Cardiff Parkway Developments Ltd

Cardiff Hendre Lakes

2019 Riparian Mammals Survey Report

Environmental Statement Appendix 7.12

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Job number 252199

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ARUP

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1 Introduction

1.1 Project Background

Ove Arup & Partners Ltd. (Arup) has been commissioned by Cardiff Parkway Developments Ltd (CPDL) to undertake baseline ecological surveys to inform the design and environmental assessment of a proposed new train station and expansion of the business park at St. Mellons, Cardiff. The site is centred on National Grid Reference ST251808 and is shown on Figure 1.

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 2017[1] (and updated in July 2019[2]) 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 *Lutra lutra* and water vole *Arvicola amphibius* to be present and therefore detailed species-specific surveys were required.

This report provides an update to the 2017 otter and water vole survey[3] which was undertaken to inform the development of the project; it identifies the presence of important habitat areas for otter and water vole within the site, to inform any additional survey or mitigation measures that may be required.

1.2 Survey Objectives

The survey objectives were to:

- provide a habitat suitability assessment within the survey area for otter and water vole;
- determine the presence or likely absence of otter and water vole within the survey area;
- determine the site distribution of and usage by any riparian mammals found within the survey area; and,
- provide sufficient information to inform the assessment of impacts on riparian mammals from the proposed development as part of the Environmental Impact Assessment.

[1] Arup (2017) Cardiff Hendre Lakes | 2017 Extended Phase 1 Habitat Survey Report
[2] Arup (2020) Cardiff Hendre Lakes | 2019 Extended Phase 1 Habitat Update Survey Report
[3] Arup (2020) Cardiff Hendre Lakes | 2017 Riparian Mammal Survey Report

1.3 Legislative and Policy Context

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

The otter is also fully protected, along with water vole, 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 or water vole;
- possess or control alive or dead otter or water vole, or any part of an otter or water vole; or,
- intentionally or recklessly damage, destroy or obstruct access to any structure or place which otters or water voles use for shelter or protection, or disturb otters or water voles while they are using such a place.

Otter and water vole are listed as species that are a 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 both listed as species of 'Principal Importance for the Conservation of Biological Diversity' in Wales in response to Section 7.

Local Biodiversity Action Plans (LBAPs) continue to provide a list of habitats and species of conservation significance for their relevant area. Particular attention has been given to the Cardiff LBAP[4] and the Species Action Plans for otter and water vole.

[4] Cardiff Council (2008) Cardiff Local Biodiversity Action Plan

2 Methodology

2.1 Desk Study

Biodiversity Information was obtained from the South East Wales Biodiversity Records Centre (SEWBReC)[5] on the 31st January 2017. The search included information for otter and water vole up to 2km from the site centre point, and data was limited to the 10-year period of 2007-2016. The full desk study results are provided in the Extended Phase 1 Habitat Survey Report[2].

The report by Arup detailing the results of otter and water vole surveys and habitat suitability assessments carried out in 2017 was also reviewed as part of the study[3].

2.2 Field Survey

2.2.1 Introduction

Due to the cross-over between otter and water vole survey methods, the two surveys were combined. Otter and water vole surveys were carried out between June and September 2019 and included all water bodies within the survey area (shown on Figure 1), as identified through a desk study of Ordnance Survey data and an appraisal of previous survey results[1,2]. The surveys were undertaken by pairs of surveyors, with at least one of the surveyors being a suitably qualified ecologist.

Information was recorded during the surveys using standard recording sheets which were completed in the field using tablet devices. These had Global Positioning System (GPS) mapping capability enabled to record the location of the waterbody, any relevant signs, features, and/or any photographs taken.

For the purposes of the surveys, each waterbody was defined as:

- pond / lake – a semi-stagnant and isolated waterbody, 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; and,
- ditch - minor man-made drainage channel which dries out on a regular basis e.g. field ditches.

Surveying was avoided for at least three days after heavy rain 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. Weather conditions during each of the survey visits are detailed in Appendix A.

[5] http://www.sewbrec.org.uk/home.page

The following sections describe the methodologies associated with Habitat Suitability Assessment and Presence/Likely Absence Survey.

2.2.2 Habitat Suitability Assessment

A habitat suitability assessment was undertaken for each waterbody to assess their suitability to support otter and water vole, using criteria specific to each species. Assessment of the habitat suitability indicates how likely water voles or otters are to use a waterbody given the present habitat condition.

Otter

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[6,7] 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.

Table 1: Habitat suitability for otter

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; particularl	Intermediate man-made modification of watercourse habitat or disturbance	Watercourse with slow to moderate flow velocity or	'Fair' chemical or biological water quality.

[6] Chanin, P, 2003. *Ecology of the European Otter. Conserving Nature 2000 Rivers, Ecology Series No 10*. EN, CCW, EA, SEPA, SNH & SNIFFER
[7] Crawford, A. (2003). *Fourth Otter Survey of England 2000 - 2002*. Environment Agency, Bristol.

Habitat Suitability	Shelter Requirements	Food Supply	Modification & Disturbance	Hydrology	Pollutants
		y fish species.	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.

Water Vole

According to guidance[8], the habitats which water voles are most likely to use are those that have a highly layered bank-side vegetation with tall grasses and stands of willow herb *Epilobium spp.*, loosestrife *Lythrum spp.*, meadowsweet *Filipendula ulmaria* or nettles *Urtica dioica*, often fringed with thick stands of rushes, sedges and reed.

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 vegetation and the promotion of scrub or planting of trees is detrimental to them.

Habitat suitability assessments were carried out at each waterbody, with each being defined as being of high, moderate, low or negligible suitability for water vole 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 PRoW, farm vehicle access tracks or road traffic;

[8] Strachan, R., Moorhouse, T., and Gelling, M., (2011). *Water Vole Conservation Handbook.* Wildlife Conservation Research Unit.

- potential for the water body to dry out;
- suitability of bank substrates for burrowing; and
- water quality.

Examples of habitat suitability assessments for water vole are as follows:

- High - habitat comprises 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 - habitat comprises 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 - habitat comprises overhanging trees and/or shrubs reduce the abundance 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 - habitat where there is no waterbody present. Examples include a ditch which is completely overgrown with vegetation and cannot hold water and settlement pools/ditches which collect water polluted with sediment and/or chemicals.

2.2.3 Presence/Likely Absence Survey

Two presence/likely absence survey approaches were undertaken: bank-based and boat-based. Bank-based surveys were carried out by hand searching for field signs and any features that could have the potential to be used by water vole and/or otter. In instances where the size, depth or bank steepness of the waterbody prevented a safe hand search of the bank by surveyors, a kayak was used as a floating platform from which to survey.

Water vole guidance[8] dictates that for an Environmental Assessment, surveyors should undertake one presence/absence survey within each half of the season (i.e. one visit in mid-April, May or June, and a second visit in July, August or September), totalling two separate visits to each waterbody. The first visit was therefore carried out over numerous days (due to the size of the site) in June 2019, and the second visit was carried out over numerous days in August and September 2019. Exact dates of each survey visit to each waterbody are given in Appendix A.

For otter, only one visit is necessary, ideally carried out between May and September[6]. However, field signs and features of use to otter were all searched for and recorded at each waterbody on both visits, in order to maximise survey effort.

Otter

The presence/likely absence of otter was determined at each waterbody by searching for the following field signs: 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 also examined, this included: suitable bridges, bases of large trees, dense vegetation, crossings, confluences of water bodies, culverts and boulders.

Water Vole

Where possible a thorough search (every 1m) of the bankside vegetation was performed at each waterbody. The banks of waterbodies were surveyed from a minimum of 2m from the waters' edge. Where the waterbody was inaccessible from the bank, the survey was carried out from the kayak. The following water vole field signs were searched for: droppings (the most distinctive field sign to indicate recent use of a waterbody by water voles); latrines; feeding stations; burrows; and, footprints.

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 waterbody stopping access;
- poaching of bankside by cattle occluding field signs;
- poor water quality;
- steep banks and deep water; and,
- rain showers wetting field signs.

Where a ditch was inaccessible due to dense vegetation, but the waterbody 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 waterbody 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.

3 Results

3.1 Desk Study

SEWBReC records data show one record of an otter spraint, recorded in 2010 as within the site, where reen 7 and 26 meet adjacent to Cobol Road. They also recorded an otter casualty in 2008, 2.4km 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.

During the 2017 surveys a potential otter couch was recorded alongside waterbody 4. No other signs of otter found, although it was noted that the reens provided suitable habitat for foraging and commuting otter.

Water vole field signs/likely evidence were recorded on three of the waterbodies surveyed, with feeding stations recorded on waterbodies 8, 18 and 32. These were main reens which were considered to have high suitability. A probable water vole sighting was recorded on waterbody 18.

3.2 Field Surveys

3.2.1 Otter

Habitat Suitability Assessment

Hendre Lake (waterbody 1), Faendre Reen (waterbody 2) and waterbody 39 in particular were considered to have the highest suitability for otter. They were all relatively large, held water year-round, supported larger fish, and had more opportunities for resting otter. The suitability of waterbodies to support otter are shown on Figure 2. Further details of the otter habitat suitability assessment can be found in Table 2 within Appendix B1.1.

Seven waterbodies were recorded as high suitability to support otter within the survey area in 2017. Three of these waterbodies reduced to moderate suitability and two reduced to low suitability in 2019, whilst two of these waterbodies remained of high suitability and an additional reen surveyed in 2019 was recorded as high suitability. All of these (with the exception of waterbody 17 which reduced from high to low suitability) are Primary Reens managed by NRW, and therefore subject to regular management of the banks. As such, these differences are likely due to timing of maintenance activities making the waterbodies banks less suitable, and timing of survey.

Presence/Absence Survey

Numerous signs of otter were recorded across the site during both the early and late 2019 survey visits. Spraints were identified at seven waterbodies (Waterbodies 1, 2, 26, 30, 34, 35, and 39), footprints were recorded on one

occasion (waterbody 2), laying up sites were identified at four waterbodies (Waterbodies 1, 2, 23, and 39) and slides were identified at three waterbodies (Waterbodies 2, 3, and 8). Feeding remains in the form of freshwater mussel and/or snail shells were identified at two waterbodies (Waterbodies 1 and 8). No holts or couches were identified at any waterbody during any survey visit.

More details of the otter presence / likely absence survey results can be found in Table 3 within Appendix B1.2, with results shown on Figure 2.

3.2.2 Water Vole

Habitat Suitability Assessment

Six waterbodies of high suitability to support water vole were recorded within the survey area: Waterbodies 8, 18, 26, 30, 32 and 39. All of these are Main Reens managed by Natural Resources Wales, 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, including the reens alongside Heol Las (Waterbodies 7 and 39) and Cobol Road (waterbody 26). A large number of waterbodies were assessed as being of low or negligible suitability due to the presence of established and overgrown hedgerows which severely limit the availability of suitable foraging habitats.

Six waterbodies were recorded as high suitability to support water vole within the survey area in 2017. Three of these waterbodies remained of high suitability, two reduced to moderate suitability and one reduced to negligible suitability in 2019. Two waterbodies initially identified as moderate suitability in 2017 increased to high suitability in 2019, and an additional reen surveyed in 2019 was recorded as high suitability.

As above, all of these (with the exception of waterbody 17 which reduced from high to negligible suitability) are Primary Reens managed by NRW, and therefore subject to regular management of the banks, and as such, these differences are likely due to timing of maintenance activities making the waterbodies banks less suitable, and timing of survey.

The suitability of waterbodies to support water vole are shown on Figure 3, with further details given in Table 2 within Appendix B1.1.

Presence/Absence Survey

Water vole field signs were recorded on only one of the waterbodies surveyed (waterbody 26). These were in the form of feeding stations and water vole burrows. A water vole feeding station was also identified outside of the riparian mammal survey area, during the Extended Phase 1 Habitat survey on 16th July 2019 (this is marked on Figure 3 adjacent to an unlabelled waterbody).

There was an anecdotal record from a passer-by of water voles being present along waterbody 2. However, this was unconfirmed, and no signs of water vole were found by surveyors along waterbody 2. The distinctive ‘plop’ sound was

also heard by surveyors on multiple occasions along waterbody 18. However, the 'plop' sound cannot be considered as conclusive evidence of water vole presence as the sound could be made by numerous other species such as rat *Rattus rattus*, fish, or bank vole *Myodes glareolus*.

Waterbodies 18 and 26 are main reens which were considered to have high suitability as described above.

Potential water vole feeding stations were recorded along six waterbodies within the survey area: Waterbodies 7, 15, 32, 33, 35, and 36. However, no water vole droppings were identified alongside these feeding stations. Bank vole feeding stations and latrines were present throughout waterbodies within the survey area, so it was therefore considered that these feeding stations were more likely to be from bank vole. Results of the water vole presence / likely absence survey are shown on Figure 3, with further details given in Table 3 within Appendix B1.2.

Despite presence of water vole only being confirmed along one waterbody in 2019, it is considered that water voles could be present across most of the site where suitable habitat is present, subject to grass cutting on the banks of the reen network. This is due to the presence of water vole being recorded along Waterbodies 8 and 32 in 2017, and the limitation of poached banks occluding field signs.

American mink *Neovison vison* scats were, however recorded on waterbody 2 and waterbody 39, and further scats were recorded during other ecological surveys throughout 2019. The presence of mink are likely to have reduced the population of water vole in the area, which may explain the reduction in positive signs from 2017 to 2019, and are likely to be keeping the population minimal while present.

4 Conclusions

Signs of otter and foraging activity were recorded throughout the survey area in 2019, confirming their presence within the site boundary. Fish within Hendre Lake (waterbody 1 to the west side of the survey area) and Faendre Reen (waterbody 2 to the north-west side of the survey area) are likely to provide an important foraging resources for otters. No otter breeding site or place of shelter was confirmed during surveys undertaken in 2019.

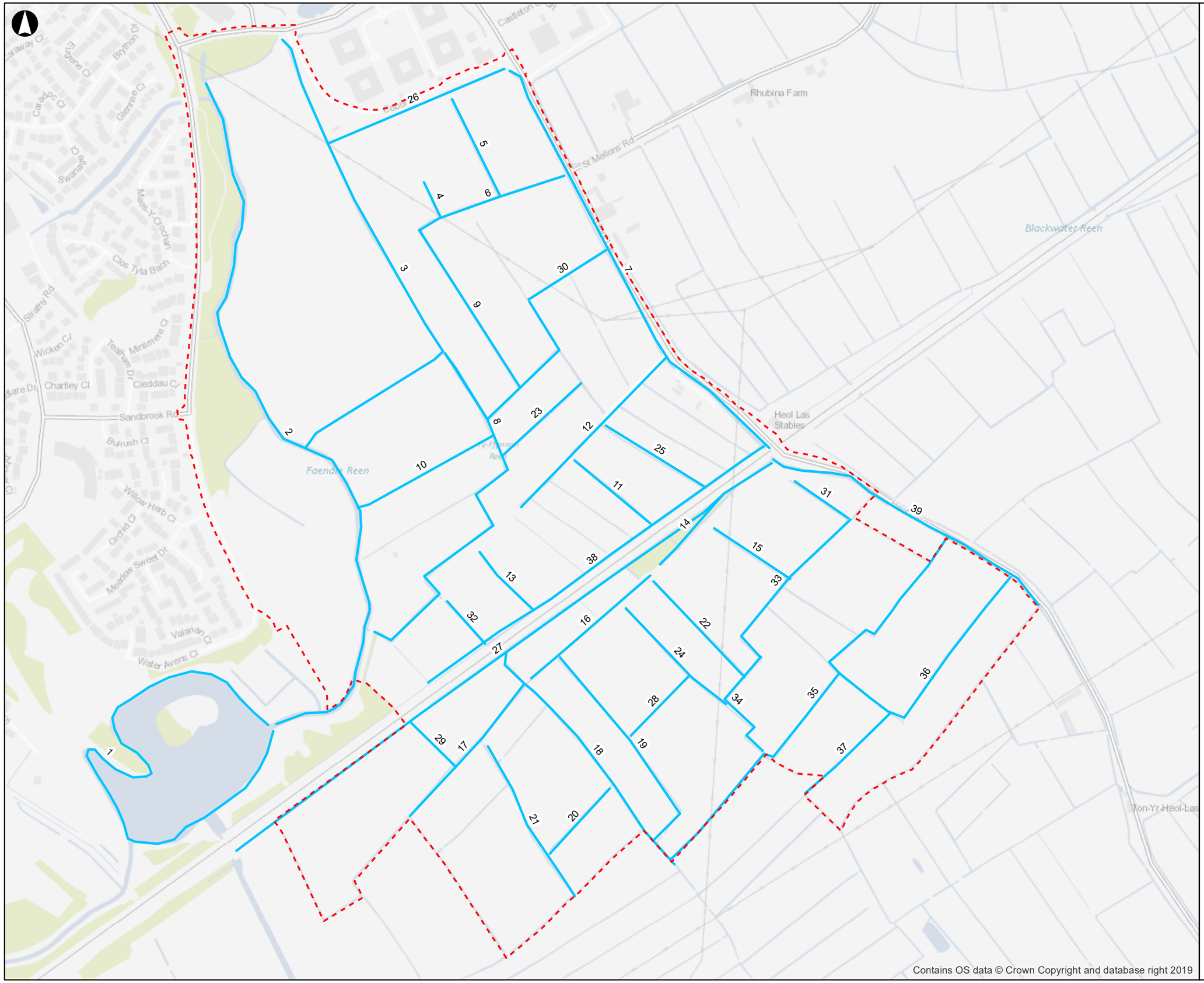
Signs of water vole foraging activity were confirmed in 2017 within the central areas of the site. In 2019 water vole foraging activity and burrows were confirmed for waterbody 26 (along the northern boundary of the survey area). Water vole are likely to be present elsewhere in the interconnected reen system where suitable habitat is present, subject to grass cutting of the banks. However, the presence of American mink is likely to be keeping the water vole population minimal while present

Surveys will need to be undertaken to search for otter and water vole places of shelter prior to any construction works on site, including ground investigation works. If an otter or water vole place of shelter is confirmed, then protected species licences for the relevant species will need to be obtained from Natural Resources Wales. The protected species licenses will detail the mitigation measures that will need to be implemented prior to any site works commencing.

This report is the result of survey work undertaken between June and September 2019. 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

A3



LEGEND

- Survey boundary
- Waterbodies surveyed

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Issue	Date	By	Chkd	Appd
F1	2019-09-20	EA	PW	PW

Metres

0 75 150 300

ARUP

Client

Cardiff Parkway Developments Ltd

Job Title

Cardiff Hendre Lakes

Waterbodies Surveyed in 2019

Scale at A3

1:5,500

Job No	Drawing Status
252199	**For Issue**

Drawing No	Issue
001	**F1**

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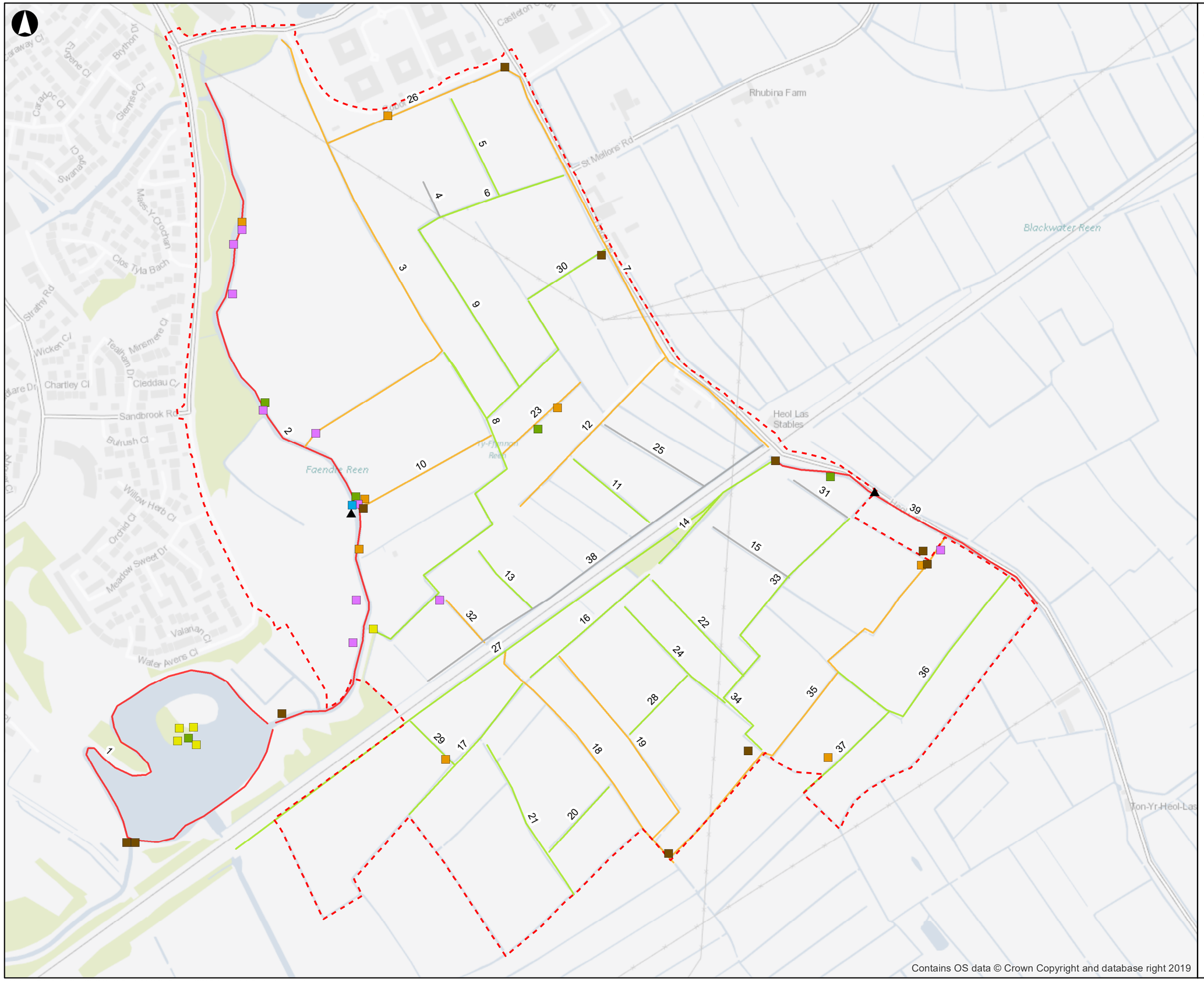

LEGEND

- Survey boundary

Habitat Suitability

- High suitability
- Moderate suitability
- Low suitability
- Negligible suitability

Presence/Absence

- Lay-up site
- Feeding remains
- Pathway
- Slide
- Footprints
- Spraint
- American mink scat

Issue	Date	By	Chkd	Appd
F1	2019-09-20	EA	PW	PW

Metres
0 75 150 300

ARUP

Client
Cardiff Parkway Developments Ltd

Job Title
Cardiff Hendre Lakes

Otter Survey Results

Scale at A3
1:5,500

Job No	Drawing Status
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Drawing No	Issue
002	**F1**

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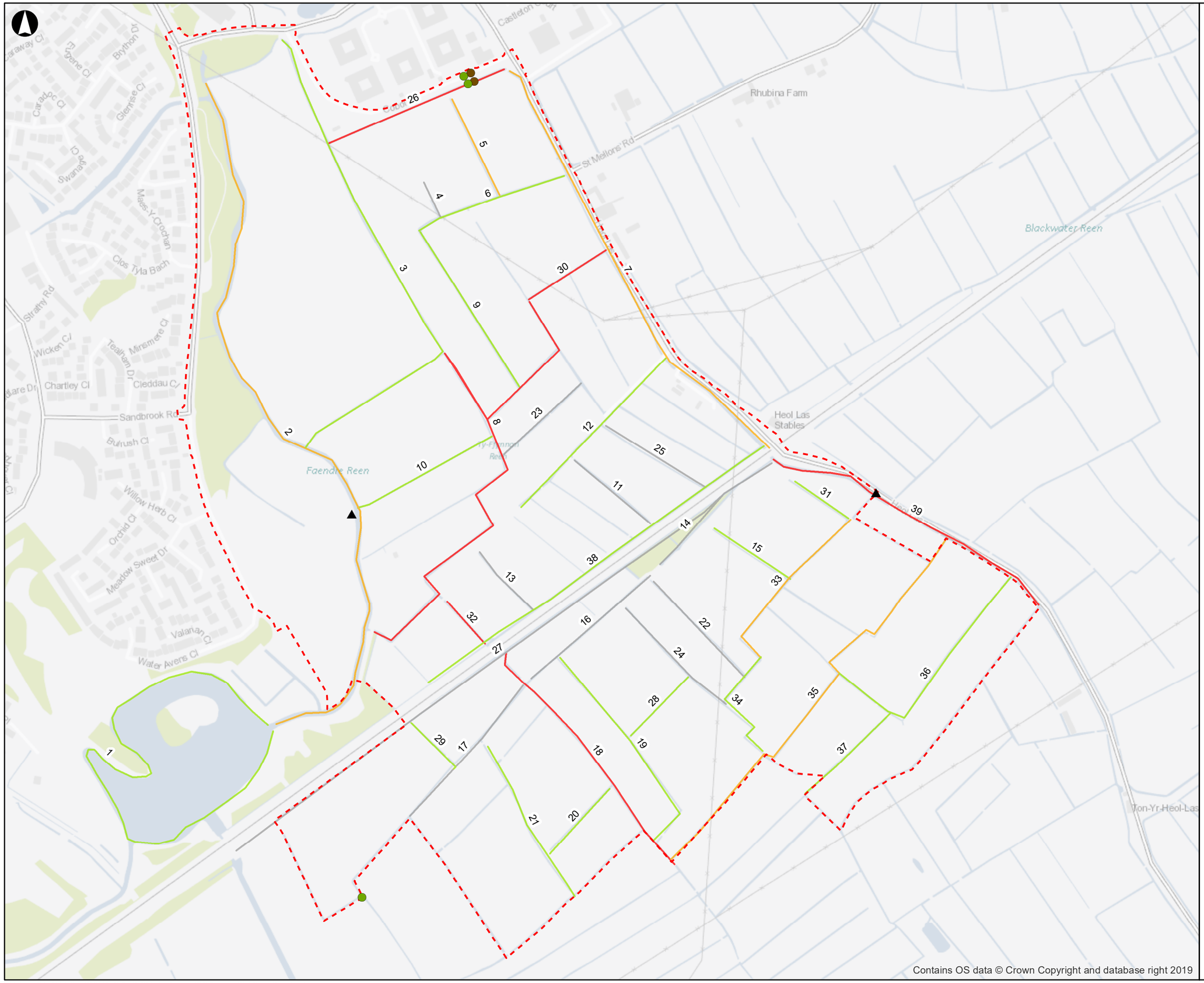

LEGEND

- Survey boundary

Habitat Suitability

- High suitability
- Moderate suitability
- Low suitability
- Negligible suitability

Presence/Absence

- Burrow
- Feeding station
- American mink scat

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Issue	Date	By	Chkd	Appd
F1	2019-09-20	EA	PW	PW

Metres
0 75 150 300

ARUP

Client
Cardiff Parkway Developments Ltd

Job Title
Cardiff Hendre Lakes

Water Vole Survey Results

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Job No	Drawing Status
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Drawing No	Issue
003	**F1**

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Photographs

Photograph 1: One of multiple spraints identified on the concrete sluice structures around waterbody 1

Photograph 2: Otter feeding remains on waterbody 1 island

Photograph 3: Potential otter resting spot along waterbody 2

Photograph 4: Otter spraint on willow branch adjacent to mammal pathway into water at waterbody 2

Photograph 5: One of multiple otter slides into water of waterbody 2

Photograph 6: Potential otter slide into water of waterbody 3

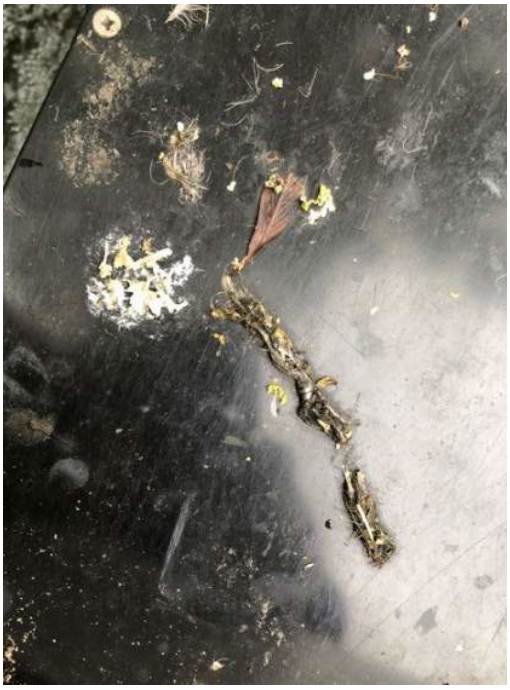
Photograph 7: Potential otter laying up site by waterbody 23

Photograph 8: Otter spraint on waterbody 26

Photograph 9: Water vole burrow in bank slope of waterbody 26

Photograph 10: One of multiple fresh water vole feeding stations identified along waterbody 26

Photograph 11: Water vole burrow with fresh feeding remains on waterbody 26



Photograph 12: One of several spraints present on sluice structure of waterbody 35

Photograph 13: Pathway through duckweed and through hedgerow of northern bank on waterbody 35

Photograph 14: Spraint on plank crossing waterbody 35

Photograph 15: Likely laying up spot for otter on water's edge, adjacent to pathway into water on waterbody 39

Photographs of Waterbodies	
 Waterbody 1	 Waterbody 1
 Waterbody 1	
 Waterbody 2	 Waterbody 2
 Waterbody 2	

Waterbody 3

Waterbody 3

Waterbody 4

Waterbody 4

Waterbody 5

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Appendix A

Weather Conditions

A1 Weather Conditions

Date	Temp (°C)	Wind Speed (Beaufort Scale)	Wind Direction	Cloud Cover (%)	Conditions
First Visit					
03/06/2019	14	3	SW	90	Dry
04/06/2019	14	2	SE	70	Dry/Steady Rain (dry in morning, steady rain for a few hours in afternoon then dry again)
05/06/2019	15	3	SW	80	Dry
10/06/2019	16	1	NW	50	Sunny
17/06/2019	14	1	SW	80	Sunny
19/06/2019	17	1	W	100	Dry
28/06/2019	19	2	S	10	Sunny
Second Visit					
27/08/2019	19	1	W	70	Sunny
28/08/2019	17	2	SW	70	Dry
02/09/2019	15	1	SW	80	Dry
03/09/2019	15	2	W	85	Dry
04/09/2019	16	4	W	20	Sunny
12/09/2019	18	3	SW	100	Dry
23/09/2019	16	3	S	80	Dry

Appendix B

Survey Results

B1 Habitat Suitability Assessment Results

Table 2: Results of the Habitat Suitability Assessment

Water body no.	Early season visit	Late season visit	NGR	Suitability for Otter	Suitability for Water Vole	Surveyed Length (m)	Type	Bank Profile[9]	Depth of Water	Channel Width	Flow Speed	Vegetation Description	Shore Banks	Neighbouring Land-use	Comments
1	28/06/2019	12/09/2019 and 23/09/2019	ST 24631 80469	High	Low	850	Lake	Shallow to Steep	>2m	>20m	Still	Around edge of lake there are regular dense patches of common reed *Phragmites australis* on the bank, with multiple amenity areas for fishing. The amenity areas comprise amenity grassland and bare ground leaving minimal cover for water vole. However, conservation areas have more dense vegetation providing fringe habitat and cover. Scattered scrub and trees also present around the banks. Other species present on the banks included willow *Salix spp.*, hawthorn *Crataegus monogyna*, water mint *Mentha citrata*, buttercup *Ranunculus spp.*, knapweed *Centaurea nigra*, ribwort plantain *Plantago lanceolata*, bulrush *Typha latifolia*, bramble *Rubus fruticosa*, hedge bindweed *Calystegia sepium*, oak *Quercus robur*, alder *Alnus glutinosa* and hazel *Corylus avellana*. Vegetation on the island was scrub (bramble) and trees (oak) in the middle, while the banks of the island being predominately trees including alder, hawthorn, dog rose *Rosa canina*, and willow, with some small patches of common reed and yellow flag iris *Iris pseudacorus*.	Earth; Man-made. Unfenced	Broadleaf woodland; Park/garden; Scrub.	Central island has shallow banks not suitable for water vole, and is also used extensively by birds including geese, ducks and swans. The level of bird activity made it difficult to identify otter pathways. The island has numerous trees and thick vegetation suitable for otter resting spots. Lake banks are mainly low suitability for water vole due to man-made banks in multiple areas (wooden slats holding up bank preventing burrowing), and a lack of food at low level (most areas have dead vegetation for first foot due to over-shading). There are a few suitable banks however no burrows found. Where habitat was suitable some bank vole latrines and feeding stations were found but no water vole signs. Fishermen report seeing mink regularly.
2	19/06/2019	02/09/2019	ST 24854 80898	High (some Moderate)	Moderate	100	Reen	Steep	1 - 2m	5 - 10m	Still	Vegetation very dense at banks, and water completely choked by duckweed *Lemnoideae spp.* and Schedule 9 Invasive Non-Native *Elodea spp.*. Some patches of common reed. present in the middle of the reen. Vegetation present on banks included yellow flag iris, water dropwort *Oenanthe crocata*, hedge bindweed, common nettle *Urtica dioica*, bramble, duckweed, amphibious bistort *Persicaria amphibia*, meadow sweet *Filipendula ulmaria*, bittersweet *Solanum dulcamara*, vetch *Vicia sativa*, horsetails *Equisetum spp.*, rushes *Juncus spp.*, bur reed *Sparganium spp.*.	Earth; Canalized; Poached; Man-made. Unfenced	Arable; Livestock grazing; Park/garden;	Poached in places. Passer-by stated that she had seen water vole on the stretch closest to Hendre lake, however, this is not confirmed.

[9] Flat <10°; Shallow <45°; Steep >45°

Water body no.	Early season visit	Late season visit	NGR	Suitability for Otter	Suitability for Water Vole	Surveyed Length (m)	Type	Bank Profile[9]	Depth of Water	Channel Width	Flow Speed	Vegetation Description	Shore Banks	Neighbouring Land-use	Comments
3	05/06/2019	27/08/2019 and 28/08/2019	ST 24911 81017	Moderate	Low	250	Reen	Shallow	0.5 - 1m	1 - 2m	Still	Generally sheltered by dense scrub (bramble and other woody species, some trees and common reed). Some reeds are present in small areas where reen is not shaded by scrub.	Earth. Unfenced	Arable; Livestock grazing;	Difficult to survey due to dense vegetation. Reen was mostly dry. Wet areas were generally overgrown and dark and thus not suitable for water vole/otter. However, reen was considered to have moderate suitability for commuting otter due to connectivity to Felindre reen (Waterbody 2).
4	05/06/2019	27/08/2019	ST 24998 81322	Negligible	Negligible	30	Ditch	Shallow	0.5 - 1m	2 - 5m	Still	Completely choked by bramble and trees.	Earth. Unfenced	Arable;	Dry at the time of survey.
5	05/06/2019	27/08/2019	ST 25069 81392	Low	Moderate	50	Reen	Shallow	<0.5m	2 - 5m	Still	Very overgrown and choked with vegetation. Full of emergent vegetation along length of reen which shades what little open water there is. Tall common reeds, sedges *Carex spp.*, some bulrush at northern end, and some trees.	Earth. Mixture	Arable;	Suitable water vole food plants present. Some water present, but very little open water.
6	05/06/2019	27/08/2019	ST 25081 81319	Low	Low	10	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Very overgrown with bramble, trees, and tall reeds above head height on northern side. Some bulrush and yellow flag-iris.	Earth; Poached. Mixture	Livestock grazing; Arable.	Some water present. Poached by cattle all the way along south side.
7	05/06/2019 and 17/06/2019	04/09/2019	ST 25257 81264	Moderate	Moderate	100	Reen	Steep	1 - 2m	2 - 5m	Still	Common reed dominated the banks with nettle and meadowsweet in patches. Yellow flag-iris, cow parsley *Anthriscus sylvestris*, and Schedule 9 Invasive Non-Native *Elodea spp.* also present. Very overgrown towards southern end.	Earth; Canalized; Man-made; Poached Unfenced	Urban; Arable; Livestock grazing;	Field-side bank poached by cattle, with grazing right up to edge, leaving only a very narrow band (approx.. 30cm) of cover). Lots of bank vole signs (feeding stations and droppings) identified, and some potential water vole feeding stations (slightly longer stems and angled cut) but no water vole droppings found so assumed to be bank vole. Bank vole runs and burrows also found. Road-side bank has 2-3m of common reed cover but is disturbed by the immediately adjacent road.
8	05/06/2019 and 10/06/2019	03/09/2019	ST 25148 81039	Low	High	650	Reen	Steep	1 - 2m	2 - 5m	Still	Surrounding vegetation varies along length but is generally fairly open and supports common reed, nettles, thistle, yellow flag-iris, sedges, and grasses. Some smaller sections of dense scrub comprised bramble, dog rose and other woody species, but the water remained unshaded. The reen itself was fairly clear of vegetation, with some duckweed and common frogbit *Hydrocharis morsus-ranae* in places.	Earth; Man-made; Poached. Unfenced	Livestock grazing; Arable; Scrub.	Bank vole feeding stations and latrines found along length of reen. Cattle have poached banks lightly in most areas, but central section of reen is heavily poached and vegetation eaten by cows thus removing a continuous/substantial corridor for water vole. Any water vole feeding stations or latrines present could be obscured by poaching. Some areas suitable for commuting / foraging but no cover for resting places.

Water body no.	Early season visit	Late season visit	NGR	Suitability for Otter	Suitability for Water Vole	Surveyed Length (m)	Type	Bank Profile[9]	Depth of Water	Channel Width	Flow Speed	Vegetation Description	Shore Banks	Neighbouring Land-use	Comments
															Some areas considered suitable for water vole burrows but majority of reen is so poached that fringe habitat for feeding is minimal and burrows could be damaged by cows.
9	05/06/2019	27/08/2019	ST 25050 81163	Low	Low	30	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Dense scrub (mostly bramble, especially at northern end), reeds and trees. No aquatic vegetation. Some yellow flag-iris along bank, particularly towards southern end where the water and banks are less shaded.	Earth. Unfenced	Livestock grazing; Arable.	Very little water in places.
10	10/06/2019	28/08/2019	ST 24993 80895	Moderate	Low	250	Reen	Steep	0.5 - 1m	2 - 5m	Still	Reen shaded by tree-line / scrub / un-managed hedgerow, comprising bramble, hawthorn, oak, blackthorn *Prunus spinose*, ivy *Hedera helix* and willow. Dock *Rumex spp.*, nettle, water dropwort, heath speedwell *Veronica officinalis*, buttercup and bittersweet. Little aquatic vegetation due to overshadowing trees.	Earth; Poached; Man-made. Unfenced	Livestock grazing; Arable.	Looks to dry out regularly. Not much food available for water vole. Moderate suitability for commuting otter due to connectivity to Felindre reen.
11	05/06/2019	27/08/2019	ST 25275 80874	Low	Negligible	50	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Predominantly shaded by overgrown trees and scrub (bramble). No aquatic vegetation, only leaf litter on reen bed.	Earth. Unfenced	Livestock grazing;	Reen completely dry. Low suitability for commuting otter. No plants present suitable for water vole feeding.
12	04/06/2019	27/08/2019	ST 25227 80940	Moderate	Low	300	Ditch	Shallow	0.5 - 1m	2 - 5m	Still	Heavily shaded by bramble and trees but bankside vegetation still present, comprising thistle, nettles, common reed, rosebay willowherb *Chamaenerion angustifolium*, hedge bindweed, cleavers *Galium aparine*, rushes *Juncus spp*., buttercup, bittersweet, yellow flag-iris, bracken *Pteridium spp*., and cut-leaf water parsnip *Berula erecta*.	Earth; Poached. Unfenced	Livestock grazing;	Dry along length. Commuting and resting potential for otter. Low suitability for water vole as not many plants present suitable for feeding. Lots of Japanese knotweed present.
13	04/06/2019	04/09/2019	ST 25104 80738	Low	Negligible	150	Reen	Shallow	<0.5m	1 - 2m	Still	Completely shaded by trees and scrub, not much bankside vegetation. Species present included alder, hawthorn, willow, bramble, common reed, hedge bindweed, sycamore *Acer pseudoplatanus*, dock, water dropwort, celery leaved buttercup *Ranunculus sceleratus*, yellow flag-iris.	Earth. Mixture	Livestock grazing;	Predominantly dry, only a few wet areas remaining. Scrub surrounding waterbody too thick to allow access along half of length. However, sections that could be seen were considered to not be suitable for water vole due to a lack of burrowing and feeding opportunities. No foraging opportunities for otter but shade and protection could provide suitable resting places, although none found.
14	04/06/2019	27/08/2019	ST 25406 80817	Low	Negligible	300	Reen	Flat	<0.5m	5 - 10m	Still	Structure similar to that of a wet woodland, although it was nearly completely dry (where water was present it was still shallow, very boggy and very poached by cows). Mature trees and bramble within. Bankside vegetation only present in small area, but where present it was very	Earth; Poached. Mixture	Livestock grazing;	Fenced in some areas but not in others and is used by cows in unfenced areas. One bank vole feeding station identified. Not many feeding opportunities for water vole or otter. Banks not steep enough for water vole burrows. Some cover

Water body no.	Early season visit	Late season visit	NGR	Suitability for Otter	Suitability for Water Vole	Surveyed Length (m)	Type	Bank Profile[9]	Depth of Water	Channel Width	Flow Speed	Vegetation Description	Shore Banks	Neighbouring Land-use	Comments
												overgrown with species comprising grasses, reeds, willowherb, celery leaved buttercup, bridewort *Filipendula ulmaria*, cut-leaf water parsnip, rushes, dock, silverweed *Argentina anserina*, yellow flag-iris, and nettle.			available for commuting otter.
15	03/06/2019	27/08/2019	ST 25493 80769	Negligible	Low	90	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Heavily choked with vegetation. Reeds, sedges and rushes in water and improved grassland surrounding. Some trees scattered along.	Earth. Mixture	Livestock grazing;	Dry at the time of survey, although looked to have held water recently. Stock fence on western side. Bank vole feeding stations and latrines present.
16	03/06/2019	27/08/2019	ST 25255 80666	Low	Negligible	225	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Dominated by reeds / grasses in western quarter, with the rest dominated and shaded by scrub. Reeds and grasses have all been eaten by cows and banks have been poached. Species present include yellow flag iris, cut-leaf water parsnip, and hedge bindweed.	Earth; Poached. Mixture	Livestock grazing;	Completely dry. Some feeding opportunities for water vole but poached and eaten by cows. No burrowing opportunities. No feeding opportunities for otter, but some cover present for commuting otter.
17	03/06/2019	27/08/2019	ST 25045 80463	Low	Negligible	225	Reen	Steep	<0.5m	1 - 2m	Still	Very overgrown and shaded by dense bramble in western half. More open in eastern half with more bankside vegetation including rosebay willowherb, hedge bindweed, nettles, water dropwort, hawthorn, reeds, duckweed, and cleavers.	Earth; Poached. Unfenced	Arable; Livestock grazing;	Nearly completely dry, water very shallow where it was present (only approximately 25m in total was wet). Not many feeding opportunities for water vole and banks too shallow for burrows in places. Good cover for commuting otter although vegetation too dense in places for otter to commute through. Water quality bad.
18	03/06/2019	27/08/2019	ST 25203 80512	Moderate	High	400	Reen	Various (vertical / undercut, shallow and steep)	1 - 2m	2 - 5m	Still	Generally open and unshaded. Reeds, rosebay willowherb, buttercup, thistle, bramble, yellow flag iris, pondweed *Potamogeton spp.*, cut-leaf water parsnip, sedges, rushes and common vetch.	Earth; Poached. Unfenced	Livestock grazing;	Poached by cows along one bank, any signs of water vole could therefore be obscured. Suitable for otter commuting / foraging.
19	03/06/2019	27/08/2019	ST 25317 80482	Moderate	Low	300	Reen	Steep	0.5 - 1m	2 - 5m	Still	Bramble, trees, sedges, rushes, duckweed, yellow flag-iris, thistle, hedge bindweed, buttercup, bridewort, reeds.	Earth; Poached. Unfenced	Livestock grazing;	Nearly completely dry at time of survey, only small pools of water remaining. Bank vole feeding stations and latrines present. Suitable for commuting otter.
20	03/06/2019	27/08/2019	ST 25231 80363	Low	Low	125	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Predominantly shaded by dense scrub (bramble, hawthorn and rose). Open area dominated by reeds. Reeds, grasses, sedges present along banks / within water.	Earth. Unfenced	Livestock grazing;	Mostly dry, few areas of water still present. Very few opportunities for feeding or burrowing water vole.
21	03/06/2019	27/08/2019	ST 25144 80357	Low	Low	225	Reen	Flat	2 - 5m	1 - 2m	Still	Very dense reeds and some scrub. Mainly dry and bed of reen is completely shaded by vegetation.	Earth. Unfenced	Livestock grazing;	Mainly dry at time of survey, some damp / wetter areas present. Bank nearly completely flat. No burrowing opportunities for water vole and no obvious paths. Potential feeding opportunities for water vole but

Water body no.	Early season visit	Late season visit	NGR	Suitability for Otter	Suitability for Water Vole	Surveyed Length (m)	Type	Bank Profile[9]	Depth of Water	Channel Width	Flow Speed	Vegetation Description	Shore Banks	Neighbouring Land-use	Comments
															vegetation very dense to travel through. Vegetation quite dense for commuting otter and not much cover available.
22	04/06/2019	27/08/2019	ST 25420 80653	Low	Negligible	200	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Trees scattered along length which are frequently used by cows for shade. Other species present include nettle, bramble, cleavers, thistle, dock, water dropwort, buttercup. No suitable water vole food plants present.	Earth; Poached. Unfenced	Livestock grazing;	Completely dry. Suitable for commuting otter.
23	05/06/2019	03/09/2019	ST 25176 80985	Moderate	Negligible	160	Ditch	Flat	<0.5m	2 - 5m	Still	Heavily shaded by bramble, hawthorn, ivy, nettle, and willow trees. Lots of leaf litter. Water is stagnant with no aquatic vegetation.	Earth. Unfenced	Arable;	Banks not suitable for water vole and no suitable feeding opportunities. Shaded and protected and considered to provide good resting and commuting opportunities for otter.
24	04/06/2019	27/08/2019	ST 25361 80624	Low	Negligible	200	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Bramble, trees, yellow flag-iris, nettle, hedge bindweed, cleavers, water starwort *Callitriche spp.*, dock, buttercup, water dropwort, and thistle.	Earth; Poached. Unfenced	Livestock grazing;	Nearly completely dry. Low suitability for commuting otter.
25	05/06/2019	27/08/2019	ST 25336 80925	Negligible	Negligible	175	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Shaded by dense scrub (bramble) along most of reen. Leaf litter on reen-bed. Rosebay willowherb and reeds present in places.	Earth. Unfenced	Livestock grazing;	Completely dry at time of survey.
26	17/06/2019	04/09/2019	ST 24997 81467	Moderate	High	275	Reen	Steep	1-2m	2-5m	Still	Northern bank has approximately 5m wide corridor of common reed and southern bank has approximately 2m wide corridor of common reed. Bramble and nettle were also present. Lots of water vole food present, particularly on the northern bank.	Earth; Canalized; Man-made. Unfenced	Arable; Livestock grazing.	Both banks are suitable for water vole burrows. Potential feeding signs seen for water vole but unable to confirm due to lack of water vole latrines. Bank vole feeding stations found throughout. There is also potential for otter to commute along this reen as it is sheltered from the road and there is a large bramble patch at the west end of the reen which is suitable for a resting/laying up spot for otter.
27	03/06/2019	27/08/2019	ST 25090 80601	Low	Negligible	750	Reen	Shallow	<0.5m	1 - 2m	Still	Very overgrown with grasses, sedges, rushes, and others: hedge bindweed, some reeds, nettles, horsetail, some brambles and some bracken.	Stones; Earth; Poached. Fenced	Arable; Livestock grazing; Urban;	Completely dry at time of survey. Railway track along northern bank. Some feeding opportunities for water vole but no burrowing opportunities. No feeding opportunities for otter. Some cover for commuting otter but no visible paths.
28	03/06/2019	27/08/2019	ST 25355 80540	Low	Low	115	Reen	Shallow	<0.5m	1 - 2m	Still	Dominated by grasses, bramble and trees. Reeds, hedge bindweed, yellow flag-iris, cleavers, celery leaved buttercup, bridewort and nettles.	Earth; Poached. Unfenced	Livestock grazing;	Completely dry at time of survey. Suitable for commuting otter. Banks considered too shallow for water vole burrows, but some feeding opportunities present. Suitable for commuting otter.

Water body no.	Early season visit	Late season visit	NGR	Suitability for Otter	Suitability for Water Vole	Surveyed Length (m)	Type	Bank Profile[9]	Depth of Water	Channel Width	Flow Speed	Vegetation Description	Shore Banks	Neighbouring Land-use	Comments
29	03/06/2019	27/08/2019	ST 24994 80489	Low	Low	100	Reen	Steep	1 - 2m	2 - 5m	Still	Very overgrown and shaded by bramble and hawthorn. Some reeds, grasses, water dropwort, sedges and hedge bindweed also present.	Earth; Poached. Unfenced	Arable; Livestock grazing;	Not many feeding opportunities for water vole but banks are steep enough for burrows, although water not very deep. Some suitability for foraging/commuting otter but no holts/couches. Northern half starting to dry up.
30	05/06/2019	03/09/2019	ST 25228 81210	Low	High	150	Reen	Shallow	1 - 2m	2 - 5m	Still	Quite open and unshaded on eastern half. Reeds on banks and some areas dominated by duckweed. Banks in western half more densely vegetated by reeds and water more shaded by duckweed and common frogbit. Most vegetation along the banks has been eaten by cows and banks have been poached right up to the edge. Other plants present include yellow flag-iris, water horsetail, and Schedule 9 Invasive Non-Native *Elodea spp.*.	Earth; Poached. Unfenced	Livestock grazing;	Multiple bank vole latrines present. Suitable for foraging and commuting otter, but no resting places present. Banks not steep enough for water vole burrows, but any signs could be obscured by poaching on banks.
31	03/06/2019	27/08/2019	ST 25600 80854	Negligible	Low	100	Reen	Shallow	<0.5m	2 - 5m	Still	Very choked with overgrown vegetation: feather reed grass *Calamagrostis acutiflora*, common reed, sedges, rushes, nettle, bramble, common vetch, hedge bindweed, water dropwort, and trees. Improved grassland surrounding.	Earth. Unfenced	Livestock grazing;	Predominately dry along length although looks to have held water previously. Bank vole feeding stations and latrines present along length.
32	04/06/2019	04/09/2019	ST 25048 80673	Moderate	High	100	Reen	Vertical / undercut	1 - 2m	2 - 5m	Still	Open and unshaded. Banks are colonised by common reed, thistle, water mint, purple loosestrife *Lythrum salicaria*, nettle, bramble, common vetch, hedge bindweed, water dropwort, bittersweet, pondweed, cinquefoil *Potentilla spp.*, bridewort. The water itself was dominated by duckweed and some common frogbit. Some areas are poached by cattle but a sufficient vegetated corridor still remains.	Earth; Poached. Mixture	Livestock grazing;	Banks were steep enough for water vole and feeding opportunities also present but no conclusive signs found. There was potential for commuting and foraging otter but no cover available for resting otter. Bank vole latrines and feeding stations were present along length of waterbody.
33	03/06/2019	27/08/2019	ST 25573 80759	Low	Moderate	100	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Sedges, rushes and duckweed in water, with some common reed and trees on banks. Improved grassland surrounding.	Earth. Unfenced	Livestock grazing;	Dry for two thirds at the time of survey but looked to have held water recently. Bank vole feeding stations present along length, with some potential water vole feeding stations but no water vole latrines to confirm.
34	03/06/2019	27/08/2019	ST 25478 80577	Low	Low	50	Reen	Shallow	0.5 - 1m	2 - 5m	Still	Bramble and hawthorn along most of bank. Common reed, fool's watercress *Apium nodiflorum*, water mint, sedges, and duckweed in reen. Improved grassland fields surrounding.	Earth. Unfenced	Livestock grazing;	Mostly dry at time of survey. Low suitability for water vole due to lack of feeding opportunities. Commuting suitability for otter. Some bank vole feeding stations identified.

Water body no.	Early season visit	Late season visit	NGR	Suitability for Otter	Suitability for Water Vole	Surveyed Length (m)	Type	Bank Profile[9]	Depth of Water	Channel Width	Flow Speed	Vegetation Description	Shore Banks	Neighbouring Land-use	Comments
35	04/06/2019	12/09/2019 and 23/09/2019	ST 25577 80523	Moderate	Moderate	650	Reen	Steep	1 - 2m	2 - 5m	Still	Common reed, water parsnip, duckweed, common frogbit, burweed, pondweed, sedges, yellow flag iris and algae in reen. Improved grassland surrounding.	Earth; Man-made. Unfenced	Livestock grazing;	Heavily poached by cows, particularly on southern bank, leaving too narrow a corridor for water vole to take shelter, burrow or feed. Northern bank was also poached in places. Bank vole feeding stations and latrines present in suitable areas along northern bank. Only a few sections along the reen had vegetation of sufficient height and width to support water vole.
36	04/06/2019	12/09/2019	ST 25810 80638	Low	Low	100	Reen	Shallow	<0.5m	1 - 2m	Still	Common reed and sedges in reen. Improved grassland surrounding.	Earth; Man-made. Mixture	Arable; Livestock grazing;	Dry at time of survey but appeared as though it does occasionally hold water. Minimal water present in the stretch running north west to south east. Fenced on northern side. Some areas of scrub could be used by otter for shelter or as a lay-up. Food availability and shelter for water vole was minimal.
37	04/06/2019	12/09/2019	ST 25652 80477	Low	Low	90	Reen	Flat	<0.5m	1 - 2m	Still	Eastern half fairly open and unshaded, whilst western half was densely shaded by bramble, nettles, hedge bindweed and rose, with occasional hawthorn and willow. Common reed and yellow flag iris in reen but heavily grazed by cattle.	Earth; Poached. Mixture	Livestock grazing;	Reen completely dry at time of survey. Fenced on southern bank on the western half, and on northern bank in the eastern half. Very low suitability for water vole due to lack of water and suitable grasses, and heavy poaching. No suitable resting spots for otter due to heavy poaching.
38	05/06/2019	04/09/2019	ST 25208 80723	Negligible	Low	550	Ditch	Shallow	<0.5m	2-5m	Still	Very overgrown with common reed, nettles, bramble, hedge bindweed and some purple loosestrife. Eastern end is even more overgrown with scrub (bramble, rose, hawthorn etc.).	Earth; Man-made. Mixture	Livestock grazing; Urban;	No water at time of survey. Access to search thoroughly not possible due to barbed wire fence and railway. Railway runs parallel to the south and fence runs parallel to the north. No foraging or resting opportunities for otter, and vegetation considered too dense to commute through. No burrowing opportunities for water vole and minimal feeding opportunities.
39	04/06/2019	12/09/2019	ST 25844 80764	High	High	450	Reen	Steep	1 - 2m	2-5m	Still	Fairly open and unshaded, with minimal areas of shelter towards the northern end. Common reed fringe of approximately 1 metre on eastern bank, including nettle, common cinquefoil *Potentilla simplex*, meadow sweet, common bindweed, celery leaved buttercup, yellow flag iris, thistle, dock, common vetch, chickweed *Stellaria media*, bridewort, and water dropwort.	Earth; Man-made. Unfenced	Livestock grazing;	Reen has large amount of litter and fly tipping due to proximity to road. Grass was recently mown prior to Visit 1 making hand searching difficult. Banks considered steep enough for water vole burrows but none found. Reen is suitable for commuting/foraging otter, with suitable lay-up areas at the northern.

B2 Presence/Likely Absence Survey Results

Table 3: Results of the presence / likely absence survey

Water body no.	Visit	Date	Otter signs	Water vole signs	Comments
1	Early	28/06/2019	Spraints; Laying up; Feeding remains	-	Multiple suitable laying up sites and feeding remains (freshwater mussels) identified on island. Old spraints identified on both the eastern and western sluices. Bank vole feeding stations present.
	Late	12/09/2019 and 23/09/2019	Spraints; Feeding remains	-	Spraint identified on western sluice and feeding remains (freshwater mussels) again identified on the island. Bank vole feeding stations and latrines present.
2	Early	19/06/2019	Footprints; Spraints; Slides; Laying up	-	Slide on eastern bank of reen with lots of scratch marks (could be dog). Otter spraint on willow branch where tree overhangs reen. Area is sheltered and would be an ideal otter resting spot. Pathway from field into water and onto tree also present in this area. Bank vole feeding stations present.
	Late	02/09/2019	Spraints; Slides; Laying up	Anecdotal record	Otter slide into reen, and otter spraint identified on eastern bank. Laying-up site identified again in sheltered area under willow. Passer-by stated that she had seen water vole on the stretch closest to Hendre lake, however, this is not confirmed. Bank vole latrines present.
3	Early	05/06/2019	-	-	Bank vole feeding stations and droppings present.
	Late	27/08/2019 and 28/08/2019	Slides	-	Potential otter slide identified in and out of water.
4	Early	05/06/2019	-	-	
	Late	27/08/2019	-	-	
5	Early	05/06/2019	-	-	
	Late	27/08/2019	-	-	
6	Early	05/06/2019	-	-	
	Late	27/08/2019	-	-	

Water body no.	Visit	Date	Otter signs	Water vole signs	Comments
7	Early	05/06/2019 and 17/06/2019	-	-	Lots of bank vole signs (feeding stations and droppings) and some potential water vole feeding stations (slightly longer stems and angled cut) but no droppings found so assumed were bank vole. Bank vole runs and burrows also found.
	Late	04/09/2019	-	-	Bank vole feeding stations found throughout.
8	Early	05/06/2019 and 10/06/2019	Slides	-	Potential otter slide (flattened vegetation leading into reen). Bank vole feeding stations and droppings found throughout, plus potential pathways into reen.
	Late	03/09/2019	Feeding remains	-	Potential otter feeding remains (snail shells) identified on sluice structure at western end of reen. Bank vole latrines present. Some larger feeding stations but no droppings to confirm water vole.
9	Early	05/06/2019	-	-	
	Late	27/08/2019	-	-	
10	Early	10/06/2019	-	-	Bank vole feeding stations present.
	Late	28/08/2019	-	-	
11	Early	05/06/2019	-	-	
	Late	27/08/2019	-	-	
12	Early	04/06/2019	-	-	
	Late	27/08/2019	-	-	
13	Early	04/06/2019	-	-	
	Late	04/09/2019	-	-	
14	Early	04/06/2019	-	-	
	Late	27/08/2019	-	-	Bank vole feeding stations present.
15	Early	03/06/2019	-	-	Potential water vole feeding station but no droppings to confirm, so could be bank vole.
	Late	27/08/2019	-	-	
16	Early	03/06/2019	-	-	
	Late	27/08/2019	-	-	
17	Early	03/06/2019	-	-	Potential mammal pathway through reeds into reen. No other signs seen.
	Late	27/08/2019	-	-	

Water body no.	Visit	Date	Otter signs	Water vole signs	Comments
18	Early	03/06/2019	-	-	'Plop' heard by both surveyors, however could not confirm to be water vole due to no other signs.
	Late	27/08/2019	-	-	Five 'plop' sounds heard in five places.
19	Early	03/06/2019	-	-	Bank vole feeding signs
	Late	27/08/2019	-	-	Bank vole feeding stations and latrines present.
20	Early	03/06/2019	-	-	
	Late	27/08/2019	-	-	
21	Early	03/06/2019	-	-	
	Late	27/08/2019	-	-	
22	Early	04/06/2019	-	-	
	Late	27/08/2019	-	-	
23	Early	05/06/2019	-	-	
	Late	03/09/2019	Laying up	-	One potential laying up site identified and one potential pathway.
24	Early	04/06/2019	-	-	
	Late	27/08/2019	-	-	
25	Early	05/06/2019	-	-	
	Late	27/08/2019	-	-	
26	Early	17/06/2019	-	-	Bank vole feeding stations and droppings.
	Late	04/09/2019	Spraint	Feeding stations; Burrows;	Spraint on plank at eastern end of reen. Potential water vole burrow in bank slope. Excavated loose earth and old feeding remains at entrance identified on two occasions. Bank vole feeding stations and droppings present.
27	Early	03/06/2019	-	-	
	Late	27/08/2019	-	-	
28	Early	03/06/2019	-	-	
	Late	27/08/2019	-	-	
29	Early	03/06/2019	-	-	
	Late	27/08/2019	-	-	
30	Early	05/06/2019	-	-	Bank vole latrine present

Water body no.	Visit	Date	Otter signs	Water vole signs	Comments
	Late	03/09/2019	Spraints	-	Spraint found on concrete bridge structure at eastern end of reen. Multiple bank vole latrines present along southern bank.
31	Early	03/06/2019	-	-	Bank vole feeding stations and latrines along length of reen.
	Late	27/08/2019	-	-	Bank vole feeding stations and droppings present.
32	Early	04/06/2019	-	-	Potential water vole feeding station found on eastern bank but no droppings to confirm.
	Late	04/09/2019	-	-	Bank vole latrines and feeding stations present along length of waterbody
33	Early	03/06/2019	-	-	Bank vole feeding stations, some potential water vole feeding stations but no latrines to confirm.
	Late	27/08/2019	-	-	Bank vole feeding stations and droppings present.
34	Early	03/06/2019	-	-	Bank vole feeding stations and droppings present.
	Late	27/08/2019	Spraint	-	Spraint identified on the 12/09/2019 survey at junction of reen 34 and 35.
35	Early	04/06/2019	Spraint	-	Two fresh otter spraints on sluice gate. Three potential old mink scats but no odour. Bank vole droppings and feeding stations. Some larger feeding stations but no droppings to confirm water vole.
	Late	12/09/2019 and 23/09/2019	Spraints	-	Spraint on plank adjacent to western end of reen, and another spraint in the field at the junction of reen 34 and 35. Several old spraints on sluice structure at eastern end. Pathway also present on northern bank, with a path through the duckweed on water's surface.
36	Early	04/06/2019	-	-	Bank vole feeding stations and droppings present. Some larger feeding stations but no droppings to confirm water vole and pathways between feeding stations smaller thus suggesting bank vole.
	Late	12/09/2019	-	-	
37	Early	04/06/2019	-	-	Mammal pathway running into brambles on side of reen.

Water body no.	Visit	Date	Otter signs	Water vole signs	Comments
	Late	12/09/2019	-	-	
38	Early	05/06/2019	-	-	
	Late	04/09/2019	-	-	
39	Early	04/06/2019	Spraints	-	Two spraints at northern end of reen. Area adjacent smells like mink. Mammal pathway into water in this location. Mink scat also found where reen meets road.
	Late	12/09/2019	Laying up	-	Likely laying up spot for otter on water's edge at northern end of reen, next to pathway into water.