



Hallam Land Management

Bognor Regis Golf Club

APPENDIX 8.8 - RIPARIAN MAMMAL SURVEY REPORT

December 2021

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1.0 INTRODUCTION

- 1.1 The following report has been prepared by FPCR Environment and Design Ltd. on behalf of the applicant Hallam Land and in support of an outline planning application for the residential redevelopment of Bognor Regis Golf Club. The report provides the results of a survey for water vole *Arvicola amphibius* and otter *Lutra lutra* undertaken at land at Bognor Regis Golf Club, Bognor Regis, West Sussex (central grid reference: SU 950 012).
- 1.2 To inform the assessment, an updated survey was completed on 3rd September 2021. This report also summarises previous riparian mammal surveys completed by FPCR at the site in 2016 and 2017.

Site Context

- 1.3 The site is located to the north of Felpham and Bognor Regis and is adjacent to the north-western edge of the built-up area of Felpham. It is bounded to the west by Lidsey Rife, beyond which is the LEC Airfield, the railway line and areas of commercial development. To the north is the A259. To the east is the existing residential environs of Felpham and Downview Primary School. To the south are open fields extending to the B2259 and further afield Felpham.
- 1.4 The site covers an area of approximately 40ha and currently comprises the existing Bognor Regis Golf Course and associated club house and car parking. Vehicular and pedestrian access is provided from Golf Links Road. The golf course comprises fairways, fairway trees with occasional drainage ditches. A practice green is also located close to the club house.

Development Proposals

- 1.5 Outline planning application with all matters reserved, except means of access, for the erection of up to 480 new homes, the formation of a new means of access onto Golf Links Road, together with the creation of new surface water drainage, new landscaping and habitat creation, ground works and other infrastructure. The retention and re-purposing of the retained club house.

2.0 LEGISLATION

Otter

- 2.1 Otter are fully protected under Schedule 5 of the Wildlife & Countryside Act 1981 (*as amended*) due to the protection afforded to their places of shelter and protection. They are afforded protection under Section 9 parts 4(a) and 4(b). This makes it an offence to:
- Intentionally or recklessly kill, injure or take these species
 - Possess or control live or dead species or derivatives
 - Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection
 - Intentionally or recklessly disturb these species whilst occupying a structure or place used for that purpose
 - Sell these species or offer or expose for sale or transport for sale
 - Publish or cause to be published any advertisement which conveys the buying or selling of these species
- 2.2 The otter is also protected by the Habitats and Species Regulations 2019 (Amendment)(EU Exit). In effect this legal protection makes it an offence to deliberately:
- Kill, take or injure an otter
 - Damage or destroy an otter's place of shelter
 - Disturb an otter whilst using such a place
- 2.3 The European otter is listed as a Species of Principal Importance in England under Section 41 of the NERC Act 2006.
- 2.4 Any operations that may lead to either a direct or indirect effect upon otter or their places of rest or shelter require a Natural England European Protected Species (EPS) license. EPS licenses involve the production of a method statement detailing appropriate mitigation and compensation to ensure that the favourable conservation status of otter is not affected during the proposed operations.

Water Vole

- 2.5 Water voles are fully protected under The Wildlife and Countryside Act 1981 (*as amended*) (WCA). This makes it an offence to:-
- Intentionally kill, injure or take water voles;
 - Possess or control live or dead water voles or derivatives;
 - Intentionally or recklessly damage, destroy and obstruct access to any structure or place used by water voles for shelter or protection;
 - Intentionally or recklessly disturb water voles whilst they are using such a place;
 - Sell water voles or offer to expose for sale or transport for sale:

- Publish or cause to publish any advertisement which conveys the buying or selling of water voles.
- 2.6 Water voles are listed as a Species of Principal Importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.
- 2.7 If water voles are found to be present and impacts cannot be avoided then depending on the size of area to be affected a Protected Species Conservation Licence from Natural England may be required and suitable mitigation implemented to ensure this species comes to no detrimental harm during and after development, and the scheme results in a conservation benefit to the species.

3.0 METHODOLOGY

Desk Study

- 3.1 An updated desk study was undertaken with Sussex Biodiversity Records Centre SBRC in October 2021, to obtain updated water vole, otter and American mink *Neovison vison* records for the site and its surrounds.

Field Surveys

Otter

- 3.2 The survey methodology detailed below is used to determine the status of otters. The methodology follows that of the full survey detailed in the New Rivers and Wildlife Handbook¹ and Chanin (2003)²³.
- 3.3 Due to the unlikely event of actual observation, the survey concentrated on locating field signs indicating otter presence or use. Such field signs include:
- Spraints – characteristic sweet-smelling, black tar-like (where fresh/relatively recent i.e. within a few weeks) or grey crumbly (when old) faecal deposits usually containing fish scales, bones and occasionally invertebrate exoskeleton and bird feathers.
 - Footprints – In good substrate typically asymmetrical and showing five toes arched around a large pad and, depending on substrate, webbing and claw marks. Poorer, generally coarser substrates do not often enable the identification of otter footprints.
- 3.4 Additional signs of otter presence may occur, although without additional evidence are usually not conclusive proof of current otter presence, such as:
- Feeding remains – Remains of fish and aquatic invertebrates
 - Slides/haul-outs – Routes into and out of the water, which are usually associated with terrestrial routes such as short cuts around meanders or along traditionally, used otter paths/routes.
 - Couches/hovers – above ground resting place. Usually associated with cover such as dense scrub, rushes or reed, flood debris or fallen trees. Many couches are rarely used whilst others more so. Difficult to prove use without radio tracking.
 - Holts – below ground resting site usually associated with sprainting. Sometimes used with greater frequency than couches and can be important for breeding (natal holts) where other signs are usually absent. Notoriously difficult to find or prove without radio tracking.
- 3.5 Otter surveys can be undertaken at all times of the year, if weather conditions are suitable prior to and during the surveys.

¹ RSPB, the National Rivers Authority, and the RSNC 1994

² Chanin, P (2003) *Ecology of the European Otter*. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough

³ Chanin, P (2003) *Monitoring the European Otter*. Conserving Natura 2000 Rivers. Ecology Series No.10. English Nature, Peterborough

Water Vole

- 3.6 An initial habitat assessment was made by an experienced surveyor to determine the suitability of habitats within the site to support water voles. Habitat requirements were based on those detailed in para 3.3.2 of the Water Vole Mitigation Handbook⁴ and Water Vole Field Signs and Habitat Assessment⁵ and include:
- dry areas above water level for nesting, either in burrows or above-ground woven nests;
 - steep bank profiles;
 - suitable bank substrate for burrowing;
 - daily water level fluctuations;
 - herbaceous marginal and bankside vegetation; and
 - suitable water depth.
- 3.7 In 2016, 2017 and 2021, the presence/absence surveys took place in accordance with those specified within Water Vole Mitigation Handbook (2016)⁶, and involved the identification of evidence of water vole activity within 5m of the banks of the waterbodies and any suitable habitat, including ditches. These surveys were undertaken by experienced ecologists during suitable conditions.
- 3.8 The banks/margins of the waterbodies and suitable habitat were surveyed for evidence of:
- *water voles* - live sightings
 - *latrines* - distinct piles of water vole droppings found near nest sites, at the ranges of territorial boundaries and where the animals enter and leave the water. The presence of droppings is the only field sign which can be used reliably on its own;
 - *burrows* - burrow entrances are typically wider than high with a diameter between 4 and 8cm. Generally, these burrow entrances are located at the water's edge;
 - *feeding stations* - areas with distinct neat piles of chewed lengths of vegetation along pathways or haul out platforms along the water's edge;
 - *footprints* - identifiable prints in soft margins of the watercourse;
 - *runways* - low tunnels that are pushed through the vegetation and often leading to burrows or feeding stations; and
 - *nest balls* – woven vegetation of approximately the size and shape of a rugby ball, usually found within a tuft of vegetation above the water line.
- 3.9 The survey within the reedbed was undertaken by walking a transect route through the reeds

Habitat Assessment

- 3.10 The Water Vole Mitigation Handbook outlines that water voles have the following three habitat requirements:

⁴ Dean, M., Strachan, R., Gow, D & Andrews, (2016) The Water Vole Mitigation Handbook. The Mammal Society Guidance Series. Eds F. Matthews & P. Chanin. The Mammal Society, London.

⁵ Dean, M. (2021), Water Vole Field Signs and Habitat Assessment: A Practical Guide to Water vole Surveys, Pelagic Publishing

⁶ Dean, M., Strachan, R., Gow, D & Andrews, (2016) The Water Vole Mitigation Handbook. The Mammal Society Guidance Series. Eds F. Matthews & P. Chanin. The Mammal Society, London

- dry areas above water level for nesting (either in burrows or occasionally in woven nest balls);
- herbaceous vegetation to provide food and cover; and
- water (as a means of escape from predators).

3.11 These criteria are rationalised in a recently published matrix⁷ which can be used to assess the potential value of habitat for water vole, see *Table 1*.

Table 1: Assessing the Value of Habitat for Water Voles (Deans, 2021 – Table 21)

Habitat category	Bank Profile	Bank substrate	Variation in water level	Herbaceous vegetation	Water
	Dry areas for burrows or nests				
Optimal (all criteria need to be met)	Steep (approaching 1:1) on at least one side of a watercourse. Steep or shallow banks on static waterbodies or fen-type habitat, where water levels do not fluctuate significantly	Earth or peat	No noticeable variation during the summer months; banks are not overtopped regularly ^a	Continuous swathe of tall and luxurious riparian vegetation providing 90-100% cover on the banks (tall tussocky grassland) and marginal/in-channel vegetation is present (emergent species)	Permanent water
Good (all criteria need to be met)	Steep (approaching 1:1) on at least one side of a watercourse. Steep or shallow banks on static waterbodies or fen-type habitat, where water levels do not fluctuate significantly	Earth or peat bank, or stony/reinforced bank with gaps allowing access to the earth behind	No noticeable variation during the summer months; banks are not overtopped regularly	Continuous swathe of bankside or in-channel (emergent) vegetation providing at least 60% ground cover. May be dominated by grasses and weeds, rather than luxurious riparian vegetation. The vegetation should generally be tall, except in urban or suburban areas, where shorted bankside vegetation may also qualify	Permanent water. Or routinely wet for at least 2-3 months during the summer, and where other 'good' habitat is present in immediately adjacent areas with permanent water
Suitable but poor ^b	Any habitat that falls short of the criteria to qualify as 'good' but does not meet the criteria of 'negligible value' could reasonably be considered to be suitable but 'poor'				

⁷ Dean M (2021) *Water vole Field Signs and Habitat Assessment: A Practical Guide to Water Vole Surveys*. Pelagic Publishing

Habitat category	Bank Profile	Bank substrate	Variation in water level	Herbaceous vegetation	Water
	Dry areas for burrows or nests				
Negligible value (will generally need to meet the criteria for herbaceous vegetation and at least one other)	Shallow profile on both banks	Rocky or gravel, unsuitable for burrowing	Considerable variation in water level – the bank toe can move by more than 1m horizontally over the breeding season	No or limited bankside and marginal vegetation (due to shading or other 'permanent' factors – note that management can change and is often a 'temporary' factor)	n/a
	Vertical bank face with no burrowing opportunities behind it	Reinforced banks with no gaps	n/a		n/a

^a overtopping once every 5-10 years is likely to be too frequent in most cases; overtopping less frequently than this may also be problematic for water voles.

^b the term 'suitable but poor' is used to avoid the possible misinterpretation of this habitat category opposed to the term 'poor', which some would dismiss as 'unsuitable'.

4.0 RESULTS

- 4.1 *Figure 1* provides the locations of the consultation records, *Figure 2* presents the results of the previous water vole surveys, completed in 2016 and 2017 and the results of the update 2021 survey is presented on *Figure 3*.

Desk Study

- 4.2 The SBRC returned 29 records of water voles within 1 km of the site. Records were from between 2012 and 2015, with four of the records from a section of the Lidsey Rife that borders the golf course, see *Figure 1* for locations.
- 4.3 No records for otter or mink were returned for within 1km.

Waterbody and Habitat Descriptions

- 4.4 The majority of habitats present within the site are limited both in their range and diversity due to the site's purpose as a golf club and resultant intensive management.
- 4.5 There are three ponds and a network of wet and dry ditches on site as well as the Lidsey Rife, which flows north to south along the western boundary. A single pond (P4) was present off-site adjacent the northern boundary. Habitat descriptions for D1 – D13 are provided in *Table 2* below, with the locations provided on *Figures 2* and *3*.
- 4.6 The three ponds present within the site boundary, all supported aquatic and marginal plant species. P1 is situated within the fairway as part of the landscaping and ponds P2, P3 and P4 are associated with the onsite drains. Habitat descriptions for these (and the off-site P4) are provided below:
- Pond 1: Largest Pond c. 15 x 8m, large amount of aquatic/emergence vegetation present including lesser bulrush *Typha angustifolia*, water mint *Mentha aquatica* and parrot feather *Myriophyllum aquaticum*.
 - Pond 2: c. 10 x 10m, located at end of wet drain running along northern site boundary, largely shaded and heavily vegetated with common reed *Phragmites australis* and duck weed, with some additional aquatic / marginal vegetation present including false watercress *Apium nodiflorum*, yellow flag iris *Iris pseudacorus* L and water mint.
 - Pond 3: c. 10 x 4m, located at end of ditch 2 in south of site, partially shaded, aquatic / marginal species present including common reed, yellow flag iris, water forget me not *Myosotis scorpioides* and parrot feather.
 - Pond 4 (off site 1m from the northern site boundary): c. 10 x 6m, located at northern end of ditch 1. Heavily shaded by the large amount of aquatic/marginal vegetation present including common reed *Phragmites australis*, water mint, and great willowherb *Epilobium hirsutum*.
- 4.7 Aquatic/marginal species present in the ponds/ditches included yellow Iris *Iris pseudacorus*, reed canary-grass *Phalaris arundinacea*, common reed *Phragmites australis*, lesser bulrush *Typha angustifolia* and the invasive non-native species Parrot's feather *Myriophyllum aquaticum*. Species present along the drain corridors include cow parsley *Anthriscus sylvestris*, false oat-grass, grey sedge *Carex divulsa*, spear thistle *Cirsium vulgare*, common nettle *Urtica dioica*, bittersweet *Solanum dulcamara*, great willowherb *Epilobium hirsutum*.

- 4.8 The Lidsey Rife comprises a slow-flowing watercourse, which gently meanders south. Aquatic/marginal species included yellow Iris and starwort *Callitriche sp.* The banks and margins of the watercourse are densely vegetated with common reed and these directly back onto the heavily managed fairways. Other bankside vegetation species included hemlock water dropwort *Oenanthe crocata*, great willowherb, greater burdock *Arctium lappa*, common nettle, teasel *Dipsacus fullonum*, bittersweet and black bryony *Tamus communis*. Scattered scrub included dog-rose *Rosa canina*, bramble *Rubus fruticosus* agg., blackthorn *Prunus spinosa* and elder *Sambucus nigra*.

Table 2: Ditch Descriptions and Resultant Habitat Category⁸

Ditch ref	Waterbody width (m)	Water depth (m)	Substrate	Bank type	Bank profile	Bordering land use	General description	Habitat Category
D1	2-5m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A - Woodland and scrub, A3.3 - Mixed Parkland/scattered trees, J1.1 - Cultivated/disturbed land - arable	Along northern boundary, wet with common reeds, steep banks up to 3m tall, c. 2-5m wide, overgrown/shaded by bramble in places, associated with Pond 4. On eastern side of ditch, water was shallow with limited aquatic vegetation and scrubby banks. On western side lots of reeds and vegetation present, owing to lack of overshadowing from bank trees on southern side.	Good
D2	1-2m	<0.5m	Silt/Mud	Earth	Shallow < 45 degrees	A3 - Parkland/scattered trees, B4 - Improved grassland, J1.2 - Cultivated/disturbed land - amenity grassland	Shallow ditch with shallowly sloping banks, banks densely covered with vegetation some areas of standing water in ditch. Associated with pond 3.	Suitable but poor
D3	2-5m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	B4 - Improved grassland	Internal golf course ditch, on western side of site, heavily vegetated with bank side trees, scrub and emergent vegetation including reed mace, water mint and aquatic vegetation including water parsnip. Top of the banksides regularly mown, with some standing but shallow water and some sections drying out. Parrots feather present.	Good
D3a	1-2m	<0.5m	Silt/Mud	Earth	Vertical	B4 - Improved grassland	Mostly dry ditch connected to D3, well managed artificial ditch with vertical banks, shallow water and limited bankside, marginal and aquatic vegetation. Notable algae covered the ditch. Banksides were short mown grassland. Parrots feather present.	Negligible
D4	1-2m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A - Woodland and scrub, A3.3 - Mixed Parkland/scattered trees	Short section of onsite ditch which connects with the Lidsey Ride via a sluice. Dry at the time of survey with steep banks, and heavily vegetated with scrub species including hawthorn, bramble and willow species.	Negligible
D5	1-2m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A3.3 - Mixed Parkland/scattered trees	Short section of ditch partially within tree groups/fairways, with intermittent gaps where golf green is present. Steep, but small banks with channel measuring c. 1-2m wide. Northern end wet (sludgy water) with limited aquatic vegetation.	Negligible
D6	1-2m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A3.3 - Mixed Parkland/scattered trees	Sedges, tall grass, bankside trees, short grass observed. The southern section - dry ditch in golf course with no aquatic vegetation. More northern areas wet with up to 0.5m deep water. Limited aquatic vegetation. Largely similar to D5	Suitable but poor

⁸ Dean M (2021) *Water vole Field Signs and Habitat Assessment: A Practical Guide to Water Vole Surveys*. Pelagic Publishing

Ditch ref	Waterbody width (m)	Water depth (m)	Substrate	Bank type	Bank profile	Bordering land use	General description	Habitat Category
							with ditch partially within tree groups/fairways. with intermittent gaps where golf green is present. Steep, but small banks with channel measuring c. 1-2m wide.	
D7	2-5m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A3.3 - Mixed Parkland/scattered trees, A - Woodland and scrub	Bank-side trees, reed choked drainage ditch in middle of golf course. Where there is exposed water under trees, water coated with duck weed, no aquatic vegetation in shaded areas under trees.	Suitable but poor
D8	1-2m	<0.5m	Silt/Mud	Earth	Shallow < 45 degrees	A3 - Parkland/scattered trees, B4 - Improved grassland	Bank-side trees and bushes, edge of golf course ditch, dry and shallow ditch with large amounts of scrub vegetation present including hawthorn and bramble.	Negligible
D9	1-2m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A3 - Parkland/scattered trees, B4 - Improved grassland	Dry ditch, located along central track measuring c. 1-2m in width with no aquatic vegetation present. Grass species observed within channel along with bristly ox-tongue and doves-foot crane's-bill. Bank-side trees, short grass, herbs observed. Dry ditch, with some limited herb growth. Grasses growing in base, no aquatic vegetation, suggesting dry for some time.	Suitable but poor
D10	1-2m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A3 - Parkland/scattered trees	Largely similar to D9, located on adjacent side of track., Short mown grassland on banksides with occasional bankside trees, emergent vegetation including reed-mace, sedges and herbs suggesting ephemerally wet. A few cm of water in areas of the ditch adjacent to path and golf course.	Suitable but poor
D11	2-5m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A - Woodland and scrub, A3 - Parkland/scattered trees, B4 - Improved grassland	Golf course ditch with bankside trees. some areas of shallow water, with substantial woody debris and leaf litter from overshadowing trees. Limited marginal and no aquatic vegetation. Wet, shallow ditch with wide channel measuring 2-5m. Duckweed observed.	Negligible
D12	1-2m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	A3 - Parkland/scattered trees	Wet ditch with steep sides and channel measuring c. 1-2m. Heavily managed with no marginal or bank side towards northern extent, less managed towards southern extent with aquatic species present. Golf course ditch, which has been recently scraped at northern end resulting in no bankside or marginal vegetation present. Southern section less managed with yellow flag iris and fools water cress and bank side vegetation recorded.	Suitable but poor
D13	1-2m	<0.5m	Silt/Mud	Earth	Shallow		Dry ditch, with shallow sloping banks and no emergent or aquatic vegetation recorded.	Negligible
Lidsey Rife	2-5m	<0.5m	Silt/Mud	Earth	Steep >45 degrees	B4 - Improved grassland, A3 - Parkland/scattered trees	Reeds, herbs, rushes, short grass observed. Watercourse with steep, heavily vegetated sides. water edge not accessible through dense reeds and steep banks.	Optimal

Otter

Habitat Suitability

- 4.9 Otters are known to utilise virtually all types of water and waterway in the UK including small streams and ditches, even when dry⁹. It is considered that the habitats onsite have potential to be of value to otters for commuting, resting and some foraging.

Field Survey

- 4.10 During the previous surveys in 2016 and 2017 and during the update survey in 2021, no evidence of otters was observed.

Water Vole

- 4.11 Previous surveys at the site were completed during the optimal surveying period, with the first survey completed on 20th July and the second on 28th September 2016. In 2017, an update survey was completed on 12th May. Evidence of water voles at this time was recorded along the Lidsey Rife and in ditches D1, D2, D3 and D7 on site. During the 2021 survey, feeding stations and possible burrows, were observed at D1 and D3 only. No water vole evidence was noted in association with any of the surveyed ponds.
- 4.12 The locations of field evidence are provided on *Figures 2 & 3* and the survey details are provided in *Table 3* below.

Table 3: Water Vole Survey Results from 2016, 2017 and 2021

Waterbody Ref	July 2016	September 2016	May 2017	September 2021
Lidsey Rife	2 x holes at southern end, most of the waterbody was too steep/deep to survey. Anecdotal records of water vole sightings from green keepers at southern end.	None	None	None
D1	Anecdotal record of sighting at western side adjacent Lidsey Rife.	Hole	Possible burrow	Possible burrow
D2	6 x holes, latrine and run. Old dried latrine. Anecdotal record of WV sighting.	None	None	None
D3	None	2 x holes and several runs	None	2 x feeding stations
D7	Old dried latrine. Anecdotal record of WV sighting.	Hole	None	None

- 4.13 The Lidsey Rife, is a slow flowing with a suitable water depth of over 1m and steep banks which would be suitable for burrowing, bank-side and marginal vegetation was dense, providing suitable cover and food source. Although it was noted on each survey occasional that dense vegetation

⁹ Chanin, P (2003) *Ecology of the European Otter*. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough

and steep slopes of the Lidsey Rife restricted access to survey, the watercourse was considered to likely represent 'optimal' habitat¹⁰. Therefore, although no evidence of water vole has been observed in the Rife since the 2016 survey, the presence of water vole along this stretch of the river cannot be ruled out.

- 4.14 D1 follows the northern boundary of the site, had suitable steep bank profiles up to 3m tall and substrate and burrows/possible burrows have been identified during the survey occasions. The western extent of the ditch was open with marginal vegetation present. At the eastern end of the ditch it becomes increasingly shaded with very limited marginal and aquatic vegetation providing a food resource. It is considered that this section of ditch is still suitable for water voles but the ditch was assessed overall to be of 'good' quality rather than 'optimal'.
- 4.15 D2 was a short section of shallow ditch in the southern extent of the site, associated with pond 3, with shallowly sloping banks, banks densely covered with vegetation and some areas of standing water. It is considered that this section of ditch is 'suitable but poor' for water voles given the short extent and lack of permanent water. No evidence of water vole has been recorded in this ditch since 2016 suggesting that it is no longer part of the water vole's range.
- 4.16 D3, on the western side of the site, was approximately 2- 5m wide with steep banks. It was heavily vegetated with bank side trees, scrub and a varied range of emergent and aquatic vegetation. It is considered that this section of ditch is still suitable for water voles but the ditch was assessed overall to be of 'good' quality rather than 'optimal'. Evidence has fluctuated in this ditch, with two feeding stations being found here during the September 2021 survey suggesting occasional use for foraging.
- 4.17 D7 was a wide ditch measuring approximately 2-3m in width. Banks were densely covered by scrub vegetation towards the southern end, at the northern end the ditch was heavily vegetated with emergent vegetation, with some duckweed present. It is considered that this section of ditch is 'suitable but poor' for water voles given the short extent and lack of permanent water. No evidence of water vole has been recorded in this ditch since 2016 suggesting that it is no longer part of the water vole's range.

5.0 DISCUSSION

Population Estimate

- 5.1 Field signs including two latrines were identified during the 2016 survey, confirming that ditches D1, D2, D3 and D7 as well as the Lidsey Rife were being used by water vole. Whereas water vole field evidence was much depleted during the 2017 and 2021 surveys, suggesting that only ditches D1 and D3 had occasional use.
- 5.2 Water voles typically form a series of contiguous territories along the length of a watercourse. As many of the habitats that water voles tend to occupy in the UK are linear (e.g. streams/rivers/banks of waterbodies) it is therefore appropriate to measure their territory sizes in terms of 'length' in most UK habitats. Breeding female water voles are territorial, and their territories represent a 'breeding unit'; territory size will influence the number of breeding females that a given length of habitat can support. Frequent interactions and the presence of marker latrines determine the boundaries of a territory. Females may share their breeding unit with their female offspring; males are not territorial as such but have ranges that overlap with the ranges of many females and other males.
- 5.3 An assessment of the relative water vole populations within the site was completed using guidelines outlined in the Water Vole Mitigation Guidelines. The guidelines state that it is not possible to make robust estimates of absolute numbers of animals from latrine counts however, the numbers of latrines recorded by the survey will give an indication of relative population size and can be helpful in identifying the most valuable parts of a site for water voles and subsequently assessing impacts or designing mitigation. They suggest the density of water voles can be considered to be 'high', 'medium' or 'low' within a site (or within different parts of a site) based on the criteria outlined in Table 4, below.

Table 4: Assessment of Relative Water Vole Population Density

Relative Population Density	Approximate Number of Latrines per 100m of Bankside Habitat	
	First half of survey season (mid-April to end of June)	Second half of survey season (July to September)
High	10 or more	20 or more
Medium	3–9	6–19
Low	≤ 2 (or none, but with other confirmatory field signs)	≤ 5 (or none, but with other confirmatory field signs)

- 5.4 Strachan et. al (2011)¹¹ stated that depending on the overall population density, season and habitat quality, the length of territory varies between 30 m and 150 m for breeding females and 60 m and 300 m for males. The larger range sizes occur when the population density is low and/or the habitat quality is poor. Therefore, in good quality habitat, more water voles can be supported. When water vole populations are fragmented or small, water voles are likely to maintain fewer latrines as conflicts with neighbouring water voles are likely to be rare.

¹¹ Strachan, R., Moorhouse, T. and Gelling, M. (2011). Water Vole Conservation Handbook 3rd Edition. Wildlife Conservation Research Unit, Oxford.

- 5.5 There are limited opportunities on site for the water vole population to expand because of the majority of the habitat being assessed as *suitable but poor* and the restriction of onward connectivity due to the residential dwellings located to the south and east.
- 5.6 Two latrines in total were found during the 2016 survey, one in D2 and the other in D7, with no other latrines have been found during the surveys in 2017 and 2021. Using the assessment in *Table 4* above the on-site population density can therefore be classed as 'Low'. Although it is recognised that water vole populations fluctuate and drastically decline over the winter months, given the decline in recent survey evidence it is considered unlikely that the site forms the core range of any water vole population.

Potential Impacts

Habitat Isolation/Fragmentation

- 5.7 Under the proposals and considering the survey results gathered, there will be no habitat isolation or fragmentation as a result of the scheme. Connectivity to the Lidsey Rife would still be possible via habitats in the west of the site.

Habitat Loss

- 5.8 The majority of the existing ditch network will be retained and enhanced within the scheme. Where losses are proposed, these have been described in further detail below.
- 5.9 The proposals will result in the partial loss of ditches D3, D3a, D7, D9 and D12.
- D3, on the western side of the site, was assessed overall to be of 'good' quality rather than 'optimal'. Evidence has fluctuated in this ditch, with two feeding stations being found here during the September 2021 survey suggesting occasional use for foraging.
 - D3a, connected to D3, was a short section of artificial dry ditch, that was assessed as being of negligible value to water vole, no evidence of water vole has been recorded within this ditch therefore it is not considered to be part of the water vole range.
 - D7, the majority of the ditch will be lost to the development of a new SuDs basin, with the western extent retained to maintain connection with the new SuDs basin and the Lidsey Rife. D7 was assessed as being 'suitable but poor' for water voles given the short extent and lack of permanent water. No evidence of water vole has been recorded in this ditch since 2016 suggesting that it is no longer part of the water vole's range.
 - D9, a dry ditch assessed as being suitable but poor for value to water vole will largely be retained. No evidence of water vole has been identified on this length of ditch throughout the surveys and therefore it is not considered to be part of the water vole range.
 - D12 a short section of ephemerally wet ditch assessed as being suitable 'but poor'. No evidence of water vole has been identified on this length of ditch throughout the surveys and therefore it is not considered to be part of the water vole range.
- 5.10 D13 (dry, assessed as negligible) in the southern extent of the site will be lost in entirety, where no historic or recent evidence of water vole has been identified. D13 was permanently dry and therefore its loss can be easily compensated for within the new ditch network.

- 5.11 Water vole ranges are known to expand and contract over-time; therefore, the impact of habitat loss may change prior to development. It would be reasonable to assume that water voles may in time colonise the ditch D1 at the northern boundary which currently has 'good' habitat value. This ultimately may be determined by changes in the water levels in the ditch and changes to the vegetation. The development framework retains D1 in entirety, maintaining connectivity with the Lidsey Rife across the north of the site.
- 5.12 Ponds P1 and P3 will be lost as a result of the proposals. The ponds weren't considered to offer extensive/suitable habitat for water vole given the small size (with no evidence of water vole observed in association with them) and their loss can be easily compensated through the creation of the new SuDs basins and new ditch networks on site.

Mitigation Measures

- 5.13 A 'toolbox' talk will be held with the works team before any work (which could result in impacts to protected species) is undertaken to ensure that the contractors are aware of the protected species issues associated with the site. This will be delivered by a suitably qualified ecologist and will include detailed coverage of the mitigation work, as detailed in this document.
- 5.14 The potential for contamination of ditches (with sediment, chemicals, or hydrocarbons), is a risk associated with all development sites. This would pose a direct risk to water voles within the area, as well as to all other wildlife. As such, best practice guidelines will be adhered to at all times to ensure no adverse impact upon the ditches, waterbodies and their associated fauna. Appropriate precautions will be incorporated into a Construction Environmental Management Plan (CEMP) which will be implemented to control the works.
- 5.15 The site will be subject to an update survey in 2022 to update the existing baseline. Should evidence of water vole be found within ditches that will be affected or within 5m of a working area, it should be investigated if potential impacts can be avoided by micro-siting working areas. If this is unfeasible then mitigation measures such as passive displacement may need to be initiated to prevent an offence being committed.
- 5.16 Passive displacement involves the removal of vegetation from the working area by strimming down to bare ground and removing all arisings and blading off of banks to make them unsuitable for water voles. Displacement can only be undertaken under a class licence (CL31) which is held by an appropriately experienced ecologist between late February and early April, and should only be used in linear habitats less than or equivalent to 50m in length and not more than once within a 500m stretch of continuous habitat. It should be noted that if works need to occur outside of the period stated above then displacement would need to be undertaken in the preceding period and maintained in an unsuitable condition. The conditions of such a licence require planning permission to be granted, relevant conditions discharged and conservation benefit to occur as a result.
- 5.17 Works on ditches with water vole presence (suitably distanced from water vole burrows/evidence – see above section) should try to be focused during periods where the ditch has little to no water present, but also meet the timing detailed within The Water Vole Mitigation Handbook (2016)¹²;

¹² Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

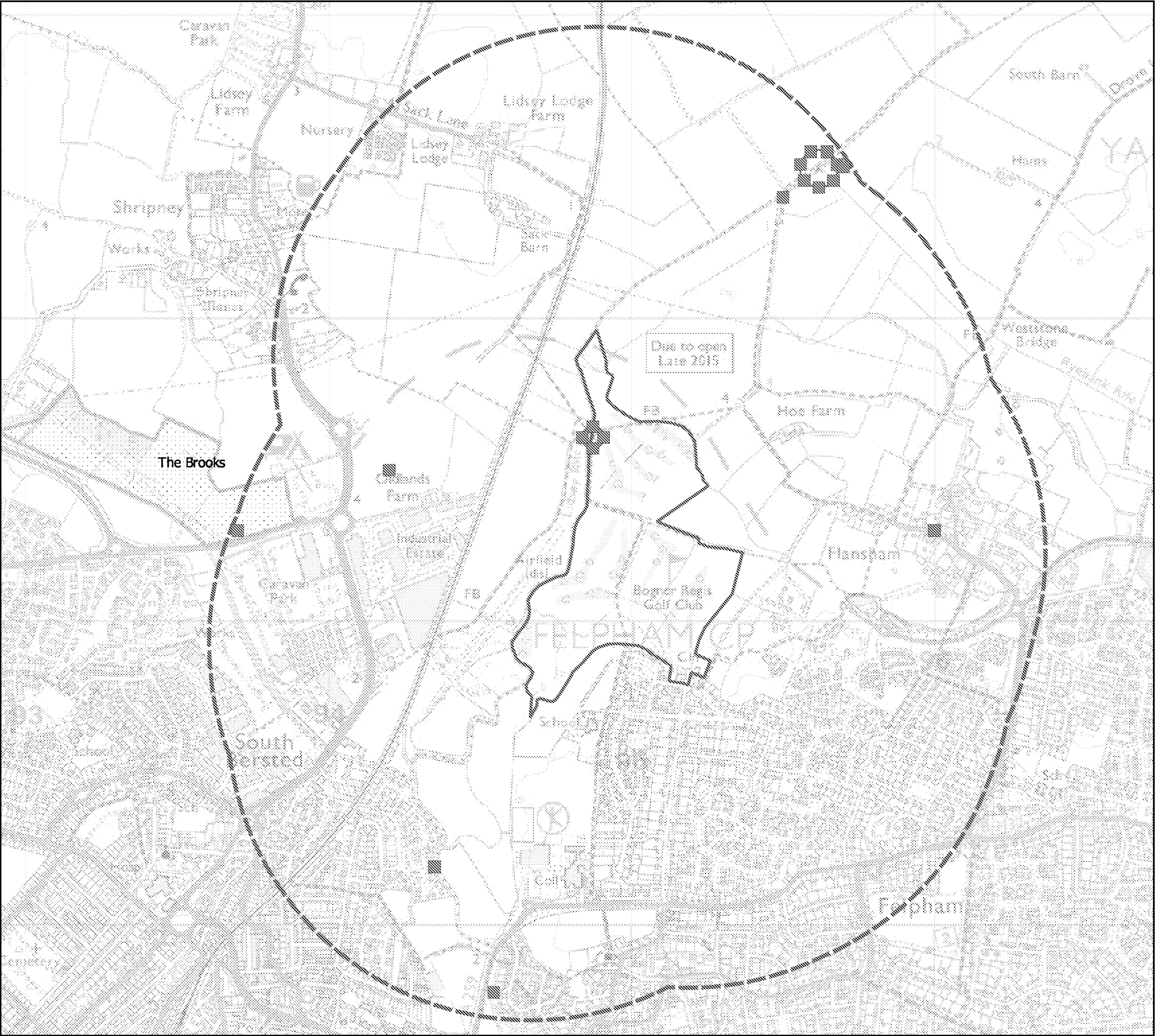
where it is suggested for such work to be between 15th September to 30th November or 1st March to 15th April, although this will need to fit in with the construction program.

- 5.18 Where such works are to be undertaken in close proximity to those waterbodies supporting both water vole and those supporting suitable habitat features for water vole, appropriate protection measures should be implemented. Hi-visibility fencing will be positioned around the retained ditches approximately 7-10m from the banks to ensure accidental encroachment and destruction of burrows does not occur that could cause an offence through injury to or damage/disturb any water vole.
- 5.19 The aim is to provide a buffer zone of undisturbed vegetation no less than 5m around from the water's edge and protect the waterbodies from construction traffic, personnel and disturbance. In addition, the use of fencing will avoid topsoil and subsoil mounds being stored close to the waterbodies which may otherwise degrade habitats used by water vole and potentially cause sediment build up.
- 5.20 A buffer will be created along the Lidsey Rife in order to ensure the area is protected and buffered from the built environment. Within this buffer, habitats of ecological value will be created, including tussock grassland habitats nearer the banks that will progress into meadow grassland around informal paths with potential for amenity grassland areas that have a flowering content but can tolerate management. Where existing and new waterbodies are to be created/enhanced, these will be designed to promote ecological value, which will include a varied bank profile, changes in water levels, irregular shaped with embayment's if possible; allowing for areas to dry and areas of aquatic/marginal species to colonise. These will benefit aquatic invertebrates, amphibians and water voles. Natural colonisation of new water features will be encouraged; however, some parts will be planted with native species of local provenance to ensure good development of vegetation. Additional species such as fool's-water-cress *Apium nodiflorum*, lesser water-parsnip *Berula erecta*, marsh marigold *Caltha palustris*, purple loosestrife *Lythrum salicaria*, brooklime *Veronica beccabunga* and water mint *Mentha aquatic* will be planted.
- 5.21 Although approximately 600m of ditch will be lost to the development, a total of 2,211m of new ditches will be created, making a total of 3,737m of ditch habitat across the site that will be available to the water vole population.
- 5.22 The sections of existing ditch network that will be retained (approximately 1,526m), will be enhanced (where feasible) through selected clearance of vegetation build up that is currently clogging the channels and reducing water retention. The ditches should be lined where possible to improve water retention throughout these habitats. Removal of non-beneficial species and the thinning of overshadowing vegetation will also promote a greater variety of marginal and aquatic species that will ensure a food resource throughout the year. It is recommended that additional planting within these ditches with marginal and aquatic species will create diverse communities throughout the ditch system.
- 5.23 A new network of ditches is proposed within the GI in the northern and western extent of the site. These will be created with biodiversity in mind and will include creation of banks with a variety of profiles to include marginal shelves and areas of bank at 45° to provide suitable feeding and breeding habitat. These new ditches will ensure connectivity/corridors offsite with the Lidsey Rife,

to link with other populations. Suitable aquatic vegetation will also be established including grasses, rushes, sedges and reeds as these are primary foraging resources for water voles¹³.

- 5.24 A number of new SuDs basins will be created along the western extent of the site that will join into some of the ditch network, maintaining connectivity across the site and with the Lidsey Rife. A new total area of 1.36ha will be created, with the upper basin being created permanently wet area, the middle basin will hold approximately 50% of water and the most southerly basin will be lined and seeded, in order to hold water if required, but will not have permanent water. Other smaller dry SuDs will be created totalling 0.16ha. The size of the permanently wet basin will compensate for the loss of ponds P1 and P3. Reedbeds will be created within the northern and middle basin, as these provide important refuge and foraging habitats.

¹³ Biodiversity Sussex Website, *Species Action Plan for Water Vole*, [ONLINE] Available from <http://www.biodiversitysussex.org/watervole.html>



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- Key**
- Site Boundary
 - 1km Buffer
 - Local Nature Reserve (LNR)
 - European Water Vole



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Key

- Site Boundary
- Additional Survey Area Boundary

Wolverine Survey 3rd September 2021

- Burrows
- Feeding Activity



Hallam Land Management
Bognor Regis Golf Club, Bognor Regis
Wolverine Survey Plan 2021

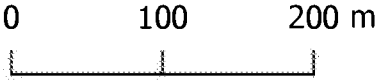
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AC/JMT

24/11/2021

Figure 2

7338-E-01





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Key

- Site Boundary
- Additional Survey Area Boundary

Watervole Evidence 20th July 2016

- Latrine
- Possible Burrow
- Anecdotal Sightings
- Burrow

Watervole Survey 28th September 2016

- Runs
- Possible Burrow
- Burrow

Watervole Survey 12th May 2017

- Possible Burrow



Hallam Land Management
Bognor Regis Golf Club, Bognor Regis
Water Vole Survey Plan 2016/17

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24/11/2021

Figure 3

7338-E-01