Lomond Banks

Technical Appendix 5.1 - Ecology

Produced for Flamingo Land Ltd

By Applied Ecology Ltd

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1 Introduction

Background

1.1 In April 2021 Applied Ecology Ltd (AEL) was commissioned by Flamingo Land Ltd to provide ecological support for proposals on land in Balloch, West Dunbartonshire ("the Site"), adjacent to the existing 'Loch Lomond Shores' development. A plan showing the location of the Site, which is also situated with in the Loch Lomond and the Trossachs National Park (LLTNP), is provided in **Figure 1.1**.

1.2 The study was required in order to determine the likely ecological constraints associated with a proposal to construct a multi-purpose tourism facility, with associated infrastructure and landscaping (referred to herewith as "the Proposed Development"). Surveys for those constraints were needed to inform an Ecological Impact Assessment (EcIA) evaluating the ecological impacts and effects arising from the proposals, and to identify the necessary mitigation, compensation or enhancement measures needed to ameliorate those impacts.

Purpose of this report

1.3 This report provides details of surveys undertaken on the Site between May 2021 and February 2022, including the methods used to collect primary and secondary data relating to ecological features on or near to the Site, a description of the survey results and an evaluation of the implications of these findings for the Proposed Development.

1.4 These data will be used in the EcIA presented in Chapter 5 (Ecology) of the Environmental Impact Assessment Report (EIAR) for the proposed Development. This report is an updated version of a Technical Appendix produced in May 2022, in response to a revised Site boundary and layout of the Proposed Development.

Report qualification

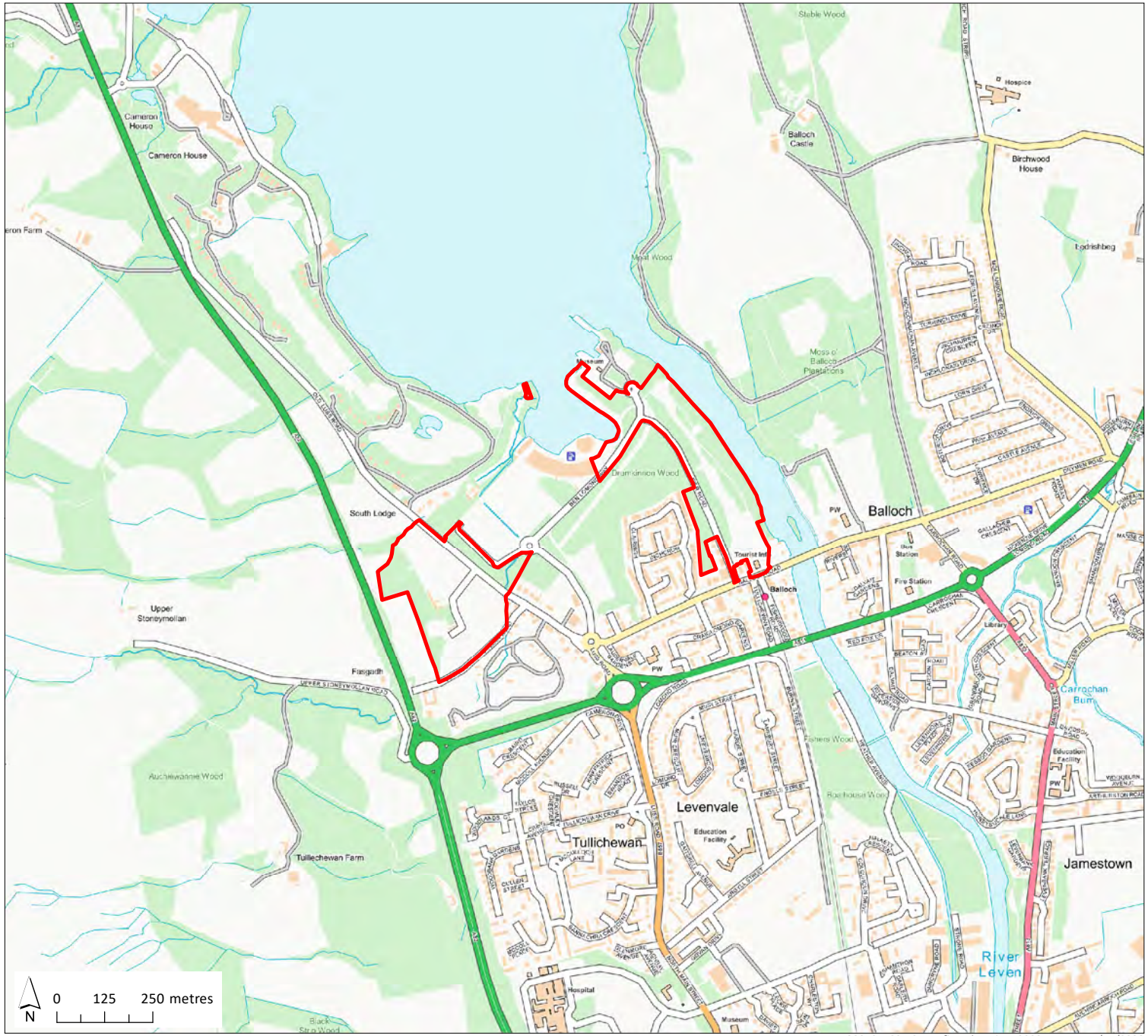
1.5 The surveys described here were undertaken in accordance with the best practice methodologies current at the time of commissioning. Site circumstances, scientific knowledge or methodological requirements can change during the course of a project, and these external factors may impact on the scope of subsequent work requirements.

1.6 All survey work and reporting was undertaken by experienced and qualified ecologists in accordance with the Code of Professional Conduct of the Chartered Institute of Ecology and Environmental Management (CIEEM) and BS 42020:2013 (Biodiversity). The work was undertaken during the Covid-19 pandemic, following all Scottish Government rules regarding social distancing and other protection measures to be taken by businesses operating at that time.

1.7 All ecological surveys have an expected validity period, owing to the tendency of the natural environment to change over time. This validity period varies from feature to feature, and is also dependent on the degree of change in a site's management and overall

landscape ecology. Where the potential for change is considered to be relevant to the Site, this is highlighted in the appropriate section.

1.8 This report does not purport to provide detailed, specialist legal advice. Where legislation is referenced, the reader should consult the original legal text, and/or the advice of a qualified environmental lawyer.



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Lomond Banks

Site Location

Site boundary

Figure 1.1

Map Scale @ A4: 1:15,000

Surveyed by: -	
Survey date: -	
Drawn by: RAH	
Checked by: DS	
Status: Final	

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2 Designated Sites

Methodology

2.1 Details of nearby statutory sites designated for nature conservation were obtained from the NatureScot Natural Spaces website[1] and plotted in a Geographical Information System (GIS). Sites listed on the NatureScot Ancient Woodland Inventory (AWI) were also obtained from this source and plotted in GIS.

2.2 The location and extent of West Dunbartonshire Council's non-statutory sites for nature conservation, known as Local Nature Conservation Sites (LNCSs), were searched for in the 2020 Proposed Local Development Plan (LDP)[2], and were subsequently plotted in GIS if they fell within 2 km of the Site. At the time of writing, the adoption status of some of these LNCSs was not clear.

Results

2.3 A map showing the location of statutory and non-statutory sites in the vicinity of the Site is provided in **Figure 2.1**.

Statutory designations

2.4 There was one statutory nature conservation site within 2 km of the Site, namely the **Boturich Woodlands Site of Special Scientific Interest** (SSSI), 1.3 km to the north. The SSSI designation is related to a mosaic of broad-leaved woodland, open areas of rough grassland and scattered scrub.

2.5 Although located 8 km to the north of the Site and therefore not shown on **Figure 2.1**, qualifying interests of the **Endrick Water SAC** are linked with the Site through the connectivity presented by Loch Lomond and the River Leven. The Endrick Water is both nationally and internationally important for its population of river lamprey *Lampetra fluviatilis* and brook lamprey *L. planeri*. These two lamprey species are the primary reasons for the selection of this site as an SAC, although Atlantic salmon *Salmo salar* is also present and listed as a qualifying feature.

Non-statutory designations

2.6 Ten non-statutory LNCSs were located within 2 km of the Site. Part of the **River Leven Corridor LNCS** sits partially within, and adjacent to, the Site along its eastern boundary. The remaining LNCSs were located a considerable distance away, or had no direct connectivity with the Site. Although in close proximity to the Site (100 m to the south-west), **Stoneymallon Road Woodland LNCS** is separated from the Site boundary by the A82 and therefore shared no connecting features.

[1] https://sitelink.nature.scot/home. Accessed November 2021.
[2] https://wdcweb.blob.core.windows.net/wdc-public-live-media/4319308/wdc_ldp2_2020_web-26.pdf. Accessed November 2021.

Ancient Woodland Inventory

2.7 A number of areas listed on the Ancient Woodland Inventory were present within 2 km of the Site, including an area within the Site boundary. Drumkinnon Wood, between the two main sections of the Site, and the area of woodland around Woodbank House in the west of the Site, are listed on the AWI as long-established ancient woodlands of plantation origin. Although likely historically planted, both these areas of woodland now have characteristics of well-established semi-natural woodland.

2.8 The boundary of the Boathouse section of the Site (separate from the main part of the Site, to the north) also partially contained woodland listed on the AWI as long-establish woodland of plantation origin. However, during the surveys described in **Chapter 3** of this report, it was found that this area actually contained early successional scrub woodland, and that the longer-established woodland ran along its boundary.

Discussion

Statutory designations

2.9 The Boturich Woodlands SSSI is considered to be an Important Ecological Feature (IEF) of national importance. Although no direct impacts on this designated site are anticipated, indirect impacts from increased visitor numbers to the area will be considered as part of the EcIA.

2.10 The Endrick Water SAC is considered to be an IEF of International importance. No direct impacts on this site are anticipated as a result of the Proposed Development, due to the separation distance between the SAC and the Site. However, qualifying aquatic features of the SAC use the River Leven as a migratory corridor between the SAC and the sea. Therefore, disturbance impacts on the River Leven have the potential to affect SAC qualifying features. Indirect impacts on the SAC, will therefore be considered in full as an IEF of **International** importance within the EcIA, and in a shadow Habitat Regulations Assessment (HRA).

Non-statutory designations

2.11 The majority of the LNCSs within 2 km of the Site are separated from the Site by a considerable distance, or do not share any immediate connecting features. However, the River Leven Corridor LNCS, located along the eastern boundary, will be affected either directly or indirectly by the Proposed Development. As a non-statutory designation, the LNCS is considered to be a **Council** level IEF, and will be considered in full in the EcIA.

2.12 LNCSs in West Dunbartonshire are covered by the 2020 Proposed Local Development Plan Policy ENV1. Policy ENV1 states that:

"*There will be a strong presumption against development where it would compromise the overall integrity of Local Biodiversity Sites, Tree Preservation Orders and ancient and long established woodland sites…*

Development that adversely affects the integrity of sites designated for nature conservation or harms protected species will not be permitted except:…

d) Local Nature Conservation Sites and Local Nature Reserves, where adverse effects are offset or compensated in a way that adequately maintains the integrity of the interests affected and maintains the involvement of people."

Ancient woodland

2.13 The woodland within the Site listed on the AWI is ancient woodland of long-established plantation origins. This means that woodland has persisted at this location since at least 1750, and likely longer than this. This does not necessarily mean that trees within the Site are ancient or veteran specimens *per se*, but that there has been a continuity of woodland cover since the date thresholds set for the inventory. As a result of this longevity, ancient woodland sites are associated with unique and complex communities of plants, fungi, soil biota, and insects and other animal species, and are hence priorities for conservation. Generally, AWI sites are usually considered to be IEFs of at least **Council** level importance.

2.14 Ancient Woodland within the Site will be affected either directly (development within the Woodbank woodland) or indirectly (increased pressures from higher visitor numbers within Drumkinnon Wood and woodland adjacent to the Boathouse). Ancient Woodland will therefore need to be considered in full in the EcIA.

2.15 Loch Lomond and Trossachs National Park Authority (LLTNPA) Trees and Woodland Strategy[3] references Ancient Woodland, where it states:

"Ancient woodland (woodland since at least 1860) should be a focus of enhancement and restoration efforts such as herbivore management and invasive species control due to their high level of biodiversity. These woodlands form important core areas of any woodland habitat networks"

2.16 Ancient woodland is included in the Habitat Action Plan for woodland within the Dunbartonshire Local Biodiversity Action Plan (LBAP)[4] which aims to maintain the ancient woodland resource in the area. Ancient Woodland is also a material consideration for planning in the 2020 proposed Local Development Plan (Policy ENV1 and ENV4). Under ENV1 it states:

"Development that adversely affects non-designated habitats identified in the Dunbartonshire Local Biodiversity Action Plan will be assessed against the level of net impacts. In all instances, the Council will require development proposals to have regard to safeguarding features of nature conservation value including woodlands, hedgerows, lochs, ponds, watercourses, wetlands, wildlife corridors and geological features."

2.17 Policy ENV4 specifically references Ancient Woodland and states:

"Developments that involve the loss or fragmentation of long-established woodland; woodlands of high conservation value (including categories 1b, 2b and 3 on SNH[5] Ancient Woodlands Inventory and woodlands identified in Forestry Commission Native Woodland Survey of Scotland); and those area covered by a provisional or confirmed tree preservation

[3] https://www.lochlomond-trossachs.org/wp-content/uploads/2019/11/Trees_woodland_2019_2039.pdf. Accessed November 2022.

[4] https://www.west-dunbarton.gov.uk/media/3197361/biodiversity_plan_2010_final.pdf. Accessed November 2022.

[5] Scottish Natural Heritage (SNH) is now known as NatureScot.

order, will only be supported where any significant adverse effects are clearly outweighed by significant social or economic benefits and, where:

- *Measures can be taken to conserve the nature conservation interest through planning conditions; and/or*
- *The conservation interest loss can be compensated for by habitat creation or site enhancement elsewhere by planning agreements or conditions."*

Lomond Banks

Designated Sites

- Site boundary
- 2 km from Site boundary
- SSSI
- LNCS

Ancient Woodland Inventory:

- Ancient (of semi-natural origin)
- Long-Established (of plantation origin)
- Other (on Roy map)

Ancient Woodland data may exclude some woodlands present on 1st Edition OS maps.

Figure 2.1

Map Scale @ A4: 1:30,000

Surveyed by: -	
Survey date: -	
Drawn by: DS	
Checked by: RAH	
Status: Final	

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3 Habitats and Flora

Methodology

Pre-existing data records

3.1 Pre-existing biological data records were sourced from the Glasgow Museums Resource Centre (GMRC), for the Study Area and a 2 km buffer. A large number of records were subsequently supplied, and were reduced to those dated within the last 10 years.

3.2 Pre-existing survey data from ecology work completed by Envirocentre[6] in 2017 were also reviewed.

Scottish EUNIS habitat survey

3.3 NatureScot has now adopted EUNIS, the European Nature Information System, as the standard habitat classification scheme for terrestrial habitat data and mapping in Scotland[7]. As a result, the old JNCC Phase 1 Habitat Survey (JNCC, 2010[8]) is being phased out, to be replaced by the new Scottish EUNIS system. On 26 May 2021, 03 June 2021 and 09 June 2021, the habitat survey of the Site was therefore undertaken using Scottish EUNIS, during which all habitats present within the Site were classified and mapped according to the standard EUNIS categories. Target notes were used to describe areas of both typical and unique botanical character. Habitat patches were mapped as polygon features, and if sufficient space on the map linear features (such as walls and fences) as lines where this provided added value. Point features were recorded where there were notable isolated trees or scrub. Plant species abundance was noted using the DAFOR[9] system, and the minimum mappable unit (MMU) was 10 x 10 m except where features marked on the base map allowed mapping to be more precise.

3.4 The habitat map was subsequently digitised using GIS.

3.5 The standard habitat survey approach was "extended" to include a search for invasive non-native species (INNS) and also consideration of whether or not the habitats recorded should be classified as Groundwater Dependent Terrestrial Ecosystems (GWDTEs).

Survey limitations

3.6 The survey was carried out within the core botanical survey season and there were no significant restrictions to access. There were therefore no notable limitations to the study.

[6] **Envirocentre (2018**) *West Riverside, Balloch – Phase 1 Habitat Survey*. Unpublished contract report for TSL Contractors Limited. May 2018.

[7] **Strachan, I.M. (2017)** *Manual of terrestrial EUNIS habitats in Scotland*. Version 2. Scottish Natural Heritage Commissioned Report No. 766.

[8] **JNCC (2010)** *Handbook for Phase 1 Habitat Survey – A technique for Environmental Audit*. JNCC, Peterborough.

[9] DAFOR: whereby species occurrence may be classified as being **d**ominant, **a**bundant, **f**requent, **o**ccasional or **r**are. Rare in the context of a DAFOR score should not be confused with species rarity in the more widely accepted meaning of general scarcity.

Results

Pre-existing data records

3.7 No notable flora records were returned within the GMRC records search. A subsequent record search on databases available did return records of notable species within the Site but none were licensed for commercial use. However, all such records were with respect to species which were subsequently located and mapped during the 2021 field surveys, and therefore are reported below under those auspices.

Scottish EUNIS habitat survey

3.8 The Scottish EUNIS habitat map is shown in **Figure 3.1**. A summary of just those habitats recorded within the Site is provided in **Table 3.1** but the descriptions below cover the wider Study Area which included Drumkinnon Wood. Target notes can be found in **Appendix B** and a selection of habitat survey photographs can be found in **Appendix C**.

3.9 The mosaic of habitats within the Site were fragmented and poorly connected as a result of pre-existing roads, car parks and the buildings at Loch Lomond Shores.

Woodland

3.10 Over half of the Site was classified as some form of woodland, the vast majority of which was **mixed broad-leaved woodland**.

3.11 The northern section of Drumkinnon Wood in the centre of the Site (TN1 and TN4) was listed as ancient woodland of plantation origin and had clear signs of historic planting, with mature beech *Fagus sylvatica* along the top of the western slope. Other species frequently found included mature sycamore *Acer pseudoplatanus*, mature oak *Quercus robur*, birch *Betula* sp*.,* larch *Larix decidua* and occasional lime *Tilia x europaea* and yew *Taxus baccata*. Conifer species included Scot's pine *Pinus sylvestris*, Douglas fir *Pseudotsuga menziesii*, and cedar *Cedrus* sp.. The lower canopy here contained hazel *Corylus avellana*, hawthorn *Crataegus monogyna* and holly *Ilex aquifolium*. Dense regeneration of sycamore saplings occurred along sloped ground.

3.12 The ground layer in this section of woodland had been impacted by worn paths and mountain biking trails. Despite this, dominant native bluebell *Hyacinthoides non-scripta* occurred along slopes, alongside species of fern, red campion *Silene dioica*, wood sorrel *Oxalis acetosella*, dog's mercury *Mercurialis perennis*, pink purslane *Claytonia sibirica*, and bramble *Rubus fruticosus* agg.. Other frequently recorded species included wood avens *Geum urbanum*, wood speedwell *Veronica montana*, greater woodrush *Luzula sylvatica* and herb Robert *Geranium robertianum*. Areas of more disturbed ground tended to be dominated by species such as common nettle *Urtica dioica*, cleavers *Galium aparine* and bramble. Common ivy *Hedera helix* was locally abundant in places.

3.13 The centre of Drumkinnon Wood (TN6) was the most diverse in terms of both the canopy and ground layer, and more closely resembled ancient woodland of semi-natural origin. The canopy was dominated by birch, sycamore, oak, willow *Salix* sp. and occasional wych elm *Ulmus glabra*. Large mature oaks were scattered throughout this section of the woodland. Hawthorn was frequent in the lower canopy as well as occasional rowan *Sorbus aucuparia* and locally abundant honeysuckle *Lonicera periclymenum*. An impressive carpet

of native bluebell occurred throughout. Where native bluebell had not formed dense carpets, it was continuous as the dominant species albeit at a lower density. Other locally dominant species included red campion, pink purslane and enchanter's nightshade *Circaea lutetiana*. Wood avens, common figwort *Scrophularia nodosa*, creeping buttercup *Ranunculus repens* and cleavers were all frequent. Opposite-leaved golden saxifrage *Chrysosplenium oppositifolium* was locally abundant in wetter areas, and common nettle, rosebay willowherb *Chamaenerion angustifolium* and dense bracken *Pteridium aquilinum* were found adjacent to previous disturbed ground.

3.14 Non ancient woodland sections of Drumkinnon Wood were present in the far south (TN9 and TN10). These areas appeared younger in structure with evidence in places of past tree planting. There was as high level of dumping of garden waste due to the proximity of residential back gardens. Woodland around TN9 had naturally regenerating oak, sycamore, birch and willow. Shading in places had reduced the density of the ground flora, but native bluebell was still dominant throughout. Other species included ferns, common comfrey *Symphytum officinale*, wood avens, red campion, enchanter's nightshade, honeysuckle, common nettle, Welsh poppy *Papaver cambricum*, hedge woundwort *Stachys sylvatica* and bramble. The far southern end of the woodland had evidence of garden escapee plants such as *Cotoneaster* sp. and Spanish bluebell *Hyacinthoides hispanica*.

3.15 The section of Drumkinnon Wood in the far south-west corner (TN10) had ash *Fraxinus excelsior* and hazel that had been planted as part of screening at the roadside. The remainder of this section of woodland had a semi-natural canopy of sycamore, oak, birch and wych elm. Ash trees here appeared to be infected with dieback. The ground layer was dominated by bluebells with hybrid/Spanish bluebell more dominant further south. Common nettle, ferns, cleavers, creeping buttercup, red campion, wood avens, Welsh poppy and bramble all occurred frequently. In the far south-western corner of this area, the woodland was predominantly of more recent plantation origin, and difficult to access due to dense bramble.

3.16 At Riverside, in the far east of the Site, two strips of mixed broad-leaved woodland lined both sides of an open area of recreational grassland. Both these strips were younger in structure but were still established woodland habitats. The far eastern section (TN18) included a network of formal footpaths adjacent to the River Leven. Sycamore, birch, ash and wych elm were dominant here, with occasional beech. Hazel and hawthorn and holly were frequent in the lower canopy. The ground flora was highly shaded in places and was dominated by ferns and common nettle. More species-rich ground flora occurred in patches throughout, with wood avens, enchanter's-nightshade, common comfrey, creeping buttercup, cleavers and herb-Robert all commonly found. Dense patches of bramble occurred along the slope adjacent to the River Leven.

3.17 On the eastern side of Pier Road, the strip of woodland had a similar structure to TN18, with birch, sycamore, oak and wych elm all frequent. Goat willow *Salix caprea* was dominant along the northern edge, and hazel, hawthorn, elder *Sambucus nigra* and rowan comprised the lower canopy. The ground layer was again highly shaded in places and was limited to ferns, common nettle and regenerating tree saplings. A more species-rich ground flora was evident elsewhere with bluebell (dominated by hybrid/Spanish), dog's mercury, wood avens, pink purslane and red campion. Common figwort and Welsh poppy

were found occasionally. Common nettle, creeping buttercup and wild strawberry *Fragaria vesca* were locally abundant along the northern edge adjacent to the open grassland.

3.18 On the eastern side of Old Luss Road, north of the woodland south of the Ben Lomond Way roundabout, an isolated section of broad-leaved mixed woodland extended eastwards. At TN22 and TN23, wetter conditions associated with the burn had led to dominant goat willow, sycamore, oak and alder *Alnus glutinosa*. The ground flora was species-rich, with ferns, native bluebell, greater woodrush, common comfrey, woodruff *Galium odoratum*, red campion, Welsh poppy, wood avens and herb Robert. Opposite-leaved golden saxifrage was locally abundant at the side of the burn. In the north-east corner of this woodland (TN25), within the woodland south of the Ben Lomond Way roundabout adjacent to Ben Lomond Way, a distinctive area of older established woodland was contained within a fenced boundary. There were sizeable specimens of beech, oak, sycamore and ash. A carpet of dense native bluebell (with occasional hybrid bluebell) comprised the majority of the ground layer.

3.19 In the far west of the Site, the woodland around Woodbank House was also classified as mixed broad-leaved woodland. This was an ancient woodland of plantation origin, but largely now supported a semi-natural canopy. Large mature oaks were dominant along with sycamore, ash, yew, birch and lime. Wild cherry *Prunus avium* was found frequently on the lower slopes, as well as occasional elder and rowan. The majority of the sloped ground layer in the south of the woodland was covered in extremely dense rhododendron *Rhododendron* sp. or cherry laurel *Prunus laurocerasus*. The upper slopes of the woodland here had retained a richer ground flora with a carpet of native bluebell, wood sorrel and ferns Dense bamboo *Pseudosasa* sp. created an impenetrable corridor along a dry ditch in the centre of the woodland (TN34).

3.20 The far north of this section of woodland (TN35) was judged to be the highest quality of the woodland in this part of the Site, in terms of its structure and ground flora. Sizeable mature oaks dominated here, but regenerating sycamore still occurred frequently. The ground layer had an impressive carpet of dense native bluebell extending down the slope, alongside wood sorrel, greater stitchwort *Stellaria holostea*, pink purslane, fringecups *Tellima grandiflora* and occasional pignut *Conopodium majus* and common figwort. Wild garlic *Allium ursinum* was locally abundant along the northern edge. Rhododendron occurred less frequently but scattered stands were still visible. As described above, the previous historic landscaping associated with Woodbank House had led to invasive rhododendron and bamboo taking over large parts of this woodland area; the eastern fringe of the woodland still retained a number of large ornamental conifer tree species that were assumed to have been planted as part of the original Woodbank House gardens.

3.21 In terms of other woodland types recorded, pockets of **broad-leaved plantation woodland** occurred throughout the Site, mainly associated with small areas of landscaping around the Pierhead area of the Site. These tended to be young densely planted stands of a species mix which included alder, oak, wych elm, rowan, willow and ash. There was also frequent lodgepole pine *Pinus contorta*, but not in high enough density to be classed as mixed plantation.

3.22 A strip of **mixed plantation woodland** did however occur along the eastern side of Old Luss Road (TN21) with planted larch and elm as a clearly separate habitat from the adjacent

broad-leaved plantation associated with the Lomond Shores car park, and more natural mixed broad-leaved woodland further south.

3.23 The old Boathouse area in the outlier section of the Site boundary contained early successional regenerating **scrub woodland**, with dominant alder, birch and goat willow. A section of long-established plantation woodland occurred along the southern side of this habitat, with mature oaks and sycamore. The ground flora of the scrub woodland indicated wetter conditions with the presence of meadowsweet *Filipendula ulmaria* and common valerian *Valeriana officinalis*, alongside the alder and willow trees. Other species included creeping buttercup, bramble, fringecups and red campion.

Scrub

3.24 Patches of scrub were confined to the west of the Site. At TN30, a line of **mixed scrub** and trees had formed along the existing avenue to Woodbank House, at the field boundary. Dense bramble flanked rhododendron, and leylandii *Cupressus × leylandii*, common laburnum *Laburnum anagyroides* and wild cherry were also scattered throughout this area. At TN36, patches of mixed scrub surrounded the existing ruined buildings, and bramble was the most common species here, with scattered cherry laurel and rhododendron. Within the open grassland field in the far south of the Site, patches of dense **bramble scrub** occurred, as well as a strip of willow trees along the existing watercourse which was classified as **willow scrub**. The southern boundary here was also lined with bramble and wild privet *Ligustrum vulgare* mixed scrub, interspersed with hawthorn, sycamore and beech trees.

Grasslands

3.25 During the habitat survey in June 2021, the large field around Woodbank House in the west of the Site was overgrown, unmown and assumed to be an area previously used for grazing. It was therefore classified as **abandoned pasture**. In the northern section of the field, at TN27, the grassland mix was relatively species-rich and dominated by a number of grass species such as Yorkshire fog *Holcus lanatus*, meadow foxtail *Alopecurus pratensis*, red fescue *Festuca rubra* and sweet vernal-grass *Anthoxanthum odoratum*. Timothy *Phleum pratense* was frequent. Dominant forb species included creeping buttercup, meadow buttercup *Ranunculus acris*, common sorrel *Rumex acetosa*, germander speedwell *Veronica chamaedrys*, black medick *Medicago lupulina* and ribwort plantain *Plantago lanceolata*. Broad-leaved dock *Rumex obtusifolius* was locally abundant along the eastern boundary. A single elder shrub occurred within the centre of the field. Further south, at TN28, slightly wetter conditions had led to soft rush *Juncus effusus* being frequent throughout, but no other indicators of marshy grassland were found. Dominant grasses here were Yorkshire fog, sweet vernal-grass and meadow foxtail. Cock's-foot *Dactylis glomerata* was also frequent. Common sorrel, ribwort plantain, creeping buttercup and meadow buttercup were the dominant forbs, alongside frequent germander speedwell, common knapweed *Centaurea nigra*, common hogweed *Heracleum sphondylium* and smooth lady's-mantle *Alchemilla glabra*. Common spotted orchid *Dactylorhiza fuchsii* was found occasionally. Two large mature ash trees occurred within the south-western section of the field. During bat activity surveys in July 2021, it was noted that these fields had been cut.

3.26 The only other grasslands within the Site were landscaped areas of mown **amenity grassland**, associated with the adjacent Loch Lomond Shores development, and one large

area of recreational amenity grassland space in the Riverside section of the Site. This latter area was heavily used by dog walkers and the general public, and comprised red fescue, Yorkshire fog and rough meadow-grass *Poa trivialis*. Forb species included creeping buttercup, ribwort plantain, greater plantain *Plantago major*, daisy *Bellis perennis*, white clover *Trifolium repens* and black medick.

Disturbed and other habitats

3.27 Small areas of disturbed ground had led to the formation of areas of **anthropogenic herb stands**/tall ruderal habitats including the wayleave through Drumkinnon Wood associated with the INEOS pipeline, which was dominated by native bluebell along with rosebay willowherb, bramble and bracken. In the west of the Site, a strip of rosebay willowherb, creeping thistle *Cirsium arvense* and common nettle ran along the eastern edge of the Woodbank woodland.

3.28 The artificial shoreline at Pierhead in the north-west of the Site was classified as **bare ground**, along with areas of previously cleared ground associated with the INEOS pipeline in Drumkinnon Wood, and play areas. The section of open water in the east of the Site was labelled **surface standing water**.

3.29 The derelict structures associated with Woodbank House and the existing visitor information building the far south-east were labelled **buildings**, and roads, car parking and path networks as **hard standing**.

Table 3.1: Summary of Scottish EUNIS habitat types found within the Site.

Habitat type	Area within Site (ha)	% of Site
C1: Surface standing water	0.07	0.4
E2.13 Abandoned pasture	4.09	22.3
E2.6: Amenity grassland	2.08	11.3
E5.1: Anthropogenic herb stands	0.12	0.7
F3.1: Mixed scrub	0.48	2.6
F3.13: Bramble scrub	0.16	0.9
F9.2: Willow scrub	0.03	0.1
G1.A: Mixed broad-leaved woodland	6.94	37.9
G1.C: Broad-leaved plantation woodland	0.94	5.1
G4.F: Mixed plantation woodland	0.42	2.3
G5.61: Scrub woodland	0.04	0.2
H5.3: Bare ground	0.35	1.9
J1: Buildings	0.09	0.5
J4: Hard standing	2.51	13.7
Total	**18.31**	**100.0**

Linear features

3.30 There were a number of species-poor **managed native hedgerows** across the Site, presumed to have been planted as part of the landscaping works at Loch Lomond Shores.

These enclosed the whole of Drumkinnon Wood and other woodland areas, and comprised either hawthorn or beech.

3.31 In the west of the Site, a **line of trees** was located along the field boundary at Old Luss Road, dominated by mature lime. Along the far south-western boundary, there was a line of mature oaks.

3.32 Small watercourses in the Site were categorised as **flowing water**, and a **dry ditch** intersected the Woodbank woodland.

3.33 Old Luss Road was lined with stone **walls** on either side of the pavement.

Notable flora

Native bluebell

3.34 The Site contained a number of woodland areas with dense carpets of native bluebell, as shown in **Figure 3.2**. Drumkinnon Wood had the most widespread coverage of bluebell, primarily of the native species except for the southern extensions of the woodland. The ancient woodland around Woodbank House also had large areas of dense native bluebell however, the lower slopes had been impacted by the dense rhododendron and bamboo cover. The upper slopes, and in particular the northern section of the woodland, had widespread native bluebell as the dominant species in the ground layer.

Invasive non-native species (INNS)

3.35 A number of INNS were recorded across the Site, as shown in **Figure 3.3**.

3.36 Patchy areas of hybrid/Spanish bluebell were noted in the southern sections of Drumkinnon Wood, as well as within both sections in the Riverside area of the Site. These rarely formed continuous carpets, and tended to be more interspersed with other ground flora species.

3.37 In the west of the Site, dense rhododendron occurred through most of the woodland around Woodbank House, as well as dense areas of cherry laurel and bamboo. A patch of Himalayan balsam *Impatiens glandulifera* was also recoded within the southern end of the woodland here, as well as along the burn in woodland adjacent to Old Luss Road.

3.38 Scattered patches of Japanese knotweed *Fallopia japonica* occurred in the woodland in the far south-east of the Site, as well as a larger, more dense patch within woodland in the centre of the Site. Cotoneaster was found in small areas throughout the Site. There was also one area of variegated yellow archangel *Lamiastrum galeobdolon* subsp*. argentatum* within woodland to the east of Old Luss Road. A single patch of snowberry *Symphoricarpos albus* was recorded in the far eastern part of the Site.

Discussion

Valuing habitat and flora

3.39 A summary of the value (see Chapter 6 of the EIAR for criteria for the determination of IEFs) of the habitats recorded within the Site is provided in **Table 3.2** below.

3.40 **Table 3.2** shows that the majority of the habitats on the Site would in isolation be considered to be of **Site** or **Less than Site** ecological value. However, there are a number of IEFs considered to be of **Local** importance, primarily those associated with mixed scrub, species-rich grassland, lines of trees and field margins. Areas of mixed broad-leaved woodland within the Site contained ancient woodland or were associated with the River Leven SINC and vegetation along the river corridor, were considered to be a **Council** level IEF.

3.41 No habitats within the Site were considered to be GWDTEs, and GWDTEs will not be considered as IEFs in the EcIA. In addition, habitats valued as being Site or less than Site importance will not be considered as IEFs in the context of the EcIA.

Native bluebell

3.42 Native bluebell is included as a priority species in the Dunbartonshire LBAP[10].

3.43 No built development is proposed within Drumkinnon Wood, but increased visitor numbers to the woodland could impact on areas of native bluebell. In the west of the Site, proposed development will directly impact on known carpets of dense native bluebell in the Woodbank woodland and the woodland south of the Ben Lomond Way roundabout. Due to being a Council level IEF, direct and indirect impacts on native bluebell will be considered in full in the EcIA.

Table 3.2: Summary value of habitat IEFs found within the Site.

Habitat type	Area within Site (ha)	Level of importance	Rationale
C1: Surface standing water	0.07 (0.4 %)	Local	Commonplace habitat but important as part of a large, notable features within the wider ecological landscape.
E2.13: Abandoned pasture	4.09 (22.3 %)	Local	Commonplace habitat but relatively species-rich when unmown, providing linkages between areas of lower value, and therefore important within the wider ecological mosaic.
E2.6: Amenity grassland	2.08 (11.3 %)	< Site	Low value, commonplace habitat.
E5.1: Anthropogenic herb stands	0.12 (0.7 %)	Site	Commonplace habitat but important as a connecting feature within the Site ecological landscape.
F3.1: Mixed scrub	0.48 (2.6 %)	Local	Commonplace habitat important to the mosaic of habitats associated with adjacent woodland, and important as a connecting feature within the overall ecological landscape, associated with open grassland habitat.

[10] https://www.west-dunbarton.gov.uk/media/3197361/biodiversity_plan_2010_final.pdf Accessed January 2022.

Habitat type	Area within Site (ha)	Level of importance	Rationale
F3.13: Bramble scrub	0.16 (0.9 %)	Site	Small areas of commonplace habitat but important as a connecting feature within the overall Site ecological landscape.
F9.2: Willow scrub	0.03 (0.1 %)	Site	Small area of commonplace habitat but important as a connecting feature within the Site ecological landscape.
G1.A: Mixed broad-leaved woodland	6.94 (37.9 %)	Council	Woodland habitat included within the LBAP. Important as a connecting feature within the overall ecological landscape and contain diverse ground flora, as well as many mature trees.
G1.C: Broad-leaved plantation woodland	0.94 (5.1 %)	Site	Commonplace fragmented habitat of low value due to previous formal landscaping. May be important refuge for nesting birds.
G4.F: Mixed plantation woodland	0.42 (2.3 %)	Site	Commonplace habitat of lower value, but important as a connecting feature within the overall ecological landscape.
G5.61: Scrub woodland	0.04 (0.2 %)	Site	Commonplace successional habitat but important as a connecting feature within the overall ecological landscape.
H5.3: Bare ground	0.35 (1.9 %)	< Site	Low value, commonplace habitat.
J1: Buildings	0.09 (0.5 %)	Site	Commonplace habitat but provides various ecological niches for lichens and bryophytes due to derelict state. (Value for bats is covered in Chapter 9.)
J4: Hard standing	2.51 (13.7 %)	< Site	Low value, commonplace habitat.
Linear features	**Level of importance**		**Rationale**
C2.3 Flowing water	Site		Commonplace habitat and relatively poor in structure and low suitability for protected species, but important as a connecting feature within the overall ecological landscape.
FA.2: Managed native hedgerow	Site		Commonplace habitat and species-poor as a result of previous formal landscaping. Important as a connecting feature within the overall ecological landscape.
G5.1: Line of trees	Local		Mature, long-standing habitats in the west of the Site likely to be originally of plantation origin but now important as a connecting feature within the overall ecological landscape.

Invasive non-native species (INNS)

Relevant legislation

3.44 Non-native species are covered in Scotland by clauses within the Wildlife and Natural Environment (Scotland) Act (2011) ("WANE Act"), which superseded non-native legislation previously contained within the Wildlife and Countryside Act (1981, as amended). This legislation states that it is an offence to plant any named invasive species in the wild in locations that are outwith its native range. Current legal interpretation is that this applies whether planting/propagation has occurred intentionally or unintentionally.

INNS at Lomond Banks

3.45 Due to the widespread and dense coverage of INNS at the Site, the majority of which are covered under current legislation (Spanish bluebell, rhododendron, Himalayan balsam, Japanese knotweed, cotoneaster and variegated yellow archangel) an INNS eradication

programme will be required as part of the Proposed Development. It is recommended that:

- a qualified specialist contractor is commissioned to devise and execute an INNS eradication programme. This should include plans for the removal of areas directly impacted by the proposed Development, but also a wider eradication programme for the Site due to the current extent of colonisation. This is particularly relevant to the Woodbank woodland where removal of INNS may allow the ancient woodland ground flora to recover. Removal of INNS within Ancient Woodland is a specific aim of the LLTNPA Tress and Woodland Strategy, as previously discussed;
- treatment measures must be suitable for use in proximity to watercourses, and if herbicides are proposed this may require an authorisation under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 ("CAR"). SEPA has recently produced new guidance in this respect[11];

3.46 The Code of Practice on Non-Native Species (Scottish Government, 2012)[12] should be adhered to throughout any INNS removal programme, and in addition to any legislative requirements, any soil that may contain non-native plant material should also be moved in line with this good practice guidance.

3.47 A detailed method statement pertaining to the removal of INNS and site biosecurity should be produced by the contractor. This will inform all relevant parties of their responsibilities and provide a framework for safely working on a site with INNS present. In addition, the eradication programme should include monitoring for subsequent years following the treatment to assess the effectiveness of measures employed and to retreat any areas where additional measures are needed.

3.48 Although cherry laurel, bamboo and snowberry are considered as pernicious as other INNS, it is also recommended that these are formally removed from the Site. Dense areas of bamboo and cherry laurel have colonised the ancient woodland around Woodbank House and shaded out the ground layer. Removal of these INNS would be a positive management step for the overall functioning of the ancient woodland.

[11] https://www.sepa.org.uk/media/532108/wat-sg-18.pdf Accessed November 2021.

[12] **Scottish Government (2012)** *Code of Practice on Non-Native Species*. Made by the Scottish Ministers under Section 14c of the Wildlife and Countryside Act, 1981.

Lomond Banks

Scottish EUNIS Habitat Map

Site boundary

Habitats:

- C1: Surface standing water
- E2.13 Abandoned pasture
- E2.6: Amenity grassland
- E5.1: Anthropogenic herb stands
- F3.1: Mixed scrub
- F3.13: Bramble scrub
- F9.2: Willow scrub
- G1.A: Mixed broad-leaved woodland
- G1.C: Broad-leaved plantation woodland
- G4.F: Mixed plantation woodland
- G5.61: Scrub woodland
- H5.3: Bare ground
- J1: Buildings
- J4: Hard standing
- C2.3: Flowing water
- C2.5: Dry ditch/temporary flowing water
- FA.2: Managed native hedgerow
- G5.1: Line of trees
- Stone wall
- Individual tree
- Target note

Figure 3.1

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: May 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

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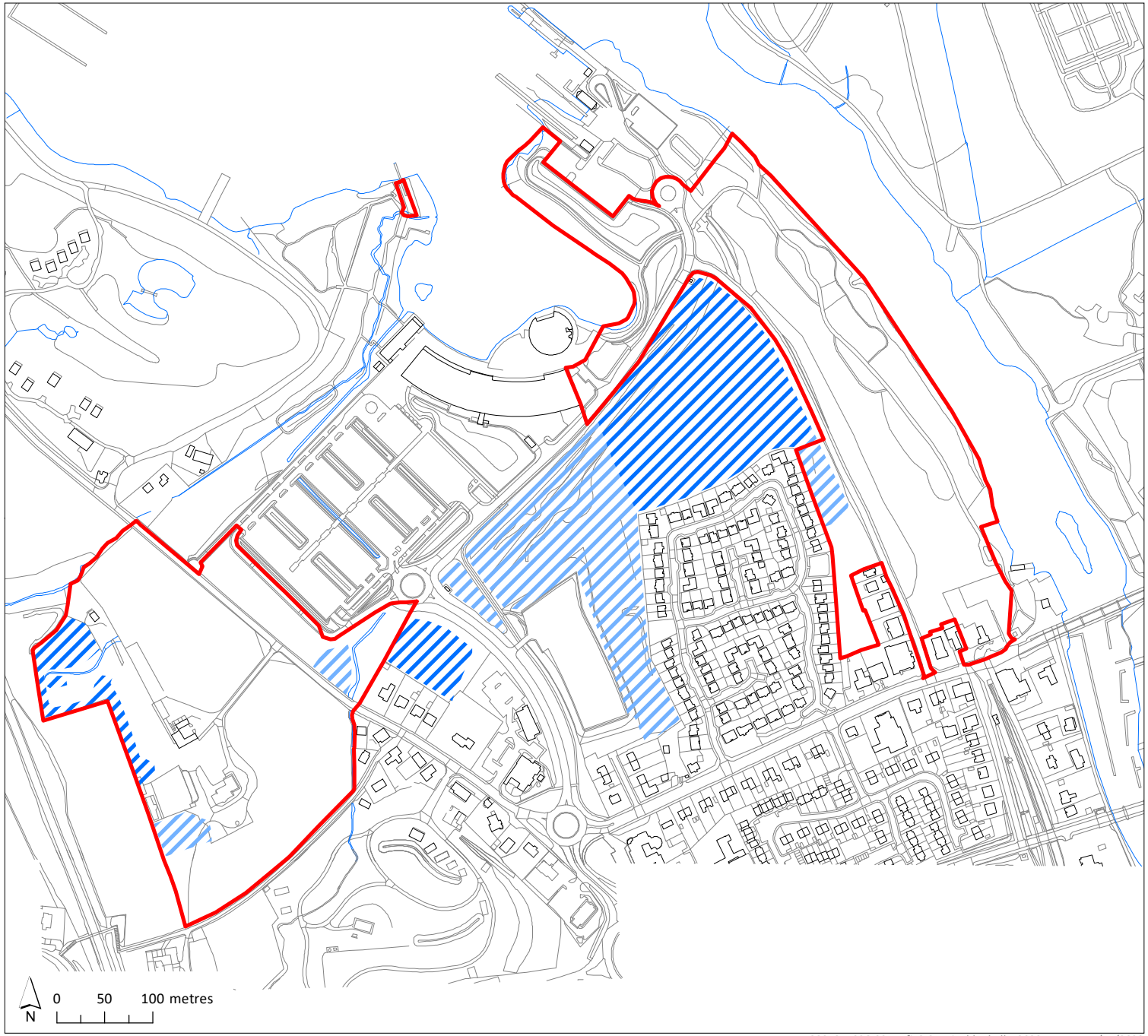


Lomond Banks

Native Bluebell Areas

Site boundary

Bluebell areas:

Dense native bluebell

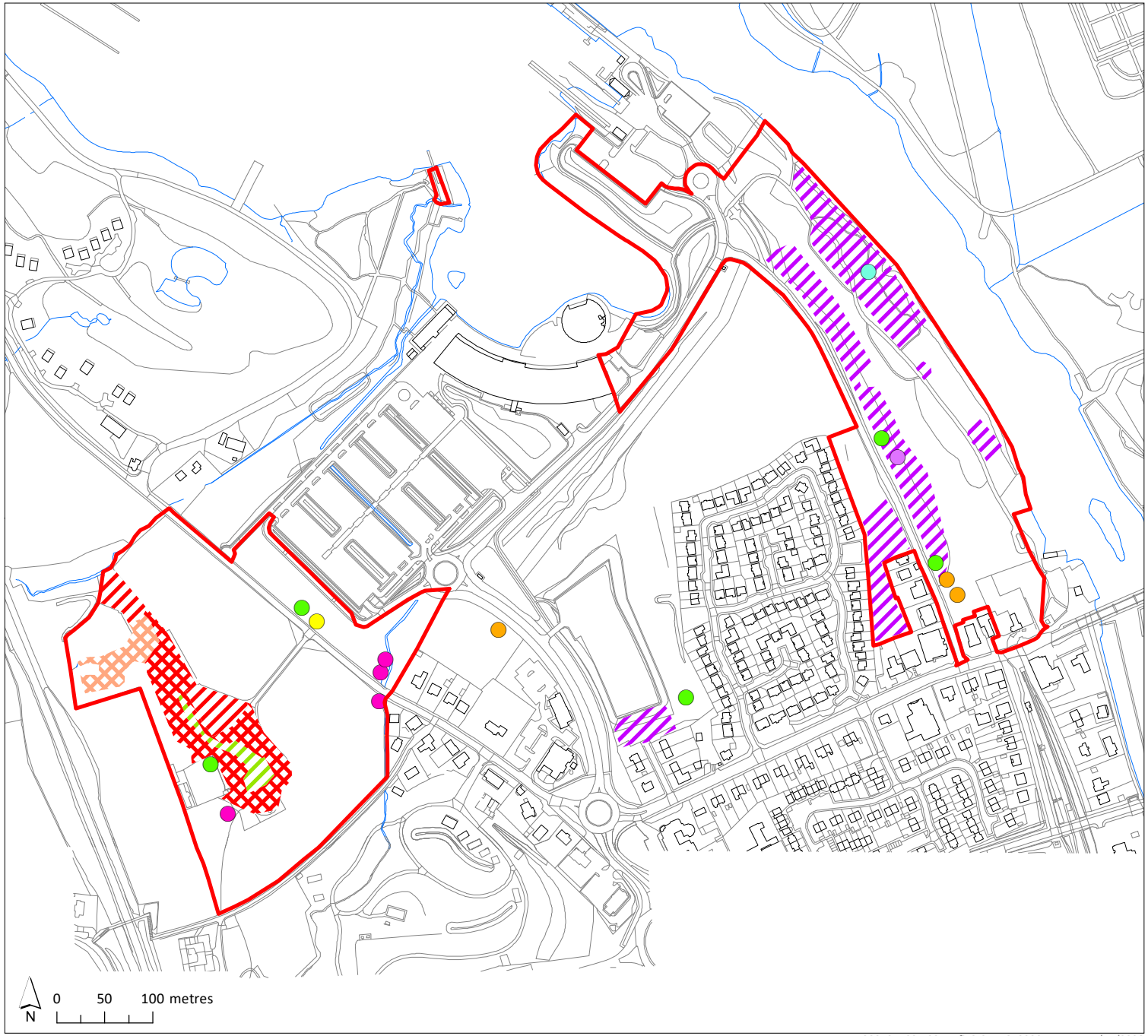
Continuous dominant native bluebell

Figure 3.2

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: May 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd



Lomond Banks

INNS Locations

Site boundary

Patches of INNS:

- Patch of Japanese knotweed
- Patch of cotoneaster
- Patch of Himalayan balsam
- Patch of rhododendron
- Patch of snowberry
- Patch of variegated yellow archangel

More extensive INNS:

- Dense rhododendron
- Dense bamboo
- Scattered rhododendron
- Scattered cherry laurel
- Patchy mosaic of hybrid/Spanish bluebell

Figure 3.3

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: May 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

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AELSC0501_007-03_TAfig3-3INNS_20221114 A4 14/11/2022

4 Otter

Methodology

Pre-existing data records

4.1 Pre-existing biological data records were sourced from GMRC, for the Study Area and a 2 km buffer. A large number of records were subsequently supplied, and were reduced to those dated within the last 10 years.

4.2 Pre-existing survey data from ecology surveys completed by Envirocentre[13] in 2017 were also reviewed.

Field survey

4.3 On 30 June 2021, a formal otter survey was conducted for the Site and a 200 m buffer of this, where access allowed. The survey followed the guidance provided by NatureScot[14], comprising searches for field signs, including spraints, confirmed shelters[15], feeding remains, slides, prints and tracks.

4.4 All signs of otter activity were noted, both from within the watercourse and along the banks, and their locations recorded using a hand-held GPS. Survey findings were subsequently digitised in GIS.

Survey limitations

4.5 Otters do not hibernate, and their survey can be undertaken at any time of the year. However, it is best attempted after 4-5 rain free days, when water levels are lower and there is less likelihood that signs of the species' presence will have been washed away.

4.6 The survey reported here was undertaken during a period of dry weather, and water levels were low. All stretches of watercourses within the Study Area were accessible and therefore there were no significant limitations to the survey.

Results

Pre-existing data records

4.7 A single record for a dead otter dating from 2014 was included in the results of the data search, located north of Duck Bay Marina, 2 km north of the Site. No signs of otter were identified during surveys undertaken by Envirocentre in 2017.

[13] **Envirocentre (2018**) *West Riverside, Balloch – Otter and Water Vole Survey*. Unpublished contract report for TSL Contractors Limited. February 2018.

[14] https://www.nature.scot/doc/standing-advice-planning-consultations-otters accessed March 2021.

[15] Otter home ranges can be extensive and will include various cavities below ground known as holts and above ground shelters. The latter includes couches in vegetation and hovers in cavities under overhanging banks or between boulders (Green *et al*., 1994).

Field survey

4.8 The results of the otter survey are described below. Target notes are provided in **Table 4.1** and displayed in **Figure 4.1**. A selection of survey photographs is provided in **Figure 4.2**.

Table 4.1: Otter survey target notes.

Target note	Description	Suitability for otter
A	Watercourse c. 1.5 m wide, with shallow banks and a bedrock base covered by a wire mesh. Very low waterline at the time of the survey. Culverted under field and under road at Old Luss Road. High stone banks further upstream by the caravan park in the south-west of the study Area. No instream vegetation.	No suitable resting sites, but potential for commuting and foraging otter.
B	Ditch in car park that was part of a SUDs system. Very overgrown, with concrete culverts at either end and a wire mesh covering the stone base.	No suitable resting sites and heavily disturbed by car park. Unlikely to be used by commuting otter.
C	Rocky watercourse that was dry at time of survey. Wire mesh covered base and banks in places. Heavily disturbed by public footpaths nearby and aerial pathways above associated with leisure activities.	No suitable resting sites and heavily disturbed by the public. Possible foraging and commuting route.
D	Small watercourse on the eastern side of the River Leven. At entry to the Leven the watercourse becomes wider with very shallow earth banks. Upstream had stone base and banks. No instream vegetation.	No suitable resting sites, but possible foraging and commuting route for otter.
E	Small ditch entering the eastern side of the River Leven. Ditch was dry at the time of the survey.	No suitable resting sites and heavily disturbed by the public. Unlikely to be used by otter for commuting.
F	Rocky narrow watercourse that flowed through woodland. Almost fully dry at time of survey. Overhanging trees made access difficult but banks were mostly shallow, with wire covering the base and banks.	No suitable resting sites but possible commuting route for otter.
G	Rock armour and sandy beach shoreline around Lomond Shores. Highly disturbed by members of the public.	No suitable resting sites. Shore area has the potential to be used by foraging and commuting otter, but is less likely due to the level of disturbance.
H	Western side of the River Leven along the boundary of the Site. Overhanging tree roots in places as well as gravel shoreline. Area heavily disturbed by the public and boats within the marina area. Eastern side of the River Leven was marshy and heavily disturbed by nearby paths. No overhanging tree roots or other suitable resting sites.	Potential resting sites where there are overhanging tree roots along the western side of the Leven, but no signs found. Possible commuting and foraging route, but general area is heavily disturbed.

4.9 Overall, no signs of otter were found within the Site or wider Study Area. The majority of watercourses were lacking in any suitable features for otter resting sites, the exception being the western shoreline of the River Leven where occasional overhanging tree roots were noted. However, no signs of otter use were recorded here and the general area was heavily disturbed by the public and boats within the marina. The remainder of the watercourses that flowed through the Site could potentially have offered otter commuting

and foraging routes, but human disturbance levels meant that overall these areas were sub-optimal for the species.

Discussion

Relevant legislation

4.10 The otter is a European Protected Species (EPS), protected by the Conservation (Natural Habitats, etc.) Regulations 1994, as translated into domestic legislation post-Brexit and via the Wildlife and Countryside Act 1981 (as amended). This legislation collectively makes it an offence to capture, harass, injure or kill an otter; obstruct access to, damage or destroy a breeding site or resting place of an otter; disturb an otter in such a way as is likely to affect their distribution or abundance, disturb otter in such a way as is likely to impair their ability to survive or breed, or disturb an otter while it is occupying a structure or place which it uses for shelter or protection. Each of these actions is considered to be an offence whether the action is deliberate or reckless, except in the case of damaging or destroying a breeding site or resting place, which is a strict liability offence i.e., there is no defence for destroying a breeding site or resting place.

4.11 A licence is required for all developments that will affect otter. Disturbance is defined by NatureScot as any new effect occurring within a minimum of 30 m of an otter shelter. This distance is likely to increase for activities with a higher potential for disturbance, such as blasting or track-laying, or in remote locations or where the shelter in question is regarded as being high-status. If breeding is suspected, NatureScot may request a non-intervention zone of 100-200 m, or that work be suspended pending further investigation[16]. Otters are inquisitive animals and are known to habituate to a range of disturbances. They are, however, often particularly intolerant of dogs.

Otter at Lomond Banks

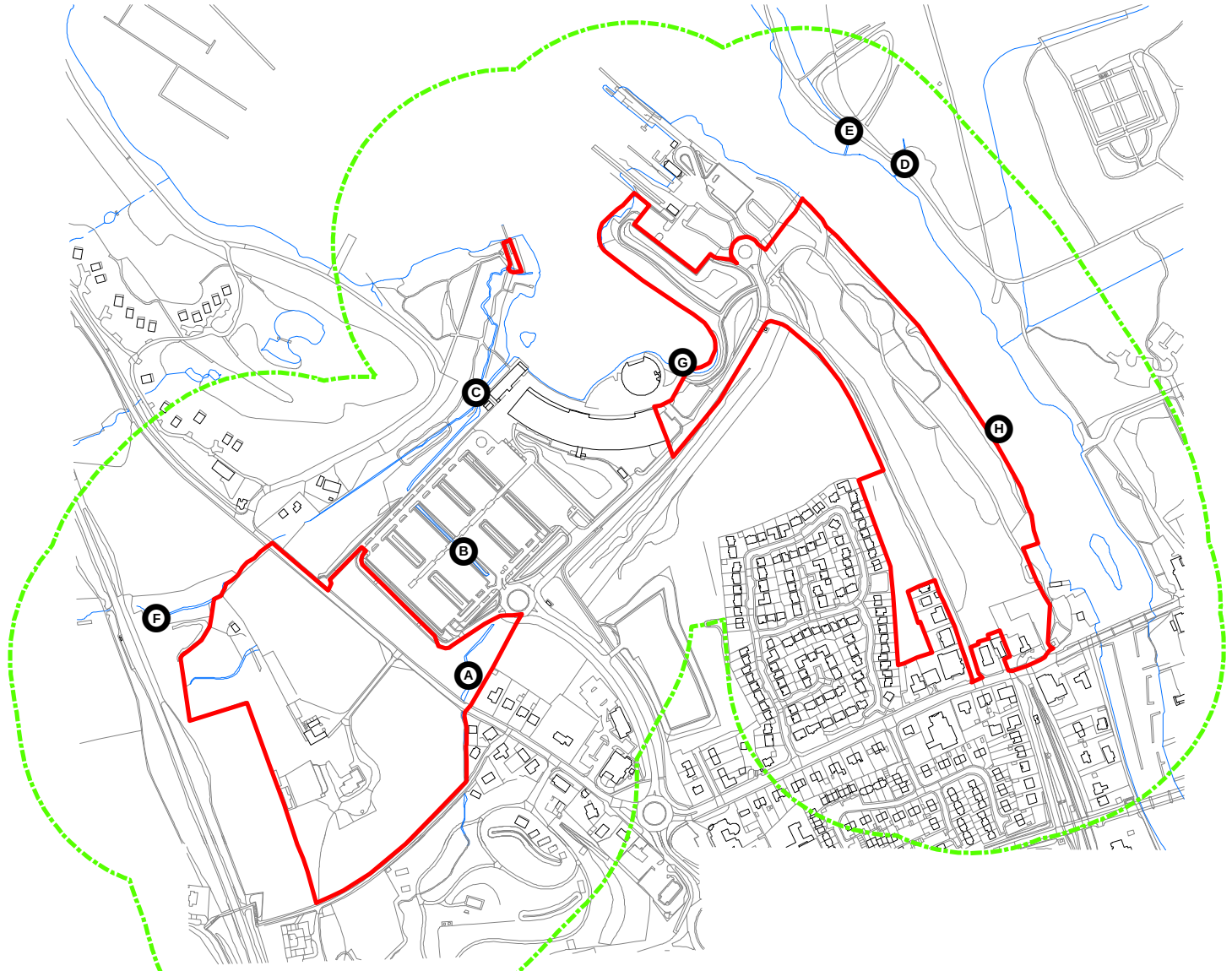
4.12 Otter are known to use the shores of Loch Lomond in areas north of the Study Area. However, the survey described here indicated that otter were unlikely to be present within the Site, and habitat within the Site and the wider Study Area only offered potential commuting and foraging routes. The majority of these locations were classed as sub-optimal due to high levels of disturbance. Higher quality foraging and commuting habitat was identified along the western side of the River Leven, but this was also heavily disturbed by boats from the marina and general public.

4.13 At this time, there are therefore no specific licensing issues associated with otter, and the Site is considered to be of **Site** level importance for the species at best. However, given the level of protection afforded to otter, the species should be considered to be an IEF in the EcIA, and to avoid disturbance the following good practice measures should be adhered to during the construction phase:

- a watching brief for the occurrence of otter field signs should be kept by an Ecological Clerk of Works (ECoW), who will advise regarding appropriate action should the species be found or suspected to be present during the works;

[16] https://www.nature.scot/sites/default/files/2020-06/Species%20Planning%20Advice%20-%20otter.pdf accessed March 2021.

- general good practice measures for working in and near to watercourses must be adhered to, for example, silt interception traps will be provided to minimise unchecked contaminated run-off. A pollution prevention and sediment control plan should be written and implemented for the works;
- fuels and other chemicals must be stored securely as far as practicable from any watercourse, and preferably over 50 m away;
- appropriate wash-out/wash-down facilities will be available for vehicles and machinery which will not discharge into the watercourses;
- trenches and excavations will be covered at the end of each working day, or will include ramps, and stored pipes will be capped (or stored vertically), to prevent entrapment of animals. During longer periods of Site shut down, trenches and excavations will be infilled or covered;
- machinery left on-site overnight must be carefully checked each morning for the potential presence of resting up otters;
- in the unlikely event of any Site activity being carried out during the hours of darkness, machinery and floodlights will be directed away from watercourses, ensuring wherever possible an unlit corridor of 10 m;
- the use of heavy machinery should be limited to avoid the period two hours before and after dawn and dusk during the months of March to October inclusive, and one hour before and after dawn/dusk during the months of November to February inclusive. This is because these are the times of day when otter will be most active on the nearby watercourses.



Lomond Banks

Otter Survey Results

Site boundary

200 m from Site boundary

Otter habitat target note

Figure 4.1

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: June 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

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Figure 4.2: Selection of photographs from the otter survey.

(a) Watercourse referenced as target note A.

(b) Watercourse referenced as target note B.

(c) Watercourse referenced as target note C.

(d) Watercourse referenced as target note D.

(e) Watercourse referenced as target note E.

(f) Shore-edge referenced as target note G.

(g) Overhanging tree root along the western side of the River Leven that had potential as an otter resting site. No signs of otter use was found and the area was heavily disturbed by boats and people.

(h) Gravel shoreline along the western side of the River Leven, referenced as target note H.

5 Water Vole

Methodology

Pre-existing data records

5.1 Pre-existing biological data records were sourced from GMRC, for the Study Area and a 2 km buffer. A large number of records were subsequently supplied, and were reduced to those dated within the last 10 years.

5.2 Pre-existing survey data from ecology surveys completed by Envirocentre in 2017 were also reviewed.

Field survey

5.3 On 30 June 2021, a formal water vole survey was conducted for the Site and a 50 m buffer of this (the "Study Area"). The survey followed national survey guidance[17,18] and comprised searches of the ditch system for water vole signs, including feeding stations, latrines, footprints, burrows and runs, as well as sightings of voles.

5.4 Any signs or potential signs of water vole were noted, and their location recorded using a hand-held GPS. Survey findings were subsequently digitised in GIS.

Survey limitations

5.5 The survey was undertaken at the appropriate time of year, when water levels were low, suitable for identifying recent signs of water vole. All sections of watercourses within the Study Area were accessible and there were therefore no limitations to the survey.

Results

Pre-existing data records

5.6 No water vole records were found within the data search results. No suitability or signs of water vole were identified during surveys undertaken by Envirocentre in 2017.

Field survey

5.7 Only a small number of watercourses ran through the Site, or along the boundaries (see **Figure 4.1** in previous chapter), and all were all judged to be unsuitable for water vole. The burn referenced at point A on **Figure 4.1** had sloping soft banks in places, but was lacking in suitable bank vegetation, as well as having no in-stream vegetation for foraging or cover. In addition, there was debris netting along the floor of the burn. Ditches at location B were slow flowing and associated with a drainage system within the main car park of Lomond Shores. Although some sections provided suitable vole burrowing habitat within the soft

[17] https://www.nature.scot/standing-advice-planning-consultations-water-voles accessed March 2021.

[18] **Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016).** *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series).* Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

banks, and had good in-stream vegetation, the location of the ditches were within a busy car park, with hard standing on all sides, and this significantly decreased the suitability for water vole overall. The watercourse at location F in the south-west of the Site was a rocky burn with no suitable banks for burrowing and therefore unsuitable for water vole. The remainder of waterbodies within the Study Area were either shoreline or areas of rock armour, with no suitable habitat for water vole.

Discussion

Relevant legislation

5.8 The water vole is protected by the Wildlife and Countryside Act (1981, as amended) and the Nature Conservation (Scotland) Act (2004). It is an offence intentionally or recklessly to disturb a water vole in its place of shelter, or to intentionally or recklessly damage, destroy or obstruct access to a shelter. Both these Acts have been amended by the Wildlife and Natural Environment (Scotland) Act (2011), known as the WANE Act. Sections 18(2)(a) and (b) of the WANE Act insert a licensable purpose into section 16 of the Wildlife and Countryside Act. NatureScot can therefore licence the disturbance of water vole (including destruction of burrows) for reasons of social, economic and environmental significance, provided there is no satisfactory alternative.

Water vole at Lomond Banks

5.9 Water vole were judged to be absent from the Site and Study Area and there was limited habitat suitability to suggest that the Site could become colonised in the future.

5.10 For the purposes of the EcIA, water vole is not considered to be an IEF needing to be included in the assessment.

6 Badger

Methodology

Pre-existing data records

6.1 Pre-existing biological data records were sourced from GMRC, for the Study Area and a 2 km buffer. A large number of records were subsequently supplied, and were reduced to those dated within the last 10 years.

6.2 A request to Scottish Badgers was also made for any records within 2 km of the Study Area.

6.3 Pre-existing survey data from ecology surveys completed by Envirocentre[19] in 2017 were also reviewed.

Field survey

6.4 On 30 June 2021 and 01 July 2021, searches for badger field signs were undertaken for the Site and a 100 m buffer of this where access allowed ("the Study Area"), as per the survey guidelines provided by Scottish Badgers[20]. Features such as setts, latrines and dung pits, badger hair, footprints, trails and evidence of foraging were all searched for[21].

6.5 The survey concentrated on areas potentially suitable for sett excavation, including woodland habitats, their margins and embankments. All badger signs, confirmed or potential, were noted and their locations recorded using a hand-held GPS. Any relevant survey findings were subsequently digitised in GIS.

Categorisation of badger setts

6.6 Whilst badger setts are usually categorised according to their present use and appearance, this can be dynamic, particularly with regard to the prevalence of supplementary setts and the fact that their status is able to change over relatively short periods of time. The conventions shown in **Table 6.1** were used to describe setts.

6.7 In addition to sett classification, the level of badger activity is conventionally recorded for each sett by classifying each sett entrance hole according to one of three categories, as follows:

- well-used: an entrance free of leaf-litter and showing recent signs of excavation;
- partly-used: an entrance with some debris and leaf-litter but also showing some signs of recent digging;
- disused: an entrance with debris and leaf-litter partially obscuring the hole, with no recent signs of digging, or a hole that exhibits the characteristics of a badger sett

[19] **Envirocentre (2018**) *West Riverside, Balloch – Protected Species Survey*. Unpublished contract report for TSL Contractors Limited. February 2018.

[20] **Scottish Badgers (2018)** *Surveying for Badgers: Good Practice Guidelines*. Online publication at www.scottishbadgers.org.uk

[21] **Harris, S., Cresswell, P. & Jefferies, D. (1989)** *Surveying for Badgers*. Occasional Publication of the Mammal Society No. 9. Mammal Society, Bristol.

entrance hole (large and D-shaped entrance and old spoil piles at the entrance), but with no other signs of badger activity.

Table 6.1: Conventions used to classify badger setts.

Sett type	Characteristics
Main	The continuously used breeding and over-wintering sett for a social group of badgers. Only one main sett will exist in each social group's territory and will be relatively centrally located within the group's range. Several holes with large spoil heaps and obvious paths between sett entrances.
Annex	Linked by well-used paths to the main sett but not connected underground and not continuously used. Normally less than 150 m from the main sett, comprising several holes. May not be in use all the time, even if the main sett is very active.
Subsidiary	Distant from the main sett. Several entrances but with no well-used paths connecting to a main sett, and used only seasonally.
Outlier	Distant from main sett. Small, with one or two entrances only. Used for short periods sporadically, with no obvious well-used paths connecting to other setts. Little spoil outside holes.

Potential limitations of the badger survey

6.8 Badger surveys can be undertaken at any time of year, although the optimal times are March-June and September-November when badgers are particularly active but vegetation is lower. Badger latrines are reliably maintained by badgers in early spring, and at other times of year can be harder to locate. The survey was therefore undertaken just outside the optimal summer window, and when vegetation heights were greater, although the majority of suitable habitats could still be searched fully. The exception to this was a small section of the woodland around Woodbank House which had dense bamboo and rhododendron. These areas would be dense with this type of vegetation all year round and therefore the timing of the survey was not judged to be a limitation in this instance. A full assessment of the area adjacent to these dense patches of vegetation was undertaken, noting signs in close proximity to these or mammal paths leading into inaccessible areas. There were therefore no significant limitations to the survey.

Results

Pre-existing data records

6.9 No badger records were found within the data search results. This included direct communication with Scottish Badgers, who confirmed a general absence of data records for the Site and wider area[22]. No badger signs were identified during surveys undertaken by Envirocentre in 2017.

Field survey

6.10 The results of the badger survey are described below and target notes are provided in **Table 6.2** and displayed in **Figure 6.1**. A selection of survey photographs is provided in **Figure 6.2**.

[22] Email correspondence between AEL and Emily Platt/Scottish Badgers dated 29 June 2021.

6.11 No badger setts were identified during the survey.

6.12 The woodland slopes within Drumkinnon Wood were noted as offering potential habitat for sett creation. However, this woodland was isolated with poor connectivity due to the surrounding Loch Lomond Shores development. The woodland was also fenced in on all sides by dense hedgerows. In addition, there was a high level of disturbance from dog walkers and the general public throughout Drumkinnon Wood. A series of mammal holes were found in this section of the Site, both within Drumkinnon Wood and the adjacent strip of trees to the east of Old Pier Road. The majority of these were judged to be too small for badger and most likely used by rabbit which are known to be present in this part of the Site.

6.13 The woodland around Woodbank House had steep sided slopes that would be suitable for sett creation. This woodland also had connectivity with additional sections of woodland and grassland fields to the north. Not all areas of the woodland in the west of the Site were accessible due to the dense bamboo and rhododendron cover. However, no signs of badger were found within the wider woodland and no notable mammal paths were found entering inaccessible areas.

6.14 Signs of badger foraging were identified in the open field in the west of the Site, with 'snuffle holes' visible in areas of grassland.

Table 6.2: Badger target notes.

Target note	Grid reference	Sign	Comments
1	238074 681982	Foraging	Badger foraging signs in the corner of field.
2	238569 682005	Mammal holes	At least six old burrows large enough for rabbits. The burrows had become infilled with soil and leaves.
3	238495 682054	Mammal holes	A hole that was too small for badger, with sandy spoil on embankment beneath the roots of a tree. The tunnel extended back at least 1 m in an upwards direction.
4	238517 682015	Mammal holes	Two old excavated tunnels on a collapsed embankment infilled with sand and entrances completely eroded away. Too small for badger.
5	238796 682255	Mammal holes	Three holes with spoil heaps. Too small for badger and no signs found. Most likely rabbit due as presence of species in the area.
6	238782 682225	Mammal holes	Two holes one of which was large enough for badger. However, no signs of badger and most likely rabbit due to location by the roadside and known presence of rabbit in the area.
7	238441 681907	Mammal holes	Disused rabbit warren within area of Japanese knotweed.
8	238808 682123	Mammal holes	Two small mammal holes with rabbit droppings at entrance. Too small to be used by badger.

Discussion

Relevant legislation

6.15 The badger and its setts are protected in Scotland by the Protection of Badgers Act 1992 (as amended) and strengthened by the Wildlife and Natural Environment (Scotland) Act (2011).

This makes it illegal to wilfully kill, injure or take a badger, or attempt to do so, cruelly ill-treat a badger, interfere with a sett by damaging it or any part of it, destroying it, obstructing access to it or disturbing a badger while it is occupying a sett.

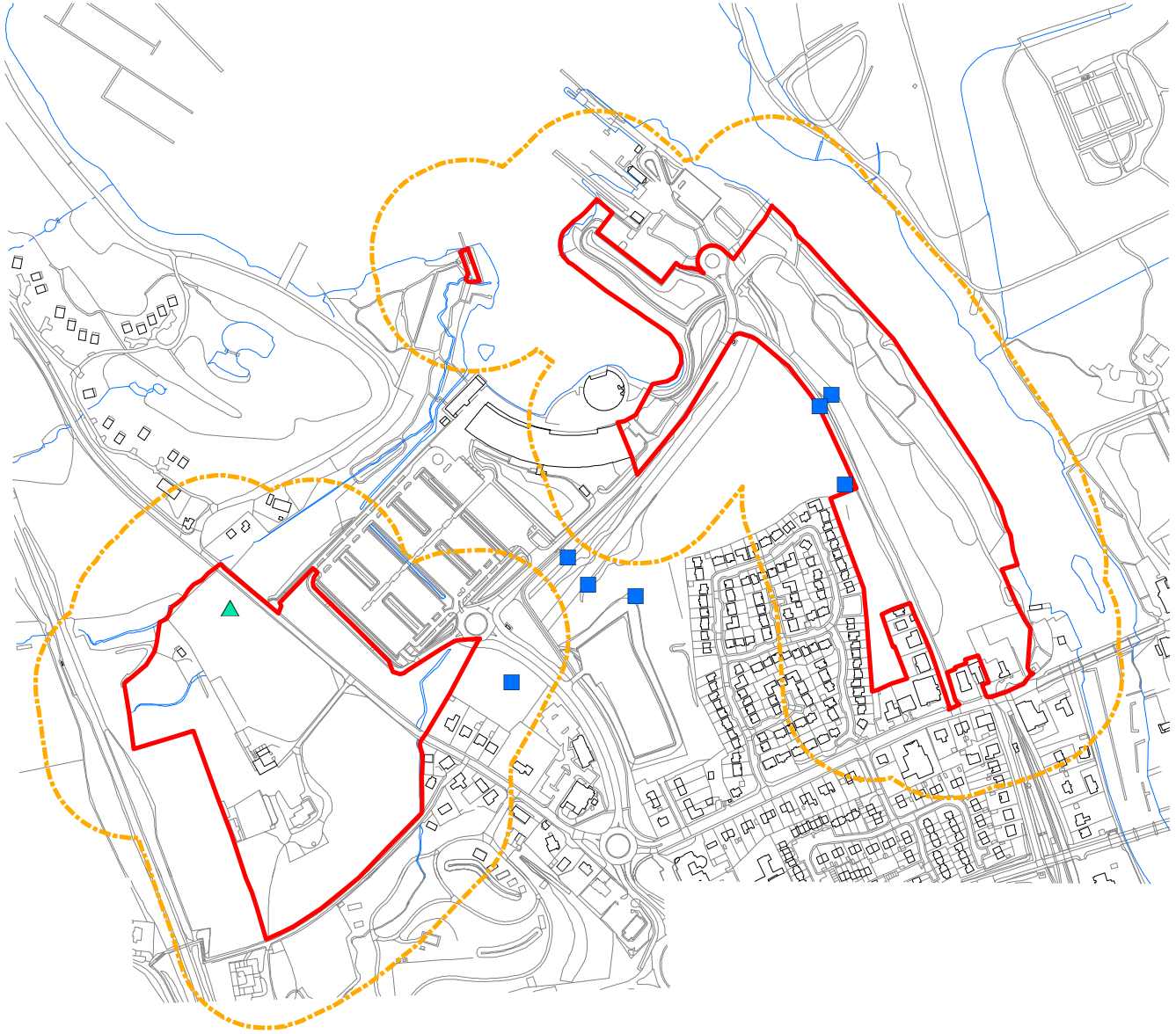
6.16 NatureScot is responsible for issuing licences under the Badgers Act for the purpose of development. Generally, it is considered that development using heavy machinery within at least 30 m of a badger sett entrance could result in disturbance and would therefore be licensable.

Badger at Lomond Banks

6.17 Badger foraging activity was confirmed in the west of the Site, with badgers likely accessing the Site from higher quality, connected habitat to the north and north-west. The majority of the woodland cover in the Site was judged to be unsuitable for badger sett creation, primarily due to high levels of disturbance from humans and dogs within Drumkinnon Wood and in the woodland areas in the far east of the Site. Wooded slopes around Woodbank House offered the best habitat for sett creation within the Site but no setts were found. However, badger were utilising the adjacent field for foraging.

6.18 At this time, there are therefore no specific licensing issues associated with badger, and the Site is considered to be at best of **Site** level importance for the species. However, given the frequenting of habitats within the west of the Site by badger, the species should be considered to be an IEF in the EcIA, and to avoid disturbance the following good practice measures should be adhered to during the construction phase:

- a pre-commencement survey for badger should be undertaken no earlier than 3-6 months before commencement, within the Site and 100 m buffer, with particular focus on woodland in the west of the Site;
- a watching brief for the occurrence of badger field signs should be kept by an ECoW, who will advise regarding appropriate action should the species be found or suspected to be present during the works. Where a potential and/or previously unknown sett is identified, all works will stop within a distance considered suitable to prevent damage or disturbance to the structure (at least 30 m). The area should not be approached by any site personnel until the ECoW has been informed of the suspected sett location and has confirmed whether or not it is a badger sett and any necessary mitigation and licensing requirements;
- trenches and excavations will be covered at the end of each working day, or will include ramps, and stored pipes will be capped (or stored vertically), to prevent entrapment of animals. During longer periods of Site shut down, trenches and excavations will be infilled or covered;
- in the unlikely event of any Site activity being carried out during the hours of darkness, machinery and floodlights will be directed away from woodland edges.



Lomond Banks

Badger Survey Results

Site boundary

100 m from Site boundary

Field signs recorded:

Badger foraging

Mammal holes

Figure 6.1

Map Scale @ A4: 1:7,500

Surveyed by: AEL	
Survey date: June - July 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

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Figure 6.2: Selection of photographs from the badger survey.

(a) Badger foraging evidence found in the west of the Site, described in TN1.

(b) Grassland field in the west of the Site where evidence of badger foraging was found.

(c) Mammal hole suspected to be previously used by rabbit, found within Drumkinnon Wood and described in TN3.

(d) Mammal hole suspected to be used by rabbit, found in the east of the Site and described in TN6.

7 Red Squirrel

Methodology

Pre-existing data records

7.1 Pre-existing biological data records were sourced from GMRC, for the Study Area and a 2 km buffer. A large number of records were subsequently supplied, and were reduced to those dated within the last 10 years.

7.2 Saving Scotland's Red Squirrels (SSRS) maintain a database of sightings of both grey and red squirrels. This was searched for records within the Study Area and 2 km buffer dated within the last 10 years.

7.3 Pre-existing survey data from ecology surveys completed by Envirocentre[23] in 2017 were also reviewed.

Initial walkover – July 2021

7.4 On 07 July 2021, an initial survey of woodland within the study area was undertaken, to search for signs of red squirrel. Trees were inspected from ground-level, using binoculars if necessary, for squirrel dreys. Feeding signs were also recorded, namely the remains of pine cones, acorns or hazelnuts with the characteristic marks of having been eaten by squirrels.

Walked transects – January/February 2022

7.5 Walked transects were undertaken over a series of mornings, as shown in **Table 7.1**, as close to first light as possible, to locate active squirrels. These were in line with guidance from NatureScot[24] and were undertaken in the winter months when foliage cover was at its lowest. Line transects were undertaken throughout all areas of woodland cover across the Site.

Table 7.1: Summary of squirrel transect survey details.

Date	Sunrise	Start time	Weather[25]
11 January 2022	08:41	08:25	Rain: 0; Cloud cover: 2; Wind speed: 1; Temp: 5 °C
20 January 2022	08:31	08:15	Rain: 0; Cloud cover: 1; Wind speed: 1; Temp: 2 °C
02 February 2022	08:12	08:00	Rain: 0; Cloud cover: 8; Wind speed: 2; Temp: 8 °C

[23] **Envirocentre (2018**) West Riverside, Balloch – Protected Species Survey. Unpublished contract report for TSL Contractors Limited. February 2018.

[24] https://www.nature.scot/doc/standing-advice-planning-consultations-red-squirrels accessed November 2021.

[25] Key to weather conditions summary: Rain = 0-4 (0 = dry); Cloud cover = (in eighths); Wind speed = 0 (calm) to 12 (hurricane); Temp = Temperature (°C)

Camera trap monitoring of feeder stations – January/February 2022

7.6 Squirrel feeder boxes and camera traps were initially placed at four locations, two within Drumkinnon Wood and two within the Woodbank woodland, as shown in **Figure 7.1**:

- Location 1 within the central area of Drumkinnon Wood;
- Location 2 in the south-western corner of Drumkinnon Wood;
- Location 3 in the southern end of the Woodbank woodland;
- Location 4 in the northern end of the Woodbank woodland.

7.7 After ten days of deployment, the squirrel feeders were checked and refilled if necessary. During this visit the camera trap videos were reviewed, and it was revealed that the feeder box at Location 2 had been emptied soon after the initial deployment. When combining this activity with other sightings during transect surveys, it was determined that grey squirrels were highly active in this part of the Site, and this feeder was moved to a fifth location (Location 5) after cleaning and disinfecting. The feeder boxes at Locations 1, 3 and 4 were in place for 22 days between 11 January 2022 and 02 February 2022. Location 2 was in place for 10 days and Location 5 was deployed for 12 days but the camera trap failed here after only one day of deployment (see below). All feeder stations were disinfected before deployment and prior to being refilled.

7.8 Camera traps were deployed alongside the feeders on adjacent trees facing the feeder boxes. These were also checked after 10 days to replace the batteries if necessary and download the files recorded in the first half of the deployment.

Survey limitations

7.9 Squirrel dreys are difficult to find in dense tree cover. The initial walkover in July was undertaken when trees were coming into full foliage, and a considerable number of trees were covered in dense ivy. Some trees therefore could not be inspected fully and the timing of this initial survey was thus not optimal. However, further surveys were undertaken in the winter months allowing for a more complete inspection for dreys, and to confirm observations made earlier in the year.

7.10 Feeder station monitoring should ideally be carried out at the end of winter/beginning of spring when food resources are at their lowest, increasing the likelihood that squirrels will visit the feeding stations. However, due to the time constraints of the commission this was not possible, and deployment of cameras was instead undertaken in the middle of winter. The timing of the survey was therefore not optimal, given that squirrels in the area were likely still to have some food stores available. However, in areas where squirrels were recorded, they were found to be using the feeders regularly. Therefore, this sub-optimal survey timing was not considered to be a significant limitation.

7.11 The dreys and feeding signs of red and grey squirrels are very similar and cannot be distinguished visually. The walked transects and monitoring of feeding stations was undertaken to establish presence/absence of red squirrels with as much certainty as possible, in order to address this limitation.

7.12 When the camera trap was deployed at Location 5, it was displaying 50 % battery remaining and therefore new batteries were inserted. However, for reasons that are not clear, the camera failed after only a single day of deployment. The feeder station at this location was

empty on retrieval and but there no images for what species of squirrel had emptied the feeder. This did present some limitations to the interpretation of results for Location 5, and this is discussed in more detail below.

Results

Pre-existing data records

7.13 One record of red squirrel was supplied by GMRC, dating from 2019 and located from behind the National Park Centre, 500 m south-east of the Site.

7.14 SSRS database had no confirmed red squirrel sightings within any parts of the Site. However, the database contained a large number of sightings of red squirrel within the wider area, most notably consistently directly across the River Leven from the Site, within Balloch Country Park. Red squirrel have also been consistently recorded in recent years within woodland along Stoneymollan Road, 200 m to the south-west of the Site and across the A82. The closest record to the Site was a recent red squirrel sighting submitted in July 2021, 150 m south of the Woodbank section of the Site. A second sighting within close proximity to the Site was submitted in 2015 directly south of the Site at Balloch train station. Both of these records appeared to be outliers in terms of the general trend of recorded red squirrel sightings in the area.

7.15 There were many records of grey squirrel sightings within the SSRS database for both Drumkinnon Wood and the Boathouse area of the Site, the most recent of which was February 2021.

Field survey

Initial walkover – July 2021

7.16 All areas of woodland in the Site predominantly comprised broad-leaved trees, but within Drumkinnon Wood and the Woodbank woodland there were scattered patches of conifer species which provided a better food source for red squirrel. Woodland areas throughout the Site were generally fragmented as a result of existing development and infrastructure, but the Woodbank woodland in the west of the Site had better connectivity to the wider landscape.

7.17 No red squirrels were seen during the initial walkover, but grey squirrels were seen on two occasions within the Woodbank woodland. The location of these are shown in **Figure 7.1**.

7.18 Dense foliage and ivy growth obscured inspection of many tree canopies at the time of the initial walkover. It was considered likely that further dreys would be present which were not visible from ground level.

Walked transects – January/February 2022

7.19 **On 11 January 2022,there was a sighting of a pair of red squirrel during the walked transects.** Two red squirrels were observed moving through a strip of larch trees in a narrow woodland area between Old Luss Road and the Loch Lomond Shores car park. The squirrels were seen grooming and feeding within the trees before moving north. No other sightings of red squirrel were recorded on any subsequent transects.

7.20 A total of eight grey squirrel sightings were recorded across the three transects, two during the first transect, three during the second transect and three during the third transect. Sightings were concentrated around the northern end of the Woodbank woodland and in the east of the Site within the southern end of Drumkinnon Wood and adjacent strip of woodland to the east of Pier Road. A single sighting of a grey squirrel was made on the last transect in the woodland south of the Ben Lomond Way roundabout, close to the only drey recorded in this area. This sighting is important in the context of the camera failure at this location (see earlier).

7.21 Dreys were noted throughout the Site, with the highest number within the Woodbank woodland (see **Figure 7.1**). No dreys were found in close proximity to the Boathouse area of the Site, but a network of dreys were visible further west within the woodland containing the aerial adventure ropes course.

Camera trap monitoring of feeder stations – January/February 2022

7.22 Full results of the feeding stations monitoring can be found in **Appendix D**.

7.23 **No red squirrels were recorded visiting any of the feeder stations**.

7.24 Grey squirrel activity varied across the feeder locations. At Location 1, no squirrel activity was recorded during the entire deployment period. Location 2 had high grey squirrel activity immediately on deployment, with at least two grey squirrels repeatedly collecting food and emptying the feeder within a few days of deployment. Location 3 saw low levels of grey squirrel activity up until 22 January 2022 when grey squirrels were then recorded repeatedly visiting the feeder until it was empty. Location 4 had sporadic clips of grey squirrel, with a more concentrated period between 26-28 January 2022 when a grey squirrel repeatedly visited the feeder. Location 5 suffered a camera failure but the feeder was empty when it was retrieved on 02 February 2022.

7.25 Other species recorded on the cameras included roe deer at Location 3, and a variety of bird species across all locations including blue tit, coal tit, great tit, chaffinch, robin, blackbird, nuthatch and great spotted woodpecker.

Discussion

Relevant legislation

7.26 Red squirrel is protected by the Wildlife and Countryside Act 1981 (as amended) and the Nature Conservation (Scotland) Act 2004, against intentional or reckless killing, injury or taking (capturing), damaging, destroying or obstructing access to any structure or place which a red squirrel uses for shelter or protection, or disturbance while it is occupying a structure or place which it uses for that purpose. In 2011, both of these Acts were amended by the Wildlife and Natural Environment (Scotland) Act 2011 (known as the WANE Act). NatureScot can therefore license disturbance of red squirrel (including removal of dreys) for over-riding reasons of social, economic and environmental reasons provided there is no satisfactory alternative. The distance at which disturbance to a red squirrel drey may occur is variable, depending on the activity and whether or not breeding is suspected.

7.27 The red squirrel population is in decline in the UK and has been replaced over most of England, Wales and central and south-east Scotland by the non-native grey squirrel. Red squirrel is primarily a conifer specialist and population densities are highest in stands containing conifer tree species of a variety of ages and with reliable cone crops.

Red squirrel at Lomond Banks

7.28 When combining the various findings from surveys undertaken, grey squirrel were found to be abundant and frequent within the Woodbank woodland and the southern end of Drumkinnon Wood. The sightings of grey squirrels were also close by to the dreys recorded in the woodland south of the Ben Lomond Way roundabout and the Riverside area of the Site. A notable lack of grey squirrel activity was recorded in the centre of Drumkinnon Wood, both during the transects and at the feeder station deployed there.

7.29 A single sighting of two red squirrels within a narrow woodland strip along Old Luss Road was notable given that there were no previous records of red squirrels within any parts of the Site. There were no dreys in the immediate area surrounding the location of the red squirrel sighting, but a single drey was located in the southern end of the woodland block south of the Ben Lomond Way roundabout. Unfortunately, the Location 5 feeder station camera failed, but a grey squirrel was observed in a tree close to this drey during the walked transects. Other dreys recorded were in areas where higher levels of grey squirrel activity were recorded, either during the transects or on the camera traps, with the exception of the centre of Drumkinnon Wood where there was seemingly no squirrel activity.

7.30 It was considered likely that the majority, if not all, of the dreys within the Site were being used by grey squirrels rather than by reds, and that the red squirrels sighted were vagrant reds occasionally moving in from areas to the north for feeding within the larch trees along this section of woodland. The absence of red squirrel from the feeder stations further supports this. The section of woodland where the sighting took place was relatively isolated and fragmented, and only included a single drey to the south, but there was connectivity with woodland cover to the north. Nevertheless, it is not possible to confirm conclusively that all dreys within the Site were being used by grey squirrels, and therefore in line with NatureScot guidance, in areas where both red and grey squirrels have been recorded all dreys should be treated as if they are protected, unless it can be demonstrated beyond reasonable doubt that the drey is only being used by grey squirrels.

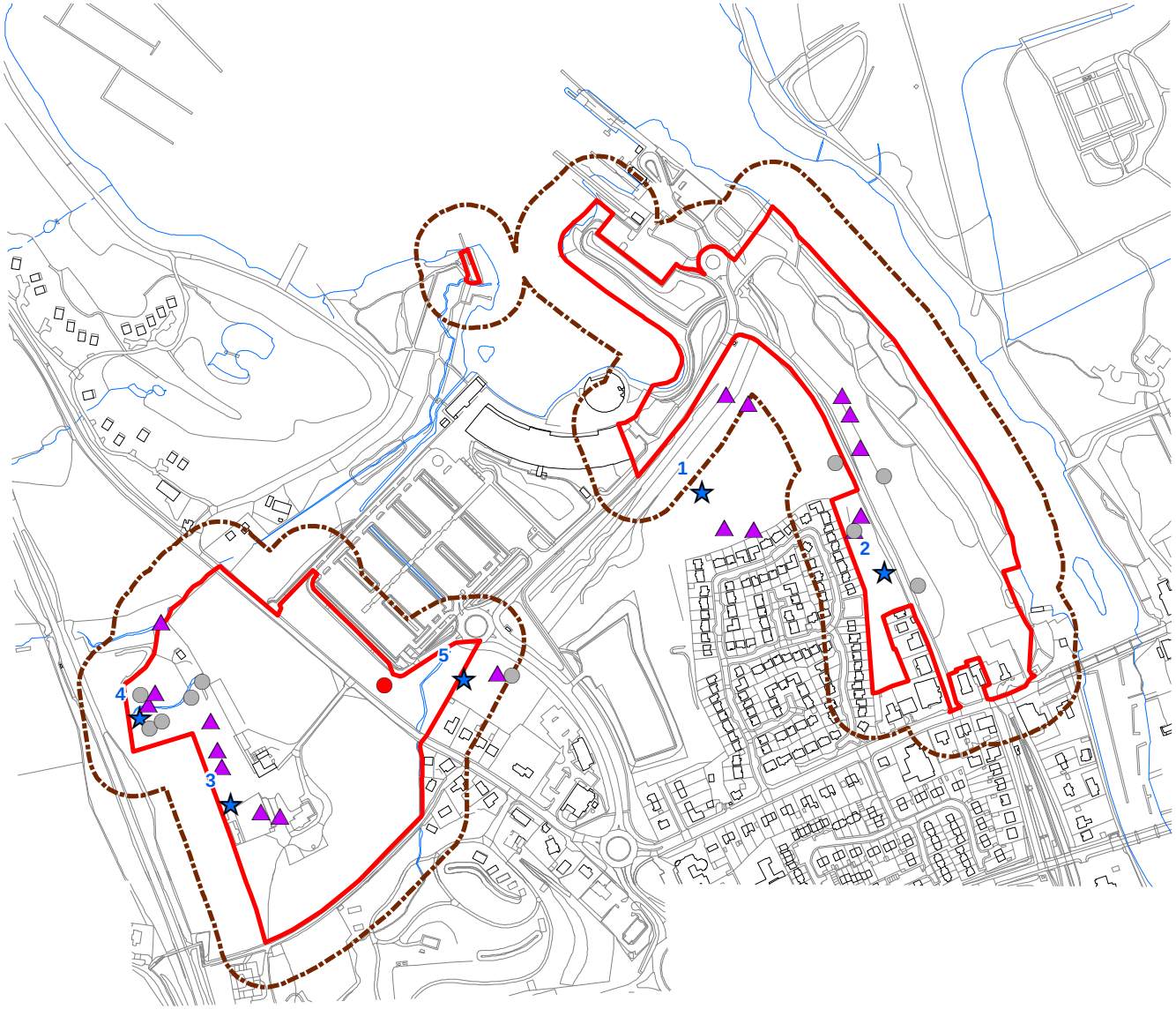
7.31 In the Riverside section of the Site and the southern end of Drumkinnon Wood, grey squirrels were consistently observed in areas close to dreys. In the context of the surrounding habitat, it was presumed that this part of the Site did not support red squirrel.

7.32 The woodland block south of the Ben Lomond Way roundabout only contained a single drey, where a grey squirrel was observed in close proximity during the walked transects. However, this drey was within the same woodland strip as the red squirrel sighting. Grey squirrels were frequently recorded within the Woodbank woodland, both during transects and at feeder stations. There was a substantial network of dreys within this woodland and habitat here was better connected to the wider area, including being in relatively close proximity to the red squirrel sighting.

7.33 Red squirrel is a highly mobile species, and can move into areas within a short timeframe. Red squirrel should therefore be considered a **Council** level IEF in the EcIA, and the following measures will be required:

- in line with NatureScot guidance, for all development proposals where red squirrels are a consideration, pre-construction surveys for dreys in the woodland south of the Ben Lomond Way roundabout and Woodbank areas of the Site should be completed no earlier than 3 months before the start of works. At this time, no such surveys are considered to be required for Riverside and Drumkinnon Wood (see above);
- also in line with NatureScot guidance, if impacts on potential red squirrel dreys are unavoidable, dedicated surveys will be required for these features. This should include any dreys within 50 m of works within the woodland south of the Ben Lomond Way roundabout and the Woodbank woodland. This will involve watches on each drey over three mornings at dawn, either using surveyors or through the licensed use of camera traps. This should be completed during the breeding season (February-September);
- if pre-construction surveys determine that red squirrels are occupying any dreys within the Site, then all dreys within 50 m of the works would potentially represent licensable features. Works within this 50 m disturbance zone should be avoided during the squirrel breeding season, in line with NatureScot guidance, reduced to 5 m outwith the breeding season. Removal of a red squirrel drey could only occur under licence from NatureScot.

7.34 The red squirrel sighting made in 2022 should be submitted to the SSRS database.



Lomond Banks

Red Squirrel Survey Results

Site boundary

50 m from Site boundary

Feeder station

Transect results:

Red squirrel sighting

Grey squirrel sighting

Drey

Figure 7.1

Map Scale @ A4: 1:7,500

Surveyed by: DS	
Survey date: January - February 2022	
Drawn by: DS	
Checked by: RAH	
Status: Final	

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AELSC0501_016-04_TAfig7-1redsquirrel_20221114 A4 24/11/2022

Figure 7.2: Selection of photographs from the red squirrel survey.

(a) Grey squirrel recorded at Location 2 feeder station.

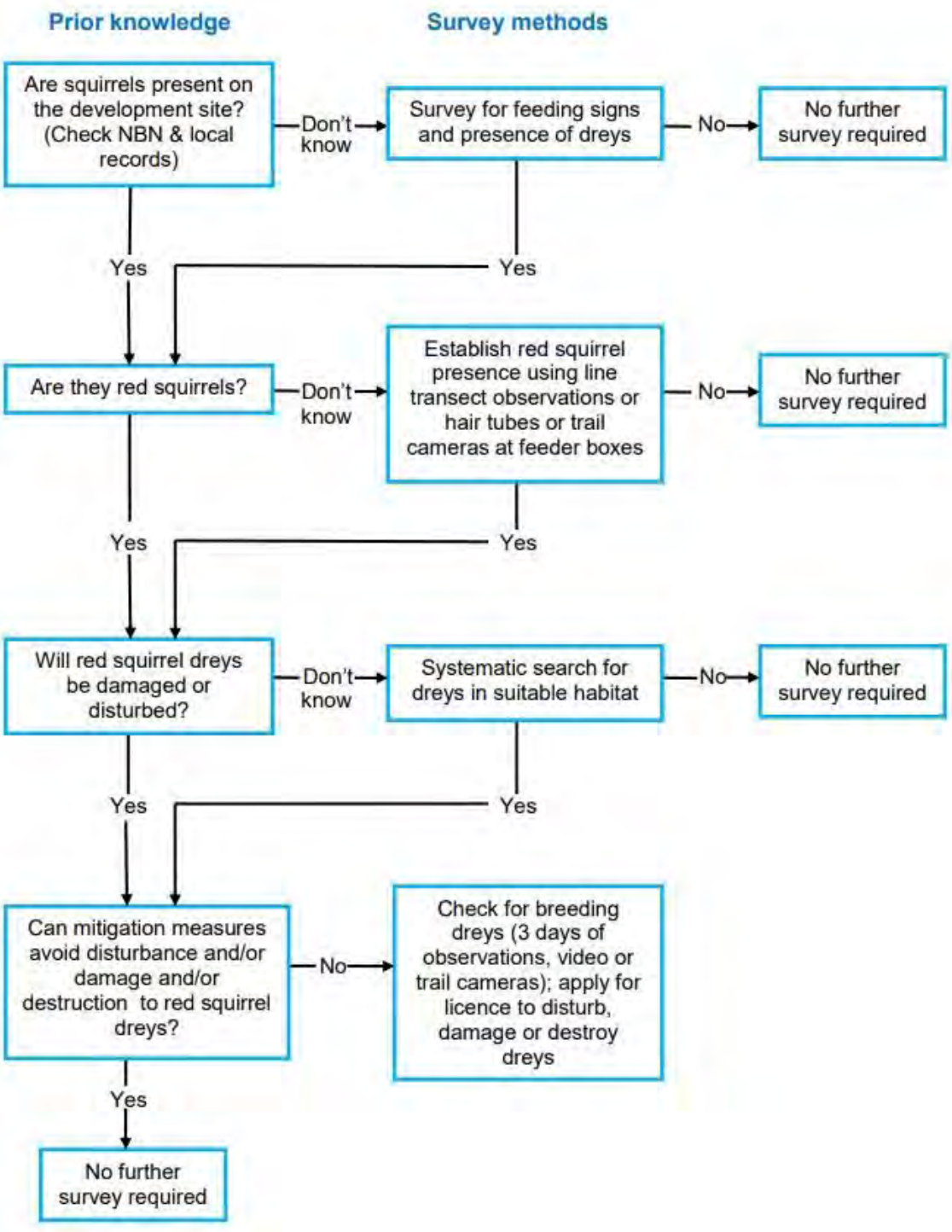
(b) Two grey squirrels recorded at Location 3 feeder station (one on the feeder and one at ground level).

(c) Grey squirrel recorded at Location 4 feeder.

(d) Red squirrel sighting during walked transect.

(e) Grey squirrel sighting in tree during initial walkover in July 2021.

Figure 7.3: NatureScot flow diagram for red squirrel assessment.



8 Pine Marten

Methodology

Pre-existing data records

8.1 Pre-existing biological data records were sourced from GMRC, for the Study Area and a 2 km buffer. A large number of records were subsequently supplied, and were reduced to those dated within the last 10 years.

8.2 Pre-existing survey data from ecology surveys completed by Envirocentre[26] in 2017 were also reviewed.

Field survey

8.3 On 30 June 2021, 01 July 2021 and 22 July 2021, all areas within 250 m of the Site were searched for pine marten signs, primarily scats as a simple means of detecting pine marten presence. Particular attention was made to prominent rocks, tree stumps and other places where martens were likely to leave scats. In addition, potential den sites such as elevated tree cavities, large raptor nests, owl nest boxes, elevated rocky outcrops and large upturned root plates of fallen trees were searched for and recorded. All identified pine marten signs, both confirmed or potential, were noted and their locations were recorded using a hand-held GPS. Survey findings were subsequently digitised in GIS.

Survey limitations

8.4 Some of the woodland in the 250 m survey buffer for pine marten survey had areas of dense vegetation which impeded access. This included sections of woodland west of the A82 and areas of the Woodbank woodland within the Site which had sections of dense bamboo and rhododendron. However, these were only small sections of the overall Study Area and therefore any minor access limitations were not considered to be sufficient to affect the conclusions of the survey.

Results

Pre-existing data records

8.5 A single record for pine marten was contained within the results of the data search, namely a sighting dating from 2010 within Balloch Country Park, 600 m north of the Site on the opposite side of the River Leven. No signs of pine marten were identified during the surveys undertaken by Envirocentre in 2017.

[26] **Envirocentre (2018**) *West Riverside, Balloch – Protected Species Surveys*. Unpublished contract report for TSL Contractors Limited. February 2018.

Field survey

8.6 No signs of pine marten were found within the Site or Study Area. Additionally, no clips of pine marten were recorded on camera traps deployed in Drumkinnon Wood and the Woodbank woodland as part of red squirrel feeder box monitoring.

8.7 Drumkinnon Wood was considered to contain suitable foraging habitat for pine marten. However, this area of the Site was isolated and poorly connected to the wider area, as well as being heavily used by people and dog walkers, decreasing its suitability for the species. The woodland around Woodbank House contained a number of mature trees, but none had any obvious large cavities that could be used for pine marten denning. No scats were found within the woodland on features that pine marten would typically use to mark territories, such as large rocks or fallen trees. This section of woodland had limited connectivity with other areas of woodland to the north, but it bordered the busy A82 to the west.

8.8 Suitable pine marten foraging habitat was located within Balloch Country Park in the north-east of the Study Area with connectivity to more extensive woodland cover to the north. However, the area within the Study Area was again heavily used by visitors and dog walkers, and the River Leven presented a barrier for movement for pine marten from the eastern side of the river towards the Site. Extensive woodland cover in the south-west of the Study Area also provided opportunities for pine marten foraging and potential dens, where larger cavities may have been present in mature trees. This section of the Study Area was separated from the Site by the busy A82, which would potentially have acted as a barrier for pine marten regularly travelling east-west.

Discussion

Relevant legislation

8.9 Pine marten and its dens are protected by the Wildlife and Countryside Act 1981 (as amended) and by the Nature Conservation Act 2004. It is an offence to intentionally or recklessly:

- kill, injure or capture a pine marten;
- disturb a pine marten in a den;
- damage, destroy or obstruct access to a pine marten den[27].

8.10 NatureScot is responsible for issuing licences relating to pine marten for the purpose of development. For non-breeding dens, exclusion zones should be a minimum of 30 m; at least 100 m is necessary where dens are known or suspected of being used for breeding and works in the breeding season cannot be avoided (March-June inclusive). Where exclusion zones of the required size cannot be achieved, works will require a licence from NatureScot before they can proceed.

[27] The exception to this is when the den is in the roof space or other part of a house, where it is not an offence to discourage a pine marten from using the den, or to block access to the den, provided a pine marten is not in the den at the time the action is taken and does not have dependent young.

Pine marten at Lomond Banks

8.11 Although suitable habitat for pine marten was identified within the woodland in the west of the Site, no signs of the species were confirmed. Suitable habitat within the wider Study Area was also separated from the Site by the River Leven in the east and the A82 in the west, and located a considerable distance from the Site. Pine marten are shy creatures and not tolerant of disturbance. The level of disturbance caused by the volume of people and dogs that currently access the Site, combined with the isolated nature of the majority of woodland habitat in the Site, lack of signs found, and absence of any recent data records or road casualty data, means that pine marten are unlikely to be present within the Site.

8.12 For the purposes of the EcIA, pine marten is not considered to be an IEF needing to be included in the assessment. However, it is recommended that a watching brief for the occurrence of pine marten field signs is kept by the ECoW, who will advise regarding appropriate action should the species be found or suspected to be present during the works. General precautionary measures during construction will include:

- all trenches and excavations should be covered at the end of each working day, or will include ramps;
- stored pipes should be capped, to prevent entrapment of animals;
- if construction work is carried out during the hours of darkness, machinery and floodlights will be directed away from woodland edges.

9 Bats

Methodology

Pre-existing data records

9.1 Pre-existing information regarding the presence of bat roosts in the near vicinity of the Site was extracted from a range of data sources including:

- GMRC;
- Bat Conservation Trust (BCT): Colony Count Survey;
- mammal records from Britain from the Atlas of Mammals (1993), with some subsequent records;
- NatureScot: Bat Records for Scotland;
- National Waterway Survey;
- the BCT/MTUK Bats and Roadside Mammal Survey.

9.2 Pre-existing survey data from ecology surveys completed by Envirocentre[28] in 2017 were also reviewed.

Habitat assessment

9.3 A general appraisal of the landscape ecology value of the Site for foraging and commuting bats was made, based on the criteria provided in Collins (2016)[29] and Wray *et al*. (2010)[30].

Preliminary Roost Assessment of buildings

9.4 On 26 May 2021, a licensed bat ecologist carried out a PRA for the built structures at the Site. In accordance with current best practice survey guidance produced by the BCT (Collins, 2016 - see **Table 9.1**), the structures were carefully inspected externally for features which might typically provide access into their structures for roosting and/or hibernating bats. Binoculars were used (together with a high-powered Clulite torch where light conditions were poor or close access difficult) to inspect likely bat entry points such as lifted tiles, ill-fitting fascia boards, cladding and wall crevices. Well-used roosting bat entry/exit points can show signs of bat use, such as staining and scratch marks, as well as droppings below or adhering to nearby walls. Evidence of this kind was also searched for during the inspection.

9.5 Internal inspections were carried out where safe to do so, but were limited by the poor structural state of the ruined buildings.

[28] **Envirocentre (2018**) *West Riverside, Balloch – Bat Surveys*. Unpublished contract report for TSL Contractors Limited. February 2018.

[29] **Collins, J. (2016)** *Bat Surveys: Good Practice Guidelines, 3rd Edition*. Bat Conservation Trust.

[30] **Wray, S., Wells, D., Long, E. and Mitchell-Jones, A. (2010).** Valuing bats in Ecological Impact Assessment. *In Practice*, December 2010.

9.6 No formal PRA assessment was commissioned to be undertaken for the existing visitor information centre in the far south-east of the Site.

Table 9.1: Categories of habitat suitability for bats (after Collins, 2016).

Suitability	Description of roosting habitats	Description of commuting and foraging habitats
Negligible	Negligible roosting features likely to be used by roosting bats.	Negligible habitat features likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis by larger numbers of bats (i.e., unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain potential roost features, but with none seen from the ground, or the features seen have only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but is isolated i.e., not well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats, due to its size, shelter, protection, conditions and surrounding habitat, but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting, such as lines of trees and scrub, or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging, such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost site(s) that is/are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to its/their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape which is likely to be used regularly by commuting bats, such as river valleys, streams, hedgerows, lines of trees and woodland edges. High-quality habitat that is well-connected to the wider landscape and which is likely to be used regularly by foraging bats, such as broad-leaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Limitations of the buildings PRA

9.7 The inspection of buildings for evidence of bats can be conducted at any time of the year. However, the chances of finding evidence of bats (e.g., their droppings) on external 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 any evidence of bat presence may have been washed away. It is important to note that visible signs are not always obvious at a roost site, even when bats are present. The survey described here was undertaken within the main bat active period and after a prolonged period of dry weather. The conditions were therefore optimal for the physical identification of bat presence.

9.8 A PRA would also usually require a survey to be undertaken internally as well as externally. However, the three structures inspected were all in an advanced state of ruin and comprised areas of collapsed and unstable stonework. Internal surveys were carried out throughout all the safely accessible areas, inspecting crevices for roosting bats or signs of bat use. The height of the stone/brick walls and unsafe access also prohibited a full inspection of all possible crevices but a general assessment of bat roost suitability (BRS) was possible based on the features visible from ground level.

9.9 As physical signs of bat occupancy can be absent even during the bat active period, if potentially suitable roost features were present, this would have formed the basis of the evaluation regardless of the presence or absence of confirmatory physical evidence of bats. Therefore, the minimal access restrictions were not considered to be a significant limitation to the study as recommendations regarding bat activity survey are not dependent on the need for conclusive physical evidence of bats, although both may result in caveats to the survey findings.

Preliminary roost assessment of trees

9.10 On 19, 25 and 26 January 2022, trees within the Site that had been identified as being potentially impacted by the Proposed Development were assessed for their BRS, in accordance with the protocol for visual inspection of trees due to be affected by arboricultural work (Collins, 2016) (see **Table 9.1**). Trees within the Woodbank woodland, the woodland south of the Ben Lomond Way roundabout, the southern end of Drumkinnon Wood and along the Riverside were the focus of the assessment, as these areas contained trees that were likely to be impacted by direct removal or disturbance as a result of the Proposed Development.

9.11 The trees were inspected from ground-level, using binoculars if necessary, for features considered to be suitable for bats, including cracked or flaking bark, split limbs or trunks, ivy cladding, knot holes, woodpecker holes and bird/bat boxes. A high-powered torch and an endoscope were also used to aid the survey where appropriate. Consideration was also made of the habitat context of a tree - its connectivity with and/or proximity to suitable bat commuting or foraging habitat, and accessibility for a flying bat.

Limitations of the PRA of trees

9.12 The inspection of trees for their suitability for bats can be conducted at any time of year, according to the best practice survey guidance produced by the BCT. However, finding evidence of bats (e.g. their droppings) on surfaces that are unprotected from rainfall may be restricted if undertaken outside the main bat active season (May to September) and/or after periods of wet weather. During the latter, evidence of bat presence may have been washed away. This survey was undertaken after a period of mixed colder weather and out with the main bat active season. However, the winter months often allow a clearer view of potential roost features (PRFs) due to the lack of vegetation cover, particularly within the types of woodland habitat surveyed at the Site.

9.13 Evidence of roosting bats in trees, such as droppings and staining, is often entirely absent, even when roosting bats are present. This, combined with the transitional nature of use of tree roosts by many species of bat, means that while survey work may confirm roost presence, it is unlikely to confirm conclusively absence.

9.14 The absence of leaves on the trees at the time of survey increased the visibility of PRFs. However, many of the trees were sufficiently large (25-30 m in height) that some features still may not have been visible from the ground. Similarly, PRFs on a number of the larger mature trees may have been obscured by ivy growth. In these cases, further aerial survey and/or precautionary methods of felling would normally be required, and therefore were not considered to be a limitation to the results of the survey.

9.15 Only the trees in the Woodbank area had been formally tagged as part of an arboricultural survey. This meant that the majority of trees in other areas had no tree tags to reference within this report. Trees within the Woodbank woodland contained tags with numbers over 1000 but these trees were not included within the arboricultural report appendix tables. Similarly, during the PRA some discrepancies were noted between the tree tag in the field and the descriptions within the appendices of the arboricultural report, such as the species and size of the tree identified.

Activity surveys of buildings

9.16 The emergence/return watch survey methods followed best practice guidance (Collins, 2016[31]). Surveys were carried out across a number of nights between July-September 2021, encompassing the peak maternity period and late summer/early autumn transitional phase, as summarised in **Table 9.2**. Due to the initial PRA rating of moderate suitability for Building A and B (see Results, below), two surveys were originally proposed here, but these were followed by a third survey for both these buildings due to bat roost locations being recorded during the first two surveys. Building C had an initial PRA rating of low suitability, and therefore only one activity survey was completed at this location. Five surveyor positions were used for Building A, five for Building B and two for Building C, as shown in **Figures 9.6** and **9.7**. Due to the complex facades of Building A and B, comprising collapsed internal areas that had exposed multiple potential roosting features, certain positions were placed within the internal footprint of both buildings to allow better vantage points of possible roosts within the internal façade.

9.17 For each dusk watch, surveyors were in position at least 30 mins before sunset and continued surveying until c. 90 mins after sunset. For the dawn surveys, surveyors were in position at least 1.5 hrs before sunrise and continued to survey until dawn or until no further bat activity was detected. The surveys were undertaken using handheld frequency division Pettersson D230 detectors paired with a Anabat Swift or SM2 static detector. The Anabat and SM2 recordings were made onto a memory card and later analysed to confirm species identification. All surveys were undertaken in relatively dry, calm weather conditions with temperatures at or greater than 7 ^{o}C.

9.18 Radio contact between surveyors was maintained throughout the surveys, to assist with determining whether bats had flown over/through the buildings being watched or emerged from the building itself. An infrared camera with additional infrared lights was also used at Buildings A and C in order to give more complete coverage of difficult viewsheds and to provide better visibility in the poor light levels.

[31] **Collins, J. (2016)** *Bat Surveys: Good Practice Guidelines, 3rd Edition*. Bat Conservation Trust.

Table 9.2: Summary of survey details.

Date	Building	Survey type	Sunset/ sunrise	Start/ finish times	Weather at start[32]	Weather at finish
01 July 2021	C	Dusk emergence	22:08	21:38/23:38	Rain: 0 Cloud cover: 7 Wind speed: 1 Temp: 19 °C	Rain: 0 Cloud cover: 8 Wind speed: 1 Temp: 17 °C
13 July 2021	B	Dusk emergence	21:57	21:30/23:26	Rain: 0 Cloud cover: 3 Wind speed: 1 Temp: 16 °C	Rain: 0 Cloud cover: 3 Wind speed: 0 Temp: 14 °C
14 July 2021	A	Dusk emergence	21:56	21:26/23:26	Rain: 1 Cloud cover: 8 Wind speed: 1 Temp: 17 °C	Rain: 0 Cloud cover: 8 Wind speed: 1 Temp: 15 °C
30 July 2021	A	Dawn return	05:18	03:18/05:25	Rain: 0 Cloud cover: 3 Wind speed: 1 Temp: 14 °C	Rain: 0 Cloud cover: 7 Wind speed: 1 Temp: 13 °C
03 August 2021	B	Dawn return	05:26	03:56/05:26	Rain: 0 Cloud cover: 1 Wind speed: 1 Temp: 12 °C	Rain: 0 Cloud cover: 8 Wind speed: 0 Temp: 10 °C
27 August 2021	B	Dusk emergence	20:25	19:55/22:00	Rain: 0 Cloud cover: 0 Wind speed: 0 Temp: 17 °C	Rain: 0 Cloud cover: 0 Wind speed: 1 Temp: 13 °C
15 September 2021	A	Dusk emergence	19:37	19:07/21:07	Rain: 0 Cloud cover: 8 Wind speed: 0 Temp: 16 °C	Rain: 0 Cloud cover: 8 Wind speed: 1 Temp: 15 °C

Limitations of the building activity surveys

9.19 Light drizzle occurred throughout the dusk survey on 14 July 2021 at Building A. However, this did not progress to heavier rain and bats were recorded throughout the survey, including emerging from roosts, and therefore this was not considered to be a significant limitation.

9.20 The buildings were located within woodland and therefore light levels dropped quickly during the dusk surveys, and remained darker closer to dawn. This meant that some bats were heard on detectors but were not visible. The general direction these bats had come from could be determined via radio communication between surveyors. These passes were generally later (dusk survey visits) or earlier (dawn survey visits) in the survey sessions,

[32] Key to weather conditions summary: Rain = 0-4 (0 = dry); Cloud cover = (in eighths); Wind speed = - 0 (calm) – 12 (hurricane); Temp = Temperature (°C)

outwith the peak times of emergence or return for pipistrelle bats. Passes by *Myotis* spp. and brown long-eared (BLE) bats were harder to confirm visually.

9.21 Small bat roosts with one or two non-breeding bats can often be difficult to identify precisely at any time of the year, because bats utilise roosts on a transient basis. Unless bats are conclusively seen "dropping" from a roost location, caution should be exercised in the interpretation of the perceived distribution of the roosts recorded. If or where this limitation has implications for the Proposed Development, this is discussed below.

9.22 Caution is also required when interpreting bat calls recorded by static bat detectors. Each recorded call represents a pass of a bat within the range of the microphone. These data do not provide information about the actual number of bats present (a high number of passes could be a single bat repeatedly passing the microphone).

9.23 It is not always possible to identify bat calls to species level, and the analysis of bat detector calls can be prone to some subjectivity. However, it was undertaken here by experienced analysts, following appropriate guidance and in consultation with other experts where necessary. It is often difficult to identify some *Pipistrellus*, *Myotis* and *Nyctalus* bats to species level. With regard to pipistrelles, where recordings peaked at 50 kHz, intermediate between common pipistrelle (45 kHz) and soprano pipistrelle (55 kHz), these passes were simply classified as "pipistrelle species".

Hibernation surveys

9.24 The PRA identified bat hibernation suitability within Buildings A and B, mostly associated with voids in window lintels and numerous deep stone crevices in both external and internal walls.

9.25 On 20 January 2022 and 04 February 2022, hibernacula inspections of the accessible areas of the buildings were carried out by an appropriately licensed bat worker, including features that had previously been identified as having potential to support hibernating bats. Full details of the survey visits are included in **Table 9.3** below. In accordance with current best practice survey guidance produced by the BCT (Collins, 2016), all safely accessible features which might typically provide suitable shelter for hibernating bats were checked systematically and carefully with the use of torch light, using an endoscope where the end of any crevices could be not be seen fully. Evidence of bat use, such as staining and scratch marks, as well as droppings below or adhering to nearby stonework was also searched for during the inspection.

9.26 Three static SM4+BAT detectors were also placed within areas of Building A and B between 14 December 2021 and 19 January 2022, in order to monitor any activity of bats which may have temporarily come out of hibernation to feed or drink on milder nights. Two detectors were used at Building A (Location 2 in the western sections, and Location 3 in eastern sections of the internal façade), and one detector was placed in the centre of Building B (Location 1).

9.27 A temperature and humidity logger was also placed within a deep stone crevice in Building A during the SM4 deployment. A ground level location for this was first checked to ensure it did not contain any hibernating bats, and selected so as to collect data regarding the typical conditions found in the many inaccessible but similar features on the building.

The temperature logger was placed within a deep stone crevice on the internal wall at the north side of Building A. Temperature and humidity readings were saved every six hours.

Table 9.3: Summary of hibernation survey details.

Date	Start/ finish times	Temperature on day before survey	Temperature on day of survey
20 January 2022	13:30/16:30	Day temp: 8 °C Night temp: 0 °C	Day temp: 5 °C Night temp: 3 °C
04 February 2022	09:30/13:30	Day temp: 2 °C Night temp: 1 °C	Day temp: 9 °C Night temp: 2 °C

Limitations of hibernation surveys

9.28 As described above, Buildings A and B were in a state of ruin and this meant that not all potential hibernation locations could be inspected due to health and safety concerns. Only a small number of features were accessible at lower levels on Building A, with the majority of the stone crevices on the external and internal walls at height or within collapsed sections of the building.

9.29 The winter period between December 2021 and early February 2022 was mild with very few periods of frost or wintery weather. Hibernation inspections are usually timed for periods of particularly cold weather but the only notable period of hard frost that occurred during the Christmas break was in late December. Planned submission dates meant that surveys could not be delayed until potentially colder weather later in February, and therefore, it was not possible to carry out hibernation inspections in optimum weather conditions. Due to the access limitations described above, and the need to consider hibernation suitability in the absence of physically finding hibernating bats, the milder conditions throughout the winter were not however judged to be a significant limitation to the overall conclusions of the survey.

9.30 Bat calls detected on the SM4 detectors could not be conclusively attributed to bats hibernating within the buildings, due to the likelihood of bats also being recorded around the exterior of the buildings on milder nights. The placement of the SM4 units for over a month aimed to collect enough recording data to estimate the likelihood of hibernation, when evaluated in the context of the clarity of the call, time and weather conditions at the time of recording.

9.31 For an unknown reason, all three static detectors recorded a large volume of noise files. At Location 2 this resulted in the 32 GB memory card becoming full by 06 January 2022 and the static not recording past this date. However, only a small number of bat calls were recorded here during the recording period and the absence of data beyond this date was not deemed to be a limitation. Location 1 recorded until 12 January 2022 before the batteries ran out (assumed to be due to the colder weather), and Location 3 recorded until 17 January 2022.

Walked transects

9.32 A manual transect route was walked on seven occasions between May and October 2021, as shown in **Figure 9.9** and summarised in **Table 9.4** below. This included a dusk transect in May, June, August, September and October, and a back to back dusk and dawn transect in July. Current guidance for high habitat suitability advises on two transect visits per month but it was judged that one visit per month would be appropriate for transects, with emphasis placed instead on a higher density of static detectors than that advised in current guidance. Transect surveys provide a narrow snapshot of how bats use a Site, and therefore a single transect a month allowed for an evaluation of how bats were using the habitats, when paired with the larger volume of data recorded by the static detectors.

Table 9.4: Summary of manual transects.

Date	Transect type	Sunset/ sunrise	Start/ finish times	Weather at start[33]	Weather at finish
25 May 2021	Dusk	21:42	21:42/00:11	Rain: 0 Cloud cover: 4 Wind speed: 1 Temp: 10 °C	Rain: 0 Cloud cover: 2 Wind speed: 1 Temp: 8 °C
14 June 2021	Dusk	22:06	22:12/00:50	Rain: 0 Cloud cover: 3 Wind speed: 2 Temp: 12 °C	Rain: 0 Cloud cover: 4 Wind speed: 1 Temp: 11 °C
15 July 2021	Dusk	21:55	22:09/00:35	Rain: 0 Cloud cover: 0 Wind speed: 1 Temp: 18 °C	Rain: 0 Cloud cover: 0 Wind speed: 1 Temp: 16 °C
16 July 2021	Dawn	04:54	02:19/04:29	Rain: 0 Cloud cover: 0 Wind speed: 1 Temp: 16 °C	Rain: 0 Cloud cover: 0 Wind speed: 1 Temp: 15 °C
10 August 2021	Dusk	21:08	21:13/23:26	Rain: 0 Cloud cover: 1 Wind speed: 1 Temp: 14 °C	Rain: 0 Cloud cover: 1 Wind speed: 1 Temp: 13 °C
02 September 2021	Dusk	20:11	20:09/22:23	Rain: 0 Cloud cover: 0 Wind speed: 1 Temp: 15 °C	Rain: 0 Cloud cover: 0 Wind speed: 1 Temp: 13 °C
05 October 2021	Dusk	18:45	18:56/21:07	Rain: 0 Cloud cover: 6 Wind speed: 3 Temp: 11 °C	Rain: 0 Cloud cover: 2 Wind speed: 4 Temp: 10 °C

[33] Key to weather conditions summary: Rain = 0-4 (0 = dry); Cloud cover = (in eighths); Wind speed = - 0 (calm) – 12 (hurricane); Temp = Temperature (°C)

9.33 The transect route was devised to ensure good overall coverage of the majority of the Site, and its component habitats, while following path networks to allow easy navigation through woodland habitats in the dark.

9.34 The Woodbank area in the west of the Site was not included within the transect route. This area was mainly open grassland fields with a block of dense woodland, and two static detector locations were judged to be sufficient, located along the woodland edge which was the most likely area of sustained bat foraging activity. Similarly, the transect did not include the small outlying Boathouse area of the Site and one static detector was placed here instead.

9.35 Each dusk transect commenced at sunset or shortly after, and was typically completed within 2.5 hrs. The dawn transect in July was started 2.5 hrs before sunrise and finished within 30 mins of sunrise. The route had thirteen stopping points where timed point counts were made. The route was walked slowly between point count locations, and surveyors were stationary at each stopping point for 5 mins. Bat passes at each stopping point were recorded, along with species and type of activity, where these parameters could be determined. Similar information was recorded for any bat calls detected *en route* between the point count locations. The starting point and direction of the transect was switched frequently, to gather data on activity levels across the Site at various times after sunset.

9.36 Experienced surveyors carried out the manual transects, using Petterson D-230 frequency division detectors in tandem with a continually recording static Anabat Swift detector, carried in a backpack with its microphone mounted externally.

Limitations of the transect surveys

9.37 During the dawn transect in July, anti-social behaviour within the adjacent southern section of Loch Lomond Shores car park meant that the decision was made to abandon a section of the transect at c. 03:00 am, for health and safety reasons. The transect, which was being walked in reverse, was curtailed between the southern edge of Drumkinnon Wood and point count 9 (also omitting Point count 8) and recommenced from point count 7. Ten minute point counts were undertaken at P6, P5 and P4 to compensate, and to ensure the transect was not finished too early.

9.38 It was not always possible to see all bats recorded during the manual transects due to low light levels and/or separation distances between the surveyors and the bats; Pettersson D230 detectors are highly sensitive and can detect bats at quite a distance. In these instances, bats were recorded as “heard not seen”.

Static monitoring

9.39 Full spectrum SM4+BAT static detectors were installed at eight locations through the Site, as shown in **Figure 9.9**. A summary of the locations used is provided in **Table 9.5**.

9.40 The detectors were installed for six nights each month for six months between May and October 2021 inclusive. They were programmed to record from 30 mins before sunset each night, until 30 mins after sunrise the following morning. A summary of the number of nights sampled is provided in **Table 9.6** below.

ECOBAT

9.41 Following the call analysis, the SM4 data were entered into ECOBAT[34]. ECOBAT is a UK-wide database and analysis platform which enables temporal and spatial comparisons of bat activity recorded by static detectors, relative to reference datasets already entered into the platform.

9.42 In terms of classifying bat activity according to median percentile scores, the 2019 SNH (now 'NatureScot') wind farm guidance[35] uses the definitions presented in **Table 9.7**. These bands of values for specific activity median percentiles were also used in the analyses.

Table 9.5: Static detector locations.

Static location	Grid reference	Habitat description
1	238159 681766	Eastern edge of southern section of the Woodbank woodland adjacent to ruins of Woodbank House. Detector had to be hidden within vegetation to prevent theft.
2	238083 681914	Eastern edge of northern section of the Woodbank woodland.
3	238404 682363	Boathouse area of the Site within existing woodland/scrub woodland close to the shore.
4	238576 682366	Within broad-leaved plantation woodland at the Pierhead area of the Site, close to existing Lomond Shores. Detector had to be hidden within vegetation to prevent theft.
5	238914 682180	Within southern section of woodland strip along the River Leven in the Riverside section of the Site. Detector had to be hidden within vegetation to prevent theft.
6	238691 682135	Within eastern section of Drumkinnon Wood.
7	238511 681989	Within western section of Drumkinnon Wood.
8	238752 682411	Within northern section of woodland strip along the River Leven in the Riverside section of the Site. Detector had to be hidden within vegetation to prevent theft.

Table 9.6: Static detector deployment periods.

Recording period	Detector locations								Total nights
	1	2	3	4	5	6	7	8	
19 May – 25 May 2021	6	6	6	6	6	6	6	6	48
17 June – 23 June 2021	6	6	6	6	6	6	6	6	48
15 July – 21 July 2021	6	6	6	6	6	6	6	6	48
17 August– 23 August 2021	6	6	6	6	6	6	6	6	48
16 September – 22 September 2021	6	6	6	6	6	6	6	6	48
14 October – 20 October 2021	6	6	6	6	6	6	6	6	48
Total nights	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**36**	**288**

[34] http://www.ecobat.org.uk/ Accessed November 2020.

[35] **SNH (2019)** *Bats and Onshore Wind Turbines: Survey Assessment and Mitigation*. SNH, January 2019.

Table 9.7: Percentile scores and categorised level of bat activity (after NatureScot, 2019).

Percentile	Bat activity rating
81 to 100	High
61 to 80	Moderate to high
41 to 60	Moderate
21 to 40	Low to moderate
0 to 20	Low

Limitations of the static detector surveys

9.43 None of the static detectors malfunctioned, and all eight units recorded for the full six nights across all months.

9.44 During surveys in 2017, Envirocentre reported theft of some static detectors during their deployment. The Site was widely used by the public and the risk of theft remained high in 2021. In order to try and prevent this from occurring, detectors at the locations at the highest risk of theft had to be placed within vegetation to reduce the risk of the unit being visible (notably Locations 1, 4, 5 and 8). The microphone was extended up from ground level and attached up to 2 m above ground level on a tree to get the best recording position. However, the location of detectors within dense vegetation cover resulted in 'noisier' calls on analysis and this was likely to have reduced the distance at which the microphones recorded. Location 1 was particularly at risk given the anti-social behaviour and vandalism that was visible around Woodbank House. The hidden placement and cluttered vegetation at Location 1 was likely the reason for what appeared to be an anomaly of a low number of calls recorded here compared with that observed during the bat activity surveys at the buildings in this location. This potential limitation is discussed in more detail in the Results section of this chapter.

9.45 Overall, the potential limitations outlined above did not significantly impact the ability of detectors to record bat passes, with close to 75,000 passes recorded across all locations during the sampling periods. Furthermore, the combination of static deployments, manual transects and bat activity surveys of buildings allowed for detailed overview of how bats were using the Site, and any limitations outlined above were not considered to have impacted the conclusions drawn relating to bat activity at the Site.

9.46 Static detector surveys such as those reported here tend to provide just a snapshot view of bat activity in one place and over a relatively short period of time. Poor weather (rain, wind and/or low temperatures) can influence bat activity, and if sampling period(s) overlap with poor conditions, this can potentially skew the results. However, the 2016 BCT methodology for this sampling protocol aims to overcome some of these limitations through the use of a minimum number of survey nights, to increase the probability that a typical range of weather conditions will be encountered, and this protocol was followed in this study. Additionally, the use of ECOBAT to compare the results with other datasets allowed a qualitative and quantitative evaluation of their representativeness.

9.47 Caution is required when interpreting bat calls recorded by static bat detectors. Each recorded call represents a pass of a bat within the range of the microphone. These data do

not provide information about the actual number of bats present (a high number of passes could be a single bat repeatedly passing the microphone).

9.48 Additionally, it is not always possible to identify bat calls to species level, and the analysis of bat detector calls can be prone to some subjectivity. However, it was undertaken here by experienced analysts, following appropriate guidance and in consultation with other experts where necessary. It is often difficult to identify some *Pipistrellus*, *Myotis* and *Nyctalus* bats to species level. With regard to pipistrelles, where recordings peaked at 50 kHz, intermediate between common pipistrelle (45 kHz) and soprano pipistrelle (55 kHz), these passes were simply classified as "pipistrelle sp.". Where only the social call segment of a pipistrelle pass was recorded, these were also classified as "pipistrelle sp.".

9.49 Brown long-eared (BLE) are a quiet calling species and therefore it was considered likely that the activity for this species was higher than that recorded during the static monitoring.

Results

Pre-existing data records

9.50 Two records of bats were found within 2 km of the Site, both of which were NatureScot soprano pipistrelle roost records. Both were also for grid square NS3981, with one roost in a domestic dwelling with 87 bats recorded in 2014, and a second domestic dwelling roost with 80 bats recorded in 2015. The absence of any other records within closer proximity to the Site does not mean that bats are absent, being more likely a result of recording effort.

9.51 Buildings A and B were rated as having low bat roost suitability in 2017 by Envirocentre. A single activity survey was completed at each building at the end of August 2017 with no roosts found. In 2017, no activity survey was completed at Building C, and a selective endoscope inspection at this building did not confirm any roosting bats.

Habitat assessment

Roosting

9.52 Ancient woodland within the Site, both in Drumkinnon Wood and the Woodbank woodland, provided a network of trees that offered numerous roosting opportunities for bats. Roosting suitability of trees was formally identified as part of a PRA assessment at the Site, and the results of this are described in more detail below. The derelict structures associated with Woodbank House also displayed bat roost suitability and were the subject of dedicated PRA assessment and bat activity surveys. The façade of Woodbank House and adjacent outbuilding were both found to contain bat roosts, which is also described in more detail below.

Foraging

9.53 The mosaic of habitats within the Site created a mixture of attractive bat foraging and commuting areas. Abundant woodland tree cover occurred throughout the Site, with woodland edges offering particularly attractive bat foraging habitat, as well as clearings within the woodland canopy. Dark woodland corridors along the River Leven also offered opportunities for foraging below the canopy and over water, and this was replicated in north of the Site around the existing shoreline at the Pierhead and at the Boathouse section

of the Site. The woodland edges and existing tree lines provided attractive commuting routes, although this was somewhat fragmented by existing development and infrastructure which have introduced well-lit areas around Ben Lomond Way and the adjacent Loch Lomond Shores car park. The existing dark corridor along Pier Road allowed connectivity from the east of the Site and further west through Drumkinnon Wood. The Woodbank area in the west of the Site also had good connectivity to high quality habitats in the wider area to the north and west.

9.54 In accordance with the criteria provided in Wray *et al*. (2010), the habitat mosaic of the Site was initially considered to have at least **Local** value for foraging and/or commuting bats. The habitats present within the Site were judged to offer **High** habitat suitability for bats, based on the criteria provided by Collins *et al*. (2016).

Preliminary roost assessment of buildings

9.55 A plan of the general arrangement of the buildings inspected and suitability results of the PRA can be found in **Figure 9.1**. A description of each building and the roost suitability are shown in **Table 9.8**. Photographs of the buildings can be found in **Appendix E**.

Table 9.8: Description of bat roosting suitability recorded in the PRA of buildings.

Building	Building description	Bat roost suitability
A (Woodbank House)	Remains of Woodbank House. Only the external façade remained partially standing. No roof coverings had survived. Internal areas were completely collapsed with only isolated sections of stone or brick dividing walls remaining. There appeared to be a basement area in the southern end of the building, although most of this had collapsed under the weight of rubble above. The ability to inspect fully the internal sections was limited by the unsafe conditions of the building. A small underground room was located immediately to the west of Woodbank House, under the previous walled garden with a row of ground level windows. This was accessed via a small stairwell on the south side of the existing wall. The internal area contained a narrow room that was tiled on the majority of the walls and ceiling. Where tiles had broken off, bare concrete render remained. The eastern internal wall had evidence of subsistence resulting in large cracks in the stone that was exposed behind the tiles.	**Summer roosting:** Opportunities for transient summer roosts for crevice dwelling pipistrelle species were scattered throughout the external and internal stone walls. This included exposed lintels and stone crevices. These spaces were judged unlikely to reach the thermal conditions preferred by larger maternity roosts of pipistrelles. Daubenton's bats are known to use stone structures in close proximity to water. There were therefore plentiful roost features suitable for this species, with Loch Lomond in accessible commuting distance via woodland cover. The building location within Ancient Woodland increased the likelihood of bats utilising features for roosts. The small underground room directly west of Woodbank House was not judged to offer any summer roosting suitability. The flight access to the internal areas was obscured somewhat by surrounding vegetation and there would be a lack of sunlight penetration. No bat droppings were found adhered to walls or on the floor areas. **Hibernation:** The majority of the stone crevices were judged to provide suitable depth and conditions to support hibernating bats. This included deep voids extending from where fireplaces once were located. Individual pipistrelle, *Myotis* and BLE bats could potentially make use of these features for hibernation roosts. The basement area also had direct flight access via two large openings on the north and south of the building at ground level. However, the footprint of the basement was largely filled with collapsed debris from above. The small underground room directly west of Woodbank House offered hibernation conditions within deep stone crevices in the eastern wall. The climate within the room was judged to offer a stable and consistent temperature and humidity.
B	Remains of second large house. Less of the external façade left standing than Woodbank House, although	**Summer roosting:** Opportunities for transient summer roosts for crevice dwelling pipistrelle species were scattered throughout the external and internal stone/brick walls. This

Building	Building description	Bat roost suitability
	some sections of the wings were in tact with ceilings. Staircase somewhat intact which theoretically allowed access to remaining walls of upper floor but access was not safe. Section of smaller building further north, in a more advanced state of ruin. There was a sheltered dark space under the stairway which was accessible for inspection.	included exposed lintels, gaps under plaster, and stone crevices. These spaces were judged unlikely to reach the thermal conditions preferred by larger maternity roosts of pipistrelles. Daubenton's bats are known to use stone structures in close proximity to water. There was therefore plentiful roost features suitable for this species, with Loch Lomond in accessible commuting distance via woodland cover. The building location within Ancient Woodland increased the likelihood of bats utilising features for roosts. **Hibernation:** The majority of the stone crevices were judged to provide suitable depth and conditions to support hibernating bats. This included deep voids extending from exposed lintels as well as masonry gaps. Sheltered crevices were also found within the area under the stairway that were particularly suitable for hibernation. Individual pipistrelle, Myotis and BLE bats could potentially make use of these features for hibernation roosts. The remaining section of building to the north was less suitable for roosting bats, with minimal features and would be much more exposed to the elements. Multiple active bird nests were confirmed, with wren, blue tit and song thrush all seen carrying food. Feral pigeon were confirmed nesting within the stone wall and blue tit also seen entering the stone wall. Corvid nests were located in the remaining chimney.
C	Ruined outbuilding. Single storey pitched building with tin/metal roof. The roof was mainly intact with only a few holes. Stone external walls with two gables. The southern gable had a large collapsed section and there were no remaining doors or windows. At the north of the building there was a collapsed lean to that was now a pile of rubble. Internally the roof was single lined and the underside of the sheeting was visible. Wooden rafters were all in place.	**Summer roosting:** The external stone walls were lacking in notable crevices. Similarly, internal mortar gaps were limited. The exception to this was the southern gable that had collapsed, exposing cavities within the chimney area but this was relatively exposed. The window lintels were all metal and did not have any gaps. The roof was judged unsuitable for day roosting, but would be suitable for a night feeding roost for BLE. No evidence of this was recorded but there was a substantial amount of debris from anti-social behaviour inside the building. **Hibernation:** The building was lacking in notable stone crevices that were visible on Building A and B. Therefore, no hibernation suitability was recorded.

Visitor Information Centre

9.56 No formal PRA was commissioned for the existing visitor information centre in the far south-east of the Site. This was due to the uncertainty over what renovations may be carried out on the building. However, the building was located adjacent to areas with high foraging activity recorded during the manual transect surveys within woodland along the River Leven. The construction of the building, with red sandstone external walls and slate roof with lead flashing, would be likely to provide summer roosting opportunities for bats. Further recommendations relating to this building are provided in the discussion below.

Preliminary roost assessment of trees

9.57 A summary of the assessment of trees within the Site is provided in **Appendix F** and **Figures 9.2-9.5,** with survey photographs in **Appendix G**.

9.58 The areas inspected were split into defined areas, comprising the Woodbank woodland, the Boathouse, the woodland south of the Ben Lomond Way roundabout (also referred to "Area 10"), Drumkinnon Wood car parking and Riverside. No PRA was required within the Pierhead section of the Site due to the young age of trees there. Trees were included in the assessment if they were likely to be directly impacted by proposals (potential removal), or if they fell within a distance likely to be impacted by disturbance arising from noise, vibration of lighting (either during construction or operation).

9.59 In total, of the trees surveyed, 87 were considered to have some degree of suitability for roosting bats due to their age and/or structure, 47 of which would potentially be impacted by the Proposed Development. Overall, of all the trees classified, 11 were considered to have **high** bat roost suitability based on the PRFs visible from ground level, 54 had **moderate** bat roosting suitability, and 22 had **low** roosting suitability. Trees with negligible suitability were not recorded formally as part of this assessment.

9.60 The majority of trees with potential roost features were recorded within the Woodbank area of the Site, where 59 trees displayed some level of bat roost suitability. There were a number of large mature specimens of oak and ash which offered high roosting suitability due to their age and structure. Mature oak trees were concentrated in the north-west corner of the Woodbank woodland, and many of these trees could not be fully inspected from ground level due to their size. This area has now been excluded from the Proposed Development.

Activity surveys of buildings

9.61 Full details of the bat activity recorded during the activity surveys can be found in **Appendix H**. Photographs of the roost locations are included in **Appendix E**, and locations of the roosts are highlighted in **Figure 9.8**.

Building A

Dusk watch – 14 July 2021

9.62 A total of **three roosts** of individual pipistrelle bats were identified on Building A during the survey. The first emergence was recorded by both Surveyors 4 and 5, 13 mins before sunset, where a bat emerged from a gap in the brickwork of the existing chimney at the highest point of the building. A second pipistrelle bat was then seen by Surveyor 4 exiting a roost within a stone lintel on the northern side of the building shortly after sunset, before at bat (presumably the same one that emerged) returned to the same roost location a minute later. The third roost location was also on the northern external stone wall of the building, where a bat potentially returned to roost within a stone crevice, although light levels made this hard confirm with certainty.

9.63 In terms of bat activity levels, constant foraging and commuting bats were observed by all surveyors throughout the survey. Periods of intensive pipistrelle foraging were associated with the building, and *Myotis* sp. and BLE passes were also recorded. Bats appeared to be regularly flying through the structure as well as within the surrounding tree cover.

Dawn watch – 30 July 2021

9.64 A total of **two roosts** of individual pipistrelle species were identified on the building during the survey. Swarming activity was observed by two bats at sunrise, with one bat returning

to a roost within the internal stone lintel on the eastern side of the building, and a second bat returning to a stone crevice at the top of the stone wall next to Surveyor 1.

9.65 In terms of bat activity levels, constant foraging and commuting bats were again seen by all surveyors. This comprised intensive foraging by pipistrelle species in the trees surrounding the building, as well as social activity by pipistrelle bats displaying 'chasing' behaviour and loud social calls being heard on detectors. Passes by *Myotis* sp. and BLE bats were also picked up during the survey.

9.66 Tawny owl were heard calling throughout the survey from within the woodland.

Dusk watch – 15 September 2021

9.67 No roosts were identified within the building during the survey. However, the first bat pass was recorded 10 mins before sunset and was likely to have been a bat that had emerged close by. Lower levels of bat activity were observed overall compared to previous surveys but there were still periods of intensive foraging by pipistrelle species both within and surrounding the building. Pipistrelle bats were also witnessed 'chasing' each other through the internal areas of the building during parts of the survey, and this was potentially thought to be linked to males setting up territories in the area as bats transition away from summer roosts and approach the breeding season.

9.68 Tawny owl were again heard calling throughout the survey from within the woodland.

Building B

Dusk watch – 13 July 2021

9.69 **One roost** of an individual soprano pipistrelle bat was identified during the first survey on Building B. The bat emerged from a stone crevice on northern side of the building. Activity surrounding the building was lower than that recorded at Building A, but a number of commuting passes of both common and soprano pipistrelle, *Myotis* sp. and BLE were picked up in the general area, with short periods of foraging pipistrelle activity.

Dawn watch – 03 August 2021

9.70 No roosts were identified during the survey. Bat activity around the building was generally low, with brief periods of pipistrelle foraging observed by Surveyor 6, and a number of commuting passes of *Myotis* sp., BLE and common and soprano pipistrelle recorded by Surveyor 8. This included four pipistrelle bats commuting west into the woodland at sunrise, potentially returning to a tree roost nearby.

Dusk watch – 27 August 2021

9.71 No roosts were identified during the third survey. Bat activity surrounding the building was higher than in previous surveys with intermittent foraging passes of both common and soprano pipistrelles heard consistently through the survey, associated with bats foraging in the surrounding trees. The other small number of passes were limited to commuting common and soprano pipistrelle, *Myotis* sp. and BLE.

Building C

Building C dusk watch – 01 July 2021

9.72 No bat roosts were identified on the building.

9.73 High levels of soprano pipistrelle bat foraging were observed by both surveyors, particularly around position 1, associated with the woodland edge. This began 15 mins before sunset and occurred for prolonged periods throughout the survey session.

9.74 A small number of passes by BLE and *Myotis* sp. (suspected to be Natterer's) were also recorded.

9.75 A tawny owl perched within the roof beams of the building at the start of the survey and flew into the woodland when disturbed. For periods during the survey, a barn owl was also seen flying over the adjacent open field.

Summary

9.76 Across all surveys, a total of five roost locations of individual pipistrelle bats were identified for Building A, and one soprano pipistrelle roost of an individual bat was found on Building B. Soprano and common pipistrelle were observed foraging in the areas surrounding all three of the buildings surveyed, and later in the season these species displayed territorial behaviour at Building A. Passes by *Myotis* sp. and BLE bats were also noted across all surveys.

Hibernation surveys

Inspection visit – 20 January 2022

9.77 No hibernating bats were found in the limited number of crevices that could be inspected safely. The winter inspection revealed that Building B had a high volume of water ingress due to the lack of roof in many areas, and this made some features unsuitable. Suitable crevices that could be inspected in Building B included deep stone window lintels and gaps within stone under remaining stairwells. Building A was overall more suitable for hibernating bats than Building B, with an abundance of deep stone crevices both externally and internally. A number of these were judged likely to be subject to temperature fluctuation due to the lack of full cover. However, there were sufficiently deep sheltered areas in Building A for hibernating bats, including the internal areas of old fireplace flues and chimney stacks.

Inspection visit – 04 February 2022

9.78 No hibernating bats were found in the limited number of crevices that could be inspected safely.

SM4 recordings

9.79 Over the winter period of deployment, 52 bat calls were detected at Location 1 at Building B (35 common pipistrelle passes and 17 soprano pipistrelle), eight bat calls in the western end of Building A at Location 2 (five common pipistrelle and three soprano pipistrelle), and 33 calls at the eastern end of Building A at Location 3 (three common pipistrelle and 30 soprano pipistrelle). A full breakdown of activity is included in **Table 9.9** below.

9.80 The passes were generally small numbers of calls spread across the deployment period, with a few notable exceptions on nights where slighter higher activity was recorded (16 December 2021 and 11 January 2022). Both these nights were milder with minimum temperatures not falling below 6 ^{o}C. No consistent pattern of calls was evident that would

be suggestive of bats emerging and returning from roosts, but passes did occur close to sunrise on the morning of 12 January 2022 at Locations 1 and 3. Calls at all three locations generally occurred on the same selection of nights. The sonogram recordings at Locations 2 and 3 were extremely distorted, with no clear registrations across the deployment. Detectors here were placed within the internal walls of the building and therefore the sonograms were suggestive of bats that were foraging/commuting around the trees surrounding the exterior of the building, rather than internally. Recordings at Location 1 were clearer, but this would be expected given the absence of a roof across the majority of the building.

Table 9.9.: Hibernation static detector bat calls.

Night	Closest call to sunset	Closest call to sunrise	Species	Number of bat passes that night	Minimum temperature on night of recording (historical weather data)
Location 1 – Building B					
16 December 2021	01:12	07:32	Soprano pipistrelle	21	6 °C
17 December 2021	00:10	05:52	Common pipistrelle	12	4 °C
21 December 2021	01:59	-	Soprano pipistrelle	1	2 °C
24 December 2021	03:48	-	Soprano pipistrelle	2	2 °C
27 December 2021	01:22	-	Common pipistrelle	1	4 °C
28 December 2021	01:46	-	Soprano pipistrelle	3	2 °C
01 January 2022	01:59	-	Soprano pipistrelle	3	7 °C
03 January 2022	03:44	-	Soprano pipistrelle	2	-1 °C
04 January 2022	01:50	-	Soprano pipistrelle	1	2 °C
11 January 2022	00:56	00:39	Soprano pipistrelle	2	6 °C
12 January 2022	00:52	-	Soprano pipistrelle	4	8 °C
Location 2 - Building A					
17 December 2021	-	05:55	Common pipistrelle	1	4 °C
27 December 2021	01:18	-	Common pipistrelle	2	4 °C
01 January 2022	01:56	-	Soprano pipistrelle	3	7 °C
04 January 2022	01:47	-	Common pipistrelle	2	2 °C
Location 3 – Building A					
16 December 2021	00:47	07:35	Soprano pipistrelle	2	6 °C
17 December 2021	02:00	-	Common pipistrelle	1	4 °C
24 December 2021	03:39	-	Soprano pipistrelle	2	2 °C
25 December 2021	05:13	-	Soprano pipistrelle	1	1 °C
01 January 2022	05:16	-	Common pipistrelle	2	7 °C
03 January 2022	05:05	-	Soprano pipistrelle	2	-1 °C
11 January 2022	-	00:13	Soprano pipistrelle	13	6 °C
12 January 2022	01:30	-	Soprano pipistrelle	3	8 °C
14 January 2022	-	06:40	Soprano pipistrelle	6	4 °C
17 January 2022	-	05:19	Common pipistrelle	1	4 °C

9.81 The full dataset from the temperature and humidity logger can be found in **Appendix I**. The highest temperature recorded was 10 °C and the lowest was 1 °C. Although temperatures appeared to be relatively stable within each 24 hr period, there was notable fluctuation in temperatures overall, suggesting that the particular stone crevice selected did not maintain a consistent temperature. In comparison, humidity readings did remain relatively stable across the full deployment period.

Walked transects

9.82 A heat map highlighting the areas of highest bat activity recorded across the seven manual bat activity transect is provided in **Figure 9.10**. Full details are provided in **Appendix J**.

9.83 The majority of activity recorded during manual transects was from pipistrelle species, primarily soprano pipistrelle. Small numbers of *Myotis* sp. passes were also recorded, mostly associated with Point Count 5 by the shoreline, making it likely that these passes were by Daubenton's.

9.84 The spatial distribution of activity recorded across all transects was generally similar, although activity levels were lower in September and October which would be as expected later in the activity season. Key areas of bat foraging were consistent across visits, and included:

- Pipistrelle bats consistently observed foraging in high numbers along the dark path corridor between Point Counts 1-3 at the Riverside area of the Site. Bats were present here from early after sunset and often were flying up and down the path below the tree canopy, sometimes close to ground level. Bats were also observed foraging continuously above the tree canopy.
- Pipistrelle bats consistently recorded intensively foraging along the path by the shoreline at the Pierhead area of the Site between Point Counts 4 and 5. Multiple bats were often recorded, flying up and down the path at the edge of the block of the broad-leaved plantation woodland.
- Individual or small numbers of pipistrelle bats were consistently recorded within clearings in the eastern section of Drumkinnon Wood, recorded at Point Counts 6 and 12. Bats here were foraging high around adjacent trees, and social calls were often recorded in these areas later in the season.
- Foraging and commuting pipistrelle passes were often recorded between Point Counts 8 and 9, associated with the eastern and southern edges of the woodland block at this location. This included along the road access to the Loch Lomond Shores car park which had retained a dark corridor away from adjacent lighting, as well as along Old Luss Road.

Static monitoring

9.85 Summaries of the data recorded by the SM4 detectors are provided in **Figure 9.11-9.17**. A detailed breakdown of the average numbers of passes per night (ppn) per species location per month can be found in **Appendix K**. However, a summary table of average ppn per location can be found in **Table 9.10**.

9.86 Overall, a total of 74,873 passes were recorded during the six sampling sessions. A total of 74,233 of these were pipistrelle species (99 %) and within this 62,067 (83 %) were soprano

pipistrelle, 6,447 were common pipistrelle passes, 5,707 were labelled "pipistrelle sp." and 12 Nathusius pipistrelle passes were recorded. A total of 608 *Myotis* sp. passes were also identified, 30 BLE passes and two *Nyctalus* sp. passes. The total number of passes translated into an average ppn across the Site of almost 260. Within this dataset, ppn in June peaked at 401 and decreased to an average of 85 in October. All other months had an average ppn of between 170-358.

Table 9.10: Summary of passes per night (ppn) per location.

Location	May	June	July	August	September	October	Total average
1	93.83	19.83	5.33	18.67	63.50	3.83	34.17
2	141.17	245.00	84.50	85.00	83.83	94.50	122.33
3	479.17	1268.33	1008.00	981.83	299.17	136.83	695.56
4	945.50	479.50	711.00	331.00	284.33	8.00	459.89
5	29.00	152.50	356.17	135.33	91.33	93.00	142.89
6	221.50	228.17	140.83	46.00	271.00	174.67	180.36
7	142.50	371.00	178.50	149.67	211.67	93.83	191.19
8	115.33	443.50	380.00	433.50	72.33	75.83	253.42
All locations	271.00	400.98	358.04	272.63	172.15	85.06	259.98

Locational analysis

9.87 **Figures 9.11-9.17** show that in all sampling periods except May, the greatest amount of bat activity was recorded at Location 3, in the Boathouse area of the Site, adjacent to the Loch Lomond shoreline. Location 3 recorded the highest levels of activity in June, peaking at 1,268 ppn but activity also remained high in July and August, at 1,008 ppn and 981 ppn respectively, primarily representing pipistrelle activity. Location 4 at the Pierhead was the location with the second highest activity through all deployments, with an average ppn of 460, and Location 8 at Riverside had the third highest average ppn at 253. All three of these locations were located close to the shoreline of the River Leven and Loch Lomond. Locations 2, 5, 6 and 7 had an average ppn across all deployments ranging from 122 to 191.

9.88 Notably lower levels of activity were recorded at Location 1 with an average ppn across the deployment period of 34, peaking at 94 ppn in May. As outlined above, the location of the detector at Location 1, within dense vegetation to prevent theft, likely explains the lower levels of activity recorded here, at least in part. This data contradicts the activity observed in this area during activity surveys. Nevertheless, peaks in activity at this location occurred in the May and September transitional months, which is relevant when combined with the social behaviour observed by bats during the September activity surveys, near to Location 1. Similarly, Location 6 had a peak of 271 ppn in September, coinciding with the time when social behaviour by pipistrelles was recorded within Drumkinnon Wood.

ECOBAT analysis

9.89 **Figure 9.18** provides a summary of bat activity on the Site relative to other activity surveys carried out within 100 km^2 of the Site and within 30 days of the recording date (on a

DD/MM basis), as provided by the ECOBAT analysis. The data are displayed as being the percentage of the total number of recording nights that comprised each activity category for each species (or species group). The full ECOBAT tables detailing the number of nights for each activity category for each species (or species group) at each sampling location are provided in **Appendix L**.

9.90 **Figure 9.18** shows that across the deployments, 70 % of nights experienced high soprano pipistrelle activity nights. When moderate to high activity nights were added, this was 84 % of nights. Common pipistrelle had high activity on 13 % of nights, rising to a total of 40 % when moderate to high nights were included. This demonstrates the dominance of soprano pipistrelle activity across the Site. *Myotis* sp. had 6 % of moderate to high activity nights, 12 % of moderate activity nights, and 25 % of nights equalled low to mod or low activity. All nights of brown long-eared activity were low to moderate or low.

9.91 **Figure 9.19** shows how these activity levels varied at each location across the Site when considering all species. High activity was recorded at all locations during the survey period, and proportionally exceeded between 28 % and 35 % of sampling nights at Locations 3 to 8. A lower number of high activity nights was recorded at Location 1 (9 %) and Location 2 (21 %). When nights of moderate and moderate to high activity are also taken into consideration, between 37 % and 44 % of nights at Locations 3 to 8 fell within these categories, and for Location 2 the proportion was 34 %, and 19 % at Location 1.

First pass timing

9.92 Combining the time elapsed between sunset and the first recorded bat pass, with knowledge of the typical emergence times of individual bat species, provides an indication of proximity to a roost site. A summary of the minimum and average timings after sunset of recorded first passes is provided in **Tables 9.11** and **9.12**. The timings are given for each key species or species group recorded on the Site. Due to the small numbers of passes recorded, Nathusius pipistrelle and *Nyctalus* sp. have not been included in the tables below. Different species of bat emerge from their roosts at different average times after sunset. For pipistrelle bats, the key period is approximately 30 mins after sunset.

9.93 The recorded first pass times were highly suggestive of roost locations in close proximity, particularly for soprano pipistrelle, and were consistent for locations across the Site. Indeed, at Locations 6 and 7 within Drumkinnon Wood, the average first pass was 2 mins before sunset. Across all locations, first passes were on average no later than 28 mins after sunset, with the majority of locations having an average first pass within 20 mins of sunset. *Myotis* sp. and BLE are often referenced as later emerging species, but even for these species, average first pass timings at Locations 1, 5 and 6 were within 40 mins of sunset for *Myotis* sp. and at Location 7 for BLE. Last passes before sunrise were less indicative of bats returning to roosts, but this can be less reliable due to the variability in bats behaviour through the night. Nevertheless, the average last pass timing for soprano pipistrelle was still within 30 mins of sunset at Location 2, 3, 5 and 6. *Myotis* sp. often return to roost earlier than pipistrelles, sometimes up to 2 hrs before sunrise. The average last pass at Location 6 was 1 hr 13 mins before sunrise.

9.94 Overall, the first and last pass timings support the findings of the other assessments that bat roosting opportunities occur across the Site in the form of mature trees and derelict buildings. Throughout the manual transect surveys, foraging activity was observed from

close to sunset, indicating that habitats within the Site offered a key foraging resource earlier in the evening, and this is supported by the timings in **Table 9.12**. The Site was also in close proximity to a number of residential properties that could have supported roosting bats, which then commute into the Site for foraging shortly after sunset. The early first pass timings for *Myotis* sp. at Locations 1 and 6 could also indicate tree roosts within Drumkinnon Wood and the Woodbank woodland, most likely of Natterer's bats, based on the habitat context and activity observed during manual transects and activity surveys of buildings around Woodbank house.

Table 9.11: Minimum times for first pass after sunset hh:mm:ss).

Location	Common pipistrelle	Soprano pipistrelle	Pipistrelle sp.	*Myotis* sp.	BLE
1	0:24:00	0:21:57	1:07:20	0:34:00	-
2	0:32:50	0:03:03	0:40:54	1:00:30	1:04:00
3	0:32:04	0:10:51	0:36:38	1:05:43	1:47:20
4	0:50:39	0:28:35	0:34:36	0:45:00	0:52:00
5	0:53:35	0:09:37	0:44:02	0:39:05	-
6	0:22:17	**0:02:27**	0:49:05	0:38:14	-
7	0:18:42	**0:02:07**	0:46:07	0:55:27	0:31:40
8	1:00:37	0:19:45	0:37:36	0:54:50	0:42:00

Table 9.12: Minimum times for last pass before sunrise hh:mm:ss).

Location	Common pipistrelle	Soprano pipistrelle	Pipistrelle sp.	*Myotis* sp.	BLE
1	0:57:30	0:41:56	2:22:15	1:59:00	-
2	2:14:06	0:19:04	1:17:50	1:30:44	3:00:45
3	0:57:57	0:15:19	1:03:48	2:53:42	3:04:00
4	1:10:49	0:33:50	1:17:36	4:30:15	5:08:00
5	1:14:42	0:25:25	1:44:03	3:07:40	-
6	1:00:33	0:08:32	2:07:09	1:13:55	4:27:00
7	1:53:07	0:36:07	1:35:54	1:56:12	4:19:00
8	1:11:09	0:47:07	1:14:57	1:24:30	1:18:00

Discussion

Relevant legislation

9.95 All British bats are EPS, protected in Scotland by the Conservation (Natural Habitats &c.) Regulations (1994) as translated into domestic legislation post-Brexit, and the Wildlife and Countryside Act (1981, as amended). This legislation makes it an offence to capture, harass, injure or kill a bat; obstruct access to, damage or destroy a breeding or other resting place of a bat; disturb bats in such a way as is likely to affect their distribution or

abundance, or disturb bats in such a way as is likely to impair their ability to survive or breed. Each of these actions is considered to be an offence whether the action is deliberate or reckless, except in the case of damaging or destroying a breeding site or resting place which is a strict liability offence. A licence is required for all developments which will affect areas known to contain bat roosts.

9.96 A bat roost is defined as any structure or place which is used for shelter or protection, irrespective of whether or not bats are resident. Buildings and trees may be used by bats for a number of different purposes throughout the year including resting, sleeping, breeding, raising young and hibernating. Use depends on the age, sex, condition and species of bat as well as the external factors of season and weather conditions. A roost used during one season is therefore protected throughout the year and any proposed works that may result in disturbance to bats, or loss, obstruction of or damage to a roost are licensable.

Bats at Lomond Banks

Bat roosts within buildings

Summer roosting

9.97 Combining the data gathered during all of the survey sessions at the Site, a total of five roosts were identified. Four of these were within Building A (Woodbank House) and one was within Building B, all being individual pipistrelle bats utilising the abundance of stone crevices available within these structures. No same roost location was used twice across all of the surveys, suggesting that pipistrelle bats were using a number of roost locations across the building depending on factors such as weather and time of year.

9.98 Pipistrelle bats are included as a priority species within Dunbartonshire LBAP. As a **Council** level IEF, impacts on roosts of this species will need to be considered in full within the EcIA.

Winter hibernation

9.99 No confirmed evidence of hibernation was found during surveys over the winter of 2021/2022. There were however significant limitations to the survey due to the unsafe nature of the structures leading to an inability to inspect the majority of crevices, as well as the unusually mild weather during the winter survey period. The original PRA highlighted hibernation potential relating to thick stone walls, but during the hibernation surveys it was noted that there was a significant level of water ingress associated with Building B whereas Building A had more sheltered areas where internal stone walls had ceiling levels intact. However, recorded temperature data indicated that, at least in the crevice monitored, the stone walls were unable to maintain a consistent temperature that bat species such as BLEs and *Myotis* sp. prefer. Nevertheless, there were many areas of deep stone crevices that could not be inspected and therefore hibernation cannot be ruled out entirely.

9.100 Pipistrelle bats are often active for periods throughout the winter, when temperatures are milder and invertebrates are active. The milder winter weather would have been expected to result in pipistrelle activity, and this was reflected in the static monitoring data which showed pipistrelles to be active in areas around both Buildings A and B. There was no consistent pattern in the calls to indicate that these were pipistrelle bats returning or exiting roosts within buildings, but it is possible that roosts confirmed during summer

surveys could be used by pipistrelles through the winter months, relating more to transitionary periods of torpor rather than prolonged hibernation. It is therefore not possible to discount hibernation roosts within the derelict structures comprising Buildings A and B.

Licensing

9.101 The proposed renovation of Buildings A and B as part of the Proposed Development have the potential to disturb, obstruct, harm or kill bats, through blocking access to known roost locations or injuring bats during structural works. Therefore, the works will require appropriate licensing through NatureScot. The licence application will need to be supported by sufficient survey within the correct season(s), and a mitigation and method statement proportionate to the scale of the likely impact on bats. The licence application will need to state the measures which will be taken to ensure that bats will not be harmed and appropriate mitigation to ensure longevity of the conservation status of the local bat population.

9.102 It is unlikely that the bat roosting features within Buildings A and B could be retained as part of the Proposed Development, due to the need to make safe and then restore the buildings so that they can be brought back into use. The intention therefore will be to construct a building to act as a dedicated bat roost within the footprint of the Site, close to the existing Woodbank House. This will be designed so as to have provision for maternity roosting pipistrelles, but also a loft void that would be suitable for maternity colonies of BLE which are also known to be in the area and at present have no suitable roof voids within the existing derelict buildings. Hibernation provision will also be designed into the building via an underground chamber and/or deep crevice features suitable for use by bats in the winter months. Bat boxes will also be provided in trees and collectively it is considered likely that these would provide a long-term and sustainable compensation for the loss of confirmed summer pipistrelle roosts at the Site, as well as providing a form of enhancement as part of the Proposed Development.

9.103 The widespread nature of suitable roosting crevices on Building A and Building B, most of which were in unsafe areas, means the ability to rule out fully the presence of bats before structural works begin will be challenging. A Species Protection Plan (SPP) will be required to support the licence application required for these works, and this will need to state in detail the methods to be employed to ensure that bats are not present during the renovation works. These measures are likely to include:

- systematic searching/exclusion of crevices with the use of MEWP and/or scaffolds to cover as many features as possible. Where the full extent of a feature cannot be assessed, exclusion devices are likely to be required;
- a series of dusk/dawn watches proceeding planned works and throughout duration of initial works, primarily to cover features not able to be inspected. These must be undertaken immediately prior to the exact day on which the works are planned.

9.104 Due to the inability to rule out the presence of hibernating bats, works on buildings with known roosts will need to commence outwith the hibernation period (hibernation is usually considered to cover November-February). Outwith this time period, there would be no specific restrictions on the timing of the commencement of works as at present no maternity roosts have been recorded in the structures.

9.105 Activity survey data from the summer of 2021 will have a validity period of 18 months in order to be used to support a licence application. If works are planned beyond this time, the data will need to be reviewed and updated surveys may well be required.

Visitor Information Centre

9.106 As outlined previously, no formal PRA or activity survey was commissioned for the existing Visitor Information Centre in the south-east of the Site, within the Riverside section of the Proposed Development. If during detailed design renovations are proposed for this building, such as roof works and external repairs, then further survey will be required to determine if bat roosts are present within the building.

Roosting suitability of trees

9.107 The PRA of trees within the Site identified 87 trees that displayed bat roost suitability and at least 50 of these fall within the current footprint of the Proposed Development. Therefore, at the detailed design stage it is likely that further survey work will be necessary to establish whether or not any of the trees with bat roosting suitability do indeed support any bat roosts. Based on the results of the tree PRA, the highest impact on potential roosts in trees will likely to be within the Woodbank woodland. The results of the tree PRA and activity recorded during static monitoring, activity surveys, and hibernation monitoring, suggested that bats were highly active in and around the Woodbank woodland and it is likely therefore that bats will be utilising tree roosts in this part of the Site. The existing woodland habitats comprising the Site are generally unlit, and the Woodbank woodland is currently a considerable distance from any background disturbance. Therefore, trees needing further survey will not only include those directly impacted (through removal), but also those at risk from disturbance during the construction and operational phases, due to the changes that will occur as a result of the Proposed Development such as fragmentation of dark corridors through introduction of lighting, and noise disturbance from visitors.

9.108 Based on the above, for the purposes of the EcIA, and in the absence of any further survey data from aerial inspections, it should be assumed that the Proposed Development will have both direct and indirect impacts on tree roosts.

Reducing the number of trees to be impacted

9.109 It is understood that the Proposed Development will aim to design out direct impact on trees as far as is practicable.

9.110 Compensatory planting has already been incorporated into the design at Woodbank House. However, many of the trees that could be impacted within the woodland there were of a considerable height, and integral to the character of the ancient woodland and its biological functioning. Compensatory planting will take many years to provide comparable habitat and would not offer the types of features for bats that are presented by the existing mature trees. Therefore, it is recommended that options are explored in detailed design as to how the number of mature trees needing to be removed can be minimised.

Requirements for further survey

9.111 No physical evidence of roosting bats was found within any of the trees. However, the survey was not carried out during the bat active period, and roosting is rarely confirmed from ground level.

9.112 At present, at least 50 trees would require aerial inspection, which would be time-consuming and impractical. The assumption therefore is that the detailed design phase will aim to design out impacts on the trees identified as having bat roost suitability, because normal protocol is that works affecting trees identified as having low, moderate or high bat roosting suitability **should be avoided wherever possible**. However, if the design considerations described above cannot wholly discount potential effects on trees, then further survey will be necessary.

9.113 Where it is not practical to avoid impacts on PRFs in trees that have been classified as having high or moderate bat roosting suitability, works on these trees will require formal confirmation of their bat roosting status. The PRFs will need to be inspected at-height and endoscopically by an appropriately licensed bat worker (LBW). Where PRFs are located at-height, the checks will need to be carried out by an LBW who is also a qualified tree climber.

9.114 Formal surveys of these trees will confirm the presence or absence of roosting signs, and may result in the trees being downgraded to low suitability (if presence/absence is still not conclusive), or negligible suitability. If PRFs are still classed as having moderate or high suitability then this would require the features to be rechecked during the main bat active period (May-September). If roosting is confirmed, then a licence would be needed from NatureScot (see "Licensing" below).

9.115 Trees with low bat roosting suitability could be soft-felled and checked on the ground by a licensed bat worker. However, as aerial inspections will be required for all of the trees with moderate suitability, it is recommended that these low suitability features are simply included in the at-height work. It is then possible that the low suitability features can be downgraded to a negligible rating, and that full felling can take place without further restrictions.

Licensing

9.116 If further survey work identifies the presence of a bat roost in trees which are scheduled to be removed or indirectly impacted, it will be necessary to apply to NatureScot for a derogation licence, to allow the proposals to proceed legally. The licence will need to be supported by sufficient survey information recorded at an appropriate time of year, and details regarding proposed methods of working and mitigation, commensurate with the predicted impacts on the Site's bat population.

Foraging and commuting

9.117 The survey data collected throughout 2021 via static detectors, manual transects and activity surveys, showed that the Site was well-used by a range of bat species, the majority of which were soprano and common pipistrelles, along with BLE and *Myotis* sp.. Intense foraging behaviour by multiple bats was witnessed during manual transects along existing dark corridors in the Riverside and Pierhead areas of the Site. Static monitoring confirmed regular, high volume foraging activity across the Site, but particularly at the Boathouse area of the Site and at the Pierhead. Observations during activity surveys on buildings at Woodbank confirmed roosts within the buildings, as well as bats using the woodland edges and tree canopies for foraging and socialising.

9.118 It is considered likely that changes to artificial night lighting across the Site will introduce barriers for bats which currently use dark areas to move freely across the Site, unless a bat-friendly lighting strategy is incorporated into the design. This is particularly relevant to any lighting proposed along roads or walkways, as well as lighting linked to parking areas and new buildings. The lighting strategy should therefore accommodate the following recommendations:

- if night lighting is needed during construction, then tree canopies and watercourses/water edges must remain unlit;
- operational phase lighting will need to ensure that existing dark corridors are retained where possible;
- where lighting is required, this should be low level pillar lighting, directional and if possible, on timers. Light spill into woodland and tree canopies should be avoided entirely;
- where there is a requirement to light a larger area that may represent a significant barrier to commuting or foraging bats, higher wavelength lighting may be needed rather than standard white lights[36]. The BCT provides a range of information sources relating to bats and lighting[37] which should be consulted be the lighting designers.

[36] https://www.lighting.philips.com/main/support/connect/lighting-technology/integrations/light-sensitive-bats
[37] http://www.bats.org.uk/pages/bats_and_lighting.html

Lomond Banks

Building PRA Results

Site boundary

Bat roost suitability:

Low

Moderate

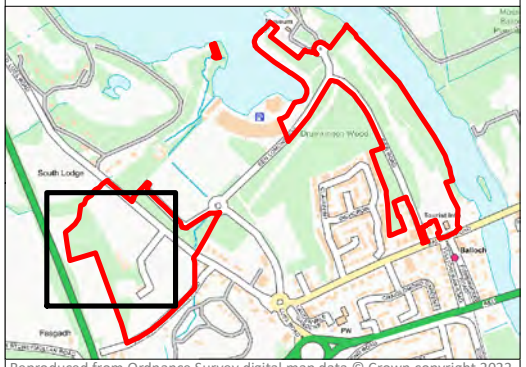
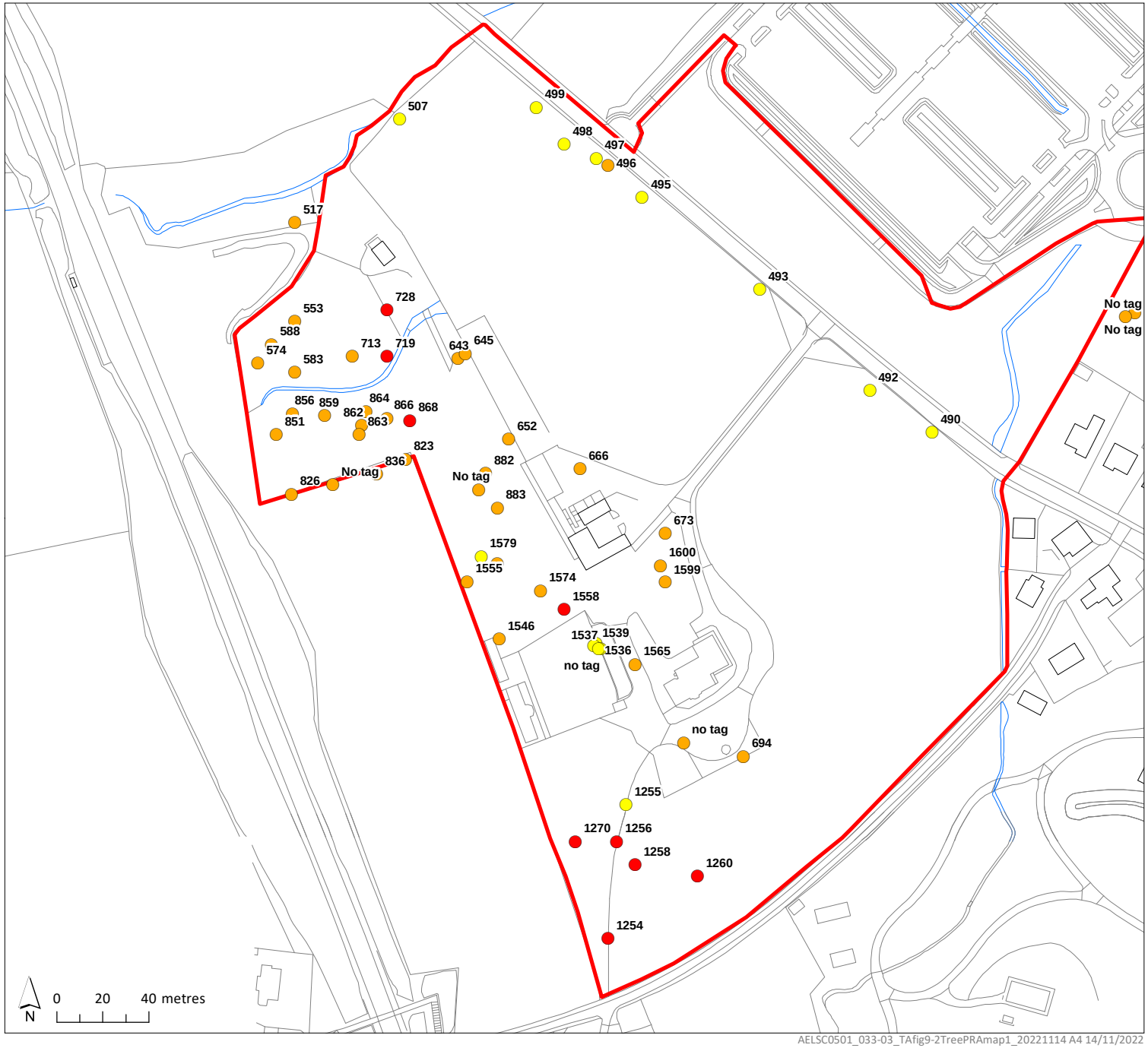


Figure 9.1

Map Scale @ A4: 1:1,500

Surveyed by: AEL	
Survey date: May 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd



AELSC0501_033-03_TAfig9-2TreePRAmap1_20221114 A4 14/11/2022

Lomond Banks

Tree PRA Results - Map 1/4

Site boundary

Bat roost suitability:

- High
- Moderate
- Low

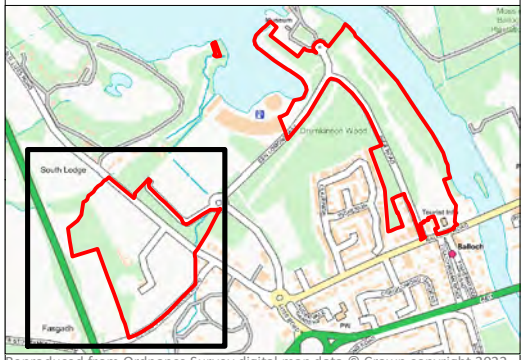
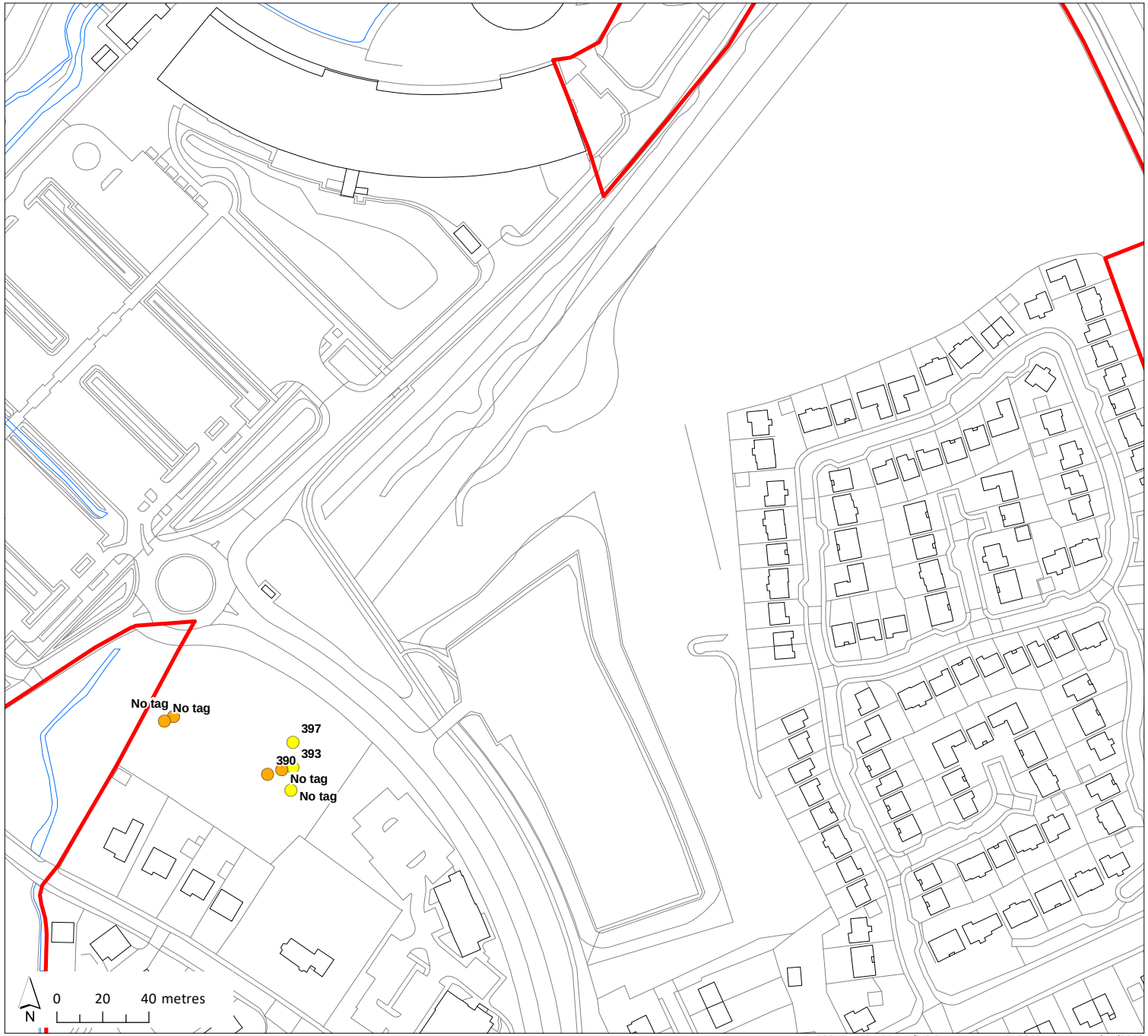


Figure 9.2

Map Scale @ A4: 1:2,500

Surveyed by: DS	
Survey date: January 2022	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd



AELSC0501_034-03_TAfig9-3TreePRAmap2_20221114 A4 14/11/2022

Lomond Banks

Tree PRA Results - Map 2/4

Site boundary

Bat roost suitability:

- High
- Moderate
- Low

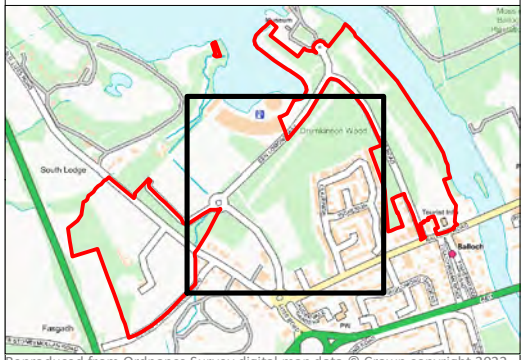
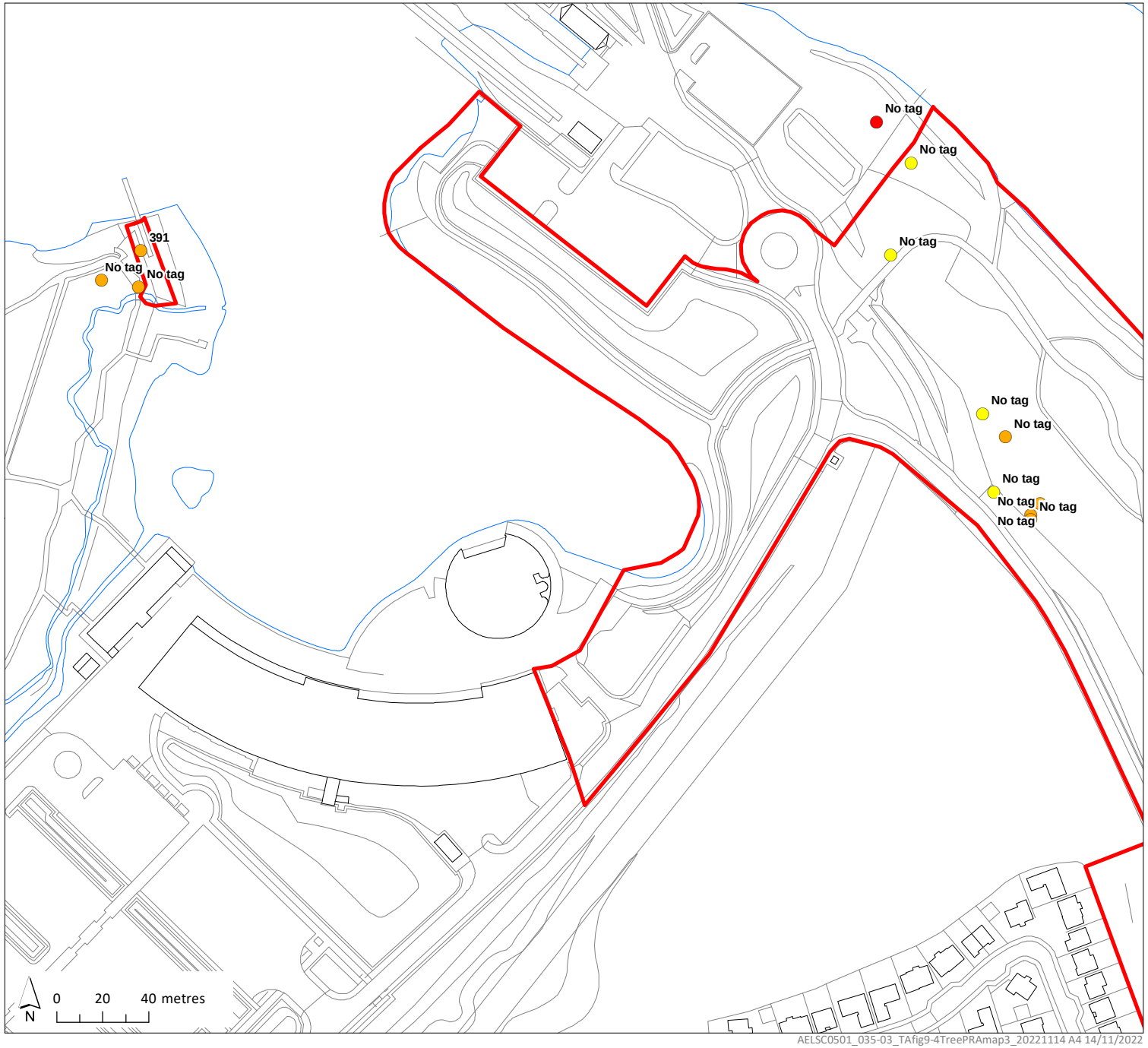


Figure 9.3

Map Scale @ A4: 1:2,500

Surveyed by: DS	
Survey date: January 2022	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd



AELSC0501_035-03_TAfig9-4TreePRAmap3_20221114 A4 14/11/2022

Lomond Banks

Tree PRA Results - Map 3/4

Site boundary

Bat roost suitability:

- High
- Moderate
- Low

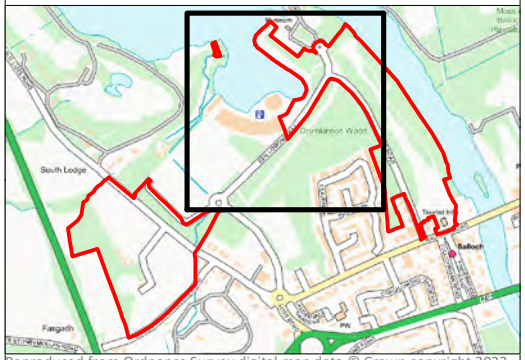


Figure 9.4

Map Scale @ A4: 1:2,500

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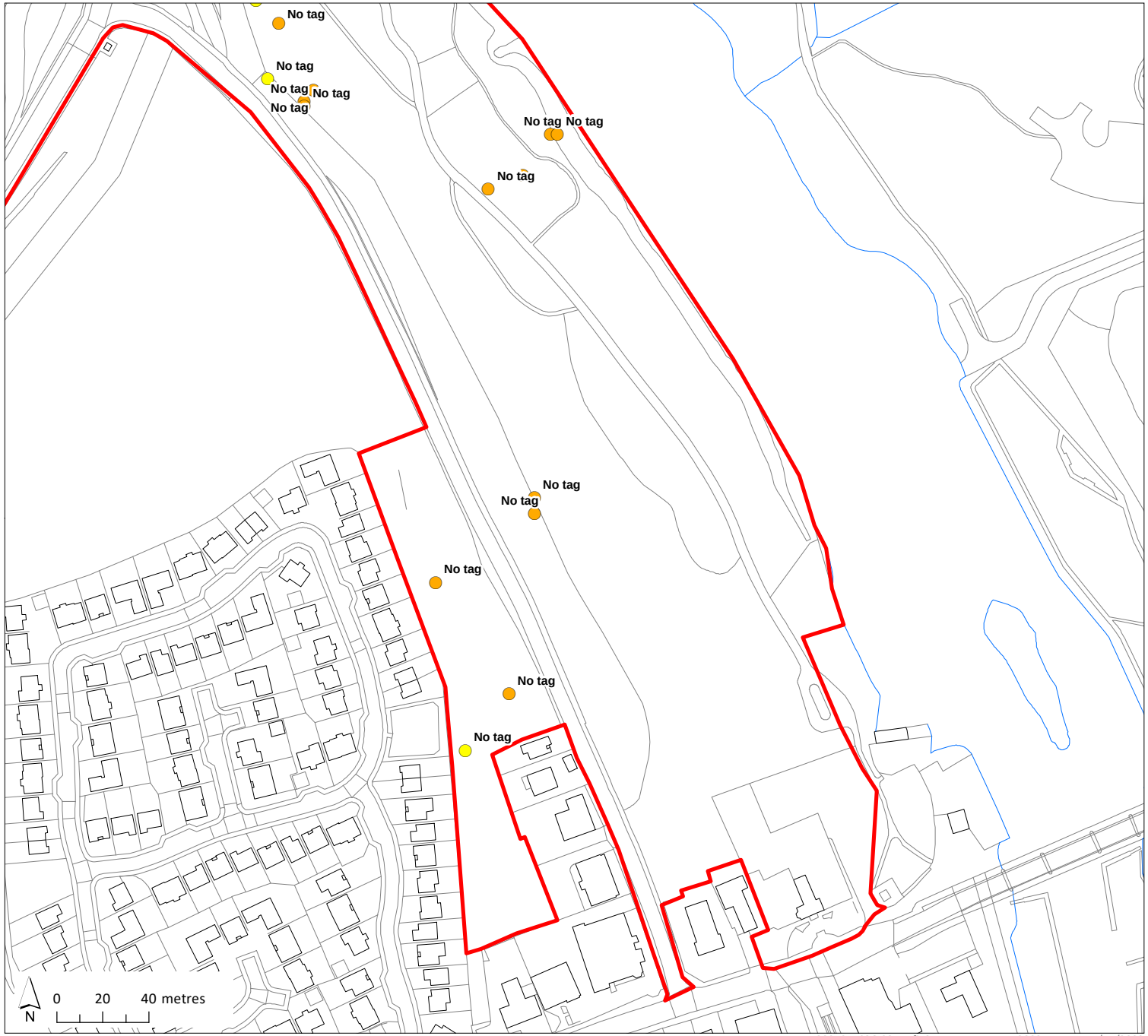
Survey date: January 2022	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd



AELSC0501_036-03_TAfig9-5TreePRAmap4_20221114 A4 14/11/2022

Lomond Banks

Tree PRA Results - Map 4/4

Site boundary

Bat roost suitability:

- High
- Moderate
- Low

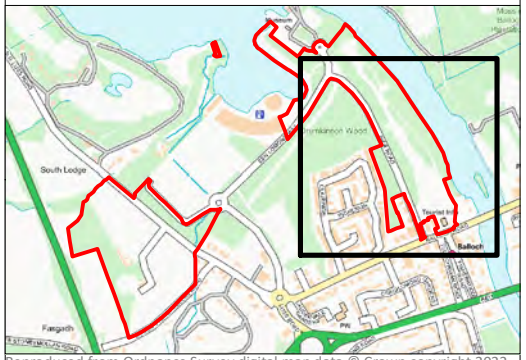
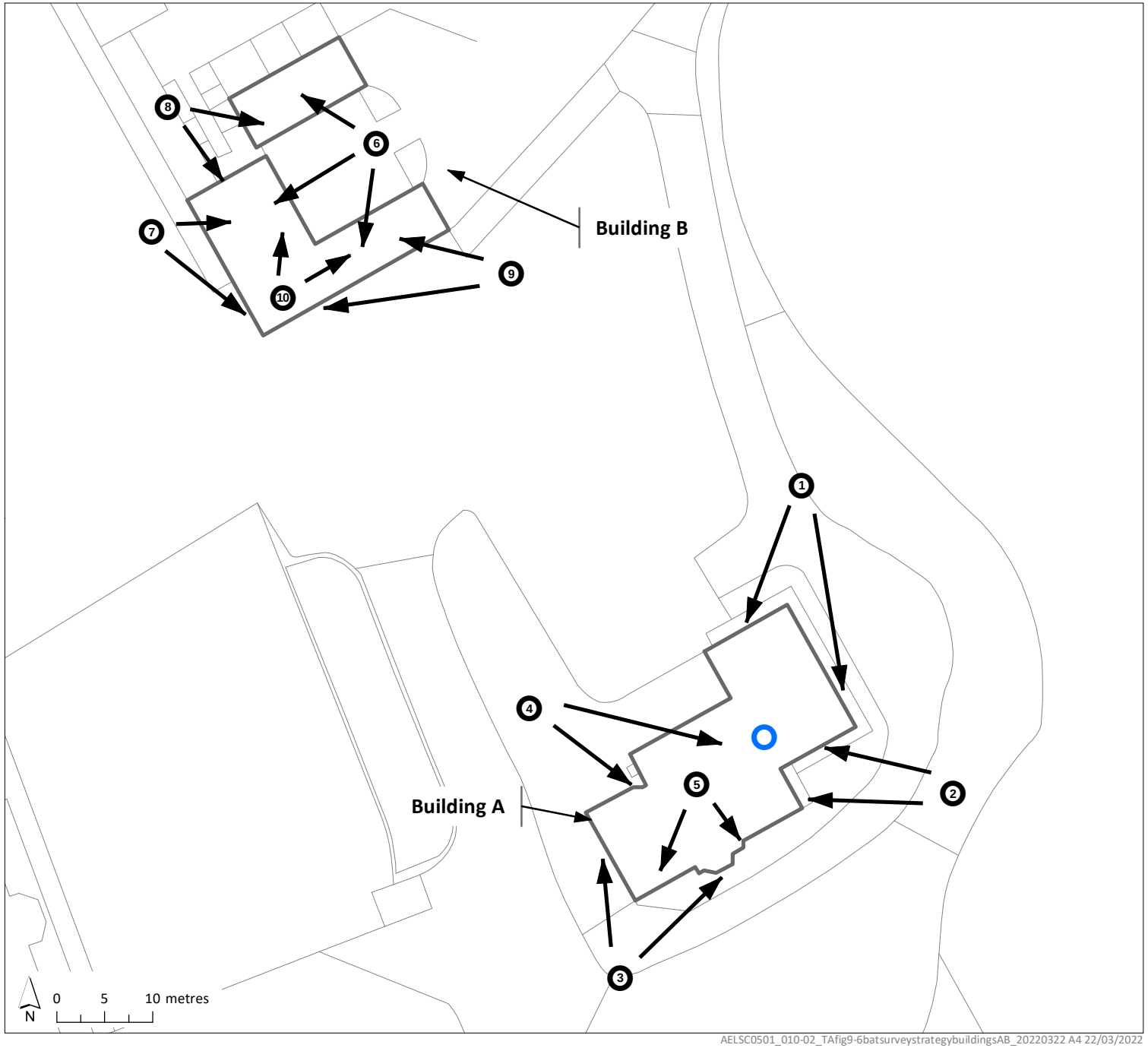


Figure 9.5

Map Scale @ A4: 1:2,500

Surveyed by: DS	
Survey date: January 2022	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd



Lomond Banks

Bat Activity Survey Strategy - Buildings A and B

Buildings surveyed

Surveyor position

IR camera position

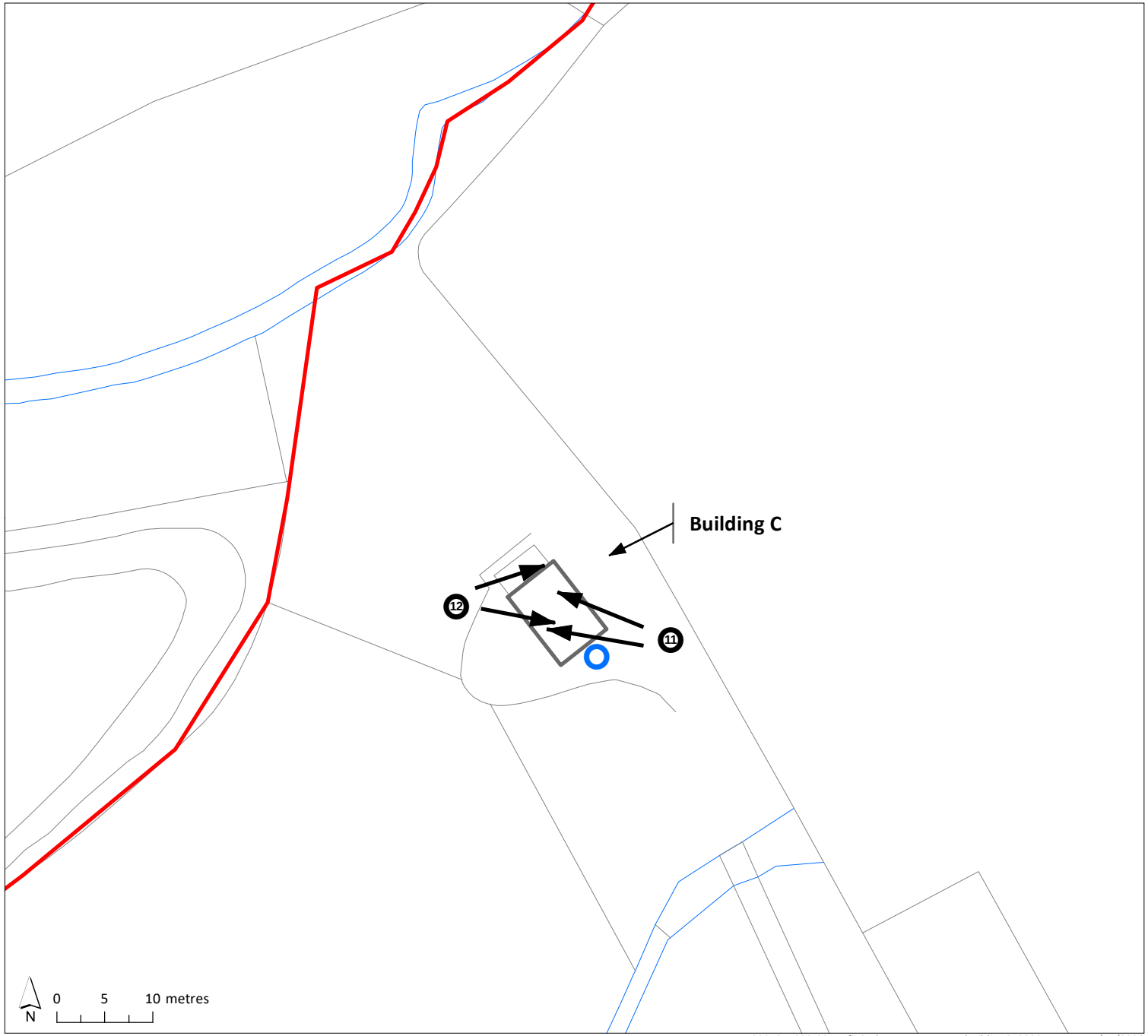
Figure 9.6

Map Scale @ A4: 1:600

Surveyed by: AEL	
Survey date: July - September 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd

AELSC0501_010-02_TAfig9-6batsurveystrategybuildingsAB_20220322 A4 22/03/2022



Lomond Banks

Bat Activity Survey Strategy - Building C

Site boundary

Buildings surveyed

Surveyor position

IR camera position

Figure 9.7

Map Scale @ A4: 1:600

Surveyed by: AEL	
Survey date: July 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd

AELSC0501_032-03_TAfig9-7batsurveystrategybuildingC_20221114 A4 14/11/2022

Lomond Banks

Roost Locations

Buildings surveyed

Roost location

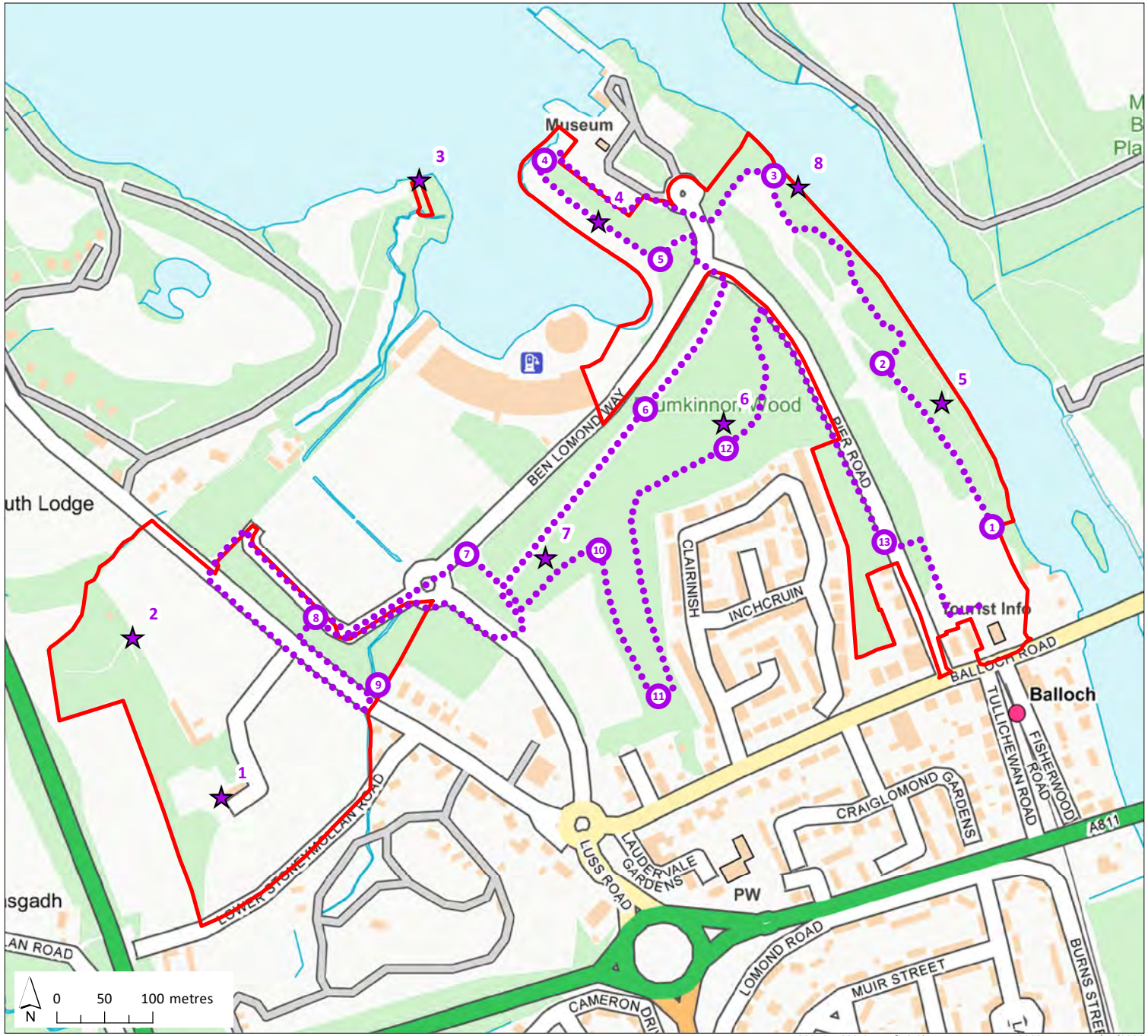
Figure 9.8

Map Scale @ A4: 1:600

Surveyed by: AEL	
Survey date: July - September 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd

AELSC0501_017-02_TAfig9-8roostlocations_20220322 A4 22/03/2022



AELSC0501_002-04_TAfig9-9batsurveystrategy_20221114 A4 14/11/2022

Lomond Banks

Bat Survey Strategy - Static Monitoring/Walked Transects

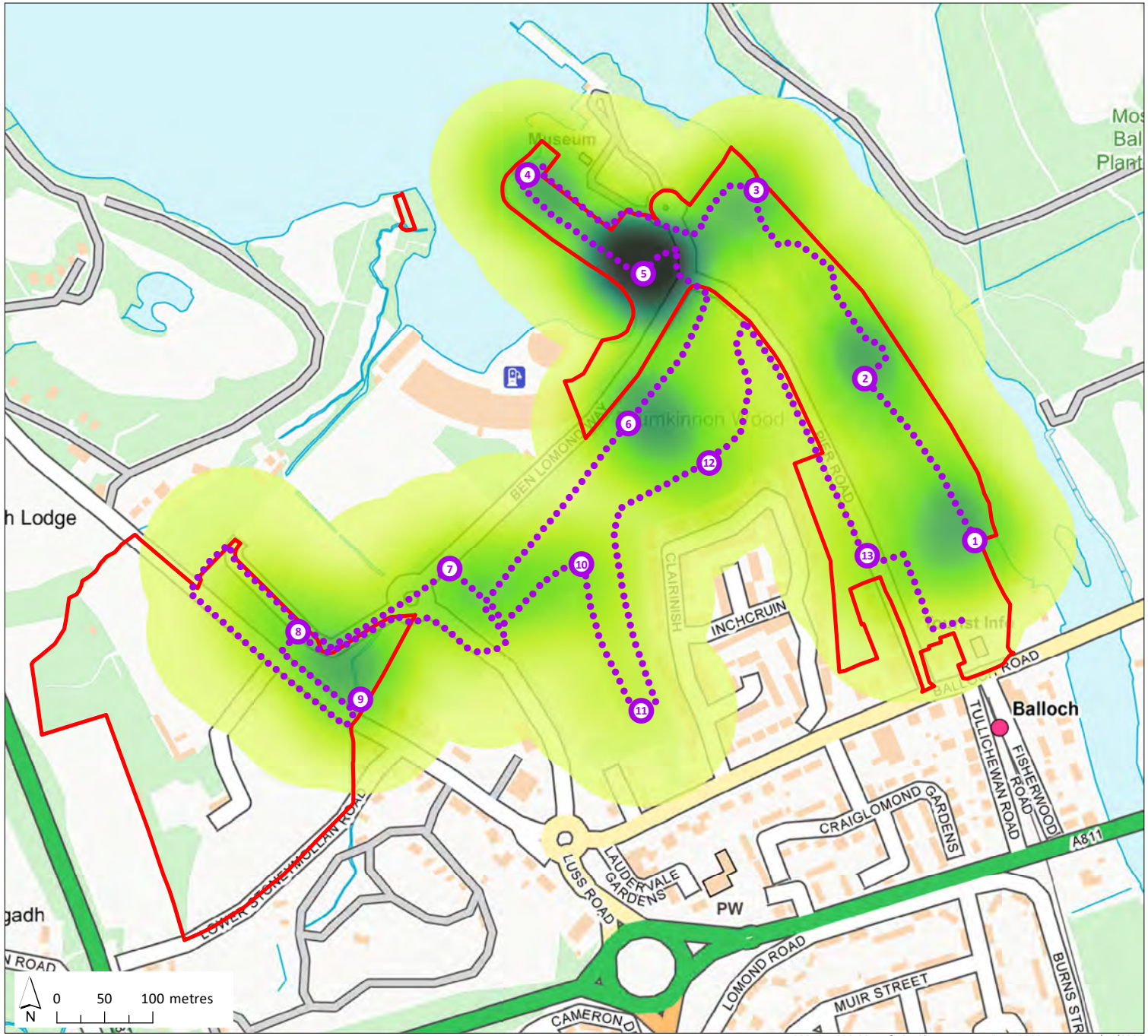
- Site boundary
- Bat transect
- Transect stopping points
- SM4 location

Figure 9.9

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: May - October 2021	
Drawn by: DS	
Checked by: RAH	
Status: Final	

Applied Ecology Ltd



Lomond Banks

Key Areas of Bat Activity Recorded During Transect Surveys (May-October 2021)

Site boundary

Bat transect

Transect stopping points

Number of bats recorded on transects:

High : 20

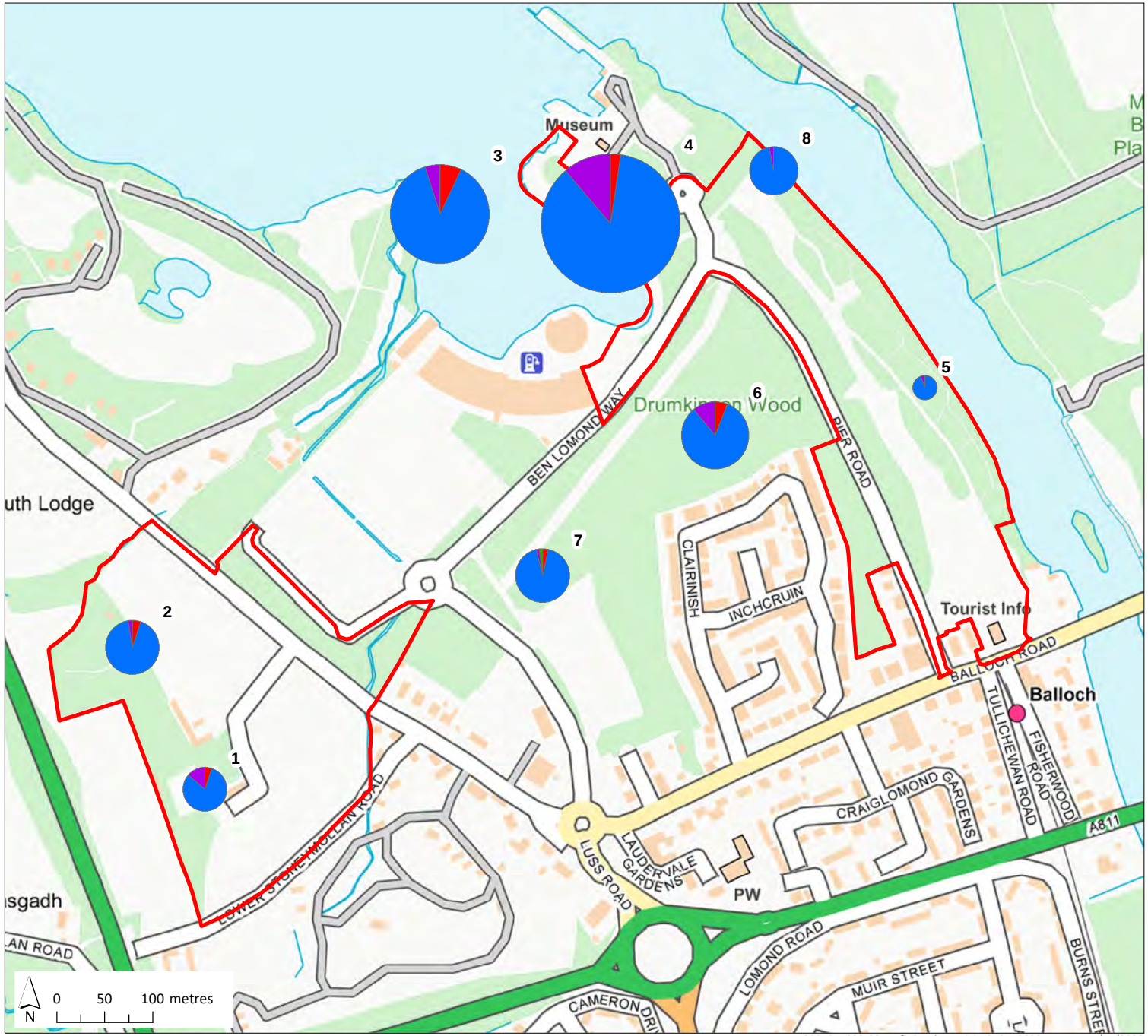
Low : 0

Figure 9.10

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: May - October 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

Applied Ecology Ltd



Lomond Banks

Static Detector Survey Results - May 2021

Site boundary

Mean passes per night (ppn)

The radius of each disc shown on the map is proportional to the total ppn for all species in the displayed sampling session. The radius of the disc shown here in the legend represents a total of 210 ppn.

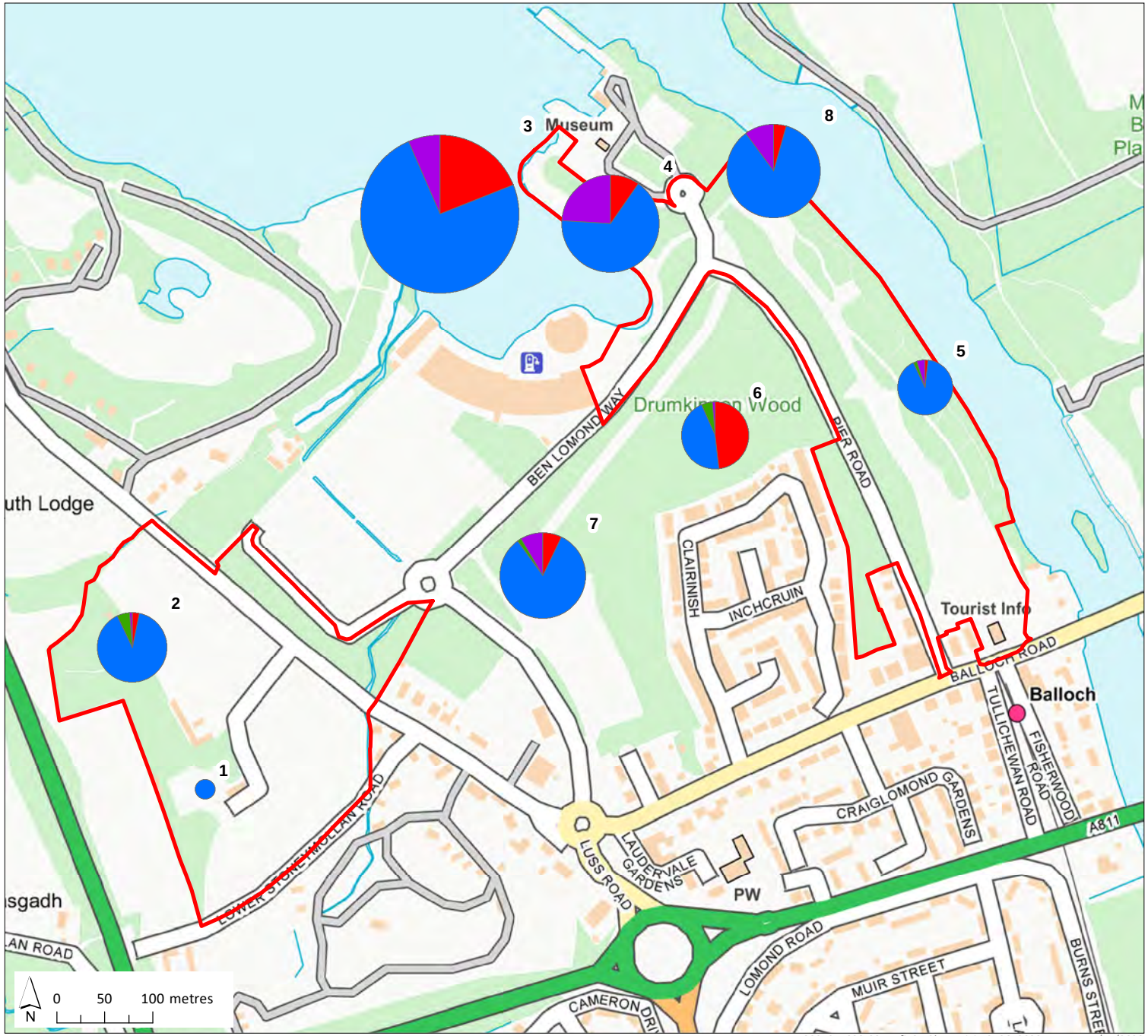
- Common pipistrelle
- Soprano pipistrelle
- Nathusius pipistrelle
- Pipistrelle sp.
- Brown long-eared
- Myotis sp.
- Nyctalus sp.

Figure 9.11

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: May 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

Applied Ecology Ltd



Lomond Banks

Static Detector Survey Results - June 2021

Site boundary

Mean passes per night (ppn)

The radius of each disc shown on the map is proportional to the total ppn for all species in the displayed sampling session. The radius of the disc shown here in the legend represents a total of 210 ppn.

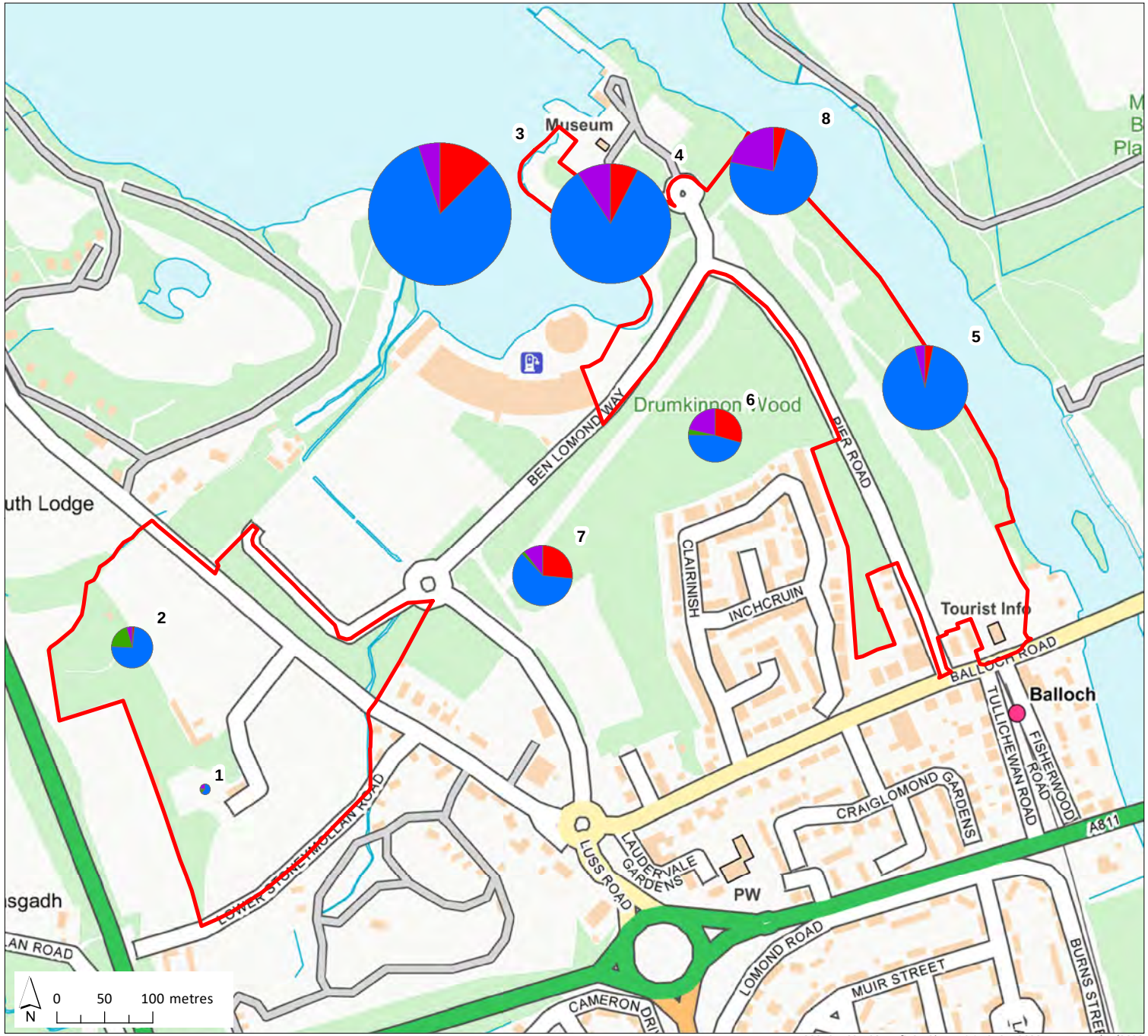
- Common pipistrelle
- Soprano pipistrelle
- Nathusius pipistrelle
- Pipistrelle sp.
- Brown long-eared
- Myotis sp.
- Nyctalus sp.

Figure 9.12

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: June 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

Applied Ecology Ltd



AELSC0501_024-03_TAfig9-13batactivity2107_20221114 A4 14/11/2022

Lomond Banks

Static Detector Survey Results - July 2021

Site boundary

Mean passes per night (ppn)

The radius of each disc shown on the map is proportional to the total ppn for all species in the displayed sampling session. The radius of the disc shown here in the legend represents a total of 210 ppn.

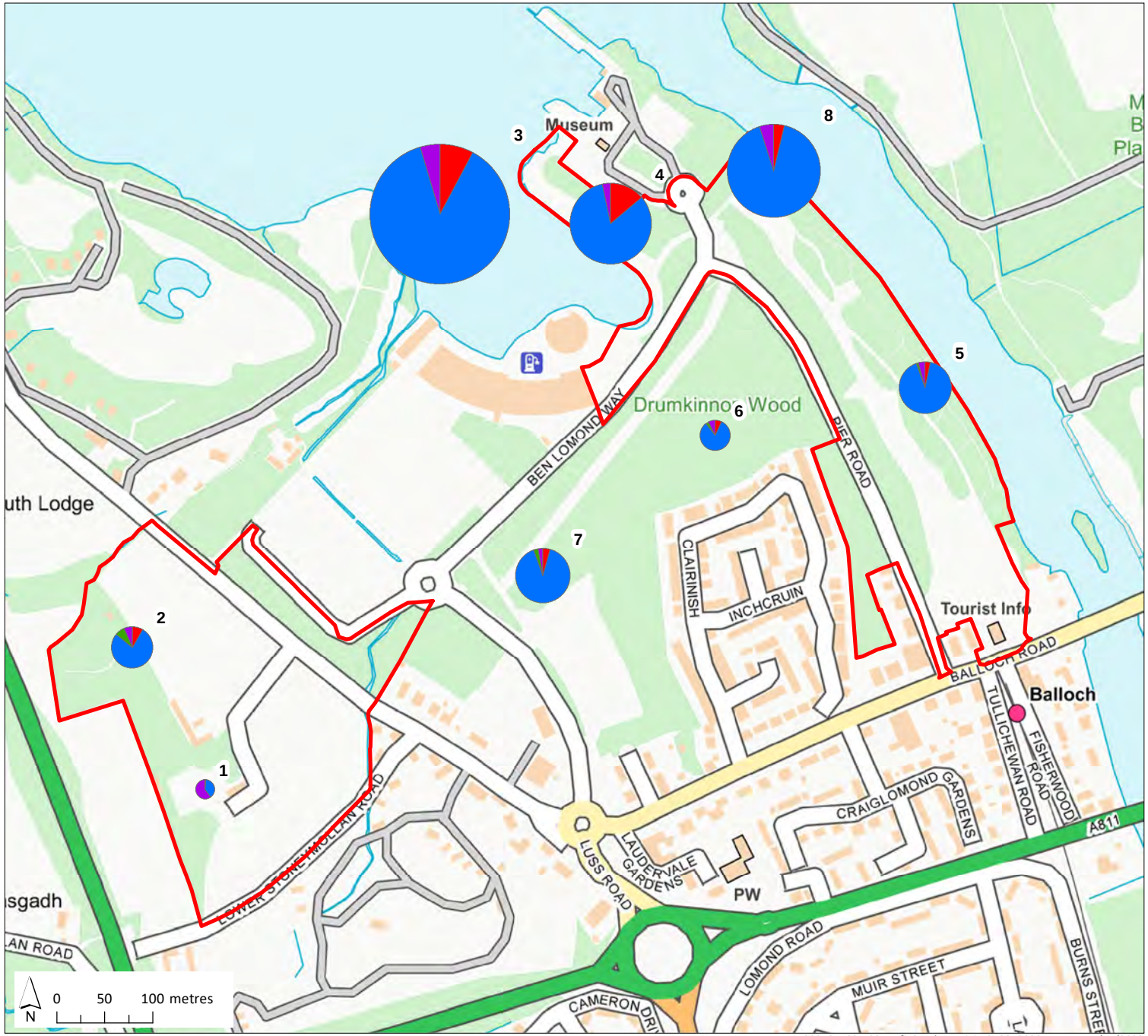
- Common pipistrelle
- Soprano pipistrelle
- Nathusius pipistrelle
- Pipistrelle sp.
- Brown long-eared
- Myotis sp.
- Nyctalus sp.

Figure 9.13

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: July 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

Applied Ecology Ltd



AELSC0501_025-03_TAfig9-14batactivity2108_20221114 A4 14/11/2022

Lomond Banks

Static Detector Survey Results - August 2021

Site boundary

Mean passes per night (ppn)

The radius of each disc shown on the map is proportional to the total ppn for all species in the displayed sampling session. The radius of the disc shown here in the legend represents a total of 210 ppn.

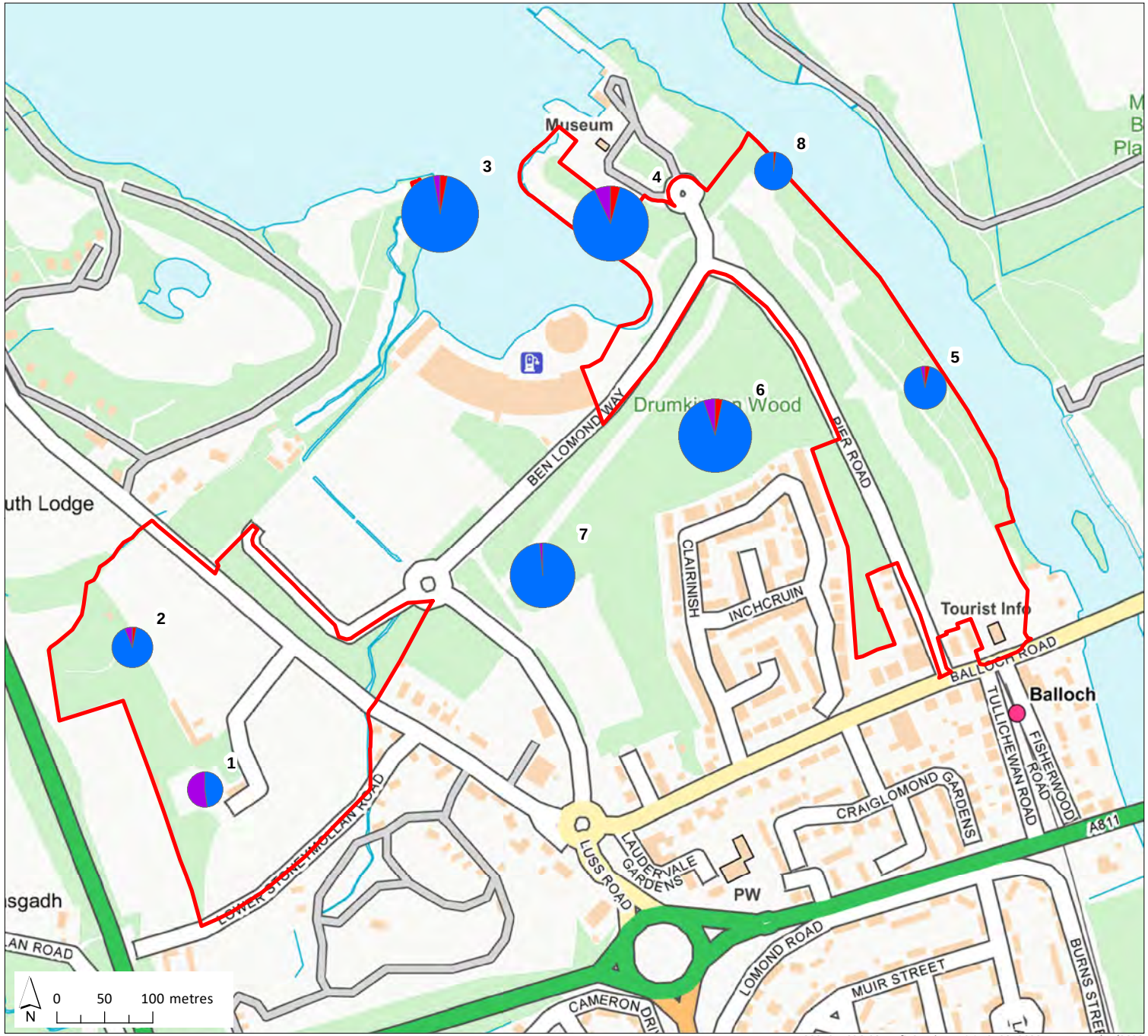
- Common pipistrelle
- Soprano pipistrelle
- Nathusius pipistrelle
- Pipistrelle sp.
- Brown long-eared
- Myotis sp.
- Nyctalus sp.

Figure 9.14

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: August 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

Applied Ecology Ltd



AELSC0501_026-03_TAfig9-15batactivity2109_20221114 A4 14/11/2022

Lomond Banks

Static Detector Survey Results - September 2021

Site boundary

Mean passes per night (ppn)

The radius of each disc shown on the map is proportional to the total ppn for all species in the displayed sampling session. The radius of the disc shown here in the legend represents a total of 210 ppn.

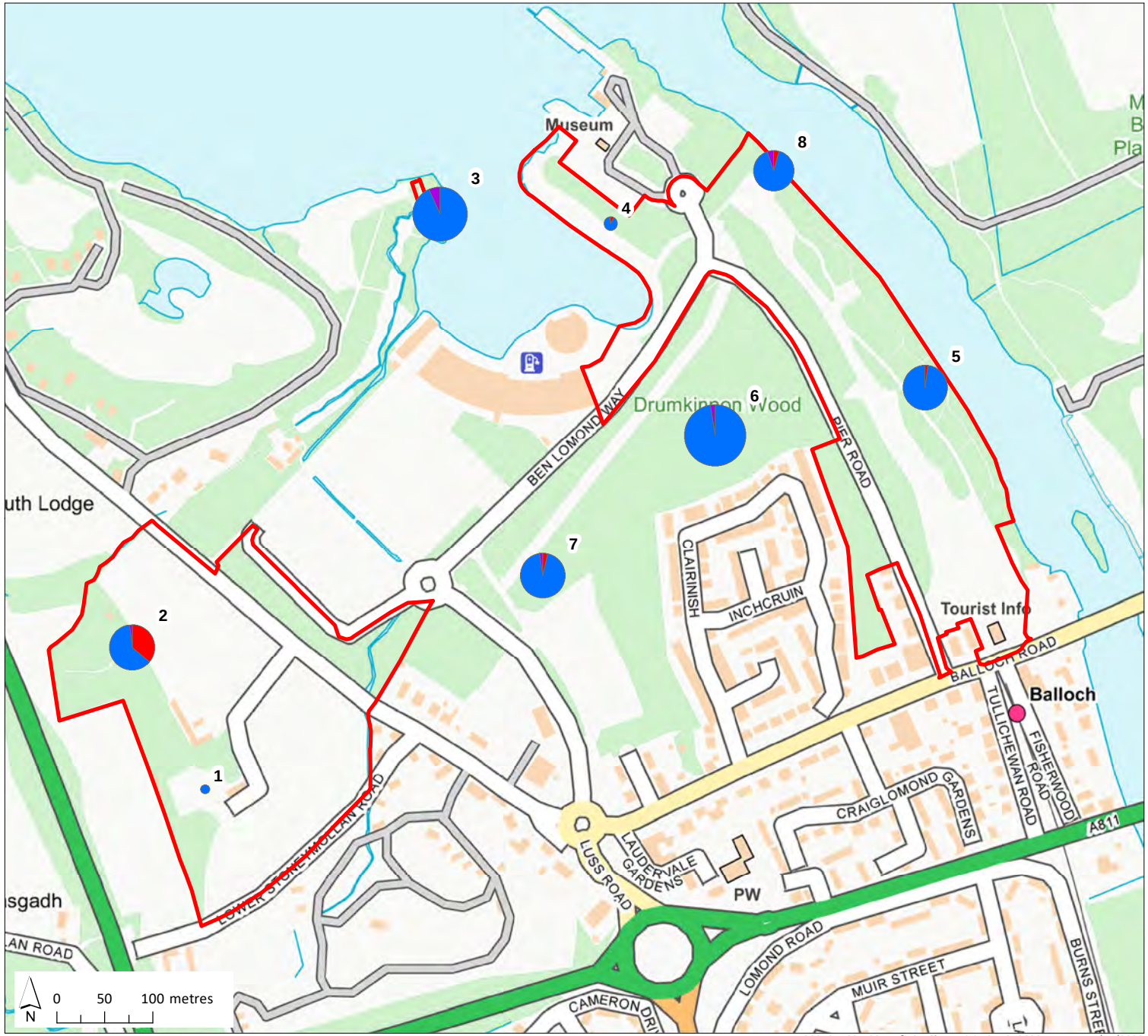
- Common pipistrelle
- Soprano pipistrelle
- Nathusius pipistrelle
- Pipistrelle sp.
- Brown long-eared
- Myotis sp.
- Nyctalus sp.

Figure 9.15

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: September 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

Applied Ecology Ltd



AELSC0501_027-03_TAfig9-16batactivity2110_20221114 A4 14/11/2022

Lomond Banks

Static Detector Survey Results - October 2021

Site boundary

Mean passes per night (ppn)

The radius of each disc shown on the map is proportional to the total ppn for all species in the displayed sampling session. The radius of the disc shown here in the legend represents a total of 210 ppn.

- Common pipistrelle
- Soprano pipistrelle
- Nathusius pipistrelle
- Pipistrelle sp.
- Brown long-eared
- Myotis sp.
- Nyctalus sp.

Figure 9.16

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: October 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

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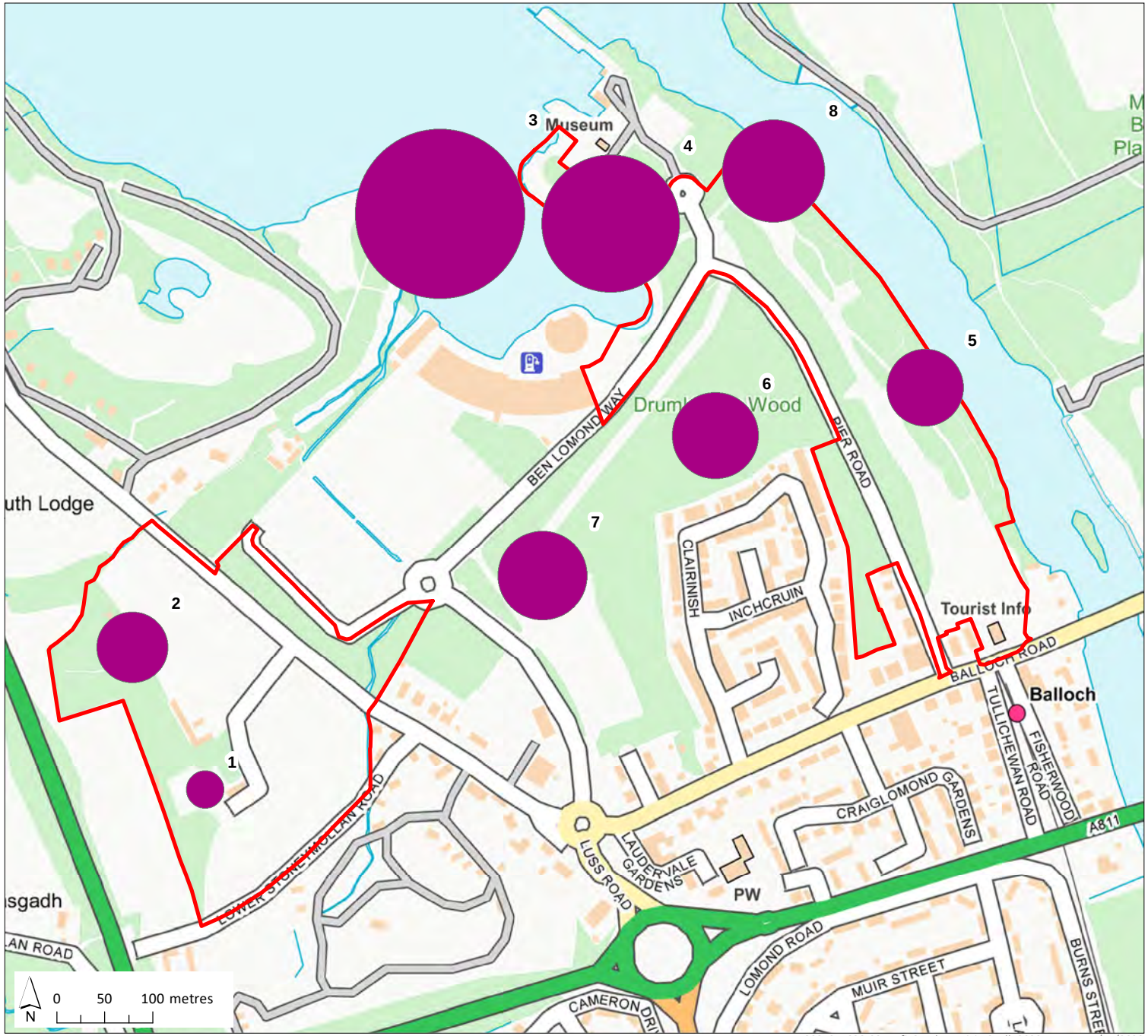

AELSC0501_028-03_TAfig9-17batactivity21all_20221114 A4 14/11/2022

Lomond Banks

Static Detector Survey Results May-October 2021

Site boundary

Mean passes per night (ppn)

The radius of each disc shown on the map is proportional to the total ppn for all species in the displayed sampling session. The radius of the disc shown here in the legend represents a total average of 100 ppn over the season.

Figure 9.17

Map Scale @ A4: 1:6,000

Surveyed by: AEL	
Survey date: May-October 2021	
Drawn by: RAH	
Checked by: DS	
Status: Final	

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Figure 9.18: Summary categorisation of sampling nights for each species or species group, according to local levels of bat activity.

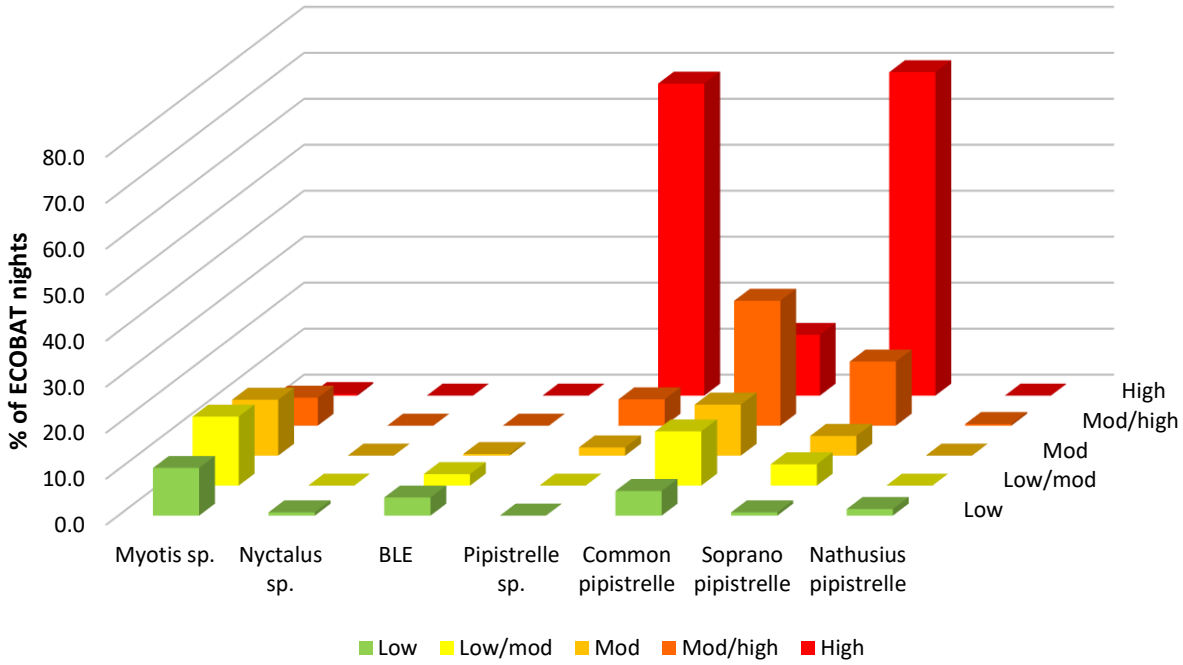
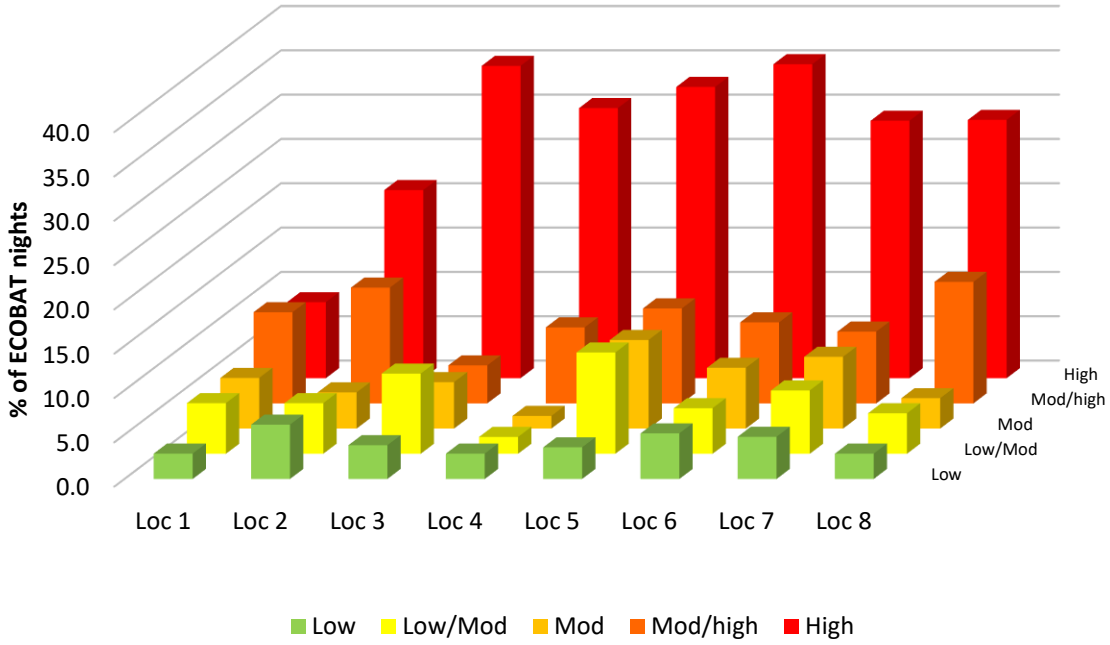


Figure 9.19: Summary categorisation of sampling nights at each sampling location, according to local levels of bat activity.



10 Breeding Birds

Methodology

Pre-existing data records

10.1 Pre-existing biological data records were sourced from GMRC, for the Study Area and a 2 km buffer. A large number of records were subsequently supplied, and were reduced to those dated within the last 10 years.

10.2 No breeding bird surveys were completed by EnviroCentre in 2017.

Field survey

10.3 The breeding bird survey methodology was based on the Woodland Point Count method as described by Bibby *et al.* (2000)[38]. The Site was covered by a transect route that evenly covered the Proposed Development area, with 16 count point locations (**Figure 10.1**). At each count point there was a two minute 'settling in' period to allow any displaced birds to settle, and then a five-minute period of recording time. All birds detected whether visually or by hearing were recorded including species not associated with woodland such as waterbirds. The location of birds detected by songs or calls, or visually, were estimated in bands of up to 50 m and 100 m from the count point, along with their compass direction.

10.4 The survey was repeated on four occasions between May and July 2021, namely on 22 May 2021, 28 May 2021, 26 June 2021 and 30 July 2021. Visits started at dawn and lasted around four hours. All surveys were carried out in good weather.

10.5 All birds recorded during the survey visits were plotted in GIS, and classified according to their conservation status (Stanbury *et al*., 2021[39]). GIS was used to create "heatmaps", and distribution maps produced according to their classification within the Red and Amber lists within Birds of Conservation Concern (BoCC).

Limitations of the breeding bird surveys

10.6 Due to the late commissioning of the surveys two visits were carried out in May rather than the initial survey being carried out in April as planned. However, this is not considered to have had any significant effect on the overall results as spring 2021 was unusually late. There were no access restrictions within the Site and therefore no limitations to completing the surveys.

[38] **Bibby, C.J., Burgess, N.D. & Hill, D.A. & Mustoe, S. (2000)** *Bird Census Techniques* (Second edition). Academic Press, London.

[39] **Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021)**. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* 114: 723-747.

Results

Pre-existing data records

10.7 There were records for 72 species of birds in the Study Area and a 2 km buffer in the dataset provided by GMRC. Forty-four of these occurred in the breeding season (March – August) although 11 were unlikely to have bred due to lack of suitable habitat (e.g. glaucous gull and guillemot), or were late over-wintering birds. Breeding season records of notable species not recorded during the field surveys included cuckoo, house martin and osprey.

10.8 There were several species recorded during the field surveys but for which there were no records of in the breeding season in the GMRC dataset, including bullfinch and great spotted woodpecker, although these species were recorded in winter.

Field survey

10.9 Results of the breeding bird survey are shown in **Figures 10.2** and **10.3** and **Tables 10.1** and **10.2**. Notes on the breeding status of birds are found in **Appendix K**.

Species assemblage

10.10 Forty-one species were recorded during the breeding bird surveys, with a further three recorded though *ad hoc* observations. Twenty-eight of these species were proven to or were thought to have bred within the Site, with a further seven being potential breeders. The Site held a typical assemblage of small common woodland birds including blackbird, song thrush, robin, and a number of tit and finch species. Less common passerines included wood warbler, redstart, and spotted flycatcher, with these species breeding or potentially breeding on the Site.

Table 10.1: Summary of breeding bird data by BoCC status.

BoCC status	Number of species	% of species	Breeding species			
			Confirmed	Potential	Total	% species
Red	5	11.4	3	1	4	11.8
Amber	13	29.5	7	3	10	29.4
Green	26	59.1	17	3	20	58.8
n/a	-	-	-	-	-	-
Total	**44**		**27**	**7**	**34**	**100.0**

10.11 During bat surveys within ruined buildings on the Site (See **Chapter 9**), a number of passerine active nests were observed including nuthatch and blackbird, as well as old nests, probably of the latter species.

10.12 Larger bird species present included corvids such as magpie, carrion crow and jackdaw, as well as woodpigeon. Raven and buzzard were recorded flying over the Site but did not breed within it. Tawny owls were regularly seen and heard while doing bat surveys and one was seen flying out of Building C. It is likely that this species bred on the Site or close to it.

There was a single sighting of a barn owl hunting at dusk at Woodbank, and although there were potential nest sites for this species on the Site in the form of old buildings and potentially tree cavities, no evidence was found of this species breeding.

10.13 A number of aquatic bird species were recorded as well as larger birds such as gulls. There was no suitable habitat for most of these species to breed within the Site, but some like mallard probably bred in undergrowth in the woodlands.

10.14 Under criteria developed by Fuller (1980)[40], the total of 27 species recorded breeding at the Site during field surveys means that it is of **Council** importance for breeding birds, the requirement for this being a total of 20-39 species. Regarding ornithological species-richness criteria, the Site ranks as being of **Local** conservation importance (25-49 species). All of the confirmed or suspected breeding species were those which breed in woodland and scrub, the key habitats surveyed by the method used. However, the inclusion of any aquatic species present and were likely to have bred would not alter the Site's status regarding these two rankings.

Key areas for nesting birds

10.15 As the nesting bird assemblage was recorded using point counts, the heatmap shown in **Figure 10.3** will by definition show concentrations of bird numbers around each point count location. It can therefore only be used comparatively between those key recording locations. To that end, it is notable that the greatest number of birds were recorded within the woodland clearing to the north of the visitor centre, and the woodland/loch shore interface at the boathouse. To a lesser extent, the areas around Woodbank House were also important for nesting birds.

[40] **Fuller, R.J. (1980)** A method for assessing the ornithological interest of sites for conservation. *Biological Conservation*, **17** pp229-239.

Table 10.2: Summary of species recorded in 2021.

Species	Schedule 1	SBL	LBAP	Red	Amber	Green
Barn owl	X		X			X
Black-headed gull		X			X	
Blackbird						X
Blue tit						X
Bullfinch		X	X		X	
Buzzard						X
Carrion crow						X
Chaffinch						X
Chiffchaff						X
Coal tit						X
Dunnock		X			X	
Garden warbler						X
Goldcrest						X
Goldfinch						X
Goosander						X
Great tit						X
Great-spotted woodpecker			X			X
Herring gull		X		X		
Jackdaw						X
Lesser black-backed gull					X	
Long-tailed tit						X
Magpie						X
Mallard					X	
Mistle thrush				X		
Moorhen					X	
Mute swan						X
Nuthatch						X
Oystercatcher					X	
Pied wagtail						X
Raven						X
Redstart			X	X		
Robin						X
Siskin		X				X
Song thrush		X	X		X	
Spotted flycatcher		X	X		X	
Starling		X		X		
Swallow			X			X
Tawny owl					X	
Treecreeper						X
Whitethroat					X	
Willow warbler					X	
Woodpigeon					X	
Wood warbler		X		X		
Wren						X
Totals	**1**	**9**	**7**	**5**	**13**	**26**

Discussion

Relevant legislation

10.16 All wild birds in the UK, their nests and their eggs are protected by the Wildlife and Countryside Act 1981, (as amended). Under this legislation it is an offence, with certain exceptions, to:

- intentionally or recklessly kill, injure or take any wild bird;
- intentionally or recklessly take, damage or destroy the nest of any wild birds while it is in use or being built;
- intentionally or recklessly take or destroy the egg of any wild bird.

10.17 As described above, a number of bird species have been highlighted as priorities for bird conservation in the UK (Stanbury *et al*., 2021[41]). Certain bird species also have additional protection under the terms of the EC Birds Directive, and may be local priorities for conservation action via Local Biodiversity Action Plans (LBAPs).

Nesting birds at Lomond Banks

10.18 Although the Site did contain some scarcer passerines such as wood warbler and redstart, most of the species breeding there were common and typical of woodland and garden habitats. Clusters of bird activity were related to where count points coincided with habitat boundaries such as woodland/scrub edges or features such as hedges which provide good nesting and feeding opportunities for birds. This particularly appeared to be the case in the west of the site where most of the intense 'hotspots' were. One hotspot in the north of the Site was related to a high level of use of water by aquatic birds and so not indicative of a high level of breeding activity.

10.19 Over 40 % of the species assemblage was comprised of red- or amber-listed species, and therefore birds in the breeding season at the Site should be considered as being an IEF of **Site** importance in the EcIA.

Recommendations

Construction phase

10.20 The legislation relating to nesting birds on the Site will be applicable within the bird breeding season[42]. Given the likely nesting within buildings, trees and dense shrubs, habitats to be possibly impacted by the Proposed Development, any works involving the removal or disturbance of these habitats should be executed outside of the breeding bird season.

[41] **Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021)**. The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds* 114: 723-747.

[42] The breeding bird season is usually considered to be mid-March through to mid-August, although some species can start to nest earlier than this, and some continue later. In all cases timings are dependent on the prevailing weather conditions each spring. Advice should be sought from a Suitably Qualified Ecologist.

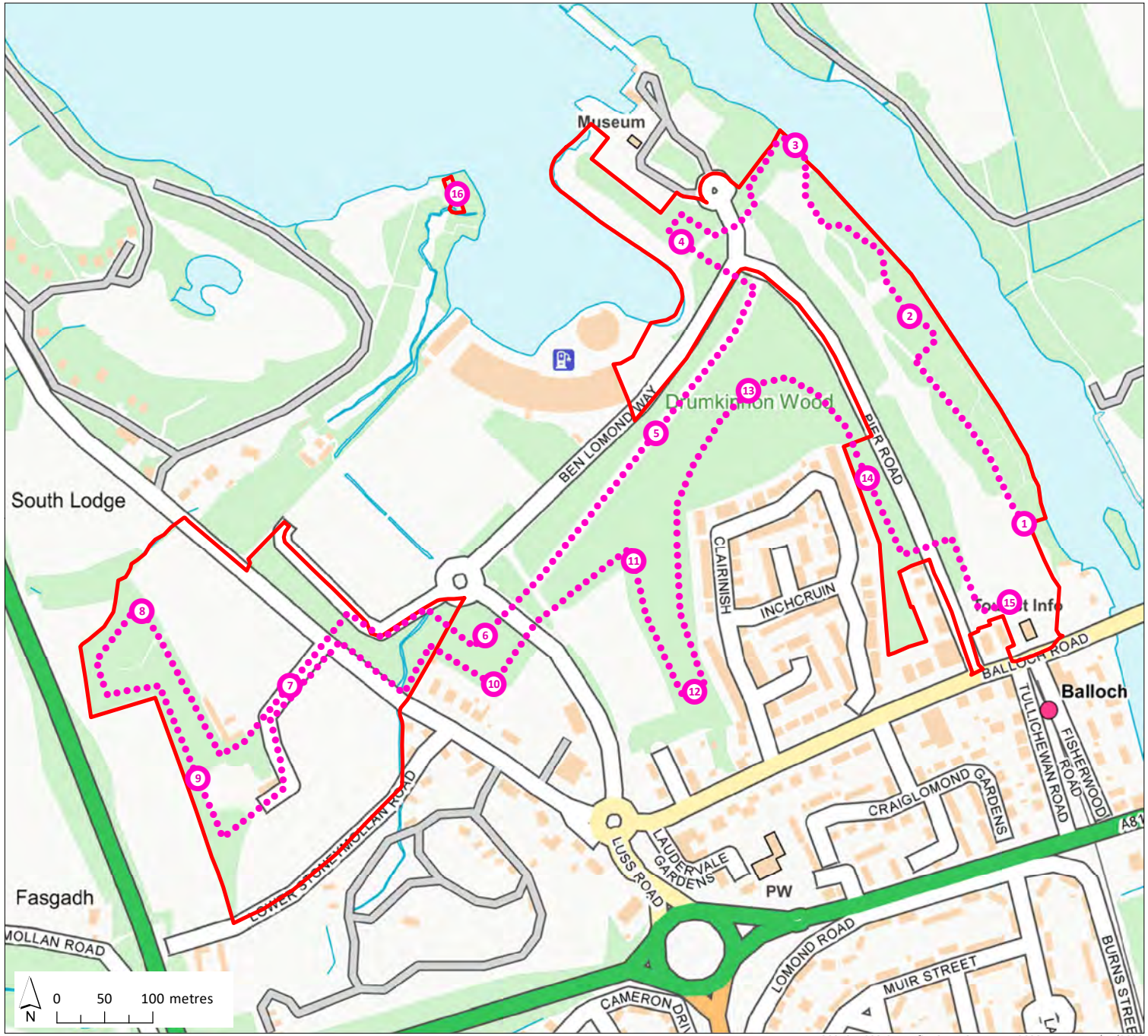
10.21 If works cannot be scheduled so as to avoid the nesting bird season, the relevant areas will need to be inspected by a suitably qualified ecologist in advance of the works, to ensure that no breeding birds are present. If nesting is noted or suspected, works will need to cease until it has been ascertained that all fledglings have hatched and have left the nest(s). The time required for this varies between bird species.

Enhancements for nesting birds

10.22 Soft landscaping proposals for the Site should also take into consideration the potential for incorporating enhancement measures for birds (and other wildlife). These could include:

- use of native tree species, such as oak, hazel, rowan and silver birch, in soft landscaping proposals, with under-planting with appropriate native shrub species such as bramble, hawthorn and elder. The same principle should apply to new hedging if used, where native species-richness and connectivity should be the main priorities. The buffering of edge habitats using native shrubs and trees is beneficial for nesting birds, which prefer thick hedgerows and scrub. The planting of new hedgerows with berry-producing species such as hawthorn, dog-rose, elder and bramble would also assist in providing additional potential nesting and foraging resources for birds;
- provision of nest boxes on buildings to replace current nesting sites, suitable for use by tit sp., house sparrow and specific house martin boxes. The use of integrated nest boxes could be considered for house sparrow, as these are unobtrusive;
- provision of additional new nest boxes on retained suitable trees for use by tree nesting bird species.

10.23 The incorporation of such measures would represent best practice for the promotion and enhancement of biodiversity.



Lomond Banks

Breeding Bird Survey Strategy

Site boundary

Breeding bird transect route

Point count locations

Figure 10.1

Map Scale @ A4: 1:6,000

Surveyed by: SS	
Survey date: May-July 2021	
Drawn by: RAH	
Checked by: KD	
Status: Final	

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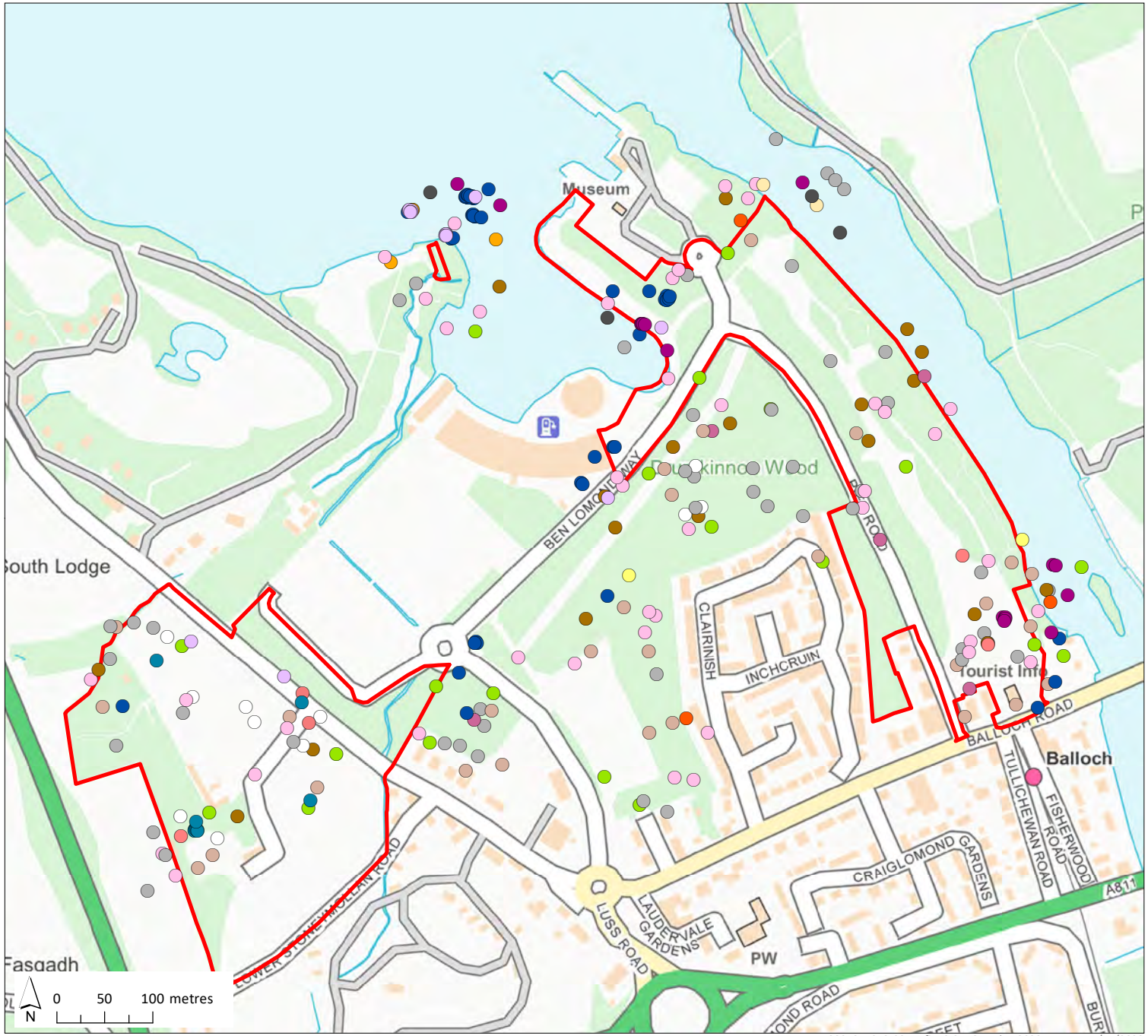

Lomond Banks

Breeding Bird Survey Results - Red and Amber BoCC

Site boundary

Red list species:

- Herring gull
- Mistle thrush
- Spotted flycatcher
- Starling
- Wood warbler

Amber list species:

- Black-headed gull
- Bullfinch
- Dunnock
- Lesser black-backed gull
- Mallard
- Moorhen
- Oystercatcher
- Redstart
- Song thrush
- Whitethroat
- Willow warbler
- Woodpigeon
- Wren

Figure 10.2

Map Scale @ A4: 1:6,000

Surveyed by: SS	
Survey date: May - July 2021	
Drawn by: RAH	
Checked by: KD	
Status: Final	

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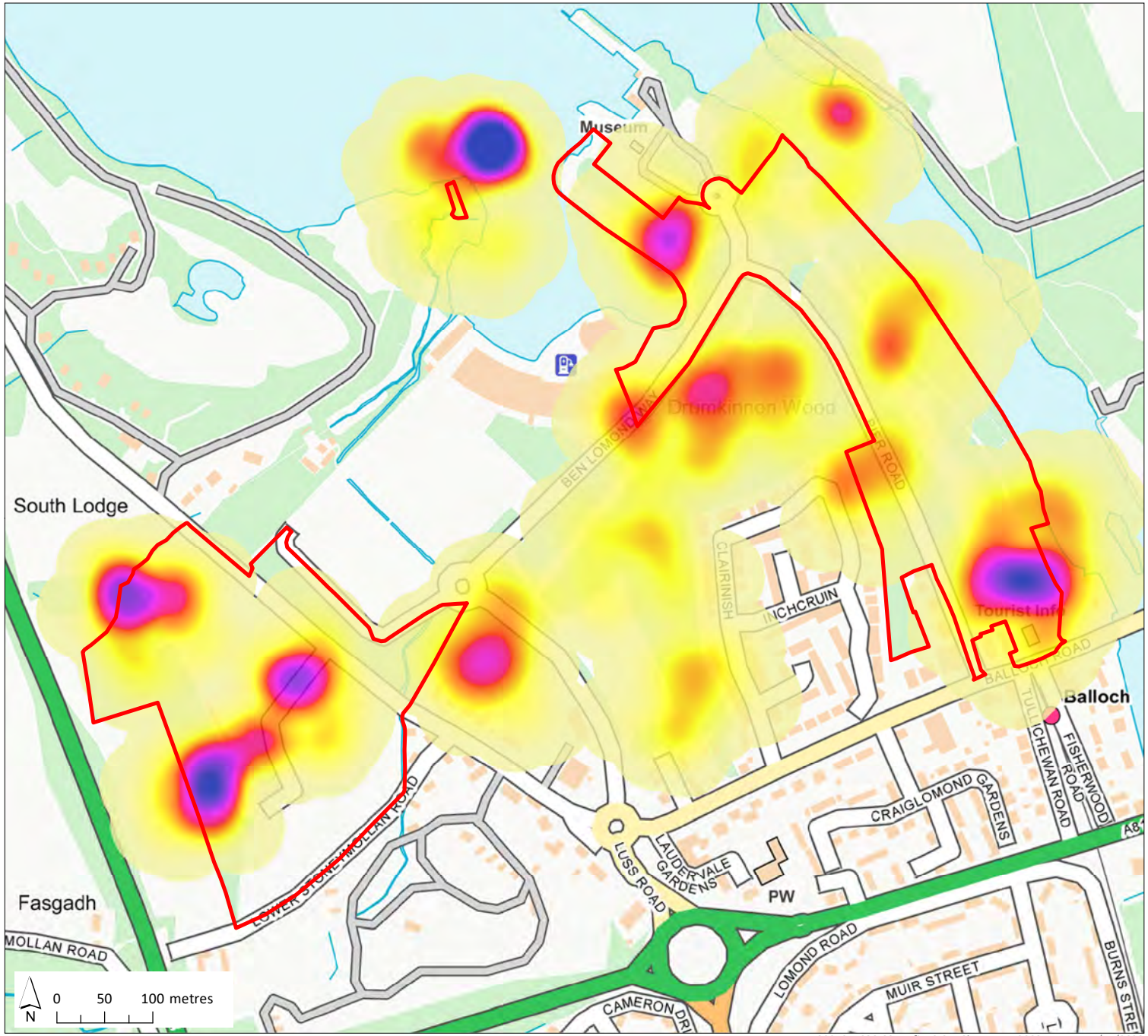

Lomond Banks

Key Areas for Birds in the Breeding Season (Heatmap)

Site boundary

Number of birds recorded:

High : 31

Low : 0

Figure 10.3

Map Scale @ A4: 1:6,000

Surveyed by: SS	
Survey date: April-July 2021	
Drawn by: RAH	
Checked by: KD	
Status: Final	

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11 Over-Wintering Birds

Methodology

Pre-existing data records

11.1 Pre-existing biological data records were sourced from the BTO Wetland Bird Survey[43], representing the most relevant dataset for wintering aquatic birds. This was because the Site included a small part of the River Leven – Balloch to Dumbarton WeBS site[44].

11.2 Pre-existing biological data records were also sourced from GMRC, for the Study Area and a 2 km buffer of this. A large number of records were subsequently supplied and were reduced to those dated within the last 10 years.

11.3 No wintering bird surveys were undertaken by EnviroCentre in 2017.

Field survey

11.4 Field surveys for over-wintering birds were based on the BTO WeBS counts method[45]. Surveys were carried out once a month between October and February inclusive. A transect route was walked covering the River Leven and the shoreline of Loch Lomond adjacent to the Proposed Development, as shown in **Figure 11.1**. The transect route took in prominent vantage points on the riverbanks and loch shore where the water and water's edge could be scanned with binoculars. When the transect was finished the same route was walked back but this time only recording species or obvious individuals (such as swans or herons) missed on the initial transect, so as to avoid double counting.

11.5 In line with WeBS, the surveys visits were carried out in the morning and lasted around three hours. All waterfowl, gulls, grebes and other aquatic birds such as herons and cormorants were counted. Passerines associated with aquatic habitats such as grey wagtails were also counted. There were no particular weather conditions selected or avoided as this would have no impact on the behaviour of most aquatic species.

11.6 Tallies of each species counted were made during the surveys. The distribution of birds counted was also recorded and later mapped on a GIS.

Limitations of the over-wintering bird survey

11.7 The River Leven was crowded with moored boats, often for its much of its width. In places, this impeded open water views in places. However, it was possible to check some of these areas from public footpaths on the opposite bank to the Site. In addition, the boats were also used as for perching by some birds, especially gulls, providing easy opportunities for counting. There was open public access and so there were no physical restrictions in carrying out the counts. The presence of often large numbers of people was not

[43] Wetland Bird Survey | BTO - British Trust for Ornithology Viewed February 2022.
[44] BTO WeBS Reports Viewed February 2022.
[45] Waterbirds in the UK (bto.org) Viewed February 2022.

considered to have any impact on the surveys at this already heavily used, public site. Therefore, there were no limitations to completing the over-wintering bird survey.

Results

Pre-existing data records

11.1 Thirty-two species of wildfowl, waders and other aquatic birds were reported within the River Leven – Balloch to Dumbarton WeBS dataset between 2015 and 2020. The species composition was similar to that found during the field surveys with 17 of the WeBS species recorded during the Site field surveys. The two most common birds were black-headed gull with a 5-year average (2015-20) peak of 192 birds and mallard with a five-year average of 113 in the same period, however these numbers are for the whole River Leven – Balloch to Dumbarton WeBS count area of which the Site forms a very small part.

11.2 There were records of 26 species of aquatic birds recorded in the Study Area and a 2 km buffer during winter periods (September – February) in the GMRC dataset. Seventeen of these species were recorded during field surveys but other, scarcer species not recorded included Iceland gull, velvet scoter, scaup, black guillemot and little auk.

Field survey

11.3 Results of the field survey are summarised in **Tables 11.1** and **11.2**, and displayed in **Figures 11.2** and **11.3.**

Species assemblage

11.4 The Site held a typical assemblage of wintering wildfowl and water birds, such as black-headed gull, mallard, tufted duck, moorhen and mute swan, as well as less common wintering wildfowl such as goldeneye. A single female long-tailed duck, normally a marine species was present near the Loch Lomond Shores retail area during four of the counts. There was one record of three guillemot, also a marine species. Other less common species included mandarin duck.

Key areas for wintering birds

11.5 There was one main cluster of high bird activity identified through the surveys. This 'hotspot' on the bank of the River Leven was largely the result of members of the public feeding birds, predominantly mallards and black-headed gulls, from a public footpath. There was also a number of moored boats which served as perching places for black-headed gulls at the same location.

11.6 There were two less intense areas of bird use in the west of the Study Area. One was also due to large numbers of mallard and gulls being fed (or anticipating being fed) by members of the public. The second, more westerly hotspot was largely associated with black-headed gulls, and to a lesser extent common gulls, using a jetty as a loafing place.

11.7 Distribution and density of aquatic birds elsewhere in the Study Area was fairly uniform and low, although there was an increased level of use near 'The Maid of the Loch' where the remains of a jetty was used as a perch for gulls and cormorants.

11.8 Thirteen of the 22 recorded species were of some conservation concern being either red- or amber listed BoCC. However, all the red-listed species were represented by a small number of individuals and in the case of long-tailed duck, a single individual. This was also true of most of the amber-listed species with the exception of mallard and black-headed gull.

Table 11.1: Summary of conservation status of over-wintering aquatic birds recorded at the Site.

BoCC status	Number of species	% species assemblage	Number of birds	% birds recorded
Red	3	14.3	48	4.4
Amber	10	42.8	958	86.9
Green	7	33.3	81	7.4
n/a	2	9.5	15	1.3
Total	**22**	**100.0**	**1102**	**100.0**

Table 11.2: Results of over-wintering bird counts.

Species	Survey date					
	12/10/2021	22/11/2021	15/12/2021	12/01/2022	10/02/2022	Total[46]
Black-headed gull	125	120	67	73	68	453
Common gull	7	19	13	8	8	55
Coot	-	-	1	1	1	3
Cormorant	3	5	4	-	2	14
Domestic/hybrid duck	2	2	2	-	-	6
Goldeneye	-	3	7	7	14	31
Goosander	-	5	9	4	1	19
Great black-backed gull	1	1	-	1	-	3
Grey wagtail	3	-	-	-	-	3
Guillemot	3	-	-	-	-	3
Heron	1	1	1	1	-	4
Herring gull	1	3	2	5	2	13
Lesser black-backed gull	21	-	-	1	-	22
Little grebe	1	2	3	3	5	14
Long-tailed duck	-	1	1	1	1	4
Mallard	64	84	82	88	71	389
Mandarin	-	-	2	6	1	9
Moorhen	4	6	9	5	4	28
Mute swan	4	2	2	2	2	12
Oystercatcher	-	-	-	-	1	1
Red-breasted merganser	1	-	-	-	-	1
Tufted duck	-	4	6	5	-	15
Total - species	**15**	**15**	**16**	**16**	**14**	**21**
Total - birds	**241**	**258**	**211**	**211**	**180**	**1102**

[46] These numbers should be taken as numbers of records (i.e., a record meaning one sighting of one individual bird) rather than actual individuals as there will have been double counting of individuals over the separate visits.

Discussion

Over-wintering birds at Lomond Banks

11.9 The field surveys results matched the BTO WeBS results in that black-headed gull and mallard were the two most abundant birds recorded, and the majority of the species recorded during the field surveys were all recorded during the WeBS counts. Nevertheless, as the Study Area only contained a small part of the River Leven WeBS count area and also captured a small section of Loch Lomond, it is difficult to make any definitive comparisons. In addition, the WeBS counts will have continued outwith the winter. The high numbers of mallard and black-headed gull, both amber-listed BoCC, resulted in a high number of birds of conservation concern being present when given as number of individuals. However, the number of these birds was artificially inflated due to their feeding by members of the public, especially in the east of the Study Area.

11.10 Less common aquatic birds included the single long-tailed duck present during four of the surveys. Although this species is primarily a winter visitor to coastal areas, records in inland lochs are relatively common[47]. Similarly, guillemot is also a marine species but records of these are also relatively common on inland lochs, especially after storms. Mandarin duck was recorded on three of the surveys, and although an introduced species, these were considered wild birds and the population of this species is increasing in western Scotland, including in the Loch Lomond area[48].

11.11 Generally however, the Site held relatively low numbers of aquatic wintering birds and most species recorded were mainly common and widespread. Under criteria developed by Fuller (1980)[49], the total of 21 species (excluding feral domestic duck) recorded at the Site does not rank it as being of any importance for wintering aquatic species, the lowest ranking of **Local** importance for wintering birds requiring a total of 25-54 species. Similarly, the Site did not have sufficient numbers of wildfowl under the same criteria (500 or 100 of two species) to assign a rank of importance to it regarding bird numbers.

Recommendations

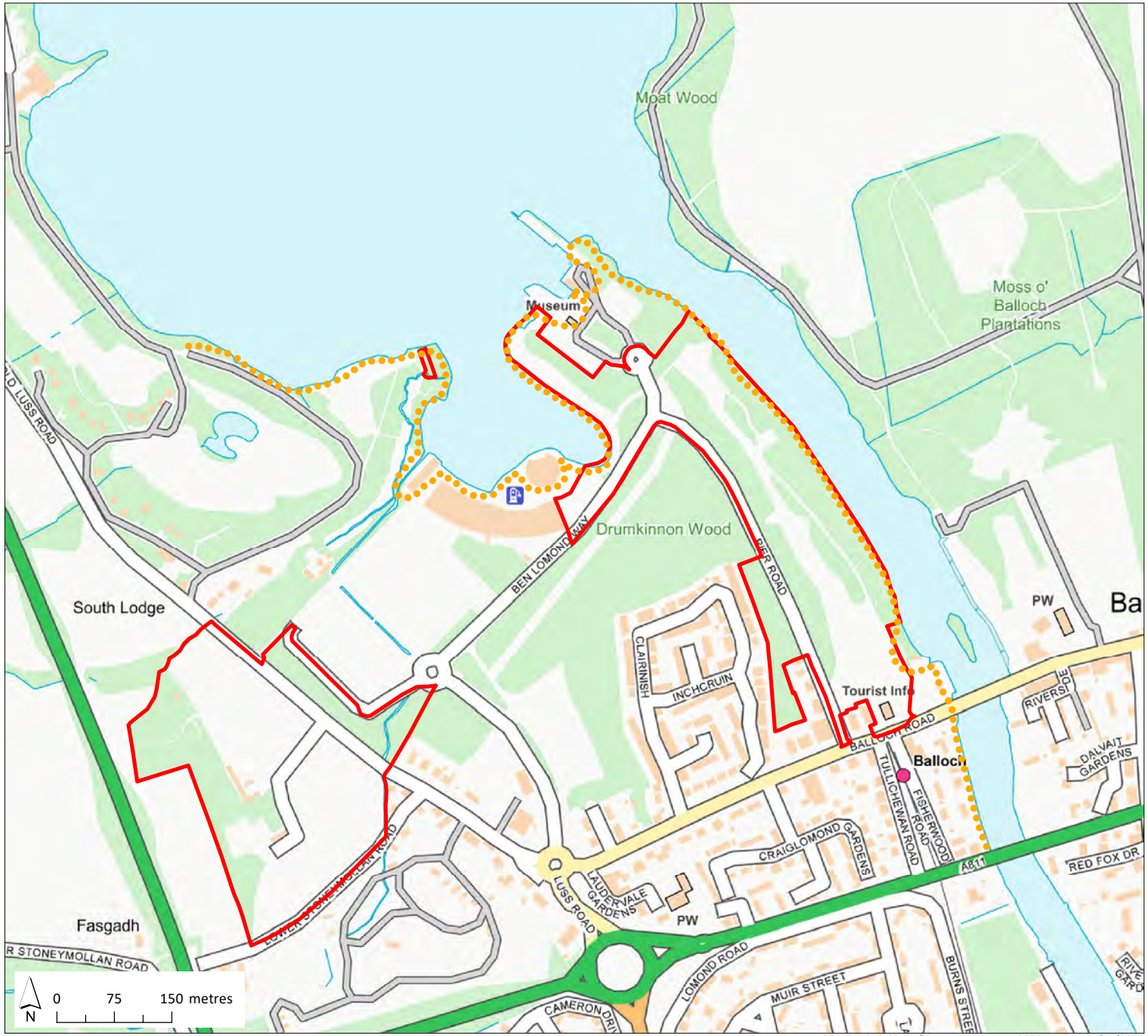
11.12 Given the widespread and commonplace nature of the over-wintering bird assemblage at Lomond Banks, these species do not need to be included in the EcIA as an IEF. However, some general best practice recommendations for working near over-wintering birds should be followed, including:

- avoiding introduction of any new direct lighting into waterbodies which are currently unlit, both during construction and operation of the Proposed Development;
- avoiding high disturbance construction activities within 10 m of the shoreline, such as piling, an hour either side of sunrise and sunset, during the winter months.

[47] **Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013)**. *Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland.* BTO Books, Thetford, p. 218.

[48] **Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. (2013)**. *Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland.* BTO Books, Thetford, p. 190.

[49] **Fuller, R.J. (1980)** A method for assessing the ornithological interest of sites for conservation. *Biological Conservation*, **17** pp229-239.



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Lomond Banks

Winter Bird Survey Strategy

Site boundary

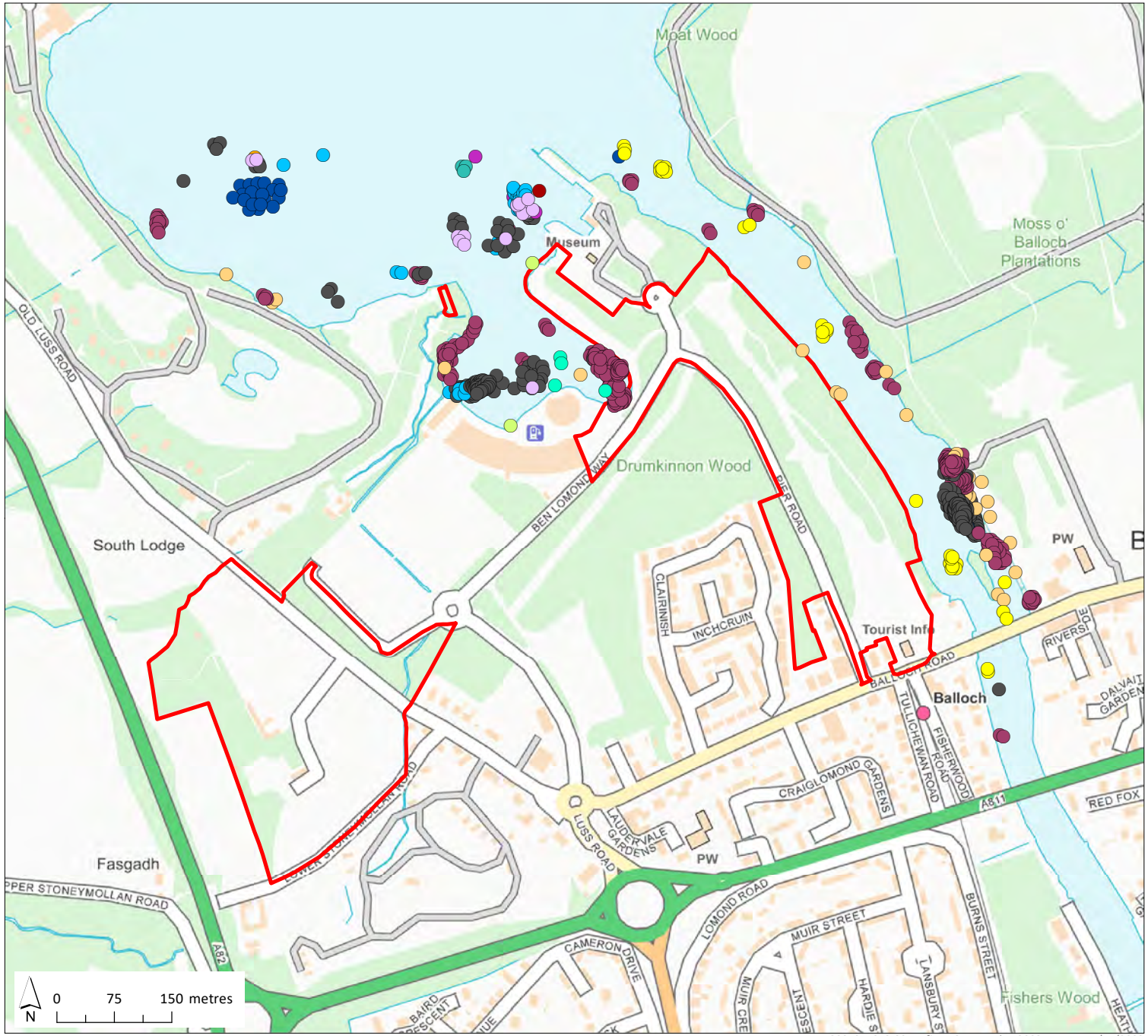
Transect route

Figure 11.1

Map Scale @ A4: 1:7,500

Surveyed by: KD	
Survey date: Nov 2021 - Feb 2022	
Drawn by: RAH	
Checked by: KD	
Status: Final	

Applied Ecology Ltd



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Lomond Banks

Over-Wintering Birds Survey Results - Red and Amber BoCC

Site boundary

Red list species:

- Goldeneye
- Herring gull
- Long-tailed duck

Amber list species:

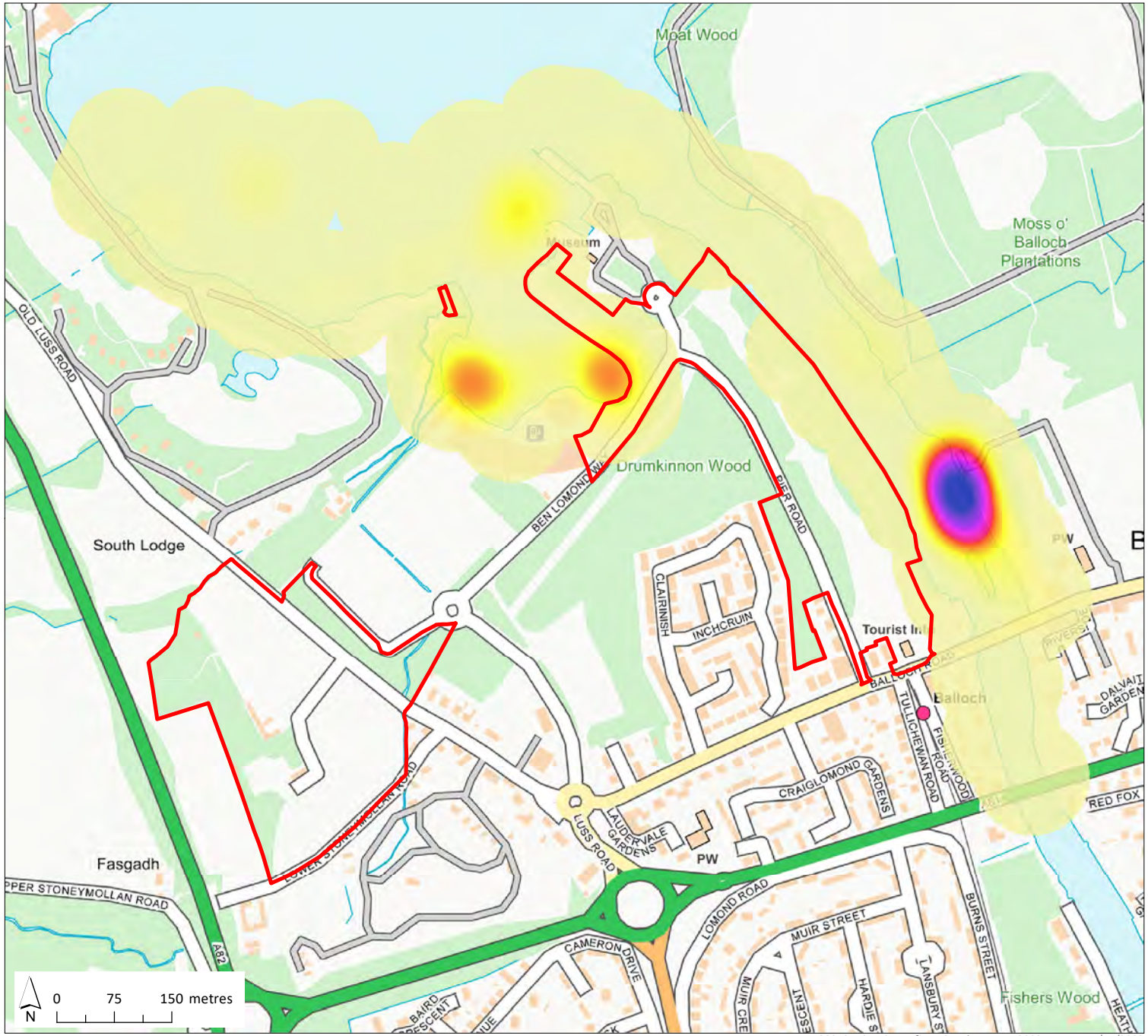
- Black-headed gull
- Common gull
- Great black-backed gull
- Grey wagtail
- Guillemot
- Lesser black-backed gull
- Mallard
- Moorhen
- Oystercatcher
- Red-breasted merganser

Figure 11.2

Map Scale @ A4: 1:7,500

Surveyed by: KD	
Survey date: Nov 2021 - Feb 2022	
Drawn by: RAH	
Checked by: KD	
Status: Final	

Applied Ecology Ltd



AELSC0501_011-05_TAfig11-3WBheatmap_20221114 A4 14/11/2022

Lomond Banks

Key Areas for Over-Wintering Birds (Heatmap)

Site boundary

Number of birds recorded:

High : 300

Low : 0

Figure 11.3

Map Scale @ A4: 1:7,500

Surveyed by: KD	
Survey date: Nov 2021 - Feb 2022	
Drawn by: RAH	
Checked by: KD	
Status: Final	

Applied Ecology Ltd

12 Conclusions

12.1 A range of habitat, protected species and ornithological survey were undertaken across the Site at Lomond Banks during 2021 and early 2022. The results of these surveys have informed constraints mapping for the proposed Development and will be utilised in the Ecology chapter of the EIAR.

12.2 These results and conclusions will remain valid for a period of 12-18 months, after which time a review would be needed.

Appendix A

List of Abbreviations Used in this Report

Abbreviation	Full terminology
AEL	Applied Ecology Ltd
AGL	Above Ground Level
AWI	Ancient Woodland Inventory
BLE	Brown long-eared bat
BoCC	Birds of Conservation Concern
BRS	Bat Roost Suitability
CIEEM	Chartered Institute of Ecology and Environmental Management
DAFOR	Dominant, abundant, frequent, occasional or rare.
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EUNIS	European Nature Information System
GIS	Geographical Information System
GMRC	Glasgow Museums Records Centre
GWDTE	Groundwater Dependent Terrestrial Ecosystem
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LDP	Local Development Plan
LLTNP	Loch Lomond and the Trossachs National Park
LLTNPA	Loch Lomond and the Trossachs National Park Authority
LNCS	Local Nature Conservation Site
MMU	Minimum Mappable Unit
ppn	[Bat] passes per night
PRA	Preliminary Roost Assessment
PRF	Potential Roost Feature
SBL	Scottish Biodiversity List
SEPA	Scottish Environmental Protection Agency
SNH	Scottish Natural Heritage (now known as NatureScot)
WANE Act	Wildlife and Natural Environment (Scotland) Act (2011)
WDC	West Dunbartonshire Council
EPS	European Protected Species
HRA	Habitats Regulations Assessment
SSSI	Site of Special Scientific Interest
SAC	Special Area of Conservation
ECoW	Ecological Clerk of Works
GPS	Global Positioning System
SSRS	Saving Scotland's Red Squirrels
BCT	Bat Conservation Trust
MTUK	Mammal Trust UK
SPP	Species Protection Plan
MEWP	Mobile Elevated Work Platform
BTO	British Trust for Ornithology

Abbreviation	Full terminology
WeBS	Wetland Birds Survey

Appendix B
Scottish EUNIS Target Notes

Target Note	Description
1	Northern strip of Drumkinnon Wood which was long-established Ancient Woodland. Mature beech along the top of the slope. Other species frequently found included mature sycamore, mature oak, birch, larch and occasional lime. Lower canopy had hazel, hawthorn and holly. Ground layer had been impacted by worn paths. Dominant native bluebell along slopes, alongside fern species, red campion, wood sorrel, dog's mercury, pink purslane, and bramble. Other frequent species found included wood sorrel, wood avens, wood speedwell, greater woodrush and herb robert. Trees throughout this area displayed bat roost suitability.
2	Previously cleared ground that was still bare. Appeared to be from an avenue historically cleared for a pipeline linking to the substation building at the north-eastern end of Drumkinnon Wood. Evidence of use as a mountain bike track which had prevented ground vegetation recovering.
3	Strip of previously cleared ground for pipeline. Now tall ruderal habitat dominated by native bluebell along with rosebay willowherb, bramble and bracken.
4	Continuation of plantation Ancient Woodland along this section of Drumkinnon Wood. Mature beech and sycamore with occasional larch, oak and birch. Hawthorn and holly in lower canopy. Similar tree composition and ground flora to TN1. Trees throughout this area displayed bat roost suitability.
5	Small clearing within woodland. Resembled amenity grassland but slightly more species rich. Red fescue the dominant grass with Yorkshire fog and sweet vernal-grass. Forb species included creeping buttercup, redshank *Persicaria maculosa*, eyebright *Euphrasia officinalis agg*., daisy, and occasional bluebell.
6	Broad-leaved woodland with naturally forming canopy dominated by birch, sycamore, oak, willow and occasional elm. Large mature oaks were scattered throughout this section of Drumkinnon Wood. Hawthorn was frequent in the lower canopy as well as occasional rowan and locally abundant honeysuckle. Species rich ground flora in many areas, with carpets of native bluebell. Where native bluebell had not formed dense carpets, it was continuous as the dominant species elsewhere at a lower density. Other dominant species included red campion, pink purslane and enchanters nightshade. Wood avens, common figwort, creeping buttercup and cleavers were all frequent. Opposite-leaved golden saxifrage was locally abundant further south, and common nettle, rosebay willowherb and dense bracken were found adjacent to previous disturbed ground. Highly shaded areas in the north-east of Drumkinnon Wood had less ground cover, with scattered native bluebell, ferns, bramble and foxglove *Digitalis purpurea*. Trees throughout this area displayed bat roost suitability.
7	Embankment within Drumkinnon Wood that was overwhelmingly dominated by sycamore, both mature specimens and dense sapling regeneration. Occasional birch. Bluebells not as densely occurring along this section as the ground layer was highly shaded. Species found included ferns, bramble, native bluebell and locally abundant common comfrey.
8	Strip of younger broad-leaved plantation woodland surrounding Lomond Shores constructed car park. Commonly found mixture of species within this type of screening planting including ash, wild cherry, birch, oak and occasional lodgepole pine. Ash trees appeared to be heavily afflicted with dieback.
9	Broad-leaved woodland that appeared younger in structure with possible previous planting. Now formed natural occurring canopy. Southern end of woodland had oak, sycamore birch and willow. Hawthorn was frequent in lower canopy. Shading in places had reduced density of the ground flora, but native bluebell was dominant throughout. Other species included ferns, common comfrey, wood avens, red campion, enchanters nightshade, honeysuckle, common nettle, Welsh poppy and bramble. Far southern end of the woodland had evidence of garden escapee plants such as cotoneaster and Spanish bluebell. Trees throughout this area displayed bat roost suitability. Nest boxes were erected on small number of trees.
10	Broad-leaved woodland with evidence of planting adjacent to road. Ash and hazel appeared to be the most dominant species planted as part of screening at the roadside. Remainder of woodland in this area was naturally occurring canopy of sycamore, oak, birch and elm. Lower canopy had hawthorn, elder and hazel. Ash trees appeared to have dieback. Ground layer had dominant bluebells with hybrid/Spanish bluebell more dominant further south. Common nettle, ferns, cleavers, creeping buttercup, red campion, wood avens, Welsh poppy and bramble all occurred frequently. Far southern end was not accessible due to dense vegetation. Trees throughout this area displayed bat roost suitability.
11	Fragmented section of broad-leaved woodland that would have originally have been part of Drumkinnon Wood. It was now separated by the Lomond Shores path network. The woodland was enclosed by planted ornamental beech hedge. Scattered mature species throughout included oak, sycamore and ash. Additional planting in recent years appeared to have been carried out with younger specimens of birch, elder, hawthorn and rowan. Highly shaded ground flora but dominant native bluebell was evident throughout alongside

Target Note	Description
	bramble, ferns, common comfrey and common nettle. There was a line of planted ornamental lime trees along the southern edge adjacent to the road. Trees throughout this area displayed bat roost suitability.
12	Southern edge of Lomond Shores building that was located on Site boundary. Building has modern construction and did not display any bat roost suitability. Surrounding area was mostly hard standing with ornamental hedge landscaping as well as a playpark.
13	Section of broad-leaved plantation woodland from Lomond Shores development. Woodland was enclosed with ornamental beech hedge. Alder, oak, elm, rowan and willow dominant. Frequent lodgepole pine but overall not high enough density to be classed mixed plantation.
14	Bare gravel manmade shoreline. No vegetation. Northern edge had line of trees dominated by planted alder and birch.
15	Plantation woodland similar species to TN13 but slightly larger in area. Enclosed by ornamental beech and hawthorn hedge. Ground layer was highly shaded and limited to saplings, patches of field horsetail *Equisetum arvense* and locally abundant creeping buttercup along the northern edge.
16	Strip of broad-leaved woodland. Not ancient woodland in form but had naturally occurring diverse structure. Birch, sycamore, oak and elm all were frequently occurring. Willow was dominant along the northern edge. Hazel, hawthorn, elder and rowan comprised the lower canopy. Ground layer was highly shaded in places and was limited to ferns, common nettle and saplings in these areas. Richer ground flora was evident elsewhere with bluebell (dominated by hybrid/Spanish), dog's mercury, wood avens, pink purslane and red campion. Common figwort and Welsh poppy were found occasionally. Common nettle, creeping buttercup and wild strawberry were locally abundant along the northern edge. Rhododendron and cotoneaster was within the woodland at NS 38861 82100. Trees throughout this area displayed bat roost suitability.
17	Continuation of woodland similar to TN16 but more dominated by willow. Sycamore, birch and elm were still frequent but oak was absent. Tall ruderal fringes along the northern edge, with common nettle, cleavers, rosebay willowherb, creeping buttercup and common hogweed. Patches of Japanese knotweed at NS 38912 81974 and NS 38927 81963.
18	Strip of broad-leaved woodland similar to TN16. Sycamore, birch, ash and elm were dominant with occasional beech. Hazel and hawthorn and holly were frequent in the lower canopy. Scattered willow along edge of the water but no continuous cover. Ground flora was again highly shaded in places and comprised dominant ferns and common nettle in these areas. More species rich ground flora occurred in patches throughout, with wood avens, enchanters nightshade, common comfrey, creeping buttercup, cleavers and herb robert all commonly found. Dense patches of bramble occurred along the slope adjacent to the water. Patches of woodland on the southern side of the path tended to have additional species such as germander speedwell, wood forget-me-not, wild strawberry, cuckoo flower and occasional raspberry. Hyrbrid/Spanish bluebell throughout this section of woodland. Patch of snowberry at NS 38837 82291. Trees throughout this area displayed bat roost suitability. Piles of previously felled wood in places here, suitable for invertebrates.
19	Gravel bare shoreline with open water. No vegetation within gravel.
20	Amenity grassland strip between woodland. Frequently mown and areas were heavily worn from continuous foot traffic. Red fescue, Yorkshire fog and rough meadow grass were the dominant grasses. Forb species included creping buttercup, ribwort plantain, greater plantain, daisy, white clover and black medic.
21	Mixed plantation woodland strip with larch and elm dominant. North-eastern fringe was more recent plantation broad-leaved woodland associated with Lomond Shores development. Young trees comprising birch, oak, ash and willow. Ground flora was shaded along the south-west edge of mixed plantation woodland. Common nettle and bramble were the most frequently occurring species. Yong magpie fledgling found on the ground.
22	Broad-leaved woodland with naturally occurring canopy. Wetter ground conditions related to the burn have led to dominant willow, sycamore, oak, elm and also frequent alder. Ground flora was species rich with ferns, native bluebell, greater woodrush, common comfrey, woodruff, red campion, Welsh poppy, wood avens and herb robert. Dog's mercury was locally abundant near the burn. Himalayan balsam found in small areas along burn. Trees throughout this area displayed bat roost suitability.
23	Woodland structure similar to TN22, but alder more frequent along burn. Larger scattered mature oak trees in places. Opposite-leaved golden saxifrage carpeted the side of the burn, underneath a dense covering of common comfrey. Common nettle, greater woodrush, ferns were other dominant species. Cleavers and bramble occurred frequently with occasional wood speedwell and Welsh poppy. Trees throughout this area displayed bat roost suitability.

Target Note	Description
24	Tall ruderal clearing within woodland with common nettle and bracken dominant. Carpet of native bluebell occurred on the ground underneath.
25	Remnants of old woodland, with sizeable trees within fenced section. Large beech, oak, sycamore and ash trees. Canopy more spacious with less small tree species but hawthorn and younger sycamore comprised the lower canopy. A carpet of dense native bluebell (with occasional hybrid bluebell) comprised the majority of the ground layer. Pink purslane and common comfrey were frequent. Large patch of Japanese knotweed was found in the north-east corner of the woodland. Trees throughout this area displayed bat roost suitability.
26	Small strip of broad-leaved plantation woodland along the edge of adjacent gardens. Beech, ash, birch, elm and hawthorn.
27	Previous grazed field within wider grounds of Woodbank House. Grazing had not occurred in many years and now a relatively species rich meadow had formed. Dominant grasses included Yorkshire fog, meadow foxtail, red fescue and sweet vernal-grass. Timothy grass was frequent. Dominant other species included creeping buttercup, meadow buttercup, common sorrel, germander speedwell, black medic and ribwort plantain. Broad-leaved dock was locally abundant along the northern edge. A single elder shrub was within the centre of the field.
28	Similar open grassland to TN27 but with slightly wetter conditions as soft rush was frequent throughout. No other indicators of marshy grassland were found. Dominant grasses were Yorkshire fog, rough meadow grass, sweet vernal-grass and meadow foxtail. Cock's-foot was frequent. Common sorrel, ribwort plantain, creeping buttercup, meadow buttercup were the dominant forbs, alongside frequent germander speedwell, common knapweed, common hogweed and lady's mantle. Patches of bramble scrub occurred throughout, especially in the far south-west. Scattered mature trees in the south-west of the field with two large ash trees within the field, and mature oaks along the south-west boundary. Nuthatch nest confirmed within mature ash at NS 38188 81677. Patch of Himalayan balsam at NS 38169 81698. Mature trees in the south-west displayed bat roost suitability. Mature ash trees displayed bat roost suitability.
29	Line of scrub along boundary dominated by bramble and wild privet. Trees interspersed with scrub including sycamore, hawthorn, beech and locally abundant section of willow scrub.
30	Line of scrub and trees that had formed along existing avenue to Woodbank House at the field boundary. Dense bramble sat in front of dense rhododendron from previous landscaping. Leylandii and common laburnum with wild cherry also throughout. Trees throughout this area displayed bat roost suitability.
31	Old walled garden at the top of woodland slope and still enclosed by remnants of old stone wall. Now dominated by sycamore trees with occasional yew and hawthorn. Ground flora was shaded and limited to ferns and common comfrey.
32	Ancient Woodland as part of Woodbank House. Mature oaks frequent along with sycamore, ash, yew, silver birch and lime. Wild cherry found frequently in lower slopes of woodland here. Lower canopy had occasional elder and rowan. Majority of the sloped ground layer was covered in extremely dense rhododendron or cherry laurel. Upper slopes of the woodland had richer ground flora with carpet of native bluebell, wood sorrel and ferns Trees throughout this area displayed bat roost suitability.
33	Woodland around Woodbank House with species including wild cherry, willow, sycamore and lime with occasional mature oaks. Dense rhododendron throughout along with scattered cherry laurel. Trees throughout this area displayed bat roost suitability.
34	Ancient Woodland with large mature oaks, but frequent sycamore. Ground layer on lower slopes had continuous dense rhododendron and large extended area of bamboo. Trees throughout this area displayed bat roost suitability.
35	Highest quality section of Ancient Woodland with mature oaks but a lot of sycamore still found here. Carpet of dense native bluebell extending down the slope, with wood sorrel, greater stitchwort, pink purslane, fringecups and occasional pignut and common figwort. Wild garlic was locally abundant along the northern edge. Rhododendron less frequent in this section of woodland but scattered stands still present. Trees throughout this area displayed bat roost suitability.
36	Dense overgrown scrub surrounding existing ruined buildings, also occurring within the buildings. Bramble most common species here with scattered cherry laurel and rhododendron.
37	Eastern edge of woodland had a higher incidence of ornamental tree species from previous historic landscaping that were now of considerable size.

Target Note	Description
38	Scrub woodland forming at old pier. Successional habitat forming with regenerating alder, silver birch and willow. Broad-leaved woodland adjacent at the southern side of this habitat with mature oaks and sycamore. Ground flora of scrub woodland signalled wetter conditions with meadowsweet and common valerian. Other species here included creeping buttercup, bramble, fringecups and red campion. Wet ditch was located at the south-eastern end of this part of the Site but had no water within the channel at the time of the survey.

Appendix C
Habitat Survey Photographs

(a) Drumkinnon Wood mixed broad-leaved woodland, with carpet of native bluebell, as described in TN6.

(b) Drumkinnon Wood mixed broad-leaved woodland, in the southern section described in TN10.

(c) Woodbank mixed broad-leaved woodland, with dense bamboo and rhododendron as described in TN34.

(d) Woodbank mixed broad-leaved woodland in the highest quality northern section, as described in TN35.

(e) Mixed plantation woodland along Old Luss Road, as described in TN21.

(f) Broad-leaved plantation woodland around the Pierhead, as described in TN15.

(g) Scrub woodland around the Boathouse area of the Site, as described in TN38.

(h) Strip of mixed scrub, with bramble and rhododendron, as described in TN30.

(i) mosaic of dense bramble scrub in the west of the Sitw within grassland field and individual mature trees.

(j) Northern section of unmown abandoned pasture (before mowing took place in July 2021), as described in TN27.

(k) Southern section of unmown abandoned pasture (before mowing took place in July 2021), as described in TN28.

(l) Open amenity grassland area in the east of the Site, lined by two areas of mixed broad-leaved woodland, as described in TN20.

(m) Area of bare ground within Drumkinnon Wood that was cleared as part of INEOS pipeline, as described in TN2.

(n) River Leven in the east of the Site that was classified as surface standing water.

(o) Derelict structures in the west of the Site that were classified as buildings.

(p) An example of a watercourse within the Site (TN23) that was classified as flowing water.

(q) An example of the highly managed hedgerows found across the Site.

(r) Line of mature lime trees along the field boundary in the west of the Site.

(s) Patches of hybrid/Spanish bluebell within the east of the Site.

(t) Dense rhododendron within the Woodbank woodland.

(u) Dense area of bamboo within Woodlank woodland.

(v) Cherry laurel surrounding existing derelict buoldings.

(w) Himalayan balsam growth in the west of the Site.

(x) Dense patch of Japanese knotweed in the Ben Lomond Way section of the Site.

Appendix D
Squirrel Feeding Station Results

Date	Location 1	Location 2	Location 3	Location 4	Location 5
11/1/22	No activity.	Grey squirrel repeatedly visiting feeder.	No activity.	No activity.	-
12/1/22	No activity.	Two grey squirrels repeatedly visiting feeder.	No activity.	No activity.	-
13/1/22	No activity.	Two grey squirrels repeatedly visiting feeder.	No activity.	No activity.	-
14/1/22	No activity.	Two grey squirrels repeatedly visiting feeder.	Two grey squirrels recorded chasing each other.	No activity.	-
15/1/22	No activity.	Two grey squirrels repeatedly visiting feeder.	No activity.	No activity.	-
16/1/22	No activity.	Feeder now empty. Grey squirrel recorded in the hours after dawn.	No activity.	No activity.	-
17/1/22	No activity.	No activity.	No activity.	No activity.	-
18/1/22	No activity.	No activity.	No activity.	No activity.	-
19/1/22	No activity.	Grey squirrel recorded in the hours after dawn.	No activity.	No activity.	-
20/1/22	No activity.	Camera moved to Location 5.	No activity.	No activity.	Camera deployed from Location 2.
21/1/22	No activity.	-	Grey squirrel briefly visiting feeder.	No activity.	No activity.
22/1/22	No activity.	-	Grey squirrel repeatedly visiting feeder.	No activity.	Camera malfunctioned due to battery error
23/1/22	No activity.	-	Grey squirrel repeatedly visiting feeder.	No activity.	-
24/1/22	No activity.	-	Grey squirrel repeatedly visiting feeder. Two greys on camera briefly.	No activity.	-
25/1/22	No activity.	-	Feeder now empty. Grey squirrel recorded in the hours after dawn.	No activity.	-
26/1/22	No activity.	-	Grey squirrel recorded in the hours after dawn.	Grey squirrel repeatedly visiting feeder.	-
27/1/22	No activity.	-	Grey squirrel recorded in the hours after dawn.	Grey squirrel repeatedly visiting feeder.	-

Date	Location 1	Location 2	Location 3	Location 4	Location 5
28/1/22	No activity.	-	Grey squirrel recorded in the hours after dawn.	Grey squirrel repeatedly visiting feeder.	-
29/1/22	No activity.	-	Grey squirrel recorded in the hours after dawn.	No activity.	-
30/1/22	No activity.	-	Grey squirrel recorded in the hours after dawn.	Two clips of grey squirrel passing feeder.	-
31/1/22	No activity.	-	Grey squirrel recorded in the hours after dawn.	No activity.	-
1/2/22	No activity.	-	No activity.	No activity.	-
2/2/22	No activity.	-	No activity.	One clip of grey squirrel at feeder.	Feeder was empty on retrieval.

Appendix E

Photographs from Building Bat Surveys (PRA and Activity Surveys)

(a) Building A – part of the northern and eastern façade.

(b) Building A – southern and western façade.

(c) Building A – internal area of the building which had almost entirely collapsed.

(d) Building A – internal area of the eastern section of the building. Dense overgrown vegetation prohibited safe access.

(e) Building A - internal stone walls with numerous crevices for both summer roosting and potentially hibernation.

(f) Building A – deep sheltered void within previous fireplace.

(g) Building A – missing mortar on external wall with deep crevice.

(h) Building A – void on the northern façade, with flight access to basement area with hibernation suitability which was not safe to access.

(i) Building A – general area of three roost locations on the northern elevation, identified during the dusk survey on 14 July 2021.

(j) Building A – general area of roost location recorded on the eastern internal wall of the building, during the dawn survey on 30 July 2021.

(k) Building A – general area of roost location recorded on the northern external wall of the building, during the dawn survey on 30 July 2021.

(l) Building B – southern façade.

(m) Building B – what remained of the eastern façade of the building.

(n) Building B – northern façade.

(o) Building B – western façade.

(p) Building B – remaining internal section of the building.

(q) Building B – remaining internal section of the building on the southern side.

(r) Building B – void within existing window lintels throughout the building.

(s) Building B – potential roosting space behind broken plaster within internal areas.

(t) Building B – sheltered space under existing stairwell with crevices suitable for hibernation.

(u) Building B – general area of roost location recorded on the northern external wall of the building, during the dusk survey on 13 July 2021.

(v) Building C – southern and eastern façade.

(w) Building C – western façade.

(x) Building C – northern façade.

(y) Building C – internal area with single lined roof.

(z) Building C – chimney at the southern end of the building with minimal stone crevices.

Appendix F
Tree PRA Results

Tree tag	Area of Site	x	Y	Description of PRFs	Bat roost suitability	Species
390	Woodland south of the Ben Lomond Way roundabout	238428	681896	Large mature tree with multiple potential roost features. Snapped tear out on south side at 7 m Above Ground Level (AGL). Snag limbs at various heights. One snagged limb has failed hazard beam feature at 4 m AGL.	Moderate	Ash
393	Woodland south of the Ben Lomond Way roundabout	238439	681899	Hole on south facing branch at 5 m AGL where it joined with trunk.	Low	Birch
397	Woodland south of the Ben Lomond Way roundabout	238439	681910	Row of fallen ash trees. One remaining standing had no tag but was next to tag 397. Snag limb visible on east side at 11 m AGL.	Low	Ash
-	Woodland south of the Ben Lomond Way roundabout	238438	681889	Cavity in trunk on north side at 4.5 m AGL that appeared to be relatively shallow.	Low	Lime
-	Woodland south of the Ben Lomond Way roundabout	238434	681898	Southern branch had failed hazard beam at 7 m AGL.	Moderate	Oak
-	Woodland south of the Ben Lomond Way roundabout	238387	681921	Large tree with dense ivy cover. Potential for features behind ivy due to size.	Moderate	Ash
-	Woodland south of the Ben Lomond Way roundabout	238383	681919	Large tree with dense ivy cover. Potential for features behind ivy due to size.	Moderate	Beech
391	Boathouse	238381	682388	Hole visible on north branch at 4.5 m AGL. Potential for features at height due to size and age.	Moderate	Oak
-	Boathouse	238364	682375	Outside the boundary of boathouse but in close proximity. Large tree that is part of aerial climbing course. Two kent style bat boxes on western side of trunk. Inspected with torch but no bats present.	Moderate	Oak
-	Boathouse	238380	682372	Outside the boundary of boathouse but in close proximity. Large tree that is part of aerial climbing course. Potential for features at height due to size and age.	Moderate	Oak
-	Drumkinnon Parking	238825	682064	Cavity in trunk at 1.5 m AGL that extended a considerable distance. Cavity was dry when inspected with endoscope.	Moderate	Elm

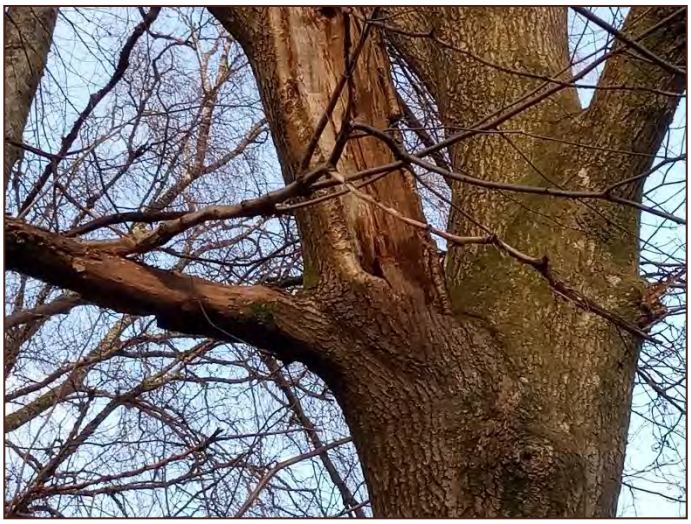
Tree tag	Area of Site	x	Y	Description of PRFs	Bat roost suitability	Species
-	Drumkinnon Parking	238858	682012	Cavity in east facing branch at 4.5 AGL.	Moderate	Elm
-	Drumkinnon Parking	238838	681991	Twisted broken limb at 5 m AGL with potential for small cavities in splintered wood.	Low	Elm
-	Riverside	238707	682386	Single snapped limb at 8 m AGL but appeared to be upward facing.	Low	Elm
-	Riverside	238716	682426	Dead standing tree with large bend in trunk. Deadwood splintered at top of tree but any cavities likely upward facing. Unsafe to climb.	Low	Birch
-	Riverside	238701	682444	Included due to potential SUDS area. Large cavity in trunk at 4.5 m AGL.	High	Birch
-	Riverside	238875	682259	Large tree with knotholes visible on main trunk at various heights. Potential for additional features at height.	Moderate	Ash
-	Riverside	238878	682259	Large tree with knotholes visible on main trunk at various heights. Potential for additional features at height.	Moderate	Ash
-	Riverside	238863	682241	Frost crack in east facing branch at 10 m AGL with potential cavity.	Moderate	Elm
-	Riverside	238848	682235	Cavity on east side of trunk at 3 m AGL. Torch confirmed it extended upwards.	Moderate	Elm
-	Riverside	238868	682094	Sheltered cavity in leaning trunk at 3 m AGL.	Moderate	Elm
-	Riverside	238868	682101	Potential cavity from wound in south facing branch at 4 m AGL.	Moderate	Elm
-	Riverside	238772	682278	Frost crack with potential cavity on northern side of trunk at 7 m AGL.	Moderate	Birch
-	Riverside	238768	682273	Snapped deadwood visible in upper sections at over 20 m AGL.	Moderate	Oak
-	Riverside	2388752	682283	Series of knotholes in lower sections that are likely to be shallow.	Low	Sycamore
-	Riverside	238757	682307	Cavity in leaning trunk on top side at 8 m AGL.	Moderate	Elm
-	Riverside	238747	682317	Dead tree with large split up trunk. Potential for pockets within the split but open at the top. Unsafe to climb.	Low	Sycamore
-	Riverside	238768	682271	Rot hole on branch at 12 m AGL. Unsafe to climb.	Moderate	Oak
490	Woodbank	238299	681869	Broken limbs at height. Upward facing.	Low	Lime
492	Woodbank	238272	681887	Broken limbs at height. Upward facing.	Low	Lime
493	Woodbank	238224	681931	Split in stem between 2-5 m AGL. Shallow dry crevice.	Low	Lime
495	Woodbank	238173	681971	Twin stem with deadwood at the split. Upward facing cracks.	Low	Lime

Tree tag	Area of Site	x	Y	Description of PRFs	Bat roost suitability	Species
496	Woodbank	238158	681985	Potential for features at height due to size and age.	Moderate	Lime
497	Woodbank	238153	681988	Broken limbs at height. Upward facing.	Low	Lime
498	Woodbank	238139	681994	Broken limbs at height. Upward facing.	Low	Lime
499	Woodbank	238127	682010	Broken limbs at height. Upward facing.	Low	Lime
507	Woodbank	238073	682001	Knothole on east facing trunk at 5 m.	Low	Ash
517	Woodbank	238016	681956	Split deadwood with cracks.	Moderate	Oak
553	Woodbank	238022	681917	Snapped off limb with cavity at 7 m AGL. Rotten section in upper branch over 15 m AGL.	Moderate	Oak
574	Woodbank	238006	681899	Large tree with potential for features not visible from ground level due to size and age.	Moderate	Oak
583	Woodbank	238022	681895	Large tree with potential for features not visible from ground level due to size and age.	Moderate	Oak
588	Woodbank	238012	681907	Split on south facing branch at 10 m AGL.	Moderate	Oak
643	Woodbank	238093	681901	Large tree with snapped off limb on eastern side. Could not see into snapped limb from ground level but there was potential for cavities.	Moderate	Larch
645	Woodbank	238096	681903	Split in east facing branch at 20 m AGL.	Moderate	Oak
652	Woodbank	238115	681866	Large oak. Clear feature on south facing branch at 20 m AGL. Potential for additional features due to size and age.	Moderate	Oak
666	Woodbank	238146	681853	Cavity in main trunk at 6 m AGL.	Moderate	Sycamore
672	Woodbank	238182	381838	Large tree. Numerous high quality features at various heights	High	Oak
673	Woodbank	238183	681825	Large tree. Lifted bark on broken limb. Potential for features at height due to size and age.	Moderate	Oak
694	Woodbank	238217	681728	Cavities at around 1 m AGL leading into stem.	Moderate	Ash
713	Woodbank	238047	681902	Large tree with potential for features not visible from ground level due to size and age.	Moderate	Oak
719	Woodbank	238062	681902	Large tree with numerous high quality features. Split limb and nearby clear hole on underside of west facing branch at 15 m AGL.	High	Oak
728	Woodbank	238062	681922	Woodpecker holes in north facing limb at over 15 m AGL.	High	Oak
823	Woodbank	238070	681853	Large tree. Multiple cracked limbs with downward facing openings.	Moderate	Oak

Tree tag	Area of Site	x	Y	Description of PRFs	Bat roost suitability	Species
826	Woodbank	238024	681838	Large tree with deadwood visible on snag limbs. Potential for other features at height due to size and age.	Moderate	Oak
836	Woodbank	238061	681848	Large tree. Multiple cracked limbs with downward facing openings.	Moderate	Ash
851	Woodbank	238014	681868	One notable feature on bend in branch at 20 m AGL.	Moderate	Oak
856	Woodbank	238021	681877	Knotholes and snag limbs visible at various heights. Potential for features not visible from ground level due to size and age.	Moderate	Oak
859	Woodbank	238035	681876	Old large oak with potential for features not visible from ground level due to size and age.	Moderate	Oak
862	Woodbank	238051	681872	Large old tree. Snapped limb with potential cavity at 15 m AGL.	Moderate	Oak
863	Woodbank	238050	681868	Old large oak with potential for features not visible from ground level due to size and age.	Moderate	Oak
864	Woodbank	238053	681878	Dead snag limbs at various heights. Potential for features not visible from ground level due to size and age.	Moderate	Oak
866	Woodbank	238062	681875	Old large oak with potential for features not visible from ground level due to size and age.	Moderate	Oak
868	Woodbank	238072	681874	Large oak with multiple high quality features at various heights.	High	Oak
882	Woodbank	238105	681851	Large tree with knotholes visible on main trunk at various heights.	Moderate	Lime
883	Woodbank	238110	681836	Old large oak. Deadwood visible in lower sections and potential for features not visible from ground level due to size and age.	Moderate	Oak
1254	Woodbank	238158	681649	Cavities visible within various broken limbs. Potential for features at heigh due to size and age.	High	Oak
1255	Woodbank	238166	681707	Broken limbs at height. Upward facing.	Low	Oak
1256	Woodbank	238162	681691	Multiple cracked/ twisted limbs with crevices and lifted bark.	High	Oak
1258	Woodbank	238170	681681	Large dead tree. Multiple knotholes and dead limbs with cracks.	High	Ash
1260	Woodbank	238197	681676	Large tree. Numerous high quality features at various heights	High	Ash
1270	Woodbank	238144	681691	Knotholes at height. Twisted limb with fissure.	High	Oak
1536	Woodbank	238153	681777	Thick, interweaving ivy that was thick enough to provide some potential roosting space for individual bats.	Low	Sycamore
1537	Woodbank	238155	681775	Thick, interweaving ivy that was thick enough to provide some potential roosting space for individual bats.	Low	Sycamore

Tree tag	Area of Site	x	Y	Description of PRFs	Bat roost suitability	Species
1539	Woodbank	238152	681776	Thick, interweaving ivy that was thick enough to provide some potential roosting space for individual bats.	Low	Sycamore
1546	Woodbank	238111	681779	Large tree with thick, interweaving ivy that was preventing full view. Split limbs visible at various heights.	Moderate	Oak
1555	Woodbank	238097	681804	Crevices in deadwood between 2-3 m AGL. Twisted/borken limbs with downward facing cracks.	Moderate	unknown
1558	Woodbank	238139	681792	Multiple downward facing cracks on broken limbs. Potential for features at height due to size and age.	High	Oak
1565	Woodbank	238170	681768	Large tree with potential for features not visible from ground level due to size and age.	Moderate	Lime
1574	Woodbank	238129	681800	Cracked limbs with downward facing openings.	Moderate	unknown
1579	Woodbank	238103	681815	Broken upward facing limbs.	Low	unknown
1599	Woodbank	238183	681804	Multiple broken limbs with cracks. Potential for features at height due to size and age.	Moderate	Oak
1600	Woodbank	238181	681811	Fissures all the way up the stem. Some shallow closer to ground level but not possible to assess ones higher up.	Moderate	Yew
-	Woodbank	238191	681734	Downward facing split in twisted branch.	Moderate	Goat willow
-	Woodbank	238154	681775	Thick, interweaving ivy that was thick enough to provide some potential roosting space for individual bats.	Low	Sycamore
-	Woodbank	238110	681812	Woodpecker hole visible.	Moderate	Birch
-	Woodbank	238102	681844	Old oak that has dead sections. Knothole and snag limb visible on north and south branches at 15 m AGL.	Moderate	Oak
-	Woodbank	238040	681840	Dead tree leaning towards fence line. Long crack with suitable crevice. Unsafe to climb.	Moderate	Ash

Appendix G
Photographs from the Ground Level Tree PRA



(a) Tear out with cavity at the base on Tree 390 in woodland south of the Ben Lomond Way roundabout.

(b) Cavity in elm tree within Drumkinnon Parking area.

(c) Cavity within birch tree within potential SUDs area in the Riverside area of the Site.

(d) Dense vegetation and tree cover within the Woodbank woodland.

(e) Area in the north-west of the Woodbank woodland with higher concentration of mature oaks.

(f) Split on branch typical of that found on mature trees in the Woodbank woodland.

(g) Tree 1258 in the Woodbank Area of the Site with numerous high quality features (picture taken in summer 2021).

(h) Large mature oak tagged as 574, typical of trees found in north-west section of Woodbank Woodland (picture taken in summer 2021). Often these trees were too large to fully rule out features from ground level.

(i) High suitability woodpecker hole on Tree 728 in the Woodbank woodland.

Appendix H
Building Activity Survey Results

Abbreviation used	Full Latin name	Common name
P. pyg	*Pipistrellus pygmaeus*	Soprano pipistrelle
P. pip	*Pipistrellus pipistrellus*	Common pipistrelle
Pip sp.	*Pipistrellus* sp.	Pipistrelle species
P. aur	*Plecotus auritus*	Brown long-eared bat
Myotis sp.	*Myotis* species	Myotis species
Chiro sp.	*Chiroptera* species	Bat species

Appendix H1: Building A activity survey results.

Dusk survey on 14 July 2021 – Surveyor 1

Target note	Time	Species	Activity
1	21:43	P. pyg	An individual bat was recorded commuting from north to south over the building.
2	21:53	P. pyg	Bat flew through window on the north elevation of the building.
3	21:17-23:20	P. pyg and P. pip	Bats were intermittently recorded foraging between surveyors 1, 2 and 4 throughout the survey. Both soprano and common pipistrelle bat species were recorded with a maximum of two bats foraging in the area at any one time.
4	22:21	P. pip	An individual bat was recorded commuting from east to west over the building.
5	22:50	Myotis sp.	Bat flew over the east elevation of the building. Not heard echolocating with Petterson but calls recorded on Anabat Swift.
6	23:01	Chiro sp.	An individual bat was recorded flying into the internal area of the building through a window on the west elevation. The bat was not echolocating and the Anabat Swift recorded no calls at this time.
7	23:09	P. pip	An individual bat was recorded commuting from north to south over the building.
8	23:22	P. pyg	Foraging bat flew through window on the east elevation of the building.

Dusk survey on 14 July 2021 – Surveyor 2

Target note	Time	Species	Activity
1	22:03	Chiro. sp.	Single bat seen commuting over woodland behind Surveyor 4.
2	22:18	P. pyg	Bat foraging between Surveyor 1 and 2.
3	22:22 – 22:32	P. pyg	Bat foraging between Surveyor 1,2 and 3.
4	22:33	Chiro. sp.	Single bat flew south to north over Surveyor 2. No calls were recorded.
5	22:37 – 23:09	P. pyg and P. pip	At least two bats foraging between Surveyor 1 and 2. Feeding buzzes heard.
6	23:11 – 23:25	P. pyg	Bat foraging between Surveyor 1 and 2.

Dusk survey on 14 July 2021 – Surveyor 3

Target note	Time	Species	Activity
1	22:03	Chiro. sp.	Bat seen foraging above the building. Too far away for any echolocation to be picked up by detector.
2	22:08	Chiro. sp.	Faint pass picked up on Pettersson detector but not the Anabat Swift. Was thought to be in woodland clearing to the east of the surveyor.
3	22:22	P. pyg	Bat flew out of woodland to the east of the surveyor and foraged between Surveyors 2 and 3 before flying into the building through the centre bay window on the second floor. No bat reported exiting by surveyors on opposite side of building.
4	22:24	P. pyg	Came over the building and foraged between Surveyors 2 and 3. Feeding buzzes heard on Pettersson.
5	22:29	Pip sp.	Faint passes heard on the Pettersson, probably originating from woodland to the south of the surveyor – calls not picked up by the Anabat Swift.
6	22:41	Chiro. sp.	Bat came along the western side of the building. Appeared not to be echolocating as no call detected by Pettersson or Anabat Swift.
7	22:51	Chiro. sp.	Faint passes heard on the Pettersson, probably originating from woodland to the south of the surveyor – calls not picked up by the Anabat Swift.
8	22:53	P. pip	Faint pass heard on the Pettersson and picked up by the Anabat Swift. No bats seen – call appeared to be from the woodland to the east.
9	22:56	Chiro. sp.	Faint passes heard on the Pettersson, probably originating from woodland to the south of the surveyor – calls not picked up by the Anabat Swift.
10	23:11	P. pyg	Two passes of a bat along the woodland edge between Surveyors 2 and 3.
11	23:17	Chiro. sp.	Faint call heard on the Pettersson but not picked up by the Anabat. Location uncertain – no bats seen on skyline.
12	23:25	P. pyg	Single pass of a bat across corner of building.

Dusk survey on 14 July 2021 – Surveyor 4

Target note	Time	Species	Activity
1	21:37	P.pyg	Very faint call. Heard not seen.
2	**21:44**	**Pip sp.**	**Bat emerged from chimney brickwork but was not echolocating. Identified through flight pattern and early emergence.**
3	**22:00**	**Pip sp.**	**Bat emerged from stone wall. Identified through flight pattern and early emergence.**
4	**22:01**	**P. pyg**	**Bat re-entered same location in stone wall. Presumed to be the same bat.**
5	**22:17**	**P. pyg**	**Bat emerged again from roost in stone wall. Presumed to be same bat at TN3 and TN4.**
6	22:20	P. pip	Heard not seen.
7	22:24	P. pip and P. pyg	Two bats recorded foraging.
8	22:26	P. pyg	Commuting pass from Surveyor 5 direction to Surveyor 3.
9	22:36	P. pyg	Commuting pass towards the centre of the building.
10	22:42	P. pip	Heard not seen.
11	**22:43**	**Pip sp.**	**Bat flew into stone wall and appeared to re-enter a roost in a different location from TN3-TN5.**
12	22:46	Myotis sp.	Heard not seen

Target note	Time	Species	Activity
13	22:51-23:06	Pip sp.	Foraging bat heard within trees.
14	23:07	P. aur	Quick pass picked up on the detector.
15	23:25	P. pyg	Quick pass detected from above surveyor.

Dusk survey on 14 July 2021 – Surveyor 5

Target note	Time	Species	Activity
1	**21:43**	**Pip sp.**	**Bat seen out the corner of surveyors eye emerging from middle chimney high up on the brickwork. Also recorded by Surveyor 4.**
2	**22:00**	**Pip sp.**	**Emergence from stone wall crevice above open window on the north side of the building. Not echolocating but also recorded by Surveyor 4.**
3	**22:01**	**Pip sp.**	**Bat returned to roost in stone wall. Possible light sampling behaviour.**
4	**22:17**	**Pip sp.**	**Bat again emerged from stone wall and flew north.**
5	22:25	P. pip	Commuting pass east to west over the building.
6	22:30	Pip sp.	Commuting pass east to west over the building. Heard on Pettersson but not picked up on Anabat.
7	22:36	Pip sp.	Commuting pass north to south over building. Heard on Pettersson but not picked up on Anabat.
7	**22:42**	**Pip sp.**	**Probable return to roost on north stone wall in crevice.**
8	22:43	P. pip	Foraging pass overhead.
9	22:49	*Nyctalus* sp.	'Chip-chop' call heard on Pettersson. Surveyor 1 also reported flight of bigger bat. Possible noctule pass.
10	22:52	P. pyg	Commuting pass. Heard not seen.
11	22:56	Pip sp.	Bat seen feeding above trees to the west of the building.
12	23:05	P. pip	Heard not seen.
13	23:25	P. pyg	Heard not seen.

Dawn survey on 30 July 2021 – Surveyor 1

Target note	Time	Species	Activity
1	03:12	P. pyg	An individual bat foraging from the start of the survey between Surveyor 1 and 2.
2	03:21	P. pyg	An individual bat commuting along the treeline to the east of the building. Very loud social calling.
3	03:21 – 04:20	P. pyg and P. pip	Intermittent foraging by up to Three bats throughout the first hour of the survey. Common pipistrelle occasionally recorded by the static detector.
4	03:47	Chiro sp.	An individual bat was observed flying in front of the building not echolocating.
5	04:22	P. pyg	Three bats were observed to commute from the north of the site towards Surveyor 2.
6	04:33	Chiro sp.	An individual bat was observed circling the building not echolocating.
7	05:12	Pip sp.	Two bats were observed investigating a gap in stonework above the open window on the north elevation of the building.
8	**05:17**	**Pip sp.**	**An individual bat entered a roost location above an open window on the north elevation just before sunrise.**

Dawn survey on 30 July 2021 – Surveyor 2

Target note	Time	Species	Activity
1	03:19-03:28	P. pyg	Foraging passes from bat in the general area around trees.
2	03:28-03:44	P. pyg	Foraging passes from bat in the general area around trees.
3	03:45	P. pip	Commuting pass towards Surveyor 3.
4	03:47-04:10	P. pyg	Foraging passes from bat feeding around trees.
5	04:10	P. pip and P. pyg	Two bats flying around building at the southern wall and flying over the building.
6	04:13	P. pyg	Flew over south wall towards Surveyor 3.
7	04:22	P. pyg	Two bats observed flying north to south and south to north.
8	04:23-04:28	P. pyg	Foraging around trees at the south of the building.
9	04:39	P. pip	Commuting pass north to south.
10	04:42	P. pyg	Passes from Surveyor 1 to Surveyor 2 and back again.
11	04:46	P. pyg	Commuting pass north to south.
12	04:52	P. pyg	Passes from Surveyor 1 to Surveyor 2 and back again.
13	05:14	P. pyg	Bat observed circling within internal area of the building. Picked up by Surveyor 5.

Dawn survey on 30 July 2021 – Surveyor 3

Target note	Time	Species	Activity
1	03:12	P. pyg	Bat heard not seen, foraging behind surveyor position.
2	03:17	P. pyg	Bat heard not seen, foraging behind surveyor position.
3	03:21-03:32	P. pyg	Bat foraging between Surveyor 2 and 3.
4	03:35	P. pyg	Bat calls recorded on Anabat, but not seen or heard during survey.
5	03:37-03:39	P. pyg	Bat foraging between Surveyors 4, 3 and 2.
6	03:58-04:21	P. pyg and Pip sp.	Bat calls and feeding buzzes recorded on Anabat, not heard or seen during survey.
7	04:23	P. pip	Bat commuting from Surveyor 2 and foraging between Surveyors 3 and 4.
8	04:26-04:36	P. pip and P. pyg	Occasional calls and feeding buzzes recorded on Anabat, but not seen or heard during survey.
9	04:37-04:42	P. pip	Bat continuously circling exterior of the building.

Dawn survey on 30 July 2021 – Surveyor 4

Target note	Time	Species	Activity
1	03:11	P. pyg	First bat recorded but not seen. Two passes recorded on Anabat with social calls.
2	03:13	P. pyg	Heard not seen. Social calls recorded
3	03:13 to 03:46	P. pyg	Multiple passes, with often two bats seen against the sky. Social calls recorded and chasing behaviour.
4	03:46	*Myotis* sp.	Commuting pass.
5	03:47-03:57	P. pyg	Foraging activity around building and trees, with often two bats seen against the sky. Social calls recorded and chasing behaviour.
6	03:58	*Myotis* sp.	Commuting pass.
7	03:58-04:20	P. pyg and *Myotis* sp.	Multiple foraging passes by the pipistrelle, visible against the sky.
8	04:20	P. pip	Commuting pass.
9	04:20-04:43	P. pip and P. pyg	Foraging activity and social calls recorded.

Dawn survey on 30 July 2021 – Surveyor 5

Target note	Time	Species	Activity
1	03:24	P. pyg	Social calls of pipistrelle heard. No main call. Could not locate bat due to level of darkness.
2	03:26-03:28	P. pyg	Faint calls heard of nearby foraging bat.
3	03:28-03:36	P. pyg	Intermittent foraging and social calls from bat foraging around building.
4	03:39	P. aur	Bat seen against sky and building. Later confirmed via Anabat calls as BLE.
5	03:40-03:44	Pip sp.	Foraging calls from bat feeding in general area.
6	03:45-03:50	P. pyg	Bat not echolocating on Pettersson but seen flying around vegetation within building. Later confirmed via Anabat calls as soprano pipistrelle.
7	03:58	P. aur	Pass heard on Pettersson. Confirmed as BLE from Anabat calls.
8	04:05	*Myotis* sp.	Bat flew in and around surveyor. Confirmed as *Myotis* from Anabat calls.
9	04:10	P. pip and P. pyg	Two bats flying around building and over surveyor 1.
10	04:13	P. pyg	Commuting pass east to west.
11	04:19	P. pyg	Commuting pass north to south.
12	04:24	P. pyg	Commuting pass south to north.
13	04:27-04:31	P. pyg	Multiple passes from bats commuting in the wider area and foraging over building.
14	04:37-04:38	P. pyg	Bat passes above building to the west and flying north to south.
15	04:41	P. pip	Two bats seen flying back and forth over building north to south and south to north.
16	**05:15-05:18**	**Pip sp.**	**Two bats swarming around building at the eastern end. One bat eventually entered on the external northern wall confirmed by surveyor 1. Second bat entered on internal eastern wall within stone above window.**

Dusk survey on 15 September 2021 – Surveyor 1

Target note	Time	Species	Activity
1	19:27	P. pyg	An individual bat was recorded flying along the eastern elevation of the building. Potential emergence from nearby due to timing of the pass.
2	19:37	P. pyg	Heard not seen. Faint call on Pettersson detector but recorded clearly on Anabat.
3	19:44	P. pyg	Heard not seen. Faint call on Pettersson detector but recorded clearly on Anabat.
4	19:47-20:50	P. pip and P. pyg	Up to three bats were recorded flying between surveyors 2, 1 and 4. Foraging activity and social calls continued intermittently throughout the survey.

Dusk survey on 15 September 2021 – Surveyor 2

Target note	Time	Species	Activity
1	19:33	P. pyg	Single commuting bat flew north to south over building before flying towards Surveyor 3.
2	19:45	P. pyg	Single commuting bat flew west to east over building.
3	19:46	P. pyg	Single commuting bat heard not seen.
4	19:47-19:53	P. pyg	Bat foraging over Surveyor 2 and then between Surveyors 1 and 2.
5	20:01-20:10	P. pyg	Two bats foraging between Surveyors 1 and 2, occasionally looping round to Surveyor 3 and back.
6	20:19	P. pip	Brief pass heard not seen in fading light.
7	20:28-20:41	P. pyg	Two bats foraging between Surveyor 1 and 2, occasionally looping round to Surveyor 3 and back.

Dusk survey on 15 September 2021 – Surveyor 3

Target note	Time	Species	Activity
1	19:45	P. pyg	Single commuting bat flew south over the building and looped back north.
2	19:47	P. pyg	Single bat looped east to west around the building. Very quiet on Pettersson.
3	19:57	P. pyg	Foraging bat flying from Surveyor 2 to Surveyor 3 and back again.
4	19:58	P. pyg	Bat foraging over Surveyor 3 before flying to Surveyor 2.
5	20:02	P. pyg	Bat foraging over Surveyor 3 before flying to Surveyor 2.
6	20:05	P. pyg	Foraging bat flew from Surveyor 2 to 3.
7	20:19	P. pip	Faint pass heard not seen.
8	20:29	P. pyg	Faint pass heard not seen.
9	20:37-20:40	P. pyg	Social calls heard from two bats.

Dusk survey on 15 September 2021 – Surveyor 4

Target note	Time	Species	Activity
1	19:33	P. pyg	An individual bat was recorded flying over the surveyor.
2	19:43	P. pyg	An individual bat was recorded flying high over the building from north to south.
3	19:45	P. pyg	An individual bat was recorded flying high over the building from west to east.
4	19:48	P. pyg	An individual bat was recorded flying high over the building from east to west.
5	19:57	P. pip	An individual bat was recorded flying high over the building from north to south.
6	20:05	P. pip and P. pyg	An individual bat was recorded flying around the building between Surveyor 4 and 1. Both common and soprano pipistrelle calls were recorded at during this time period. Social calls were audible.

Dusk survey on 15 September 2021 – Surveyor 5

Target note	Time	Species	Activity
1	19:33	P. pyg	Bat flew into open column of building, circled and then flew south over Surveyor 4. Probable emergence from nearby due to time recorded.
2	19:42	P. pyg	Commuting pass north-west to south-east towards Surveyor 2.
3	19:45	P. pyg	Foraging passes picked up from bat over Surveyor 2.
4	19:52	P. pyg	Faint foraging passes.
5	19:58	P. pyg	Faint passes from bat flying up and down the south side of the building.
6	20:01	P. pyg	Passes from bat foraging around the building.
7	20:03-20:12	P. pyg	Two bats at times, foraging around building and chasing behaviour.
8	20:19	P. pip	Faint pass.
9	20:25	P. pyg	Faint pass.
10	20:26-20:41	P. pyg	Two bats chasing each other around the building with loud social calls. Likely territorial behaviour at this time of year in preparation for breeding.
11	20:39	*Myotis* sp.	Single pass detected on Anabat detector.

Appendix H2: Building B activity survey results.

Dusk survey on 13 July 2021 – Surveyor 6

Target note	Time	Species	Activity
1	22:06	Pip sp.	An individual bat flew along the eastern elevation of the building and then across to the north.
2	22:20	P. pyg	An individual bat was observed to commute from north to south.
3	22:40	P. aur	An individual bat flew along the eastern elevation of the building.
4	22:45	*Myotis* sp.	An individual bat flew along the eastern elevation of the building.
5	23:04	*Myotis* sp.	An individual bat flew along the eastern elevation of the building.

Dusk survey on 13 July 2021 – Surveyor 7

Target note	Time	Species	Activity
1	21:46	P. pyg	An individual bat commuted overhead from west to east.
2	21:58	P. pyg	An individual bat commuted overhead from west to east.
3	22:11	P. pyg	An individual bat commuted overhead from west to east.

Dusk survey on 13 July 2021 – Surveyor 8

Target note	Time	Species	Activity
1	**22:28**	**P. pyg**	**An individual bat emerged from a roost in a crevice on the wall of the northern elevation.**
2	22:56	*Myotis* sp.	An individual bat flew along the northern elevation of the building.
3	23:17	*Myotis* sp.	An individual bat flew along the northern elevation of the building.

Dusk survey on 13 July 2021 – Surveyor 9

Target note	Time	Species	Activity
1	22:14	P. pip	An individual bat was observed commuting from the south to north-east.
2	22:18	P. pyg	An individual bat was observed commuting from the east to north-west
3	22:24	P. pyg	An individual bat was observed foraging along the north, east and south elevations of the building.

Dusk survey on 13 July 2021 – Surveyor 10

Target note	Time	Species	Activity
-	-	-	No additional activity recorded other than passes observed by other surveyor positions.

Dawn survey on 03 August 2021 – Surveyor 6

Target note	Time	Species	Activity
1	04:35 – 04:38	P. pyg	An individual bat was observed foraging along the northern and eastern elevations of the building.
2	04:54 – 05:02	P. pip	Multiple passes by an individual bat along the eastern elevation.

Dawn survey on 03 August 2021 – Surveyor 7

Target note	Time	Species	Activity
-	-	-	No additional activity recorded other than passes observed by other surveyor positions.

Dawn survey on 03 August 2021 – Surveyor 8

Target note	Time	Species	Activity
1	04:05	*Myotis* sp.	An individual bat flew along the northern elevation of the building.
2	04:18	*Myotis* sp.	An individual bat flew along the northern elevation of the building.
3	04:23	P. aur	An individual bat flew along the northern elevation of the building.
4	04:39	*Myotis* sp.	An individual bat flew along the northern elevation of the building.
5	04:46	P. pyg	An individual bat flew along the northern elevation of the building.
6	05:15	Pip sp.	An individual bat flew along the northern elevation of the building.
7	05:18	P .pyg	Four bats were observed commuting from east to west along the northern elevation of the building.

Dawn survey on 03 August 2021 – Surveyor 9

Target note	Time	Species	Activity
1	04:07	P. pyg	An individual bat flew along the eastern elevation of the building.

Dawn survey on 03 August 2021 – Surveyor 10

Target note	Time	Species	Activity
-	-	-	No additional activity recorded other than passes observed by other surveyor positions.

Dusk survey on 27 August 2021 – Surveyor 6

Target note	Time	Species	Activity
1	20:44	P .pyg	Two bats were observed to commute from the northern elevation to the eastern elevation of the building.
2	20:46 – 22:00	P. pip	Occasional passes by 1–2 bats every ten minutes. Foraging activity as they passed.
3	20:46 – 22:00	P. pyg	Occasional passes by 1–2 bats every ten minutes. Foraging activity as they passed.
4	21:22	P. aur	An individual bat flew along the eastern elevation of the building.
5	21:54	P. aur	An individual bat flew along the eastern elevation of the building.

Dusk survey on 27 August 2021 – Surveyor 7

Target note	Time	Species	Activity
-	-	-	No additional activity recorded other than passes observed by other surveyor positions.

Dusk survey on 27 August 2021 – Surveyor 8

Target note	Time	Species	Activity
1	20:56	Myotis sp.	An individual bat flew along the northern elevation of the building.

Dusk survey on 27 August 2021 – Surveyor 9

Target note	Time	Species	Activity
1	20:41	P. pyg	An individual bat flew along the southern elevation of the building.
2	20:46	P. pip	An individual bat flew along the southern elevation of the building.
3	21:05	*Myotis* sp.	An individual bat was observed commuting passed the eastern elevation then the southern elevation of the building.

Dusk survey on 27 August 2021 – Surveyor 10

Target note	Time	Species	Activity
-	-	-	No additional activity recorded other than passes observed by other surveyor positions.

Appendix H3: Building C activity survey results.

Dusk survey on 01 July 2021 – Surveyor 11

Target note	Time	Species	Activity
1	21:50	n/a	Tawny owl flew out of building when surveyors approached. Assumed to be a perch as no suitable nesting areas internally.
2	21:50	P. pyg	Foraging bat around Surveyor 2.
3	22:05	P. pyg	Foraging passes from the tree canopy.
4	22:08-22:10	P. pyg	Foraging passes around the front of the building in the tree canopy.
5	22:15	P. pyg	Foraging passes heard from within woodland.
6	22:23-22:33	P. pyg	Single bat observed foraging along woodland edge into open grassland behind surveyor.
7	22:33-22:46	P. pyg	Intermittent foraging by two bats along woodland edge and into open grassland behind surveyor. Social calls and chasing behaviour observed.
7	22:50	n/a	Barn owl flying along woodland edge and over grassland.
8	22:50	*Myotis* sp.	Bat seen flying across in front of building. Identified via Anabat calls.
9	23:03	*Myotis* sp.	Call picked up on Anabat. Assumed to be Natterer's due to habitat setting and slope pattern in analysis.
10	23:14	*Myotis* sp.	Call picked up on Anabat. Assumed to be Natterer's due to habitat setting and slope pattern in analysis.
11	23:17	P. aur	Potential BLE call picked up on Anabat. Short segment of call with few pulses.
12	23:23	P. aur	Potential BLE call picked up on Anabat. Short segment of call with few pulses.

Dusk survey on 01 July 2021 – Surveyor 12

Target note	Time	Species	Activity
1	21:50-22:20	P. pyg	An individual bat was recorded foraging from the start of the survey around the west side of the building. It left intermittently but returned to forage several times until 22:20.
2	22:25	P. pyg	Faint call on Pettersson, nothing recorded on Anabat.
3	22:38	P. pyg	An individual bat was recorded commuting over the treetops from the meadow to the east across the building in a westerly direction.
4	23:29	P. pyg	Heard not seen. Commuting pass.
5	23:35	*Myotis* sp.	Recording of one pass on Anabat. Nothing noted during survey using Pettersson.

Appendix I

Hibernation Survey Temperature Logger Data

Appendix I1: Table of temperature and humidity recordings.

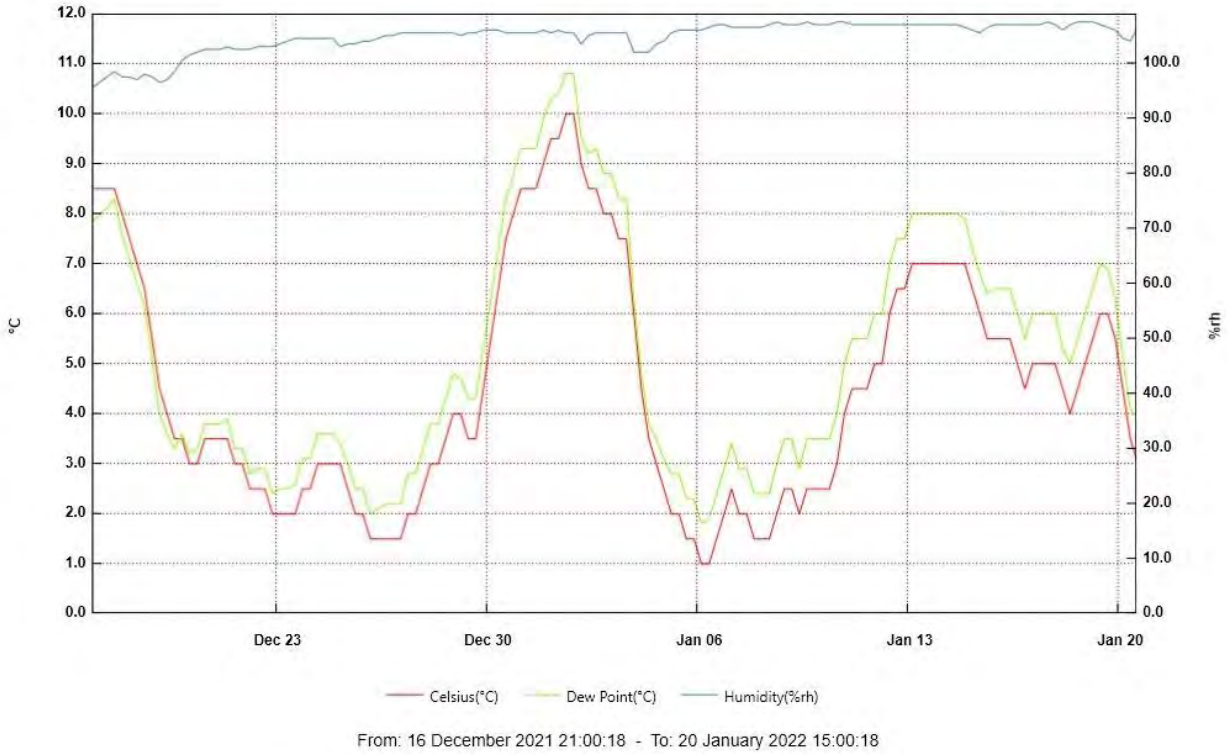
Recording date and time	Temperature (°C)	Humidity (%rh)
16/12/2021 21:00	8.5	95.5
17/12/2021 03:00	8.5	96.5
17/12/2021 09:00	8.5	97.5
17/12/2021 15:00	8.5	98.5
17/12/2021 21:00	8.0	97.5
18/12/2021 03:00	7.5	97.5
18/12/2021 09:00	7.0	97.0
18/12/2021 15:00	6.5	98.0
18/12/2021 21:00	5.5	97.5
19/12/2021 03:00	4.5	96.5
19/12/2021 09:00	4.0	97.0
19/12/2021 15:00	3.5	98.5
19/12/2021 21:00	3.5	100.5
20/12/2021 03:00	3.0	101.5
20/12/2021 09:00	3.0	102.0
20/12/2021 15:00	3.5	102.5
20/12/2021 21:00	3.5	102.5
21/12/2021 03:00	3.5	102.5
21/12/2021 09:00	3.5	103.0
21/12/2021 15:00	3.0	102.5
21/12/2021 21:00	3.0	102.5
22/12/2021 03:00	2.5	102.5
22/12/2021 09:00	2.5	103.0
22/12/2021 15:00	2.5	103.0
22/12/2021 21:00	2.0	103.0
23/12/2021 03:00	2.0	103.5
23/12/2021 09:00	2.0	104.0
23/12/2021 15:00	2.0	104.5
23/12/2021 21:00	2.5	104.5
24/12/2021 03:00	2.5	104.5
24/12/2021 09:00	3.0	104.5
24/12/2021 15:00	3.0	104.5
24/12/2021 21:00	3.0	104.5
25/12/2021 03:00	3.0	103.0
25/12/2021 09:00	2.5	103.5
25/12/2021 15:00	2.0	103.5
25/12/2021 21:00	2.0	104.0
26/12/2021 03:00	1.5	104.0
26/12/2021 09:00	1.5	104.5
26/12/2021 15:00	1.5	105.0
26/12/2021 21:00	1.5	105.0

Recording date and time	Temperature (°C)	Humidity (%rh)
27/12/2021 03:00	1.5	105.5
27/12/2021 09:00	2.0	105.5
27/12/2021 15:00	2.0	105.5
27/12/2021 21:00	2.5	105.5
28/12/2021 03:00	3.0	105.5
28/12/2021 09:00	3.0	105.5
28/12/2021 15:00	3.5	105.5
28/12/2021 21:00	4.0	105.5
29/12/2021 03:00	4.0	105.0
29/12/2021 09:00	3.5	105.5
29/12/2021 15:00	3.5	105.5
29/12/2021 21:00	4.5	106.0
30/12/2021 03:00	5.5	106.0
30/12/2021 09:00	6.5	106.0
30/12/2021 15:00	7.5	105.5
30/12/2021 21:00	8.0	105.5
31/12/2021 03:00	8.5	105.5
31/12/2021 09:00	8.5	105.5
31/12/2021 15:00	8.5	105.5
31/12/2021 21:00	9.0	106.0
01/01/2022 03:00	9.5	105.5
01/01/2022 09:00	9.5	106.0
01/01/2022 15:00	10.0	105.5
01/01/2022 21:00	10.0	105.5
02/01/2022 03:00	9.0	103.5
02/01/2022 09:00	8.5	105.0
02/01/2022 15:00	8.5	105.5
02/01/2022 21:00	8.0	105.5
03/01/2022 03:00	8.0	105.5
03/01/2022 09:00	7.5	105.5
03/01/2022 15:00	7.5	105.5
03/01/2022 21:00	6.0	102.0
04/01/2022 03:00	4.5	102.0
04/01/2022 09:00	3.5	102.0
04/01/2022 15:00	3.0	103.5
04/01/2022 21:00	2.5	104.0
05/01/2022 03:00	2.0	105.5
05/01/2022 09:00	2.0	106.0
05/01/2022 15:00	1.5	106.0
05/01/2022 21:00	1.5	106.0
06/01/2022 03:00	1.0	106.0
06/01/2022 09:00	1.0	106.5
06/01/2022 15:00	1.5	107.0

Recording date and time	Temperature (°C)	Humidity (%rh)
06/01/2022 21:00	2.0	107.0
07/01/2022 03:00	2.5	106.5
07/01/2022 09:00	2.0	106.5
07/01/2022 15:00	2.0	106.5
07/01/2022 21:00	1.5	106.5
08/01/2022 03:00	1.5	106.5
08/01/2022 09:00	1.5	107.0
08/01/2022 15:00	2.0	107.5
08/01/2022 21:00	2.5	107.0
09/01/2022 03:00	2.5	107.0
09/01/2022 09:00	2.0	107.0
09/01/2022 15:00	2.5	107.5
09/01/2022 21:00	2.5	107.0
10/01/2022 03:00	2.5	107.0
10/01/2022 09:00	2.5	107.0
10/01/2022 15:00	3.0	107.5
10/01/2022 21:00	4.0	107.5
11/01/2022 03:00	4.5	107.0
11/01/2022 09:00	4.5	107.0
11/01/2022 15:00	4.5	107.0
11/01/2022 21:00	5.0	107.0
12/01/2022 03:00	5.0	107.0
12/01/2022 09:00	6.0	107.0
12/01/2022 15:00	6.5	107.0
12/01/2022 21:00	6.5	107.0
13/01/2022 03:00	7.0	107.0
13/01/2022 09:00	7.0	107.0
13/01/2022 15:00	7.0	107.0
13/01/2022 21:00	7.0	107.0
14/01/2022 03:00	7.0	107.0
14/01/2022 09:00	7.0	107.0
14/01/2022 15:00	7.0	107.0
14/01/2022 21:00	7.0	106.5
15/01/2022 03:00	6.5	106.0
15/01/2022 09:00	6.0	105.5
15/01/2022 15:00	5.5	106.5
15/01/2022 21:00	5.5	107.0
16/01/2022 03:00	5.5	107.0
16/01/2022 09:00	5.5	107.0
16/01/2022 15:00	5.0	107.0
16/01/2022 21:00	4.5	107.0
17/01/2022 03:00	5.0	107.0
17/01/2022 09:00	5.0	107.0

Recording date and time	Temperature (°C)	Humidity (%rh)
17/01/2022 15:00	5.0	107.5
17/01/2022 21:00	5.0	107.0
18/01/2022 03:00	4.5	106.0
18/01/2022 09:00	4.0	107.0
18/01/2022 15:00	4.5	107.5
18/01/2022 21:00	5.0	107.5
19/01/2022 03:00	5.5	107.5
19/01/2022 09:00	6.0	107.0
19/01/2022 15:00	6.0	106.5
19/01/2022 21:00	5.5	106.0
20/01/2022 03:00	4.5	104.5
20/01/2022 09:00	3.5	104.0
20/01/2022 15:00	3.0	106.5

Appendix I2: Graph of temperature and humidity recordings.



Appendix J
Manual Transect Results

Abbreviation used	Full Latin name	Common name
P. pyg	*Pipistrellus pygmaeus*	Soprano pipistrelle
P. pip	*Pipistrellus pipistrellus*	Common pipistrelle
Pip sp.	*Pipistrellus* sp.	Pipistrelle species
P. aur	*Plecotus auritus*	Brown long-eared bat
Myotis sp.	*Myotis* species	Myotis species
Chiro sp.	*Chiroptera* species	Bat species

Appendix J1: 25 May dusk transect.

Stopping point	Time	Location	Species	Activity
P1	21:42-21:47		P. pyg	Two bats foraging above trees around point count. Not echolocating loudly but visible.
P1-P2	21:48 21:51	NS 38958 82063 NS 38936 82115	P. pip and P. pyg P. pip and P. pyg	Two bats foraging under tree canopy. Three to five bats foraging along woodland path.
P2	21:54-21:59		P. pip and P. pyg	Three to four bats foraging along avenue close to ground level.
P2-P3	21:59 22:01-22:05	NS 38891 82230 NS 38843 82283	P. pyg P. pyg	Three to four bats foraging low under trees along path. Foraging bat along path continually flying up and down.
P3	22:07-22:12		P. pyg	Foraging bat around clearing at point count and at shoreline. Continual passes.
P3-P4	22:13 22:15 22:18	NS 38717 82380 NS 38669 82357 NS 38555 82399	P. pyg P. pyg P. pyg	Foraging bat around tree canopy. Foraging bat around street light and car park. Foraging bat feeding along woodland edge.
P4	22:19-22:24		P. pyg	Continual passes by foraging bat around woodland edge and out to shoreline around point count.
P4-P5	22:25	NS 38559 82364	P. pyg	Foraging bat flying up and down path under tree canopy.
P5	22:27-22:32		P. pyg Myotis sp.	Foraging bat flying up and down path. Two passes picked up on Anabat, not seen.
P5-P6	22:36-22:37 22:36	NS 38652 82212	P. pyg Myotis sp.	Brief foraging passes in tree canopy. Pass picked up on Anabat, not seen.
P6	22:39-22:44		P. pip and P. pyg	Foraging bat visible in clearing around trees. Second bat joined at 22:43.
P6-P7	22:48	NS 38499 82004	P. pip	Faint foraging passes from above. Not seen.
P7	22:50-22:55		No bats	-
P7-P8	22:57 22:59	NS 38327 81926 NS 38256 81967	Pip sp. P. pyg	Faint pass. Not picked up on Anabat. Foraging passes in trees overhanging road.
P8 (missed initially, done after P9)	23:13-23:18		No bats	-
P8-P9	23:05	NS 38238 81931	Pip sp.	Faint passes heard on Pettersson along woodland edge at road. Not picked up on Anabat.

Stopping point	Time	Location	Species	Activity
P9	23:06-23:11		P. pyg P. pyg	Single commuting pass. Heard not seen. Single commuting pass along road.
P9-P10	23:19 23:22	NS 38350 81943 NS 38488 81946	Pip sp. Pip sp.	Faint commuting pass. Not seen. Faint commuting pass. Not seen.
P10	23:27-22:32		P. pyg	Foraging bat heard in trees above continuously.
P10-P11			No bats	-
P11	23:36-23:41		Pip sp.	Brief pass heard above point count on Pettersson. Not recorded on Anabat.
P11-P12			No bats	-
P12	23:51-23:56		Pip sp.	Brief commuting pass heard on Pettersson. Not recorded on Anabat.
P12-P13	23:57	NS 38741 82155	Myotis sp.	Commuting pass along road at woodland edge.
P13	00:05-00:10		No bats	-
P13-end			No bats	-

Appendix J2: 14 June dusk transect.

Stopping point	Time	Location	Species	Activity
End-P13	22:16	NS 38901 82048	P. pyg	Foraging pass along the woodland edge.
P13	22:17-22:22		P. pyg	Three bats observed foraging under the tree canopy along the road.
P13-P12	22:24 22:26 22:29-22:34	NS 38830 82124 NS 38780 82227 NS 38715 82276	P. pip and P. pyg P. pyg P. pyg	Two bats foraging along the road. Faint pass heard not seen. Three bats foraging along woodland path at various locations low to the ground.
P12	22:34-22:39		P. pyg	Up to four bats foraging around woodland, both at head height in upper tree canopy.
P12-P11	22:40 22:43 22:46	*NS 38695 82114* *NS 38660 82092* *NS 38609 81984*	P. pyg P. pyg Pip sp.	Two bats foraging in tree canopy. Two bats foraging in tree canopy. Foraging in tree canopy.
P11	22:50-22:55		No bats	-
P11-P10			No bats	-
P10	23:01-23:06		P. pyg	Foraging along tree line at point count.
P10-P9	23:08 23:09 23:20	NS 38527 81988 NS 38474 81973 NS 38297 81881	P. pyg *Myotis* sp. Pip sp.	Foraging pass. Pass recorded on Anabat. Foraging pass.
P9	23:21-23:26		P. pyg	Foraging passes in tree line around point count and along road.
P9-P8	23:32	NS 38255 81971	P. pyg	Foraging pass heard but not seen.
P8	23:35-23:40		Pip sp.	Faint foraging activity not recorded on Anabat.
P8-P7			No bats	-
P7	23:44-23:49		P. pyg and Pip sp.	Foraging passes heard in adjacent woodland.
P7-P6			No bats	-
P6	23:54-23:59		P. pyg	Two bats continually foraging around point, both lower to the ground and in tree canopy.
P6-P5	00:01 00:03	NS 38650 92206 NS 38693 82287	P. pyg P. pyg	Foraging passes heard not seen. Foraging passes heard not seen.
P5	00:06-00:11		P.pyg *Myotis* sp.	Continuous foraging from two bats. Pass recorded on Anabat.
P5-P4	00:12 00:13	NS 38606 82328 NS 38562 82365	P. pyg P. pyg	Foraging activity along path adjacent to shore. Continuous foraging from three bats along path.
P4	00:15-00:20		P. pip and P.pyg	Continuous foraging by up to four bats around point count.
P4-P3	00:22	NS 38664 82367	P. pyg	Foraging pass along the road.
P3	00:24-00:29		P. pyg	Two bats foraging in trees around point count.
P3-P2	00:30 00:30-00:34	NS 38775 82363 Various	P. pyg P. pyg	Bat foraging along woodland path low down. Up to three bats flying low along woodland path and foraging.
P2	00:35-00:40		P. pyg	Two foraging bats along path low down under tree canopy. Same behaviour that was recorded in May transect.

Stopping point	Time	Location	Species	Activity
P2-P1	00:42	NS 38937 82119	P. pyg	Foraging passes along path under tree canopy. Same as May transect.
P1	00:45-00:50		P. pip	Foraging passes above trees at point count.

Appendix J3: 15 July dusk transect.

Stopping point	Time	Location	Species	Activity
P1	22:09-22:14		Pip sp.	Faint pass heard nearby. Not recorded on Anabat.
P1-P2	22:14 22:17 22:19	NS 38985 82037 NS 38946 82109 NS 38913 82152	P. pip P. pyg P. pyg	Bat feeding below tree canopy along path. Bat feeding below tree canopy along path. Four bats foraging along path, both below and above tree canopy.
P2	22:20-22:25		P. pyg	Three bats continuously foraging under and above tree canopy along path.
P2-P3	22:25 22:27 22:28 22:30	NS 38884 82221 NS 38843 82281 NS 38839 82304 NS 38789 82344	P. pyg P. pyg P. pyg P. pyg	Two bats feeding close to ground along path. Bat feeding along path under tree canopy. Bat feeding along path under tree canopy. Bat feeding along path under tree canopy.
P3	22:31-22:36		P. pyg	Two bats foraging at point count for around 3 mins.
P3-P4	22:37	NS 38707 82372	P. pyg	Commuting pass along woodland edge.
P4	22:40-22:45		P. pyg	Two bats continuously foraging over water and along woodland edge.
P4-P5	22:46	NS 38592 82333	P. pyg	Brief pass heard not seen.
P5	22:47-22:52		P. pyg *Myotis* sp.	Foraging passes around point count. Pass picked up on Anabat.
P5-P6	22:52 22:56 22:57	NS 38673 82343 NS 38671 82236 NS 38649 82211	Pip sp. Pip sp. Pip sp.	Faint pass heard not seen. Commuting pass through woodland. Foraging passes above tree canopy. Not picked up on Anabat.
P6	22:58-23:03		Pip sp.	Faint foraging passes above point count.
P6-P7			No bats	-
P7	23:08-23:13		P. pyg	Two single passes during point count.
P7-P8	23:15	NS 38334 81934	P. pyg	Faint commuting pass heard not seen.
P8	23:17-23:22		P. pyg	Single commuting pass overhead.
P8-P9	23:27	NS 38282 81896	P. aur	Pass recorded on Anabat.
P9	23:28-23:33		P. pyg P. pip	Single commuting pass. Single commuting pass.
P9-P10	23:38 23:41 23:44 23:46	NS 38233 81992 NS 38400 81952 NS 38468 81977 NS 38501 81969	P. pip P. pip P. pyg P. pyg	Brief commuting pass heard not seen. Foraging passes in woodland adjacent to road. Brief commuting pass along tree line. Brief commuting pass heard not seen.
P10	23:48-23:53		Pip sp.	Brief commuting pass heard at point count.
P10-P11			No bats.	-
P11	23:56-00:01		No bats.	-
P11-P12	00:03 00:05 00:06	NS 38599 81889 NS 38582 81930 NS 38583 81989	P. pyg P. pyg P. pyg	Faint commuting pass in tree canopy. Foraging pass low to ground along path. Foraging pass low to ground along path.
P12	00:09-00:14		P. pyg	Faint foraging passes heard around point count.
P12-P13	00:15	NS 38736 82173	P. pyg	Foraging pass low to ground along path.

Stopping point	Time	Location	Species	Activity
	00:16 00:22	NS 38739 82223 NS 38889 82000	P. pyg Pip sp.	Foraging pass low to ground along path. Commuting pass along woodland edge.
P13	00:23-00:28		P. pyg	Pass within Drumkinnon Wood adjacent to Pier Road.
P13-End			No bats.	-

Appendix J4: 16 July dawn transect.

Stopping point	Time	Location	Species	Activity
End-P13	02:20	NS 38927 81971	P. pyg	Faint foraging passes heard not seen.
P13	02:22-02:27		P. pyg	Small number of passes at point count.
P13-P12	02:28	NS 38848 82081	P. pip	Brief commuting pass heard not seen.
P12	02:35-02:40		No bats.	-
P12-P11			No bats.	-
P11	02:47-02:52		No bats.	-
P11-P10			No bats.	-
P10	02:54-02:59		No bats.	-
P10-P9			Abandoned at southern exit to Drumkinnon Wood.	Anti-social behaviour was taking place within south end of Lomond Shores car park. Decision made to abandon P9 and P8 and carry on from P7. Ten minute point counts undertaken at P6, P5 and P4 to compensate and ensure transect was not finished too early.
P7	03:06-03:11		No bats.	-
P7-P6			No bats.	-
P6	03:15-03:25 (10 min point count)		P. pyg	Very faint foraging passes intermittently around point count.
P6-P5	03:30	NS 38695 82313	P. pyg	Brief commuting pass heard not seen.
P5	03:32-03:42 (10 min point count)		P. pyg and P. pip	Two bats with continuous foraging passes along path.
P5-P4	03:42	NS 38597 82331	P. pyg	Two bats foraging along path.
P4	03:45-03:55 (10 min point count)		P. pip and P. pyg	Two bats continuously foraging around treeline and shore.
P4-P3	03:56 04:00	NS 38565 82407 NS 38703 82368	P. pyg P. pyg	Foraging within car park area. Foraging along path between trees.
P3	04:01-04:06		P. pyg	Intermittent foraging around trees at point count.
P3-P2	04:08 04:10 04:12	NS 38814 82326 NS 38843 82283 NS 38885 82232	P. pyg P. pyg P. pyg	Foraging along path within woodland. Foraging along path within woodland. Foraging along path within woodland
P2	04:14-04:19		Pip sp.	One bat foraging high up above tree canopy. Not picked up on Anabat.
P2-P1			No bats.	-
P1	04:24-04:29		P. pyg	One bat foraging high above tree canopy near point count.

Appendix J5: 10 August dusk transect.

Stopping point	Time	Location	Species	Activity
P7	21:13-21:18		No bats	-
P7-P6	21:19 21:22	NS 38449 81998 NS 38492 82031	P. pyg P. pyg	Foraging in tree canopy. Foraging in tree canopy.
P6	21:25-21:30		P. pyg	Two bats foraging in clearing above point count.
P6-P5	21:32	NS 38638 82192	P. pyg	Two bats foraging in tree canopy.
P5	21:36-21:41		P. pyg	Foraging around point count.
P5-P4	21:42	NS 38594 82335	P. pyg	Foraging along path at woodland edge.
P4	21:43-21:48		P. pyg	Intermittent foraging around shore.
P4-P3	21:50	NS 38666 82366	P. pyg	Brief commuting pass.
P3	21:52-21:57		P. pyg *Myotis* sp.	Foraging passes around point count. Pass picked up on Anabat.
P3-P2	21:59 22:01	NS 38849 82275 NS 38890 82237	P. pyg P. pyg	Foraging passes in tree canopy. Brief commuting pass.
P2	22:02-22:07		P. pyg	Brief foraging along avenue under tree canopy.
P2-P1	22:08 22:09	NS 38927 82131 NS 38927 82131	P. pyg P. aur	Brief faint pass. Pass picked up on Anabat.
P1	22:11-22:16		P. pyg and P. pip	Two bats foraging in trees around point count.
P1-P13	22:17	NS 38905 81970	P. pyg	Brief faint pass.
P13	22:18-22:23		No bats	-
P13-P12			No bats	-
P12	22:31-22:36		P. pyg	Faint foraging passes.
P12-P11			No bats	-
P11	22:41-22:46		No bats	-
P11-P10			No bats.	-
P10	22:48-22:53		No bats.	-
P10-P9	22:56 22:58 23:02	NS 38459 81990 NS 38471 81923 NS 38301 81929	P. pyg P. pyg P. pip	Brief commuting pass. Foraging passes along woodland edge. Foraging passes along woodland edge.
P9	23:08-23:13		P. pyg	Two bats foraging around point count.
P9-P8	23:17	NS 38255 81962	P. pip	Foraging passes along woodland edge.
P8	23:19-23:24		No bats	-
P8-P7	23:24	NS 38373 81975	P. pyg	Brief commuting pass.

Appendix J6: 02 September dusk transect.

Stopping point	Time	Location	Species	Activity
P1	20:09-20:14		No bats	-
P1-P2			No bats	-
P2	20:17-20:22		No bats	-
P2-P3			No bats	-
P3	20:28-20:33		P. pyg	Two bats foraging around point and over shoreline.
P3-P4	20:35	NS 38590 82407	P. pyg	Commuting pass within car park.
P4	20:37-20:42		P. pyg	Brief commuting pass heard at the end of point count.
P4-P5	20:43	NS 38584 82342	P. pyg	Foraging bat along path by the shoreline.
P5	20:45-20:50		*Myotis* sp. P. pyg	Pass picked up on Anabat. Two bats chasing each other with loud social calls.
P5-P6	20:52 20:55	NS 38703 82294 NS 38654 82211	Pip sp. Pip sp.	Faint foraging passes in tree canopy. Faint foraging passes in tree canopy.
P6	20:57-21:02		*Myotis* sp.	Foraging passes heard in tree canopy. Assumed to be Natterer's.
P6-P7			No bats	-
P7	21:07-21:12		No bats	-
P7-P8	21:14	NS 38322 81924	*Myotis* sp.	Brief faint pass.
P8	21:16-21:21		No bats	-
P8-P9			No bats	-
P9	21:25-21:30		No bats	-
P9-P10			No bats	-
P10	21:42-21:47		No bats	-
P10-P11	21:49	NS 38610 81894	Pip sp.	Faint commuting pass.
P11	21:50-21:55		No bats	-
P11-P12	22:01 22:03	NS 38660 82088 NS 38688 82117	P. pyg P. pyg	Loud social calls heard with faint main call. Loud social calls heard with faint main call.
P12	22:04-22:09		No bats	-
P12-P13			No bats	-
P13	22:16-22:21		Pip sp.	Faint commuting pass.
P13-End	22:22	NS 38936 81977	P. pyg	Brief commuting pass.

Appendix J7: 05 October dusk transect.

Stopping point	Time	Location	Species	Activity
P1	18:56-19:01		P. pyg	Bat foraging above point count in trees.
P1-P2	19:02	NS 38970 82059	P. pyg	Foraging passes along tree avenue.
P2	19:06-19:11		P. pyg	Foraging passes in trees above point count.
P2-P3	19:13	NS 38850 82276	No bats	-
P3	19:16-19:21		Pip sp.	Brief foraging passes near shoreline.
P3-P4			No bats	-
P4	19:25-19:30		Pip sp.	Brief pass. Strong winds at this location.
P4-P5	19:31	NS 38550 82374	P. pyg	Three Foraging bats along path by the shoreline.
P5	19:35-19:40		*Myotis* sp. P. pyg	Pass picked up on Anabat. Two foraging bats in area of point count.
P5-P6			No bats	-
P6	19:45-19:50		P. pyg	Two foraging bats in area of point count. Social calls heard.
P6-P7			No bats	-
P7	19:53-19:58		No bats	-
P7-P8	19:59	NS 38375 81986	P. pyg	Brief faint pass.
P8	20:01-20:06		No bats	-
P8-P9	20:06	NS 38209 82017	P. pyg	Brief pass.
P9	20:10-20:15		P. pyg	Two commuting passes.
P9-P10	20:16 20:22 20:27	NS 38216 81948 NS 38399 81961 NS 38527 81991	P. pyg P. pyg P. pyg	Foraging passes along trees. Brief commuting pass. Brief commuting pass.
P10	20:29-20:34		Pip sp.	Single commuting pass heard.
P10-P11			No bats	-
P11	20:37-20:42		No bats	-
P11-P12			No bats	-
P12	20:48-20:53		Pip sp.	Passes from a single bat heard along with social calls.
P12-P13			No bats	-
P13	21:00-21:05		No bats	-
P13-End			No bats	-

Appendix K
Summary of Static Monitoring

Average passes per night recorded at each sampling location by species.

Month	Location	Common pipistrelle	Soprano pipistrelle	*Nathusius pipistrelle*	*Pipistrellus* sp.	*Myotis sp.*	BLE	*Nyctalus* sp.	Total
May	1	**4.5**	**76.2**	**0.0**	**13.0**	**0.2**	**0.0**	**0.0**	**93.8**
	2	7.3	129.0	0.0	3.7	1.0	0.0	0.2	141.2
	3	33.8	421.2	0.2	23.2	0.8	0.0	0.0	479.2
	4	22.2	816.8	0.0	106.5	0.0	0.0	0.0	945.5
	5	0.2	27.0	0.0	1.7	0.2	0.0	0.0	29.0
	6	13.0	182.8	0.0	24.5	1.0	0.2	0.0	221.5
	7	4.5	132.3	0.0	2.5	3.2	0.0	0.0	142.5
	8	0.3	111.7	0.0	3.3	0.0	0.0	0.0	115.3
	Total	**10.7**	**237.1**	**0.0**	**22.3**	**0.8**	**0.0**	**0.0**	**271.0**
June	1	0.0	19.8	0.0	0.0	0.0	0.0	0.0	19.8
	2	8.0	219.7	0.2	3.0	14.2	0.0	0.0	245.0
	3	239.7	941.3	0.0	83.2	3.8	0.3	0.0	1268.3
	4	46.0	318.0	0.0	115.5	0.0	0.0	0.0	479.5
	5	2.3	139.2	0.0	7.7	3.3	0.0	0.0	152.5
	6	110.0	103.2	0.0	3.0	12.0	0.0	0.0	228.2
	7	26.7	307.3	0.0	31.3	5.7	0.0	0.0	371.0
	8	19.0	379.0	0.0	45.3	0.2	0.0	0.0	443.5
	Total	**56.5**	**303.4**	**0.0**	**36.1**	**4.9**	**0.0**	**0.0**	**401.0**
July	1	0.0	3.3	0.0	1.2	0.7	0.0	0.2	5.3
	2	1.3	62.0	0.2	3.8	16.8	0.3	0.0	84.5
	3	125.0	831.2	0.0	49.2	2.5	0.2	0.0	1008.0
	4	52.7	592.3	0.0	65.0	1.0	0.0	0.0	711.0
	5	11.0	328.7	0.0	14.5	2.0	0.0	0.0	356.2
	6	41.5	64.8	0.0	30.3	4.2	0.0	0.0	140.8
	7	47.3	109.5	0.0	18.5	3.2	0.0	0.0	178.5
	8	17.2	278.0	0.0	83.0	1.8	0.0	0.0	380.0
	Total	**37.0**	**283.7**	**0.0**	**33.2**	**4.0**	**0.1**	**0.0**	**358.0**
August	1	0.2	7.3	0.0	11.2	0.0	0.0	0.0	18.7
	2	7.2	65.8	0.0	5.5	6.5	0.0	0.0	85.0
	3	76.3	856.2	0.0	45.5	3.8	0.0	0.0	981.8
	4	45.8	272.5	1.3	11.3	0.0	0.0	0.0	331.0
	5	4.2	123.5	0.0	6.0	1.7	0.0	0.0	135.3
	6	3.0	38.0	0.0	3.5	1.5	0.0	0.0	46.0
	7	6.7	134.8	0.2	4.2	3.8	0.0	0.0	149.7
	8	15.5	394.5	0.0	21.3	1.5	0.7	0.0	433.5
	Total	**19.9**	**236.6**	**0.2**	**13.6**	**2.4**	**0.1**	**0.0**	**272.6**
September	1	0.0	30.5	0.0	33.0	0.0	0.0	0.0	63.5
	2	2.5	75.0	0.0	5.0	0.7	0.7	0.0	83.8
	3	9.2	279.2	0.0	8.3	1.5	1.0	0.0	299.2
	4	11.8	251.5	0.0	20.5	0.2	0.3	0.0	284.3
	5	3.2	84.7	0.0	3.3	0.2	0.0	0.0	91.3

Month	Location	Common pipistrelle	Soprano pipistrelle	*Nathusius pipistrelle*	*Pipistrellus* sp.	*Myotis sp.*	BLE	*Nyctalus* sp.	Total
	6	8.5	247.8	0.0	14.3	0.3	0.0	0.0	271.0
	7	1.7	205.2	0.0	3.3	0.3	1.2	0.0	211.7
	8	1.5	70.5	0.0	0.3	0.0	0.0	0.0	72.3
	Total	**4.8**	**155.5**	**0.0**	**11.0**	**0.4**	**0.4**	**0.0**	**172.2**
October	1	0.0	3.8	0.0	0.0	0.0	0.0	0.0	3.8
	2	34.0	58.2	0.0	1.8	0.5	0.0	0.0	94.5
	3	0.5	126.5	0.0	9.2	0.7	0.0	0.0	136.8
	4	0.7	7.2	0.0	0.0	0.0	0.2	0.0	8.0
	5	1.8	91.0	0.0	0.2	0.0	0.0	0.0	93.0
	6	0.3	170.0	0.0	4.3	0.0	0.0	0.0	174.7
	7	3.3	87.8	0.0	2.2	0.5	0.0	0.0	93.8
	8	3.2	68.7	0.0	4.0	0.0	0.0	0.0	75.8
	Total	**5.5**	**76.7**	**0.0**	**2.7**	**0.2**	**0.0**	**0.0**	**85.1**
Totals		**22.39**	**22.4**	**215.5**	**0.0**	**19.8**	**2.1**	**0.1**	**0.0**

Appendix L
ECOBAT Bat Data

Appendix L1: Summary table showing the number of nights recorded bat activity fell into each activity band for each species.

Location	Species/Species Group	Nights of activity				
		High	Moderate/ High	Moderate	Low/ Moderate	Low
1	*Myotis* sp.	0	0	0	1	3
	Nyctalus sp.	0	0	0	0	1
	Pipistrellus sp.	9	6	4	0	0
	Pipistrellus pipistrellus	0	1	1	2	1
	Pipistrellus pygmaeus	6	11	5	7	0
2	*Myotis* sp.	0	13	2	5	3
	Nyctalus sp.	0	0	0	0	1
	Pipistrellus sp.	25	2	0	0	0
	Pipistrellus nathusii	0	0	0	0	2
	Pipistrellus pipistrellus	3	7	7	7	7
	Pipistrellus pygmaeus	24	10	1	0	0
	Plecotus auritus	0	0	0	2	2
3	*Myotis* sp.	0	1	7	12	4
	Pipistrellus sp.	28	0	0	0	0
	Pipistrellus nathusii	0	0	0	0	1
	Pipistrellus pipistrellus	16	7	3	2	0
	Pipistrellus pygmaeus	30	1	1	2	0
	Plecotus auritus	0	0	0	3	3
4	*Myotis* sp.	0	0	0	2	2
	Pipistrellus sp.	27	0	0	0	0
	Pipistrellus nathusii	0	1	0	0	0
	Pipistrellus pipistrellus	8	16	3	1	0
	Pipistrellus pygmaeus	29	1	0	1	1
	Plecotus auritus	0	0	0	0	3
5	*Myotis* sp.	0	1	2	7	3
	Pipistrellus sp.	22	3	1	0	0
	Pipistrellus pipistrellus	0	5	8	8	2
	Pipistrellus pygmaeus	24	6	3	1	0
6	*Myotis* sp.	1	0	10	4	6
	Pipistrellus sp.	27	2	0	0	0
	Pipistrellus pipistrellus	6	13	2	4	1
	Pipistrellus pygmaeus	28	1	0	1	1
	Plecotus auritus	0	0	0	0	1
7	*Myotis* sp.	0	2	11	7	6
	Pipistrellus sp.	28	1	0	0	0
	Pipistrellus nathusii	0	0	0	0	1
	Pipistrellus pipistrellus	3	12	6	5	1
	Pipistrellus pygmaeus	30	2	0	1	0
	Plecotus auritus	0	0	0	2	2

Location	Species/Species Group	Nights of activity				
		High	Moderate/ High	Moderate	Low/ Moderate	Low
8	*Myotis* sp.	0	0	2	4	2
	Pipistrellus sp.	24	2	0	0	0
	Pipistrellus pipistrellus	1	15	3	4	3
	Pipistrellus pygmaeus	26	7	0	0	0
	Plecotus auritus	0	0	1	0	0

Appendix L2: Summary table showing key metrics for each species recorded.

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
1	*Myotis* sp.	1	1 - 1	26	4	785
	Nyctalus sp.	1	0	1	1	449
	Pipistrellus sp.	78	65 - 82.5	92	19	1955
	Pipistrellus pipistrellus	38	19.5 - 55	72	5	1411
	Pipistrellus pygmaeus	70	55 - 72.5	91	29	1759
2	*Myotis* sp.	66	37 - 68	76	23	785
	Nyctalus sp.	1	0	1	1	449
	Pipistrellus sp.	87	84.5 - 89	97	27	1955
	Pipistrellus nathusii	1	1 - 1	1	2	7
	Pipistrellus pipistrellus	46	32 - 53.5	85	31	1411
	Pipistrellus pygmaeus	84	80 - 86	97	35	1759
	Plecotus auritus	14	1 - 26	26	4	57
3	*Myotis* sp.	38	26 - 42	66	24	785
	Pipistrellus sp.	99	97.5 - 99	100	28	1955
	Pipistrellus nathusii	1	0	1	1	7
	Pipistrellus pipistrellus	84	70 - 86.5	97	28	1411
	Pipistrellus pygmaeus	98	92.5 - 98.5	100	34	1759
	Plecotus auritus	14	1 - 26	26	6	57
4	*Myotis* sp.	14	1 - 26	38	4	785
	Pipistrellus sp.	97	96 - 98	100	27	1955
	Pipistrellus nathusii	61	0	61	1	7
	Pipistrellus pipistrellus	77	67 - 78.5	88	28	1411
	Pipistrellus pygmaeus	96	91 - 96.5	100	32	1759
	Plecotus auritus	1	1 - 1	1	3	57
5	*Myotis* sp.	26	13.5 - 45	69	13	785
	Pipistrellus sp.	89	84 - 91	98	26	1955
	Pipistrellus pipistrellus	46	34 - 51	78	23	1411
	Pipistrellus pygmaeus	86	77 - 88.5	97	34	1759
6	*Myotis* sp.	46	23.5 - 46	80	21	785
	Pipistrellus sp.	88	86 - 91	98	29	1955
	Pipistrellus pipistrellus	73	56.5 - 76.5	92	26	1411
	Pipistrellus pygmaeus	84	83 - 88.5	99	31	1759
	Plecotus auritus	1	0	1	1	57
7	*Myotis* sp.	42	26.5 - 48.5	63	26	785
	Pipistrellus sp.	90	88.5 - 91	100	29	1955
	Pipistrellus nathusii	1	0	1	1	7
	Pipistrellus pipistrellus	66	52 - 68.5	88	27	1411
	Pipistrellus pygmaeus	88	86 - 89	100	33	1759
	Plecotus auritus	14	1 - 26	38	4	57
8	*Myotis* sp.	32	13.5 - 45	52	8	785
	Pipistrellus sp.	96	89.5 - 96	99	26	1955

Location	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
	Pipistrellus pipistrellus	65	45 - 68	82	26	1411
	Pipistrellus pygmaeus	89	82.5 - 92	99	33	1759
	Plecotus auritus	46	0	46	1	57

Appendix K:
Notes on breeding birds in 2021

Species	Bred	Notes
Barn Owl	P	One *ad hoc* record during bat survey, suitable nesting habitat present.
Black-headed Gull	N	No suitable habitat for nesting with the Site, birds using adjacent loch and river.
Blackbird	Y	Widespread across Site, 27 territories.
Blue Tit	Y	Widespread across Site, estimated minimum of 14 territories.
Bullfinch	Y	Pair seen with four fledged young, two territories.
Buzzard	N	No evidence of breeding on Site, birds recorded flying over.
Carrion Crow	Y	Pair present in suitable habitat.
Chaffinch	Y	Widespread across Site, 16 territories.
Chiffchaff	Y	Three territories.
Coal Tit	Y	Only one record but considered likely to have bred, at least one territory.
Dunnock	Y	Widespread across Site, nine territories.
Garden Warbler	Y	Birds in suitable habitat, six territories.
Goldcrest	Y	Only two records but considered likely to have bred, at least one territory.
Goldfinch	N	No evidence of breeding on Site.
Goosander	N	No evidence of breeding on Site.
Great Tit	Y	At least five territories, probably under-recorded.
Great-spotted Woodpecker	Y	Four probable territories.
Herring Gull	N	No suitable nesting habitat, birds using adjacent loch and river.
Jackdaw	Y	Birds in suitable habitat, at least one territory.
Lesser black-backed Gull	N	No suitable nesting habitat, birds using adjacent loch and river.
Long-tailed Tit	Y	Multiple birds in suitable habitat.
Magpie	Y	Widespread across Site, nine territories.
Mallard	P	Probably bred in waterside vegetation.
Mistle Thrush	Y	Two birds recorded, one alarm calling, one territory.
Moorhen	P	Probably bred in waterside vegetation.
Mute Swan	N	No evidence of breeding on Site, but pair with eight juveniles.
Nuthatch	Y	Nest in ash tree, Woodbank. Also recorded on camera trap set for red squirrels.
Oystercatcher	N	No evidence of breeding on Site, pair seen.
Pied wagtail	N	Single record in June.
Raven	N	No evidence of breeding on Site, birds recorded flying over.
Redstart	Y	One singing bird in suitable habitat, in both May and June.
Robin	Y	Widespread across Site, 19 territories.
Siskin	P	Only one record but considered likely to have bred.
Song Thrush	Y	Widespread across Site, 13 territories.
Spotted Flycatcher	Y	Two singing birds in suitable habitat, May, two territories presumed.
Starling	P	Potentially bred in tree cavities on Site, mainly flocks seen.
Swallow	P	Potentially bred in buildings on site.
Tawny Owl	P	Probably bred, multiple records of birds in suitable habitat.
Treecreeper	Y	Only one territory, probably under-recorded.
Whitethroat	Y	Widespread across Site, six territories.
Willow Warbler	Y	Widespread across Site, 13 territories.
Wood Pigeon	Y	Widespread across Site, 16 territories.
Wood Warbler	Y	Two singing birds in May, at different territories.
Wren	Y	Widespread across Site, 21 territories.

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