# 5 Ecology

**EIA Addendum Update**

This EIA Chapter has been updated to account for the proposed reduction of 22 accommodation units at Woodbank and deletion of Area 10.
Sections updated are:

- Habitats 5.6.15
- Table 5.10 Habitat Loss
- Bats 5.6.21
- Table 5.11 Trees with Bat Roost Suitability Suitably Affected Directly and Indirectly During the Construction
- Potential Impacts on SAC Conservation Objectives 5.7.9
- Construction Method Statement 5.7.12
- Table 5.16 Residual Effects

## 5.1 Introduction

5.1.1 This chapter of the EIAR provides an assessment of the likely significant effects from the Proposed Development on ecological features. The assessment is based on the characteristics of the site and surrounding area and the key parameters of the Proposed Development detailed in **Chapter 2 – Site and Proposed Development**. Other chapters relevant to this chapter include **Chapter 4 – Legislative and Planning Policy Context, Chapter 6 – Trees and Woodland, Chapter 9 – Ground Conditions and Geology, Chapter 10 – Water, Hydrology and Flood Risk, and Chapter 16 – Schedule of Mitigation and Monitoring.**

5.1.2 This chapter has been prepared by Applied Ecology Ltd in line with best practice. A statement outlining the relevant expertise and qualifications of competent experts appointed to prepare this EIAR is provided in **Appendix 1.1 – Project Team**.

5.1.3 This chapter is supported by a technical reports provided in **Appendix 5.1 (Ecology Technical Appendix)** and a schematic of the ecological footprint in **Appendix 5.2.**

## 5.2 Policy Context, Legislation, Guidance and Standards

### Legislation

5.2.1 Detailed information relating to planning policy can be found within **Chapter 4 – Legislative and Planning Policy Context**. The chapter presented here has also been informed by relevant biodiversity legislation and policy, including European which has become subsumed into Scottish law post-Brexit, domestic environmental legislation, UK nature conservation policy and local biodiversity guidance. These include:

- The Conservation (Natural Habitats etc.) Regulations 1994 as amended, including amendments made in 2017 with limited relevance to Scotland, and as translated post-Brexit by the UK Withdrawal from the European Union (Continuity) (Scotland) Bill (2020);
- The Wildlife and Countryside Act (as amended) 1981;
- The Wildlife and Natural Environment Act (2011);
- The Nature Conservation (Scotland) Act 2004 (as amended);

- The Protection of Badgers (Scotland) (as amended) Act 1992;
- The Scottish Biodiversity List (SBL); and,
- The Dunbartonshire Local Biodiversity Action Plan (LBAP).

5.2.2 Further detail of relevant legislation and policy is provided in the Technical Appendices accompanying this chapter.

## 5.3 Scope of Assessment

### Study Area

5.3.1 For the purposes of the assessment, the study areas referred to throughout the chapter vary by ecological feature. Investigations were carried out within the following buffers:

- Statutory designated site searches - 2 km from the Site, extended to 10 km for Natura 2000 sites for which screening for Habitats Regulations Assessment (HRA) was required;
- Existing faunal/flora records - 2 km from the Site;
- Bat surveys - within the Site;
- Other protected species surveys - Within 50-250 m of the Site depending on the species; and,
- Habitat surveys - within the Site.

### Scoping and Consultation

5.3.2 Throughout the design process, a number of organisations were consulted to inform both the design and this assessment process. **Table 5-1** summarises consultation responses received. Responses listed in the table include those received via the Scoping Opinion and later discussions regarding survey scope and method.

Table 5-1: Scoping Response for Ecology

| Consultee | Summary of Response | Where & How Addressed |
|---|---|---|
| NatureScot<br>15 July 2021 | Unlikely to be any direct impacts on designated sites, but screening of the River Leven as a functional corridor for the Endrick Water SAC should be included in the assessment. | Screening and shadow HRA provided at Section 5.7. |
| | Ecological and arboricultural attributes of the site will require evaluation. | Ecological attributes included in full in this chapter. |
| | Proposed protected species survey suite provided during screening is supported. | Protected species listed during screening are assessed in full in this chapter where identified as an IEF. |
| The Woodland Trust<br>10 December 2021 | Concerns regarding direct impacts on Ancient Woodland at Drumkinnon Wood, Woodbank House and the Boat House. | Incorporated into the EcIA at Section 5.6.14. |
| | Concerns regarding indirect impacts on Ancient Woodland arising from increased recreational use, pollution, changes in runoff, tree management for safety reasons and INNS. | Incorporated into the EcIA at Section 5.6.14. |
| | Do not consider active management to be compensation for loss of Ancient Woodland. | Noted. |

| Consultee | Summary of Response | Where & How Addressed |
|---|---|---|
| | Lighting schemes must consider nocturnal and crepuscular species. | Incorporated into the EcIA at Section 5.6.44. |
| LLTNPA<br>27 July 2021 | Scottish EUNIS is replacing JNCC Phase 1 and should include full consideration of Ancient Woodland ground flora indicator species. Development footprint to be overlain. | Scottish EUNIS habitat survey was undertaken, including vernal woodland survey - see **Appendix 5.1**. Development footprint overlay provided in **Appendix 5.2**. |
| | INNS should be mapped. | Maps provided in **Appendix 5.1**. |
| | TPO woodlands cover the Boathouse section of the Site. | Covered in **Chapter 6** of the EIAR. |
| | The Control of Woodland Removal policy will be relevant. | Covered in **Chapter 6** of the EIAR. |
| | The EcIA must consider the impact of fragmentation. | Incorporated into the EcIA at Section 5.6.14. |
| | Cumulative assessment is only needed for Traffic and Transport. | No ecological cumulative assessment is therefore presented here. |

## 5.4 Methodology

5.4.1 This chapter has been informed by a suite of desk and field studies, further details of which are described below. The Ecological Impact Assessment (EcIA) has been undertaken in line with good practice guidance, also as described below.

5.4.2 The scope of desk and field studies were agreed with consultees during scoping, and as set out in **Table 5-1**.

### Desk Study

5.4.3 In order to anticipate the potential ecological sensitivities associated with the Site, a desk study was conducted in advance of the field surveys. This included a review of:

- Existing data on statutory designated sites available through NatureScot Sitelink website for statutory designated sites up to 10 km from the Site;
- Records of Ancient Woodlands available from NatureScot (up to 2 km from the Site);
- The SBL; and,
- Records from Scottish Badgers (up to 2 km from the Site).

5.4.4 West Dunbartonshire Council has designated non-statutory nature conservation sites, and such sites within 2 km from the Site were extracted from the West Dunbartonshire Local Development Plan.

5.4.5 Other pre-existing biological data relevant to the Site were also searched for in online databases to which the authors had access and for which there were no copyright issues associated with their use in a commercial setting.

### Field Survey

5.4.6 The EcIA presented here has been informed by a series of technical field studies, as described in **Appendix 5.1**. In summary, the surveys included:

- Habitats, including GWDTEs and those listed as Annex 1 Priority Habitats, and notable flora, including Invasive Non-Native Species (INNS);
- Otter;
- Water vole;

- Badger;
- Red squirrel;
- Pine marten;
- Bats;
- Breeding birds, and,
- Over-wintering birds.

## Ecological Impact Assessment Methodology

5.4.7 The EcIA was undertaken following good practice guidelines current at the time of writing (CIEEM, 2018).

5.4.8 In summary, EcIA requires six steps:

- Identifying and characterising Important Ecological Features (IEFs);
- Identifying and characterising impacts and their effects;
- Identifying measures to avoid and mitigate effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and,
- Identifying opportunities for ecological enhancement and monitoring.

## Identifying Important Ecological Features (IEFs)

5.4.9 The sensitivity, value or importance of ecological features can be related to a wide range of ecosystem services that they can provide to the environment, people or wider society. These benefits can include the conservation of genetic diversity, people's enjoyment or understanding of biodiversity, or the health benefits of biodiversity. A summary of an approach to valuing ecological features in Scotland can be found in **Table 5-2**. The table shows how ecological importance can be ascertained using a combination of statutory measures (legally protected sites and species) and non-statutory but widely accepted measures, such as the presence of notable habitats and species listed in biodiversity lists of local Biodiversity Action Plans (LBAPs). Use can also be made of the Ratcliffe assessment criteria for the selection of sites with nature conservation value (Ratcliffe, 1977) and certain protected species have their own frameworks for the assessment of the importance of on-site populations. All these criteria can vary at different geographical scales.

Table 5-2: An approach to Assessing Important Ecological Features in Scotland.

| Level of Sensitivity or Value | Examples (Not Exhaustive) |
|---|---|
| International (Including European) | An internationally designated site or candidate site (SPA[2], proposed SPA (pSPA)[3], Special Area of Conservation (SAC)[4], candidate SAC (cSAC)[5], pSAC[6], Ramsar site[7], Biogenetic |

[2] Special Protection Area classified under the EU Birds Directive for importance to birds.

[3] Potential Special Protection Area.

[4] Special Area of Conservation Area classified under the EU Habitats Directive for important habitat or non-bird species.

[5] Candidate Special Area of Conservation.

[6] Potential Special Area of Conservation.

[7] Wetland of international importance designated under the Ramsar Convention.

| Level of Sensitivity or Value | Examples (Not Exhaustive) |
|---|---|
| | Reserve[8]) or an area which NatureScot has determined meets the published selection criteria for such designations, irrespective of whether or not it has yet been notified.<br><br>A viable area of a habitat type listed in Annex 1 of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of that ecological resource.<br><br>A regularly occurring population representing >1 % of the European resource of a species listed in Schedules 2 or 4 of the Habitat Regulations (As amended post-Brexit). |
| National | A nationally designated site (Site of Special Scientific Interest (SSSI)[9], National Nature Reserve (NNR)[10], Marine Nature Reserve) or a discrete area which NatureScot has determined meets the published selection criteria for national designation irrespective of whether or not it has yet been notified.<br><br>A viable area of a priority habitat identified in the former UK BAP or Scottish Biodiversity List, or smaller areas of such habitat which are essential to maintain the viability of that ecological resource.<br><br>A regularly occurring population representing >1 % of the national population of a nationally important species, i.e., a priority species listed in the former UK BAP or Scottish Biodiversity List and/or Schedules 1, 5 (S9 (1, 4a, 4b)) or 8 of the Wildlife and Countryside Act, or Schedules 2 or 4 of the Habitat Regulations (as amended post-Brexit).<br><br>A regularly occurring and viable population of a UK Red Data Book species. |
| Council | Viable areas of key habitat identified in Council LBAP or Scottish Biodiversity List, or smaller areas of such habitats that are essential to maintain the viability of that ecological resource.<br><br>Any regularly occurring, locally significant population of a species listed as being nationally scarce (occurring in 16-100 10 km squares in the UK) or in a relevant Council LBAP or Natural Heritage Zone profile on account of its rarity or localisation.<br>Non-statutory designated wildlife sites including semi-natural ancient woodland greater than 0.25 ha.<br><br>Networks of species-rich hedgerows. |
| Local | Locally important habitats or species such as:<br>▪ Semi-natural ancient woodland smaller than 0.25 ha;<br><br>▪ Features that are scarce within the local area or which appreciably enrich the local habitat resource e.g. networks of hedgerow/ditches not considered to be species-rich; and,<br><br>▪ Small populations of notable species (e.g., SBL or LBAP species) regularly resident on or using the site. |

[8] Sites deemed representative examples of particular habitats in Europe.

[9] Site of Special Scientific Interest.

[10] National Nature Reserve.

| Level of Sensitivity or Value | Examples (Not Exhaustive) |
|---|---|
| Site | Commonplace and widespread habitats or species which contribute to the functioning or value of the wider ecological landscape, such as:<br>▪ Scrub, poor semi-improved grassland, coniferous plantation woodland, intensive arable farmland etc.; and,<br>▪ Common and widespread faunal species, or occasional individuals of more notable species such as SBL or LBAP species, either resident on or using the site. |

## Identifying Impacts and Their Effects

5.4.10 Characterising impacts refers to the changes expected in the extent and integrity of an IEF. It takes into consideration the fact that different impacts on different IEFs can result in permanent or temporary effects of differing magnitudes, and this is also dependent on their timing and/or frequency of occurrence, and whether or not they can be reversed.

5.4.11 Impacts have been defined here as being high, medium, low or neutral, as summarised in **Table 5-3**. Impacts may be adverse (detrimental) or positive (beneficial).

Table 5-3: Criteria for Describing Impacts and Effects on Important Ecological Features

| Impact Type | Description |
|---|---|
| High | High impacts may include those that result in large-scale, permanent (or at least the lifetime of the Proposed Development) changes in an IEF, and likely to change its ecological integrity. These impacts are likely to result in overall changes in the conservation status of a species population or habitat type at the location(s) or geographical scale under consideration. |
| Medium | Medium impacts may include moderate-scale, permanent (with respect to the lifetime of the Proposed Development) changes in an IEF, or larger-scale temporary changes, but the integrity of the feature is not affected. This may mean that there are temporary changes in the conservation status of a species-population or habitat type at the location(s) or geographical scale under consideration, but these are unlikely to be irreversible or long-term. |
| Low | Low impacts may include those that are small in magnitude, have medium-scale temporary changes, and where integrity is not affected. These impacts are unlikely to result in overall changes in the conservation status of a species population or habitat type at the location(s) under consideration, but it does not exclude the possibility that mitigation or compensation will be required. |
| Neutral | There is no perceptible change in the ecological feature. |

5.4.12 Different impacts and their outcomes also have different probabilities of occurring. It is rarely possible to quantify probability accurately in the natural world in the absence of large, long-running data sets, and therefore for the purposes of this EcIA, probabilities are simply assessed qualitatively and relatively, using the terms defined in **Table 5-4** below.

Table 5-4: Criteria for Categorising the Probability of Effects Occurring

| Probability | Description |
|---|---|
| Certain | It is reasonable to conclude that these effects will occur as a result of the proposals. |
| Likely | It is reasonable to conclude that these effects are more likely to occur than not occur. |
| Unlikely | It is reasonable to conclude that these effects are less likely to occur than to occur. |

### Significance of Effects

5.4.13 The 2018 CIEEM guidelines use only two categories to classify effects, namely those which are significant, and those which are not. In accordance with those guidelines, a "significant effect" in this assessment is one which supports (positive) or undermines (adverse) biodiversity conservation objectives for a stated IEF, or for biodiversity generally if this is more relevant to the circumstances being assessed, in particular where the integrity of an IEF will be affected. These significant effects are considered by an ecological professional to be sufficiently important to warrant explicit assessment and reporting so that a decision-maker is adequately informed of the environmental consequences of a proposed project.

5.4.14 The significance of an effect on an IEF is given with reference to a specific spatial scale, which may or may not be related to the geographical scale used to define the IEF. The mitigation hierarchy (avoid, mitigate, compensate, enhance) may need to be applied, consistent with the scale at which the significant effect has been identified, in order to ameliorate any identified significant effects.

## 5.5 Baseline Conditions

### Desk Study and Designated Sites

5.5.1 The findings of the desk study are as presented in **Table 5-5**.

Table 5-5: Summary of Desk Study

| Source | Relevant Data |
|---|---|
| NatureScot | 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.<br><br>Although located 8 km to the north of the Site and therefore not shown in **Appendix 5.1**, 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.<br><br>NatureScot soprano pipistrelle roost records for grid square NS3981; one roost in a domestic dwelling with 87 bats recorded in 2014, and a second domestic dwelling roost with 80 bats recorded in 2015. |
| WDC | Ten non-statutory LNCSs were located within 2 km of the Site. Part of the River Leven Corridor LNCS sits 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 was separated from the Site boundary by the A82 and therefore shared no connecting features. |
| Ancient Woodland Inventory | A number of areas listed on the Ancient Woodland Inventory were present within 2 km of the Site, including areas within or immediately adjacent to 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.<br><br>The boundary of the Boathouse section 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 **Appendix 5.1**, it was found that this area actually contained early successional scrub woodland, and that the longer-established woodland ran along its boundary. |
| GMRC | Data records for which there were no copyright issues were found for the Site dating between 2010-2021:<br>▪ A dead otter north of Duck Bay, in 2014; |

| Source | Relevant Data |
|---|---|
| | ▪ One record of red squirrel, dating from 2019 and located from behind the National Park Centre, 500 m south-east of the Site;<br>▪ A single record for pine marten dating from 2010 within Balloch Country Park, 600 m north of the Site on the opposite side of the River Leven;<br>▪ Records for 72 species of birds, 44 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; and,<br>▪ 26 species of aquatic birds during the winter periods (September – February); 17 of these species were recorded during field surveys but other, scarcer species not recorded included Icelandic gull, velvet scoter, scaup, black guillemot and little auk. |
| WeBS | 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 two most commonly reported species 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. |
| SSRS | 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 within Balloch Country Park, across the River Leven from the Site. 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.<br><br>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.<br>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. |
| Scottish Badgers | Scottish Badgers confirmed a general absence of data records for the Site and wider area. |
| EnviroCentre reports from 2017/2018 | No otter, badger, pine marten, red squirrel or water vole signs were identified during surveys undertaken for the Site by Envirocentre in 2017.<br>No roosting bats were identified during surveys undertaken by EnviroCentre. |

## Field Survey

### Scottish EUNIS, GWDTEs and Notable Flora

5.5.2 Full details of the habitat survey results can be found in **Appendix 5.1**. Approximately half of the Site comprised woodland or scrub habitats, including mixed broad-leaved woodland at Riverside and around Woodbank House, and mixed and broad-leaved plantations around Loch Lomond Shores. The mixed broad-leaved woodlands frequently supported an understorey of invasive non-native species, including Spanish and hybrid bluebells at Riverside, and rhododendron and bamboo at Woodbank House. Drumkinnon Wood, lying outwith the Site, had a notable carpet of native bluebell. Areas of willow, bramble and mixed scrub occurred around Woodbank House.

5.5.3 The other main habitat type present within the Site were grasslands, including mown amenity species-poor swards in the woodland clearing at Riverside, and abandoned pasture to the east of Woodbank House. Bare ground and surface waters typically occurred around the loch shoreline.

5.5.4 Habitats considered to be of Local importance or greater were considered to be IEFs and included in this EcIA. All other habitat types were not considered to be IEFs and have been discounted from the assessment.

5.5.5 No GWDTEs were present within the Site.

### Otter

5.5.6 Details of the otter survey can be found in **Appendix 5.1**. Otters are known to use the shores of Loch Lomond in areas north of the Study Area. However, the surveys undertaken in 2021 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 being sub-optimal for the species 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.

5.5.7 The Site was considered to be of Site level importance for the species at best, but given the level of protection afforded to otter, the species will be considered to be an IEF in the EcIA.

### Water Vole

5.5.8 Details of the water vole survey can be found in **Appendix 5.1**. Water voles were judged to be absent from the Site and Study Area and there was limited habitat suitability for colonisation by the species in the future. For the purposes of the EcIA, water vole was not considered to be an IEF and has therefore been scoped out of the assessment.

### Badger

5.5.9 Details of the badger survey can be found in **Appendix 5.1**. 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, and there were 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.

5.5.10 The Site was considered to be at best of Site level importance for the badger but given the frequenting of habitats within the west of the Site by badger, the species will be considered to be an IEF in the EcIA.

### Red Squirrel

5.5.11 Details of the red squirrel surveys can be found in **Appendix 5.1**. 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. Sightings of grey squirrel were made close by to dreys recorded in the woodland south of the Ben Lomond Way roundabout and the Riverside area of the Site.

5.5.12 Two red squirrels were sighted on a single occasion within a narrow woodland strip along Old Luss Road. This 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 sighting, but a single drey was located in the southern end of the woodland block south of the Ben Lomond Way roundabout. 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.

5.5.13 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 to feed. 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.

5.5.14 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 these parts of the Site did not support red squirrel.

5.5.15 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 habitats here were better connected to the wider area, including being in relatively close proximity to the red squirrel sighting.

5.5.16 Red squirrel will therefore be considered a Council level IEF in the EcIA.

### Pine Marten

5.5.17 Details of the pine marten survey can be found in **Appendix 5.1**. 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 is unlikely to be present within the Site.

5.5.18 For the purposes of the EcIA, pine marten is not considered to be an IEF needing to be included in the assessment.

### Bats

5.5.19 Details of the bat surveys can be found in **Appendix 5.1**. With respect to foraging and commuting bats, 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 brown long-eared bats and *Myotis* spp.. 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 and 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.

5.5.20 A total of five building bat roosts were identified. Four of these were within Woodbank House and one was within the structure referenced as 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 buildings depending on factors such as weather and time of year. No confirmed evidence of hibernation was found during surveys over the winter of 2021/2022. There were however significant limitations to the hibernation surveys 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 that particular winter survey period.

5.5.21 The preliminary roost assessment (PRA) of trees within the Site identified 87 trees that displayed bat roost suitability, of which 47 may be affected by the Proposed Development. Further at height or aerial survey work will be necessary at detailed design 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 therefore particularly likely that bats will be utilising tree roosts in this part of the Site.

5.5.22 Based on the findings of the surveys, bats are included in this EcIA as an IEF of Council level importance.

### Breeding Birds

5.5.23 Details of the breeding bird survey can be found in **Appendix 5.1**. Although the surveys identified some scarcer passerines such as wood warbler and redstart as being present on the Site, 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.

5.5.24 Nevertheless, over 40 % of the species assemblage was comprised of red- or amber-listed species of conservation concern, and therefore birds in the breeding season at the Site will be considered as being an IEF of Local importance in the EcIA.

### Over-Wintering Birds

5.5.25 Details of the over-wintering bird survey can be found in **Appendix 5.1**. The surveys showed that the Site and/or Study Area held relatively low numbers of aquatic wintering birds and most species recorded were mainly common and widespread. Based on these findings, over-wintering birds were not considered to be an IEF needing to be included in the EcIA.

## Modifying Influences (Future Baseline in the Absence of Development)

5.5.26 The dynamic nature of the natural environment means that the ecological features associated with the Site will continually change over time. In the absence of the Proposed Development, the primary process by which the Site's ecological status would most likely change would be continual deterioration in the condition of derelict buildings on the Site, and unchecked encroachment of INNS. These activities may affect a range of habitats and the use of the Site by protected species.

## Implications of Climate Change

5.5.27 According to the UK Climate Change Projects 2018 (UKCP18) summary for West Dunbartonshire and the LLTNP, it is anticipated that summer temperatures and winter precipitation are both expected to increase. Additionally, extreme weather events are likely to increase in both frequency and intensity. These longer-term changes are predicted to cause range shifts in some species and may alter habitat composition and health of the plant communities present. The suitability of the Site may therefore change for some of the species which are currently present, and new, different species may colonise. The baseline surveys carried out for this EIAR represent a snapshot of ecological composition and activity present at the time of survey and cannot be extrapolated to predict future population trends in the event of climate change.

## Assumptions and Limitations

5.5.28 While every attempt was made to collect accurate baseline data for this EIAR, as identified above all ecological surveys represent a 'snapshot' of activity. Ecological features are dynamic and often transient, and it is rarely possible to confirm the absence of a species through survey. It may be necessary to update ecological surveys prior to construction, and data presented in this chapter should not be used for long-term analysis of species distribution or occurrence. However, it is considered that sufficient data have been collected for the assessment purposes of this EcIA.

5.5.29 Species or habitat specific limitations are discussed further in **Appendix 5.1**.

## Identification of Important Ecological Features (IEFs)

5.5.30 Based on the criteria given in **Table 5-2**, summaries of the IEFs identified in **Appendix 5-1** are presented in **Table 5-6** for designated sites, **Table 5-7** for habitats, and **Table 5-8** for faunal species. All other ecological features have been scoped out of this assessment (see summaries above and **Appendix 5-1** for more details).

Table 5-6: Summary of Designated Sites IEFs

| Site | Value | Rationale |
|---|---|---|
| Endrick Water SAC | International | Designated and protected under international legislation. |
| Boturich Woodlands SSSI | National | Designated and protected under national legislation. |
| River Leven Corridor LNCS | Council | Council-level non-statutory designation. |
| Ancient Woodland | Council | Ancient woodland areas over 2 ha in area. |

Table 5-7: Summary of Habitat IEFs

| Habitat Type | Value | Rationale |
|---|---|---|
| Surface Standing Waters | Local | Commonplace habitat but important as part of a large, notable features within the wider ecological landscape. |
| Abandoned Pasture | Local | Commonplace habitat but relatively species-rich when unmown, providing linkages between areas of lower value, and therefore important within the wider ecological mosaic. |
| Mixed Scrub | 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. |
| Mixed Broad-Leaved Woodland | Council | Woodland habitat included within the Dunbartonshire LBAP. Important as a connecting feature within the overall ecological landscape and contains diverse ground flora, including areas of native bluebell, as well as many mature trees. |
| Tree Lines | 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. |

Table 5-8: Summary of Faunal IEFs

| Species/Species Group | Value | Rationale |
|---|---|---|
| Otter | Site | Unlikely to be resident but may on occasion frequent the loch shoreline at the edge of the Site. |
| Badger | Site | Unlikely to be resident but known to use parts of the Site for foraging. |
| Red squirrel | Council | Known to be using the Site but residency status is not conclusively known. Impact assessment will need to be precautionary. Grey squirrel resident. |
| Bats | Council | High levels of foraging activity from a variety of common bat species, and a number of roost locations. Bats are listed as priority species in the SBL, and within the Dunbartonshire LBAP. |
| Breeding birds | Local | A typical assemblage of common woodland birds but a relatively high proportion of species listed as amber or red species of conservation concern. |

## 5.6 Assessment of Effects

### Zone of Influence

5.6.1 The study area for this assessment has been defined by determining the zone of influence of the Proposed Development in relation to each of the identified IEFs, including the extent to which direct effects caused by land take and habitat loss may be experienced by those IEFs and the extent of indirect effects, such as an IEF's prey species being affected by the Proposed Development.

5.6.2 The zone of influence is different for each of the IEFs assessed and therefore a separate study area has been defined for each.

### Embedded Mitigation

5.6.3 This assessment of impacts and their effects has been undertaken in the context of the application of embedded mitigation which will reduce impacts associated with both construction and operation of the Proposed Development. This embedded mitigation includes avoidance of IEFs during the design process, and the implementation of standard best practice mitigation during construction.

## Mitigation by Design

5.6.4 During the design process, various factors were taken into consideration in order to minimise potential impacts on IEFs. These can be summarised as:

- Exclusion of all previously proposed works from Drumkinnon Wood; and,
- Minimisation of tree removal at Woodbank House.

## Best Practice During Construction

5.6.5 An Ecological Clerk of Works (ECoW) will oversee all stages of construction, to ensure that good practice measures with regards to ecology are implemented. Other good construction practice measures will be incorporated into the Construction Environmental Management Plan (CEMP) for the Proposed Development. These can be summarised as:

- Work areas will be carefully marked out and delimited on the ground, with the assistance of the ECoW, to ensure no extraneous habitat loss. Temporary fencing will be used to ensure that plant and operatives do not encroach further than is necessary into ecologically sensitive areas;
- General good practice measures for working in and near to watercourses and waterbodies will be adhered to, for example, during construction, silt interception traps will be provided to minimise unchecked contaminated run-off. Appropriate temporary drainage solutions must be designed and installed. Detailed drainage designs will require review and approval by the scheme Environmental Manager (and ECoW as required), and appropriate drainage measures will be installed in advance of major ground-breaking works. A pollution prevention plan will be included in the CEMP;
- Fuels and other chemicals will be stored securely within the site construction compound;
- Appropriate wash-out facilities will be available for vehicles and machinery;
- Trenches and excavations will be covered at the end of each working day, or will include ramps, and stored pipes will 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 watercourses and woodland edges. Use of heavy machinery and pile drivers will be limited to avoid two hours before and after dawn and dusk within 30 m of watercourses, waterbodies or woodland edges; and,
- A site speed limit of 10 mph for all construction traffic will be in place to protect badger, red squirrel and otter.

## Construction Phase Effects

5.6.6 Potential direct effects of construction include:

- Direct loss of habitat through land take for construction of built features and associated infrastructure; and,
- Direct loss or harm of species through felling and other construction activities.

5.6.7 Potential indirect effects of construction include:

- Changes to the existing hydrology that could lead to detrimental changes in quality or availability of surface waters;
- Increased pollution risk associated with accidental spillage of fuels, oils, and increases in silt laden run-off and dust emission; and,
- Disturbance effects to faunal species.

5.6.8 Using GIS, the Proposed Development footprint was overlain on the Scottish EUNIS Habitat Map to calculate the extent of habitat lost directly to construction. Construction footprints supplied for this purpose accounted for instances where felling or construction may lead to increased direct impacts.

5.6.9 Indirect impacts on habitats and species are less easy to quantify. The zones of influence of construction activities, or disturbance to species, can be site-, species- or disturbance source-specific, as can be fragmentation effects. Indirect effects are therefore discussed at a qualitative level through consideration of the habitat and species maps and development layout.

## Designated Sites

5.6.10 Potential construction phase impacts and effects on designated sites are summarised in **Table 5-9** below.

5.6.11 With regards to the Endrick Water SAC, the Proposed Development is < 5 m from a habitat feature (the River Leven) on which qualifying features of the SAC are dependent. There is therefore the potential for the Proposed Development to affect the qualifying interest features of this site, namely Atlantic salmon and lamprey species, during their migratory phases. During the construction phase, impacts on the River Leven, for example through uncontrolled run-off containing silt, hydrocarbons or other pollutants, could decrease the attractiveness of the watercourse for migratory fish, or vibration effects arising from piling in the vicinity of the river. Prior to mitigation, these would be temporary adverse effects, significant at a Local level.

5.6.12 Due to the separation distance between the Site and the Boturich Woodlands SSSI, no construction phase impacts are predicted for the SSSI.

5.6.13 With respect to the River Leven LNCS, the potential impacts on water quality identified for the SAC above would also be relevant. There may also be disturbance of species for which the LNCS has been designated, as a result of noise during the construction phase. These would be temporary adverse effects, significant at the Site level.

5.6.14 Impacts on Ancient Woodlands include direct loss of woodland, fragmentation effects, disturbance of ground flora and impacts on root protection zones for trees associated with the Ancient Woodland. Around Woodbank House, woodland loss will result in adverse effects significant at the Council level, but the removal of invasive non-native species would constitute a positive effect, significant at the Local level. Impacts on ground flora and individual trees would be adverse effects significant at the Local or Site level.

Table 5-9: Summary of Likely Construction Phase Impacts and Effects on Designated Sites Prior to Mitigation

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| Endrick Water SAC | International | Pollution (silty run-off or other contaminants) and/or vibration | Decrease in water quality; disturbance. | Low, adverse impact; temporary, likely. | Adverse effect, significant at a **Local** level. |
| Boturich Woodlands SSSI | National | None | n/a | n/a | No significant effect. |
| River Leven Corridor LNCS | Council | Pollution (silty run-off or other contaminants) and/or vibration | Decrease in water quality; disturbance. | Low, adverse impact; temporary, likely. | Adverse effect, significant at a **Site** level. |
| | | Noise disturbance | Reduced survival or breeding success of species associated with the LNCS. | Low, adverse impact; temporary, likely. | Adverse effect, significant at a **Site** level. |

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| Ancient Woodland | Council | Construction of buildings and infrastructure. | Direct loss of 0.36 ha of Ancient Woodland habitat | Medium, adverse impact; permanent, certain. | Adverse effect significant at a **Council** level. |
| | | Removal of INNS | Restoration of native ground flora | Medium, positive impact; permanent, likely. | **Positive** effect significant at a **Local** level. |
| | | Compaction of root zones | Decreased infiltration rates and effects on tree health | Low, adverse impact, permanent, likely. | Adverse effect significant at a **Site** level. |
| | | Disturbance of ground flora | Fragmentation | Low, adverse impact, permanent and likely. | Adverse effect significant at a **Local** level. |
| | | | Deterioration in quality of ground flora. | Low, adverse impact, permanent and likely. | Adverse effect significant at a **Site** level. |

## Habitats

5.6.15 Potential construction phase impacts and effects on habitats are summarised in **Table 5-10** below. Of the c. 18.3 ha Site, c. 9.28 ha will be retained as the existing habitat mosaic. Of the 7.41 ha which will be lost to the Proposed Development, over half of the footprint will be associated with habitats not considered to be IEFs (5.0 ha, 53.9 %). Of the IEFs which will be impacted, the majority of the direct habitat loss will be either mixed broad-leaved woodland (11.4 %) or abandoned pasture (11.9 %). Smaller losses are anticipated for surface standing waters, and mixed scrub, as well as impacts associated with fragmentation and/or disturbance. For all habitats except mixed broad-leaved woodland, prior to mitigation these construction phase impacts will be significant at the Site level. For the mixed broad-leaved woodlands, direct impacts are assessed as being significant at the Council level given the hectarage involved and the importance level of this feature. Fragmentation impacts are considered to be significant at the Site level.

5.6.16 The construction phase of Zone E (Woodbank) and Zone B (Riverside) will first include the clearance of INNS, resulting in the clearance of 0.27 ha of dense bamboo, 1.2 ha of dense and more scattered stands of rhododendron, 0.16 ha of cherry laurel and 2.5 ha of hybrid/Spanish bluebell. This is considered to be a positive effect, significant at the local level.

Table 5-10: Likely Construction Phase Impacts and Effects on Habitat IEFs Prior to Mitigation

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| Surface standing waters | Local | Construction of buildings and infrastructure. | Direct loss of 0.06 ha (0.7 % of footprint). | Low, permanent, certain. | Adverse significant effect at the **Site** level. |
| | | | Fragmentation | Low, permanent, unlikely. | No significant effect. |
| | | Changes in quality or quantity of hydrological regime. | Pollution, droughting or flooding of habitats. | Low, permanent and temporary, likely. | Adverse significant effect at the **Site** level. |
| Abandoned pasture | Local | Construction of buildings | Direct loss of 1.10 ha (11.9 % of footprint). | Medium, permanent, certain. | Adverse significant effect at the **Site** level. |

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| | | and infrastructure. | Fragmentation | Low, permanent, likely. | No significant effect. |
| | | Compensatory planting. | Direct loss of 1.11 ha. | Medium, permanent, certain. | Adverse significant effect at the **Site** level. |
| Mixed scrub | Local | Construction of buildings and infrastructure. | Direct loss of 0.19 ha (2.1 % of footprint). | Low, permanent, certain. | Adverse significant effect at the **Site** level. |
| | | | Fragmentation | Low, permanent, likely. | No significant effect. |
| | | Compensatory planting. | Direct loss of 0.05 ha. | Low, permanent, certain. | No significant effect. |
| Mixed broad-leaved woodland | Council | Construction of buildings and infrastructure. | Direct loss of 1.06 ha (11.4 % of footprint). | Medium, permanent, certain. | Adverse significant effect at the **Council** level. |
| | | | Fragmentation | Medium, permanent, certain. | Adverse significant effect at the **Site** level. |
| | | | Clearance of INNS | High, permanent, certain | **Positive** significant effect at the **Local** level. |
| Tree lines | Local | Construction of buildings and infrastructure. | No effect anticipated. | n/a | No significant effect. |

### Otter

5.6.17 Potential construction phase impacts and effects on otter are summarised in **Table 5-11** below. Otters are not resident on the Site, but there remains a possibility that they may occasionally use habitats within Zone D (the Boathouse), Zone C (the Pierhead) or Zone B (Riverfront) when foraging or commuting. This may bring them into contact with construction activities or be susceptible to impacts arising from decreases in water quality. Although the majority of these impacts will be avoided through the implementation of the embedded mitigation, impacts on otter have been assessed precautionarily as being significant at the Site level with respect to disturbance and/or changes in water quality, within the three zones identified above.

### Badger

5.6.18 Potential construction phase impacts and effects on badgers are summarised in **Table 5-11** below. Badgers are not currently resident on the Site but they use habitats within Zone D (Staff Area) and Zone E (Woodbank) for foraging. Badgers are not expected to be active at the times of day when the majority of construction activities will be undertaken, but there will be a loss of foraging habitat in Zone E (Woodbank), as well as the likely interruption of traditionally used commuting routes. These adverse impacts have been assessed as being significant at the Site level within Areas D and E.

### Red Squirrel

5.6.19 Potential construction phase impacts and effects on red squirrel are summarised in **Table 5-11** below. Red squirrels are assumed to be absent from Zones A, B and C, but present within Zones D and E on a transitory basis. Although no red squirrel dreys were conclusively confirmed within either of these Zones, the sighting of red squirrel in these areas requires a precautionary approach to the assessment of impacts and effects.

5.6.20 Any tree removal within these areas could potentially affect red squirrel dreys, either directly through down-takings, or indirectly through noise and vibration disturbance. Tree and

vegetation removal will also decrease the availability of foraging habitat. Given that the Site appears to be on the edge of an ecological landscape suitable for red squirrel, and the conservation importance of this species, prior to mitigation impacts on red squirrel within Zones D and E are considered to be adverse, significant at the Local level.

### Bats

5.6.21 Potential construction phase impacts and effects on bats are summarised in **Table 5-12** below. Impacts on bats will potentially occur throughout all the Zones comprising the Site. Impacts on building roosts will be confined to Zone E (Woodbank) and are considered to be an adverse impact significant at the Site level. As detailed in **Table 5-11**, prior to detailed design, proposed tree down-takings will include five trees with high bat roost suitability (BRS), seven with moderate BRS and five with low BRS, the majority of which will be within Zone E (Woodbank). Indirect construction phase disturbance impacts, assuming a maximum zone of influence of c. 20 m, will affect a further four trees with high BRS, 13 trees with moderate BRS and 13 trees with low BRS. In total, 47 trees with bat roost suitability will be affected, 60 % of which are in Zone E (Woodbank). Collectively, and on a precautionary basis, these disturbance construction phase impacts are considered to be adverse and significant at the Local level.

Table 5-11: Trees with Bat Roost Suitability Affected Directly and Indirectly During the Construction

| Area | Number of Trees Affect by Direct Loss (BRS) | | | Number of Trees Affected by Indirect Disturbance Impacts (BRS) | | | Total |
|---|---|---|---|---|---|---|---|
| | High | Moderate | Low | High | Moderate | Low | |
| Zone A | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone B | 0 | 2 | 5 | 1 | 8 | 0 | 16 |
| Zone C | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone D | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zone E | 5 | 3 | 0 | 3 | 5 | 12 | 28 |
| Area 11 | 0 | 2 | 0 | 0 | 0 | 1 | 3 |
| Total | 5 | 7 | 5 | 4 | 13 | 13 | 47 |

### Breeding Birds

5.6.22 Potential construction phase impacts and effects on breeding birds are summarised in **Table 5-12** below. The clearance of vegetation will have direct effects on nesting birds if present at the time the works are carried out, as well as indirect disturbance effects. This will be predominantly within Zone D (Staff and Service Area) and Zone E (Woodbank). However, these impacts could occur in any location where vegetation is removed, and would represent an adverse effect, significant at the Site level.

Table 5-12: Likely Construction Phase Impacts and Effects on Faunal Species Prior to Mitigation

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| Otter | Site | Collision with plant. | Injury or death. | Low adverse impact; temporary; unlikely. | No significant effect. |
| | | Excavations | Entrapment | Low adverse impact, temporary, unlikely. | No significant effect. |
| | | Noise, vibration or lighting. | Disturbance – reduced survival/ reproduction rates. | Low adverse impact, temporary, unlikely. | Adverse significant effect at the **Site** level. |
| | | Changes in quality or quantity of hydrological regime. | Reduced foraging habitat – reduced survival/ reproduction rates. | Low adverse impact, temporary, unlikely. | Adverse significant effect at the **Site** level. |
| Badger | Site | Collision with plant. | Injury or death. | Low adverse impact; temporary; unlikely. | No significant effect. |
| | | Loss of foraging habitat. | Reduced survival/ reproduction rates. | Low adverse impact; certain, permanent. | Adverse significant effect at the **Site** level. |
| | | Severance of traditional foraging/ commuting routes. | Reduced survival/ reproduction rates. Increased risk of RTAs Entrapment. | Low adverse impact; permanent; likely. | Adverse significant effect at the **Site** level. |
| | | Noise, vibration or lighting. | Disturbance – reduced survival/ reproduction rates. | Low adverse impact; temporary; unlikely. | No significant effect. |
| Red squirrel | Council | Loss of dreys. | Reduced survival/ reproduction rates. | Low adverse impact; likely (precautionarily); permanent. | Adverse significant effect at the **Local** level. |
| | | Loss of foraging habitat. | Reduced survival/ reproduction rates. | Low adverse impact; likely (precautionarily); permanent. | Adverse significant effect at the **Local** level. |
| | | Noise, vibration or lighting. | Disturbance – reduced survival/ reproduction rates. | Low adverse impact; likely (precautionarily); permanent. | Adverse significant effect at the **Local** level. |
| Bats | Local | Loss of building roosts | Reduced survival/ reproduction rates. | Low adverse impact; certain, permanent. | Adverse significant effect at the **Site** level. |

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| | | Loss of tree roosts | Reduced survival/ reproduction rates. | Medium adverse impact; likely (precautionarily); permanent. | Adverse significant effect at the **Local** level. |
| | | Severance of foraging/ commuting routes. | Altered opportunities for foraging. | Medium adverse impact; certain, permanent. | Adverse significant effect at the **Local** level. |
| | | Noise, vibration or lighting. | Disturbance – reduced survival/ reproduction rates. | Low adverse impact; likely, temporary. | Adverse significant effect at the **Local** level. |
| Breeding birds | Local | Loss of breeding/ feeding habitat for construction. | Reduced survival/ reproduction rates. | Medium adverse impact; certain, permanent. | Adverse significant effect at the **Site** level. |
| | | Noise, vibration or lighting. | Disturbance – reduced survival/ reproduction rates. | Medium adverse impact; certain, temporary. | Adverse significant effect at the **Site** level. |

## Construction Phase Mitigation Measures

5.6.23 It will be possible to reduce some of the identified construction phase impacts and their effects during detailed design.

## Designated Sites

5.6.24 With respect to Ancient Woodland, work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas, including the fencing off and clear signage of no-go zones.

5.6.25 A formal Ancient Woodland Restoration Plan will be devised for the Ancient Woodland within Zone E (Woodbank). This will include:

- A formal eradication programme for INNS, resulting in the clearing of 0.27 ha of dense bamboo, 1.2 ha of dense and more scattered stands of rhododendron, and 0.16 ha of cherry laurel; and,
- Method statements for the approach to be used to clearing ground flora within the Ancient Woodland in locations where lodges and bothies will be sited, and the safe storage of the scraped soil and seed bank for translocation into areas previously affected by INNS. However, all soils where INNS have been present should be disposed of off-site.

5.6.26 Longer-term management of the Ancient Woodland is considered in operational phase mitigation below, via a Landscape and Biodiversity Management Plan.

5.6.27 With respect to the River Endrick SAC, the following construction phase mitigation will be implemented:

- General good practice measures for working in and near to watercourses and waterbodies will be adhered to, as per the embedded mitigation described above. A pollution prevention plan will be included in the CEMP, fuels and other chemicals will be stored securely within the site construction compound, and appropriate wash-out facilities will be available for vehicles and machinery;
- If construction work is carried out during the hours of darkness, machinery and floodlights will be directed away from the River Leven, which must not be directly lit; and,

- No piling works, or any other heavy works which may result in vibration impacts will occur within 100 m of the River Leven or shoreline of Loch Lomond during the peak salmon migration period of October through to May inclusive. If this requirement cannot be met, for whatever reason, underwater noise monitoring will be needed, and the thresholds for noise levels, activity duration, timings within the day and any other mitigation will be agreed in advance with NatureScot and detailed within a formal Species Protection Plan.

5.6.28 The above mitigation for the River Endrick SAC will also be applicable to the River Leven LNCS.

### Habitats

5.6.29 The following mitigation, enhancement or compensation will reduce construction phase impacts and effects on habitat IEFs:

- General good practice measures for working in and near to watercourses and waterbodies will be adhered to, as per the embedded mitigation described above. A pollution prevention plan will be included in the CEMP, fuels and other chemicals will be stored securely within the site construction compound, and appropriate wash-out facilities will be available for vehicles and machinery. These measures will reduce effects on surface waters;

- Retained areas of pasture within Zone E (Woodbank) will be diversified through the application of an appropriate native meadow seed mix and managed as a traditional meadow. This will improve both the structure and composition of this habitat, in particular for pollinators. These measures will be incorporated into the Landscape and Biodiversity Management Plan for the Proposed Development;

- Impacts on scrub, woodland and other tree-ed habitats, in particular within Zones B, D and E, and Area 11, will be mitigated through the provision of compensatory tree planting. Tree species to be used will be native, and typical of those which would occur naturally in these types of habitat, as described in the Design and Access Statement that accompanies this EIAR. Areas of semi-natural woodland lacking in regenerating trees and/or an appropriate ground flora will be strengthened through the underplanting of new trees, and the introduction of an appropriate ground flora (see reference above to reuse of existing Ancient Woodland soils and ground flora); and,

- Areas in Zone B (Riverside) supporting hybrid/non-native bluebells will be stripped and the soils disposed of off-site; this material will not be reused within the Proposed Development in order to prevent further spread of INNS.

### Otter

5.6.30 Construction phase impacts on otter will be reduced through:

- All watercourses within 250 m of the Proposed Development footprint will be surveyed for signs of otters. If necessary, licences will be sought for any relevant resting places; and,

- The site induction for construction personnel will include a site briefing provided by the ECoW regarding otter and the identification of shelters of this species. The briefing will also emphasise the importance of protection of watercourses.

### Badger

5.6.31 Construction phase impacts on badger will be reduced through:

- Pre-construction surveys will be carried out for badger for all relevant habitat within 100 m of construction. If necessary, licences will be sought for any relevant setts discovered as a result of this; and,

- The site induction for construction personnel will include a site briefing provided by the ECoW regarding badger, and the identification of shelters of this species. The briefing will also emphasise the importance of protection of key habitats such as woodland.

### Red Squirrel

5.6.32 Construction phase impacts on red squirrel will be reduced through:

- Minimisation of tree loss within Zones D (Staff Area) and E (Woodbank) at the detailed design stage;
- Pre-construction surveys will be carried out for red squirrel for all relevant habitat within 50 m of construction, including tree-down takings and vegetation clearance. If necessary, licences will be sought for any dreys discovered as a result of this; and,
- The site induction for construction personnel will include a site briefing provided by the ECoW regarding red squirrel, and the identification of shelters of this species. The briefing will also emphasise the importance of protection of key habitats such as woodland.

### Bats

5.6.33 Construction phase impacts on bats will be reduced through:

- Construction of a bespoke Bat House within the ground of Woodbank House (Zone E) to replace roosting opportunities which will be lost as a result of the restoration and conversion of the building. The Bat House will be situated no further than 100 m from the existing locations within Woodbank House, and will incorporate underground potential hibernation features, and a roof void suitable for use by brown long-eared bats, as well as crevices for roosting pipistrelle species. The Bat House will be in a quiet location, and will not be directly lit. A full EPS licence application will then be made to NatureScot to legitimise the works on Woodbank House;
- At the detailed design stage, minimisation of the number of trees with bat roost suitability that will be directly affected through removal, and/or disturbed through noise, vibration or construction phase lighting. For those trees which cannot be designed out of the Proposed Development, aerial survey will be needed to confirm their roosting status. Licence applications will be needed to NatureScot for any tree works which are found to affect tree bat roosts, including both direct and indirect effects, and these will be supported by Species Protection Plans detailing all relevant additional mitigation and compensation measures, for example the strapping of potential roost features directly affected onto retained mature trees; and,
- A tree-mounted bat box will be provided for each tree within the Site with bat roost suitability which will be affected by the Development, either directly through removal or indirectly through disturbance. The type and location of these boxes will be agreed with a suitably qualified ecologist, at the detailed design stage.

### Breeding Birds

5.6.34 Tree-felling and or vegetation removal will not be undertaken during the bird nesting season. If this is not possible, 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).

5.6.35 A range of bird nest boxes will be installed as part of the Proposed Development. Where possible these will be integrated boxes within new buildings, for house sparrow, but 50 tree-mounted bird boxes should also be provided throughout the Site, at locations to be agreed with a suitably qualified ecologist.

## Operational Phase Effects

5.6.36 During the operational phase of the Proposed Development, impacts on IEFs will arise through the introduction of disturbance sources, including the increased presence of people and dogs in semi-natural habitats, increased traffic movements, noise, vibration and night-time lighting levels.

### Designated Sites and Habitats

5.6.37 Direct operational impacts on Ancient Woodland, both within the Site and adjacent to it, and off-site designated sites such as the Boturich Woodlands SSSI, could arise through increased recreational use of these areas. This could include trampling, biking, dog fouling, littering and other forms of anti-social behaviour. Such activities would increase the degradation of the ground flora of these designated sites and/or habitats, leading to compaction and/or erosion of vegetation and soils, and a decrease in both habitat quality and extent. There may also be impacts on Ancient Woodland arising from ongoing management of trees for safety reasons. Operational phase impacts on the Boturich Woodlands SSSI are considered unlikely to occur given the separation distance between it at the Site, and the relative inaccessibility of the SSSI. However, impacts such as these are already evident in some parts of Drumkinnon Wood, and therefore considered to be more likely, resulting in adverse impacts significant at the Local level for Ancient Woodland.

5.6.38 The Endrick Water SAC (and by association the River Leven LNCS) would both be susceptible to disturbance impacts arising from elevated night lighting levels which could affect the migration of salmonids up the river. However, no additional lighting is proposed for Riverside, and therefore no operational phase effects are anticipated for these sites.

### Otter

5.6.39 Operational phase impacts on otter are unlikely given that they are not resident on the Site. However, animals that occasionally frequent the peripheries of the Site may experience higher levels of disturbance as a result of increased visitor numbers and may also be at risk from collision with traffic. These impacts would be significant at the Site level, prior to mitigation.

### Badger

5.6.40 As with otter, operational phase impacts on badger are unlikely, but those animals that have habitually foraged on the Site will be at greater risk from disturbance by people and/or dogs, and from collision with traffic. These impacts would be significant at the Site level, prior to mitigation.

### Red Squirrel

5.6.41 Operational phase impacts on red squirrel are also unlikely, but they too may be discouraged from frequenting the Site due to disturbance sources, and/or could be at risk from traffic collisions. These impacts would be significant at the Site level, prior to mitigation.

### Bats

5.6.42 The Site has been shown to be particularly well-used by foraging and commuting bats, with roost locations confirmed in Zone E (Woodbank) and likely to be present within trees in Zones D (Boathouse and Staff Area) and B (Riverside). Although parts of the Site, and in particular locations immediately adjacent to it, are currently night lit, any introduction of new lighting into currently dark zones, particularly those comprising wooded habitats, may alter patterns of bat foraging activity, and may therefore also alter the breeding success of bats which habitually have used the Site in the past. Although pipistrelle bats in particular are known to hawk off street lighting, this is considered likely to be a high magnitude impact, resulting in a significant adverse effect at the Local level.

### Breeding Birds

5.6.43 The operation of accommodation within habitats traditionally used by nesting birds will introduce new disturbance sources from lighting, noise, people and dogs. Prior to mitigation, this will result in an adverse effect significant at the Site level.

Table 5-13: Likely Operational Phase Impacts and Effects on Designated Sites Prior to Mitigation

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| Endrick Water SAC | International | Night-time lighting disturbance. | Reduced survival or breeding success of species associated with the SAC. | No new lighting of watercourse is proposed. | No significant effect. |
| Boturich Woodlands SSSI | National | Increased recreational pressures on woodland SSSI. | Decrease in quality and extent of habitat. | Low adverse, unlikely, ongoing. | No significant effect. |
| River Leven Corridor LNCS | Council | Night-time lighting disturbance. | Reduced survival or breeding success of species associated with the LNCS. | No new lighting of watercourse is proposed. | No significant effect. |
| Ancient Woodland | Council | Increased recreational pressures on retained areas of Ancient Woodland, including off-site locations. | Decrease in quality and extent of habitat. | Medium adverse impact; likely, permanent. | Adverse significant effect at the **Local** level. |

Table 5-14: Likely Operational Phase Impacts and Effects on Habitats Prior to Mitigation

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| Surface standing waters | Local | Increased visitor numbers to shoreline | Decrease in habitat quality and integrity. | Low adverse impact; likely, ongoing. | Adverse significant effect at the **Site** level. |
| Abandoned pasture | Local | No impacts anticipated. | n/a | n/a | No significant effect. |
| Mixed scrub | Local | Disturbance and further fragmentation. | Decrease in habitat quality and integrity. | Low adverse impact; likely, ongoing. | Adverse significant effect at the **Site** level. |
| Mixed broad-leaved woodland | Council | Increased recreational pressures. | Decrease in habitat quality and integrity. | Medium, adverse impact; likely, ongoing. | Adverse significant effect at the **Local** level. |
| Trees | Local | No impacts anticipated. | n/a | n/a | No significant effect. |

Table 5-15: Likely Operational Phase Impacts and Effects on Habitats Prior to Mitigation

| IEF | Importance Level | Impacts | Effects | Impact Scale and Certainty | Effect Significance Prior to Mitigation |
|---|---|---|---|---|---|
| Otter | Site | Increased disturbance from people and dogs. RTA casualties. | Reduced foraging areas and breeding success. | Low adverse, unlikely, ongoing. | Adverse significant effect at the **Site** level. |
| Badger | Site | Increased disturbance from people and dogs. RTA casualties. | Reduced foraging areas and breeding success. | Low adverse, unlikely, ongoing. | Adverse significant effect at the **Site** level. |
| Red squirrel | Council | Increase noise and lighting disturbance. RTA casualties. | Reduced foraging areas and breeding success. | Low adverse, unlikely, ongoing. | Adverse significant effect at the **Site** level. |
| Bats | Local | Lighting and noise. | Disturbance to commuting and foraging routes. Impaired breeding success. | High adverse, likely, ongoing. | Adverse significant effect at the **Local** level. |
| Breeding birds | Local | Increased disturbance from people, lighting and dogs. | Injury or death; reduced breeding success. | Medium adverse, likely, ongoing. | Adverse significant effect at the **Site** level. |

### Operational Phase Mitigation Measures

5.6.44 Operational effects on IEFs will be mitigated through:

- Design and installation of a wildlife-friendly night lighting scheme, in particular for bats. This should focus on restricting the use of lighting to only those areas where it is strictly needed, using timers and low-level pillar lighting wherever possible to ensure dark corridors are maintained for use by nocturnal and crepuscular animals. Lighting wavelengths should be kept within the frequencies advised by the Bat Conservation Trust for use in areas with high bat activity;
- Implementation of a 10mph speed limit on all new access roads throughout the Site;
- Dogs to be kept on leads throughout the Site;
- No pedal cycles to be used within woodland and grassland habitat areas; and,
- Clear signage of permitted pedestrian footpaths, with appropriately located environmental interpretation boards.

## 5.7 Habitats Regulations Assessment

### The Endrick Water SAC

5.7.1 The conservation objectives of the Endrick Water SAC are listed as:

(i) to avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and,

(ii) to ensure for the qualifying species that the following are maintained in the long term:

- Population of the species, including range of genetic types for salmon, as a viable component of the site;
- Distribution of the species within site;
- Distribution and extent of habitats supporting the species;
- Structure, function and supporting processes of habitats supporting the species; and,
- No significant disturbance of the species.

## Pressures on the SAC

5.7.2 NatureScot lists a number of pressures on the qualifying features of the Endrick Water SAC. Of most relevance to the Proposed Development is the potential for a reduction in water quality in the River Leven, and the potential for disturbance through noise, vibration and artificial lighting, particularly in the hours of darkness.

## The Need for HRA

5.7.3 The nearest infrastructure component of the Development is situated c. 9 km from the Endrick Water SAC. However, the Development is also < 5 m from a habitat feature (the River Leven) on which qualifying features of the SAC are dependent. There is therefore the potential for the Development to affect the qualifying interest features of this site, namely Atlantic salmon and lamprey species, during their migratory phases.

5.7.4 Due to the connection with the SAC and nature of the Development, the proposals fall under the provisions of Article 6(3) of the EU Habitats Directive, and hence Regulation 48 of the Habitat Regulations 1994 (as amended).

5.7.5 Under Regulation 48, an "appropriate assessment" needs to be undertaken in cases where any plan or project which:

a) either alone or in combination with other plans or projects would be likely to have a significant impact on a European site designated for nature conservation, and,

b) is not directly connected with the management of the site for nature conservation.

5.7.6 The term Habitats Regulations Assessment (HRA) is usually adopted to describe this appropriate assessment process.

5.7.7 In terms of the requirements listed above for HRA, it is clear that the Development is not directly connected with the management of the SAC for nature conservation (criterion b). Therefore, it must be demonstrated that the Development, either alone or in combination with other plans or projects, does not have a significant impact on the SAC. Guidance provided by SERAD (2000) and SNH (2012, updated in 2015) is clear that the HRA process is also relevant to projects or plans outwith a Natura 2000 site boundary; it is the potential impacts on a site's qualifying interests which are relevant, and not necessarily the project or plan's location in respect to the Natura 2000 site boundary.

5.7.8 Under the terms of the Regulations, the HRA is to be carried out by the relevant competent authority. With respect to the Proposed Development, the competent authority is the Loch Lomond and the Trossachs National Park Authority (LLTNPA), and this section of the report seeks to provide the information required by LLTNPA to undertake a HRA of the Development on the SAC. It is based on a review of proposed construction and operational effects of the Development, and the known ecological characteristics of the relevant qualifying features.

## Potential Impacts on the SAC's Conservation Objectives

5.7.9 No direct impacts on the SAC are predicted. However, potential indirect impacts on the SAC could arise from:

- Disturbance to the SAC component habitats and/or qualifying species through the introduction of additional lighting of work areas during the construction phase, and/or changes to baseline lighting levels during the operational phase;

- Disturbance to SAC component habitats and/or qualifying species during any Site Investigation (SI) works or construction methods which will involve piling, as this could potentially be a source of vibration disturbance; and,

- Deterioration or change in SAC component habitats or qualifying species populations arising from polluted run-off, during either the construction phase or the operational phase.

5.7.10 These potential impacts should be considered in the HRA process as being Likely Significant Effects (LSEs), and because the likelihood of these cannot be ruled out, an Appropriate Assessment is needed to determine whether these LSEs will affect any of the conservation objectives for the SAC and its qualifying features.

*Maintaining Populations of Qualifying Species as a Viable Component of the Site*

5.7.11 The River Leven is the migratory link for Atlantic salmon and lamprey species, which travel from the Atlantic up to the Endrick Water SAC. The protection and management measures described in the Proposed Development's Construction Method Statements (CMSs) will ensure that there will be no direct lighting of the river during either the construction phase or the operational phase of the Development which would impact on this migratory movement of fisheries, particularly during the night. In addition, strict water quality protection measures will be in place during construction to prevent pollution (including siltation) of the river which could decrease its attractiveness to migratory fish. This will prevent the creation of barrier to fish movement and therefore, the populations of the SAC qualifying species will be maintained as viable components of the SAC.

5.7.12 The Construction Method Statements will also state that no piling works, or any other heavy works which may result in vibration impacts will occur within 100 m of the River Leven or shoreline of Loch Lomond during the peak salmon migration period of October through to May inclusive. If this requirement cannot be met, for whatever reason, underwater noise monitoring will be needed, and the thresholds for noise levels, activity duration, timings within the day and any other mitigation will be agreed in advance with NatureScot and detailed within a formal Species Protection Plan.

*Maintaining Distribution of Qualifying Species within the Site*

5.7.13 The Site does not include any habitats on which the qualifying species are directly dependent. Therefore, it is highly unlikely that there would be any impacts as a result of the Proposed Development which would directly affect the distribution of the qualifying species within the SAC. There is a higher probability however that there could be indirect effects arising from the Proposed Development which would alter the ability of species to reach the SAC, and these are covered below.

*Maintaining Distribution and Extent of Habitats Supporting These Species*

5.7.14 There will be no direct impacts on habitats within the SAC during the construction and operation of the Development. Indirect impacts on supporting habitats, through lighting, vibration and/or deterioration in river water quality, will be addressed through measures integrated into the Proposed Developments' design, and contained in the Proposed Development's Construction Method Statements (see above). Assuming that these are implemented in full, there will be no significant impacts on the distribution or extent of the habitats which support the SAC qualifying species.

*Maintaining the Structure, Function and Supporting Processes of Habitats Supporting These Species*

5.7.15 As described above, there will be no direct impacts on habitats within the SAC as a result of the Development, and hence there will be no effects on the functioning of habitats regularly used by the qualifying species. As also described above, indirect impacts on supporting habitats, through lighting, vibration and/or deterioration in river water quality, will be addressed through measures contained in the Development's design or Construction Method Statements. Assuming that these are implemented in full, there will therefore be no significant impacts on the structure, function or supporting processes of the habitats which support the SAC qualifying species.

*No Significant Disturbance of These Species*

5.7.16 Migratory Atlantic salmon are most likely to be using the River Leven during the hours of darkness. The migratory requirements of lamprey are less specific. Lighting schemes for the operational phase of the Proposed Development will not introduce any new light-spill onto the river corridor over and above that already present, and during its construction lighting will also be well-directed and limited to just those areas of need. In doing so, it is not anticipated that there will be any significant disturbance to the SAC qualifying species. The potential for vibration disturbance to qualifying species will also be covered in Construction Method Statements, that will state that no piling works, or any other heavy works which may result in vibration impacts will occur within 100 m of the River Leven or shoreline of Loch Lomond during the peak salmon migration period of October through to May inclusive. If this requirement cannot be met, for whatever reason, underwater noise monitoring will be needed, and the thresholds for noise levels, activity duration, timings within the day and any other mitigation will be agreed in advance with NatureScot and detailed within a formal Species Protection Plan.

### Conclusion of the HRA

5.7.17 Information has been presented here relating to the material required to support a Habitats Regulations Assessments for the Endrick Water SAC, in relation to the Proposed Development.

5.7.18 Protection measures for the River Leven, relating to water quality, vibration and night-time lighting, will be integrated into design and method statements, and collectively these will ensure that identified likely significant effects on the SAC can be avoided, and that there will be no effects on site integrity.

## 5.8 Residual Effects and Statement of Significance

5.8.1 A summary of the residual significance following successful implementation of mitigation and enhancement is provided in **Table 5-16** below. Assuming full compliance with the embedded mitigation described here, and implementation of additional construction phase mitigation and operational phase enhancement, significant residual ecological effects associated with the Proposed Development will be limited to impacts on Ancient Woodland and mixed broad-leaved woodland. This is because compensatory planting is unlikely to provide compensation for the loss of ancient woodland, due to the definition of this habitat type being dependent on continuity of woodland cover, and that the planting of trees will take decades if not centuries to replicate the habitats lost to the Proposed Development. This will be ameliorated in part through translocation of the biotic and abiotic environment currently within the woodland floor wherever INNS have **not** historically been present, and the clearance of INNS from the woodland areas, but there will be a residual adverse impact significant at the Site level for Ancient Woodland. Similarly, for mix broad-leaved woodland, the introduction of built features throughout this habitat will inevitably alter its functioning and extent, but the compensation and enhancement measures will reduce residual construction phase impacts to being significant at only the Site level.

5.8.2 The shadow Habitats Regulations Assessment presented here also concluded, assuming full compliance with the mitigation described here, that there will be no significant effects on the Endrick Water SAC.

Table 5-16: Residual Effects

| Ecological Feature | Maximum Significance of Effect Prior to Mitigation | Avoidance | Mitigation | Compensation | Enhancement | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| **Construction Phase** | | | | | | |
| Endrick Water SAC | Adverse effect significant at a Local level. | Work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas. A stand-off of at least 6 m from the edges of watercourse and waterbodies will be maintained wherever possible. | Good practice measures when working in or near to watercourses will be adhered to.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible.<br>Construction phase mitigation plans required for any potential piling works within 100 m of the River Leven and/or the shoreline of Loch Lomond, between October and May inclusive. | n/a | n/a | No significant effect (n EIA terms). |
| Boturich Woodlands SSSI | None | n/a | n/a | n/a | n/a | No significant effect. |
| River Leven Corridor LNCS | Adverse effect significant at a Site level. | Work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas. A stand-off of at least 6 m from the edges of watercourse and waterbodies will be maintained wherever possible. | Good practice measures when working in or near to watercourses will be adhered to.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | n/a | n/a | No significant effect. |
| Ancient Woodland | Adverse effect significant at a Council level. | Due to mapping discrepancies in the AWI, the true area of ancient woodland affect is less than as mapped, and the Development has sought to avoid this wherever possible, removing Drumkinnon Wood from the proposals.<br>Work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas, including fencing-off of sensitive woodland areas. | Reuse of disturbed top soils where these have not historically supported INNS.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | Compensatory planting required for 0.36 ha but acknowledged that this will not technically compensate for the loss of ancient woodland habitat. | Clearance of INNS via Ancient Woodland Restoration Plan. | **Adverse effect significant at the Site level.** |

| Ecological Feature | Maximum Significance of Effect Prior to Mitigation | Avoidance | Mitigation | Compensation | Enhancement | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| Surface standing waters | Adverse effect significant at a Site level. | Work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas. A stand-off of at least 6 m from the edges of watercourse and waterbodies will be maintained wherever possible during detailed design and/or micro-siting. | Good practice measures when working in or near to watercourses will be adhered to.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | n/a | n/a | No significant effect. |
| Abandoned pasture | Adverse effect significant at a Site level. | Work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas. | On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | Landscaping proposals will maximise the opportunities for the use of native seed mixes for wildflower banks wherever practicable. | Retained pasture will be through seeded with a native wildflower mix and managed as a traditional hay meadow. | No significant effect. |
| Mixed scrub | Adverse effect significant at a Site level. | Work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas. | On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | n/a | Clearance of INNS via Ancient Woodland Restoration Plan.<br>Underplanting and landscape planting of native tree and shrub species. | No significant effect. |
| Mixed broad-leaved woodland | Adverse effect significant at a Council level. | Work areas will be tightly contained to avoid unnecessary encroachment into ecologically sensitive areas, including fencing-off of sensitive woodland areas.<br>Compensatory planting areas to be revisited during detailed design to avoid areas already considered to be broad-leaved woodland. | Reuse of disturbed top soils where these have not historically supported INNS.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | Compensatory planting required for 1.06 ha. | Clearance of INNS via Ancient Woodland Restoration Plan.<br>Underplanting and landscape planting of native tree species. | **Adverse effect significant at a Site level.** |
| Tree lines | None | n/a | n/a | n/a | n/a | No significant effect. |
| Otter | Adverse effect significant at a Site level. | Work areas will be tightly contained to avoid non-essential encroachment into ecologically sensitive areas.<br>No works at the river edge two hours before and after dawn/dusk. | Preconstruction survey.<br>Toolbox talk for all operatives regarding otter.<br>Site speed limit of 10 mph.<br>Good practice measures when working in or near to watercourses will be adhered to. | n/a | n/a | No significant effect. |

| Ecological Feature | Maximum Significance of Effect Prior to Mitigation | Avoidance | Mitigation | Compensation | Enhancement | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| | | | Trenches and excavations will be covered at the end of each working day, or will include ramps, and stored pipes will be capped, to prevent entrapment of animals.<br>If construction work is carried out during the hours of darkness, machinery and floodlights will be directed away from watercourses.<br>Use of heavy machinery and pile drivers will be limited to avoid two hours before and after dawn and dusk within 30 m of watercourses or waterbodies.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | | | |
| Badger | Adverse effect significant at a Site level. | Work areas will be tightly contained to avoid non-essential encroachment into ecologically sensitive areas. | Preconstruction survey.<br>Toolbox talk for all operatives regarding badger.<br>Site speed limit of 10 mph.<br>Trenches and excavations will be covered at the end of each working day, or will include ramps, and stored pipes will be capped, to prevent entrapment of animals.<br>If construction work is carried out during the hours of darkness, machinery and floodlights will be directed away from woodland edges. Use of heavy machinery and pile drivers will be limited to avoid two hours before and after dawn and dusk within 30 m of woodland areas.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | n/a | n/a | No significant effect. |
| Red squirrel | Adverse effect significant at a Local level. | Potential drey trees will be avoided wherever practicable during detailed design.<br>Work areas will be tightly contained to avoid non- | Preconstruction drey survey and licensing where required.<br>Toolbox talk for all operatives regarding red squirrel.<br>Site speed limit of 10 mph. | n/a | Underplanting and landscape planting of tree species known to be preferential forage | No significant effect. |

| Ecological Feature | Maximum Significance of Effect Prior to Mitigation | Avoidance | Mitigation | Compensation | Enhancement | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| | | essential encroachment into ecologically sensitive areas. | Trenches and excavations will be covered at the end of each working day, or will include ramps, and stored pipes will be capped, to prevent entrapment of animals.<br>If construction work is carried out during the hours of darkness, machinery and floodlights will be directed away from woodland edges. Use of heavy machinery and pile drivers will be limited to avoid two hours before and after dawn and dusk within 30 m of woodland areas.<br>On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | | and/or drey trees for red squirrel. | |
| Bats | Adverse effect significant at a Local level. | Impacts on trees with bat roosting suitability will be avoided wherever practicable during detailed design. | Update tree PRA and aerial inspections as required.<br>Licensing as appropriate. | Provision of bespoke Bat House.<br>Provision of tree bat boxes for every tree with BRS that is removed. | Soft landscaping schemes which utilise native species of local provenance to increase bat foraging habitat. | No significant effect. |
| Breeding birds | Adverse effect significant at a Site level. | Works with the potential to disturb nesting birds will be avoided during the nesting bird season.<br>All potential nesting bird habitat will be pre-checked by the ECoW in advance of any construction activities. | On-site work will be supervised by an ECoW who will aim for ecological effects to be minimised wherever possible. | Provision of integrated bird nest boxes in new/ renovated buildings.<br>Provision of 50 tree bird boxes. | Soft landscaping schemes which utilise native species of local provenance to increase nesting bird habitat. | No significant effect. |
| **Operational Phase** | | | | | | |
| Endrick Water SAC | No significant effect (in EIA terms). | n/a | n/a | n/a | n/a | No significant effect. |
| Boturich Woodlands SSSI | No significant effect. | n/a | n/a | n/a | n/a | No significant effect. |
| River Leven Corridor LNCS | No significant effect. | n/a | n/a | n/a | n/a | No significant effect. |
| Ancient Woodland | Adverse effect significant at a Local level. | n/a | Use of bikes prohibited within ancient woodland areas.<br>Dogs to be kept on leads within ancient woodland areas. | n/a | n/a | **Adverse effect significant at a Site level.** |

| Ecological Feature | Maximum Significance of Effect Prior to Mitigation | Avoidance | Mitigation | Compensation | Enhancement | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| | | | Clear signage of pedestrian routes through ancient woodland areas.<br>Provision of information/ environmental education boards regarding ancient woodland resource. | | | |
| Surface standing waters | Adverse effect significant at a Site level. | n/a | Use of bikes prohibited along shoreline habitats.<br>Dogs to be kept on leads along shoreline.<br>Provision of information/ environmental education boards regarding shoreline resource. | n/a | n/a | No significant effect. |
| Abandoned pasture | No significant effect. | n/a | n/a | n/a | n/a | No significant effect. |
| Mixed scrub | Adverse effect significant at a Site level. | n/a | Use of bikes prohibited within woodland areas.<br>Dogs to be kept on leads within woodland areas.<br>Clear signage of pedestrian routes through woodland areas.<br>Provision of information/ environmental education boards regarding woodland and scrub resource. | n/a | n/a | No significant effect. |
| Mixed broad-leaved woodland | Adverse effect significant at a Local level. | n/a | Use of bikes prohibited within woodland areas.<br>Dogs to be kept on leads within woodland areas.<br>Clear signage of pedestrian routes through woodland areas.<br>Provision of information/ environmental education boards regarding woodland resource. | n/a | n/a | No significant effect. |
| Tree lines | No significant effect. | n/a | n/a | n/a | n/a | No significant effect. |
| Otter | Adverse effect significant at a Site level. | n/a | Use of bikes prohibited along shoreline habitats.<br>Dogs to be kept on leads along shoreline.<br>Provision of information/ environmental education boards regarding shoreline resource.<br>Site speed limit of 10 mph. | n/a | n/a | No significant effect. |
| Badger | Adverse effect significant at a Site level. | n/a | Dogs to be kept on leads within woodland areas. | n/a | n/a | No significant effect. |

| Ecological Feature | Maximum Significance of Effect Prior to Mitigation | Avoidance | Mitigation | Compensation | Enhancement | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| | | | Clear signage of pedestrian routes through woodland areas.<br>Provision of information/ environmental education boards regarding woodland resource.<br>Site speed limit of 10 mph.<br>Wildlife-friendly lighting scheme. | | | |
| Red squirrel | Adverse effect significant at a Site level. | n/a | Dogs to be kept on leads within woodland areas.<br>Clear signage of pedestrian routes through woodland areas.<br>Provision of information/ environmental education boards regarding woodland resource.<br>Site speed limit of 10 mph.<br>Wildlife-friendly lighting scheme. | n/a | n/a | No significant effect. |
| Bats | Adverse effect significant at a Local level. | n/a | Bat-friendly lighting scheme throughout the Site, as part of detailed design. | n/a | n/a | No significant effect. |
| Breeding birds | Adverse effect significant at a Site level. | n/a | Dogs to be kept on leads within woodland areas.<br>Clear signage of pedestrian routes through woodland areas.<br>Provision of information/ environmental education boards regarding woodland resource.<br>Site speed limit of 10 mph.<br>Wildlife-friendly lighting scheme. | n/a | n/a | No significant effect. |

## 5.9 Monitoring

5.9.1 Post-construction monitoring is recommended for key IEFs present at the Site, during the first 5 years of operation. This should entail:

- Full red squirrel monitoring in Years 1, 3 and 5 of operation, with additional management recommendations stemming from those monitoring results, as appropriate; and,
- NVC survey of woodlands within the Site in Years 1 and 5 of operation, to determine the extent of habitat change and the success of restoration measures employed.

5.9.2 Additional monitoring may be required as a condition of any protected species licences, and or in detailed Habitat and Landscape Management Plans produced for detailed design.

## 5.10 Cumulative Effects

5.10.1 Following scoping, no cumulative assessment was required for ecology.

## 5.11 Summary

5.11.1 Throughout 2021, a desk study and a range of ecological field surveys were undertaken for the Site and appropriate buffers of this to inform an Ecological Impact Assessment of the Proposed Development. The findings of these studies informed the layout and proposals comprising the Proposed Development, and following the application of a range of avoidance, mitigation, enhancement and compensation measures there will be residual impacts on Ancient Woodland and mixed broad-leaved woodland as a result of the construction phase, and residual impacts on Ancient Woodland as a result of the operational phase. All of these residual impacts will be significant at the Site level.

5.11.2 Further ecological survey will be needed at the detailed design stage for the Proposed Development, and measures needed under the mitigation hierarchy will be relevant for habitats, invasive non-native species, otter, badger, red squirrel, bats and nesting birds.

5.11.3 A shadow Habitats Regulations Assessment has also been presented here, which, following the application of appropriate avoidance and mitigation measures, has concluded that likely significant effects on Natura 2000 sites as a result of the Proposed Development will not effect site integrity if appropriate mitigation and method statements are implemented.

## 5.12 References

- Chartered Institute of Ecology and Environmental Management (2018). Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater, Coastal and Marine. 3rd Edition.
- SEPA (2013). Pollution Prevention Guidelines.
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- SERAD (2000) Habitats and Bird Directives: implementation in Scotland of EC Directives on the Conservation of Natural Habitats and of Wild Flora and Fauna, and the Conservation of Wild Birds ("The Habitats and Bird Directives"). Revised Guidance updating Scottish Office Circular No. 6/1995.
- SNH (2015). Habitat Regulations Assessment of Plans: Guidance for Plan-Making Bodies in Scotland. Version 3.0. Updated version of 2012 guidance initially prepared by David Tyldesley and Associates.