Cardiff Parkway Developments Ltd Cardiff Hendre Lakes 2017 Riparian Mammal Survey Report

Environmental Statement Appendix 7.11

Issue | 11 August 2018

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 252199-00

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1 Introduction

Ove Arup & Partners Ltd has been commissioned by Cardiff Parkway Developments Ltd to undertake baseline ecological surveys to inform the proposed development of a proposed new station at St. Mellons on the Bristol to SouthWales railway line.

This report provides information to inform the development of the project; it identifies the presence of important habitat areas for European otter *Lutra lutra* and water vole *Arvicola amphibius* within the site, to inform any additional survey or mitigation measures that may be required.

1.1 Background to the Project

Cardiff Parkway Developments Ltd are proposing to develop a scheme that is an employment led development including a new railway station and park & ride facility. The site is centred on National Grid Reference (NGR) ST251808.

The site currently consists of predominantly arable and pastoral farming on the western edge of St. Mellons. The site's field boundaries are formed by hedge and tree lines with reens throughout. There is a lake, recreational grassland and woodland to the west of the site. The wider landscape comprises residential and commercial properties, and broad-leaved woodland to the north and west. To the south the land is bisected by the railway line with further neighbouring agricultural land. To the east there is agricultural land.

An extended Phase 1 habitat survey was undertaken in January 2017¹ to establish the habitats present on site and to assess the potential for legally protected species to be present. As a result of that survey and a desk study of available records, it was considered that there was the potential for otter and water voles to be present and therefore detailed species-specific surveys were required.

1.2 Survey Objectives

The aims and objectives of the surveys were to:

- Determine the presence and distribution, or likely absence of both otters and water voles within the study area;
- Provide a habitat suitability assessment within the study area for the aforementioned species;
- To provide sufficient information to inform the assessment of impacts on riparian mammals from the proposed development as part of the Environmental Impact Assessment.

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¹ Arup (2017) Cardiff Hendre Lakes | 2017 Extended Phase 1 Habitat Survey Report

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1.3 Study Area

For the purposes of this study, the survey area was based on the initial Phase 1 Survey Area, although it is noted that the area has been extended during the master planning process. These areas are shown on Figure 1.

1.4 Legislative Context

1.4.1.1 European Protected Species - Otter

The otter is protected as a European Protected Species (EPS), under the Conservation of Habitats and Species Regulations 2017, commonly referred to as the Habitats Regulations. Under this legislation it is an offence to:

- deliberately kill, injure or capture an otter;
- to deliberately or recklessly disturb or harass an otter such as to affect its ability to breed or its local distribution;
- or to damage, destroy or obstruct access to a breeding site or resting place (e.g. shelter) used by an otter.

1.4.1.2 UK Protected Species – Otter and Water Vole

The otter and water vole are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Legal protection makes it an offence to:

- Intentionally or recklessly kill, injure or take (capture) an otter and/or water vole;
- possess or control alive or dead otter, or any part of an otter and/or water vole;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place which otters and/or water vole use for shelter or protection, or disturb otters and/or water vole while they are using such a place.

1.4.1.3 Other Legislation Related to Otter and/or Water Vole

Otter and water vole are identified as a species that are 'priority for nature conservation' (Priority Species) within the 'UK Post-2010 Biodiversity Framework' Biodiversity Action Plan (UKBAP).

The Environment (Wales) Act 2016 includes a duty on all public authorities to have regard to the conservation of biodiversity in the exercise of their functions. This duty applies to government bodies, local authorities and statutory undertakers. The Act also requires lists to be published of Habitats and Species considered to be of Principal Importance for the Conservation of Biological Diversity. These are referred as Section 7 habitats and species after the sections of the Act which require the publication of lists in each devolved area. Otter and water vole are listed as a Section 7 Species

2 Methodology

2.1 Desk Study

Biodiversity information was obtained from the South East Wales Biodiversity Records Centre (SEWBReC)² on the 31st January 2017. The search included information on riparian mammals up to 2km from the site centre point, with the data limited to the last 10 years. The full desk study results are provided in the 2017 Extended Phase 1 Habitat Survey Report¹.

2.2 Survey Methods

Targeted otter and water vole surveys were carried out between June and November 2017 and aimed to include water bodies within the study area (shown on Figure 1). During these surveys an assessment of the suitability of the site was undertaken for otter and water voles. Surveying for field signs was carried out by hand searching of the banks and any features that could have the potential to be used by otters as resting places.

Surveying was avoided for at least three days after heavy rain, since this can serve to obscure signs of activity, this was to ensure that field signs were not washed away and that the water level was not too high to obscure any field signs of the two species.

For each water body that was surveyed, a standard recording sheet was completed in the field using iPads, which had Global Positioning System (GPS) mapping capability which recorded the location for each recording sheet completed. Field signs or features relevant to the survey were photographed, with a GPS location attached to the digital image.

An individual recording sheet was used for each survey of a water body, which included those water bodies that were dried up (defunct), or inaccessible. In those instances where the water body was dried up or inaccessible, the ditch length was walked and checked, and a recording sheet was completed.

The field survey involved surveying water bodies that had been identified during the Phase 1 habitat survey and which had been identified during a desk study of Ordnance Survey data. It should be noted that due to changes in the study area boundary during the evolution of the project mean that some additional water bodies are present which were not included in the 2017 surveys.

For the purposes of the surveys, each water body was defined as:

- Pond / Lake A semi-stagnant and isolated water body, using filled by a stream or by man-made means and which can dry out;
- Reen Major man-made drainage channel or canalised stream which stays wet for the majority of the year and is managed by the internal drainage board (IDB) or NRW;

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² <u>http://www.sewbrec.org.uk/home.page</u>

• Ditch - Minor man-made drainage channel which dries out on a regular basis e.g. field ditches.

2.2.1 Otters

The survey methods adopted for otters was adapted from authoritative sources and best practice survey guidelines³.

2.2.1.1 Habitat Suitability Assessment

Otters are tolerant of a wide range of habitat conditions and may use a habitat for numerous reasons (e.g. shelter, foraging, commuting through to other more suitable habitats). Habitat suitability assessments according to guidance^{3,4} were carried out at each waterbody, with each being defined as being of High, Moderate, Low or Negligible suitability for otter based on the criteria listed below and in Table 1:

- proximity of waterbody to habitats meeting the species' requirements for shelter, foraging and breeding;
- degree of modification to waterbody potentially resulting in negative impacts upon otters, e.g. canalisation or realignment;
- level of site disturbance, e.g. proximity to Public Right of Way (PRoW), farm vehicle access tracks or road traffic;
- level of visible pollution potentially impacting upon prey species; and,
- Potential for otters to use culverts, bridges and dry watercourses for foraging, commuting and dispersal.

Habitat Suitability	Shelter Requirements	Food Supply	Modification & Disturbance	Hydrology	Pollutants
High	Many suitable habitat features adjacent to watercourse.	Suspected presence of abundant prey; particularly fish species.	Minor man- made modification of watercourse habitat and disturbance from the public e.g. dog walking.	Watercourse with fast to moderate flow velocity and more than 1 m deep.	'Good' or above chemical or biological water quality.
Moderate	Several suitable habitat features adjacent to watercourse.	Suspected presence of sufficient prey; particularly fish species.	Intermediate man-made modification of watercourse habitat or	Watercourse with slow to moderate flow velocity or	'Fair' chemical or biological water quality.

Table 1: Habitat suitability for otter

³ Chanin, P. (2003) Ecology of the European Otter. Conserving Nature 2000 Rivers, Ecology Series No 10. EN, CCW, EA, SEPA, SNH & SNIFFER

⁴ Crawford, A. (2003). *Fourth Otter Survey of England 2000 - 2002*. Environment Agency, Bristol.

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Habitat Suitability	Shelter Requirements	Food Supply	Modification & Disturbance	Hydrology	Pollutants
			disturbance from the public e.g. frequent dog walking.	less than 1 m deep.	
Low	Few suitable habitat features adjacent to the watercourse.	Suspected scarcity of prey.	Major man- made modification of watercourse habitat and disturbance by the public e.g. frequent dog walking.	Watercourse with slow to moderate flow velocity and less than 1m deep.	'Fair' or below chemical or biological water quality.
Negligible	No suitable habitat features.	No prey species present.	Major man- made modification of watercourse habitat and disturbance by the public e.g. frequent dog walking.	Dry with no indication of a waterbody present on site.	'Low' water quality with indications of pollution.

2.2.1.2 Presence / Absence Survey

The extended Phase 1 Habitat Survey identified several habitats and water bodies across the site with potential to support otters, therefore a survey for otter was undertaken between June and November 2017.

The field signs that were searched for included: spraints, anal jelly, holts, tar spots, laying–up sites, bank slides, runs, tunnels, prey remains and footprints. Features that have high potential to be attractive to otters were examined, this included: suitable bridges, bases of large trees, dense vegetation, crossings, confluences of water bodies, culverts and boulders.

Terminology used to describe the resting areas for otters used the standard terminology, such as either a holt (usually a hole in the ground covered by vegetation or under the roots of a bankside tree) or a couch (an uncovered laying up or nest like structure). Natal dens refer to a hidden, secure place where the female rears her young.

2.2.2 Water Voles

The survey method for water voles was adapted from the best practice survey guidelines in the Water Vole Conservation Handbook⁵ and Water Vole Mitigation Handbook⁶. The survey was undertaken in two parts, an initial habitat suitability assessment followed by a presence / absence survey, as described in the following sections. Where possible two surveys were undertaken, with an early visit (Mid-April – June) and a late season (July – September) survey.

Banks of water bodies were surveyed from a minimum of 2 metres from the waters' edge, and where the water body was inaccessible a habitat suitability assessment was undertaken from the top of the bank.

2.2.2.1 Habitat Suitability Assessment

Assessment of the habitat suitability indicates how likely water voles are to use a site given the habitat conditions at time of survey. Habitat suitability was assessed from observing the features of each water body, with consideration to the ecology and habitat requirements of water voles.

The best sites for water voles according to guidance⁵ are those that have a highly layered bankside vegetation with tall grasses and stands of willowherb, *Epilobium* sp., purple loosestrife *Lythrum salicaria*, meadowsweet *Filipendula ulmaria* or nettles *Urtica dioica*, often fringed with think stands of rushes *Juncus spp.*, sedges *Carex spp.* and reed *Phragmites australis*. Each water vole utilises a series of burrows, which can extend 5-6 metres from the edge of the bank into the terrestrial habitat. Water voles require dense growth of herbaceous bankside and emergent vegetation⁵, and the promotion of scrub or planting of trees is detrimental to them³.

Habitat suitability assessments were carried out at each water body/watercourse visited with sites subsequently defined as being of high, moderate or low suitability based on the following criteria:

- Rate of water flow;
- Bank profiles;
- Degree of shading from overhanging trees;
- Extent of suitable emergent and bankside herbaceous vegetation in providing shelter, food and nesting material;
- Degree of cattle poaching (i.e. extent of damage to banks resulting from trampling by cattle);
- Levels of site disturbance, e.g. proximity to public rights of way, farm vehicle access tracks or road traffic;

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⁵ Strachan, M., Moorhouse, T., Gelling, M. (2011) Water Vole Conservation Handbook. Oxford. Wilderu

⁶ Dean, Strachan, R., Gow, D., Andrews (2016) The Water Vole Mitigation Handbook. London. Mammal Society

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- Potential for the water body to dry out;
- Suitability of bank substrates for burrowing; and
- Water quality.

Examples of habitat suitability assessments are as follows:

High Quality - Typical high-quality water vole habitat is a slow-flowing watercourse, less than 3m wide and 1m deep with moderately steep banks, minimal shading by trees and shrubs and luxuriant growth of emergent and bankside herbaceous vegetation to provide shelter and an abundance of food and nesting material.

Moderate Quality - Moderate quality water vole habitat would consist of a combination of the features associated with both high and low habitat suitability. For example, the flow and bank type may be suitable; however heavy grazing by livestock may reduce the cover of herbaceous vegetation and trample suitable habitat for burrowing.

Low Quality - Factors which indicate that a habitat is of a low suitability for water vole include heavy shading by overhanging trees and/or shrubs reducing the cover of emergent and bankside vegetation and thus the availability of water vole food plants. Other factors that indicate habitat of low suitability include widely fluctuating water levels, seasonal drying out of the watercourse channel and banks that are unsuitable for burrowing.

Negligible - A negligible habitat suitability would be where there is either no water body present for example, a ditch which has completely overgrown and would not hold water. An example of this would be a ditch which has a double hedge and is no longer managed and therefore the water body has filled in. Settlement pools or ditches which are visibly polluted and low water quality and obviously their purpose is to act as a buffer to collect polluted material from industry.

2.2.2.2 Presence / Absence Survey

At each water body a search for the following field signs was undertaken during two visits broadly spaced in spring/early summer and late summer/autumn: faeces & latrines; feeding stations; burrows; and footprints.

Droppings are the most distinctive field sign to indicate recent use of a water body by water voles. Where possible a thorough search (every 1 metre) of the bankside vegetation was performed at each water body, where presence had been determined field signs were recorded every 5 metres where the bankside vegetation made the channel inaccessible to reduce damage to bankside vegetation. This approach follows the current guidance on water voles⁶.

2.2.3 Surveyors

Surveys were undertaken by two surveyors, with at least one being an experienced ecologist familiar with the ecology and field signs of both otter and water vole.

2.3 Limitations and Assumptions

The findings presented in this study represent those at the time of survey and reporting, and data collected from available sources. Ecological surveys are limited by factors which affect the presence of flora and fauna, factors such as the time of year and natural behaviour of the animals. Nevertheless, these surveys were conducted at the optimal survey periods.

Where there were limitations, surveyors still strove to collect as much relevant information within the survey criteria as possible. The main limitations of the survey were:

- Dense vegetation including vegetation growing in and adjacent to water body stopping access;
- Health and safety concerns with regard to livestock in fields;
- Poaching of bankside occluding field signs;
- Poor water quality;
- Steep banks and deep water;
- Rain showers wetting field signs.

As the habitat suitability assessment is a subjective measure, the survey team was briefed with regard to these survey methods, in an aim to narrow differences in judgement between surveyors. Where a ditch was inaccessible due to dense vegetation, but the water body could be viewed, it was still possible to make an assumption with regard to habitat suitability for the two riparian mammal species.

Due to the nature of the Gwent Levels as a managed site, the water level fluctuates. Therefore, not all of the water bodies would hold water for the entire year. In some instances, the field ditches did not hold water at the time of survey and were dry, but this does not mean that at another time of year that water body would not be suitable for water voles, or otters which was considered in the habitat suitability assessment. Other neighbouring water bodies could act as a corridor to aid dispersal, and the adjacent vegetation (bankside and hedgerow) can also provide a corridor for both species to disperse.

There were a number of health & safety issues which limited the survey prevented all water bodies being surveyed within the relevant survey windows. Where dangerous animals such as young bullocks and bulls, were present in the field, then these water bodies were marked to be surveyed on another occasion. Reens with very deep water were surveyed from the bank.

As a result of this limitation 16 of the 31 water bodies were surveyed on only one occasion. However during these surveys a thorough effort was made to search for signs of water voles. Efforts will be made to repeat surveys of these water bodies during 2018 to provide greater confidence to the results of the surveys.

4 **Results**

4.1 Desk Study

There is a recent record of an otter spraint to the north of the site, and a record of an otter casualty to the northwest of the site. Otters are known to be present and have been recorded across the Gwent Levels and know to use the Severn Estuary.

The desk study identified an unconfirmed record of a water vole on Hendre Lake which is a notable water body in close proximity to the site boundary. Water voles have been recorded across the Gwent Levels ditch and reen network.

4.2 Field Surveys

4.2.1 Otter

4.2.1.1 Habitat Suitability Assessment

The habitat suitability assessment identified seven waterbodies of 'high' suitability, 13 waterbodies of 'moderate' suitability, and 11 waterbodies of 'low' suitability. Waterbody 1 (Hendre Lake) and waterbody 2 (Faendre Reen) in particular were considered to provide areas of suitable foraging habitat due to their size and the presence of larger fish. The suitability of waterbodies to support otter are shown on Figure 2. Further details of the habitat suitability assessment can be found in Appendix B.

4.2.1.2 **Presence / Absence Survey**

No field signs for otter were discovered during the dedicated surveys undertaken in 2017. However, a potential otter couch (shown in Photograph 1 and on Figure 2) was recorded in the margin of an arable field alongside water body 4 during other ecological surveys.



Photograph 1 Potential Otter Couch

4.2.2 Water vole

4.2.2.1 Habitat Suitability

Four water bodies of high suitability to support water voles were recorded on the northern side of the railway line. A further two high suitability water bodies were recorded on the southern side. The suitability of water courses to support water voles is shown on Figure 3 with further details of the assessment given in Appendix B. Three of the water bodies assessed as being of high suitability are Main Reens managed by Natural Resources Wales (water bodies 2, 8 and 18), and therefore subject to regular management of the banks.

Other reens which are subject to more regular maintenance were also recorded with high or moderate suitability. These include the reens alongside Heol Las (water body 7) and Cobol Road (water body 26). A large number of reens were assessed as being of low suitability due to the presence of established and overgrown hedgerows which severely limit the availability of suitable foraging habitats.

4.2.2.2 Presence / Absence Survey

Water vole field signs/likely evidence were recorded on three of the waterbodies surveyed, with feeding stations being recorded water bodies 8, 18 and 32. These are main reens which were considered to have high suitability as described above.

Feeding stations of water voles were recorded on water bodies 8 and 32, while a probably sighting of a water vole was recorded on water body 18. Water vole presence is shown on Figure 3 with more detail given in Appendix B.

5 Conclusions and Recommendations

The surveys recorded the presence of water vole populations within the central areas of the site. No definitive signs of otter use were recorded, although a possible resting couch was recorded during other surveys.

It is considered likely that water voles will be present across the entire site where suitable habitat is present subject to grass cutting on the banks of the reen network. Likewise, otter are considered likely to be present moving through the site between the coast and other areas further inland. They are also likely to forage within Hendre Lake and Faendre Reen.

A Protected Species Licence will need to be obtained from NRW for any clearance works to reens where water voles are present.

Pre-construction checks will need to be undertaken for both species prior to any construction works on site, including ground investigation works.

This report is the result of survey work undertaken between May and November 2017. This report refers, within the limitations stated, to the condition or proposed works of the site at the time of the surveys. Changes in legislation, guidance, best practice, etc. may necessitate a re-assessment/survey. No warranty is given as to the possibility of future changes in the condition of the site.

Figures

- Figure 1: Waterbodies surveyed in 2017
- Figure 2: Otter survey results
- Figure 3: Water vole survey results

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Appendix A

Weather Conditions

A1 Weather Conditions

Date	Temp. (°C)	Wind speed (Beaufort scale)	Wind direction	Cloud cover (%)	Conditions
26/06/2017	18	1	SW	100	Dry
27/06/2017	No weather dat	a collected			
28/06/2017	No weather dat	a collected			
23/08/2017	20	2	NE	90	Sunny
01/09/2017	20	2	NW	50	Sunny
09/11/2017	13	1	SE	80	Dry

Appendix **B**

Detailed Survey Results

Water body no.	Survey date	Туре	Bank profile ⁷	Water depth	Channel width	Flow speed	Vegetation description	Shore banks	Neighbouring land-use	Suitability for otter	Suitability for water vole	Com
1	27/06 2017	Lake	Vertical / undercut	>2m	>20m	Still	Bramble <i>Rubus fruticosa</i> , willow <i>Salix spp.</i> , common reed, meadowsweet, grasses, sedges, reed, hawthorn <i>Crataegus monogyna</i> , oak <i>Quercus robur</i> , elm <i>Ulmus spp.</i> , bulrush <i>Typha latifolia</i>	Earth Unfenced	Park/garden;	High	Low	Hendr regula
2	27/06 and 23/08 2017	Reen	Steep	>2m	>20m	Slow / Still	Bulrush, bramble, meadowsweet, willow, alder <i>Alnus</i> glutinosa, water dropwort species <i>Oenanthe spp.</i> , common reed, purple loosestrife, water mint <i>Mentha</i> aquatica	Canalized and earth Unfenced	Arable; Livestock grazing; Broadleaf woodland; Scrub;	High	High	Main
3	27/06 2017	Ditch	Shallow	<0.5m	2 - 5m	Still	Willow, water dropwort species, yellow iris <i>Iris pseudacorus</i> , common reed, bramble, bulrush	Earth Unfenced	Arable;	Low	Low	Heavi actual
4	26/06 2017	Ditch	Shallow	Dry	1 - 2m	Still	Willow, bramble, blackthorn <i>Prunus spinosa</i> , sweet- grass <i>Glyceria spp</i> .	Earth Unfenced	Arable;	Low	Low	Dense
5	27/06 2017	Ditch	Shallow	Dry	2 - 5m	Still	Predominantly common reed with willow	Earth Unfenced	Arable;	Low	Low	
6	27/06 2017	Ditch	Shallow	<0.5m	1 - 2m	Still	Predominantly common reed with willow and oak	Earth Unfenced	Arable;	Low	Low	
7	27/06 2017	Reen	Steep	1 - 2m	2 - 5m	Still	Common reed, arrowhead <i>Sagittaria spp.</i> , water horsetail <i>Equisetum fluviatile</i> , umbellifers <i>Apium spp.</i> , water dropwort species, common reed, willowherb, duckweed <i>Lemna minor</i>	Earth Unfenced	Livestock grazing; Arable; Urban;	High	High	No sig of reen Green
8	23/08 and 28/06 2017	Reen	Shallow to steep	0.5 - 2m	2 - 5m	Still / sluggish	Tall ruderal: bulrush, common reed, hornwort Ceratophyllum demersum, silver birch Betula erecta, water plantain Alisma spp., water mint, rosebay willowherb Chamerion angustifolium, common rush Juncus effusus, water forget-me-knot Myosotis scorpioides, mare's-tail Hippuris vulgaris	Earth Unfenced	Livestock grazing; Arable	High	High	8 feed livesto
9	27/06 2017	Reen	Steep	<0.5m	2 - 5m	Still	Willow, bramble, blackthorn, common reed, ash <i>Fraxinus excelsior</i> , hawthorn, water dropwort species, oak	Earth Unfenced	Arable;	Low	Low	Dry di vegeta
10	27/06 2017	Ditch	Shallow	<0.5m	2 - 5m	Still	Oak, willow, ash, common reed, water dropwort species, hawthorn, blackthorn, bramble, nettle <i>Urtica dioica</i>	Earth Unfenced	Arable;	Moderate	Low	Mostly Moder
11	27/06 2017	Ditch	Shallow to vertical / undercut	1 - 2m	1 - 5m	Still	Dense vegetation. Common reed, oak, willow, duckweed, water dropwort species, buttercup species <i>Ranunculus spp</i> .	Earth Unfenced	Arable; Livestock grazing;	Moderate	Moderate	No wa

B1 Habitat Suitability Assessment Results

⁷ Steep = >45°; Shallow = <45°; Flat = $<10^{\circ}$

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nments dre Lake. Recreational lake stocked with fish, used larly by local residents. n reen – Faendre reen vily vegetated leading to limited access to the al water sely vegetated, limited access, mostly dry sely vegetated, limited access, mostly dry sely vegetated, limited access, mostly dry eding stations in total. Poached banks due to stock grazing on adjacent land.

itch to north, becoming wet further south, dense ation

y dry ditch with species rich intact hedgerow. erate otter potential when wet

ater time of survey

Water body no.	Survey date	Туре	Bank profile ⁷	Water depth	Channel width	Flow speed	Vegetation description	Shore banks	Neighbouring land-use	Suitability for otter	Suitability for water vole	Comn
12	27/06 and 23/08 2017	Ditch	Flat / shallow	<0.5m	1 - 2m	Sluggish / still	Dense veg on southern bank but open on northern. Bramble, willow, water dropwort species, angelica Angelica archangelica, wood rush Luzula sylvatica, hawthorn Japanese knotweed Reynoutria japonica present one location	Earth Unfenced	Arable; Livestock grazing;	Moderate	Low	Mostly Possib habita
13	23/08 2017	Ditch	Steep	<0.5m	2 - 5m	Still	Common reed, willow, bramble	Earth Mixture	Livestock grazing;	Moderate	Low	Moder
14	27/06 and 09/11 2017	Ditch	Shallow / flat	<0.5m	1 - 2m	Still	Little aquatic vegetation and dry. Trees and scrub. Bramble, ground ivy <i>Glechoma hederacea</i> , nettle	Earth; poached Unfenced	Livestock grazing;	Low	Negligible	Potent
15	27/06 and 09/11 2017	Reen	Shallow	<0.5m	1 - 2m	Still	Bramble, bulrush, yellow iris, common reed	Earth; Poached Mixture	Livestock grazing;	Low	Low	Dry at Feedir
16	27/06 and 09/11 2017	Reen	Shallow / flat	<0.5m	<1m	Still	Scrub and established trees. Potential balsam <i>Impatiens spp.</i> . Bulrush, bramble, sedges. Deeper (3m) towards western-end with rush and common reed. Dry along entire length.	Earth; Poached Unfenced	Livestock grazing;	Low	Low	Dry at otter. S
17	27/06, 01/09 and 09/11 2017	Reen	Shallow to vertical / undercut	0.5 - 1m	1 - 5m	Still	Common reed dominant. Water mint, umbellifers, silver birch. Dense rush and established trees.	Earth Unfenced	Livestock grazing;	High	High	Predor Large vegeta
18	27/06 and 09/11 2017	Reen	Steep to vertical / undercut	1 - 2m	2 - 5m	Still	Recently dredged and cut in Nov survey. Common reed and rush. Water mint, umbellifers, water horsetail	Earth Unfenced	Livestock grazing;	High	High	Poor v due to
19	09/11 2017	Ditch	Shallow to steep	0.5 - 1m	1 - 2m	Still	Rush, established trees and scrub	Poached; Earth Unfenced	Livestock grazing;	Low	Low	Dry al
20	27/06 and 09/11 2017	Reen	Shallow to steep	<0.5m	<1m	Still	Blackthorn, common reed, unmanaged hedge with well-established trees, oak, bindweed <i>Convolvulus spp.</i>	Earth; Poached Unfenced	Livestock grazing;	Moderate	Moderate	Major Some for ott
21	27/06 and 09/11 2017	Reen	Shallow to vertical / undercut	<0.5m	2 - 5m	Still	Common reed, bramble, hawthorn. Dense rush	Earth Unfenced	Livestock grazing;	Moderate	Moderate	Suitab time o
22	27/06 and 09/11 2017	Reen	Shallow	<0.5m	1 - 2m	Still	Scrub and trees, defunct unmanaged hedge. Rushes, nettles, bramble, willow, hawthorn, ivy <i>Hedera helix</i>	Earth Unfenced	Livestock grazing;	Low	Negligible	Dry at corride

nents

y dry at time survey some water further to west. bly suitable for commuting otter. Limited foraging at for water vole.

erate for commuting otters. Dry ditch.

tial commuting habitat for otters

t time of visit ng remains found - potentially bank vole

t time of visit. Potential commuting corridor for Some sections too dense for survey.

minantly dry. Water collecting in some areas. e sections too dense/steep to survey. Good ation for otter and water voles.

water quality. Mammal paths. Difficult to survey o depth. Bank vole feeding stations and latrines.

long length

rity too dense to survey. Dry at time of survey. aquatic vegetation – good commuting corridor ter.

ble vegetation for otters and water voles but dry at of survey. Majority too dense to survey.

t time of visit. Potentially a good commuting lor for otter

Water body no.	Survey date	Туре	Bank profile ⁷	Water depth	Channel width	Flow speed	Vegetation description	Shore banks	Neighbouring land-use	Suitability for otter	Suitability for water vole	Comm
23	27/06, 23/08 and 09/11 2017	Reen	Flat to steep	0.5 - 1m	1 - 2m	Still	Dry with scrub and established trees. Yellow iris, hawthorn, marsh thistle <i>Cirsium palustre</i> , greater willowherb <i>Epilobium hirsutum</i> , bramble, rushes.	Earth; Poached Unfenced	Livestock grazing;	Moderate	Moderate	Dry at conne dense
24	27/06, 01/09 and 09/11 2017	Reen	Shallow to steep	<0.5m	1 - 5m	Still	Dense hedge. Bramble, yellow iris, common reed, hawthorn, reed sweet-grass <i>Glyceria maxima</i>	Earth Mixture	Livestock grazing;	Moderate	Low	Dry at Nice c holts.
25	27/06 2017	Ditch	-	-	1 - 2m	-	Dry. Dense vegetation	Earth Unfenced	Arable; Livestock grazing;	Moderate	Low	Dry at
26	27/06 2017	Reen	Steep	0.5 - 1m	2 - 5m	Still	Common reed, water dropwort species, grasses, meadowsweet	Earth Unfenced	Arable; Urban;	Moderate	Moderate	Green busine
27	28//06 and 23/08 2017	Ditch	Flat to shallow	<0.5m	1 - 2m	Still	Shaded by bramble scrub on both banks. Common reed, purple loosestrife, bulrush, willow.	Earth Unfenced	Livestock grazing;	Low	Low	Dry fi No pla
28	28/06 and 01/09 2017	Ditch	Steep	<0.5m - 1m	1 - 5m	Still	Common reed, bulrush, hedgerow	Earth Mixture	Livestock grazing;	Moderate	Low	Suitab survey
29	01/09 2017	Ditch	Steep	1 - 2m	2 - 5m	Still	Common reed, hedgerow, bulrush	Earth Unfenced	Livestock grazing;	Moderate	Low	Water Suitab
30	27/06 2017	Reen	Vertical / undercut	1 - 2m	2 - 5m	Still	Common reed, bramble	Earth Unfenced	Arable;	Moderate	Moderate	
328	23/08 2017	Reen	Vertical / undercut	0.5 - 1m	1 - 2m	Still	Common reed, branched bur reed Sparganium erectum	Earth Unfenced	Livestock grazing;	High	High	Water

nents

t time of visit. Suitable cover for otter and ections to other water bodies. No signs found - too to survey in many places.

t time of visit. Large sections too dense to survey. commuting corridor for otter and low potential for

t time of survey

a Lane Reen runs parallel to Cobol road and ess park

ield grip. Dense bramble scrub impeding access. ants growing beneath scrub.

ble for otters to commute. Dry ditch at time of y.

rbody north of 17. Not surveyed previously. ble for commuting otter.

r vole foraging and burrowing potential.

⁸ There is no waterbody 31 due to a mapping error during initial surveys

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B2 Presence/Absence Survey Results

Waterbody number	Otter signs	Water vole signs
4	Potential otter couch. See Photograph 1.	-
8	-	8 feeding stations in total along banks
18	-	Old feeding stations and potential old droppings. Distinctive 'plop' heard and brief glimpse of animal. Burrows. Runs in and out of water. Bank vole feeding stations and latrines also recorded.
32	-	Feeding stations