Grandhome Estate, Aberdeen

Technical Annex - Ecology

Produced for Grandhome Trust

By Applied Ecology Ltd

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Executive Summary

- Baseline ecology survey work of land that could be affected by a proposed new sustainable community called Grandhome that is located on the northern outskirts of Aberdeen has been completed by Applied Ecology Ltd in 2011-2012.
- The study area supports no land covered by statutory or non-statutory wildlife site designation, and consists of mixed agricultural farmland dominated by intensively managed arable land, with occasional fields of improved and species-poor semi-improved neutral grassland of relatively low nature conservation and biodiversity interest. Small blocks of plantation and semi-natural broadleaved woodland and a pond (known as the manganese quarry pond) occur within the site and have greater ecological value in a local context.
- A badger territory mapping exercise has been completed (separate confidential report) and verifies that the study area is occupied by three different badger groups, two of which have their main (breeding) setts within the study area.
- Small numbers of red squirrel have been recorded in woodland adjoining the study area as part of the baseline survey. Grey squirrel has also been recorded in a woodland belt along the site's eastern boundary, which adjoins existing residential development. The pine cone feeding remains of squirrels have also been recorded in a number of locations within the study area, although it is not possible to determine if such cones have been fed on by red or grey squirrel.
- Survey work has verified that otter, water vole and great crested newt are all absent from the study area. No habitat suitable for otter is present within the study area or a 200m buffer around it. Evidence of otter was recorded during the survey but only in areas beyond the 200m buffer zone towards the River Don.
- Wintering and breeding bird surveys have verified that the study area does not support a particularly large or important bird assemblage, and the character of its bird population is considered typical for the mixed agricultural and urban fringe landscape of this part of Scotland. A Wildlife & Countryside Act Schedule 1 list species – barn owl – has been recorded roosting (but not breeding) at one farmstead location within the study area during the winter and summer.
- Bat survey data gathered from transect, roost emergence and return and automated bat detector surveys indicate that that the study area is of *district, local or parish value* for commuting and foraging common, soprano and nathusius's pipistrelle bats, and *county value* for *Myotis* bats. Building inspection surveys have recorded evidence of minor summer roosting in two buildings, but note that most buildings possess features that bats could use for roosting and will need further investigation in advance of each development phase to verify bat presence or absence.

1 Introduction

Background

1.1 This Technical Report provides a detailed description of ecological baseline conditions associated with land that could be affected by development of a proposed new sustainable community known as Grandhome, which is strategically located between the Bridge of Don and Dyce on the north side of Aberdeen, as shown by **Figure 1.1**. The development is being promoted by the Grandhome Trust, a family-controlled company that owns the entire land area under consideration.

Survey Scope

1.2 The scope of the ecology and biodiversity survey work completed for the Grandhome development was informed by a professional judgement view on the potential value of the site for features of biodiversity importance based on a desk-based biological records search, a walkover survey of the site completed in August 2011[1], and a scoping meeting with Scottish Natural Heritage and scoping opinion provided by SEPA and Aberdeen City Council.

1.3 The ecology study area encompasses all land that was being considered for potential development at the start of project planning, and extends beyond the land area that is now being taken forward for development.

Report Structure

1.4 This report is divided into the following chapters:

- Chapter 2: Planning Policy Context;
- Chapter 3: Wildlife Designations and Existing Biological Records;
- Chapter 4: Habitats and Plants;
- Chapter 5: Birds;
- Chapter 6: Red Squirrel;
- Chapter 7: Bats;
- Chapter 8: Water Vole;
- Chapter 9: Otter;
- Chapter 10: Great Crested Newt.

1.5 It should be noted that badger survey information is provided as a standalone confidential Badger Protection Plan report.

[1] Applied Ecology Ltd (January, 2012). *Grandhome Estate, Aberdeen – Ecology Appraisal*. Report for the Grandhome Trust. Final V2. 6 January 2012.

Grandhome

Site Location

Ecology appraisal survey area

Figure 1.1

Map Scale @ A3: 1:15,000

Surveyed by: -	
Survey date: -	
Drawn by: RAH	
Checked by: DP	
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2 Planning Policy Context

International Planning Policy

2.1 In May 1992, the UK and other European Union governments adopted legislation to protect Europe's most important habitats and species. The so called 'Habitats Directive' complements the earlier 'Birds Directive' adopted in 1979. At the heart of both Directives is the creation of a Europe-wide network of sites called Natura 2000. The Birds Directive requires the establishment of Special Protection Areas (SPAs) of ornithological importance, and the Habitats Directive requires Special Areas of Conservation (SACs) to be designated for other animal species, and habitats. Together, both SPAs and SACs make up the Natura 2000 series.

2.2 The Habitats Directive was adopted into national legislation in 1994 in the form of the Conservation (Natural Habitats etc.) Regulations 1994 (hereafter referred to as the Habitats Regulations). In the UK, all terrestrial Natura 2000 sites are already notified Sites of Special Scientific Interest (SSSIs).

National Planning Policy

2.3 The Site of Special Scientific Interest (SSSI) is the main statutory nature conservation designation in the UK. Such sites are special for their plants, or animals, or habitats, their geology or landforms, or a combination of these. Scottish Natural Heritage (SNH) is the key statutory agency in Scotland for advising Government, and for acting as the Government's agent in the delivery of statutory nature conservation designations in Scotland.

2.4 Designation of a SSSI is a legal process, by which sites are notified under the Wildlife and Countryside Act 1981. The 1981 Act makes provision for the protection of sites from the effects of changes in land management, and owners and occupiers receive formal notification specifying why the land is of special scientific interest, and listing any operations likely to damage the special interest.

2.5 The Nature Conservation (Scotland) Act 2004 introduces significant changes to the existing arrangements for the establishment and protection of SSSIs by updating most of Part II of the Wildlife and Countryside Act 1981, and extending the protection of birds, animals and plants by revising Part I of the 1981 Act. The Act also strengthens the Protection of Badgers Act 1992, which protects badger *Meles meles* and its setts.

2.6 Scottish Planning Policy (February, 2010) gives a statement of the Scottish Government's Policy on land use planning, including Landscape and Natural Heritage (paragraphs 125 – 148) and covers policies relating to International Designations, National Designations, Local Designations, Protected Species and Trees and Woodland.

Strategic Structure Plan Policy

2.7 The Aberdeen City and Shire Structure Plan (August, 2009) sets a clear direction for the future development of the North East towards which the public and private sectors can work to deliver the vision.

2.8 One of the strategic objectives of the plan is "*to make sure new development maintains and improves the region's important built, natural and cultural assets*". In relation to biodiversity the plan specifically states in paragraph 4.21 that "*Biodiversity, wildlife habitats and landscape can be vulnerable to the effects of new development. As a result, we need to focus on maintaining and improving them, especially where there are plans for development…*".

Local Development Plan Policy

2.9 The Aberdeen Local Development Plan 2012 (Version: 0.1) contains a number of policies relevant to biodiversity and nature conservation.

2.10 Policies NE1-NE10 are the policies that specifically relate to the Natural Environment. A summary of the most relevant policies relating to ecology and biodiversity is provided below.

- **Policy NE1 - Green Space Network**: "*The City Council will protect, promote and enhance the wildlife, recreational, landscape and access value of the Green Space Network. Proposals for development that are likely to destroy or erode the character or function of the Green Space Network will not be permitted. Where major infrastructure projects or other developments necessitate crossing the Green Space Network, such developments shall take into account the coherence of the network. In doing so measures shall be taken to allow access across roads for wildlife and for access and outdoor recreation purposes*."
- **Policy NE5 - Trees and Woodlands**: "*There is a presumption against all activities and development that will result in the loss of, or damage to, established trees and woodlands that contribute significantly to nature conservation, landscape character or local amenity, including ancient and semi-natural woodland which is irreplaceable.*

  Appropriate measures should be taken for the protection and long term management of existing trees and new planting both during and after construction. Buildings and services should be sited so as to minimise adverse impacts on existing and future trees and tree cover.

  Native trees and woodlands should be planted in new development."
- **Policy NE8 - Natural Heritage**: "*Development that, taking into account any proposed mitigation measures, has an adverse effect on a protected species or an area designated because of its natural heritage value will only be permitted where it satisfies the relevant criteria set out in Scottish Planning Policy. These are International Designations, National Designations, Local Designations and European Protected Species and Species protected under the Wildlife and Countryside Act 1981.*

  In all cases of development at any location: -

- *Applicants should submit supporting evidence for any development that may have an adverse effect on a protected species demonstrating both the need for the development and that a full range of possible alternative courses of action has been properly examined and none found to acceptably meet the need identified.*
- *An ecological assessment will be required for a development proposal on or likely to affect a nearby designated site or where there is evidence to suggest that a habitat or species of importance (including those identified in the UK and Local Biodiversity Action Plans) exists on the site.*
- *No development will be permitted unless steps are taken to mitigate negative development impacts. All proposals that are likely to have a significant effect on the River Dee SAC will require an appropriate assessment which will include the assessment of a detailed construction method statement addressing possible impacts on Atlantic Salmon, Freshwater Pearl Mussel and Otter. Development proposals will only be approved where the appropriate assessment demonstrates that there will be no adverse effect on site integrity, except in situations of overriding public interest.*
- *Natural heritage beyond the confines of designated sites should be protected and enhanced.*
- *Where feasible, steps to prevent further fragmentation or isolation of habitats must be sought and opportunities to restore links which have been broken will be taken.*
- *Measures will be taken, in proportion to the opportunities available, to enhance biodiversity through the creation and restoration of habitats and, where possible, incorporating existing habitats.*
- *There will be a presumption against excessive engineering and culverting; natural treatments of floodplains and other water storage features will be preferred wherever possible; there will be a requirement to restore existing culverted or canalised water bodies where this is possible; and the inclusion of SUDS. Natural buffer strips will be created for the protection and enhancement of water bodies, including lochs, ponds, wetlands, rivers, tributaries, estuaries and the sea. Supplementary Guidance will be developed on buffer strips."*

Scottish Biodiversity Strategy

2.11 The Scottish Biodiversity Strategy, "Scotland's Biodiversity: It's in Your Hands" aims to conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future, and was published by the Scottish Government in May 2004. This strategy was developed in close partnership with the Scottish Biodiversity Forum, a broad based working partnership of public, private and voluntary organisations. It also draws from a set of documents published by the Forum in 2003 under the collective title of "*Towards a Strategy for Scotland's Biodiversity: Biodiversity Matters*". It represents Scotland's response to its obligations under the Convention on Biological Diversity and to the UK Biodiversity Action Plan, along with the Scottish Ministers' desire to put biodiversity at the heart of national identity and culture.

2.12 The strategy covers the period up to 2030. It presents a vision, an aim and five strategic objectives:

1) Species & Habitats: To halt the loss of biodiversity and continue to reverse previous losses through targeted action for species and habitats
2) People: To increase awareness, understanding and enjoyment of biodiversity, and engage many more people in conservation and enhancement
3) Landscapes & Ecosystems: To restore and enhance biodiversity in all our urban, rural and marine environments through better planning, design and practice
4) Integration & Co-ordination: To develop an effective management framework that ensures biodiversity is taken into account in all decision making
5) Knowledge: To ensure that the best new and existing knowledge on biodiversity is available to all policy makers and practitioners.

North East Scotland Local Biodiversity Action Plan

2.13 The North East Scotland Local Biodiversity Action Plan (NESLBAP) was first published in 2000 and included two specific habitat action plans (HAPs), five specific area action plans (AAPs) and three species action plans (SAPs). Since this time the NESLBAP has been reviewed and new action plans added. According to the Biodiversity Action Reporting System (BARS) the NESLBAP currently includes ten HAPs and four SAPs. Of these, the following are considered particularly relevant to the Grandhome development site:

- Farmland;
- Field Margins and Boundary Habitats;
- Daubenton's bat;
- Red Squirrel;
- Water Vole;
- Wych elm.

3 Conservation Designations and Existing Biological Records

Data Search

3.1 Biological records for the study area and its immediate surrounds were provided by the Northeast Scotland Biological Recording Centre (records received on the 6 September 2011). The area of search included all land within the study area boundary, together with an additional area of land to the south-west to incorporate land along the eastern floodplain of the River Don, and also a 250 metre buffer around these combined areas.

Designated Sites

3.2 The locations of statutory and non-statutory wildlife site designations in relation to the study area are shown by **Figure 3.1**.(Statutory Sites) and **Figure 3.2** (Non-Statutory Sites).

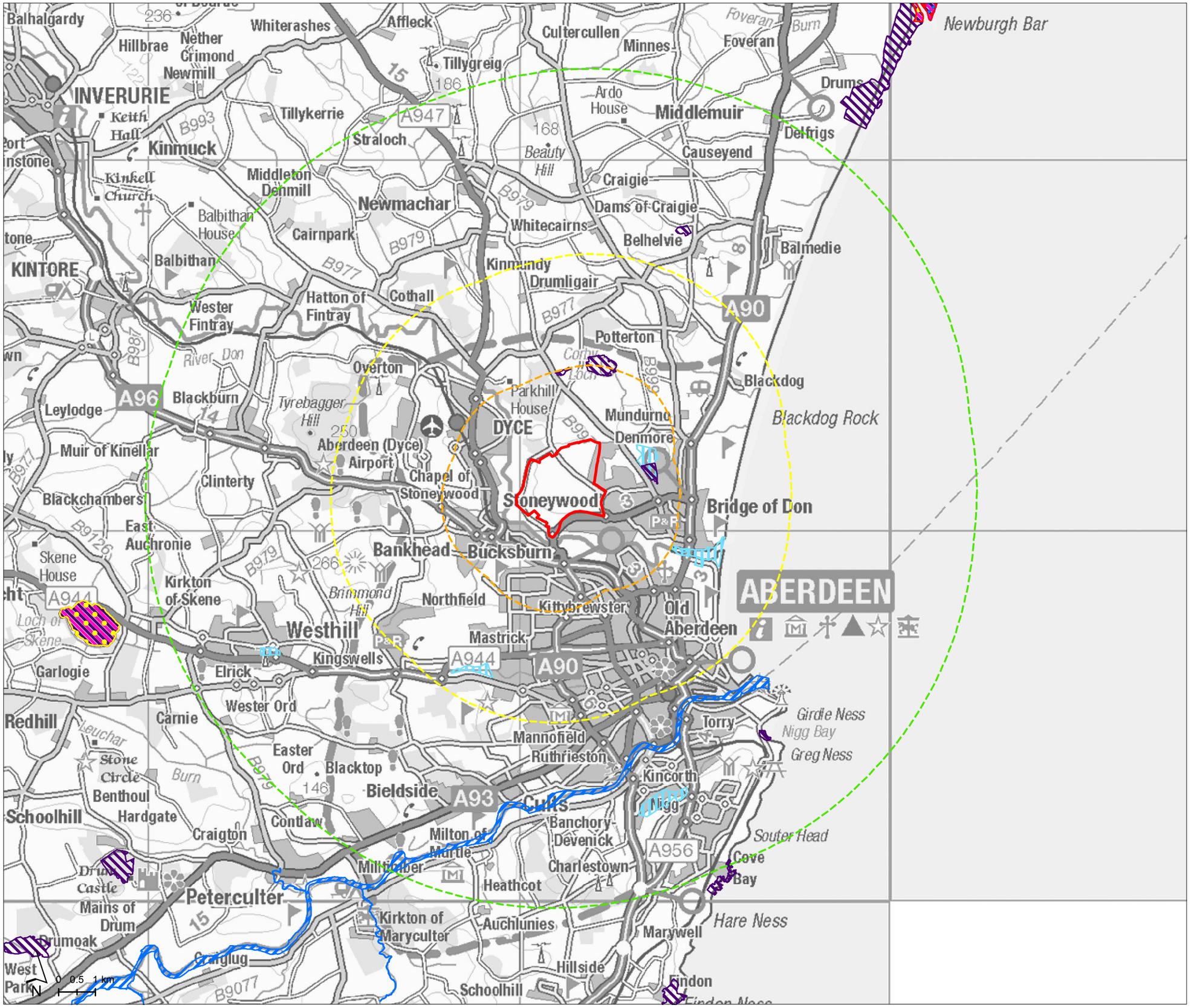
Statutory Sites

3.3 No statutory wildlife sites occur within or close to the study area, the nearest being **Corby, Lily and Bishops Lochs Site of Special Scientific Interest (SSSI)** located 1.9km to the north. This SSSI comprises three lochs with fringing reed beds, bogs and woodland, and is considered to be one of the best, and least disturbed wetland sites in the north-eastern lowlands. The SSSI citation makes no mention that the site is important for its assemblages of breeding or over-wintering waterfowl or wetland birds.

Non-Statutory Sites

3.4 Three areas within the Grandhome site boundary, namely **Clerkhill Wood, Monument Wood** and **Persley Quarries** are shown as non-statutory District Wildlife Sites on a figure produced by NESBReC. However, since the data search was undertaken these three sites have been removed from the list of Local Nature Conservation Sites (LNCS), following a review of these sites across Aberdeen. Parts of these three woodlands are classified as long established woodland of plantation origin on the Ancient Woodland Inventory, and together with two other linear belts of plantation woodland, they are classified as 'Green Space' under the policy NE1 Green Space Network of Aberdeen Local Development Plan 2012.

3.5 Four non-statutory sites adjoin the Grandhome study area along or close to its boundary. These are **Grandhome Moss LNCS** (also included in the raised bog inventory), **Stoneyhill Wood LNCS**, the **River Don Corridor LNCS** and the **Aberdeen – Inverness & Kittybrewster Railway Line LNCS**.



Grandhome

Statutory Sites for Nature Conservation

- Ecology appraisal survey area
- 2km from site
- 5km from site
- 10km from site

- SSSI
- NNR
- SPA
- SPA
- Ramsar site
- LNR

Data supplied by SNH.

Figure 3.1

Map Scale @ A3: 1:100,000

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Grandhome

Non-Statutory Sites for Nature Conservation

Ecology appraisal survey area

Local Nature Conservation Sites

Ancient Woodland

Ancient (of semi-natural origin)

Long-Established (of plantation origin)

Other (on Roy map)

Data supplied by SNH and NESBReC

Figure 3.2

Map Scale @ A3: 1:20,000

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Survey date: -	
Drawn by: RAH	
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Protected Species

3.6 Records of protected plant and animal species were provided by NESBReC for land within the study area. A number of records, for example those of redwing, hooded crow and common tern are not, however, of great significance as these species are very unlikely to occur as breeding individuals due to the site's geographical location and habitat characteristics.

3.7 Species records from within the study area that are of particular relevance in the context of the proposed development are:

- Song thrush (UK Biodiversity Action Plan);
- Red squirrel (UK BAP);
- Yellowhammer (UK BAP);
- Skylark (UK BAP);
- Wych elm (North-East Scotland Local BAP);
- Large-flowered hemp nettle (Scottish Biodiversity List); and
- Wild pansy (SBL).

4 Habitats and Plants

Approach

4.1 A Phase 1 habitat survey[2] of the entire study area was undertaken by Robert Hutchinson and Rick Goater (experienced AEL botanists and habitat surveyors and members of CIEEM) over the period 23-27 April and 18 June 2012, following a preliminary walkover survey of the site by AEL personnel in August 2011. Habitats were classified according to the standard Phase 1 habitat survey methodology and mapped in the field using a 1:10,000 OS base, printed at a scale of 1:5,000.

4.2 Numbered botanical target notes were used to provide a record of important semi-natural habitat types and habitat variation across the site, as well as of habitat features too small to map accurately in the field. Specific attention was given to recording the plant composition of higher value habitats in order that these could be described in the context of the National Vegetation Classification (NVC)[3] and the Functional Wetland Typology for Scotland (SNIFFER)[4]. Where appropriate, target notes included a full list of the plant species present, together with an estimate of their relative abundance according to the DAFOR scale[5]. The Phase 1 habitat map was subsequently digitised using Geographical Information System (GIS) software (ESRI ArcView).

4.3 The locations of any plant species with rarity status according to the 2005 Vascular Plant Red Data List[6] found during the habitat survey were recorded using a 10-figure grid reference generated from a hand-held Global Positioning System (GPS).

Survey Findings

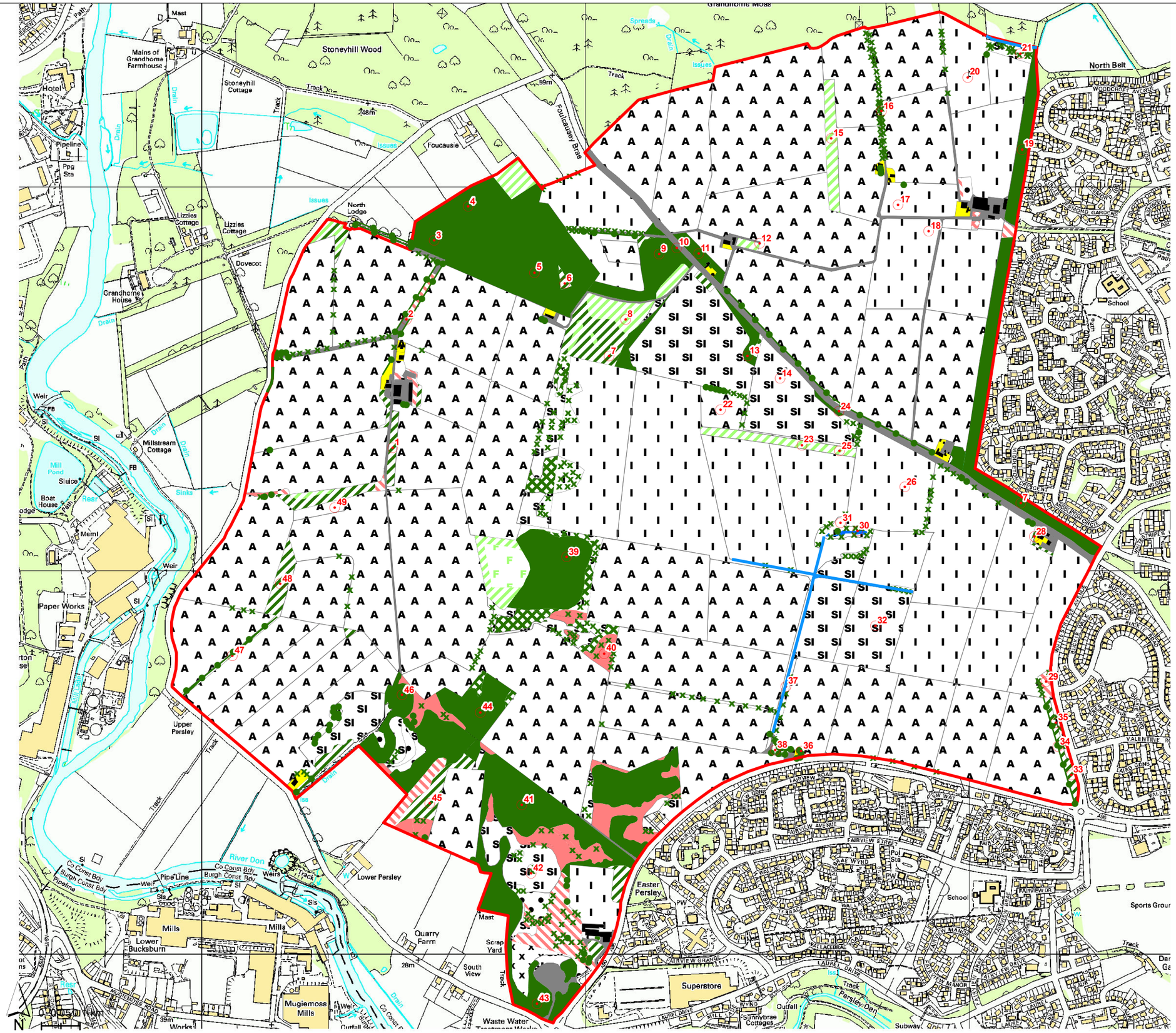
4.4 The Phase 1 habitat map is shown by **Figure 4.1**, and associated botanical target notes are provided in **Appendix 1**.

Overview

4.5 A breakdown of the habitat types by area is presented in **Table 4.1**. In summary, the study area consisted of mixed agricultural farmland dominated by intensively managed arable land, mainly growing spring barley, with occasional fields of improved and species-poor semi-improved neutral grassland. This arable landscape was punctuated with small blocks of plantation and semi-natural broadleaved woodland, most notably Monument Wood and Clerkhill Wood, coniferous shelterbelts and farmsteads. A more varied and extensive mix of semi-natural habitats was present in the south of the study area in association with the

[2] Joint Nature Conservation Committee (1993) *Handbook for Phase 1 habitat survey – a technique for environmental audit*. JNCC. Peterborough.
[3] Rodwell, J. S (1991-2000). *British Plant Communities – Vols 1-5*. Cambridge University Press. Cambridge.
[4] SNIFFER (2009) WFD95: *A Functional Wetland Typology for Scotland – Field Survey Manual*. Version 1. ISBN:978-1-906934-22-4.
[5] DAFOR: D=dominant, A=abundant, F=frequent, O=occasional and R=rare.
[6] Farrell, L. and Cheffings, C. M. (eds) (2005) *Species status No. 7: The vascular plant Red Data list for Great Britain*. JNCC.

disused quarry. Fields were bounded mainly by stonewalls and/or post and wire fencing and dry drainage ditches. **Figure 4.2** shows a selection of photographs illustrating the main habitats present.



Grandhome

Phase 1 Habitat Map

survey boundary

Habitats

- broad-leaved semi-natural woodland
- broad-leaved plantation woodland
- coniferous plantation woodland
- mixed plantation woodland
- dense scrub
- recently felled coniferous plantation woodland
- scattered broad-leaved trees
- dense bracken
- introduced shrubs
- tall ruderal
- ephemeral/short perennial
- bare ground
- poor semi-improved neutral grassland
- improved grassland
- amenity grassland
- arable
- standing water
- tracks, roads and hard-standing
- building
- not surveyed

Linear features

- species-poor hedgerow, no trees
- drain
- line of trees

Point features

- scattered scrub
- tree (indicative position)
- target note

Figure 4.1

Map Scale @ A3: 1:10,000

Surveyed by: RDG and RJH	Applied Ecology Ltd
Survey date: April and June 2012	
Drawn by: RAH	
Checked by: RJH	
Status: final	

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Arable

Broad-leaved Plantation Woodland

Broad-leaved Semi-natural Woodland

Coniferous Plantation

Dense Scrub

Improved Grassland

Grandhome Estate

Figure 4.2: Habitat photosheet (page 1 of 2)

Photos taken 2011-2012

Applied Ecology Ltd

Poor Semi-improved Neutral Grassland

Recently felled Coniferous Plantation

Standing Water (Manganese Pond)

Standing Water (wet ditch)

Tall Ruderal Vegetation

Farm Buildings

Grandhome Estate

Figure 4.2: Habitat photosheet (page 2 of 2)

Photos taken 2011/2012

Applied Ecology Ltd

Table 4.1: Phase 1 habitat type and extent within the study area

Phase 1 habitat type	Area (hectares)
Amenity grassland	0.83
Arable	200.92
Bare ground	0.98
Bare ground with scattered scrub	0.03
Broad-leaved plantation woodland	6.32
Broad-leaved semi-natural woodland	35.19
Building	0.84
Coniferous plantation woodland	4.96
Dense bracken	3.67
Dense bracken with scattered scrub	0.70
Dense bracken with scattered trees	0.12
Dense scrub	2.01
Ephemeral/short perennial	0.70
Improved grassland	77.32
Improved grassland with scattered scrub	1.45
Improved grassland with scattered trees	0.09
Introduced shrubs	0.06
Mixed plantation woodland	0.47
Poor semi-improved neutral grassland	24.84
Poor semi-improved neutral grassland with scrub	2.64
Poor semi-improved neutral grassland/scat trees	0.23
Recently felled coniferous plantation woodland	1.07
Scattered broad-leaved trees	0.21
Standing water	0.08
Tall ruderal	2.52
Tall ruderal with scrub	0.84

Phase 1 habitat type	Area (hectares)
Tall ruderal with trees	0.18
Tracks, roads and hard-standing	7.25
Grand Total	**376.51**

Arable Land

4.6 Arable land within the study area was cropped mainly for spring barley, together with a smaller proportion of winter barley, wheat and oil-seed rape. A few fields of temporary ley, used for silage production, were also present and comprised species-poor agricultural grasslands sown with a high proportion of short-lived and high yielding grass strains such Italian rye-grass *Lolium multiflorum*.

4.7 The arable weed flora was generally species-poor and was characterised by a small range of common plants typical of intensively managed arable land. Such species included common chickweed *Stellaria media*, annual meadow-grass *Poa annua*, field forget-me-not *Myosotis arvensis*, cleavers *Galium aparine* and field pansy *Viola arvensis*. Individual noteworthy species included corn spurrey *Spergula arvensis* (a Nationally Vulnerable plant species) which was recorded in a number of spring cereal crop fields in the western half of the study area, and a few plants of wild pansy *Viola tricolor* (a species listed on the Scottish Biodiversity List,) in a few locations across the study area.

Grassland

4.8 Areas of long-term and permanent grassland included a few fields of long-established improved pasture grassland with a short and uniform sward dominated by perennial rye-grass *Lolium perenne* and white clover *Trifolium repens*, and areas of semi-improved rush pasture normally associated with low-lying damp ground. Areas of rush pasture were characteristically composed of a mix of soft rush *Juncus effusus* and Yorkshire-fog *Holcus lanatus,* together with a range of other common species such as red fescue *Festuca rubra*, cocks-foot *Dactylis glomerata*, creeping bent *Agrostis capillaris*, daisy *Bellis perennis*, creeping buttercup *Ranunculus repens*, broad-leaved dock *Rumex obtusifolius*, curled dock *R. crispus* and spear thistle *Cirsium vulgare*.

Woodland and Scrub

4.9 Three relatively extensive areas of semi-natural broad-leaved woodland are present within the survey boundary, namely Persley Quarry Wood, Clerkhill Wood and Monument Wood. Parts of these woodlands are classified as long established woodland of plantation origin on the Ancient Woodland Inventory – see **Figure 3.2**. However, all possessed species-poor ground floras, with only five Scottish ancient woodland indicator species in total across all three woodlands (see **Table 4.2**). This is significantly fewer indicator species than usually

associated within Ancient Woodland according to Crawford (2009)[7], and confirms that the three woodlands are not of great nature conservation importance in this respect.

Table 4.2: Scottish ancient woodland indicator species recorded in woodland within the Grandhome survey area

Ancient Woodland Indicator species	Persley Quarry Wood	Clerkhill Wood	Monument Wood
Allium ursinum (Ramsons)	Absent	Present	Absent
Luzula pilosa (Hairy woodrush)	Present	Present	Present
Oxalis acetosella (Wood sorrel)	Present	Present	Present
Trientalis europaea (Chickweed wintergreen)	Absent	Present	Absent
Ceratocapnos claviculata (Climbing corydalis)	Present	Absent	Present
Total no. of AWI species	**3**	**4**	**3**

4.10 Mature conifer and broad-leaved woodland shelter belts also occurred within the study area, and around its boundary, and occasional mature trees were present within and around the edges of woodland and close to farmsteads and dwellings.

4.11 Persley Quarry occupied a relatively large land area in the south of the study area. The quarry has not been dug since 1930-40 and was partly occupied by a car parts scrap- yard. The area supported a wide range of habitats, including semi-natural woodland, woody and bramble scrub, dense bracken, tall ruderal vegetation, semi-improved grassland and bare ground and rock faces. Large and extensive patches of the invasive alien plant Japanese knotweed *Fallopia japonica* were also present in scattered un-shaded locations around the former quarry.

4.12 The woodland composition was mixed, being dominated by mixtures of sycamore *Acer pseudoplatanus*, beech *Fagus sylvatica*, birch *Betula* spp., and wych elm *Ulmus glabra* (an SBL species), and interspersed with patches of bracken *Pteridium aquilinum* and tall ruderal plants.

Clerkhill Wood

4.13 The eastern section of Clerkhill Wood was dominated by mature Scots pine *Pinus sylvestris*, interspersed with blocks of Sitka spruce *Picea sitchensis*, and locally abundant silver birch *Betula pendula*. The woodland's central area was entirely dominated by birch, with occasional mature beech trees around its edge. The ground layer throughout consisted of dense broad-buckler fern *Dryopteris dilatata*. A small stand of widely spaced mature beech standards was present at the western end, with a ground layer dominated by wavy hair-grass *Deschampsia flexuosa*, together with a little heath bedstraw *Galium saxatile*, wood sorrel *Oxalis acetosella* and chickweed-wintergreen *Trientalis europaeus*.

[7] Crawford, C. L (2009). Ancient Woodland Indicator Plants in Scotland. *Scottish Forestry*. 63(1):6-19.

Monument Wood

4.14 The majority of this woodland was dominated by birch regeneration and supported a relatively species-poor ground layer. A stand of mature Sitka spruce plantation adjoined the birch wood to the west, with its central core now open and cleared. Significant areas of fringing dense gorse *Ulex europaeus* and bracken occurred around the woodland's edge.

Conifer Shelterbelts

4.15 Two isolated belts of mature Scots pine plantation woodland were present in the eastern half of the study area. These woodlands were species-poor with only occasional elder *Sambucus nigra* in the understorey. The ground layers were well developed and dominated by a range of grasses, including Yorkshire-fog, creeping soft-grass *Holcus mollis*, cocks-foot, common bent and tufted hair-grass *Deschampsia cespitosa*. Other plant species present included bramble *Rubus* agg., foxglove *Digitalis purpurea*, common sorrel *Rumex acetosa*, broad buckler-fern, red campion *Silene dioica*, chickweed *Stellaria media*, hogweed *Heracleum sphondylium*, common nettle *Urtica dioica*, cleavers *Galium aparine*, a daffodil *Narcissus* agg., and pink purslane *Claytonia sibirica*.

Broadleaved Shelterbelts

4.16 A belt of broad-leaved woodland, dominated by mature beech, formed much of the eastern boundary of the study area. Beech saplings were frequent throughout, and other broad-leaved trees, including sycamore, silver birch, alder *Alnus glutinosa* and rowan *Sorbus aucuparia*, were occasional, and formed part of a varied shrub layer. Holly *Ilex aquifolium* was rare. Woodland grasses were present in sunlit areas, and included abundant wavy hair-grass and sweet vernal-grass *Anthoxanthum odoratum*, and occasional, sometimes locally abundant creeping soft-grass. Other ground layer species included locally abundant ivy *Hedera helix* and ground-elder *Aegopodium podagraria* and occasional rosebay willowherb *Chamerion angustifolia* and bramble. Other ground-layer species included rare chickweed-wintergreen, bilberry *Vaccinium myrtillus*, heather *Calluna vulgaris* and the ferns; broad buckler and polypody *Polypodium vulgare*.

4.17 A number of alien shrubs and garden plants, probably derived from nearby gardens, were also present.

Water-bodies

4.18 A single area of standing water was present within the study area. It consisted of a linear permanent water-body at least 2m deep (but probably deeper), known as the manganese quarry pond. The pond margin was steeply banked. Rooted aquatic plants included patches of submerged fennel pondweed *Potamogeton pectinatus*, and surfacing water-starwort *Callitriche* species, floating sweet-grass *Glyceria fluitans* and ivy- leaved crowfoot *Ranunculus hederaceus*. Occasional free-floating plants of common duckweed *Lemna minor* were present on the water surface.

Boundaries

4.19 The study area supported a limited network of hedgerows, with field boundaries largely consisting of dry stone walls and/or post and wire fences. The majority of the field boundary drainage ditches were dry, with only a single section of permanently wet ditch running south-north between Danestone West and the manganese quarry pond.

5 Birds

Legislation

Wildlife and Countryside Act (1981)

5.1 Wild birds are afforded protection under the Wildlife and Countryside Act 1981 (as amended). The Act makes it an offence, amongst other things, to intentionally or recklessly:"

- *"Kill, injure or take a wild bird."*
- *"Take, damage, destroy or interfere with a nest of any wild bird whilst it is in use or being built (or at any time for a nest habitually used by any bird listed in Schedule A1)."*
- *"Obstruct or prevent any wild bird from using its nest."*
- *"Take or destroy an egg of any wild bird."*
- *"Disturb any wild bird listed on Schedule 1 (e.g. goshawk, barn owl) whilst it is building a nest or is in, on, or near a nest containing eggs or young, or whilst lekking."*
- *"Disturb the dependent young of any wild bird listed on Schedule 1."*

5.2 Birds listed in Schedule 1 of the WCA 1981, rare and vulnerable breeding species in the UK, are protected by special penalties.

The Nature Conservation (Scotland) Act 2004

5.3 The Scottish Biodiversity List (SBL) was published in 2005 in order to comply with a requirement under Section 2(4) of The Nature Conservation (Scotland) Act 2004. The SBL is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland.

5.4 The purpose of the list is to help public bodies carry out their Biodiversity Duty, as described in the Nature Conservation (Scotland) Act 2004, by identifying the species and habitats which are the highest priority for biodiversity conservation in Scotland.

Birds of Conservation Concern

5.5 The population status of birds regularly found in the UK is reviewed every five years to provide an up-to-date assessment of conservation priorities[8]. A total of 246 species have been assessed and placed onto one of three lists of Birds of Conservation Concern (BoCC) – Red, Amber or Green. Fifty-two species are Red-listed, 126 are Amber-listed and the remainder are Green-listed.

[8] Eaton M A, Brown, A F, Noble D G, Musgrove A J, Hearn R, Aebischer NJ, Gibbons D W, Evans A and Gregory RD (2009) *Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man:* British Birds 102, pp 296-341.

5.6 Seven quantitative criteria are used to assess the population status of each species and to place it on the Red, Amber or Green list. These are: global conservation status, recent decline, historical decline, European conservation status, rare breeders, localised species and international importance.

5.7 Red-list species are those that are Globally Threatened according to the IUCN criteria; those whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery.

5.8 Amber-list species are those with an unfavourable conservation status in Europe; those whose population or range has declined moderately in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations.

5.9 Green-list species are those that do not fulfil any of the Red- or Amber-list criteria.

5.10 These listings do not confer specific protection to birds but can be useful when assessing the potential impact of a development on birds.

Approach

Wintering Bird Survey

5.11 A survey approach was devised to ensure that an accurate picture of the study area's typical wintering bird population (in terms of numbers of individuals and species) was obtained. Three separate survey visits were made, during the period when wintering birds would be present. Three 2-day visits were made by an experienced AEL ecologist and ornithologist (Rick Goater MCIEEM) on 5 and 6 December 2011, 28 and 29 February 2012 and 14 and 15 March 2012. Over each two-day period, a transect was walked (as shown by **Figure 5.1**), which gave the surveyor close approach to all cover habitats within the study area boundary and also allowed views of open land areas so that the use by wintering birds of all areas could be assessed. The locations of all birds seen or heard were noted on a large scale field map. Care was taken not to over- or double-count mobile species.

5.12 Different species vary in the ease with which they may be seen or heard during such a survey and therefore the resulting figures must be seen as best estimates of bird numbers present rather than as fully definitive counts for the whole site. In the case of species of woodland and cover habitats especially, some individuals are likely to have been undetected. Nevertheless, it is considered very unlikely that significant wintering species will have been overlooked, especially considering the types of habitats present and the species expected to use them in winter.

5.13 It should also be noted that numbers of birds do vary considerably between winters depending on, for instance, weather conditions and available food supply. This may be especially marked in relation to wintering thrushes, finches and geese, all of which undertake population movements in response to both weather and food supply. Therefore, the results of one winter's survey may not provide a full reflection of a site's use by birds over many winters.

5.14 Sections of the transect route were walked in different directions on the three survey occasions in order reduce the risk of bias caused by covering each section at the same time

of day. Weather conditions during the counts were favourable for bird observation; visibility was always excellent and no visits were unduly hampered by rain or high winds. Temperatures during the December visit fell to minus 3°C but the weather was mild on other visits; reaching a high of 18°C at the end of February and being a more normal 8°C in March.

5.15 Birds seen but deemed unlikely to be related to the site i.e. birds flying over and not likely to land or feed on the site, were not counted. In practice, this related mainly to various gull species.

5.16 The transect route included all accessible buildings, which were checked for the presence of barn owl.

Breeding Bird Survey

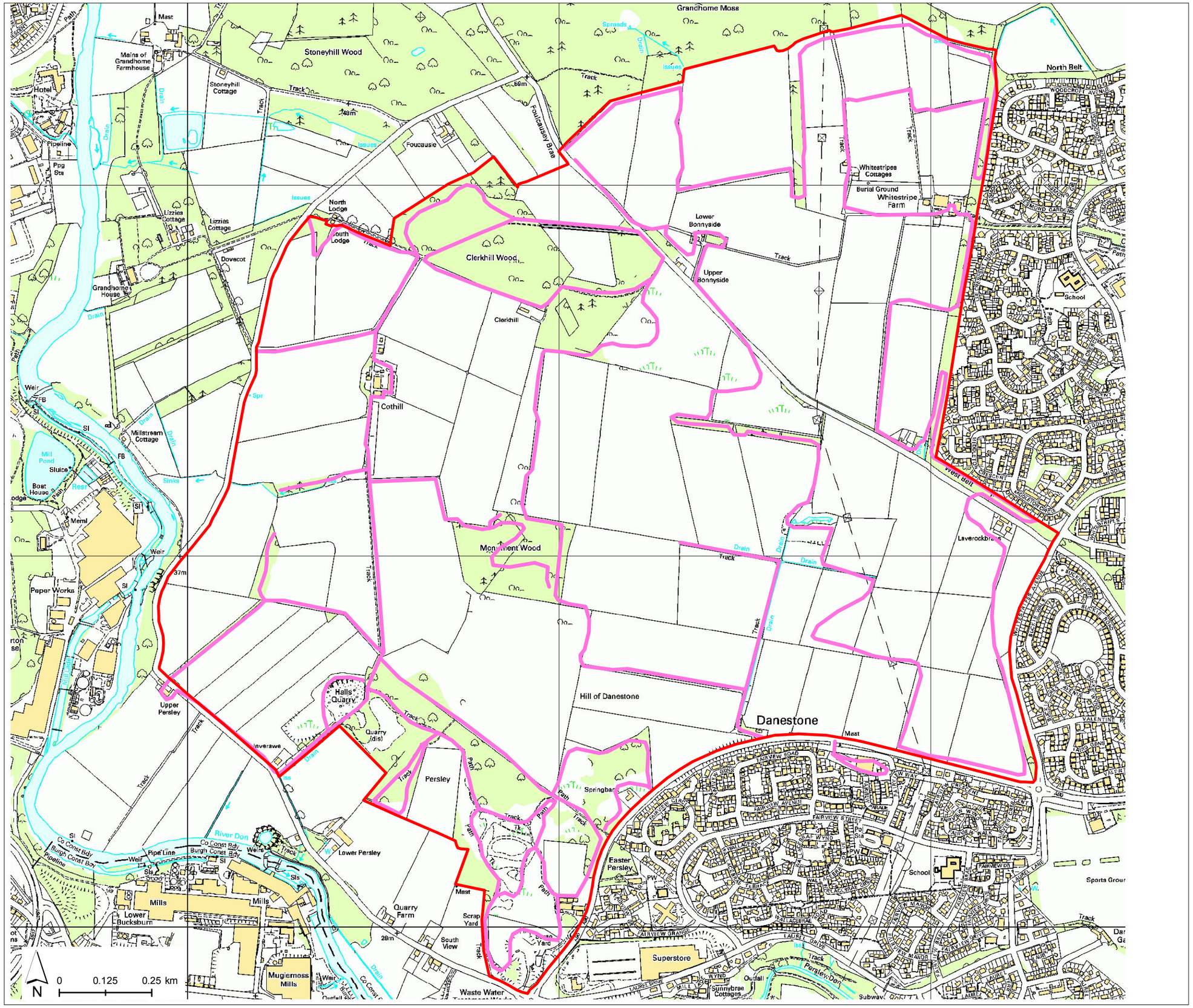
5.17 The breeding bird survey approach mirrored that used for the winter survey, the wintering bird survey transect route (**Figure 5.1**) also being used, since it brought the surveyor (Rick Goater) to within observation or hearing distance of most of the site's more complex cover habitats (notably woodland and scrub) where breeding bird density was expected to be relatively high. More open habitats, generally arable and grassland fields, where any birds present could easily be observed from relatively long distances were not approached as closely as the more complex habitats. This did not significantly reduce the chances of encountering potential breeding bird species likely to be found in such habitats, for instance breeding skylark and oystercatcher and foraging starlings and corvids, which may nest off-site but for which the fields form part of the species' feeding territory.

5.18 The survey was carried out over three visits, each visit taking three consecutive, mornings, starting shortly after dawn on each occasion. Survey visits were carried out on 23-26 April, 15-17 May and 16-18 June 2012 with different sections of the transect route being walked at different times of the morning between survey months, in order to avoid any bias caused by covering each section at the same time of day. Weather conditions during the counts were variable but generally favourable for bird observation. Visibility was always excellent but on all three visits the survey was temporarily abandoned owing to heavy rain combined with high winds, which hampered fieldwork. Survey was resumed whenever weather improved.

5.19 Locations and behaviours of all birds seen or heard were noted on a large scale field map. On completion of the three visits, the mapped registrations of each species were combined onto individual species maps. Professional judgement and knowledge of bird behaviour was used to interpret the combined observations and thus to assess the numbers and distribution of territories held by each species recorded.

5.20 As part of the survey, barn owl was searched for in suitable buildings and also over suitable foraging habitat during other ecological work on the site, some of which took place at dawn and dusk when barn owl was most likely to be active.

5.21 Long-eared owl and woodcock were species judged likely to be breeders on the site, and given that these birds were unlikely to be encountered during daytime survey, apparently suitable habitats at Monument Wood and Persley Woodlands were checked for them at dusk and during the night during the three survey visit periods.



Grandhome

Summer and Winter Bird Transect Routes

Ecology appraisal survey area

bird transect routes

Figure 5.1

Map Scale @ A3: 1:10,000

Surveyed by: RDG	Applied Ecology Ltd
Survey date: -	
Drawn by: RAH	
Checked by: RDG	
Status: Final	

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CB0449_016-01_fig5-1birdtransectroutes_20130419 A3 19/04/2013

Survey Findings

Winter Bird Survey

5.22 During the winter bird survey 37 species were recorded in December 2011; 39 in February 2012 and 34 in March 2012. The total number of species recorded was 50. In December, 852 individual birds were counted within the survey area, 1189 in February and 851 in March.

5.23 Three of the bird species recorded are listed under Schedule 1 of the Wildlife and Countryside Act (as amended), 12 are so-called 'Species of Principal Importance for Biodiversity Conservation in Scotland', appearing on the Scottish Biodiversity List, 10 are Red-listed Birds of Conservation Concern (BoCC) and 12 are Amber-listed BoCC. It should be noted that most species holding one of these conservation designations appear in more than one such list. For instance, barn owl is a Schedule 1 species, a Scottish Biodiversity List species and an Amber-listed Bird of Conservation Concern.

5.24 **Table 5.1** provides a summary, in abundance order, of the wintering numbers of each species within the survey area based on the peak counts made during the survey visits. Details of the conservation status of each species and notes on their distribution and preferred habitats within the site are given, where relevant.

Table 5.1: Results of wintering bird survey

Species	Conservation Status	Count of individuals			Comments
		Visit 1	Visit 2	Visit 3	
Woodpigeon	-	176	250	600	Ubiquitous, with large concentrations roosting in conifer belts and other woodlands
Common gull	-	75	200	380	Foraging in wet fields to the east of Monument Wood
Rook	-	280	340	140	Main foraging areas in fields around Cothill and Whitestripe Farm
Chaffinch	-	48	127	56	Widespread, favouring woodland areas
Fieldfare	Schedule 1, Red List	37	84	0	Mainly in fields immediately south of Whitestripes Road
Jackdaw	-	80	15	32	Usually foraging with rooks
Blackbird	-	49	17	16	Widespread, particularly in woodland edge habitats
Great tit	-	7	45	22	Frequent in woodland areas
Robin	-	9	44	28	Frequent in woodland areas
Carrion crow	-	10	33	0	Foraging in loose flocks near centre of site
Starling	Red List	19	33	1	Many over-flying birds recorded, smaller numbers foraging in pasture fields throughout site
Redwing	Schedule 1, Red List, SBL	32	21	20	Mainly in fields immediately south of Whitestripes Road
Yellowhammer	Red List	16	31	3	Main concentrations associated

Species	Conservation Status	Count of individuals			Comments
		Visit 1	Visit 2	Visit 3	
					with Cothill field boundaries and scrub around Monument Wood
Blue tit	-	13	26	27	Frequent in woodland areas
Lapwing	Red List, SBL	27	19	0	Small flock present in low-lying fields near Manganese Quarry
Tree sparrow	Red List, SBL	23	18	12	Present in three areas: Whitestripe Farm, Cothill and Inverawe
Wren	-	4	23	18	Frequent in woodland areas
Herring gull	Red List, SBL	0	0	20	Foraging in wet fields to the east of Monument Wood
Magpie	-	11	20	5	Widespread but scarce
Goldfinch	-	15	18	5	Widespread, mainly recorded as small parties flying overhead
Dunnock	Amber List	16	11	12	Mainly associated with scrub areas and gardens
Greenfinch	-	15	2	2	Uncommon, with most records from Whitestripe Farm and Whitestripes Cottages area
Coal tit	-	5	14	7	Most records associated with Monument wood and Clerkhill Wood conifer areas
Common buzzard	-	10	10	13	Possibly over-counted but regularly seen over all parts of site
Common snipe	Amber List	12	0	0	Counted during December shoot over wet fields south of manganese quarry. Not present on subsequent visits
Pheasant	-	11	4	6	Widespread
Song thrush	Red List, SBL	0	8	3	Associated with all woodland areas
Whooper swan	Amber List, SBL	8	0	0	Single party landed briefly in wet area south of manganese quarry
Stock dove	Amber List	4	2	4	Recorded as fly-overs only
Brambling	Schedule 1, SBL	0	0	3	Under beech in West Belt woodland
Great spotted Woodpecker	-	0	1	3	Recorded in Clerkhill, Monument and Persley Woods areas
Long-tailed tit	-	0	3	0	Uncommon, West Belt only
Mallard	Amber List	2	3	2	Associated with wet fields
Meadow pipit	Amber List	3	0	0	On poor semi-improved grassland east of Clerkhill Wood
Treecreeper	-	1	3	3	Recorded in Monument and Persley Woods
House sparrow	Red List	2	0	0	In trees at south-east extremity of site
Mistle thrush	Amber List	0	2	1	Associated with conifer belt south of Whitestripes Road
Oystercatcher	-	0	2	0	Recorded in arable fields in south-east part of site

Species	Conservation Status	Count of individuals			Comments
		Visit 1	Visit 2	Visit 3	
Pied wagtail	-	0	0	2	Whitestripe Farm
Skylark	Red List, SBL	0	2	1	Arable fields north-west of Whitestripes Cottages
Woodcock	Amber List, SBL	0	2	1	Recorded in Monument Wood and adjacent scrub
Common crossbill	-	2	0	0	Noted flying into and departing from conifer belt to west of Whitestripes cottages
Barn owl	Schedule 1, SBL Amber List	1	1	1	Single bird and fresh evidence of its presence in buildings at Cothill
Goldcrest	-	0	1	1	Clerkhill Wood only
Grey heron	-	1	1	0	Manganese Quarry
Grey wagtail	Amber List	1	0	0	In field near Upper Persley
Jay	-	1	1	0	Clerkhill Wood and Persley Woods
Kestrel	Amber List, SBL	1	1	0	Over east end of site
Red-legged partridge	-	0	1	0	Near Cothill
Reed bunting	Amber List, SBL	1	0	1	Once in wet fields near manganese quarry, and once with other buntings near Cothill
Bird Population		**850**	**1189**	**851**	
No. Species		**36**	**39**	**34**	

Breeding Bird Survey

5.25 Forty-seven species of potentially breeding bird holding a total of 575 territories or part-territories within the study area boundary were recorded during the breeding bird survey.

5.26 Barn owl was the only species found in the study area that is listed under Schedule 1 of the Wildlife and Countryside Act (as amended). Eight Scottish Biodiversity List species, seven Red-listed Birds of Conservation Concern and 14 Amber-listed Birds of Conservation Concern were recorded during the breeding bird survey.

5.27 The majority of breeding birds' territories was located in areas other than the open arable or grassland fields, being primarily associated with woodlands, scrub and more complex habitats such as farm steadings. **Table 5.2** provides a summary of species in territory abundance order, together with details of the conservation status of each and notes on distribution and preferred habitats within the site, where relevant.

Table 5.2: Results of breeding bird survey

Species	Conservation Status	Total territories	Comments
Chaffinch	-	103	Widespread and relatively abundant in all woodland areas with approximately half of the territories located within Persley Woodlands and the West Belt
Wren	-	51	Widespread in main woodland areas

Species	Conservation Status	Total territories	Comments
Robin	-	50	Widespread in main woodland areas
Blackbird	-	42	Widespread in main woodland areas, but half of territories recorded found in association with gardens and farm steading to west of site
Great tit	-	37	Widespread in main woodland areas
Rook	-	31	31 nests occupied nests in West Belt close to Whitestripe Farm. Birds recorded foraging widely on the site
Goldfinch	-	26	Widespread and mostly recorded in flight. Singing birds noted in eastern Clerkhill Wood and in West Belt near Laverock Braes
Woodpigeon	-	25	Widespread and abundant, but only calling birds in woodland areas assessed a potential breeders
Blue tit	-	24	Widespread in main woodland areas
Willow warbler	Amber List	22	All singing birds in May counted as potential breeders, with ten territories in Persley Woods area.
Dunnock	Amber List	18	Widespread in small numbers, with more than half of territories in Persley Woods and along West Belt, where off-site gardens likely to provide attractive habitat
Yellowhammer	Red List	14	Scrub areas of Monument Wood, Whitestripe Farm and eastern Persley Woods area held 11 of the territories
Coal tit	-	11	Most territories in Clerkhill and Monument Woods conifer areas
Tree sparrow	Red List, SBL	10	Five territories around Whitestripe Farm, four at Cothill and one at Inverawe. Foraging birds seen in arable fields near Upper Bonnyside
Blackcap	-	8	Widespread but uncommon in woodlands, with half of territories in West Belt woodland
Greenfinch	-	8	Uncommon, with majority of territories around Whitestripe Farm and nearby West Belt woodland
Song thrush	Red List, SBL	8	Territories held in all main woodland areas
Swallow	Amber List	8	Breeding recorded at Whitestripe Farm and Upper Persley
Carrion crow	-	6	Uncommon breeder, but widespread
Treecreeper	-	6	Found in all main woodlands, with Monument Wood providing most records
Pheasant	-	5	Uncommon but widespread during survey period
Skylark	Red List, SBL	5	Males recorded in song over fields near Whitestripes cottages, north-west of Monument Wood and south of manganese quarry
Starling	Red List	5	Frequent forager in many parts of site but breeding only noted in mature trees of West Belt, near Whitestripe Farm
Common buzzard	-	4	Nesting territories appeared to be held in all main woodland areas and may have numbered five. Occupied nests found in Clerkhill Wood and a small wood in west if site
Magpie	-	4	Uncommon but widespread
Pied wagtail	-	4	Most territories held along southern boundary of the site, associated with farm buildings there
Chiffchaff	-	3	Single singing males in Clerkhill, Monument and Persley Woods
Goldcrest	-	3	Territories noted in coniferous sectors of Clerkhill and Monument Woods, and Whitestripes coniferous shelterbelt.

Species	Conservation Status	Total territories	Comments
Great spotted woodpecker	-	3	Territories held in Clerkhill, Monument and Persley Woods
House martin	Amber List	3	Three pairs at Upper Persley
House sparrow	Red List	3	Recorded only in south-east corner of site where breeding territories likely to be associated with nearby housing estate
Jackdaw	-	3	Uncommon but widespread
Stock dove	Amber List	3	Territories held in Persley Woods and in West Belt Woods
Common whitethroat	Amber List	2	Rare breeder, with single territory in roadside scrub south-west of Whitestripe Farm and another to the east of Persley Woods
Garden warbler	-	2	Both territories in open areas of Persley Woods
Linnet	Red List, SBL	1	Breeding noted in scrub to north of Whitestripes Cottages
Mistle thrush	Amber List	2	Pair nested in conifer shelterbelt to south of Whitestripes Road
Reed bunting	Amber List, SBL	2	Territories associated with rushy fields south of manganese quarry and ground to north of site adjacent to Grandhome Moss
Sparrowhawk	-	2	Nesting proved in Persley Woods and suspected in West Belt
Barn owl	Schedule 1, Amber List, SBL	1	Breeding considered unlikely, but one bird present and fresh pellets found at Cothill during breeding season
Grey wagtail	Amber List	1	Probably bred at Upper Persley
Kestrel	Amber List, SBL	1	No evidence found of nesting on site but bird noted foraging over east of site
Long-tailed tit	-	1	Persley Woods
Mallard	Amber List	1	No evidence of breeding but likely to have nested near the manganese quarry
Meadow pipit	-	1	Pair in rushy fields near the manganese quarry
Oystercatcher	Amber List	1	Pair in arable fields in south-east of site
Wheatear	Amber List	1	Pair in rocky debris near manganese quarry
Total territories		**575**	

5.28 Neither woodcock nor long-eared owl was recorded during the evening and night-time searches for these species.

Interpretation of Findings

5.29 Interpretation of the findings of the wintering and breeding bird surveys focuses on gaining an understanding of the parts of the study area holding the highest densities of wintering and breeding birds, and confirming the distributions of key species there i.e. Schedule 1 species, Scottish Biodiversity List species and Birds of Conservation Concern. These aspects are discussed in detail below.

5.30 Most species appearing on the Amber List of Birds of Conservation Concern alone, and not on other conservation status lists, are not discussed in detail since these are generally widespread and still common species in the UK, including Scotland. Furthermore, numbers

of many of the Amber-listed species recorded during both surveys were very small and therefore were judged to be of relatively low significance in terms of the effect of development on their populations. A small number of Amber-listed species are, however, considered to be worthy of discussion in terms of their status at Grandhome. These are dealt with under the heading 'Birds of Conservation Concern', below.

Key Bird Areas

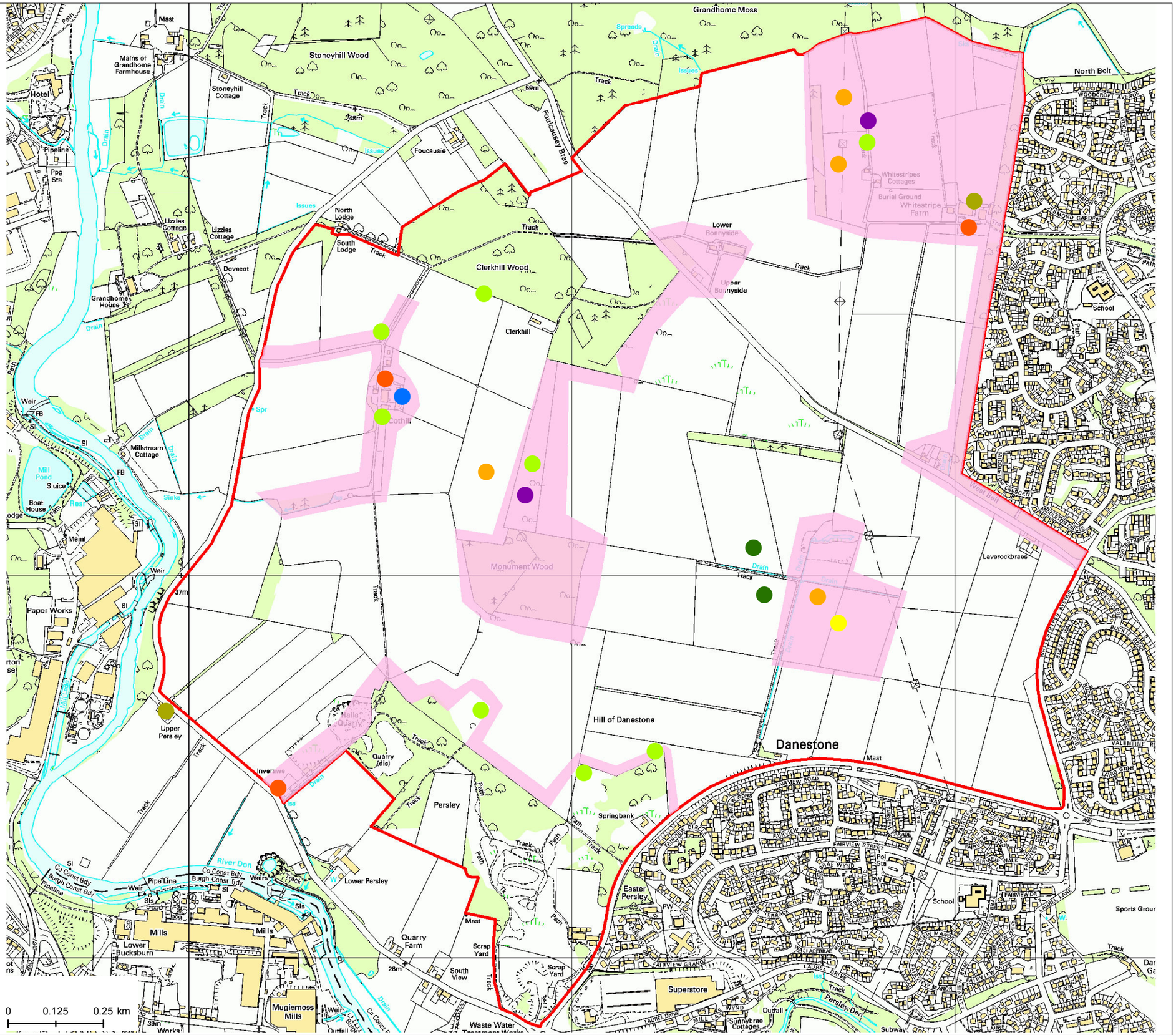
5.31 The extensive farmland of Grandhome, both arable and grassland, supported a lower diversity of species than the more complex woodland, scrub, quarry and built habitats within the study area during both, the winter and the bird breeding season.

5.32 In winter, numbers of some species were relatively high, since they involved large flocks of foraging common gulls and corvids, particularly rooks, but also jackdaws and crows. All fields were foraged in by these species during the winter, though areas with a high water table were favoured by gulls, and winter cereals appeared to be favoured by the corvids. Other species making use of open farmland for foraging or roosting in the winter included the key species: lapwing, common snipe and whooper swan. None of these were present in anything other than low numbers and they were transient species on the site; the swans, for example, spending only a few minutes resting in a flooded arable field, and the snipe being attracted to another nearby area of impeded drainage, where clumps of rushes provided shelter. During the period of the surveys, these wet areas were drained and their attractiveness to species such as these was lost.

5.33 During the breeding season, the only key species for which the open fields provided suitable habitat was skylark, for which five breeding territories were identified. Four pairs used spring barley fields and one pair's territory was centred on improved and semi-improved grassland habitat.

5.34 Based on these findings, the farmed land within the survey boundary was considered to have a low value for birds, with the exception that where field edges were adjacent to other habitats, such as woodland, scrub and gardens, these contributed to the 'edge habitats' that many bird species find attractive.

5.35 Almost all other birds recorded at Grandhome, during both the winter and the breeding season, were woodland or mixed habitat species. Highest species diversity, and density of birds, was found, not so much within the woodlands but along their edges where habitats were more complex, consisting of, for example, woodland clearings, areas of relatively well-spaced trees, gorse scrub, cottages and gardens, field boundaries and disused quarry areas. The areas where survey results showed highest densities of individuals and the highest diversity of species during both survey periods are shown in **Figure 5.2**.



Grandhome

Key Bird Locations and Locations of Bird Species of Conservation Significance

study area

areas of highest bird density and diversity

Species

- barn owl (all year)
- lapwing (winter only)
- linnet (all year)
- reed bunting (breeding)
- skylark (breeding)
- swallow (breeding)
- tree sparrow (all year)
- yellowhammer (all year)

Figure 5.2

Map Scale @ A3: 1:10,000

Surveyed by: RDG	Applied Ecology Ltd
Survey date: Dec - May 2012	
Drawn by: RAH	
Checked by: RDG	
Status: Final	

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Key Bird Species

Schedule 1 Species

5.36 Schedule 1 species recorded during the three winter survey visits were barn owl, fieldfare, redwing and brambling. Barn owl was the only Schedule 1 species recorded during the breeding bird survey. All are included on the Schedule by virtue of being rare or threatened breeding birds in the UK and therefore the significance of the species' wintering on the site is not necessarily high. Fieldfare and redwing are common wintering thrushes in the UK, favouring open field and hedgerow habitats, and brambling is a relatively common winter visitor of beech woodland and arable areas providing a winter seed food supply.

5.37 Although the woodland habitats theoretically suitable for breeding redwing, fieldfare and brambling are present at Grandhome, these three wintering species are considered to be very unlikely to nest there, and unsurprisingly, were not recorded as breeders during the breeding bird survey. They are not discussed further in this report.

Barn Owl

5.38 Barn owl was present in the buildings complex at Cothill throughout the period of the two surveys. No more than one bird at a time was seen, including by AEL personnel during evening bat surveys during the summer, and fresh pellets, produced by barn owl, were noted on each visit in two separate buildings. Careful searches of all accessible buildings that exhibited potential entry and exit points for roosting or breeding barn owl were made but no evidence, such as copious droppings, moulted feathers or calling young was present to show that a breeding pair was present and it was concluded that in 2012 Cothill was used only as a roosting site by barn owl.

Scottish Biodiversity List Species

5.39 Species of Principal Importance for Biodiversity Conservation in Scotland (listed on the Scottish Biodiversity List and therefore qualifying as National Biodiversity Action Plan Species) recorded in the study area, numbered 12 in the winter and eight during the breeding season. Most of these species are also Red- or Amber-listed Birds of Conservation Concern. The Schedule 1 species: fieldfare, redwing and brambling, all SBL species, are not commented on below as they are not significant in conservation terms in this instance. Barn owl is also not commented on here, as this species is discussed elsewhere in this report. The other SBL species recorded within the study area are discussed below, with, where relevant, details of their status taken from *The Birds of Scotland*[9]. The locations of those species within the study area, considered to be of conservation significance are shown on **Figure 5.2**.

5.40 It should be noted that the majority of SBL species discussed in this report have populations that have declined moderately in the UK in recent years but that they remain common species with relatively healthy populations in Scotland, according to *The Birds of Scotland*. Their presence in small numbers is therefore considered to be relatively insignificant in conservation terms at Grandhome. Nevertheless, it should be noted that SBL species breeding on a site where development is planned, should be taken into consideration by public bodies under their duty to further the conservation of biodiversity.

5.41 Robin is no longer included on the SBL. It was, until recently, for social rather than conservation reasons – being selected as one of the ten species most popular with the Scottish public. It was recorded in high numbers during both surveys with an estimated 50 breeding territories more or less evenly spread throughout all woodlands and 'edge habitats'. Robin is a widespread and common bird nationally and is not significant in conservation terms at Grandhome.

Lapwing

5.42 Lapwing is also a Red-listed Bird of Conservation Concern. A small flock, roosting during the day on flooded ground near the centre of the study area, was noted on two winter survey visits. Lapwing did not breed in the study area and is considered not to be significant in conservation terms at Grandhome.

Tree Sparrow

5.43 Tree sparrow is also a Red-listed BoCC. A peak count of 23 was made from birds in three separate locations in the study area during the wintering bird survey and an estimated ten pairs bred in the same locations. Five breeding pairs, and the highest winter count, were found at Whitestripe Farm, where the majority of birds favoured the built and garden environment there, and the nearby mature deciduous trees within West Belt. Four pairs were present in a similar combination of habitats at Cothill, and a single pair was present at Inverawe, in the south-west. **Figure 5.3** shows the locations of these records. Tree sparrow was noted foraging in oilseed rape some 500m from its nearest breeding location during the summer and though it appeared that the species' range within the study area was generally close to its breeding centres, the wider farmland is very likely to provide much of

[9] Forrester, R.W., Andrews,I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts' M. W., Jardine,D. C., & Grundy, D. S. (eds) 2007. *The Birds of Scotland.* The Scottish Ornithologists' Club, Aberlady.

its food. The species clearly forms part of the study area's farmland bird assemblage so it's presence at Grandhome is evaluated in this context.

Linnet

5.44 The Red-listed linnet was not recorded in the study area during the winter. In the breeding season, the species was occasionally recorded flying over the study area but it was rarely possible to equate its presence to suitable nesting habitat, or to confidently assess the approximate number of individuals using the site. Only the gorse-dominated scrub between Monument and Clerkhill Woods, and scrub to the north of Whitestripes Cottages clearly constituted linnet breeding territories, since singing and displaying birds were noted there. Linnets do not generally form pair-based breeding territories; the peak number of birds counted in these areas was five and three respectively and this was judged likely to represent two large territories with a minimum of three and two breeding females present. Linnet constitutes a species evaluated as part of the study area's farmland bird assemblage.

Herring Gull

5.45 Herring gull is a recent addition to the Red-list, its inclusion being based on a significant decline in its UK breeding population. Its presence at Grandhome was as a small number of birds foraging with common gulls in winter and it is therefore not of significance there in conservation terms.

Song Thrush

5.46 Eight individuals of this species, also included on the Red-list, were recorded in all main woodland areas of the study area during the wintering bird survey, and the same number of breeding territories was estimated for the same areas during the summer. Since pre-1989 declines in the UK, the song thrush population in Scotland has increased by 22% and it would appear that the species here is doing relatively well. Retention of woodlands and the inclusion of garden and park habitats (as part of the proposed development) to the existing gardens and woodland on the periphery of the site are likely to maintain Grandhome's attractiveness for this species.

Whooper Swan

5.47 This Amber-listed species is a very rare breeder in Scotland, and a winter visitor to traditional Scottish sites. A flock of eight birds spent a brief time resting on wet arable land during the first wintering bird survey visit. Grandhome is not a traditional roosting or feeding site for this species, and its presence is not significant in conservation terms.

Skylark

5.48 The skylark breeding population decline, noted in England in recent times, has not been mirrored in Scotland, where the population presently appears to be stable. A very small number wintered in the study area; a maximum of two birds being noted on arable ground near Whitestripes Cottages. Three pairs nested in the same area, and a single pair was found in similar habitat north-west of Monument Wood. Another pair's territory was centred on poor improved pasture near the manganese quarry pond. The use of fields within the study area by this species is likely to vary from year to year, depending on cropping patterns, and therefore all open field locations can be considered potentially valuable for skylark.

5.49 This species was one of the few key breeding species found that is associated solely with open fields and therefore the small population is likely to be reduced significantly when the farmland habitats are altered by the proposed development. Skylark constitutes part of the study area's farmland bird assemblage and its presence is evaluated in this context.

Woodcock

5.50 Woodcock is an Amber-listed species in the UK on account of a moderate decline in breeding numbers. Although apparently suitable woodland breeding habitat is present at Grandhome, the species appeared not to nest there. Woodcock is an abundant but secretive winter visitor to the UK and it was encountered by AEL personnel occasionally in and around Monument Wood during wintering bird survey visits and while undertaking other ecological work. Its presence there is not considered to be of conservation significance.

Kestrel

5.51 This Amber-listed bird was rare in the study area in both winter and during the breeding season. It was not proved to breed but a single bird was observed hunting in a number of places in the east of the study area. Kestrel is a widespread and relatively abundant species in the UK and its presence on the site is not considered to be of conservation significance.

Reed Bunting

5.52 A single reed bunting was recorded in poor semi-improved pasture with a high water table near the manganese quarry pond in the winter. This was suitable breeding habitat for reed bunting, and a single pair was found there during the breeding bird survey. A second pair was recorded in the far north-east of the site, close to Grandhome Moss, which is beyond the survey area boundary. Reed bunting, though Amber-listed in the UK, remains a common species with a relatively healthy population in Scotland. Its presence does not confer any significant ornithological value to the study area.

Birds of Conservation Concern

5.53 Eleven Red-listed species were recorded during the two surveys, with seven in the wintering bird survey and seven during the breeding bird survey. In general the inclusion of species on the Red-list is related to the fortunes of their UK breeding populations. Thus, numbers recorded during the winter survey had little bearing on the study area's importance for most of them as a breeding location. Most of the Red-listed species recorded reflected the value of Grandhome's 'edge habitats' set within an agricultural landscape, typical of this part of north-east Scotland and their value is assessed in terms of the site's assemblage of farmland birds. Red-listed species, and significant Amber-listed species not already discussed under the preceding section (Scottish Biodiversity List Species), are commented on below. **Figure 5.3** shows the locations within the study area where significant Birds of Conservation Concern were recorded.

Starling

5.54 Starling, a Red-listed species, was recorded in small numbers in the winter, mainly as over-flying birds but sometimes, up to 30 birds using improved and semi-improved grassland areas south of Whitestripes Road for foraging. Over-flying, but not foraging birds were also noted in many areas of the study area during the breeding season. The number of starlings

counted within the mature woodland of the West Belt indicated that approximately five pairs nested in trees near to Whitestripe Farm. Given the small breeding numbers involved together with the facts that the West Belt woodland is to be retained and that suitable foraging habitat for starling is widespread within the wider countryside, this species is not considered further in this evaluation.

Yellowhammer

5.55 Yellowhammer is a Red-listed species that was thinly but widely spread over the study area in winter and also during the bird breeding season. In winter, the highest count recorded was 31 birds, with greatest numbers associated with field boundaries around and close to the buildings of Cothill and the southern edge of Clerkhill Wood, and in the scrub areas linked to Monument Wood. Field boundaries close to Persley Woods and Whitestripe Farm, where gorse and other scrub was present, also provided habitat occupied by yellowhammer during the winter. Territories of 11 of the 14 pairs found during the breeding season also occupied these scrub areas. The yellowhammer constitutes part of the study area's farmland bird assemblage and is evaluated in this context.

House Sparrow

5.56 House sparrow, a Red-listed species, was recorded in both summer and winter but only within one part of the survey area. This was in the south eastern-most corner, where a small area with broad-leaved plantation woodland, tall ruderal and planted conifer habitats provided cover and foraging opportunities for house sparrows, which appeared to fly between there and nearby off-site housing and gardens. The number of birds and their sexes was judged to equate to three territories partially held in this area. House sparrow was also recorded in small numbers during the breeding season in off-site residential areas immediately to the east of West Belt. Although this species was never found in the study area, it is likely that it does use this area, including the steadings of Whitestripe Farm, for foraging. This species has been included as a constituent of the study area's farmland bird assemblage and its presence is evaluated in this context.

Swallow and House Martin

5.57 These Amber-listed Birds of Conservation Concern are considered significant in the context of the proposed development of Grandhome because they nest on and in buildings that may be demolished. It is unlikely that reduction in foraging habitat caused by the development will have a significant effect on the small populations found breeding in the Upper Persley and Whitestripe Farm areas, but the maintenance or provision of suitable nest sites in these and other locations would mitigate for the loss of nest sites.

Evaluation

5.58 The Grandhome study area was found not to support particularly large or important wintering or breeding bird assemblages and the character of its wintering and breeding bird populations may be considered typical for the mixed agricultural and urban fringe landscape of this part of Scotland. Fuller (1980)[10] described a method for assessing a site's

[10] Fuller, R. J. (1980) *A Method for Assessing the Ornithological Interest of Sites for Conservation*. BiologicalConservation 17: 229 – 239.

ornithological interest according to three bird population attributes: population size, diversity and rarity. Under this method sites are allocated levels of conservation importance, ranging from E (Local) to A (International). Where appropriate, this has been used as an aid to determine the overall value of the site in terms of its use by wintering and breeding birds.

Bird Population Size

5.59 Fuller used the size of flocks or aggregations of one or more species on a site as a measure of its conservation value, using the average maximum count for the season concerned. The average maximum count of the 50 species recorded at Grandhome in the 2011/2012 winter was 963, and the number of breeding territories held was 575, with chaffinch holding just over 100 of these. The study area does not qualify at any Importance level for population size under Fuller's method as it did not support any breeding or wintering birds in sufficiently high numbers.

Bird Population Species Richness

5.60 Under Fuller's method, sites holding between 25 and 49 breeding species, and between 25 and 54 wintering species, qualify as of Local Importance for bird species-richness. With 47 breeding species and 50 wintering species, Grandhome is therefore of **Local Importance** for its bird population diversity, according to Fuller.

Bird Population Species Rarity

5.61 Fuller's method rates a site's value for its rare bird population depending on the numbers of pairs of so-called 'scarcer species' breeding there. These are species with UK breeding populations of fewer than 100,000 pairs. More abundant breeding species are not included in the assessment, and of the potentially breeding species at Grandhome, only barn owl (3000-5000 pairs in UK) and tree sparrow (68,000 pairs in UK) qualify as scarcer species. According to Fuller's criteria, Grandhome scores two points for the presence of barn owl and one point for the presence of tree sparrow, totalling three for its scarcer bird breeding population (where 10 – 19 is required to give a site Local Importance). Consequently Grandhome does not qualify at any level of importance for species rarity.

Farmland Bird Assemblage

5.62 Most of the site's Birds of Conservation Concern reflect the presence of 'edge habitats' set within an agricultural landscape, typical of this part of north-east Scotland. In the context of the well-documented decline of breeding birds in the modern countryside, the Red-listed house sparrow, linnet, skylark, tree sparrow and yellowhammer, were of particular note. It is considered that for this reason their populations, together with Amber-listed and other more common species typical of farmland at some time of year, are best evaluated in this report as an 'assemblage of farmland birds'. The combined breeding and wintering populations of these birds, not necessarily considered to be significant individually, owing to the relatively small numbers involved, were judged to be of no more than **Local Importance** as an assemblage of farmland birds whose populations have significantly declined in recent years.

Barn Owl

5.63 Barn owl was present at Cothill throughout the two survey periods. A single individual was seen in this area in the winter and during the breeding season, and regurgitated pellets, of recent origin were found in two buildings there. Based on observations and searches made, it was considered unlikely that the species nested on the Grandhome site during 2012. Nevertheless, the Cothill location, with its suitable nesting buildings and areas of foraging habitat within range, remains potentially attractive for breeding barn owl and the species is judged likely to occupy a territory there occasionally, and possibly regularly in the future.

5.64 According to *The Birds of Scotland*, approximately 1000 pairs of barn owl are estimated to nest in Scotland, with the majority concentrated in the south and the west, and with a strong population around the inner Moray Firth and Easter Ross. Few casual observations of the species are said to occur between the Firth of Forth and the Moray Firth, the area within which Grandhome is located. The population within this very large area is said to be small; estimated at something over 20 pairs. Given the species' rarity within this part of Scotland, the presence of barn owl, and the high chance that it would breed, even intermittently, should be considered to give the site **County Importance** in terms of its value for this species.

6 Red Squirrel

Legislation

6.1 The Wildlife and Countryside Act 1981 provides the main framework for the legal protection of red squirrel *Sciurus vulgaris* in Scotland. The WCA was amended by the Nature Conservation (Scotland) Act 2004, and the consolidated Act is referred to hereafter as 'the 1981 Act'.

6.2 Sections 9(1) and (4) of the 1981 Act make it an offence to intentionally or recklessly kill, injure, take or possess a wild red squirrel, or to intentionally damage, destroy or obstruct access to any structure or place used by a Red squirrel for shelter or protection; or to disturb it while it is in a drey.

6.3 The Natural Environment and Rural Communities Act 2006 further amended the 1981 Act, to introduce a general exception to the prohibition in section 9 that is applicable only in Scotland:

6.4 S.10 (3) Notwithstanding anything in section 9, a person shall not be guilty of an offence by reason of:

(c) any act made unlawful by that section ("an unlawful act") if he shows:

(i) that each of the conditions specified in subsection (3A) was satisfied in relation to the carrying out of the unlawlful act, or

(ii) that the unlawful act was carried out in relation to an animal bred and, at the time the act was carried out, lawfully held in captivity.

(3A) Those conditions are:

(a) that the unlawful act was the incidental result of a lawful operation or other activity;

(b) that the person who carried out the lawful operation or other activity-

(i) took reasonable precautions for the purpose of avoiding carrying out the unlawful act; or

(ii) did not forsee, and could not reasonably have forseen, that the unlawful act would be an incidental result of carrying out of the lawful operation or other activity; and

(c) that the person who carried out the unlawful act took, immediately upon the consequence of that act becoming apparent to the person, such steps as were reasonably practicable in the circumstances to minimise the damage or disturbance to the wild animal, or the damage or obstruction to the structure or place, in relation to which the unlawful act was carried out.

6.5 The red squirrel is also listed as a national priority species under the UK Biodiversity Action Plan and the North East Scotland LBAP.

Approach

6.6 In April 2009 a £1.3m initiative was launched with the aim of creating new habitat for red squirrels and controlling the spread of grey squirrels, by culling them. This phased project – known as 'Saving Scotland's Red Squirrels' (SSRS) - is a collaboration between the Scottish Wildlife Trust, Forestry Commission Scotland, Scottish Land & Estates and Scottish Natural Heritage. Phase 1 ended in March 2012, with Phase 2 beginning in April of the same year. As part of this project, records of red squirrel sightings collected by SSRS have been uploaded to the National Biodiversity Network (NBN) Gateway; an interactive compilation of UK biodiversity data. The NBN Gateway clearly shows several red squirrel records to the north of Aberdeen city, within the Grandhome study area boundary.

6.7 Further evidence that red squirrels make use of the study area was provided in the Biological Records Search data, which includes four records of individual red squirrels; one within the study area and three within a 250m buffer from its boundary.

6.8 Given that red squirrels are known to be present in study area, specific presence/absence survey for this species was not carried out. However to verify their continued presence within the Grandhome boundary (and understand their distribution within the study area), a watching brief for individual red squirrels, their, dreys, and squirrel-eaten conifer cones, was maintained during all ecological survey work completed by AEL personnel in 2011 and 2012.

6.9 Survey for evidence of grey squirrel was not undertaken, although a watching brief, as indicated for red squirrel, was carried out.

Survey Findings

6.10 The results of the watching brief for evidence of red and grey squirrels are shown on **Figure 6.1**.

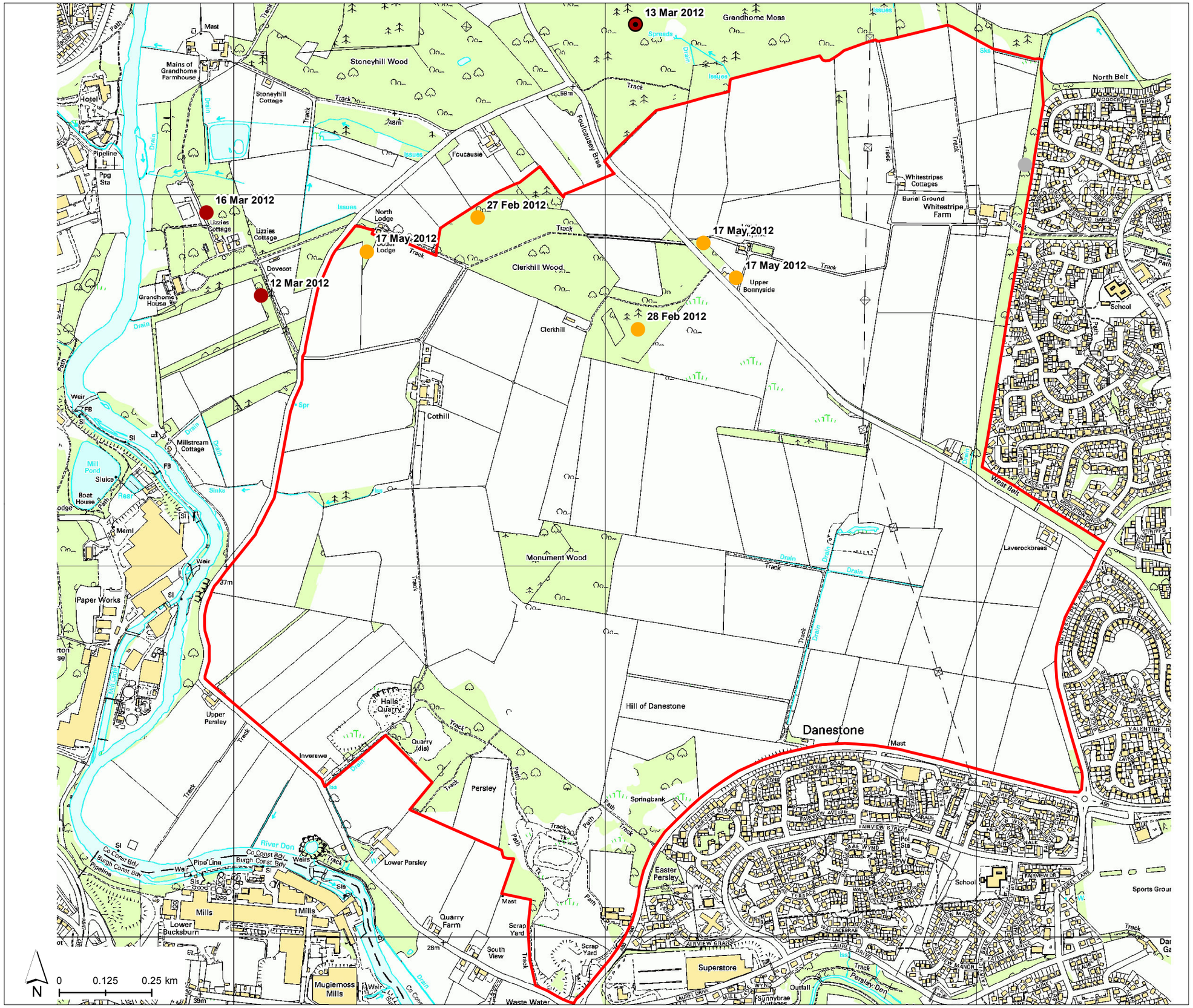
6.11 Three live red squirrels were recorded (all off-site), as well as the remains, in Grandhome Moss, also off-site, of one predated red squirrel. Individual live grey squirrels were seen in the West Belt woodland on three separate occasions. Collections of 'squirreled' pine cones, i.e. cones chewed by squirrels, were found in five locations within the study area.

Evaluation

The results of the watching brief confirm the presence of a small number of red squirrels close to the Grandhome study area, and their likely presence within the site at times, especially within conifer woodland. Given that the study area is within the area covered by the SSRS initiative, red squirrel numbers may rise as a result of the active culling of grey squirrels in the area. As shown by the NBN Gateway data, this species is currently widespread at the county level and therefore the site is considered to be of **District Value** to red squirrel. Note however, that red squirrel population sizes can decline rapidly as a result of being affected by encroaching grey squirrels, and as such this status may need to be reviewed in the future.

6.12 Any development affecting habitat suitable for and potentially attractive to red squirrel has the potential to result in an adverse impact on the existing red squirrel population, and this would be counter to the objectives of the SSRS Project.

6.13 Appropriate surveys will be required for each additional development phase area (prior to clearance of any habitat of potential value to red squirrel), to assess the likelihood of negative impacts on this species. Where the potential for adverse impacts is identified, appropriate mitigation and/or compensation measures will need to be put in place.



Grandhome

Squirrel Watching Brief

study area

Sightings

- live red squirrel
- remains of red squirrel
- squirreled cones
- live grey squirrel (one squirrel seen on three occasions)

Figure 6.1

Map Scale @ A3: 1:10,000

Surveyed by: RDG	Applied Ecology Ltd
Survey date: Feb - May 2012	
Drawn by: RAH	
Checked by: RDG	
Status: Final	

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7 Bats

Legislation

7.1 All UK species of bats and their places of shelter (roosts) are protected under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended), which implements the EC Directive 92/43/EEC in the UK. The Habitats Regulations amendments in 2007 had the effect of removing bats from all the provisions of the Wildlife & Countryside Act in Scotland. The protection of bats and roosts therefore now rests mostly with the amended Habitats Regulations.

7.2 It is an offence, with certain exceptions, to deliberately capture, kill or disturb any wild bat, and to obstruct, damage or destroy a wild bat breeding site or resting place. Any activity that would result in a contravention of the above legislation would require a licence to avoid committing an offence. A number of bat species are also priority BAP species in the UK.

7.3 The 2007 Habitats Regulations amendments strengthened the Regulations by removing the Agriculture and Animal Health Act defences, the dwelling house defence, the 'incidental result of an otherwise lawful operation' defence, and the defence that enabled certain actions to take place to prevent serious damage. These defences were removed to bring the Habitats Regulations more into line with the EU Habitats Directive. It also made non-compliance with a derogation licence a criminal offence.

Approach

Background

7.4 The inspection of buildings for evidence of bats may be conducted at any time of the year according to best practice survey guidance produced by the Bat Conservation Trust (BCT)[11]. However, the likelihood of finding evidence of bats (e.g. their droppings) on areas that are unprotected from rainfall may be restricted if undertaken outside the main bat-active season and/or after periods of wet weather, as such evidence may have been washed away.

7.5 Guidance on the level of survey effort necessary to verify use of a building by roosting bats in relation to development has also been produced by BCT, and is endorsed by Scottish Natural Heritage as the methodological approach to be followed in relation to assessing development impacts on bats. BCT 2012 suggests that up to four bat activity surveys of a building may need to be conducted in order to have confidence in a negative survey result, and that at least two of these surveys should be conducted between mid-May and August to coincide with the bat maternity (breeding) period.

7.6 All bat survey work was completed by Dr Duncan Painter – an experienced AEL bat worker who holds a Scottish Natural Heritage licence that enables him to enter and disturb bat

[11] Hundt L (2012) Bat Surveys: Good practice Guidelines, 2nd edition, Bat Conservation Trust.

roosts legally, with assistance from AEL ecologists Ms Crystal Acquaviva and Dr Martin Brammah, both experienced bat surveyors and licenced bat workers in England.

Building Inspections

7.7 An initial external visual inspection of all buildings owned and/or controlled by Grandhome Estate that are within (or adjoining) the study area were undertaken in August 2011. The locations of the buildings subject to external inspection are shown by **Figure 7.1**.

7.8 More detailed inspections, including external and internal inspections, where necessary, of all buildings that were highlighted as being scheduled for removal or renovation at that time were completed in May and June 2012 as shown by **Figure 7.2**.

7.9 During these surveys surveyors searched for direct evidence of bat presence on walls, window ledges, footings and other surfaces, using binoculars, a high-powered (1-million candle power) torch and borescope as necessary. All evidence of bats (live animals, droppings, corpses, scratch marks, urine staining, grease marks and feeding remains etc.) was searched for and recorded. Internal inspections consisted of roof void searches or, where no roof void was present (e.g. barns), a systematic search of the building's interior. External inspections were conducted from ground level and included searches for any obvious potential bat access/egress points and associated signs of bat usage (e.g. droppings).

7.10 It is of note that development plans have subsequently changed and the need for further survey will need to be reviewed in light of emerging development proposals for individual buildings within the study area.

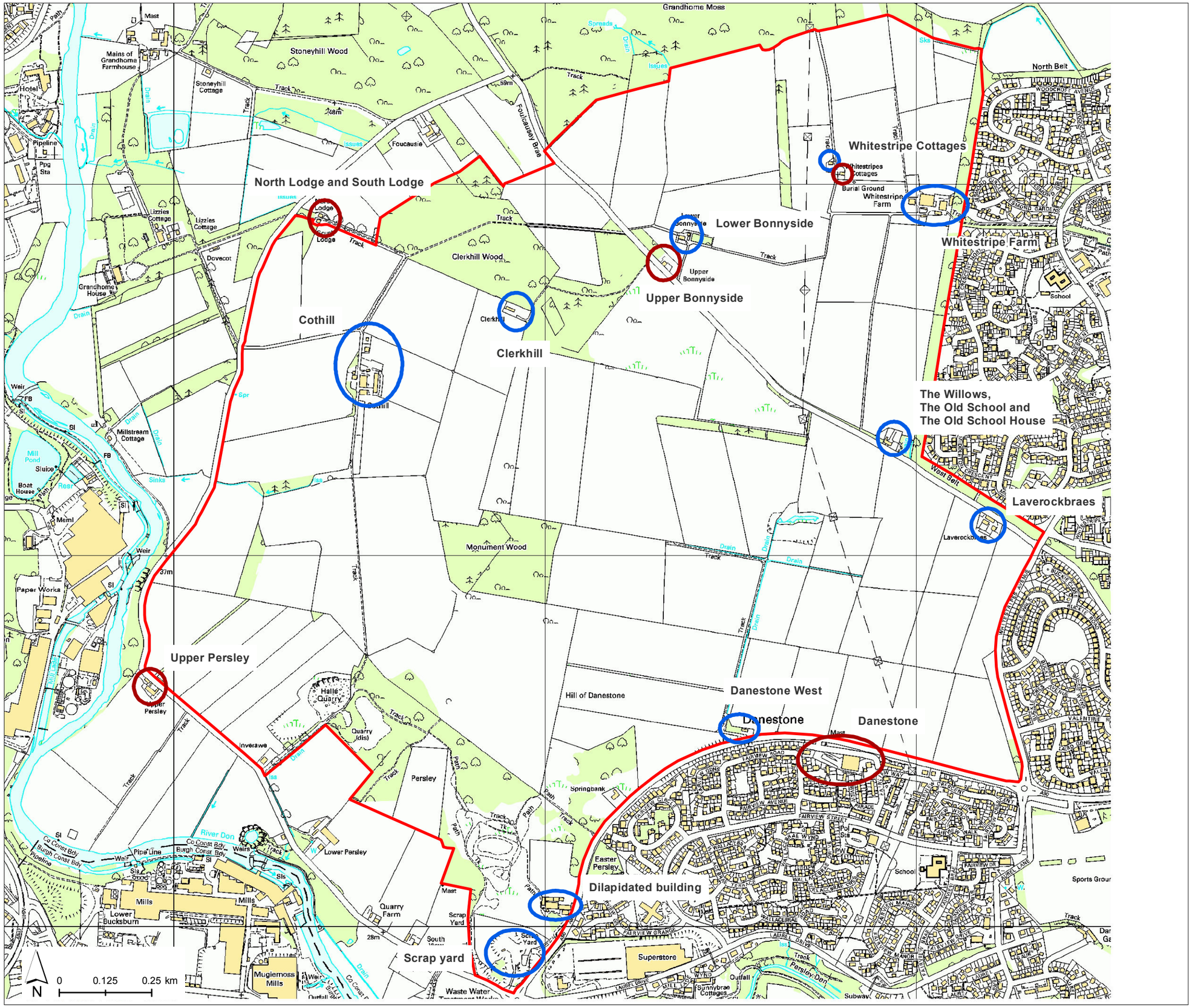
Bat Activity Surveys

7.11 Bat activity surveys were completed of buildings with bat roost potential (as identified by the building inspection surveys) that were scheduled to be removed within the first development phase area accordingly to proposals at that time, namely Danestone House, Cottage and Barns.

7.12 In addition, transect surveys and automated bat detector surveys were completed in May and June 2012 to assess the species composition of the bat population, and the amount of bat activity and use across the study area.

Building Emergence / Return Surveys

7.13 Bat activity surveys of Danestone House and Cottage were completed on 15-16 May 2012 (automated detector survey), with emergence and return surveys completed on 16-17 May and 19-20 June 2012. Bat survey of Danestone Barns was undertaken on 15-16 May 2012 (automated detector survey), with emergence and return surveys completed on 17-18 May 2012 and 20-21 June 2012.



Grandhome

Bat Survey - Location of Buildings Affected by the Development

- study area
- farmsteads/residences to be removed
- farmsteads/residences to be retained

Figure 7.1

Map Scale @ A3: 1:10,000

Surveyed by: AEL	
Survey date: 2011-2012	
Drawn by: RAH	
Checked by: DP	
Status: Final	

Applied Ecology Ltd

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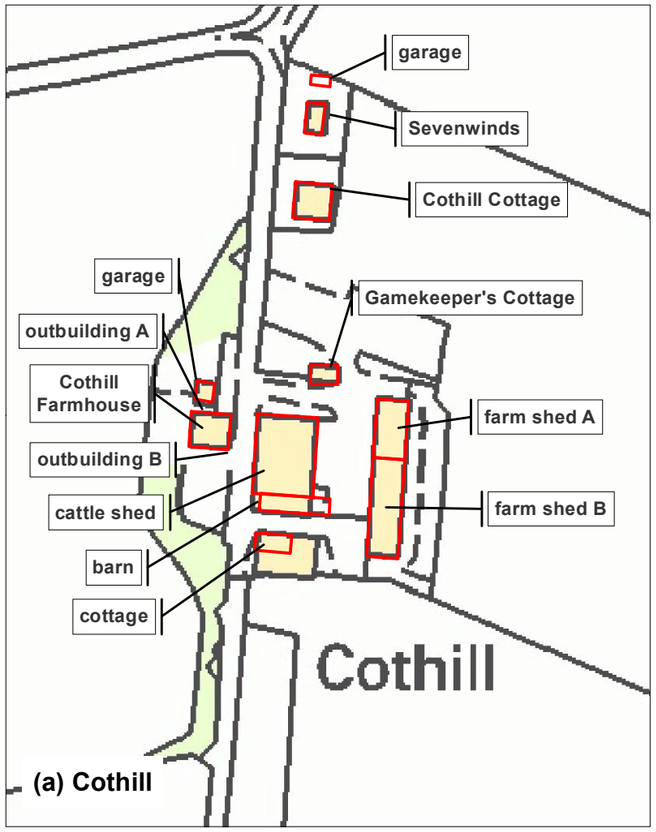
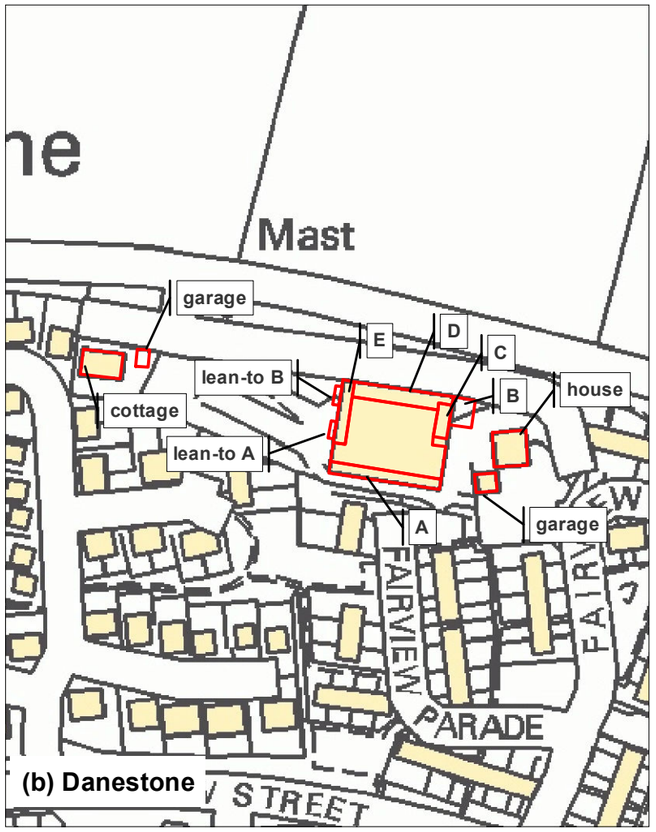
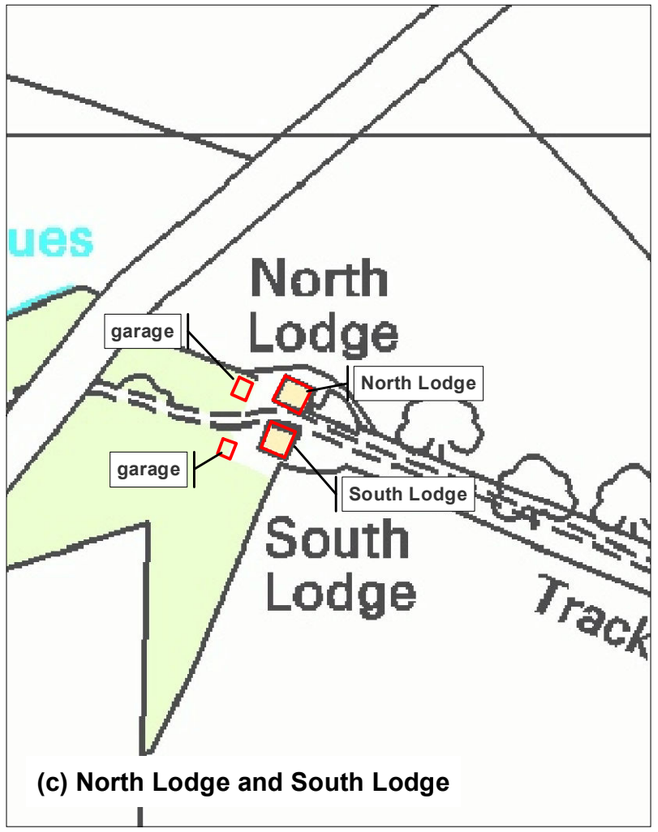


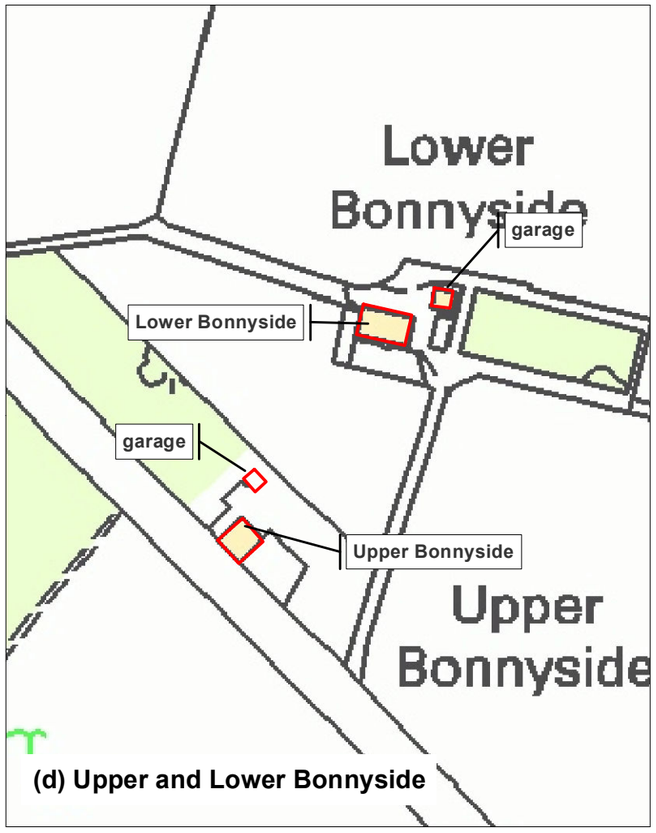
(a) Cothill



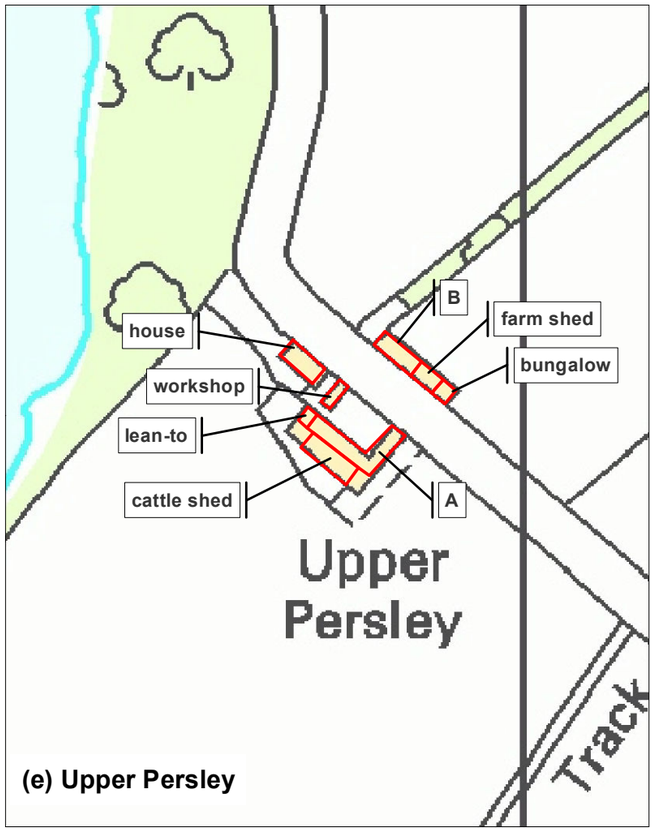
(b) Danestone



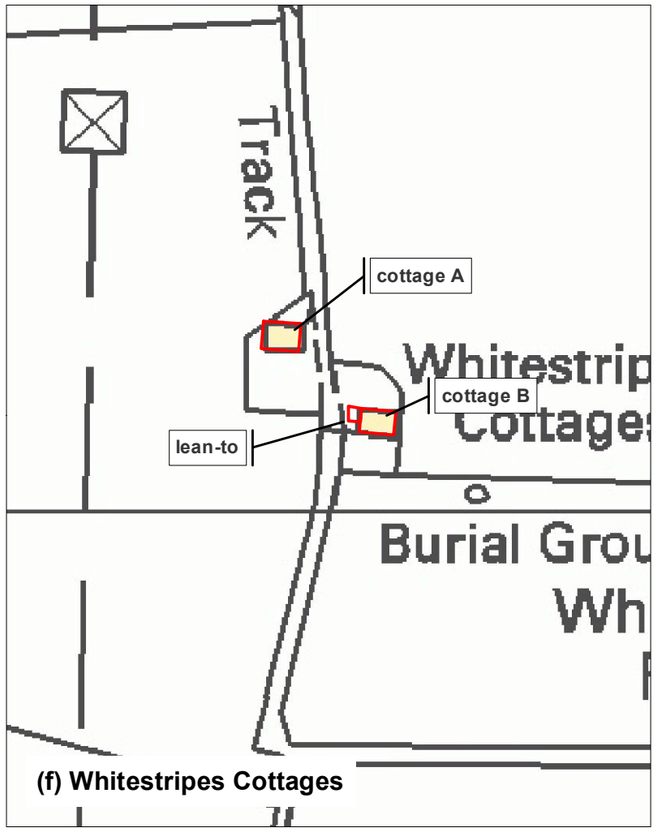
(c) North Lodge and South Lodge



(d) Upper and Lower Bonnyside



(e) Upper Persley



(f) Whitestripes Cottages

Grandhome

Bat Survey - Detail of Buildings Affected by the Development

buildings referred to in Table 7.3

Figure 7.2

Map Scale @ A3: 1:2,000

(Danestone Map Scale @ A3: 1:2,500)

Surveyed by: AEL	
Survey date: 2011-2012	
Drawn by: RAH	
Checked by: DP	
Status: Final	

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CB0449_027-00_fig7-2batbuildings_20130419 A3 22/04/2013

7.14 These buildings were surveyed by up to two surveyors during the emergence / return surveys, each equipped with a hand-held Pettersson 230 bat detector, and one with a Cobra night vision scope. Automated electronic bat detectors (Anabat SD1 and SD2 models) were used to supplement the surveyors and to record bat calls for later identification. The automated bat detectors were stationed around the perimeters of the buildings being surveyed (up to six detectors at each) above the ground with their microphones pointing skywards towards or within the building being surveyed. In addition to automated detectors and human surveyors, tripod-mounted infra-red video cameras were used to film parts of buildings not visible to the surveyors. The survey set-up is shown by **Figure 7.3**.

7.15 Emergence surveys commenced at least 15 minutes before sunset on the evening of each survey, and return surveys commenced in darkness 90 minutes before sunrise. Emergence surveys continued until such time as it was too dark to see effectively (normally around 90 minutes after sunset) with the surveyors stationed in separate locations around the building(s) being observed. During the return surveys, surveyors patrolled slowly around the perimeter of the building(s).

7.16 Weather conditions were recorded at the start of each survey session (cloud cover, air temperature, average and maximum wind speeds) using a Kestrel hand held weather meter and are summarised in **Table 7.1**. Prevailing weather conditions during most of the surveys were suitable for bats to be active and did not appear to adversely affect bat activity at any point. The exception was the dusk emergence and dawn return survey of Danestone Barns on 17-18 May 2012. At the start of the emergence survey the ambient air temperature was low at 4.5°C and there was a light rainfall. As the rain became heavier, the decision was made to end the survey early. During the night the heavy rain continued and the air temperature dropped to 2.9°C. As a result, the dawn return survey was cancelled. However, automated bat detectors were left to run from one hour before sunrise until sunrise.

7.17 Automated electronic bat detectors (Anabat SD1 and SD2 models) were also left to record overnight inside Danestone Barns (five detectors) and in the loft of Danestone House (one detector) on 15-16 May 2012.

Transect Bat Activity Survey

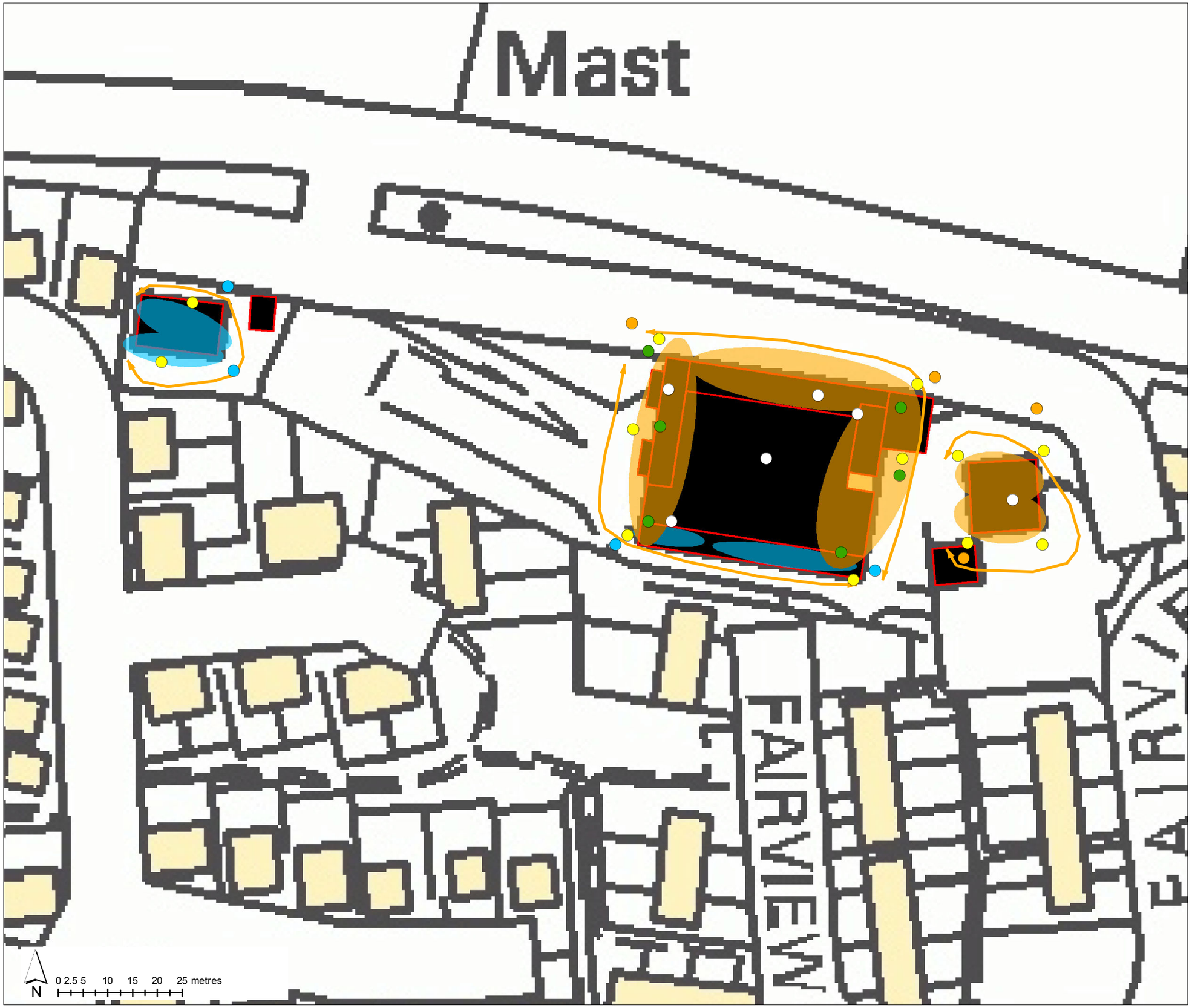
7.18 The two transects devised to cover the Grandhome study area were each walked by a single surveyor on 14 May and 18 June 2012 as shown in **Figure 7.4**. Transects were of approximately equal length, and were designed to incorporate habitat features of potential foraging and commuting value to bats, and to include all habitat types present within the Grandhome masterplan boundary.

7.19 Transect surveys started 15 minutes before sunset and ended approximately two hours after sunset.

7.20 Both surveyors were equipped with an automated electronic bat detector (Anabat SD2 model) to record bat calls along each transect. Transects were walked slowly, with stops for three minutes at each of 15 pre-determined points along each route. All bats seen and/or heard were noted.

Table 7.1: Building bat activity survey times and weather variables at the start of each survey

Variable	Danestone House and Cottage				Danestone Barns			
	16 May emergence	17 May Return	19 June Emergence	20 June Return	17 May Emergence	18 May Return	20 June Emergence	21 June Return
Sunset	21.22	04.46	22.09	04.12	21.26	04.43	22.09	04.12
Start/end	21.07/22.37	03.15/04.46	21.55/23.30	02.47/04.12	21.10/22.00	03.43/04.43 automated only	21.54/23.09	02.57/04.12
Temperature	7.6˚C	8.2˚C	10.1˚C	9.3˚C	4.5 ˚C	2.9˚C	11.5˚C	10.2˚C
Average wind speed	0.7 m/s	0 m/s	1.5 m/s	0 m/s	1.0 m/s	0.1 m/s	1.5 m/s	1.5 m/s
Maximum wind speed	1.2 m/s	0 m/s	2.0 m/s	0 m/s	1.4 m/s	0.2 m/s	2.0 m/s	2.0 m/s
Cloud cover	100%	10%	50%	90%	100%	100%	95%	100%
Precipitation	none	light drizzle	none	none	light rain heavier rain at 22.00	rain	none	none



Grandhome

Danestone Bat Activity Survey Set-Up

- buildings surveyed
- dusk surveyor position
- video camera position
- dusk and dawn static Anabat detector position
- barn Anabat position
- house and barn Anabat position
- surveyor dawn patrol route
- surveyor field of view
- video camera field of view

Figure 7.3

Map Scale @ A3: 1:750

Surveyed by: AEL	Applied Ecology Ltd
Survey date: Mar/Apr 2012	
Drawn by: RAH	
Checked by:	
Status: Draft	

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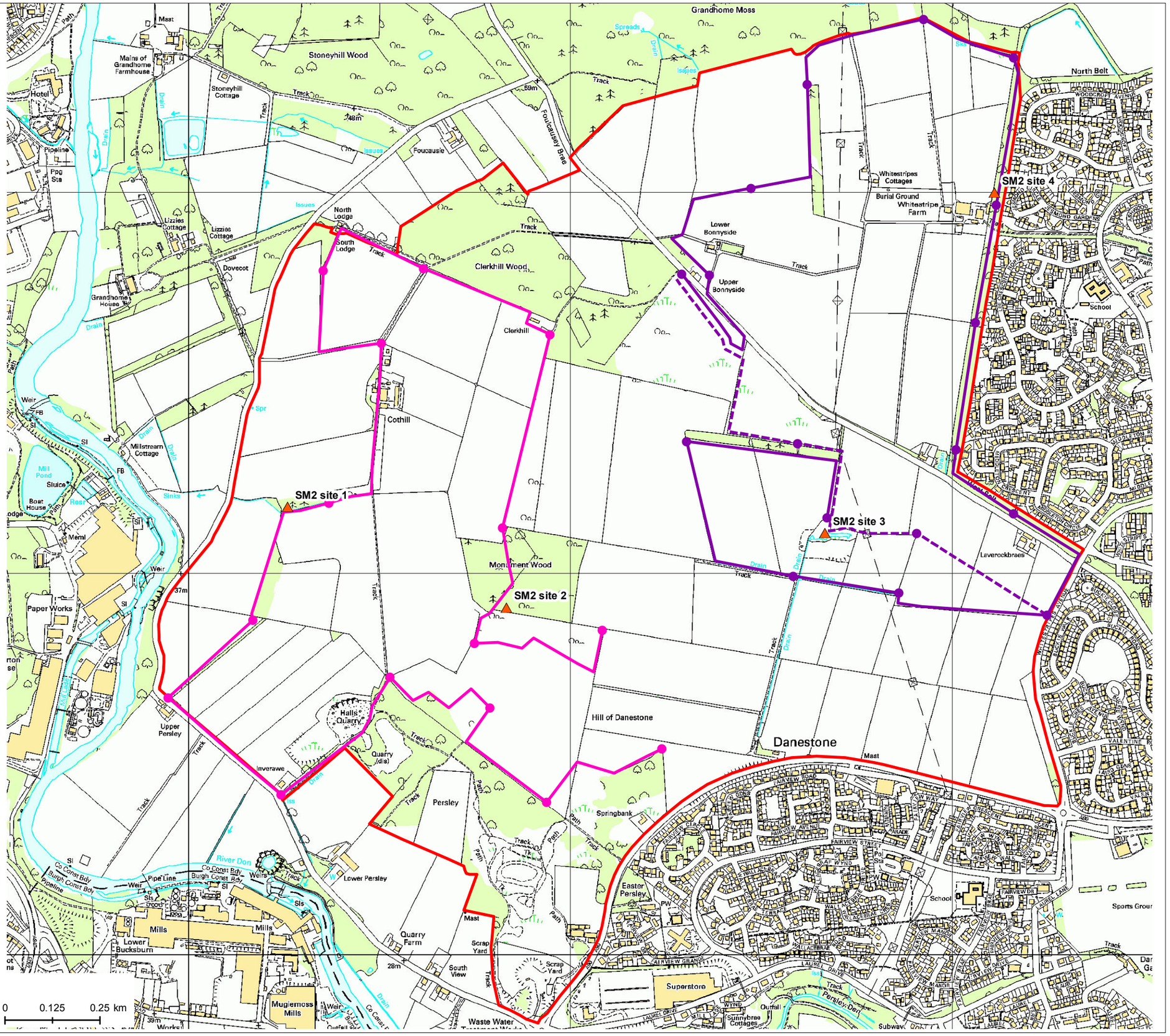
CB0449_028-00_fig7-3danestoneactivity_20130422 A3 22/04/2013


Grandhome Moss
Stoneyhill Wood
Mains of Grandhome Farmhouse
Stoneyhill Cottage
Foucausie
Foucausey Brae
North Belt
Whitestripes Cottages
Burial Ground
Whitestripe Farm
SM2 site 4
Lower Bonnyside
Upper Bonnyside
North Lodge
South Lodge
Clerkhill Wood
Clerkhill
Cothill
Lizzies Cottage
Dovecot
Grandhome House
Millstream Cottage
Mill Pond
Sluice
Boat House
Memi
Paper Works
SM2 site 1
SM2 site 2
SM2 site 3
Monument Wood
Laverockbraes
Hill of Danestone
Danestone
Halls Quarry
Quarry (dis)
Inverawe
Upper Persley
Persley
Springbank
Lower Persley
Easter Persley
Mills
Lower Bucksburn
Mugiemoss Mills
Quarry Farm
Scrap Yard
South View
Waste Water
Superstore
Sunnybrae Cottages
Persley Den
School
Sports Ground
River Don
Pipe Line
Pipeline
Co Const Bdy
Burgh Const Bdy
Weir
Mast
Track
Drain
Path
Issues
Spreads
Sinks
Spr
Rest
Pipeline
Ppg Sta
Hotel
Lizzies Cottage
Fairview Road
Fairview Avenue
Fairview Street
Fairview Grange
Laurel Drive
Laurel Avenue
Laurel Place
Laurel Terrace
Laurel Bank
Fairview Place
Fairview Drive
Fairview Manor
Fairview Crescent
Fairview Gardens
Fairview Terrace
Fairview Parade
Fairview Place
Valentine Road
Valentine Place
Woodside Avenue
Woodside Crescent
Woodside Place
Woodside Terrace
Woodside Gardens
Woodside Drive
Woodside Place
Westfield Place
Westfield Terrace
Westfield Drive
Westfield Avenue
Westfield Crescent
Westfield Place
Middleton Road
Middleton Place
Middleton Crescent
Middleton Terrace
Middleton Drive
Middleton Avenue
Middleton Place
Stripes Place
Stripes Drive
Stripes Avenue
Stripes Crescent
Stripes Place
Buckie Place
Buckie Drive
Buckie Avenue
Buckie Crescent
Buckie Place
Bleaf Wynd
Bleaf Place
Bleaf Terrace
Bleaf Drive
Bleaf Avenue
Bleaf Crescent
Bleaf Place
Wallace Place
Wallace Terrace
Wallace Drive
Wallace Avenue
Wallace Crescent
Wallace Place
Acerbrae Place
Acerbrae Terrace
Acerbrae Drive
Acerbrae Avenue
Acerbrae Crescent
Acerbrae Place
Wynd Place
Wynd Terrace
Wynd Drive
Wynd Avenue
Wynd Crescent
Wynd Place
Mill Place
Mill Terrace
Mill Drive
Mill Avenue
Mill Crescent
Mill Place
Valentine Place
Valentine Road
Valentine Place
Aird Gdns
Aird Place
Aird Terrace
Aird Drive
Aird Avenue
Aird Crescent
Aird Place
Fairview Place
Fairview Drive
Laurel Lane
Laurel Place
Laurel Terrace
Laurel Drive
Laurel Avenue
Laurel Place
Laurel Bank

7.21 In June, transects were walked in the opposite direction to that taken during the May survey. On 18 June, the route of Transect 2 was diverted to avoid a large herd of cattle present in fields on the original route.

7.22 Weather conditions were recorded at the start of each survey session (cloud cover, air temperature, average and maximum wind speeds) using a Kestrel hand-held weather meter and are summarised in **Table 7.2**. Prevailing weather conditions during all surveys were suitable for bats to be active and did not appear to adversely affect bat activity at any point.

Table 7.2: Transect bat activity survey times and weather variables at the start of each survey

Variable	14 May	18 June
Sunset	21.21	22.08
Start/end	21.06/23.26	21.53/00.10
Temperature	6.7 ˚C	10.2˚C
Average wind speed	2.0 m/s	1.5 m/s
Maximum wind speed	2.6 m/s	2.0 m/s
Cloud cover	40%	40 %
Precipitation	None	none

Automated Detector Survey

7.23 Single SM2-bat and SM2-bat^{+} automated electronic bat detectors were installed in habitats considered likely to be of value to commuting and foraging bats at four locations on the Grandhome study area as shown by **Figure 7.4**. In summary, these were:

- Site 1 - the edge of a small wooded area by a small stream, to the west of the site (grid reference: NJ 90245 11158);
- Site 2 - a scrub/woodland boundary at the centre of the site (grid reference: NJ 90809 10910);
- Site 3 - adjacent to a pond to the east of the site (grid reference: NJ 91672 11105); and
- Site 4 - along a line of beech trees next to horse paddocks, to the northeast of the site (grid reference: NJ 92113 12015).

7.24 The bat detectors were programmed to record automatically from 30 minutes before sunset on the 14 May until 30 minutes past sunrise on 18 May; and from 30 minutes before sunset on 18 June to 30 minutes past sunrise on 22 June 2012. All four detectors were mounted approximately 1.5m above the ground on sturdy vegetation with their microphones pointing slightly downward (to prevent potential rain damage) and away from the woodland edge.

7.25 Weather conditions during each survey period were typically suitable for bats to be active,. However, poor weather did appear to have an adverse effect on bat activity on some nights, e.g. heavy rain storms on the night of 21 June.

7.26 Detectors at Sites 2 and 3 were removed by third parties in June 2012. As a result no bat data are available for these locations over the June survey period.

Survey Findings

Building Inspections

7.27 A summary of the findings of the building inspections is provided in **Table 7.3** along with each building's bat roost potential (low, medium or high) and, in the case of buildings with high bat roost potential, the suspected roost type.

Table 7.3: Summary of bat survey building inspection results

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
Danestone	House	91872 10433	15/05/12	I&E (roof void inaccessible)	No evidence of bats, but roosting features present.	*Moderate*
			20/06/12	E	As above.	
	Garage	91861 10432	15/05/12	I&E	No evidence of bats, and minor roosting features present.	*Low*
			20/06/12	E	As above.	
	Cottage	91703 10469	16/05/12	I&E	No evidence of bats, but roosting features present.	*Moderate*
			20/06/12	E	As above.	
	Garage	91720 10475	16/05/12	I&E	No evidence of bats, and no roosting features – well sealed.	*None*
			20/06/12	E	As above.	
	Barn A	91821 10426	15/05/12	I&E	No evidence of bats, roosting features present.	*Moderate*
			20/06/12	I&E	As above.	
	Barn B	91852 10457	15/05/12	I&E	No evidence of bats, and minor roosting features present.	*Low*
			20/06/12	I&E	As above.	

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
	Barn C	91844 10449	15/05/12	I&E	No evidence of bats present, but roosting features present	*Moderate*
			20/06/12	I&E	As above.	
	Barn D	91832 10460	15/05/12	I&E	No evidence of bats, but roosting features present	*Moderate*
			20/06/12	I&E	As above	
	Barn E	91806 10452	15/05/12	I&E	No evidence of bats, but roosting features present	*Moderate*
			20/06/12	I&E	As above.	
	Cattle shed	91824 10443	15/05/12	I&E	No evidence of bats and no roosting features present.	*Low*
			20/06/12	I&E	No evidence of bats.	
	Lean-to A	91803 10460	15/05/12	I&E	No evidence of bats and no roosting features present.	*Low*
			20/06/12	I&E	As above.	
	Lean-to B	91800 10444	15/05/12	I&E	No evidence of bats and no roosting features present.	*Low*
			20/06/12	I&E	As above.	

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
Clerkhill	Cottage	90904 11662	22/08/11	E	No evidence of bats, but a number of roosting features present.	*Moderate*
Cothill	Sevenwinds	90520 11581	22/08/11	E	No evidence of bats but roosting features present.	*Moderate*
	Garage	90521 11593	22/08/11	E	No evidence of bats, and no roosting features present.	*Low*
	Cothill Cottage	90517 11556	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
	Cothill Farmhouse	90486 11481	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
	Garage	90487 11498	22/08/11	E	No evidence of bats, but a number of roosting features present.	*Moderate*
	Outbuilding A	90485 11491	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
	Outbuilding B	90489 11472	22/08/11	E	No evidence of bats, and no roosting features present.	*Low*
	Cottage	90506 11444	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
			17/05/12	I & E (roof void inaccessible)	As above	
			19/06/12	E	As above.	

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
	Game keeper's cottage	90523 11500	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
			17/05/12	I & E (roof void inaccessible)	As above	
			19/06/12	E	Two bat droppings present externally	
	Barn	90514 11458	22/08/11	I&E	Single bat dropping internally, and a number of roosting features present.	*High*
			17/05/12	I&E	No evidence of bats, but roosting features present	
			19/06/12	E	A few bat droppings present externally.	
	Cattle shed	90511 11473	22/08/11	E	No evidence of bats, and no roosting features present.	*Low*
			17/05/12	I&E	As above.	
			19/06/12	E	As above.	
	Farm shed A	90545 11482	22/08/11	E	No evidence of bats and no roosting features present.	*Low*
			17/05/12	I&E	As above.	
	Farm shed B	90542 11455	22/08/11	E	No evidence of bats, and no roosting features present.	*Low*

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
			17/05/12	I&E	As above.	
Danestone West	Bungalow with outbuilding and garage	91537 10529	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
Laverockbraes	Various buildings	92195 11089	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
Lower Bonnyside	Lower B	91367 11854	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
	Garage	91386 11863	22/08/11	E	No evidence of bats, but roosting features present	*Moderate*
North Lodge and South Lodge	North Lodge	90398 11915	15/05/12	E	No evidence of bats, but roosting features present.	*High* *(suspected minor summer roost)*
			16/05/12	I	No evidence of bats present	
			19/06/12	E	A few bat droppings present externally.	
	Garage	90384 11917	15/05/12	E	No evidence of bats, roosting features present.	*Moderate*
			16/05/12	I	As above.	
			19/06/12	E	As above.	

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
	South Lodge	90392 11898	15/05/12	E	No evidence of bats, but roosting features present.	*High* *(suspected minor summer roost)*
			16/05/12	I	As above.	
			19/06/12	E	A few bat droppings present externally.	
	Garage	90377 11898	15/05/12	E	No evidence of bats, but roosting features present	*Moderate*
			16/05/12	I	As above.	
			19/06/12	E	As above.	
Upper Bonnyside	Upper B	91318 11781	22/08/11	E	No evidence of bats, but roosting features present.	*Moderate*
			15/05/12	I&E	As above.	
			19/06/12	E	Two possible bat droppings present externally	
	Garage	91326 11798	15/05/12	E	No evidence of bats, but roosting features present	*Moderate*
			16/05/12	I	As above.	
			19/06/12	E	As above.	
Upper Persley	House	89929 10665	17/05/12	I&E	No evidence of bats, but roosting features present.	*Moderate*

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
			19/06/12	E	As above.	
	Bungalow	89974 10653	17/05/12	I (excl roof void) & E	No evidence of bats, but roosting features present.	*Moderate*
			19/06/12	E	As above.	
	Barn A	89949 10631	17/05/12	I&E	No evidence of bats, but roosting features present.	*Moderate*
			19/06/12	E	As above.	
	Barn B	89959 10667	17/05/12	I&E	No evidence of bats, and minor roosting features.	*Low*
			19/06/12	E	As above.	
	Cattle shed	89935 10633	17/05/12	I&E	No evidence of bats and no roosting features.	*Low*
			19/06/12	E	As above.	
	Farm shed	89967 10660	17/05/12	I&E	No evidence of bats and no roosting features.	*Low*
			19/06/12	E	As above.	
	Lean-to	89928 10648	17/05/12	I&E	No evidence of bats, but roosting features present	*Moderate*
			19/06/12	E	As above.	

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
	Workshop	89938 10654	17/05/12	I & E (roof void inaccessible)	No evidence of bats, but minor roosting features present.	*Low*
			19/06/12	E	As above.	
Whitestripes Cottages	Cottage A	91769 12054	22/08/11	E	No evidence of bats, but minor roosting features present.	*Moderate*
	Cottage B	91801 12028	22/08/11	E	No evidence of bats, but minor roosting features present.	*Moderate*
			15/05/12	E	As above	
			16/05/12	I	As above	
			19/06/12	E	As above	
	Lean-to	91792 12028	15/05/12	I&E	No evidence of bats, no roosting features present.	*Low*
			19/06/12	E	As above.	
Whitestripe Farm	Houses and agricultural buildings	92037 11954	22/08/11	E	No evidence of bats, some buildings with roosting features present.	*Moderate*
The Willows, The Old School and The Old School House	Three houses/ bungalows	91933 11316	22/08/11	E	No evidence of bats, some buildings with roosting features present	*Moderate*

Farmstead/ residence	AEL building name/ref	Grid ref (NJ)	Survey date	Inspection type completed (I – internal and E – external)	Survey findings	Bat roost potential
Dilapidated Building Complex	Various buildings	91029 10060	22/08/11	E (viewed from a distance)	Buildings with roosting features present	*Moderate*
Scrap Yard	Temporary building	90924 09919	22/08/11	E	No evidence of bats, and no obvious roosting features present	*Low*

Building Bat Activity Survey

7.28 The results of the bat activity survey completed at Danestone House, Cottage and Barns is summarised in **Table 7.4**.

Table 7.4: Summary of building bat activity surveys and internal automatic detector survey at Danestone

Danestone - AEL building name/ref	Survey date	Survey type	Survey findings	Roost type
House	15-16/05/12	Automated	No bat calls recorded.	None
	16/05/12	Emergence	No bats emerged.	
	17/05/12	Return	No bats entered.	
	19/06/12	Emergence	No bats emerged.	
	20/06/12	Return	No bats entered.	None
Cottage	16/05/12	Emergence	No bats emerged.	None
	17/05/12	Return	No bats entered.	
	19/06/12	Emergence	No bats emerged.	None
	20/06/12	Return	No bats entered.	None
Barns	15-16/05/12	Automated	No bat calls recorded	None
	17/05/12	Emergence	No bats emerged.	
	18/05/12	Return cancelled (too cold) Automated	No bats calls recorded on automated detectors within one hour of sunrise.	
	20/06/12	Emergence	No bats emerged.	
	21/06/12	Return	No bats entered.	

7.29 During the May and June surveys, common and soprano pipistrelles (up to six bats at any one time) were frequently seen foraging in the rear garden of Danestone House, and intermittently seen foraging around trees to the northeast of the house. Common pipistrelles were first seen and recorded during both emergence surveys close to sunset (earliest two minutes before sunset) indicating they were roosting in buildings to the immediate south of the survey area. Soprano pipistrelle bats were first recorded 29

minutes past sunset in May but five minutes before sunset in June, foraging in the rear garden.

7.30 Common pipistrelle calls were recorded around Danestone Cottage in both May and June (earliest nine minutes past sunset), with only a few late soprano pipistrelle calls (earliest 50 minutes past sunset) being recorded. The video cameras did not record any bats emerging in either May or June. No bats were seen in May during the return survey, but in June a small number of common and soprano pipistrelle bats were seen and recorded commuting past the Cottage and foraging along a row of bramble north of the Cottage.

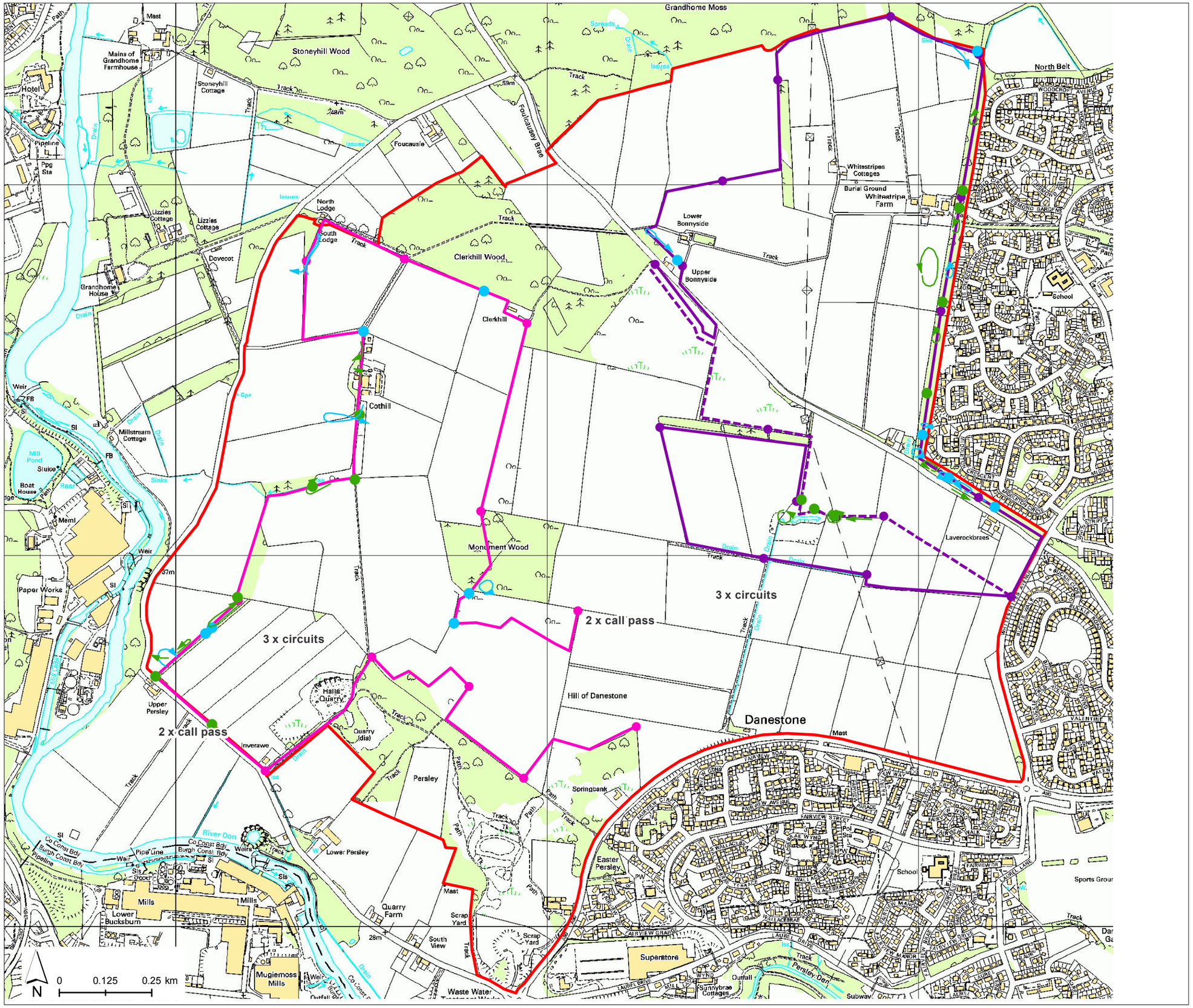
7.31 No bats were seen or heard during the May survey of Danestone Barns, but were seen foraging and commuting around (and occasionally within) the barns during the dusk and dawn surveys in June and were clearly seen commuting off site to the south and west in the morning.

Transect Bat Activity Survey

7.32 The results of bat activity survey along Transect 1 and Transect 2, completed in May and June 2012, are summarised in **Figure 7.5** and confirm that only very low levels of bat activity were recorded within the site.

7.33 Mainly individual soprano pipistrelle, and a few individual common pipistrelle bats were recorded along transects in May and appeared to be using areas covered by Transect 1 for commuting purposes (with only brief amounts of foraging), and areas covered by Transect 2, primarily for foraging.

7.34 Bat activity along transects in the June survey was similar to that in May, although in June only soprano pipistrelles were recorded along Transect 1. Transect 2 showed an increase in bat activity in June, with common pipistrelle making up around 50% of the calls recorded, the other half being soprano pipistrelle calls.



Grandhome

Bat Activity Transect Survey Results

- study area
- survey transect 1 (5.7 km) 14 May and 18 June 2012
- survey transect 2 (5.9 km) 14 May and 18 June 2012
- survey transect 2 diverted route 18 June 2012
- transect 1 stopping point
- transect 2 stopping point

Bat calls recorded

- May
- June

Bat flights seen

- May
- June

Figure 7.5

Map Scale @ A3: 1:10,000

Surveyed by: AEL	
Survey date: 2012	
Drawn by: RAH	
Checked by: RDG	
Status: Final	

Applied Ecology Ltd

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Automated Detector Survey

7.35 Summary results of the automated detector surveys completed alongside the transect surveys are provided in **Table 7.5** and **Table 7.6**. Full details are provided in **Appendix 2**.

Table 7.5: Summary of first bat call times (minutes past sunset) during automated detector surveys on 14-18 May and 18-22 June 2012

Bat Species	Static detector (SM2) sites							
	Site 1 –Wooded area (West) OS: NJ 90245 11158		Site 2 – Scrub (Central) OS: NJ 90809 10910		Site 3 – Pond (East) OS: NJ 91672 11105		Site 4 – Line of Beech (Northeast) OS: NJ 92113 12015	
	May	June	May	June	May	June	May	June
Soprano pipistrelle	+35 (26-56)	+112 (32-294)	+23 (6-48)	No Data	+39 (18-60)	No Data	+71 (22-119)	+13 (10-16)
Common pipistrelle	+34 (17-51)	+141 (43-295)	+15 (6-24)		+44 (37-54)		+26 (20-32)	+34 (24-46)
Nathusius' pipistrelle	-	-	+33 (1 night)		-		-	+186 (138-279)
Myotis sp.	-	-	-		+201 (134-268)		-	+188 (1 night)
Unidentified bat	+312 (260-364)	-	-		-		-	-

KEY: The top value is the average time past sunset at which the first bat call was recorded for that species (over entire survey period). The numbers beneath this value (in brackets) give the range of first bat call times past sunset over the recording period.

7.36 Pipistrelle calls with characteristics shared by common and soprano pipistrelle were recorded earlier than some of the times shown in the table (highlighted in bold and underlined). Hence, common and/or soprano pipistrelle bats may have been active in these areas earlier than suggested by the table. See **Appendix 2** for details.

Table 7.6: Summary of bat activity (call passes) during automated detector surveys on 14-18 May and 18-22 June 2012

Bat Species	Static detector (SM2) sites							
	Site 1 –Wooded area (West) OS: NJ 90245 11158		Site 2 – Scrub (Central) OS: NJ 90809 10910		Site 3 – Pond (East) OS: NJ 91672 11105		Site 4 – Line of Beech (Northeast) OS: NJ 92113 12015	
	May	June	May	June	May	June	May	June
Soprano pipistrelle	28 (1-105)	2 (0-4)	62 (1-176)	No Data	19 (0-51)	No Data	<1 (0-2)	39 (18-51)
Common pipistrelle	13 (0-50)	<1 (0-3)	28.5 (0-113)		7 (0-23)		2 (0-5)	7 (3-13)
Pipistrelle sp.	14 (0-46)	1 (0-2)	<1 (0-1)		1 (0-3)		-	1 (1)
Nathusius' pipistrelle	-	-	22 (0-75)		-		-	-

KEY: The top value is the average time past sunset at which the first bat call was recorded for that species (over entire survey period). The numbers beneath this value (in brackets) give the range of first bat call times past sunset over the recording period.

Evaluation

Roosting Bats

7.37 A total of three separate buildings / structures within the study area, namely Cothill Farm Barn, North Lodge and South Lodge, have been identified as possessing small summer roosts of pipistrelle bat species. A further 31 buildings / structure have been identified as having moderate bat roost potential, 16 of low potential and one of no value.

7.38 Current best practice guidance suggests that buildings with bat roost potential require specific survey in order to discount their roosting use by bats, with the degree of required minimum survey effort increasing with increasing bat roost potential. For buildings of low roost potential, a minimum of one survey during the bat active period of May to September is required to provide confidence that bats are not using a potential roost site; buildings of moderate bat roost potential require a minimum of two surveys during the bat active period (spaced several days apart); and buildings of high bat roost potential require at least three surveys during the bat active period (spaced several days apart).

7.39 Additional bat activity surveys will be required to confirm the presence / absence of roosting bats for all buildings due for demolition and/or renovation that are considered to

have bat roost potential. These surveys will need to be undertaken at an appropriate time of year once details development proposals are known and in advance of beginning each development phase.

7.40 To date bat emergence and return surveys have only been completed at the Danestone building complex. No bats were seen to emerge from or return to these buildings during any of the activity surveys.

General Bat Activity

7.41 The results of the transect surveys clearly show that although bat activity was well spread across the study area, the majority of this activity was closely associated with woodland corridors, woodland edges and standing water, all of which are prime foraging habitat for bats and provide useful bat commuting corridors. These habitats are relatively uncommon within the study area, which is dominated by arable fields and improved grassland, both habitats of low relative value to bats.

7.42 Current guidance for assessing the value of a site for bats is provided in Wray *et al*. (2010)[12]. This guidance provides a framework for valuing bat roosts, commuting routes and foraging areas for the purposes of Ecological Impact Assessment. The article assigns different values to survey data depending on the rarity of the bat species involved; the number of bats recorded at any one time; the number of roosts/potential roosts nearby; and the quality of the commuting corridors/foraging habitat on site. These numbers are combined to give a single value, which falls into one of six numerical ranges, each equating to a geographic frame of reference (ranging from 'Not important' to 'International' importance).

7.43 **Tables 7.7** and **7.8** apply this assessment method to the data gathered from the Grandhome transect and automated bat detector surveys. It includes a separate assessment for the four bat species/groups recorded within the study area, namely Common pipistrelle, Soprano pipistrelle, Nathusius' pipistrelle and *Myotis* species.

Table 7.7: Value of the study area for commuting bats (values in brackets correspond to the values assigned by Wray et al., 2010)

Species	Number of bats	Roosts/potential roosts nearby	Linear features	Overall site value for commuting bats
Common pipistrelle (2)	Small number (10)	Moderate number (4)	Un-vegetated fences and large field sizes (2)	**District, local or parish**
Soprano pipistrelle (2)	Small number (10)	Moderate number (4)		**District, local or parish**
Nathusius' pip. (5)	Individual bats (5)	Not known (4)		**District, local or parish**
Myotis spp. (20)	Individual bats (5)	None (1)		**County**

[12] Wray S, Wells D, Long E & Mitchell-Jones T (2010) *Valuing bats in ecological impact assessment*, In Practice, No. 70, Institute of Ecology and Environmental Management.

Table 7.8: Value of the study area for foraging bats

Species	Number of bats	Roosts/potential roosts nearby	Foraging habitat characteristics	Overall site value for commuting bats
Common pipistrelle (2)*	Small number (10)	Moderate number (4)	Suburban areas or intensive arable land (2)	**District local or parish**
Soprano pipistrelle (2)	Small number (10)	Moderate number (4)		**District local or parish**
Nathusius' pip. (5)	Individual bats (5)	Not known (4)		**District local or parish**
Myotis spp. (20)	Individual bats (5)	None (1)		**County**

7.44 The results show that the study area is of **district, local or parish value** for commuting and foraging bats of all three pipistrelle species found in Scotland, and of **county value** for *Myotis* bats.

8 Water Vole

Legislation

8.1 In Scotland, water vole *Arvicola amphibius* receives partial protection under the Wildlife and Countryside Act, 1981, (as amended and strengthened by the Nature Conservation (Scotland) Act 2004). It is illegal to:

- damage or destroy or obstruct access to any structure or place which water voles use for shelter or protection.
- disturb water vole while they are using such a place.

8.2 In England water vole was given full protection under the Wildlife and Countryside Act 1981 review (April 2008), making it illegal to deliberately or recklessly kill and injure the animal. This legislative change has not yet been adopted in Scotland or Wales. Water vole is a priority Biodiversity Action Plan (BAP) species in the UK and in North East Scotland.

Approach

8.3 Walkover surveys of the study area, in order to look for signs of the presence of water vole, were carried out on 16 May and 17 June 2012.

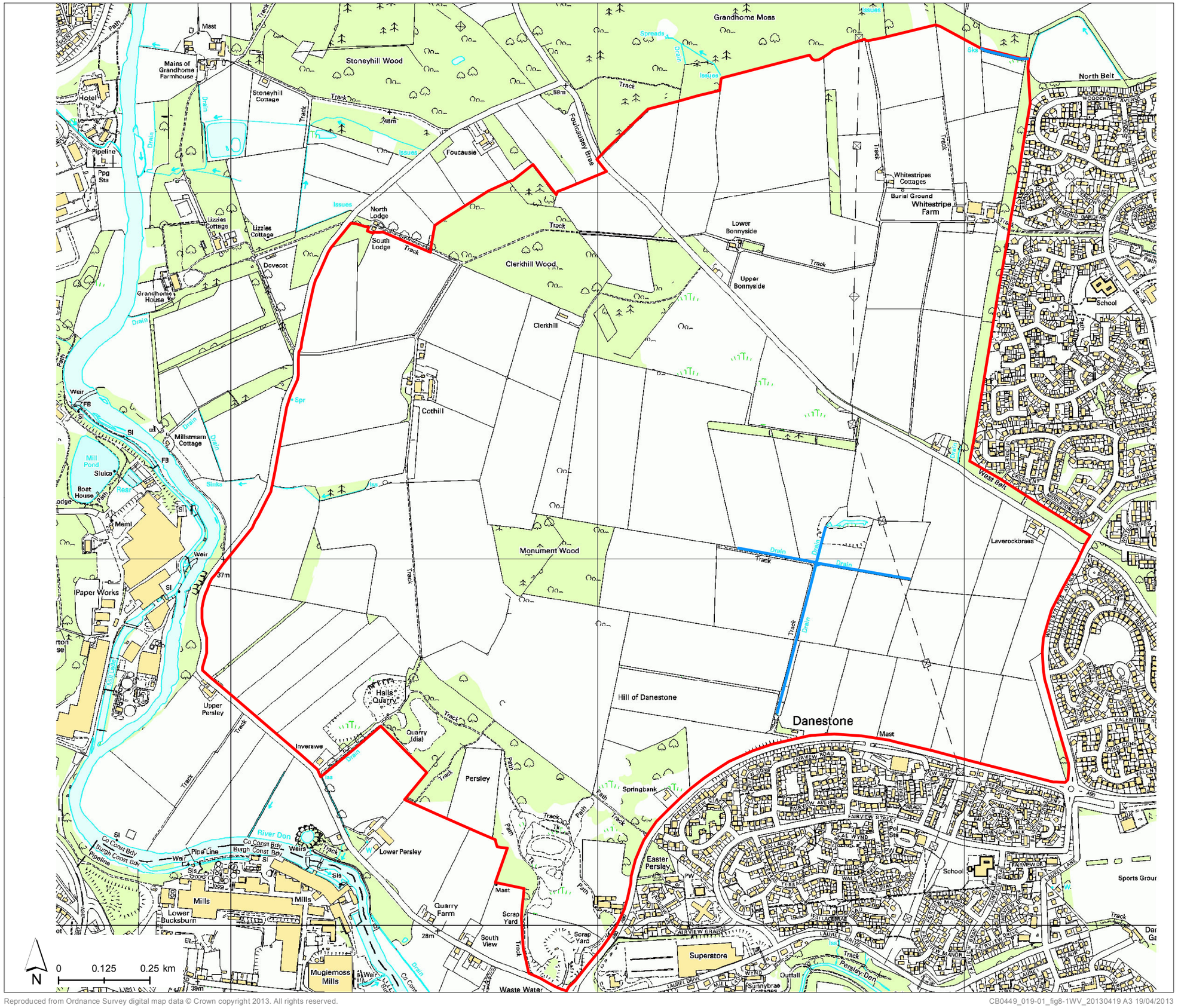
8.4 Three water-filled drainage ditches were present within the study area at the time of survey: one in the north-east corner (125m; NJ 92044 12388 - NJ 92160 12356); and two intersecting ditches forming a cross towards the south-east of the site, one orientated north-north-east to south-south-west (530m; NJ 91629 11085 - NJ 91490 10570) and one orientated west-north-west to south-south east (500m; NJ 91373 11024 - NJ 91853 10940). The locations of these ditches are shown by **Figure 8.1**.

8.5 All three ditches and the manganese quarry pond that adjoins the ditches were searched by Rick Goater (MCIEEM) for evidence of water vole in accordance with the methods for environmental assessment survey outlined in the Water Vole Conservation Handbook (Third Edition)[13]. The length of each ditch was split into contiguous 50m sections (with the final section being shorter than 50m in some cases) and each section was surveyed for signs of the presence of water vole, namely burrow holes, runs, droppings and latrines, and evidence of feeding (e.g. piles of characteristically chopped grass stems and feeding 'lawns').

Survey Findings

8.6 No evidence of the presence of water vole was recorded along any of the three ditches or around the pond within the study area boundary on either of the survey dates.

[13] Strachan, R., Moorhouse, T. & Gelling, M. (2011). *Water vole Conservation Handbook* (*third edition*). WildCRu: Oxford.



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Grandhome

Location of Ditches Surveyed for Water Vole

study area

ditch

Figure 8.1

Map Scale @ A3: 1:10,000

Surveyed by: RDG	Applied Ecology Ltd
Survey date: May - June 2012	
Drawn by: RAH	
Checked by: RDG	
Status: Final	

Evaluation

8.7 No evidence of water vole presence has been found, and this species is considered to be absent from the study area.

9 Otter

Legislation

9.1 In Scotland otter *Luta lutra* is protected by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and hereafter referred to as 'the Habitats Regulations'. Under the Habitats Regulations, otters are classed as "European Protected Species" and therefore given the highest level of species protection.

9.2 The Habitats Regulations amendments in 2007 had the effect of removing otter from all the provisions of the Wildlife & Countryside Act in Scotland. The protection of otter therefore now rests mostly with the amended Habitats Regulations which makes it an offence to:

- deliberately or recklessly kill, injure or take (capture) an otter;
- deliberately or recklessly disturb or harass an otter;
- damage, destroy or obstruct access to a breeding site or resting place of an otter (i.e. an otter shelter).

9.3 Thus, otter shelters are legally protected whether or not an otter is present. Otter is also a priority Biodiversity Action Plan (BAP) species in the UK and in North East Scotland.

Approach

9.4 No aquatic habitat likely to be of value to otter is present within the study area boundary. Therefore, and in accordance with best practice guidelines, all stretches of water-course, except for the River Don itself, and standing water within and beyond 200m of the study area boundary were surveyed on 16 May 2012 and 17 June 2012. The survey was carried out by Rick Goater (MCIEEM), who is experienced in otter survey.

9.5 The main objective of the survey was to search for permanent otter breeding or sheltering sites, and if found, for evidence that they were in use. A detailed search for this evidence was made by slowly walking within the water-courses (as far as possible) and inspecting both the adjacent vegetation and the banks themselves, below low overhanging bank sides and overhanging vegetation.

9.6 All otter field signs (i.e. spraints, footprints and paths leading to and from the water, and potential otter lying-up sites) were searched for. Where potential otter paths were found, these were followed away from the water course to see if they led to dense scrub or cavities in the ground, in trees, or amongst rock piles where otter shelter might be present.

9.7 Habitats close to water courses, and with conditions suitable for providing otter with shelter (e.g. willow carr, scrub and damp tussocky grassland) were also searched thoroughly for tracks, lying-up sites and other otter field evidence.

Survey Findings

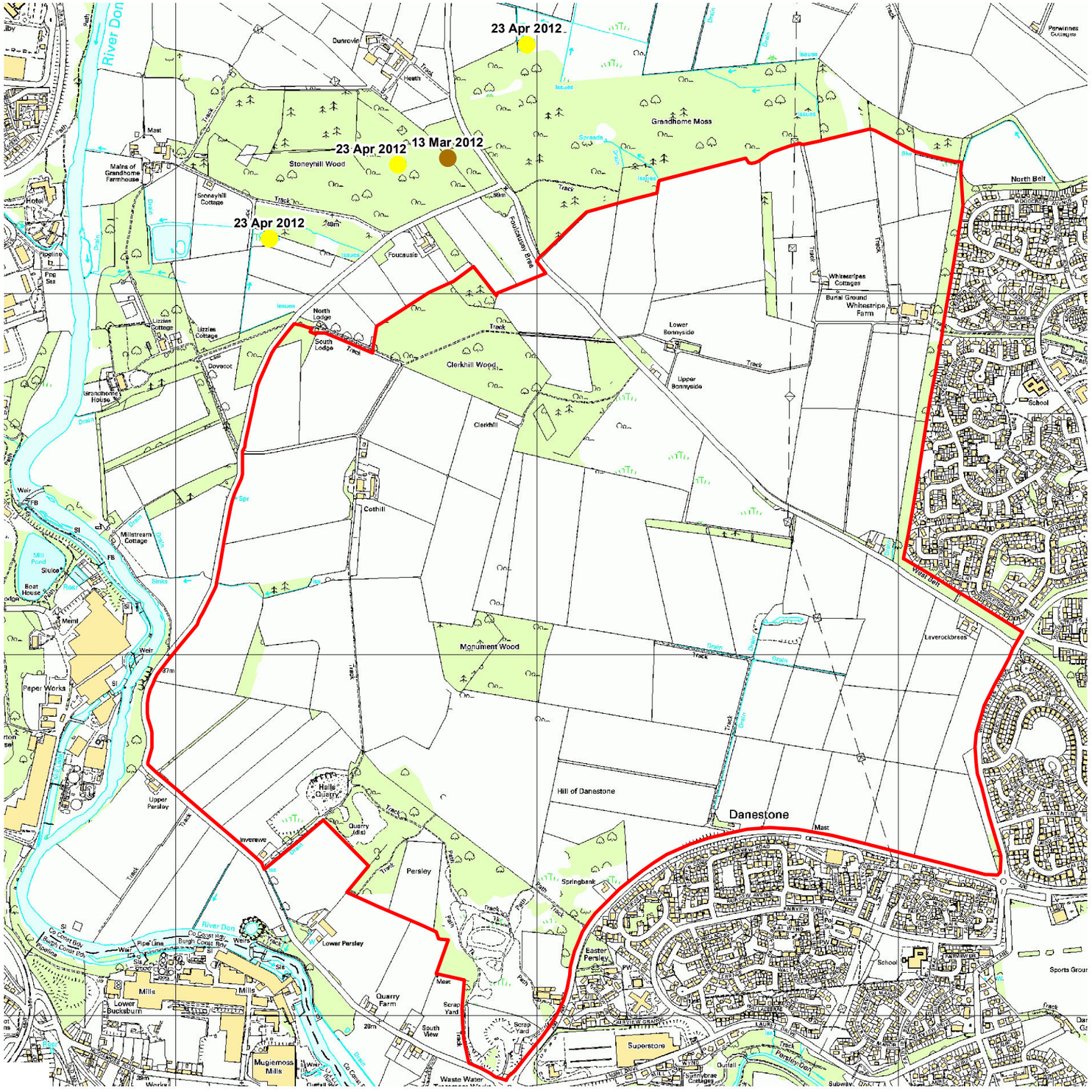
9.8 **Figure 9.1** shows the results of the otter survey. No evidence of the presence of otter along water courses within the study area or its 200m buffer zone was present during the survey.

Elsewhere within the study area and its 200m buffer zone, were, for the most part, devoid of habitats of value to otter as potential holt sites.

9.9 Beyond the 200m buffer zone, evidence confirming the nearby presence of otter was found during other survey work carried out by AEL, close to ponds within Grandhome Moss and in, and adjacent to, Stoneyhill Wood, to the north of the study area. This evidence consisted of the pond-side remains of predated frogs and common toads, and also a spraint on a drystone dyke within the eastern section of Stoneyhill Wood.

Evaluation

9.10 The survey confirmed that otter, though found in suitable habitats beyond 200m to the north of the study area, was unlikely to be regularly present on the site or within the buffer zone, as there is a poor network of ponds and watercourses and suitable otter habitats are lacking. Although the banks and land immediately adjacent to the River Don were not searched, there can be little doubt that the river would be used as a corridor for movement by this species.


23 Apr 2012
23 Apr 2012
13 Mar 2012
23 Apr 2012
Stoneyhill Wood
Grandhome Moss
Clerkhill Wood
Monument Wood
Hill of Danestone
Danestone
Persley
Easter Persley
Lower Persley
Upper Persley
Paper Works
Mills
Lower Bucksburn
Mugiemoss Mills
Superstore
School
North Belt
River Don
Grandhome House
Mains of Grandhome Farmhouse
Stoneyhill Cottage
Lizzies Cottage
Dovecot
North Lodge
South Lodge
Foucaussie
Foucaussie Burn
Whitestripes Cottages
Burial Ground
Whitestripes Farm
Lower Bonnyside
Upper Bonnyside
Clerkhill
Cothill
Millstream Cottage
Boat House
Sluice
Mill Pond
Weir
Halls Quarry
Quarry (dis)
Inverawe
Quarry Farm
South View
Scrap Yard
Springbank
Leverockbrae
Sunnybrae Cottages
Waste Water Treatment Works
Sports Ground
Perwinnes Cottages
Dunrovin
Heath
Mast
Pipeline
Fog Sta
Track
Drain
Issues
Spr
Path
Weir
Sluice
Outfall
Subway
Pipe Line
Burgh Const Brn
Co Const Brn
Aberdeen Const Brn
Pond
Works
Pol Sta
Sl
Fb
Pw
Meal
Mast
Scrap Yard
Quarry
Dam
Gas Main
Overhead Line
Footbridge
Weir
Sluice
Outfall
Subway
Track
Drain
Path
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Spreads
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10 Great Crested Newt

Legislation

10.1 In Scotland the great crested newt *Triturus cristatus* (GCN) is protected by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and hereafter referred to as 'the Habitats Regulations'. Under the Habitats Regulations, great crested newts are classed as "European Protected Species" and therefore given the highest level of species protection.

10.2 The Habitats Regulations amendments in 2007 had the effect of removing great crested newt from all the provisions of the Wildlife & Countryside Act in Scotland. The protection of great crested newts therefore now rests mostly with the amended Habitats Regulations.

10.3 It is an offence, with certain exceptions, to:

- intentionally or deliberately capture, kill, or injure GCN;
- intentionally or recklessly damage, destroy, and disturb GCN in a place used for shelter or protection, or obstruct access to such areas;
- damage or destroy a GCN breeding site or resting place;
- possess a GCN, or any part of it, unless acquired lawfully;
- sell, barter, exchange, transport, or offer for sale GCN or parts of them.

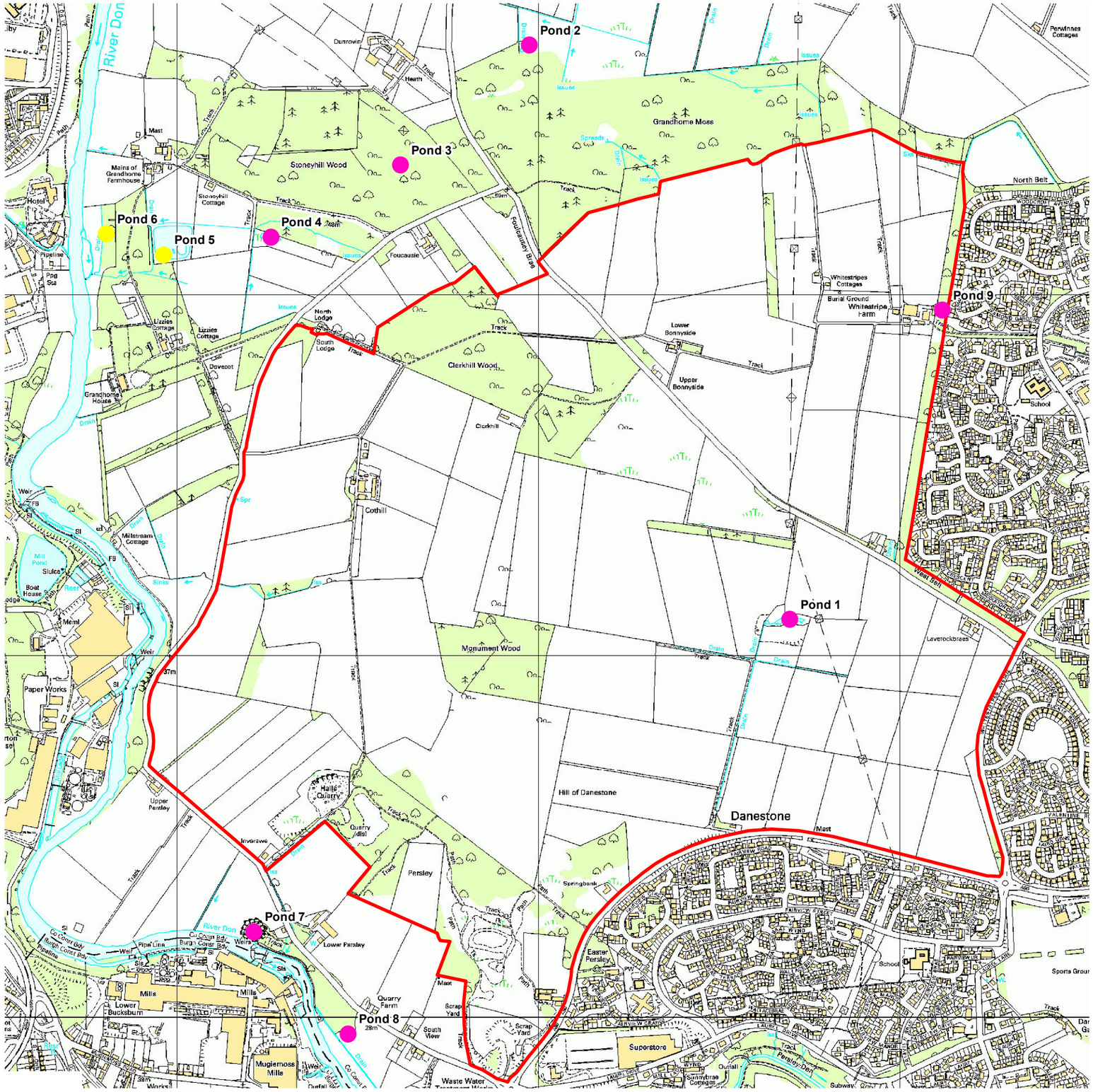
10.4 The legislation covers all newt life stages such that eggs, tadpoles and adult newts are all equally protected. Actions that are prohibited can be made lawful by a licence. In the case of development related effects that are contrary to legislation, the statutory authority from which advice should be sought is Scottish Natural Heritage. GCN is also a priority Biodiversity Action Plan (BAP) species in the UK.

Approach

10.5 Nine ponds were identified from the 1:25,000 OS map as being within 500m of the study area, of which only one was located within the study area. The location of these ponds is shown by **Figure 10.1**. For each of these ponds a visual assessment of their suitability to support GCN was made, and a Habitat Suitability Index (HSI) score was calculated.

10.6 The presence of GCN and other newt species in the nine ponds was checked using double funnel-ended traps (40 cm x 20 cm) with a 3 mm square mesh. The traps work on the same principle as bottle traps but allow the transfer of dissolved oxygen between water outside the trap and water within the trap itself, to the benefit of any trapped animals. GCN mitigation guidance produced by English Nature[14], but which also covers work in Scotland, recommends a total of four survey visits to establish the presence/absence of GCN within ponds between mid-March and mid-June. At least two of these visits should be undertaken between mid-April and mid-May to coincide the peak of the spring GCN breeding season when greatest numbers of newts are likely to be present within their breeding ponds.

[14] English Nature (2001) *Great Crested Newt Mitigation Guidelines*, August 2001. English Nature, Peterborough.



Grandhome

Great Crested Newt Survey

study area

pond not surveyed

surveyed pond - no GCN recorded

Figure 10.1

Map Scale @ A3: 1:12,000

Surveyed by: AEL	
Survey date: April-May 2012	
Drawn by: RAH	
Checked by: RDG	
Status: Final	

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10.7 Ponds 5 and 6 were inspected and found to be unsuitable for trapping, being respectively without water and too shallow. All other ponds were trapped over the period 23 April - 15 May 2012 (during the optimum GCN survey period). All traps were retrieved and their contents checked early in the morning, following each night's trapping survey.

10.8 Ponds in which large numbers of predatory sticklebacks were trapped during the first evening of trapping were not trapped subsequently, as the co-existence of GCN with large number of predatory fish in highly unlikely. On each trapping occasion, a visual check of a representative selection of accessible submerged aquatic vegetation, around the perimeter of each waterbody, was made, for the presence of GCN eggs.

Survey Findings

10.9 Descriptions and HSI scores for each of the nine ponds surveyed are provided in **Table 10.1**.

Table 10.1: Pond descriptions and HSI scores

AEL pond ref and grid reference	Description	HSI score	Specific GCN survey undertaken
Pond 1 NJ 91683 11097	Manganese quarry pond (70 m x 7 m) with < 5% aquatic vegetation cover comprising *Glyceria* sp., *Ranunculus hederacea* and *Myosotis scorpioides*. Water deep and of good quality for GCN. Pond was < 5% shaded by scrub and a lone ash tree *Fraxinus excelsior*. Isolated from other waterbodies.	0.21	Yes
Pond 2 NJ 90970 12684	Unshaded pond (40 m x 12 m) edged with *Juncus effusus* and bottle sedge *Carex rostrata*. 50% aquatic macrophyte cover.	0.33	Yes
Pond 3 NJ 90621 12360	Deep unshaded rectangular pond (30 m x 12 m) in woodland with *Spahgnum* moss. Scant emergent vegetation resulting in < 5% aquatic plant cover.	0.50	Yes
Pond 4 NJ 90257 12151	Shallow pond connected to ditch network containing *Juncus effusus* and *Glyceria fluitans.* Little emergent vegetation.	0.43	Yes
Pond 5 NJ 89986 12146	Totally dry feature comprising a stand of reed canary-grass *Phalaris arundinacea*, nettle *Urtica dioica* and soft rush *Juncus effusus*.	Dry pond	No
Pond 6 NJ 89786 12175	Linear depression located on the floodplain close to the river and dominated throughout by reed sweet grass *Glyceria maxima.* The feature possessed only patches of shallow water, but regularly floods at times of high river flow. The pond was too shallow to survey using bottle traps and is likely to support fish due to its	0.47	No - likely presence of fish as a result of connection to river

AEL pond ref and grid reference	Description	HSI score	Specific GCN survey undertaken
	connection to the river.		
Pond 7 NJ 90208 10237	Flooded quarry pond (diameter 20 m), 10 m from the river. 90% shaded with no aquatic macrophyte cover. Water of moderate quality. No wildfowl but deemed likely to contain fish.	0.27	Yes
Pond 8 NJ 90466 09961	Irregularly-shaped, deep pond (10 m x 15 m) within woodland, shaded on all sides. Moderate to poor water quality. No aquatic vegetation. Located just above main floodplain.	0.32	Yes
Pond 9 NJ 92119 11963	Pond in woodland with discarded rubbish and fallen logs. Poor water quality.	0.29	Yes

10.10 The results of the trapping surveys are presented in **Table 10.2** below. In summary, no great crested newts were captured from any of the ponds surveyed.

Table 10.2: GCN survey results

AEL pond ref	Date trapped in 2012	Great crested newts	Palmate newts	Fish	Frog/toad tadpoles
Pond 1	23 April	0	0	400	0
Pond 2	23 April	0	10	40	>1000
	25 April	0	12	50	>1000
	14 May	0	5	30	20
	15 May	0	3	40	20
Pond 3	23 April	0	180	0	0
	25 April	0	115	0	0
	14 May	0	84	0	0
	15 May	0	72	0	0
Pond 4	24 April	0	6	10	0
	26 April	0	5	6	1
	14 May	0	6	8	50
	15 May	0	2	9	30
Pond 5	**Pond not trapped – dry**				
Pond 6	**Pond not trapped – too shallow**				
Pond 7	24 April	0	0	220	0
Pond 8	24 April	0	0	0	0
	26 April	0	0	0	1
	14 May	0	0	0	0
	15 May	0	0	0	0

AEL pond ref	Date trapped in 2012	Great crested newts	Palmate newts	Fish	Frog/toad tadpoles
Pond 9	24 April	0	0	0	50
	25 April	0	0	0	50
	14 May	0	0	0	0
	15 May	0	0	0	0

Evaluation

10.11 No evidence of GCN presence has been found, and this species is considered to be absent from the study area.

Appendix 1

Phase 1 Habitat Survey Target Notes

Grandhome Estate, Aberdeen – Phase 1 Habitat Survey Target Notes

1. Young broad-leaved plantation used as sheltered game feeding area

2. Species-poor semi-improved grassland track with occasional elder *Sambucus nigra* scrub, and recent planted trees of ash *Fraxinus excelsior*, cherry *Prunus avium* and oak *Quercus robur* along edges.

3. Mature beech *Fagus sylvatica* plantation with semi-natural character dominated entirely by even-aged and widely spaced beech trees. The woodland lacked understorey shrubs, and had a well-developed ground layer dominated by wavy hair-grass *Deschampsia flexuosa*, together with broad buckler-fern *Dryopteris dilatata*, Yorkshire-fog *Holcus lanatus*, common bent *Agrostis capillaris*, red fescue *Festuca rubra,* chickweed-wintergreen *Trientalis europaea* and common mouse-ear *Cerastium fontanum*.

4. Semi-natural broadleaved woodland dominated by silver birch *Betula pendula*, under-planted locally with cherry *Prunus avium*, and with a ground layer dominated by broad buckler-fern *Dryopteris dilatata.*

5. Semi-natural broadleaved woodland dominated by silver birch *Betula pendula*, and very locally under-planted with cherry *Prunus avium*. The ground layer was dominated by broad buckler-fern *Dryopteris dilatata*, together with Yorkshire-fog *Holcus lanatus*, wavy hair-grass *Holcus latanus*, hairy wood-rush *Luzula pilosa*, wood-sorrel *Oxalis acetosella* and chickweed-wintergreen *Trientalis europaea*.

6. Small woodland clearing recently planted with broadleaved species including oak *Quercus robur*, cherry *Prunus avium* and silver birch *Betula pendula*. The ground layer with dominated by wavy hair-grass *Deschapmsia flexuosa*, and the mosses *Pseudoscleropodium purum* and *Rhytidiadelphus squarrosus*.

7. Young and partly failed broadleaved plantation of cherry *Prunus avium* and sycamore *Acer pseudoplatanus* with patches of silver birch *Betula pendula* regeneration, and the occasional Sitka spruce *Picea sitchensis*. The ground layer had been ploughed and was sparse and species-poor.

8. Dense and mature sitka spruce *Picea sitchensis* plantation, with a very sparse and species-poor ground layer consisting of a few plants of wood sorrel *Oxalis acetosella* and broad buckler-fern *Dryopteris dilatata*. Small canopy gaps had been planted with broadleaved species.

9. Semi-natural broadleaved woodland dominated entirely by silver birch *Betula pendula*, with some under-planting by cherry *Prunus avium* and sycamore *Acer pseudoplatanus*. The ground layer comprised of abundant broad buckler-fern *Dryopteris dilatata*.

10. Mature beech *Fagus sylvatica* trees along road edge.

11. Broad-leaved semi-natural woodland dominated by rowan and with abundant silver birch, rare beech, sycamore and Scot's pine. Much of the ground layer was bare, or with

considerable leaf-litter build-up, but broad buckler-fern *Dryopteris dilatata* was abundant throughout. Ramsons *Allium ursinum*, and hybrid bluebell were both locally abundant, and also on the ground-layer were tufted hair-grass *Deschampsia caespitosa* , common sorrel *Rumex acetosa* and lesser celandine *Ficaria verna*, which were rare.

12. Dense young coniferous plantation woodland.

13. Narrow belt of semi-mature silver birch *Betula pendula* on a sloping bank with poor semi-improved grassland beneath. The adjoining woodland along the road-side supported a few sycamore *Acer psuedoplatanus* and beech *Fagus sylvatica* trees, and graded into grey alder *Alnus incana* plantation.

14. Species-poor semi-improved pasture grassland dominated by Yorkshire-fog *Holcus lanatus* and soft-rush *Juncus effusus*. Other plant species present included abundant creeping buttercup *Ranunculus repens*, frequent white clover *Trifolium repens*, occasional common bent *Agrostis capillaris*, creeping bent *Agrostis stolonifera*, broad-leaved dock *Rumex obtusifolius*, perennial rye-grass *Lolium perenne*, annual meadow-grass *Poa annua*, wavy bitter-cress *Cardamine flexuosa* and daisy *Bellis perennis*, and rare floating sweet-grass *Glyceria fluitans*, meadow buttercup *Ranunuclus acris* and creeping thistle *Cirsium arvense*.

15. Mature Scots pine *Pinus sylvestris* plantation belt, with a grass-dominated ground layer. Cock's-foot was the dominant species and rough meadow-grass, and perennial rye-grass were occasional. False oat-grass was rare. Few herbs were present under the shading canopy, but common nettle was frequent, and broad-leaved dock and cleavers occasional. The only shrub-layer species present was elder, which was rare.

16. A double stone wall/bank each with scrub dominated by gorse growing along and between them. Bramble scrub was frequent, and occasional patches of broom were also present. Semi-Improved grassland ran between the scrub rows, dominated by cock's-foot and with abundant Yorkshire-fog and occasional patches of common bent. Tall ruderal and other species within the grassland and amongst the scrub were present throughout, including a number of typically garden species likely to have arisen from nearby cottage throw-outs, including locally abundant Spanish bluebell, green alkanet and ground-elder. Common nettle, cow parsley, broad-leaved dock and common sorrel were frequent. Raspberry and cleavers were occasional. Rosebay willowherb, creeping thistle and curled dock were rare.

17. Horse-grazed, short, improved pasture grassland dominated by perennial rye-grass and with frequent Yorkshire-fog. White clover was abundant within the sward, and daisy and dandelion were both frequent. Common mouse-ear was occasional.

18. *Improved grassland of similar description to Target Note 17, with we*t and disturbed area to the north with abundant marsh foxtail *Alopecurus geniculatus* and floating sweet-grass *Glyceria fluitans*, as well as frequent Yorkshire-fog *Holcus lanatus* and occasional perennial rye-grass. Forbs, colonising the disturbed soil areas included abundant Sticky mouse-ear *Cerastium glomeratum,* and frequent hairy bitter-cress *Cardamine hirsutum*, common stork's-bill *Erodium cicutatrium,* creeping buttercup *Ranunculus repens* and daisy *Bellis perennis*, together with the grass annual meadow-grass, which was abundant.

19. Broad-leaved Plantation Woodland more than 50 years old dominated by beech *Fagus sylvatica* which formed the majority of the canopy cover. Sycamore was occasional in the canopy. The shrub-layer was varied, but dominated, especially to the north, by rowan *Sorbus aucuparia*. Holly *Ilex aquifolium*, was frequent in the shrub-layer, and other species there included rare wych elm *Ulmus glabra*, silver birch *Betula pendula*, wild cherry *Prunus avium*, horse-chestnut *Aesculus* hippocastanum and broom *Cytisus scoparius*. Ivy *Hedera helix* was locally abundant. A number of tall ruderal species was present, including frequent common nettle *Urtica dioica*, cow parsley *Anthriscus sylvestris* and ground-elder *Aegopogium podagraria*. Rosebay willowherb and raspberry *Rubus ideaus* were locally abundant along the eastern boundary, close to adjacent gardens. Grass species dominated the ground flora in many areas; creeping soft-grass *Holcus mollis*, was locally abundant and Yorkshire-fog was abundant throughout the woodland. Cock's-foot *Dactylis glomerata* was frequent.

20. Horse-grazed, short improved pasture grassland with abundant cock's-foot and Yorkshire-fog, frequent creeping bent, especially in lower areas and false-oat-grass rare in less grazed parts. White clover was the most widespread and abundant forb, and soft-rush was frequent in the lower, southern half of the field.

21. Mosaic of gorse *Ulex europaea* and grey willow *Salix cinerea* scrub with a poor semi-improved grassland ground layer and numerous rock piles. The main grass species present were Yorkshire-fog, which was dominant, and cock's-foot, which was frequent. Smooth meadow-grass, sweet vernal grass, perennial rye-grass and common bent were all occasional. Tall ruderal species within the grassland areas included frequent common sorrel *Rumex acetosa* occasional common nettle *Urtica dioica* and marsh thistle *Cirsium palustre* and rare broad-leaved dock *Rumex obtusifolius*, great willowherb *Epilobium hirsutum*, and foxglove *Digitalis purpurea.* Within the sward, the forbs lady's bedstraw *Galium verum* and common mouse-ear *Cerastium fontanum* were rare.

22. Fallow arable field supporting remnants of game cover crop, together with weed species including broadleaved dock *Rumex obtusifolius*, chickweed *Stellaria media*, spear thistle *Cirsium vulgare*, creeping buttercup *Ranunculus repens*, annual meadow-grass *Poa annua*, nettle *Urtica dioica* and Yorkshire-fog *Holcus lanatus*.

23. Mature Scots pine *Pinus sylvestris* plantation belt, with occasional elder *Sambucus nigra* in the understorey. The ground layer was well developed and dominated by Yorkshire-fog *Holcus lanatus*. Other plant species present included creeping soft-grass *Holcus mollis*, bramble *Rubus* agg., foxglove *Digitalis purpurea*, cocks-foot *Dactylis glomerata*, common bent *Agrostis capillaris*, tufted hair-grass *Deschampsia caespitosa*, common sorrel *Rumex acetosa*, broad buckler-fern *Dryopteris dilatata*, red campion *Silene dioica*, chickweed *Stellaria media*, hogweed *Heracleum sphondylium*, nettle *Urtica dioica*, cleavers *Galium aparine*, a daffodil *Narcissus* agg., false oat-grass *Arrhenatherum elatius* and pink purslane *Claytonia sibirica*.

24. Small linear belt of mature beech *Fagus sylvatica* and sycamore *Acer pseudoplatanus* plantation woodland, with semi-natural character. Occasional elder *Sambucus nigra* and

rowan *Sorbus aucuparia* was present as an understorey, and the ground layer was species-poor with some lesser celandine *Ficaria verna*, nettle *Urtica dioica*, cleavers *Galium aparine*, foxglove *Digitalis purpurea*, Yorkshire-fog *Holcus lanatus* and rosebay willowherb *Chamerion angustifolium*.

25. Mature Scots pine plantation with a grass-dominated ground-layer and no shrub-layer. Yorkshire-fog *Holcus lanatus* was abundant; cock's-foot *Dactylis glomerata*, frequent and tufted hair-grass *Deschampsia caespitosa*, occasional. Herbs and ruderal species within the tall sward included frequent red campion *Silene dioica* and common nettle *Urtica dioica*; and occasional rosebay willowherb *Chamerion angustifolium*, cleavers *Galium aparine*, hairy willowherb *Epilobium hirsutum*, broad-leaved dock *Rumex obtusifolius* and common sorrel *R. acetosa*. Winter heliotrope *Petasites fragrans* was locally abundant along the northern edge of the plantation, and ramsones *Allium ursinum* was rare.

26. Improved grassland probably managed on long-term arable to grassland rotation. The sward was short, uniform and dominated by perennial rye-grass *Lolium perenne*. Other plant species present included red fescue *Festuca rubra*, cocks-foot *Dactylis glomerata*, white clover *Trifolium repens*, daisy *Bellis perennis*, creeping buttercup *Ranunculus repens*, broadleaved dock *Rumex obtusifolius*, soft rush *Juncus effusus*, Yorkshire-fog *Holcus lanatus*, curled dock *Rumex crispus* and spear thistle *Cirsium vulgare*.

27. Beech *Fagus sylvatica*-dominated plantation woodland with sycamore *Acer pseudoplatanus*, alder *Alnus glutinosa*, rowan *Sorbus aucuparia*, birch *Betula pendula*, holly *Ilex aquifolium* and beech saplings occasional in the under-storey. Grasses dominated much of the ground-layer; sweet vernal-grass *Anthoxanthum* odoratum, creeping soft-grass *Holcus* mollis, and wavy hair-grass *Deschampsia flexuosa* were abundant and the meadow-grasses *Poa pratensis and P. annua* were rare and occasional respectively. Heather *Calluna vulgaris* and bilberry *Vaccinium myrtillus* formed small patches but were rare overall. A range of herbaceous species was present, some of the plants being garden escapes. These included chickweed-wintergreen *Trientalis europaea*, Spanish bluebell *Hyacinthoides hispanica*, rosebay willowherb *Chamerin angustifolium* and ground-elder *Aegopodium podagraria*.

28. Narrow belt of young broadleaved plantation around Laverockbraes, consisting of rowan *Sorbus aucuparia*, alder *Alnus* species, hawthorn *Crataegus monogyna*, hazel *Corylus avellana*, dog-rose *Rosa canina* and silver birch *Betula pendula*.

29. Large homogenous stand of rosebay willowherb *Chamerion angustifoliu*m with a few scattered gorse *Ulex europaeus* bushes and occasional nettle *Urtica dioica*.

30. Permanent water-body known as 'the manganese pond' due to its origin as a former manganese quarry. The banks were steep with deep water at least 2m deep. Rooted aquatic plants included patches of submerged fennel pondweed *Potamogeton pectinatus*, and surfacing water-starwort *Callitriche* species, floating sweet-grass *Glyceria fluitans* and ivy leaved-crowfoot *Ranunculus hederaceus*. Occasional free-floating fronds of common duckweed *Lemna minor* were present on the water surface.

31. Boggy seepage area located at the base of a steep gorse *Ulex europaeus* dominated bank close to the ponds margin. Plant species present included creeping buttercup *Ranunculus repens*, creeping bent *Agrostis stolonifera*, bog stitchwort *Stellaria alsine*, a water-cress *Rorippa* species, ivy leaved-crowfoot *Ranunculus hederaceus,* soft rush *Juncus effusus*, floating sweet-grass *Glyceria fluitans*, common water-crowfoot *Callitriche stagnalis* sens. lat., great willowherb *Epilobium hirsutum* and brooklime *Veronica beccabunga*.

32. Poorly drained species-poor semi-improved grassland dominated by Yorkshire-fog *Holcus lanatus* and soft rush *Juncus effusus*. Other plant species present included creeping buttercup *Ranunculus repens*, common sorrel *Rumex acetosa*, curled dock *Rumex crispus*, common bent *Agrostis capillaris*, nettle *Urtica dioica*, spear thistle *Cirsium vulgare*, timothy *Phleum pratense*, and clustered dock *Rumex conglomeratus*.

33. Semi-mature dense broadleaved plantation including field maple *Acer campestre* and cherry *Prunus avium* planted in species rows. The ground layer was shaded and supported occasional nettle *Urtica dioica*, cleavers *Galium aparine*, creeping buttercup *Ranunculus repens*, Yorkshire-fog *Holcus lanatus* and rough meadow-grass *Poa trivialis*.

34. Line of relatively young Scots pine *Pinus sylvestris* along field edge.

35. Block of recently planted broadleaved woodland with a ground layer consisting of species-poor grassland. The planted trees and shrubs and ground layer species included beech *Fagus sylvatica*, ash *Fraxinus excelsior*, rowan *Sorbus aucuparia*, silver birch *Betula pendula*, cherry *Prunus avium*, oak *Quercus robur*, gorse *Ulex europaeus*, cocks-foot *Dactylis glomerata*, common sorrel *Rumex acetosa*, Yorkshire-fog *Holcus lanatus*, red fescue *Festuca rubra*, rosebay willowherb *Chamerion angustifolium*, creeping buttercup *Ranunculus repens*, broadleaved dock *Rumex obtusifolius*, rough meadow-grass *Poa trivialis*, cow-parsley *Anthriscus sylvestris*, dandelion *Taraxacum* agg., bugle *Ajuga reptans*, creeping thistle *Cirsium arvense*, ragwort *Senecio jacobaea*, daisy *Bellis perennis*, soft rush *Juncus effusus* and self-heal *Prunella vulgaris.*

36. Mature leylandii *x Cupressocyparis leylandii* screen planting around amenity grassland and residential curtilage.

37. Recently cleared and managed ditch with shallow flowing water 5-10cm and with steeply sided channel banks up to 3m high. The channel banks supported rank semi-improved grassland and bushes of gorse *Ulex europaeus*, broom *Cytisus scoparius* and woody scrub.

38. Short sward improved grassland with scattered mature sycamore *Acer pseudoplatanus*.

39. Mature silver birch *Betula pendula* dominated semi-natural woodland. The ground layer was relatively species-poor with common sorrel *Rumex acetosa*, common bent *Agrostis capillaris*, wood sorrel *Oxalis acetosella*, hairy wood-rush *Luzula pilosa*, creeping soft-grass *Holcus mollis*, Yorkshire-fog *Holcus lanatus*, foxglove *Digitalis purpurea*, broad buckler-fern *Dryopteris dilatata* and climbing corydalis *Ceratocapnos claviculata*.

40. Stand of dense bracken *Pteridium aquilinum*, with occasional patches of creeping soft-grass *Holcus mollis*, and occasional climbing corydalis *Ceratocapnos claviculata.* Many large boulders present that have probably been progressively cleared from arable fields.

41. Stand of semi-natural broadleaved woodland used for informal mountain biking, and dominated by silver birch *Betula pendula*, together with occasional rowan *Sorbus aucuparia*, sycamore *Acer pseudoplatanus* and beech *Fagus sylvatica*. The ground layer consisted of abundant Yorkshire-fog *Holcus lanatus*, frequent wood sorrel *Oxalis acetosella,* occasional bracken *Pteridium aquilinum*, foxglove *Digitalis purpurea* and chickweed wintergreen *Trientalis europaea*, and rare wavy hair-grass *Deschampsia flexuosa*, broad buckler-fern *Dryopteris dilatata* and hairy woodrush *Luzula pilosa*.

42. Complex mix of habitats including bare ground circular track with poor semi-improved grassland in centre together with a small damp depression with soft rush *Juncus effusus*, bramble *Rubus fruticosus* agg., common bird's-foot-trefoil *Lotus corniculatus*, clustered dock *Rumex conglomeratus*, a water-starwort *Callitriche* species, a comfrey *Symphytum* species, reed canary-grass *Phalaris arundinacea* and scattered willow.

43. Mature semi-natural broadleaved woodland on sloping ground around edges of quarry dominated by sycamore *Acer pseudoplatanus* with some mature wych elm *Ulmus glabra* and elder *Sambucus nigra*. The ground layer was mostly of nettle *Urtica dioica*, with some cleavers *Galium aparine*, lesser celandine *Ficaria verna*, tufted hair-grass *Deschampsia caespitosa* on rocky ground.

44. Silver birch *Betula pendula* dominated semi-natural woodland with relatively open canopy and a well development ground layer of Yorkshire-fog *Holcus lanatus*, wood sorrel *Oxalis acetosella*, foxglove *Digitalis purpurea*, wavy hair-grass *Deschapsia flexuosa*, climbing corydalis *Ceratocapnos claviculata* and a few gorse *Ulex europaeus* bushes.

45. Mature beech *Fagus sylvatica* plantation, with occasional silver birch *Betula pendula* and a few sycamores *Acer pseudoplatanus*, with semi-natural character. The ground layer supported abundant bracken *Pteridium aquilinum*, with much bare leaf litter and occasional creeping soft-grass *Holcus mollis*, foxglove *Digitalis purpurea* and climbing corydalis *Ceratocapnos claviculata.*

46. Stand of relatively open semi-natural woodland dominated by sycamore *Acer pseudoplatanus*, frequent silver birch *Betula pendula* and rare beech *Fagus sylvatica*. The ground layer comprised of locally abundant bracken *Pteridium aquilinum*, frequent creeping soft-grass *Holcus mollis*, and occasional nettle *Urtica dioica* and climbing corydalis *Ceratocapnos claviculata.*

47. Shelterbelt formed by a double row of mature wych elm *Ulmus glabra*, between two walls, with frequent sycamore *Acer pseudoplatanus*.

48. Stand of mature beech *Fagus sylvatica* plantation with semi-natural character, with a few ash *Fraxinus excelsior*, wych elm *Ulmus glabra*, silver birch *Betula pendula* and cherry *Prunus avium*. Some recent under-planting had been undertaken locally. The ground layer

was species-poor and included cock's-foot *Dactylis glomerata*, cleavers *Galium aparine*, nettle *Urtica dioica*, foxglove *Digitalis purpurea*, Yorkshire-fog *Holcus lanatus*, climbing corydalis *Ceratocapnos claviculata,* tufted hair-grass *Deschampsia caespitosa* and lesser celandine *Ficaria verna*.

Appendix 2

Automated Bat Survey Details

Summary of automated detector survey 14-18 May and 18-22 June 2012

Survey dates	Site number			
	Site 1 –Wooded area, near brook West OS: NJ 90245 11158	Site 2 – Scrub Central OS: NJ 90809 10910	Site 3 – Pond East OS: NJ 91672 11105	Site 4 – Line of Beech trees Northeast OS: NJ 92113 12015
	Bat Species time first /last call min. past sunset	Bat Species time first /last call min. past sunset	Bat Species time first /last call min. past sunset	Bat Species time first /last call min. past sunset
14-15 May (Sunset 21.21; Sunrise 04.48)	Soprano pipistrelle 21.49*/23.29 +28 Common pipistrelle 22.12*/00.00 +51 Unidentified bat 03.25/03.25 +364	Soprano pipistrelle 21.45/02.47 +24 Common pipistrelle 21.45/-* +24	Soprano pipistrelle 21.39/23.26 +18 Common pipistrelle 2215/23.33 +54 *Myotis* sp. 23.35/00.32 +134	Soprano pipistrelle 21.43/22.31 +22
15-16 May (Sunset 21.22; Sunrise 04.46)	Soprano pipistrelle 22.18/22.59 +56 Unidentified bat 01.42/- +260	Soprano pipistrelle 22.10/22.37 +48	*Myotis* sp. 01.50/01.59 +268	No Bats
16-17 May (Sunset 21.24; Sunrise 04.44)	Common pipistrelle† 21.41/23.42* +17 Soprano pipistrelle 21.50/23.36* +26	Common pipistrelle† 21.30/23.29* +6 Soprano pipistrelle 21.30/23.30* +6 Nathusius' pipistrelle 21.57/- +33	Common pipistrelle† 22.01/00.05 +37 Soprano pipistrelle 22.03/02.31 +39	Common pipistrelle 21.44/00.30 +20 Soprano pipistrelle 23.23/23.34 +119
17-18 May (Sunset	Soprano pipistrelle	Soprano pipistrelle	Common pipistrelle	Common pipistrelle

21.26; Sunrise 04.43)	21.55*/21.57 +29	21.39/22.14 +13	22.06/- +40 Soprano pipistrelle 22.26/22.40 +60	21.58/22.15 +32
18-19 June (Sunset 22.08; Sunrise 04.12)	Soprano pipistrelle 22.40*/00.25 +32 Common pipistrelle† 23.18*/- +70	No Data	No Data	Soprano pipistrelle 22.24/03.54 +16 Common pipistrelle† 22.54/03.23 +46 Nathusius' pipistrelle 00.30/- +142
19-20 June (Sunset 22.09; Sunrise 04.12)	Soprano pipistrelle 22.49/03.27 +41 Common pipistrelle 22.51/22.52* +43	No Data	No Data	Soprano pipistrelle 22.20/03.53 +12 Common pipistrelle 22.40*/03.31 +32 Nathusius' pipistrelle 02.48/- +279
20-21 June (Sunset 22.09; Sunrise 04.12)	Soprano pipistrelle 23.29*/03.25 +81 Common pipistrelle 00.45*/03.05 +157	No Data	No Data	Soprano pipistrelle 22.19/04.05 +10 Common pipistrelle 22.33/03.41 +24 Nathusius' pipistrelle 00.27/01.46 +138 *Myotis* sp. 01.17/- +188
21-22 June	Soprano pipistrelle	No Data	No Data	No Data

(Sunset 22.09; Sunrise 04.13)	03.03/03.59* +294 Common pipistrelle 03.04/- * +295			

*Pipistrelle calls with characteristics shared by common and soprano pipistrelle were recorded on: 14 May at Site 1as early as 21.48 (27 minutes past sunset) and at Site 2 as late as 23.25, on 16 May at Site1 as late as 23.56 and at Site 2 as late as 23.31, on 17 May at Site 1 as early as 21.41 (15 min past sunset), on 18 June at Site 1 as early as 22.39 (31 min past sunset), on 19 June at Site 4 as early as 22.32 (20 min past sunset), on 20 June (am) at Site 1 as late as 03.14 and (pm) at Site 1 as early as.23.12 (64 min past sunset), and on 22 June at Site 1 as late as 04.02. Thus common and/or soprano pipistrelle may have been active in these areas earlier or later than given in the table.

† Some common pipistrelle calls recorded had characteristics shared by Nathusius' pipistrelle and may have been from either bat species.

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