Report of ecology & protected species surveys of proposed development sites, University of Lincoln, Brayford Campus, Lincoln

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26 September 2011
Ecology Report Reference 2011/05/060

Executive summary of ecology and protected species surveys of proposed development sites, Brayford Campus, University of Lincoln, Lincoln

Ecology surveys of the proposed development sites at the University's Brayford campus were undertaken in the period 15 June to 30 August 2011, by Tim Smith, a freelance ecologist. Specific surveys of habitats, plants and protected species were supplemented by searches for existing habitat and species records for the sites and environs, through consultations with data-holding bodies and web sites, and examination of earlier ecology reports for the campus from the period 2002 to 2010.

The habitats of the sites are typical of those of built-up areas, and they comprise buildings, hard surfaces, hard landscaping, amenity grassland, landscaping areas of planted trees and shrubs, rough grassland and tall herbs, weedy ruderal vegetation, a garden and a short length of ditch. None of the habitats are of significant nature conservation importance. A diverse overall flora was recorded but it mostly comprises common and widespread plants of lowland grassland, wetlands, scrub and disturbed ground habitats. Five plants which are rare, scarce or declining in Lincolnshire were recorded from the Brayford Pool edge. Three invasive alien plants were recorded, from the Fosdyke Canal and Brayford Pool. There are no statutory nature conservation sites, although parts of three non-statutory County Wildlife Sites lie adjacent to the development sites.

Use of the development sites by protected species is very limited. There was no evidence of use by roosting bats, badgers, otters, great crested newts or water voles. A grass snake was seen adjacent to one site. Where use by foraging bats was observed it was concentrated over the balancing pond in front of the Architecture building and along the Brayford Pool edge, with only sparse and infrequent records elsewhere. Breeding birds are likely to be limited to small numbers of common urban built land, scrub and wetland species. It was concluded that none of the sites are of significance for protected species.

Identified impacts were the loss of buildings, hard landscaping, amenity grassland, landscaping trees and shrubs, weedy ruderal vegetation and the garden, with a short length of currently open ditch culverted. The assessment of impacts concluded that there would be no significant impacts on habitats or plants (the invasive aliens and locally notable species would not be affected). For most protected species, there would also be no significant impact; there is just the potential to affect breeding birds where nesting habitat would be cleared and the potential to harm grass snakes should they disperse onto development sites from adjacent habitats. Although not a protected species, common toads could be affected in the same manner as grass snakes.

Adoption of a few simple and standard mitigation measures would ensure that the potential impacts on birds, grass snakes and common toads could be avoided or reduced to insignificance. These are clearance of potential nesting habitat outside the bird breeding season, and the use of temporary reptile and amphibian fencing to prevent access of these species to active development sites.

Potential enhancements for biodiversity as part of the developments have been identified as provision of nesting features for declining urban birds, roosting features for bats and the use of native tree and shrub species in soft landscaping.

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1 Introduction

The University of Lincoln has commissioned Tim Smith, a freelance ecologist, to undertake ecology and protected species surveys of several proposed development sites on the Brayford Pool campus of the University, in Lincoln, as part of an application to City of Lincoln Council for planning consent. This text and the accompanying photographs comprise the ecology and protected species surveys report.

2 Methods

2.1 Data searches

Organisations contacted for existing records were Lincolnshire Environmental Records Centre (LERC) and Upper Witham IDB, which manages the Fosdyke Delph part of which runs through the campus.

Reference was also made to existing ecology reports for the campus, comprising:

- surveys for water voles and bats on 17 July 2002
- great crested newt surveys on 31 July 2002
- habitat, plant and protected species surveys for 2-10 June 2005
- a general ecological survey on 22 February 2006
- general ecological surveys in May-July 2006
- habitat, plant and protected species surveys on 3 April 2008
- habitat, plant and protected species surveys 30 August 2008
- a general ecological survey on 30 September 2010

Internet sources consulted were National Biodiversity Network (NBN) and MAGIC (Multi-Agency Geographic Information for the Countryside).

2.2 Field Surveys

Botanical surveys to record the plants of the development areas and map the locations of any species of interest were undertaken on 15, 16 & 21 June, 12 & 25 July, and 9 & 30 August 2011. Habitat surveys were undertaken on 15 & 16 June 2011.

General protected species walk-over surveys and assessments of site habitats for protected species were undertaken on 15 & 16 June, 25 July, and 9, 16 & 30 August 2011. These comprised searching for signs of use by otter and badger, searching for reptiles, and making an assessment of buildings and trees for their suitability as bat roosts.

Casual records of birds using the development areas, and indications of their activities, were made in the course of other surveys, on 15, 16 & 21 June, 12 & 25 July 2011, and 9 & 16 August 2011.

Water vole surveys of the Fosdyke Delph in front of the Science Centre, adjacent to the small car park and in front of the Sports Centre and of the balancing pond in front of the School of Architecture were undertaken on 21 June, 12 & 25 July, and 9, 16 & 30 August 2011. In these surveys, signs of use by water voles, such as the presence of burrows, droppings, latrines, feeding remains, were searched for. Additionally, “water vole rafts” (pieces of expanded polystyrene anchored in place by canes) were installed as artificial sites which could be used by water voles for latrines. Three rafts were placed in the margin of the Fosdyke Delph adjacent to the small car park; two were placed in the same watercourse in front of the Science Centre; and seven were placed at the edge of the balancing pond, on its southern margin.

Bat activity surveys were undertaken on 21 June, 25 July, and 11, 19 & 24 August 2011. The bat activity survey comprised the walking of a set transect which took in all of the development areas and habitats between, incorporating 10 stopping points at which observers were stationery for 2-5 minutes. The surveys began approximately 30 minutes before sunset and continued for approximately 1.5 hours after sunset. Bat activity was recorded using a bat detector and the times and nature of bat activity recorded along the transect and at the stopping points were noted and mapped.

Stopping point 1 was in the small car park site; 2 was at the western end of the Fosdyke Delph in front of the Science Centre; 3 was by the balancing pond; 4

was near the library; 5 was east of Harrison House; 6 was at the eastern end of the Brayford site by the River Witham bridge; 7 was in front of the main admin building; 8 was in the middle of the marina site; 9 was in the middle of the slipway site; and 10 was next to Bridge House. The stopping points and route are given in Figure 1.

The ecology surveys were commissioned too late in the year to undertake effective surveys for great crested newts in waterbodies using the methods of torching and bottle trapping. The peak time for newts to be in the water had passed and the newt survey season as defined by Natural England (English Nature, 2001) was almost over. Despite this, some egg searching was undertaken since the guidelines give the most effective season for egg searching as April to June inclusive. No newt surveys were undertaken of the Fosdyke Canal, Brayford Pool or River Witham, since these waterbodies are not suitable, being flowing and having high fish populations.

To supplement the surveys, a great crested newt Habitat Suitability Index (HSI) was calculated for the balancing pond and the pond opposite the small car park site. This is a numerical index, based on 10 habitat attributes of a waterbody and its surroundings which relate to the requirements of great crested newts, which is a measure of habitat suitability for newts. Details are given in Oldham et al (2000).

Photographs were taken of the development sites and of features of interest.

3 Records from data searches

3.1 Lincolnshire Environmental Records Centre (LERC)

The data search with LERC comprised a search for non-statutory sites within a 2km radius of the site centre (SK 969 711), and for protected species and UK and Lincolnshire Biodiversity Priority Species within a 1km radius of the site centre. This area of search included the Lincolnshire Wildlife Trust’s nature reserve of Boultham Mere and many of the records of protected species generated by the search were from this site. The nearest part of the nature reserve lies c0.8km south-west of the closest development site, with built land between, and these records are therefore not relevant to this project.

Aside from records from the nature reserve, records were received from other sites, such as County Wildlife Sites, as well as those of a casual nature, and these comprised badger, otter, water vole, reptiles, bats, notable birds, amphibians, butterflies and moths, hedgehog and brown hare.

Details were received of 24 non-statutory sites. Of these, only 3 are relevant (all are County Wildlife Sites, CWS):

- Brayford Pool
- Witham Corridor north of Bracebridge
- Fosdyke Navigation Pyewipe Inn to Brayford Pool.

The Brayford Pool CWS adjoins the marina and Brayford development sites; the very eastern end of the Fosdyke CWS adjoins the slipway development site; and the very northern end of the Witham Corridor CWS adjoins the Brayford development site.

Where relevant, records are incorporated into the site descriptions given below.

3.2 Upper Witham Internal Drainage Board (IDB)

Data received from Upper Witham IDB were casual wildlife records for Fosdyke Delph made by Board operatives in 2008-2010, and these comprised one record of kingfisher, one record of mink at Pyewipe pumping station and three negative records of water vole. Also received were the results of a 2007 conservation survey of Fosdyke Delph, comprising an annotated map of the watercourse, from the pumping station in the west to the balancing pond on the campus in the east. Notes to accompany the map gave details of the presence of UK and Lincolnshire biodiversity priority habitats and species, protected species, invasive species, other fauna and target notes to describe features of interest on and beside the watercourse. Where relevant, records are incorporated into the site descriptions given below.

3.3 Multi-Agency Geographic Information for the Countryside (MAGIC)

Data on the MAGIC web site showed that the University development sites have no statutory nature conservation designation and that no such site lies in the land adjacent. The nearest statutory sites are Greetwell Hollow Quarry Site of Special Scientific Interest (SSSI) (c3km east); Swanholme Lakes SSSI & Local Nature Reserve (c3.4km south-west); and Cross O'Cliffe Orchard Local Nature Reserve (c2.3km south). The development sites did not appear on MAGIC's habitat inventories.

3.4 National Biodiversity Network (NBN)

NBN was searched for records within the OS 10km grid square SK 97, within which the development sites stand. Records were obtained for great crested newt, slow worm, grass snake, adder, common lizard, water vole, otter, badger and three species of bat. Some of these records were unlocated within SK 97, others were over 50 years old, some were unlocated within OS 1km squares and for others, where the localities of the records were specific, they were from sites several km from the University. Where relevant, records are incorporated into the site descriptions given below.

4 Site descriptions

The locations and extents of the development sites are given in Figure 2.

4.1 Site habitats and plants

4.1.1 Small car park site

This small development site lies south of the railway and west of Brayford Way fly-over. The site is located between a University arterial road (to the north and west), the astroturf sports pitch (to the south-west), a drain and pond (to the south-west and south), and the embankment of the Brayford Way fly-over which is covered by landscaping shrubs. The grid reference of this site is SK 9679 7115. Photographs are given in Appendix 1.

The short stretch of adjacent drain (the Fosdyke Delph) has vertical walls of gabions and sparse vegetation of common reed and water starwort. The pond fed by the drain is mostly choked by common reed, although there is a clear channel through which is a continuation of the drain, and this continues under a footbridge and then is culverted under the fly-over. Also present in the pond and at its edges are great willowherb, purple loosestrife, bulrush, common nettle, cleavers, grey willow saplings, water figwort, yellow iris, marsh marigold and water dock. The pond is roughly triangular and it has a vertical gabion south-western bank, an earth northern bank, and an earth eastern bank. The dominance of common reed in the pond was noted by the Upper Witham IDB 2007 conservation survey of Fosdyke Delph.

The northern bank abuts the development site and it is marked off from it by railings. The bank has occasionally mown rough grass of soft brome, common nettle, cleavers, spear thistle, common reed, curled dock, field horsetail, rough meadow-grass, prickly sow-thistle and red fescue.

The body of the development site is an in-use tarmac car park with no vegetation. Along the railings by the pond bank there is a strip of gravel which supports dandelion, common nettle, great willowherb, annual pearlwort, broad-leaved willowherb, sticky groundsel, cleavers, smooth sow-thistle, Canadian fleabane and black medick.

Along the northern side of the car park there is a belt of low landscaping shrubs

with sub-mature plane trees. The shrubs include roses, dogwood, broom and daisy bush. Weeds growing amongst the shrubs are field horsetail, dandelion, prickly sow-thistle, smooth sow-thistle, rat's-tail fescue, annual meadow-grass and Canadian fleabane.

4.1.2 Slipway site

This small development site lies south of the Fosdyke Canal and west of Brayford Way fly-over. The site is located between a University arterial road (to the south and west), the canal and an associated slipway (to the north), and the fly-over (to the east). The grid reference of this site is SK 9689 7131. Photographs are given in Appendix 2.

The site is an in-use car park of gravel and other hard surface. A low brick wall with railing defines the car park along its western and southern sides. Along the canal side there is a small strip of mown amenity grass on a low bank; this supports perennial rye-grass, dandelion, creeping buttercup, ribwort plantain, greater plantain, wall barley, common ragwort, cow parsley, smooth meadow-grass and autumn hawkbit. This strip of grass ends at a small area of landscaping shrubs, with a conifer, comfrey, heather and hedge bindweed. The edge of the canal and slipway are reinforced with concrete and piling. The water in the slipway supports water fern, rigid hornwort, Nuttall's waterweed, yellow water-lily, great willowherb, common duckweed and tube weed.

The Fosdyke Canal opposite this development site is a very small part of the Fosdyke Navigation Pyewipe Inn to Brayford Pool CWS. The CWS citation lists aquatic and marginal plants (albeit in the whole CWS) as including water fern, water starwort, yellow water-lily, ivy-leaved duckweed, Nuttall's waterweed, rigid hornwort, spiked water-milfoil, yellow iris, branched bur-reed, meadowsweet, brooklime, wild angelica, gipsywort, false fox-sedge, hard rush and reed canary-grass.

The car park itself has scattered plants of knotgrass, autumn hawkbit, greater plantain, white clover, pineappleweed, rat's-tail fescue, shepherds purse, annual meadow-grass, dandelion, Canadian fleabane, common orache, smooth sow-thistle, sticky groundsel, dove's-foot crane's-bill, prickly lettuce, willowherbs, black medick, ivy-leaved toadflax, lesser trefoil, cleavers, common field speedwell, long-headed poppy and Eastern rocket.

4.1.3 Bridge House site

This development site lies north of the railway and west of Brayford Way fly-over. The site is located between University arterial roads (to the south and north), the fly-over (to the east) and the village hall and student halls of residence (to the west). The grid reference of this site is SK 9684 7124. Photographs are given in Appendix 3.

Part of the site is Bridge House, part mown amenity grassland, part landscaping shrubberies, part electricity sub-station, part fenced off garden and part hard surfaces.

The mown amenity grassland lies in the west on two sides of the garden area. Plants present are perennial rye-grass, annual meadow-grass, dandelion, white clover, ribwort plantain, dove's-foot crane's-bill, common ragwort, lesser trefoil, common bird's-foot trefoil, cat's-ear, germander speedwell, smooth hawk's-beard, yarrow, field horsetail, black medick, Yorkshire fog, spear thistle, creeping buttercup, red fescue, ivy-leaved speedwell, common vetch, shepherds purse and the moss *Rhytidiadelphus squarrosus*.

The shrubs along the embankment of the slip road off Brayford Way extend down to the edges of the amenity grassland, the garden fence and the hard surface around the sub-station. The plants present include cotoneaster, dogwood, ornamental dogwood, snowberry, grey willow, other willow species, hazel, rowan, guelder-rose, Korean raspberry, wild privet and garden privet. In

places under the tall shrub cover there is a ground flora carpet of ivy and scattered other ground flora plants are Yorkshire fog, black medick, cleavers, creeping buttercup, dandelion, ribwort plantain and white clover.

The fenced-off garden has sub-mature trees and tall shrubs, and numerous culinary and medicinal herbs, and weeds, including willow, hawthorn, periwinkle, bramble, dog rose, cherry, hop, ribwort plantain, marshmallow, rosemary, tansy, sage, creeping thistle, mugwort, barren brome, comfrey, lavender and vervain.

Bridge House is a modular building with external staircases at the southern end and at the north-eastern corner. There are two areas of low shrub landscaping which support roses, dogwood and daisy bush.

The embankment up to Brayford Way between Bridge House and the road itself has dense to open shrubs of elder, snowberry, grey willow, other willow species, hawthorn, silver birch, rowan, rose, dogwood, butterfly-bush and Korean raspberry. Where the shrub cover is absent or sparse, the ground is occupied by rough grass which supports red fescue, ivy, ox-eye daisy, common vetch, beaked hawk’s-beard, hogweed, dandelion, common ragwort, Oxford ragwort, black medick, great willowherb, cat’s-ear, wood small-reed, hairy tare, purple toadflax, barren brome, creeping thistle, ribwort plantain, field horsetail, soft brome, rat’s-tail fescue, broad-leaved dock, pendulous sedge and Yorkshire fog. Retaining walls are draped with ivy.

On gravel and in gaps between slabs around Bridge House there are scattered plants of hairy tare, red fescue, prickly sow-thistle, smooth sow-thistle, common ragwort, annual meadow-grass, dandelion, common field speedwell, pineappleweed, mullein, sticky groundsel, great willowherb, ribwort plantain, procumbent pearlwort and annual pearlwort.

4.1.4 Marina site

This development site lies south of the western end of the Brayford Pool and east of Brayford Way fly-over. The site is located between the Brayford Pool (to the north), the fly-over (to the west), and University arterial roads and buildings (to the south). The grid reference of this site is SK 9694 7127. Photographs are given in Appendix 4.

The majority of the site is a tarmac car park/gravel and block paving hard surface; other features are a brick sub-station, a bin store, a toilet block, the marina building and small areas of tree and shrub landscaping.

The edge of the Brayford Pool is either concrete with steel piling or vertical wood reinforcement. Growing in gaps are common chickweed, greater plantain, annual meadow-grass, hoary willowherb, great willowherb, mugwort, water dock, perennial sow-thistle, smooth sow-thistle, celery-leaved buttercup, skullcap, clustered dock, common nettle, wild angelica, knotgrass, prickly lettuce, monkey flower and gipsywort.

Scattered over the tarmac and gravel are sparse plants of willowherb, prickly sow-thistle, smooth sow-thistle, creeping thistle, common nettle, herb robert, common chickweed, Canadian fleabane, Eastern rocket, knotgrass and annual meadow-grass.

The small areas of tree and shrub landscaping are located by the toilet block and marina building. They include cherry, willow, dogwood, lavender and variegated elder.

The Brayford Pool adjacent to this development site is a small part of the Brayford Pool CWS. The CWS citation lists aquatic and marginal plants (albeit in the whole CWS) as including water dock and wild angelica, which still occur on the reinforced bank by the marina building. The water of the Pool opposite

the marina site supports some water fern and Nuttall's waterweed.

4.1.5 Main site

This development site lies south of the railway and north of Brayford Way-Ropewalk. The site is located between the Science Centre, balancing pond, railway and Performing Arts (all to the north), car parking and Ropewalk (to the west and south), and library and Sparkhouse (to the east). The grid reference of this site is SK 9704 7097. Photographs are given in Appendix 5.

To the south and west of the balancing pond the site is mown amenity grassland. Elsewhere there is a mixture of building (Harrison House), amenity grassland, hard landscape and hard surfaces, the fenced off active building site and site compound for Engineering Hub, University arterial roads and small areas of landscaping trees and shrubs.

The main area of amenity grassland is closely mown and supports perennial rye-grass, daisy, common ragwort, dandelion, creeping cinquefoil, creeping bent, common mouse-ear, ox-eye daisy, rough meadow-grass, lesser trefoil, ribwort plantain, red fescue, common bird's-foot trefoil, self-heal, smooth hawk's-beard, cat's-ear, soft brome, storksbill, white clover, greater plantain and creeping buttercup.

Plants noted in the main area of mown amenity grassland by the Lapwings 2009 survey were perennial rye-grass, red fescue, white clover, dandelion, common ragwort, black medick, ribwort plantain, cocksfoot, cats-ear, greater plantain, creeping cinquefoil, creeping buttercup, common birds-foot trefoil, creeping thistle, annual meadow-grass,

spear thistle, yarrow, daisy, red clover and curled dock.

Disturbed edges of the otherwise intact grass sward, such as along the parking bays and the top of the bank of Fosdyke Delph, have a different and weedy vegetation. This includes common poppy, long-headed poppy, field forget-me-not, black medick, prickly sow-thistle, smooth sow-thistle, fat hen, scentless mayweed, groundsel, dove's-foot crane's-bill, willowherbs, pineappleweed, redshank, thale cress, mullein, pale persicaria, halberd-leaved orache, shepherds purse, curled dock, greater plantain, opium poppy, weld, rat's-tail fescue, knotgrass, scarlet pimpernel, field penny-cress, hedge mustard, mugwort and Canadian fleabane.

Additional plants in this habitat which were previously noted by the Lapwings 2009 survey were common field speedwell, common ragwort, spear thistle, groundsel, scentless mayweed, annual meadow-grass, cats-ear, common mouse-ear, many-seeded goosefoot, hairy bittercress, common chickweed, cleavers, red dead-nettle, dandelion, sticky groundsel, cut-leaved cranes-bill and petty spurge.

The building works for the Engineering Hub have resulted in some areas of former mown amenity grassland to no longer be mown and as a result they have grown a long and rank sward, with Yorkshire fog, perennial rye-grass, white clover, creeping thistle, common ragwort, hemlock, bristly ox-tongue, broad-leaved dock, prickly sow-thistle and coltsfoot.

A length of Fosdyke Delph drain in front of the Science Centre has sloping banks of gabions over which there is locally extensive ivy cover, along with sparse common nettle, cleavers, Yorkshire fog, rough meadow-grass and rosebay willowherb. The 2009 Lapwings survey noted scattered Oxford ragwort, cleavers, grey willow saplings, great willowherb, groundsel, sticky groundsel, common nettle, silver birch saplings, prickly lettuce, petty spurge, and male fern on the open gabions.

The western half of the drain channel is dominated by reed sweet-grass, with some great willowherb, branched bur-reed and one plant of water dock. The eastern end is dominated by branched bur-reed, with occasional reed sweet-

grass, great willowherb, water starwort and tube weed. The open stretch of drain between has blanketweed and water starwort. The drain was very similar in 2009 according to the Lapwings survey, when water plantain was also noted.

A small area of newly sown amenity grassland lies just west of Sparkhouse. This mown grass is dominated by perennial rye-grass, with some black medick, white clover, soft brome, lesser trefoil, creeping buttercup, ribwort plantain, greater plantain, broad-leaved dock, bristly ox-tongue and alsike clover. On the north side of this area of grassland there is a strip of landscaping shrubs of wild privet.

To the west of the access off Ropewalk there is an area of hard standing, which is devoid of vegetation apart from strips around its sides, where a weedy amenity grassland occurs. This supports perennial rye-grass, bristly ox-tongue, spear thistle, common mallow, scentless mayweed, creeping cinquefoil, dandelion and ribwort plantain. Four sub-mature plane trees stand in the strip of grass on the western side.

Two areas of landscaping young planted trees occur to the south of Performing Arts, although the western area was removed on 21 June 2011. The remaining area has silver birch over rough grassland of red fescue, nipplewort, common ragwort, beaked hawk's-beard, rough meadow-grass, common couch, spear thistle, Yorkshire fog and tufted hair-grass. After June, new landscaping birch trees were planted to the north and east of the Engineering Hub.

The remainder of this development area is hard landscaping and hard surfaces (eg decking, tarmac, slabs, gravel), and the building of Harrison House and the Engineering Hub building site. Some Italian alder trees are planted south of Performing Arts. Plants scattered over the gravel and in other niches in the hard surfaces include prickly lettuce, bristly ox-tongue, prickly sow-thistle, smooth sow-thistle, sticky groundsel, great willowherb, other willowherbs, broad-leaved dock, groundsel, black medick, opium poppy, perennial rye-grass, dandelion, greater plantain, common ragwort, common chickweed, dove's-foot

crane’s-bill, rat’s-tail fescue, white clover, Canadian fleabane and parsley piert.

The Lapwings 2009 survey noted the following plants growing in gaps in the hard landscaping: thyme-leaved sandwort, common ragwort, black medick, groundsel, annual meadow-grass, perennial rye-grass, petty spurge, rosebay willowherb, procumbent pearlwort, greater plantain, bramble, common chickweed, Canadian fleabane, birch seedlings, sticky groundsel, butterfly-bush seedlings, mugwort, smooth sow-thistle, weld, ribwort plantain, silverweed, scarlet pimpernel, scentless mayweed, fat hen, common mouse-ear, red fescue, daisy, shepherds purse, thale cress, cats-ear, storksbill and great mullein.

The edge of the railway where it runs adjacent to the hard standing car park east of Harrison House has scattered bramble, elder, rowan, hawthorn, wild clematis, dog rose, goat willow and butterfly-bush along the fence.

Although not part of the main development site, the balancing pond is immediately adjacent. Its banks have rough grassland and tall herbs eg wood small-reed, common nettle, tufted hair-grass, broad-leaved dock, wild teasel, cow parsley, common ragwort, hard rush, soft rush, great willowherb, creeping thistle and Yorkshire fog, with bushes and saplings of silver birch, grey willow and butterfly-bush. The pond itself has stands of bulrush, common reed, reed sweet-grass, reed canary-grass and branched bur-reed, with water starwort, ivy-leaved duckweed, common duckweed and blanketweed as aquatic vegetation.

The Upper Witham IDB 2007 conservation survey of Fosdyke Delph noted the balancing pond to be of recent origin, with some bulrush in the water, and rough grass banks with thistles, docks and common ragwort.

4.1.6 Brayford site

This development site lies north of the railway. The site is located between the railway (to the south), Brayford Pool (to the north), Brayford Wharf East (to the east), and the University's main admin building (to the west). The grid reference of this site is SK 9720 7106. Photographs are given in Appendix 6.

In front of the main admin building there is a roughly semi-circular area of hard landscaping (slabs, block paving, gravel, hard core). This extends as a roadway east as far as Brayford Wharf East where it includes a vehicle bridge over the River Witham. Part of the area is used as car parking. Between the railway and roadway stand the canoe club building and a gas installation building, and these have surrounds of amenity grass with two sub-mature standard ash trees. Growing out of the gutter of the gas building are rosebay willowherb and a sapling grey willow.

Also between the railway and roadway are areas of landscaping plants, shrubs and trees, comprising cotoneaster, lady's mantle, goat willow, crack willow, other willows, hawthorn, guelder-rose, elder, dogwood, ornamental dogwood, alder, ivy, silver birch, aspen, blackthorn, rowan, ash, garden privet, Korean raspberry, daisy bush, snowberry, butterfly-bush, bramble and sycamore. Weeds growing in front of the shrubs include blue fleabane and perforate St Johns wort.

The amenity grassland around the canoe club supports perennial rye-grass, white clover, daisy, common ragwort, common mouse-ear, ribwort plantain, cat's-ear, red fescue and lesser trefoil.

The edge of the River Witham in the east is vertical brick and concrete and there are sparse plants of mugwort, Oxford ragwort, aspen, cat's-ear and barren brome.

Between the roadway and the edge of the Brayford Pool there is a strip of worm amenity grassland with a gravel path along the top of the pool's bank. Seats and

tables are set in this grassland opposite the canoe club. The grassland has scattered trees and shrubs of Lombardy poplar, other poplars, elm, rowan, goat willow, white willow, sycamore and Norway maple. The grassland supports perennial rye-grass, daisy, greater plantain, dandelion and white clover.

The edge of Brayford Pool at the River Witham end is eroding earth, roots and rocks, but this soon gives way west to stepped and vertical wooden reinforcements, with some landing stages, and in front of the reinforcements there is a small amount of earth and rocks. Growing on this are scattered trees and shrubs of dog rose, Norway maple, osier, grey willow, goat willow, white willow, elm, poplar, hawthorn, sycamore, rowan, cherry, elder, holly, garden rose, and crack willow (one mature tree and regrowth from cut stumps).

Under the trees and shrubs and where open, the earth and rocks support a rough grass and tall herb vegetation, and marginal wetland plants of the Pool. This vegetation includes lesser burdock, great willowherb, false oat-grass, hedge bindweed, marsh woundwort, wood avens, creeping thistle, meadowsweet, greater plantain, clustered dock, hogweed, cocksfoot, water forget-me-not, blue water-speedwell, common ragwort, wild angelica, hemlock water-dropwort, branched bur-reed, gipsywort, greater pond-sedge, reed sweet-grass, bramble, bittersweet, mugwort, cleavers, coltsfoot, common valerian, spear thistle, perennial sow-thistle, pendulous sedge, upright hedge-parsley, orange balsam, false fox-sedge, water figwort, nipplewort, water dock, tufted vetch, white dead-nettle, butterbur, Canadian goldenrod, nodding bur-marigold and montbretia.

The River Witham at the eastern end of this development site is a very small part of the Witham Corridor north of Bracebridge CWS. The CWS citation lists a number of aquatic and marginal plants for the whole CWS but the vegetation of the river adjacent to the site is limited: banks are artificial and yellow water-lily occurs in the water.

The Brayford Pool adjacent to this development site is a small part of the Brayford Pool CWS. The CWS citation lists aquatic and marginal plants (albeit

in the whole CWS, but especially in the south-western edge of the pool) as including water dock, wild angelica, fools watercress, marsh woundwort, reed sweet-grass, branched bur-reed, yellow iris, amphibious bistort and water figwort. Many of these plants still occur along the edge of the pool where it forms the boundary of the adjacent development site. The water of the Pool supports water fern and Nuttall's waterweed.

4.2 Protected species

4.2.1 Badger

No badger setts or any signs of badger activity were seen on any of the development sites or on land immediately adjacent to the development sites. Badger use of the local area is unlikely on account of its built up nature, where the built land is the university, retail parks, terraced housing, etc and not sub-urban housing with large gardens where badgers do sometimes occur.

NBN had no records of badgers for the development sites or the University. LERC had no records of badgers for the development sites or the University. No signs of badgers were seen by the Upper Witham IDB 2007 conservation survey of Fosdyke Delph. No signs of badgers were seen by the Lapwings 2009 survey, nor by any of the earlier Lapwings studies back to 2002.

4.2.2 Otter

No signs of use of the balancing pond, Fosdyke Delph, River Witham or the Brayford Pool edge by otters were seen.

NBN had unlocated records of otters along the Fosdyke Canal to the west and

north-west of the University. LERC had a record of otter from 2010 from a locality on a large urban drain in the city roughly 0.5km south-east of the University. This and the NBN records show that otters are using watercourses in the local area, and this is likely to include the Brayford Pool, although here such use is likely to be limited to hunting and dispersing on account of the urban nature of the Pool and the high degree of disturbance and use made of it.

No signs of otters were seen by the Upper Witham IDB 2007 conservation survey of Fosdyke Delph. No signs of otters were seen by the Lapwings 2009 survey, nor by any of the earlier Lapwings studies back to 2002.

4.2.3 Water vole

No signs of use or occupancy by water voles were seen in the balancing pond, Fosdyke Delph, River Witham or the Brayford Pool edge.

NBN had unlocated records of water voles from 2000-2003 for the Ordnance Survey grid square tetrads (2 x 2km square) which cover the University site and which are adjacent to the west, north-west, north, east and north-east, showing that water voles are widespread in the local area in suitable watercourses. The records from LERC are in agreement with this, and they include unlocated records from 2007 and 2008 for the OS 1ksquare in which the Brayford Pool stands (SK 97 71), as well as two records said to be from the campus itself but the grid reference (SK 964 714) places them c500m west of the nearest development site on the Fosdyke Canal or Fosdyke Delph.

Upper Witham IDB had no records of water vole for Fosdyke Delph from general observations by the workforce and no signs of water voles were seen by the 2007 conservation survey of Fosdyke Delph. No signs of water voles were seen by the Lapwings 2009 survey, nor by any of the earlier Lapwings studies, with the exception of work in 2002 which noted signs in a ballast pit (part of the Fosdyke Delph system) located c700m west of the small car park site.

4.2.4 Reptiles

One dead grass snake was seen on the bank of the pond opposite the small car park site on 17 August 2011 when inspecting the water vole rafts. Anecdotal records of grass snakes were received from security staff, with the animals reported to frequent the edge of the railway opposite the main admin building, and c50m west of the nearest part of the Brayford development site. A grass snake was also reported to occur on the hard landscape between the Engine Shed and Library, which is at the edge of the main development site. No common lizards, adders or slow worms were seen or reported.

NBN had records of slow worm, grass snake, adder and common lizard from various unspecified localities which are 3km to at least 5km from the University, with the exception of a record for grass snake in the OS tetrad to the west of the University, which could be just 1km west of the site. LERC had no records of adder; one record of common lizard from 1984 from a locality c1km south; a record of grass snake from the same date and locality; unlocated records of grass snake from 1977 for the OS tetrads covering the University and city; and a 2009 record of slow worm from an unknown locality in Lincoln south of the campus.

No signs of reptiles were seen by the Lapwings 2009 survey, or by any of the earlier Lapwings studies back to 2002.

4.2.5 Bats

The daylight inspections of the various buildings which stand in the development sites noted that the buildings were not suitable for use by roosting bats, and no signs of use by bats were seen. No bat droppings were seen on the exteriors of the buildings.

None of the trees in the development site have any features which could be used by roosting bats. These include the young birch trees, planes and the Italian alders in the landscaping south of the main site; trees along the edge of Brayford Pool; trees in the fenced-off garden near Bridge House; and trees in other areas of soft landscaping. Most trees are too small and young to have developed any holes or cavities, and the more mature trees are “clean” and have no such features.

Results from the bat transect surveys are given in Appendix 7. The surveys show no bat use of the small car park site (brown long-eared bats were nearby on 11 August); no use of the parts of the main site in front of the Science Centre, in front of Harrison House and in front of Performing Arts; no use of the slipway site; and no use of the Bridge House site.

There was very limited use of the marina site by bats, just commuting by single pipistrelle bats on two occasions. The balancing pond part of the main site attracted feeding pipistrelle bats on two occasions, with the pond showed to be a favoured feeding site since there was constant activity by one pipistrelle for at least five minutes on 19 August.

The Brayford site showed activity by pipistrelle and brown long-eared bats. The western site end in front of the Admin building had roughly one pipistrelle pass per visit with activity by brown long-eared bats on 24 August. The eastern site end by the river had activity by these species on 11, 19 and 24 August, and Daubenton’s bats over the Brayford Pool were recorded up by the survey on 19 and 24 August. In the Brayford site, the trees along the roadway from the Admin building to the river were the location of feeding and commuting activity by pipistrelle and brown long-eared bats on each survey visit.

Single records were made of pipistrelle bats passing over the Fosdyke Delph next to the Sports Centre (11 August); opposite the Village Hall (11 August);

opposite the student bar (19 August); and between stopping points 1 & 2 (24 August). Records of brown long-eared bats commuting and feeding were made on 24 August between the Admin building and the Pool, and between the Engine Shed and the railway.

NBN had unlocated records of brown long-eared bats, pipistrelle bats and whiskered/Brandts bats from 1987-1990 from OS tetrads and 1km squares which cover the University or nearby areas of the city, but nothing specific to the University.

LERC had many records of bats, comprising those for brown long-eared, pipistrelle, noctule, whiskered, barbastelle and Daubenton's as well as unidentified species. Many records were for specified and unspecified localities in and around the city, although some were for Brayford Pool and these were for pipistrelle and Daubenton's bats. The grid reference of one unidentified bat placed it on the University campus.

Lapwings Consultants Ltd carried out a bat activity survey of part of the campus on 1 October 2009, between 1823 and 2030 (report ref 09/08/60). This area includes part of the main development site. Very little bat activity was noted, although it was at the end of the active period of the year for bats; records were made of 2, possibly 3, passes by common pipistrelle bats in the area between the railway and School of Architecture. Lapwings also carried out a bat activity survey of what is now the Business & Law building and its surrounds which are located on the east side of Brayford Wharf East and within c50m of the eastern end of the Brayford development site (report ref 09/07/43). The survey was undertaken on 4 October 2009, between 1820 and 2030, and it noted a small number of common pipistrelle bats commuting and feeding over the site.

The citation of Brayford Pool CWS describes the pool as being used by foraging Daubenton's and pipistrelle bats; that for the Witham Corridor states that the river corridor is a major feeding area for bats (although the built-up very northern end may be less so); and that for the Fosdyke Navigation states that the

canal is likely to be good for bat feeding, but there are no data.

University security staff often see bats on the CCTV cameras and their anecdotal records were of pipistrelle bats around Bridge House, over the balancing pond and along the roadway east from the main admin building; and brown long-eared bats between the railway and the main admin and media buildings, and along the roadway.

4.2.6 Great crested newt

No great crested newts were seen and the egg searching did not find any water plants whose leaves had been used by newts for egg laying.

The scores for each of the HSI habitat attributes for the balancing pond and the pond opposite the small car park site are given in Appendix 8. The HSI scores are: balancing pond 0.66, small car park site 0.67. Both waterbodies are therefore of only “Average” suitability for great crested newts as defined by the HSI system.

No signs of great crested newts were seen by the Lapwings 2009 survey, or by any of the earlier Lapwings studies back to 2002.

NBN had records of great crested newts from OS tetrads to the north, east and north-west from the period 1980-1987, but none for the tetrad in which the University stands. More specifically there were newt records from localities roughly 2km north and north-west of the University, and also roughly 2km south and south-east. All these records can be considered not relevant to the University on account of the distance and the built land habitats between. LERC had records from 1977 of newts from OS tetrads to the west and north of the University and these are the same as those on NBN.

Overall, it is considered that great crested newts are not breeding in the balancing pond and the pond opposite the small car park site; that site habitats are largely unsuitable for sheltering newts or if not they are sub-optimal for newts; and that newts are absent from the development sites.

4.2.7 Birds

No old or active birds' nests were seen on the exteriors of any buildings within the development sites. No old or active birds' nests were seen in any trees.

Habitats available for use by breeding birds are considered to be nil on the slipway site. At the small car park site, nesting habitats are very limited and only consist of the landscaping trees and shrubs, but no nests were seen and it is considered unlikely that any birds would nest in the small area of shrubs which are low and open. Mute swans nested in the adjacent reedbed.

At the marina site, nesting habitats are similarly very limited and only consist of buildings and the landscaping trees and shrubs, although again no nests were seen and it is considered unlikely that any birds would nest in the small areas of landscaping. At Bridge House site, nesting habitats are limited and only consist of buildings and the landscaping trees and shrubs, but no nests were seen. It is considered that only small numbers of common scrub birds would be nesting in the taller shrubs along the road embankments whereas the low shrubs around Bridge House are not likely to be used.

Habitats which could be used by nesting birds at the Brayford site are buildings, trees and shrubs, and the tall herb vegetation of the Pool edge. No nests were seen, however, it is considered that small numbers of common scrub birds would be nesting in the taller landscaping shrubs and in the trees and shrubs along the roadway, with small numbers of water birds using the Pool edge. On

the main site, nesting habitats are limited to buildings, the Fosdyke Delph in front of the Science Centre and small areas of landscaping trees and shrubs. The amenity grassland is closely and frequently mown and so is not suitable for nesting birds. No nests were seen. It is considered that the landscaping trees and shrubs are too low and open to support breeding birds, although the drain could be used for nesting by limited numbers of water birds.

Casual records were made in the course of the 2011 surveys of swallows (flying over and around buildings and perching on Bridge House fire escape stairwell), pied wagtail, house martin, mallard, blackbirds, Muscovy ducks, feral pigeons, mute swans, woodpigeons, moorhen, house sparrows and dunnock. Juvenile birds were seen of blackbird, moorhen and mute swan (adults and 4 cygnets frequenting the balancing pond, but having bred in the common reeds in the Fosdyke Delph opposite the small car park site where there is a nest). On 15 June, blackbird and blackcap were singing from the landscaping shrubs near Bridge House. Security staff provided anecdotal records of nests of wren and pied wagtail in the gabions of the Fosdyke Delph opposite the small car park site, where there is also a wagtail roost in the common reeds of the pond and 3 reed warblers (also noted here in 2002 by one of the Lapwings studies).

LERC had many records of notable birds (eg Wildlife & Countryside Act Schedule 1 species, UK Biodiversity Priority Species) for the surroundings of the University, including urban sites and watercourses in the city, Lincoln castle, West Common and Swanpool. Included in the records were peregrine falcon, yellowhammer, reed bunting, kingfisher, skylark, spotted flycatcher, house sparrow, tree sparrow, bullfinch, turtledove, fieldfare and redwing.

Several records were made from 2002 from the University campus itself, with the grid reference given as SK 968 711, which is roughly central for the whole campus. These records include kingfisher (also in 2003), graylag goose, swift, linnet, snipe, yellow wagtail, house sparrow, starling and song thrush, with breeding on the campus by dunnock, house sparrow, starling and linnet.

The Upper Witham IDB 2007 conservation survey of Fosdyke Delph noted an old moorhen nest on the balancing pond. The Lapwings 2009 survey noted pied wagtail and geese, with coot and adult and juvenile moorhen on the balancing pond.

It is likely that use of the development sites by wintering birds is limited on account of the built nature of much of the site. In common with other areas of short grassland such as school playing fields, the main site amenity grassland would be used by wintering gulls. LERC records from 2002 are of wintering linnets using trees and shrubs around car parks, and wintering snipe feeding on the amenity grassland and roosting in the Fosdyke Delph. The only passage record from LERC is of yellow wagtail.

4.2.8 Other fauna

The Upper Witham IDB 2007 conservation survey of Fosdyke Delph noted 3 emperor dragonflies over the balancing pond. There is a 2003 LERC record of hedgehog from the campus. A 2005 survey found larvae of smooth newt.

LERC had several records of common frog, common toad and smooth newt from localities in the city and from unspecified localities in the OS 1km square in which the University stands (SK 97 71) and also from adjacent tetrads. There is an anecdotal record from security staff of toads breeding in the pond on the Fosdyke Delph opposite the small car park site.

5 Assessment of nature conservation importance

5.1 Habitats and plants

5.1.1 Small car park site

This site is not of significant nature conservation interest in habitat and plant terms. The majority of the site is an in-use tarmac car park and there is also a small area of planted ornamental landscaping trees and shrubs. These are common and widespread habitats of urban areas.

None of the non-landscaping plants are of interest since they are all common and widespread species of grassland and disturbed ground in urban areas in lowland Britain. There are no invasive alien plants.

5.1.2 Slipway site

This site is not of significant nature conservation interest in habitat and plant terms. The majority of the site is hard standing and there is only a very small area of mown amenity grassland and a very small area of planted landscaping shrubs. These are common and widespread habitats of urban areas. The banks of the adjacent Fosdyke Canal and slipway are artificial.

None of the plants are of interest since they are all common and widespread species of grassland and disturbed ground in urban areas in lowland Britain. There are no invasive alien plants actually on the site, although in the water of the slipway there are water fern and Nuttall’s waterweed, which are invasive alien plants as defined by the 1981 Wildlife & Countryside Act and they are listed on Schedule 9 of this Act. These species are however not relevant to the adjacent development site since they are aquatic plants and they could not be spread to the site.

5.1.3 Bridge House site

This site is not of significant nature conservation interest in habitat and plant terms. The majority of the site is buildings or hard standing/hard landscaping. Other habitats are small areas of mown amenity grassland, garden, small areas of planted low landscaping ornamental shrubs, and areas of planted tall landscaping shrubs on road embankments with pockets of rough grassland. These are common and widespread habitats of urban areas.

None of the plants are of interest since they are all common and widespread species of grassland and disturbed ground in urban areas in lowland Britain. Pendulous sedge, present in the road embankment scrub, is a rare Lincolnshire plant but as a native of ancient woodland in the county, it is a casual here and may be planted. There are no invasive alien plants.

5.1.4 Marina site

This site is not of significant nature conservation interest in habitat and plant terms. The majority of the site is buildings or hard standing/hard landscaping. There are also small areas of planted tree and shrub landscaping. These are common and widespread habitats of urban areas.

The edge of the Brayford Pool is either concrete with steel piling or vertical wood reinforcement.

All but two of the plants are of this site are common and widespread species of grassland, disturbed ground and wetlands in urban areas in lowland Britain. The exceptions are water dock and skullcap, both of which occur in the artificial bank of Brayford Pool. According to the Lincolnshire Flora (Gibbons, 1975), water dock is a decreasing plant in the county and skullcap is only scattered in Lincolnshire; both plants are however common and widespread in at least lowland Britain (Preston, Pearman & Dines, 2002) and so are of local interest

only.

There are no invasive alien plants actually on the site, although in the water of the Brayford Pool, water fern and Nuttall's waterweed occur and these species are invasive alien plants as defined by the 1981 Wildlife & Countryside Act and it is listed on Schedule 9 of this Act. The species are however not relevant to the adjacent development site since they are aquatic plants and could not be spread to the site.

5.1.5 Main site

This site is not of significant nature conservation interest in habitat and plant terms. The majority of the site is buildings or hard standing/hard landscaping. There are also small areas of planted tree landscaping and areas of mown amenity grassland. These are common and widespread habitats of urban areas.

All but one of the plants are of this site are common and widespread species of scrub, grassland, disturbed ground and wetlands in urban areas in lowland Britain. The exception is water dock, which occurs in the Fosdyke Delph in front of the Science Centre. One plant was noted here on 16 June 2011, although by 12 July the plant seemed to be dying. According to the Lincolnshire Flora (Gibbons, 1975), water dock is a decreasing plant in the county, however it is common and widespread in lowland Britain (Preston, Pearman & Dines, 2002) and is of local interest only. There are no invasive alien plants.

5.1.6 Brayford site

This site is not of significant nature conservation interest in habitat and plant terms. The majority of the site is hard standing/hard landscaping and mown amenity grassland. There are also buildings, areas of planted landscaping trees

and shrubs, and rough grass and tall herb vegetation with trees and shrubs on the Brayford Pool bank. These are common and widespread habitats of urban areas.

All but four of the plants are of this site are common and widespread species of scrub, grassland, disturbed ground and wetlands in urban areas in lowland Britain. The exceptions are marsh woundwort, water dock, common valerian and hemlock water-dropwort, all of which occur in the vegetation of the Pool edge. According to the Lincolnshire Flora (Gibbons, 1975), marsh woundwort, common valerian and water dock are decreasing plants in the county, and hemlock water-dropwort is rare in Lincolnshire, and in the East Midlands. These species are however common and widespread in at least lowland Britain (Preston, Pearman & Dines, 2002), with hemlock water-dropwort distinctly western and northern, and so are of local interest only. Pendulous sedge, present in the Pool edge, is a rare Lincolnshire plant but as a native of ancient woodland in the county, it is a casual here and may be planted.

A few plants of montbretia grow in the tall herb vegetation of the Pool edge. This is an invasive alien plant as defined by the 1981 Wildlife & Countryside Act and it is listed on Schedule 9 of this Act. This species is likely to have been planted here. It is not relevant to the adjacent development site since if the Pool edge is not disturbed it could not be spread to the site. The Pool itself supports water fern and Nuttall's waterweed; both are invasive alien plants as defined by the 1981 Wildlife & Countryside Act and are listed on Schedule 9. These species are however not relevant to the adjacent development site since they are aquatic plants and could not be spread to the site.

5.2 Protected species

5.2.1 Small car park site

This site is not of significance for protected species. No signs of use of the

adjacent Fosdyke Delph or pond by water voles or otters were seen. Potential use by nesting birds is limited to the landscaping trees and shrubs, but no nests were seen and it is considered unlikely that any birds would nest in the site's small area of shrubs which are low and open. No signs of use of the site by badgers were seen.

No use of the site by foraging bats was noted, although the adjacent grass area with surrounding trees did attract foraging brown long-eared bats. There are no habitats which could be used by roosting bats. Grass snakes use the adjacent Fosdyke Delph and pond, including the bank next to the site, but are not likely to disperse from these habitats onto the car park itself. No great crested newts have been recorded from the adjacent Fosdyke Delph or pond, and the pond has only average suitability for newts. Sheltering habitats for newts are limited to the landscaping shrub area but this is open and sub-optimal for newts.

5.2.2 Slipway site

This site is not of significance for protected species. The banks of the Fosdyke Canal and slipway are artificial hence there is no scope for water voles to occur. There are no habitats which birds could use for nesting. No use by foraging bats was noted and there are no habitats which could be used by roosting bats. Sheltering habitats for great crested newts are limited to the very small landscaping shrub area but this is open and sub-optimal for newts.

5.2.3 Bridge House site

This site is not of significance for protected species. Potential use by nesting birds is limited to the buildings, and landscaping trees and shrubs, but no nests were seen and it is considered that only small numbers of common scrub species (eg blackbird and blackcap which were singing to hold territory on 15

June) would be breeding at this site.

Bridge House and the sub-station have no potential to support roosting bats and no use of the site by foraging bats was noted. Sheltering habitats for newts are limited to the landscaping shrub areas but these are isolated from potential newt breeding sites by the railway, roads, built land and mown amenity grassland.

5.2.4 Marina site

This site is not of significance for protected species. Potential use by nesting birds is limited to the buildings, and very small areas of landscaping trees and shrubs, but no nests were seen and it is considered unlikely that any birds would nest in the trees and shrubs which are low and open. The banks of the Brayford Pool are artificial hence there is no scope for water voles to occur. The buildings have no potential to support roosting bats and very limited use of the site by foraging bats was noted. Sheltering habitats for great crested newts are limited to the very small landscaping shrub areas but they are open and sub-optimal for newts, and are isolated from potential newt breeding sites by the railway, roads, built land and mown amenity grassland.

5.2.5 Main site

This site is not of significance for protected species. Potential use by nesting birds is limited to the buildings, drain and to very small areas of landscaping trees and shrubs, but no nests were seen and it is considered that only small numbers of common birds would nest at this site. No water vole or otter signs were seen in the balancing pond or drain, and no reptiles were seen. Harrison House and the trees are not suitable for use by roosting bats. Use by foraging bats is limited to occasional feeding over the balancing pond. No great crested newts have been recorded from the balancing pond, which has only average suitability for newts. Sheltering habitats for newts are limited to the small landscaping shrub areas but they are open and sub-optimal for newts.

5.2.6 Brayford site

This site is not of significance for protected species. Potential use by nesting birds is limited to the buildings, trees and shrubs, and the Pool edge vegetation, but no nests were seen and it is considered that only small numbers of common birds would nest at this site. No water vole or otter signs were seen in the Pool edge, and no reptiles were seen. Use by foraging bats is limited to the trees and shrubs along the roadway. The buildings and trees are not suitable for use by roosting bats. Sheltering habitats for great crested newts are limited to the landscaping shrub areas and the Brayford edge vegetation but they are isolated from potential newt breeding sites by the railway, roads, built land and mown amenity grassland.

6 Potential impacts

6.1 Small car park site

The proposed development would result in the loss of most of the existing car park, and tree and shrub landscaping, although the adjacent Fosdyke Delph and pond, and shrub landscaping on the adjacent road embankment to the east would not be affected.

There would be no significant impact on habitats or plants, and no significant impact on protected species, including water vole, great crested newt and bats.

Grass snakes use the adjacent Fosdyke Delph and pond. Grass snake is a UK Biodiversity Priority Species under the terms of the UK Biodiversity Action Plan (BAP). This species is protected from deliberate and reckless killing or injury by the 1981 Wildlife & Countryside Act and it is included on Schedule 5 of the Act. Grass snake use of the development site would be very limited since

an extensive hard surface occurs adjacent to the drain bank and it would be unlikely that snakes would disperse onto this from the adjacent drain and pond habitats. Despite this, it is not impossible that snakes could venture onto the development site and consequently may be killed or injured.

Common toads are reported to breed in the pond opposite the small car park site. This species is a UK Biodiversity Priority Species under the terms of the UK Biodiversity Action Plan. It is possible that adults could disperse across the development site after breeding and young toads would do the same each year after metamorphosing from tadpoles. Thus there is the potential that toads could be killed or injured by the development works. Toad is included as a UK BAP Priority Species on account of recent population declines and so it is important to ensure that further local and national declines are avoided.

The removal of the landscaping trees and shrubs has the potential to cause the loss of active birds' nests, which would be an offence under the Wildlife & Countryside Act.

6.2 Slipway site

The proposed development would result in the loss of virtually all of the existing car park. The small areas of amenity grassland and landscaping shrubs may not be affected since they are at the edge of the site. The adjacent Fosdyke Canal and slipway would not be affected.

There would be no significant impact on habitats or plants, and no significant impact on protected species, including water vole, otter and bats. This site has no scope to support nesting birds so there would be no impact.

6.3 Bridge House site

The proposed development would result in the loss of Bridge House, the sub-station, amenity grassland and fenced garden, some of the hard landscaping and some of the shrub landscaping with rough grass pockets.

There would be no significant impact on habitats or plants, and no significant impact on protected species, including bats.

The removal of the buildings, and landscaping trees and shrubs has the potential to cause the loss of active birds' nests, which would be an offence under the Wildlife & Countryside Act.

6.4 Marina site

The proposed development would result in the loss of the existing buildings, the existing small areas of landscaping trees and shrubs, and virtually all of the existing car park. The adjacent Brayford Pool and its bank to the development site would not be affected.

There would be no significant impact on habitats or plants, and no significant impact on protected species. Roosting bats and water voles would not be affected. The removal of buildings, and landscaping trees and shrubs has the potential to cause the loss of active birds' nests, which would be an offence under the Wildlife & Countryside Act.

6.5 Main site

The proposed development would result in the loss of Harrison House, of

existing small areas of landscaping trees and shrubs, extensive areas of hard landscaping, hard surfaces and amenity grassland and the active building compound for the Engineering Hub, and it is also proposed that the length of Fosdyke Delph in front of the Science Centre would be culverted. The balancing pond would not be affected.

There would be no significant impact on habitats. The culverting of the Fosdyke Delph would cause the loss of the locally notable water dock, one plant of which occurs at the western end of the drain. There would be no significant impact on the remainder of the site's plant species.

There would be no significant impact on protected species. Roosting bats, foraging bats, great crested newts and water voles would not be affected. The culverting of the drain, the removal of the building, and landscaping trees and shrubs has the potential to cause the loss of active birds' nests, which would be an offence under the Wildlife & Countryside Act.

6.6 Brayford site

The proposed development would result in the loss of a building, of existing areas of landscaping trees and shrubs, and small areas of hard landscaping, hard surfaces and amenity grassland, all located on the south side of the roadway. The amenity grass, trees and shrubs, and Brayford Pool edge on the north side of the roadway would not be affected by the development.

There would be no significant impact on habitats or plants. The locally notable marsh woundwort, water dock, common valerian and hemlock water-dropwort all occur in the Pool edge and would not be affected.

There would be no significant impact on protected species. Roosting bats,

foraging bats, otters, great crested newts and water voles would not be affected. The removal of the building, and landscaping trees and shrubs has the potential to cause the loss of active birds' nests, which would be an offence under the Wildlife & Countryside Act.

This site is contiguous with and close (c100m) to the railway side location where grass snakes have been seen opposite the main admin building. It is therefore possible that grass snakes could be dispersing along the edge of the railway and onto the habitats of the adjacent development site. If so, this would place them in danger of being killed or injured by the works. Grass snake is protected from deliberate and reckless killing or injury by the 1981 Wildlife & Countryside Act and it is included on Schedule 5 of the Act.

7 Mitigation

7.1 Small car park site

A simple mitigation measure would prevent grass snakes and toads from gaining access to the development site from the adjacent drain and pond, and thereby ensure no significant impact on these species, and mitigation measures would also ensure no loss of active birds' nests.

To prevent grass snakes and toads from entering the development site, a temporary reptile proof fence should be erected, before the site becomes active, along the top of the drain and pond bank, and along the foot of the adjacent road embankment to the east. The fence would deflect any dispersing grass snakes and toads away from the development site. The fence needs to stay in place until major construction works have finished, when it can be removed.

To prevent nesting birds constraining the development, the landscaping shrubs

and trees should be removed outside the bird breeding season ie during the period September to February inclusive. If this is not possible, the trees and shrubs can be removed during the nesting season (March to August inclusive) but only after thorough inspections beforehand have shown that there are no active nests present. If any active nests are found, they should be marked and a buffer zone established; work should be suspended or take place elsewhere until the young have fledged and left the nest.

7.2 Slipway site

No mitigation is needed at this site for habitats, plants or protected species.

7.3 Bridge House site

To prevent nesting birds constraining the development, the garden, landscaping shrubs and trees, and existing buildings, should be removed outside the bird breeding season ie during the period September to February inclusive. If this is not possible, they can be removed during the nesting season (March to August inclusive) but only after thorough inspections beforehand have shown that there are no active nests present. If any active nests are found, they should be marked and a buffer zone established; work should be suspended or take place elsewhere until the young have fledged and left the nest.

Although the Bridge House modular building has been deemed to be not suitable for use by roosting bats, and no bat activity was recorded at this site, it is recommended that prior to demolition a re-survey for bats is carried out, especially if the demolition were to take place more than 12 months from the current work. The re-survey would determine use by bats and hence whether any mitigation is required.

7.4 Marina site

To prevent nesting birds constraining the development, the landscaping shrubs and trees, and existing buildings, should be removed outside the bird breeding season ie during the period September to February inclusive. If this is not possible, they can be removed during the nesting season (March to August inclusive) but only after thorough inspections beforehand have shown that there are no active nests present. If any active nests are found, they should be marked and a buffer zone established; work should be suspended or take place elsewhere until the young have fledged and left the nest.

Although the buildings have been deemed to be not suitable for use by roosting bats, and very little bat activity was recorded at this site, it is recommended that prior to demolition a re-survey for bats is carried out, especially if the demolition were to take place more than 12 months from the current work. The re-survey would determine use by bats and hence whether any mitigation is required.

7.5 Main site

To prevent nesting birds constraining the development, the landscaping shrubs and trees, and existing building, should be removed outside the bird breeding season ie during the period September to February inclusive. If this is not possible, they can be removed during the nesting season (March to August inclusive) but only after thorough inspections beforehand have shown that there are no active nests present. If any active nests are found, they should be marked and a buffer zone established; work should be suspended or take place elsewhere until the young have fledged and left the nest.

The locally scarce water dock in the Fosdyke Delph in front of the Science Centre should be dug out and translocated to a site on the same water system. The most suitable receptor site would be the balancing pond.

Although the Harrison House building has been deemed to be not suitable for use by roosting bats, and very little bat activity was recorded at this site other than over the balancing pond, it is recommended that prior to demolition a re-survey for bats is carried out, especially if the demolition were to take place more than 12 months from the current work. The re-survey would determine use by bats and hence whether any mitigation is required.

7.6 Brayford site

To prevent nesting birds constraining the development, the landscaping shrubs and trees, and existing building, should be removed outside the bird breeding season ie during the period September to February inclusive. If this is not possible, they can be removed during the nesting season (March to August inclusive) but only after thorough inspections beforehand have shown that there are no active nests present. If any active nests are found, they should be marked and a buffer zone established; work should be suspended or take place elsewhere until the young have fledged and left the nest.

To prevent grass snakes from entering the development site from the railway edge, a temporary reptile proof fence should be erected, before the site becomes active, along the railway fence. The fence would deflect any dispersing grass snakes away from the development site. The fence needs to stay in place until major construction works have finished, when it can be removed.

Although the buildings have been deemed to be not suitable for use by roosting bats, and with bat activity concentrated along the trees at this site, it is recommended that prior to demolition a re-survey for bats is carried out, especially if the demolition were to take place more than 12 months from the current work. The re-survey would determine use by bats and hence whether any mitigation is required.

8 Ecological enhancement

8.1 Small car park site

As shown on the Masterplan General Arrangement plan (reference 613/00/03/001), the development will result in a new building with associated hard surfaces and some soft landscaping.

Ecological enhancement could comprise the use of native tree and shrub species in the soft landscaping (as seen at the Sparkhouse 2 on the campus) and the provision of roosting boxes for pipistrelle bats, and nesting features for declining urban birds, such as starling, house sparrow, swallow, house martin and swift.

8.2 Slipway site

As shown on the Masterplan General Arrangement plan (reference 613/00/03/001), the development will result in a new building with associated hard surfaces and some limited soft landscaping along the slipway edge.

Ecological enhancement could comprise the use of native tree and shrub species in the soft landscaping (as seen at the Sparkhouse 2 on the campus) and the provision of roosting boxes for pipistrelle bats, and nesting features for declining urban birds, such as starling, house sparrow, swallow, house martin and swift.

8.3 Bridge House site

As shown on the Masterplan General Arrangement plan (reference 613/00/03/001), the development will result in two new buildings with associated hard surfaces. Existing (and slightly reduced) soft landscaping will be utilised.

Ecological enhancement could comprise the provision of roosting boxes for pipistrelle bats, and nesting features for declining urban birds, such as starling, house sparrow, swallow, house martin and swift.

8.4 Marina site

As shown on the Masterplan General Arrangement plan (reference 613/00/03/001), the development will result in a large new building with associated hard surfaces and some limited soft landscaping.

Ecological enhancement could comprise the use of native tree and shrub species in the soft landscaping (as seen at the Sparkhouse 2 on the campus) and the provision of roosting boxes for pipistrelle bats, and nesting features for declining urban birds, such as starling, house sparrow, swallow, house martin and swift.

8.5 Main site

As shown on the Masterplan General Arrangement plan (reference 613/00/03/001), the development will result in a number of new buildings with associated hard surfaces and some limited soft landscaping. Enhancement works to the balancing pond are also proposed.

Ecological enhancement could comprise the use of native tree and shrub species

in the soft landscaping (as seen at the Sparkhouse 2 on the campus) and the provision of roosting boxes for pipistrelle bats, and nesting features for declining urban birds, such as starling, house sparrow, swallow, house martin and swift.

The scale of the proposed development at the main site should also allow for imaginative ecological enhancement and it is recommended that a purpose built "bat tower" is constructed on the campus, to provide additional roosting opportunities for brown long-eared and Daubenton's bats. Both species were noted by the Masterplan ecology surveys, with the former feeding over the campus and the latter over the Brayford Pool.

8.6 Brayford site

As shown on the Masterplan General Arrangement plan (reference 613/00/03/001), the development will result in two new buildings with associated hard surfaces and some limited soft landscaping.

Ecological enhancement could comprise the use of native tree and shrub species in the soft landscaping (as seen at the Sparkhouse 2 on the campus) and the provision of roosting boxes for pipistrelle bats, and nesting features for declining urban birds, such as starling, house sparrow, swallow, house martin and swift.

9 References

English Nature. 2001. Great crested newt mitigation guidelines.

Gibbons EJ. 1975. The Flora of Lincolnshire. Lincolnshire Naturalists' Union,

Lincoln.

Oldham RS, Keeble J, Swan MJS & Jeffcote M. 2000. Evaluating the suitability of habitat for the great crested newt *Triturus cristatus.* Herpetological Journal 10 (4) pp 143-155.

Preston CD, Pearman DA & Dines TD. 2002. New Atlas of the British & Irish Flora. OUP, Oxford.

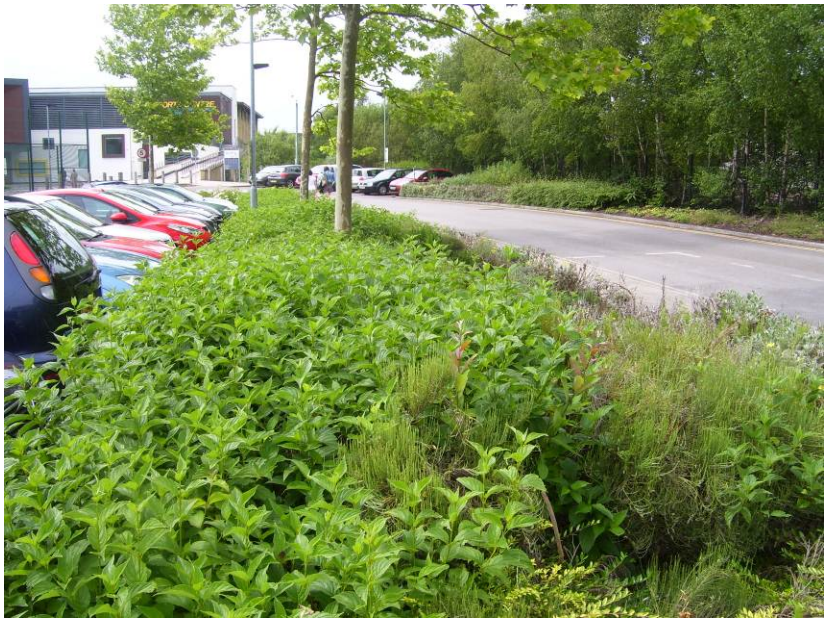
Tim Smith

26 September 2011

Ecology Report Reference 2011/05/060

APPENDIX 1

PHOTOGRAPHS: SMALL CAR PARK SITE, UNIVERSITY OF LINCOLN



Photograph 1: general view of the landscaping trees and shrubs

Photograph 2: general view of the small car park site

Photograph 3: Fosdyke Delph watercourse adjacent to the site

Photograph 4: balancing pond adjacent to the site

Photograph 5: water vole raft in the margin of Fosdyke Delph adjacent to the site

APPENDIX 2

PHOTOGRAPHS: SLIPWAY SITE, UNIVERSITY OF LINCOLN

Photograph 1: general view of the site looking east to the Brayford Way flyover with amenity grass in foreground

Photograph 2: water fern (with duckweed) in the slipway water

APPENDIX 3

PHOTOGRAPHS: BRIDGE HOUSE SITE, UNIVERSITY OF LINCOLN

Photograph 1: amenity grass and fenced-off garden

Photograph 2: landscaping shrubs behind electricity sub-station

Photograph 3: landscaping shrubs and rough grass on embankment up to Brayford Way

Photograph 4: landscaping shrubs in front of Bridge House

Photograph 5: landscaping shrubs and rough grass on embankment up to Brayford Way

Photograph 6: Bridge House

Photograph 7: electricity sub-station

APPENDIX 4

PHOTOGRAPHS: MARINA SITE, UNIVERSITY OF LINCOLN

Photograph 1: general view of the car park

Photograph 2: bin store and sub-station buildings

Photograph 3: toilet block building

Photograph 4: marina building

Photograph 5: general view of the site looking east

Photograph 6: plant of water dock growing in artificial bank of Brayford Pool

Photograph 7: plants of skullcap growing in artificial bank of Brayford Pool

Photograph 8: water fern in the Brayford Pool opposite the marina building

APPENDIX 5

PHOTOGRAPHS: MAIN SITE, UNIVERSITY OF LINCOLN

Photograph 1: Fosdyke Delph in front of the Science Centre

Photograph 2: water dock plant in Fosdyke Delph in front of the Science Centre

Photograph 3: amenity grass in front of Science Centre looking east to

balancing pond

Photograph 4: amenity grass in front of Science Centre and School of Architecture looking west

Photograph 5: Harrison House

Photograph 6: car park on east side of Harrison House

Photograph 7: amenity grass west of Sparkhouse looking towards Engineering Hub building site

Photograph 8: hard standing with landscaping trees and amenity grass

Photograph 9: stand of landscaping young birch trees south of Performing Arts,

removed on 21 June 2011

Photograph 10: second stand of landscaping young birch trees south of Performing Arts

Photograph 11: water vole raft in eastern end of Fosdyke Delph in front of Science Centre

Photograph 12: water vole raft in southern margin of balancing pond

Photograph 13: new landscaping birch trees in front of Performing Arts

APPENDIX 6

PHOTOGRAPHS: BRAYFORD SITE, UNIVERSITY OF LINCOLN

Photograph 1: general view showing Brayford Pool edge, footpath, trees and car parking

Photograph 2: landscaping trees and shrubs between car parking and railway

Photograph 3: canoe club building with landscaping trees and amenity grass

Photograph 4: gas installation building with landscaping shrubs and amenity grass

Photograph 5: flowering plants of common valerian in the Brayford Pool edge

Photograph 6: flowering plants of hemlock water-dropwort in the Brayford Pool edge

Photograph 7: flowering plants of marsh woundwort in the Brayford Pool edge

Photograph 8: flowering plants of orange balsam in the Brayford Pool edge

Photograph 9: water dock in the Brayford Pool edge

Photograph 10: flowering plants of montbretia in the Brayford Pool edge

Appendix 7 Results of bat surveys

Survey data

Visit	Date	Start time	End time	Weather	Sunset time
1	21 June 2011	2120	2300	17.5C, dry, breezy, 1/8 cloud cover	2130
2	25 July 2011	2045	2220	16.5C, cool, dry, breezy, 8/8 cloud cover	2100
3	11 August 2011	2052	2230	18C, still, mild, 8/8 cloud cover clearing by 2200	2040
4	19 August 2011	2030	2205	21C, 8/8 cloud cover, breezy, mild, dry	2021
5	24 August 2011	2045	2210	17.5C, 7/8 cloud cover, dry, breezy, mild	2010

Records

Visit 1 21/6/11

Stopping point	Time	Records

1	2130-2135	None
2	2140-2145	None
3	2148-2153	1 pipistrelle over pond at 2148-2150, including feeding buzzes; 1 over pond at 2151-2152
4	2158-2200	None
5	2203-2208	None
6	2215-2220	None
7	2226-2235	1 pipistrelle pass at 2226 and another at 2230
8	2240-2245	1 pipistrelle pass at 2240
9	2246-2248	None
10	2249-2255	None
Between stopping points	2223 2225 2226 2237	Between 6 & 7, 1 pipistrelle pass Between 6 & 7, 1 pipistrelle pass and feeding Between 6 & 7, 1 pipistrelle pass Between 7 & 8, 1 pipistrelle pass

Records

Visit 2 25/7/11

Stopping	Time	Records

point		
1	2053-2058	None
2	2100-2105	None
3	2106-2111	None
4	2115-2120	None
5	2122-2127	None
6	2133-2138	None
7	2151-2156	None
8	2201-2206	None
9	2207-2210	None
10	2211-2216	None
Between stopping points	2141 2142 2146-2150 2147 2150	Between 6 & 7, 1 pipistrelle pass Between 6 & 7, 1 pipistrelle pass Between 6 & 7, 2 brown long-eared several times over roadway and amongst trees Between 6 & 7, 1 pipistrelle pass and feeding Between 6 & 7, 1 pipistrelle pass

Records

Visit 3 11/8/11

Stopping point	Time	Records
1	2100-2108	None for the site, but 2 brown long-eared feeding over grass and trees between pond and fly-over to south-east of small car park site
2	2110-2113	None
3	2115-2120	None
4	2124-2128	None
5	2129-2134	None
6	2140-2145	1 pipistrelle pass at 2140 and another at 2144 1 brown long-eared pass at 2141

7	2151-2156	1 pipistrelle pass at 2152
8	2208-2213	1 pipistrelle pass at 2208
9	2214-2217	None
10	2219-2225	None
Between stopping points	2057 2146 2147-2149 2157 2204 2227	Over drain by Sports Centre, 1 pipistrelle pass Between 6 & 7, 1 pipistrelle pass Between 6 & 7, several pipistrelle passes Between 7 & 8, 1 pipistrelle pass Between 7 & 8, 1 pipistrelle pass Opposite Village Hall, 1 pipistrelle pass

Visit 4 19/8/11

Stopping point	Time	Records
1	2037-2041	None
2	2045-2048	None
3	2050-2055	2050-2055 constant feeding activity over western end of balancing pond by 1 pipistrelle; already there when survey arrived and still there when survey left
4	2100-2104	None
5	2105-2110	None
6	2118-2125	Pipistrelle bats over river 2118-2120 Daubenton's bats over Brayford Pool 2122
7	2130-2134	1 pipistrelle pass at 2133
8	2148-2151	None
9	2152-2155	None
10	2157-2202	None
Between stopping points	2126-2129 2146	Brown long-eared activity along trees between 6 & 7 1 Pipistrelle pass opposite student bar

Visit 5 24/8/11

Stopping point	Time	Records
1	2050-2053	None

2	2055-2058	None
3	2100-2104	None
4	2108-2111	None
5	2112-2116	None
6	2126-2135	Pipistrelle passes and feeding at 2126 and 2128; continuous passes and feeding by at least 2 Daubenton's over Brayford Pool 2130-2132
7	2145-2150	Pipistrelle passes at 2145 and brown long-eared passes 2145-2150
8	2155-2158	None
9	2159-2202	None
10	2204-2208	None
Between stopping points	2054 2020 2137-2143 2151	1 pipistrelle pass between 1 & 2 Brown long-eared passes and feeding between Engine Shed and railway Brown long-eared passes along trees between 6 & 7 Brown long-eared passes along trees between 7 & 8 between Admin buildings and trees beside Pool

Appendix 8 Great crested newt HSI habitat scores

Habitat attribute	**Balancing pond**	**Pond opposite small car park site**
Location	England zone A; score 1	England zone A; score 1
Pond area	c2350sqm; score 0.7	c720sqm; score1
Drying out	Never dries; score 0.9	Never dries; score 0.9
Water quality	Moderate; score 0.67	Moderate; score 0.67
Shading of shoreline	<5%; score 1	c35%; score 1
Water fowl	Minor; score 0.67	Minor; score 0.67
Fish	Minor; score 0.33	Minor; score 0.33
Nearby ponds	Very few; score 0.5	Very few; score 0.5
Terrestrial habitat	Poor; score 0.33	Poor; score 0.33
Macrophyte cover	c75%; score 1	c50%; score 0.8
Overall HSI score	**0.66 average suitability for great crested newt**	**0.67 average suitability for great crested newt**