Appendix 7.2 Ecology and Nature Conservation Survey Methods

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Phase 1 Habitat Survey

An initial Phase 1 Habitat survey was undertaken within the boundary of the Proposed Development in August 2011 by appropriately qualified WSP Environment and Energy Ltd (WSPE&E) ecologists. However, as outlined in the Ecology and Natural Conservation chapter, the initial survey was subsequently updated and extended to include a wider Ecological Study Area in 2012 during the NVC Survey which was undertaken by Findley Ecology Services Ltd.

Phase 1 Habitat survey is the standard technique for classifying and mapping habitats within the United Kingdom. The survey was undertaken following standard methodology (JNCC, 2007) and was extended at the time of survey to consider the presence of protected species taking cognisance of guidance published and endorsed by the Institute of Environmental Ecology and Environmental Management (IEEM, 2012).

As part of the survey, dominant plant species were recorded and habitats classified according to their vegetation types. Any notable features or features too small to map were detailed using Target Notes (TN). An indicative plant species list was also recorded, with nomenclature following Stace (2010).

Animal species were identified on an opportunistic basis and, where and when encountered, were identified and recorded. In addition, general habitat assessments were made for the possibility of the Proposed Development to support protected species.

National Vegetation Classification (NVC) Survey

NVC communities within the Site of the Proposed Development were surveyed during good weather conditions in July 2012. Communities were recorded and mapped by eye. Target notes (as per Phase 1 Habitat survey methodology (see above)) were used to record additional detail regarding small areas of interest and general descriptions of features.

Higher plant nomenclature follows that of Stace (2010); bryophyte nomenclature follows that of the British Bryological Society (1998) and lichens follow Coppins (2002). Note: that there have been many botanical name changes of higher and lower plants since the NVC communities were published. For the purpose of this chapter, the NVC community names retain the original nomenclature as published; however, subsequent references to species follow current protocol.

Limitations to Assessment

There were no identified limitations to the methods employed.

Badger Survey

Field Survey

The Proposed Development was surveyed by appropriately qualified WSPE&E ecologists for evidence indicating the presence of badger (*Meles meles*) between January and February 2012. As part of the survey, field signs including badger setts, badger paths, evidence of foraging and dung pits were actively searched out, based on methodologies described in Harris et al. (1989) and Roper (2010) which included all hedgerows, field boundaries, watercourses, paths and other linear features within the Proposed Development and 100 m Study Area. In addition, and where assessed as affording suitable habitat for badger, all areas of woodland and scrub were systematically searched for badger shelter (referred to as setts) and other field evidence.

Badger paths were identified through the observation of field signs including prints, badger hairs on barbed wire or vegetation, dung pits and scratching posts.

Bait marking within and adjacent to the Proposed Development was not undertaken as a satisfactory level of confidence, in terms of social group boundaries, could be achieved from the results obtained from the walkover surveys.

Badger Sett Interpretation

Where badger setts were recorded, the numbers of entrances were noted in addition to a description of the activity level and status of the sett. Sett status was evaluated and determined based on descriptions presented in Harris *et al.* (1994) and Roper (2010) which assigns setts onto one of six categorises, these being:

- main sett (used throughout the year and constitutes the main breeding sett);
- annexe sett (forms part of the main sett area but is not directly linked by an underground passage to the main sett either due to a barrier (e.g. separated by a watercourse or ditch) or by distance);
- subsidiary sett (offers an alternative large sett complex to the main sett but are usually although hot always at least 50m away and are not always obviously linked by a well used path);
- outlier sett (often comprising just one or two holes and are infrequently used by badgers); and
- inactive sett (judged to be disused on a temporary basis); and
- disused sett (appearing to have been abandoned by the group).

It should be noted that the status of a badger sett can change over a relatively short period of time, for example, some badger social groups will move the location of the main sett to other less used setts within their territory.

Badger Path Interpretation

Where broken badger paths or where evidence of paths was intermittent or scattered, professional judgment was exercised to determine their direction and extent based on an understanding of badger's use of landscape features.

Limitations to Assessment

There were no identified limitations to the methods employed.

Otter Survey

Field Survey

All watercourses and water features considered through professional judgement to be suitable for otter (*Lutra lutra*) within the Proposed Development Site and a 250 m Ecological Study Area were surveyed for evidence of otters by appropriately qualified WSPE&E ecologists between January and February 2012. Where possible, surveys were conducted from within the watercourse channel, along the river bank and on ground within 10 m of identified watercourses and focussed on identifying the presence of otter signs which included spraint (droppings), footprints and resting sites (holts, couches and hovers) as defined by Chanin (2003). Additional potential signs of otter activity which were recorded included runs or other well-used access points to watercourses, feeding remains e.g. fish carcasses and sightings, including otter road accident casualties.

Otter Habitat Assessment

In addition to the field surveys, data relating to the quality of identified water features was considered to make a general assessment as to the suitability of the habitat for otter. Generally speaking, habitat that is of value to otter populations provides both food and a presence of suitable lying up and/or breeding sites. However, the basic suitability of habitat should be considered against potential sources of direct mortality from road traffic and disturbance for example through farming or recreation.

It is important to note that in addition to freshwater habitats such as burns, rivers, ponds, lochs and lakes, otters will also use dry watercourses as commuting routes between areas of suitable habitat and have also been shown to will also travel overland between watercourses (Chanin, 2003).

Criteria used to determine the importance of habitats to the local otter population are:

- High Value - Abundance of prey items, optimal foraging and/or lying up habitat, low levels of disturbance, good water quality and suitable habitat links to other watercourses and/or water features;
- Medium value - Availability of prey items, less optimal foraging and/or lying up habitat, moderate levels of disturbance, fair water quality and presence of suitable habitat links to other watercourses and/or water features; and
- Low value - Lack of prey items, limited availability of foraging and/or lying up habitat, high levels of disturbance, poor water quality and absence of suitable habitat links to other watercourses and/or water features.

Limitations to Assessment

Restricting surveys to a single survey season may have limited the ability to account in the assessment of impacts for seasonality in otter activity. In addition, as surveys were restricted to 10 m either side of watercourses, signs of overland otter routes may therefore have been under-recorded.

Water Vole

Field Survey

All watercourses and water features considered through professional judgement to be suitable for water vole (*Arvicola amphibious*) within the Proposed Development Site and a 250 m Ecological Study Area were simultaneously surveyed for evidence of water vole during the otter survey by appropriately qualified WSPE&E ecologists in January and early September 2012.

As part of the survey, all watercourses and water features suitable for water vole were searched for signs of water vole presence including evidence of burrows, nests, feeding stations, latrines, runs and foot prints following survey methods outlined in Strachan & Moorhouse (2006). Surveys were conducted from within the channel where possible, along the river bank and on ground within 10 m of the watercourse.

The water vole breeding season extends from spring to autumn (March to October) when territory marking is at its peak (Woodroffe, 2000). As a consequence, between these periods is considered the optimal survey season. The Water Vole Handbook (Strachan & Moorhouse, 2006) recommends carrying out surveys in spring (mid-April, May or June and a second visit in July, August or September) which was taken into consideration in terms of ensuing surveys coincided with the above period.

Where possible, surveys were conducted following periods of dry weather when high water levels were unlikely to have affected the presence of water vole field signs.

The presence of American mink is likely to affect the presence of water vole populations within a given watercourse as this species has been shown to be a major predator of water vole populations. Consequently, as part of the survey, any signs of mink including footprints, scats (faeces) were recorded.

Water Vole Habitat Assessment

In addition to the field surveys, data relating to the quality of identified water features was considered to make a general assessment as to the suitability of the habitat for water vole. The assessment of water vole habitat quality was undertaken based on characteristics including: flow rate, water depth, characteristics of aquatic and emergent vegetation, availability of adjacent foraging habitat and bank suitability.

Criteria used to determine the importance of habitats to the local otter population are:

- High Value - Abundance of optimal foraging and/or burrowing habitat comprising a good cover of emergence and aquatic vegetation, absence of mink, good water quality and suitable habitat links to other watercourses and/or water features;
- Medium Value - Availability of less optimal foraging and/or burrowing habitat comprising a moderate cover of emergence and aquatic vegetation, fair water quality, low levels of mink activity and presence of suitable habitat links to other watercourses and/or water features;
- Low Value - Lack of availability of foraging and/or burrowing habitat comprising a poor cover of emergence and aquatic vegetation, poor water quality, moderate to high levels of mink activity and presence of suitable habitat links to other watercourses and/or water features.

Limitations to Assessment

There were no identified limitations to the methods employed.

Red Squirrel

Field Survey

Desk-based Review and Site Walkover

All suitable wooded habitat identified through desk-based review within and adjacent to the Proposed Development Site and considered to be suitable for red squirrel (*Sciurus vulgaris*), based on factors such as size, degree of isolation and tree species present following Verbeylen *et al.* (2003), were surveyed for evidence of red squirrel by appropriately qualified WSPE&E ecologists in 2012.

As part of the surveys, an initial walkover survey was undertaken to familiarise ecologists with areas of woodland and to provide information required for the identification of habitats that would be subject to further detailed surveys. In addition, the walkover surveys also aimed to identify initial signs of occupation by squirrel species such as chewed pine cones, drays and/or feeding stations. However, it should be noted that as the above signs cannot be used to differentiate between red and grey squirrel (*Sciurus carolinensis*), any evidence recorded cannot be used to confirm the presence of red squirrel.

Visual Surveys

Where either suitable red squirrel habitat and/or initial signs of squirrel presence were recorded, a combination of visual counts at probable dray locations and visual transect surveys were undertaken within the Proposed Development and 100 m Study Area as a combination of these two methods provides the most robust approach in respect to identifying the presence of red squirrel (Gurnell *et al.,* 2004).

Although not the primary focus of this study, the presence of grey squirrels was additionally noted. The purpose of this was to assess the potential for inter-specific competition between red (if present) and grey populations and long term viability of red squirrel populations as part of the ecological assessment.

Visual surveys were carried out in accordance with the method described by Gurnell *et al.* (2001) and comprised at least three surveys which were carried out at each dray location and/or woodland area.

Hair-Tube Surveys

Hair-tube surveys were not undertaken due to concerns regarding the spread of squirrel pox virus where red squirrel populations co-exist with grey squirrel populations.

Red Squirrel Habitat Assessment

In addition to the field surveys, data relating to the quality of identified wooded area was considered to make a general assessment as to the suitability of the habitat for red squirrel. The value of recorded woodland habitats

for red squirrel was assessed taking cognisance of the criteria presented in Table A7.1. It should be noted that coniferous woodland is generally regarded as being of higher importance for red squirrels compared with broad-leaved woodland due to the limited value of coniferous woodlands for grey squirrels in terms of inter-specific competition with red squirrels.

Table 1 - Assessment of Habitat Value for Red Squirrel Populations

Habitat Value	Criteria
High	Abundance of foraging opportunities presented by cone-bearing conifers and small-mast producing broad-leaved trees of varied age structure, low levels of disturbance and suitable woodland habitat forming a contiguous cover.
Medium	Availability of foraging opportunities presented by cone-bearing conifers and small-mast producing broad-leaved trees of varied age structure, moderate levels of disturbance, lack of cover with some fragmentation between wooded areas and presence of suitable woodland habitat with low levels of grey squirrel activity.
Low	Limited availability of foraging opportunities, high levels of disturbance, lack of cover with considerable fragmentation between wooded areas and lack of suitable woodland habitat with moderate to high levels of grey squirrel activity.

Limitations to Assessment

There were no identified limitations to the methods employed.

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