mite <i>Eutrombidium rostratus</i>	On willows and other vegetation

Insects

Araneae	Garden Spider <i>Araneus diadematus</i>	In vegetation
	Daddy-long-legs Spider <i>Pholcus phalangiodes</i>	On willows
	Woodlouse Spider <i>Dysdera crocata</i>	On vegetation
	Flower Spider <i>Misumena vatia</i>	On vegetation
Opiliones	Harvestman <i>Leiobunum rotundum</i>	
	Harvestman <i>Nemastoma</i> sp.	On vegetation
	Harvestman <i>Mitopus morio</i>	On vegetation
Diplura	Two-pronged Bristletail	Under logs/stones
Collembola	Springtail <i>Tomocerus vulgaris</i>	Under logs/stones
	Springtail <i>Tomocerus longicornus</i>	Under logs/stones
	Springtail <i>Isotoma</i> sp.	Under logs/stones
Dermaptera	Earwig <i>Forficula auricularia</i>	In vegetation
Hemiptera	Flower Bug <i>Anthocoris nemorum</i>	In vegetation
	Mirid Bug sp.	In vegetation
Homoptera	Common Froghopper <i>Philaenus spumarius</i>	In vegetation
	Leafhopper <i>Edwardsiana</i> sp.	In vegetation
	Aphid <i>Periphyllus testudinaceus</i>	In willows
	Green aphid sp.	In vegetation
Lepidoptera	See <i>Butterflies</i> above	In vegetation
Odonata	Large Red damselfly <i>Pyrrosoma nymphula</i>	Feeding in wetter areas
	Common Bue Damselfly <i>Enallagma cyathigerum</i>	Feeding in wetter areas
	<i>Coenagrion puella</i>	Feeding in wetter areas
	<i>Lestes sponsa</i>	Feeding in wetter areas
	Blue-tailed Damselfly <i>Ischnura elegans</i>	Feeding in wetter areas
	Common Hawker Dragonfly <i>Aeshna juncea</i>	Feeding in wetter areas
	<i>Libella quadrimaculata</i>	Feeding in wetter areas
	Red Darter <i>Sympetrum srtiolatum</i>	Feeding in wetter areas
Diptera	Crane-fly <i>Tipula oleracea</i>	In vegetation
	Owl Midge <i>Pericoma</i> sp.	In vegetation
	Flesh-fly <i>Sarcophaga carnaria</i>	In vegetation
	Greenbottle <i>Lucilia</i> sp.	In vegetation
	House Fly <i>Musca domestica</i>	In vegetation
	Dung Fly <i>Scathophaga</i> sp.	On ground
Hymenoptera	Ichneumon Fly <i>Protichneumon pisorius</i>	In vegetation
	Black Garden Ant <i>Lasius niger</i>	On willows, other vegetation and on ground
	Red Ant <i>Myrmica laevinodis</i>	On ground, under logs and stones
	Wasp <i>Vespula</i> sp.	In vegetation
	Honey Bee <i>Apis mellifera</i>	In vegetation
	Buff-tailed Bumblebee <i>Bombus terrestris</i>	In vegetation
	Carder Bee <i>Bombus agrorum</i>	In vegetation
Coleoptera	Ground Beetle <i>Cychrus caraboides</i>	Under logs/stones

Millipedes &
Centipedes

	Ground Beetle <i>Pterostichus sp.</i>	Under logs/stones
	Dock Leaf Beetle <i>Gastrophysa viridula</i>	On docks
	Soldier Beetle <i>Cantharis rustica</i>	In vegetation
	Soldier Beetle <i>Cantharis livida</i>	In vegetation
	7-spot Ladybird <i>Coccinella 7-punctata</i>	In vegetation
Staphylinidae	Rove Beetle <i>Bledius furcatus</i>	Under logs/stones
	Weevil <i>Apion pomonae</i>	In vegetation
Diplopoda	Flat-backed Millipede <i>Polydesmus angustus</i>	Under logs/stones
	Millipede <i>Tachypodoiulus niger</i>	Under logs/stones
Chilopoda	Centipede <i>Lithobius forficatus</i>	Under logs/stones
	Ribbon Centipede <i>Necrophloeophagus longicornus</i>	On ground

Scottish Natural Heritage may consider it necessary to carry out timed, targeted surveys for certain groups.

5.4 Aquatic Invertebrates

The three Dargavel ponds were sampled and also parts of the Dargavel Burn and other water courses. Very few invertebrates were found, this could partly be due to the lateness of the survey. In the Dargavel burn numbers of invertebrates were similar at the exit of the site as they were at the entrance .

Invertebrate	Taxon
Freshwater shrimp	<i>Gammaridae</i>
River Limpet	<i>Ancylidae</i>
Pea Mussel	<i>Ancylidae</i>
Freshwater sponge	<i>Spongillidae family</i>
Adult Water Boatman	<i>Corixidae</i>
Adult Waterboatman	<i>Nonectidae</i>
Water Cricket	<i>Velia caprai</i>
Stonefly	<i>Taeniopterygidae species</i>
Caddisfly larva	<i>Agapetus species</i>
Caddisfly species	?

5.5 Discussion

As numbers of invertebrates were relatively low there is no great concern over loss of species. Perhaps the most important group are the order Odonata. There will be a loss of some habitat for Dragonflies and Damselflies in the development area especially in the cleared Larch plantation with its numerous small ponds. However development and improvement of wetlands in the rest of the site would benefit these invertebrates.

6. Amphibian and Reptiles

6.1 It was too late in the season to carry out any meaningful surveys of amphibians and reptiles. The time of year meant that none of the standard methodologies (trapping, torching, netting, tiling) were employed. However a search was made for both amphibians and reptiles by all surveyors during the other ecological surveys. Netting was carried out during the aquatic invertebrate survey of the ponds and watercourses. Stones, logs and sheets of metal were turned over throughout the site.

6.2 Results

Common Frog *Rana temporaria* and Common Toad *Bufo bufo* were recorded throughout the site mainly near watercourses. Some were found in vegetation, some under logs and stones.

No newts were noted, however it is highly likely that newt species do exist within the site.

No reptiles were recorded.

6.3 Discussion

There are undoubtedly good numbers of amphibians using the site. Loss of habitat for amphibians within the development area will be from mainly the clear felled larch area to the northeast of the site. However, this can be compensated for by the improvement of wetland discussed in other chapters. Such development would not be beneficial to reptiles, however since the site has shown to be of little or no significance there is no real concern for this group.

7. Summary

The main value in the Bishopton site is as a refuge for a large number of birds, mammals and other species. Consideration has been given mainly to protected species to minimise disturbance and loss. However, it must be taken into consideration that the site is quite unique in the area providing a significant habitat to large numbers of common species. Loss of species will not always be compensated on a 'like for like' basis although this is possible to some extent by improving woodlands, scrub and grassland outside the development area. However the main recommendation is that the site is improved for other species not currently common on the site thus maximising the biodiversity. This can be achieved by the improvement of the Dargavel Burn and associated wetlands. This will increase the number of wetland bird species, improve the site for Water Vole and Otter, amphibians and invertebrates. Improvement of farmland within the planning application site by various means is also strongly recommended. This can be achieved by various means such as hedgerow improvement, set-aside, growing fields of wild bird cover, supplementary feeding and creation of small wetlands. Careful planning of the development area is vital with monitoring of various species being carried out on a regular basis leading up to and during works.

Outside the development area consideration has been given to the various habitats and its wildlife assemblages and how they can be managed and improved in value. At this point in time access to the countryside is very much in vogue. However, it is in the opinion of Starling Learning that access should very much take second place when considering the development of the area. Due to the huge loss from the development area it is vital that consideration is given first to the wildlife in the rest of the site and that access is restricted to certain areas and carefully managed.

This would include:

- No recreation on the ponds
- Walkers and cyclists restricted to the existing roads
- No traffic allowed

Liz Parsons
Starling Learning
December 2005

Appendices

Species Lists: Vascular Plant

Scientific_name	Common_name
<i>Acer platanoides</i>	Norway Maple
<i>Acer pseudoplatanus</i>	Sycamore
<i>Achillea millefolium</i>	Yarrow
<i>Achillea ptarmica</i>	Sneezewort
<i>Adoxa moschatellina</i>	Moschatel
<i>Aegopodium podagraria</i>	Ground-elder
<i>Aesculus hippocastanum</i>	Horse-chestnut
<i>Agrostis capillaris</i>	Common Bent
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Aira praecox</i>	Early Hair-grass
<i>Ajuga reptans</i>	Bugle
<i>Alchemilla glabra</i>	a lady's-mantle
<i>Alisma plantagoaquatica</i>	Water-plantain
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Allium ursinum</i>	Ramsons
<i>Alnus glutinosa</i>	Alder
<i>Alopecurus geniculatus</i>	Marsh Foxtail
<i>Alopecurus pratensis</i>	Meadow Foxtail
<i>Angelica sylvestris</i>	Wild Angelica
<i>Anthoxanthum odoratum</i>	Sweet Vernal Grass
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Aphanes arvensis</i> agg.	Parsley piert
<i>Aphanes arvensis</i> sens.str.	Parsley-piert
<i>Arabidopsis thaliana</i>	Thale Cress
<i>Arctium minus</i>	Lesser Burdock
<i>Arenaria serpyllifolia</i> sens.lat.	Thyme-leaved Sandwort
<i>Arrhenatherum elatius</i>	False Oat-grass
<i>Arum maculatum</i>	Lords-and-ladies
<i>Asplenium trichomanes</i> subsp.quadrivalens	a spleenwort
<i>Athyrium filixfemina</i>	Lady Fern
<i>Barbarea intermedia</i>	Medium-flowered Winter-cress
<i>Barbarea vulgaris</i>	Winter-cress
<i>Bellis perennis</i>	Daisy
<i>Betula pendula</i>	Silver Birch
<i>Betula pubescens</i>	Downy Birch
<i>Blechnum spicant</i>	Hard Fern
<i>Callitriche stagnalis</i> sens.lat.	Common Water-starwort
<i>Callitriche stagnalis</i> sens.str.	Common Water-starwort
<i>Campanula latifolia</i>	Giant Bellflower
<i>Cardamine amara</i>	Large Bitter-cress
<i>Cardamine flexuosa</i>	Wavy Bitter-cress
<i>Cardamine hirsuta</i>	Hairy Bitter-cress
<i>Cardamine pratensis</i>	Cuckooflower
<i>Cardamine raphanifolia</i>	
<i>Carduus crispus</i>	Wetted Thistle

Scientific_name	Common_name
Carex acuta	Slender Tufted-sedge
Carex flacca	Glaucous Sedge
Carex hirta	Hairy Sedge
Carex nigra	Common Sedge
Carex ovalis	Oval Sedge
Carex pilulifera	Pill Sedge
Carex remota	Remote Sedge
Carex rostrata	Bottle Sedge
Carex spicata	Spiked Sedge
Carex sylvatica	Wood-sedge
Carex viridula subsp.oedocarpa	Common Yellow Sedge
Carpinus betulus	Hornbeam
Centaurea nigra	Common Knapweed
Centaureum erythraea	Common Centaury
Cerastium fontanum	Common Mouse-ear
Cerastium glomeratum	Sticky Mouse-ear
Ceratocarpus claviculata	Climbing Corydalis
Chamerion angustifolium	Rosebay Willowherb
Chrysosplenium alternifolium	Alternate-leaved Golden-saxifrage
Chrysosplenium oppositifolium	Opposite-leaved Golden-saxifrage
Circaea lutetiana	Enchanter's-nightshade
Cirsium arvense	Creeping Thistle
Cirsium palustre	Marsh Thistle
Cirsium vulgare	Spear Thistle
Conopodium majus	Pignut
Cornus alba	White Dogwood
Corylus avellana	Hazel
Crataegus monogyna	Hawthorn
Crocodylia paniculata	Aunt-Eliza
Cynosurus cristatus	Crested Dog's-tail
Cystopteris fragilis	Brittle Bladder-fern
Cytisus scoparius	Broom
Dactylis glomerata	Cock's-foot
Deschampsia cespitosa	Tufted Hair-grass
Deschampsia flexuosa	Wavy Hair-grass
Digitalis purpurea	Foxglove
Dryopteris affinis	Scaly Male Fern
Dryopteris carthusiana	Narrow Buckler-fern
Dryopteris dilatata	Broad Buckler-fern
Dryopteris filixmas	Common Male Fern
Echium vulgare	Viper's Bugloss
Eleocharis palustris	Common Spike-rush
Elodea canadensis	Canadian Waterweed
Elytrigia repens	Common Couch
Epilobium brunnescens	New Zealand Willowherb
Epilobium ciliatum	American Willowherb
Epilobium hirsutum	Great Willowherb
Epilobium komarovianum	Bronzy Willowherb
Epilobium montanum	Broad-leaved Willowherb

Scientific_name	Common_name
<i>Epilobium obscurum</i>	Short-fruited Willowherb
<i>Epipactis helleborine</i>	Broad-leaved Helleborine
<i>Equisetum arvense</i>	Field Horsetail
<i>Equisetum palustre</i>	Marsh Horsetail
<i>Equisetum sylvaticum</i>	Wood Horsetail
<i>Erophila verna</i> sens.lat.	Common Whitlowgrass
<i>Euphrasia officinalis</i> agg.	Eyebright
<i>Fagus sylvatica</i>	Beech
<i>Fallopia japonica</i>	Japanese Knotweed
<i>Festuca arundinacea</i>	Tall Fescue
<i>Festuca pratensis</i>	Meadow Fescue
<i>Festuca rubra</i> agg.	Red Fescue
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fragaria vesca</i>	Wild Strawberry
<i>Fraxinus excelsior</i>	Ash
<i>Galanthus nivalis</i>	Snowdrop
<i>Galeopsis bifida</i>	Bifid Hemp-nettle
<i>Galium aparine</i>	Cleavers
<i>Galium palustre</i>	Common Marsh-bedstraw
<i>Galium saxatile</i>	Heath Bedstraw
<i>Galium verum</i>	Lady's Bedstraw
<i>Geranium dissectum</i>	Cut-leaved Crane's-bill
<i>Geranium molle</i>	Dove's-foot Crane's-bill
<i>Geranium robertianum</i>	Herb-robert
<i>Geum rivale</i>	Water Avens
<i>Geum urbanum</i>	Herb Bennet
<i>Glechoma hederacea</i>	Ground-ivy
<i>Glyceria fluitans</i>	Floating Sweet-grass
<i>Gnaphalium uliginosum</i>	Marsh Cudweed
<i>Hedera helix</i> 'Hibernica'	an ivy
<i>Hedera helix</i> subsp.helix	Common Ivy
<i>Heracleum sphondylium</i>	Hogweed
<i>Hieracium sabaudum</i>	
<i>Hieracium vulgatum</i>	a hawkweed
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Holcus mollis</i>	Creeping Soft-grass
<i>Hyacinthoides hispanica</i>	Spanish Bluebell
<i>Hyacinthoides hispanica</i> x <i>nonscripta</i>	a bluebell
<i>Hyacinthoides nonscripta</i>	Bluebell
<i>Hypericum androsaemum</i>	Tutsan
<i>Hypericum humifusum</i>	Trailing St. John's-wort
<i>Hypericum perforatum</i>	Perforate St. John's-wort
<i>Hypericum tetrapterum</i>	Square-stalked St. John's-wort
<i>Hypochaeris radicata</i>	Cat's-ear
<i>Ilex aquifolium</i>	Holly
<i>Iris pseudacorus</i>	Yellow Iris
<i>Juncus acutiflorus</i>	Sharp-flowered Rush
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bufonius</i> sens.str.	Toad Rush

Scientific_name	Common_name
Juncus conglomeratus	Compact Rush
Juncus effusus	Soft Rush
Juncus tenuis	Slender Rush
Laburnum alpinum	Scottish Laburnum
Lapsana communis	Nipplewort
Larix decidua	Larch
Larix decidua x kaempferi (L. x marschlinii)	Hybrid Larch
Lathyrus pratensis	Meadow Vetchling
Lemna minor	Common Duckweed
Lemna trisulca	Ivy-leaved Duckweed
Leontodon autumnalis	Autumnal Hawkbit
Lepidium heterophyllum	Smith's Pepperwort
Leucanthemum vulgare	Oxeye Daisy
Ligustrum vulgare	Wild Privet
Linaria repens	Pale Toadflax
Linaria vulgaris	Common Toadflax
Linum catharticum	Fairy Flax
Listera ovata	Common Twayblade
Lolium perenne	Perennial Rye-grass
Lonicera periclymenum	Honeysuckle
Lotus corniculatus	Common Bird's-foot-trefoil
Lotus pedunculatus	Large Bird's-foot-trefoil
Luzula campestris	Field Wood-rush
Luzula multiflora	Heath Wood-rush
Lysichiton americanus	American Skunk-cabbage
Lysimachia nummularia	Creeping-Jenny
Lysimachia punctata	Dotted Loosestrife
Malus domestica	Apple
Medicago lupulina	Black Medick
Mentha aquatica	Water Mint
Mercurialis perennis	Dog's Mercury
Montia fontana subsp.fontana	a blinks
Myosotis arvensis	Field Forget-me-not
Myosotis discolor	Changing Forget-me-not
Myosotis laxa	Tufted Forget-me-not
Myosotis scorpioides	Water Forget-me-not
Myosotis sylvatica	Wood Forget-me-not
Narcissus agg.	a garden daffodil
Narcissus poeticus	
Odontites vernus	Red Bartsia
Oenanthe crocata	Hemlock Water-dropwort
Oxalis acetosella	Wood-sorrel
Persicaria amphibia	Amphibious Bistort
Persicaria maculosa	Redshank
Phalaris arundinacea	Reed Canary-grass
Phleum pratense sens.str.	Timothy
Phragmites australis	Common Reed
Phyllitis scolopendrium	Hart's-tongue
Pilosella aurantiaca subsp.carpathicola	a fox and cubs

Scientific_name	Common_name
<i>Pilosella officinarum</i>	Mouse-ear-hawkweed
<i>Pinus sylvestris</i>	Scots Pine
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Poa annua</i>	Annual Meadow-grass
<i>Poa pratensis</i> sens.str.	Smooth Meadow-grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Polygonatum multiflorum</i> x <i>odoratum</i> (P. x <i>hybridum</i>)	Garden Solomon's Seal
<i>Polygonum arenastrum</i>	Equal-leaved Knot-grass
<i>Polygonum aviculare</i> agg.	Knotgrass [agg.]
<i>Polypodium vulgare</i> sens.str.	Polypody
<i>Populus nigra</i>	a poplar
<i>Potamogeton berchtoldii</i>	Small Pondweed
<i>Potamogeton natans</i>	Broad-leaved Pondweed
<i>Potentilla anglica</i>	Trailing Tormentil
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla sterilis</i>	Barren Strawberry
<i>Primula</i> cv.	Primrose cultivar
<i>Primula vulgaris</i>	Primrose
<i>Prunella vulgaris</i>	Selfheal
<i>Prunus avium</i>	Wild Cherry
<i>Prunus domestica</i>	Wild Plum
<i>Prunus spinosa</i>	Blackthorn
<i>Prunus</i> x <i>fruticosa</i>	Hybrid Blackthorn
<i>Pteridium aquilinum</i>	Bracken
<i>Quercus cerris</i>	Turkey Oak
<i>Quercus robur</i>	Pedunculate Oak
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus aquatilis</i> sens.lat.	Water Crowfoot
<i>Ranunculus ficaria</i>	Lesser Celandine
<i>Ranunculus ficaria</i> subsp. <i>bulbilifer</i>	a lesser celandine
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Reseda luteola</i>	Weld
<i>Rhododendron ponticum</i>	Rhododendron
<i>Ribes rubrum</i>	Red Currant
<i>Ribes uvacrispa</i>	Gooseberry
<i>Rosa caesia</i> subsp. <i>glauca</i>	Glaucous Dog-rose
<i>Rosa canina</i> agg.	Dog Rose
<i>Rosa canina</i> sens.str.	Dog Rose
<i>Rubus fruticosus</i> agg.	Bramble
<i>Rubus idaeus</i>	Raspberry
<i>Rumex acetosa</i>	Common Sorrel
<i>Rumex acetosella</i>	Sheep's Sorrel [agg.]
<i>Rumex crispus</i>	Curled Dock
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Rumex sanguineus</i>	Wood Dock
<i>Sagina apetala</i> subsp. <i>erecta</i>	Fringed Pearlwort
<i>Sagina procumbens</i>	Procumbent Pearlwort

Scientific_name	Common_name
Salix alba	White Willow
Salix caprea	Goat Willow
Salix caprea x viminalis (S. x sericans)	Broad-leaved Osier
Salix cinerea	Grey Willow
Salix cinerea subsp.oleifolia	a willow
Salix cinerea x viminalis (S. x smithiana)	Silky-leaved Osier
Salix fragilis	Crack Willow
Salix viminalis	Osier
Sambucus nigra	Elder
Scrophularia nodosa	Common Figwort
Sedum acre	Biting Stonecrop
Sedum album	White Stonecrop
Senecio jacobaea	Common Ragwort
Senecio viscosus	Sticky Groundsel
Senecio vulgaris	Groundsel
Silene dioica	Red Campion
Solanum dulcamara	Bittersweet
Sonchus asper	Prickly Sow-thistle
Sonchus oleraceus	Smooth Sow-thistle
Sorbus aria agg.	Whitebeam
Sorbus aucuparia	Rowan
Sparganium erectum	Branched Bur-reed
Spiraea douglasii	Steeplebush
Spiraea douglasii x salicifolia (S. x pseudosalicifolia)	Cofused Bridewort
Stachys palustris	Marsh Woundwort
Stachys sylvatica	Hedge Woundwort
Stellaria graminea	Lesser Stitchwort
Stellaria holostea	Greater Stitchwort
Stellaria media	Common Chickweed
Stellaria nemorum	Wood Stitchwort
Stellaria uliginosa	Bog Stitchwort
Symphoricarpos albus	Snowberry
Symphytum asperum x officinale (S. x uplandicum)	Russian Comfrey
Symphytum officinale	Common Comfrey
Symphytum tuberosum	Tuberous Comfrey
Syringa vulgaris	Lilac
Taraxacum agg.	Dandelion agg.
Taraxacum maculosum	a dandelion
Taxus baccata	Yew
Tellima grandiflora	Fringe-cups
Tilia cordata x platyphyllos (T. x vulgaris)	Lime
Tolmiea menziesii	Pick-a-back-plant
Trifolium dubium	Lesser Trefoil
Trifolium pratense	Red Clover
Trifolium repens	White Clover
Tripleurospermum inodorum	Scentless Mayweed
Tussilago farfara	Colt's-foot
Typha latifolia	Bulrush
Ulex europaeus	Gorse

Scientific_name	Common_name
Ulmus glabra	Wych Elm
Urtica dioica	Common Nettle
Valeriana officinalis	Common Valerian
Verbascum nigrum	Dark Mullein
Verbascum thapsus	Great Mullein
Veronica beccabunga	Brooklime
Veronica chamaedrys	Germander Speedwell
Veronica montana	Wood Speedwell
Veronica officinalis	Heath Speedwell
Veronica serpyllifolia	Thyme-leaved Speedwell
Vicia cracca	Tufted Vetch
Vicia sepium	Bush Vetch
Viola riviniana	Common Dog-violet

Species Lists: Bryophytes

Mosses

Amblystegium serpens
Amblystegium tenax
Atrichum undulatum
Aulacomnium palustre
Barbula convolute
Barbula cylindrica
Barbula recurvirostra
Barbula unguiculata
Brachythecium populeum
Brachythecium rivulare
Brachythecium rutabulum
Bryum argenteum
Bryum bicolor
Bryum caespiticium
Bryum capillare
Bryum pseudotriquetrum
Calliergon cuspidatum
Campylopus introflexus
Campylopus pyriformis
Ceratodon purpurea
Cirriphyllum piliferum
Climacium dendroides
Cryphaea heteromalla
Dicranella heteromalla
Dicranella rufescens
Dicranella varia
Dicranoweisia cirrata
Dicranum flagellare?
Dicranum fuscescens
Dicranum scoparium
Ditrichum cylindricum
Eurhynchium praelongum
Eurhynchium striatum
Eurhynchium swartzii
Fissidens bryoides
Fissidens taxifolius
Fissidens viridulus
Fontinalis antipyretica
Funaria hygrometrica
Grimmia pulvinata
Heterocladium heteropterum
Homalothecium sericans
Hylocomium splendens
Hypnum cupressiforme
Hypnum jutlandicum
Hypnum mammillatum
Isopterygium elegans
Isothecium myosuroides
Mnium hornum

Orthodontium lineare
Orthotrichum affine
Orthotrichum anomolum
Orthotrichum diaphanum
Orthotrichum pulchellum
Philonotis fontana
Plagiomnium affine
Plagiomnium cuspidatum
Plagiomnium undulatum
Plagiothecium nemorale
Plagiothecium undulatum
Pleurozium schreberii
Pogonatum aloides
Pogonatum urnigerum
Pohlia annotina
Pohlia nutans
Pohlia wahlenbergii
Polytrichum commune
Polytrichum formosum
Polytrichum juniperum
Polytrichum piliferum
Pottia truncata
Pseudoscleropodium purum
Racomitrium canescens var. ericoides
Racomitrium heterostichum
Racomitrium lanuginosum
Rhynchostegium riparioides
Rhytidiadelphus loreus
Rhytidiadelphus squarrosus
Rhytidiadelphus triquetrus
Schistidium apocarpon agg.
Schistidium crassipilum
Sphagnum palustre
Tetraphis pellucida
Thamnobryum alopecurum
Thuidium tamariscinum
Tortula muralis
Tortula ruralis ssp. ruralis
Ulota crispa s.s.
Ulota phyllantha
Zygodon conoideus
Zygodon viridissimus
Total 91

Liverworts

Blasia pusilla
Calypogeia fissa
Cephalozia bicupsidata
Cephaloziella divaricata
Chilocyphus polyanthos
Diplophyllum albicans
Fossombronia wondraczekii
Frullania dilatata

Jungermannia gracillima
Lepidozia reptans
Lophocolea bidentata
Lophocolea heterophylla
Marchantia polymorpha
Metzgeria fruticulosa
Metzgeria furcata
Pellia endiviifolia
Pellia epiphylla
Plagiochila porelloides
Porella cordeana
Riccia sorocarpa
Scapania irrigua
Total 21

Algae (not sampled)
Trentepohlia sp. (on bark)
Rivularia sp. (path edges)
Desmococcus viridis (on bark)

Species Lists: Fungi and Lichens

Lichens

Acarospora fuscata
Arthonia radiata
Bacidia inundata
Caloplaca citrina
Caloplaca holocarpa
Caloplaca saxicola
Candelariella reflexa
Candelariella vitellina
Cladonia bellidiflora
Cladonia chlorophaea
Cladonia coccifera
Cladonia coniocraea
Cladonia fimbriata
Cladonia floerkeana
Cladonia furcata
Cladonia impexa
Cladonia macilenta
Cladonia polydactyla
Cladonia rangiformis??
Cladonia squamosa
Collema cristatum
Evernia prunastri
Fuscidea lightfootii
Hypogymnia tubulosa
Hypogymnia physodes
Lecania erysibe?
Lecanora albescens?
Lecanora campestris?
Lecanora chlarotera
Lecanora dispersa
Lecanora expallens
Lecanora intricata
Lecanora symmicta?
Lecidea lithophylla
Lecidella elaeochroma
Lecidella scabra
Lepraria incana agg.
Leptogium gelatinosa
Ochrolechia androgyna
Parmelia caperata
Parmelia crinita?
Parmelia glabratula
Parmelia saxatilis
Parmelia subaurifera
Parmelia sulcata
Peltigera horizontalis
Peltigera lactucifolia
Peltigera membranacea
Pertusaria pertusa

Phaeophyscia orbicularis
Physcia adscendens
Physcia aipolia
Physcia caesia
Physcia tenella
Platismatia glauca
Porina aenea
Porpidia tuberculata
Ramalina farinacea
Ramalina fastigiata
Usnea subfloridana
Xanthoria parietina
Xanthoria polycarpon
Total 62

Fungi

Armillaria tabescens
Amanita muscaria
Amanita rubescens
Auricularia auricula
Amanita fulva
Boletus badius
Leccinum scabra
Bolbitis vitellinus
Clavulina cristata
Coriolus versicolor
Dacrymyces stillatus
Cortinarius pallescens
Cortinariua pseudosuber
Cortinarius spp.
Crepidotus mollis
Crepidotus variabilis
Cystoderma amianthinum
Entoloma prophyrophaeum
Entoloma rhodopolium
Fomes fomentarius
Galerina laevis
Geoglossum cookeianum
Hebeloma crustuliniforme
Hypholoma fasciculare
Hypholoma sublateritium
Hygrocybe conica
Hygrocybe coccinea
Hygrocybe langeii?
Hygrocybe pratensis
Hygrocybe nivea
Hygrocybe psittacina
Hygrocybe vitellina?
Hygrophoropsis aurantium
Hypoxyton fragiforme
Inocybe rimosa
Laccaria laccata
Lactarius torminalis

Lactarius rufus
Lactarius glyciosmus
Lentinellus ursinus?
Lycopodium perlatum
Mycena acicula?
Mycena hiemalis
Mycena haemotopus
Mycena metata
Mycena olida
Mycena pseudocorticola
Mycena alcalina?
Mycena galericulata
Panaeolus rickenii
Paxillus involuta
Pholiota graminis?
Pluteus cervicornis
Polyporus betulinus
Polyporus varius
Postia styptica
Russula ochroleuca
Russula spp.
Sceleroderma citrina
Stereum gausapatum
Stropharia semiglobatum
Tricholoma saponacea
Xylaria hypoxylon
Total 63