Environmental Impact Assessment Report (EIAR)

Volume 3 Part 2 Appendices

In respect of
The Royal Canal Urban Greenway

On behalf of
Fingal County Council

October 2026

This Volume should be read in conjunction with the EIAR Main Document. This Volume (Part 2) contains certain Appendices associated with Chapter 8 (Biodiversity) as follows:

Chapter 8 Biodiversity

Appendix 8.5:Additional Non-JBA surveys

- 8.5.9. Royal Canal Urban Greenway Badger (*Meles meles*) stage 1 & 2 survey 2025. Triturus Environmental Ltd
- 8.5.10.1 Royal Canal Urban Greenway otter (Lutra lutra) survey 2025. Triturus Environmental Ltd
- 8.5.10.2 Royal Canal (1st to 16th lock) Otter survey 2025. Triturus Environmental Ltd

Appendix 8.6: Environmental Impact Assessment Report (EIAR) BNG Report in respect of Royal Canal Urban Greenway

KPMG

Royal Canal Urban Greenway

Environmental Impact Assessment Report

Appendix 8.5 Additional Non-JBA surveys

October 2026



Royal Canal Urban Greenway badger (*Meles meles*) stage 1 & 2 survey 2025

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Triturus

Prepared by Triturus Environmental Ltd. for DBFL

April 2025

Please note: given the location details of highly sensitive badger breeding areas this report has been redacted by the authors to make it available to the public

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Please cite as:

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1. Introduction

1.1 Project background

Triturus Environmental Ltd. were commissioned by DBFL Consulting Engineers Ltd., on behalf of Fingal County Council and the National Transport Authority (NTA), to undertake a badger (*Meles meles*) survey of the Royal Canal between the Kildare/Fingal County boundary near Leixlip and the 12th lock, Castleknock, Co. Dublin. The baseline survey was completed to inform the proposed Royal Canal Urban Greenway Scheme and sought to update previous surveys completed in the 2021-2024 period. The survey was undertaken along 8km linear length of the Royal Canal corridor during April 2025.

The proposed scheme is an 8.1km-long shared pedestrian and cycle route which is to be constructed along /adjacent to the Royal Canal as it heads eastwards from the Kildare/Fingal County boundary to the Old Navan Road (near the 12th lock) to connect with a previously constructed Ashtown section of the Greenway. When complete, the Royal Canal Urban Greenway will deliver a continuous greenway from Dublin City's Docklands to Kildare and westwards towards the Shannon and Galway. Works will include the construction of a new 3-4m wide footpath, bridge installation, embankment works, localised removal of vegetation (i.e. for bridge construction), the installation of fencing and guardrails, lighting installation along said route and complementary landscaping and planting works (DBFL, 2021).

The baseline stage 1 survey identified the most important areas for badgers along the Royal Canal corridor relative to the proposed works based on an assessments of sign distribution, in addition to observations on general habitat suitability. The distribution of badger signs inclusive of potential breeding areas (i.e. setts) would help identify areas of habitat in the vicinity of the Greenway preferentially used by badger. The purpose of the additional stage 2 survey element was to determine and map the location of foraging and commuting routes in the vicinity of identified setts to clarify the movement of badgers between breeding areas and foraging habitats. The data collated would inform mitigation measures to protect badger populations in the vicinity of the proposed Royal Canal Urban Greenway Scheme.

1.2 Legislative protection and status

In Ireland, badgers (*Meles meles*) and their setts (whether occupied or unoccupied) are protected by the Irish Wildlife Acts 1976-2023. It is an offence to intentionally kill or injure a protected species or to wilfully interfere with or destroy the breeding site or resting place of a protected wild animal. Furthermore, at a European level, the species is also protected under Appendix III of the Bern Convention.

The Irish badger population is considered stable, with the species' conservation status in Ireland currently assessed as 'least concern' (Marnell et al., 2019).

1.3 Study area description

The Royal Canal is some 150km long and links the River Liffey in Dublin City with the River Shannon in Co. Longford. The canal is fed by Lough Owel, Co. Westmeath and flows east to Dublin and west to the Shannon. Though originally constructed for transport of goods (work was completed in 1817), the Royal Canal was closed to typical navigation in 1961. The present-day canal serves as a highly valuable

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recreational amenity site and regionally-important ecological corridor. The entire length of the Royal Canal is designated as a proposed Natural Heritage Area (pNHA) (site code: 002103) (NPWS, 1995). The survey area comprised approximately 8.5km of linear canal corridor between the Kildare/Fingal County boundary and the M50, east of the 12th lock, Castleknock (**Figure 2.1**).

To the south and west, the land use adjoining the survey area is dominated by non-irrigated arable land (CORINE 211) and pastures (231), with discontinuous urban fabric (112) to the north and east.

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2. Methodology

2.1 Desktop review of badger records

A desktop review of published and unpublished data for the Royal Canal and connected habitats was undertaken in respect of badgers. Data pertaining to badgers held by the National Biodiversity Data Centre (NBDC) was also reviewed.

2.2 Badger sign surveys

Walkover badger surveys of the Royal Canal corridor were undertaken on the 8th, 9th and 10th April 2025. The survey area comprised approximately 8.5km of linear canal corridor between the Kildare/Fingal County boundary and the M50, east of the 12th lock, Castleknock (**Figure 2.1**). Whilst survey effort was focused on the immediate riparian corridor, contiguous habitats with suitability for badgers were also surveyed, where present. Surveys followed best practice guidance for badger (i.e. Scottish Badgers, 2018; CIEEM, 2013; Scottish Natural Heritage, 2003; NRA, 2005; Harris et al., 1989).

The surveys were completed during dry, mild, bright and settled conditions and aimed to establish the location of badger setts and signs (latrines, snuffle holes, trails & prints), whilst also detailing commuting and foraging routes of badgers in the vicinity of the proposed Greenway. The site surveys were conducted by walking through these habitats (some of which were only accessible via boat from the Royal Canal) and searching for signs, including features such as embankments and south facing slopes in the escarpments of adjoining woodland and scrub blocks which favour badger sett locations. The winter/early spring period is a good time to find setts as vegetation growth is low, thus increasing visibility.

Given the inherent difficulty in defining badger sett types (Byrne et al., 2012), setts were divided into two categories in the current survey i.e. '**main setts**' and '**non-main setts**'. They were not categorized using the sub-classes of Thornton (1988), e.g. main, annex, subsidiary, outlier etc. as this determination would require more expansive monitoring of identified populations and sett clusters.

Main setts were identified following the definition of Smal (1995); *"Usually have a large number of entrances (used and disused) with conspicuous soil heaps. The setts look well used, with paths between entrances and to and from the sett being obvious and well-worn. Main setts are breeding setts and are normally in continuous use".*

Non-main setts were defined by the authors of this report as follows; *"setts within the catchment of the main sett and thus most probably utilized by the social group from the main sett, characteristically having a smaller number of entrances and showing clear signs of badger activity, recent or historical".* (Triturus, 2021).

2.3 Biosecurity

A strict biosecurity protocol including the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules between survey

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sites with particular emphasis on boat equipment. Surveys were undertaken at sites in a downstream order to minimise the risk of upstream propagule mobilisation.

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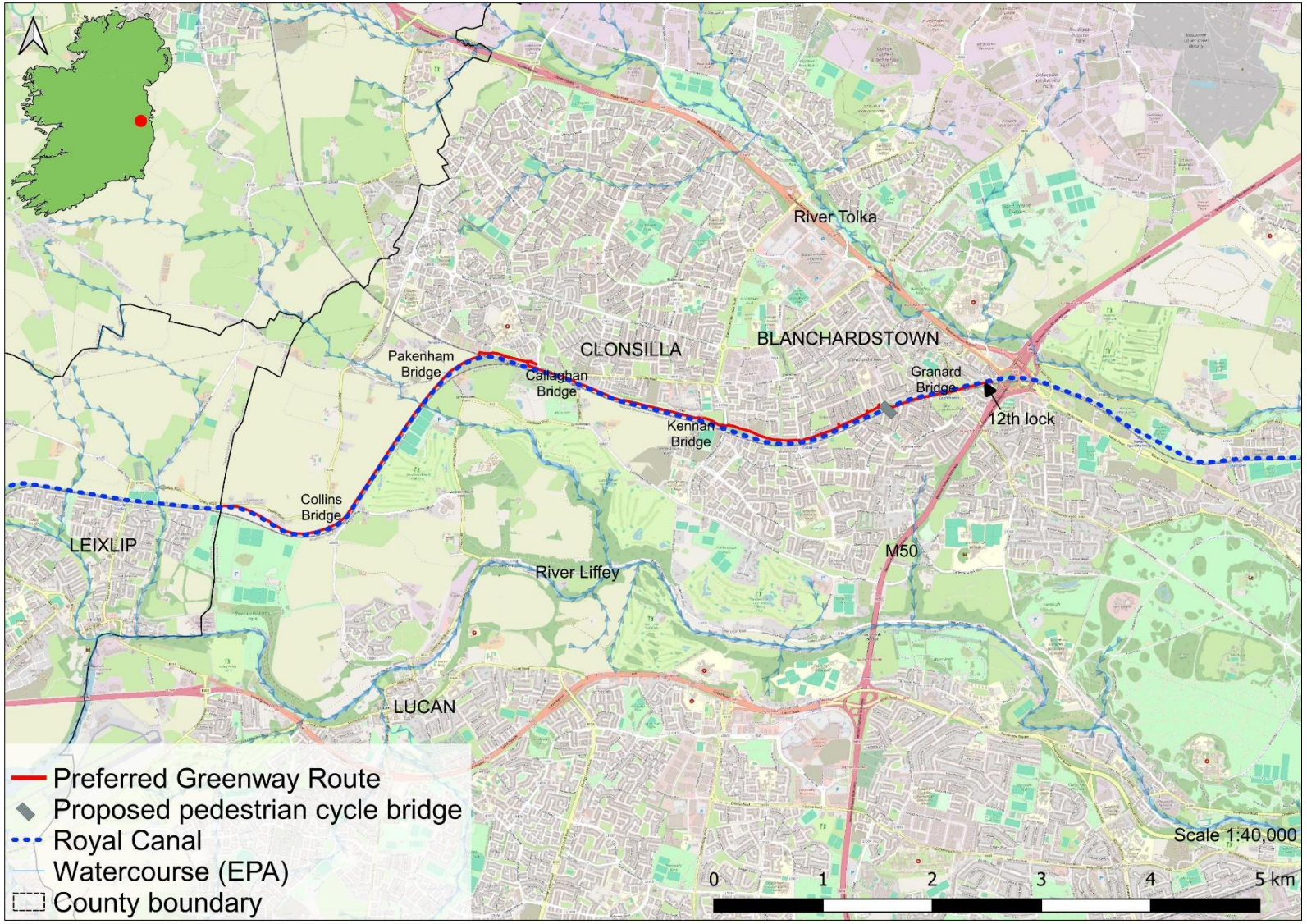


Figure 2.1 Overview of the Royal Canal Urban Greenway badger survey area (Kildare/Fingal County boundary to 12th lock)

3. Desktop review

A desktop review revealed a low number of badger records within and in the vicinity of the survey area. Numerous roadkill records for badger were available for the Westmanstown/Lucan area (south of survey area), as well as near Hansfield station to the north of the survey area (NBCD data; 2007-2017 period). Several roadkill reports and live sighting records of badgers are available for the Castleknock, Blanchardstown and Leixlip areas (NBCD data). A live badger was reported in 2015 along the Royal Canal corridor in 2015 between Louisa Bridge and Cope Bridge, Leixlip (NBDC data) (**Figure 3.1**). No NBDC records for the survey area have been submitted/verified since 2017.

A historical badger sett (disused non-main/outlier sett) was recorded in broad-leaved woodland on the north bank of the Royal Canal, east of Kirkpatrick Bridge and adjacent to Delwood Park, Castleknock in 2004 and confirmed inactive in 2019 (by Richard Nairn).

Keeley (2004) also reported badger signs, including digging and a latrine, near Porter's Gate housing estate, Clonsilla. Several badger setts are known along the River Tolka very close to the Royal Canal and along the perimeter of Blanchardstown Hospital. A number of setts were also noted in St. Catherine's Park, Lucan (Keeley, 2004). More recent surveys carried out in March 2021 by Mairéad Stack identified significant levels of badger activity in the vicinity of [redacted] (Stack, 2021). These included well-worn trails into scrub undergrowth with tunnelling into the undergrowth in addition to snuffle holes in the adjoining grassy areas. The tunnelling was considered as evidence of a potential sett albeit no visible excavation was noted.

As per observations made by Stack (2021), a badger survey undertaken by Dr. Chris Smal for a residential development at [redacted] in January-February 2022 identified a badger sett (single entrance, non-main) approximately 45m north-north-west of [redacted] ([redacted]). The intensity of badger trails and signs (bedding material, prints & feeding signs) recorded in vicinity of [redacted] also strongly suggested the presence of a second (main) sett c.100m west of [redacted]. However, the presence and or exact location could not be confirmed due to the very dense nature of the scrub at this location (Smal, 2022). Ecological surveys for a proposed housing development at Porterstown Road in September 2021 identified a number of snuffle holes and a latrine near Glen Garbh, Porterstown, with a hole to the north-east of the site (along a Leyland cypress treeline) said to have characteristics of a badger sett (Enviroguide, 2021).

An active badger sett was identified in low disturbance woodland on the north bank of the Royal Canal near [redacted] during an otter survey undertaken in January 2022 (Triturus, 2022a). This main sett (3 entrances) was located approximately [redacted] east of the current study area (along the canal corridor).

Previous surveys completed by Triturus in the November 2021 to April 2023 period (Triturus, 2023) identified a high number of badger signs (*n*=78) within the current Urban Greenway survey area, inclusive of 11 no. setts (both active and inactive) in the vicinity of [redacted]. Follow-up surveys by Triturus in March 2024 recorded a total of *n*=41 badger signs within the survey area, with badger breeding confirmed via trail camera monitoring at a main sett at [redacted] (sett ID: MS_3), and non-main setts at [redacted] (NMS_1) and [redacted] residential areas (NMS_6) (Triturus, 2024).

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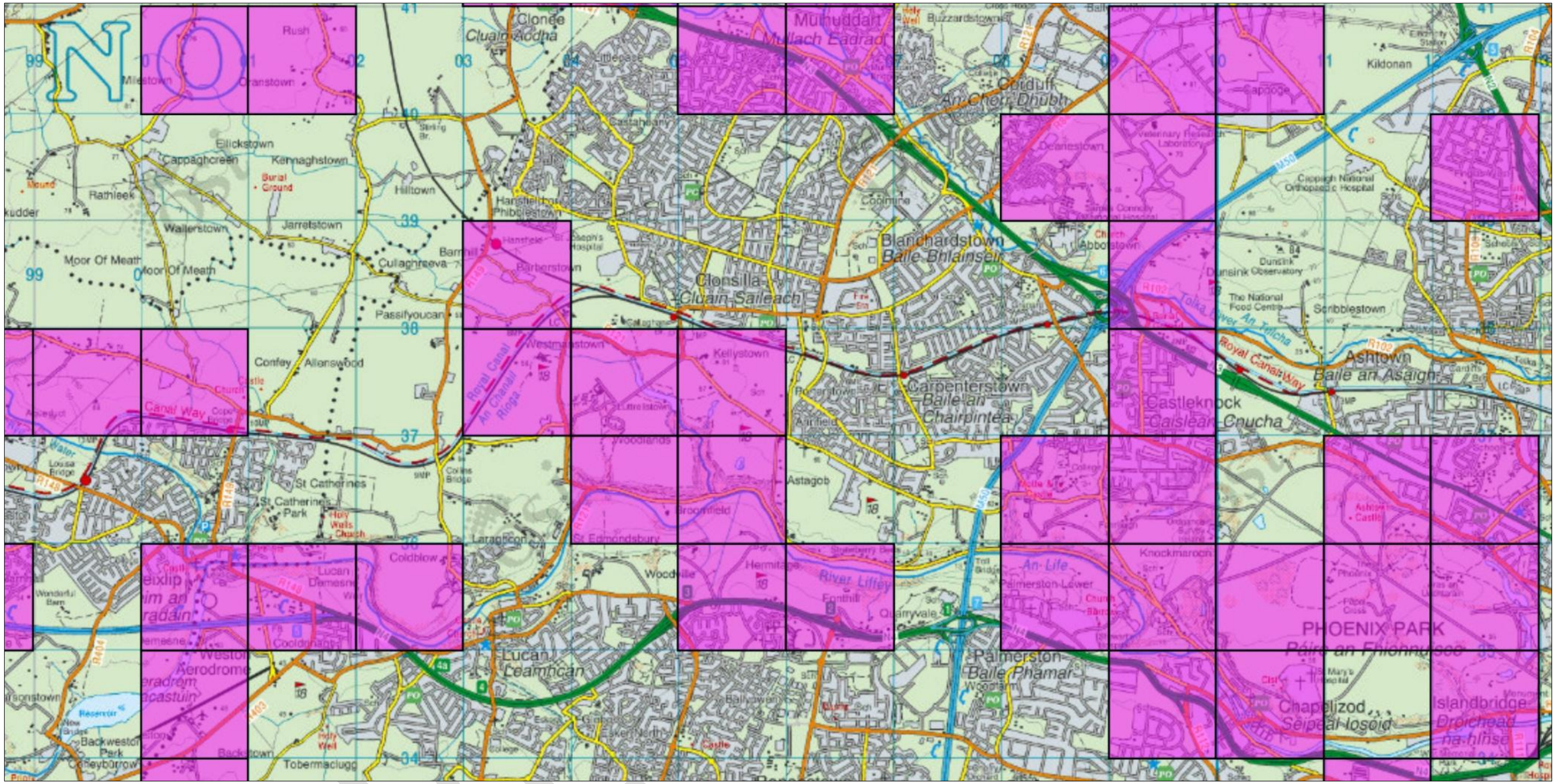


Figure 3.1 Desktop review of badger records in the vicinity of the wider survey area (1992-2017; NBDC records) (pink box indicates badger record(s) within individual 1km^2 grid square)

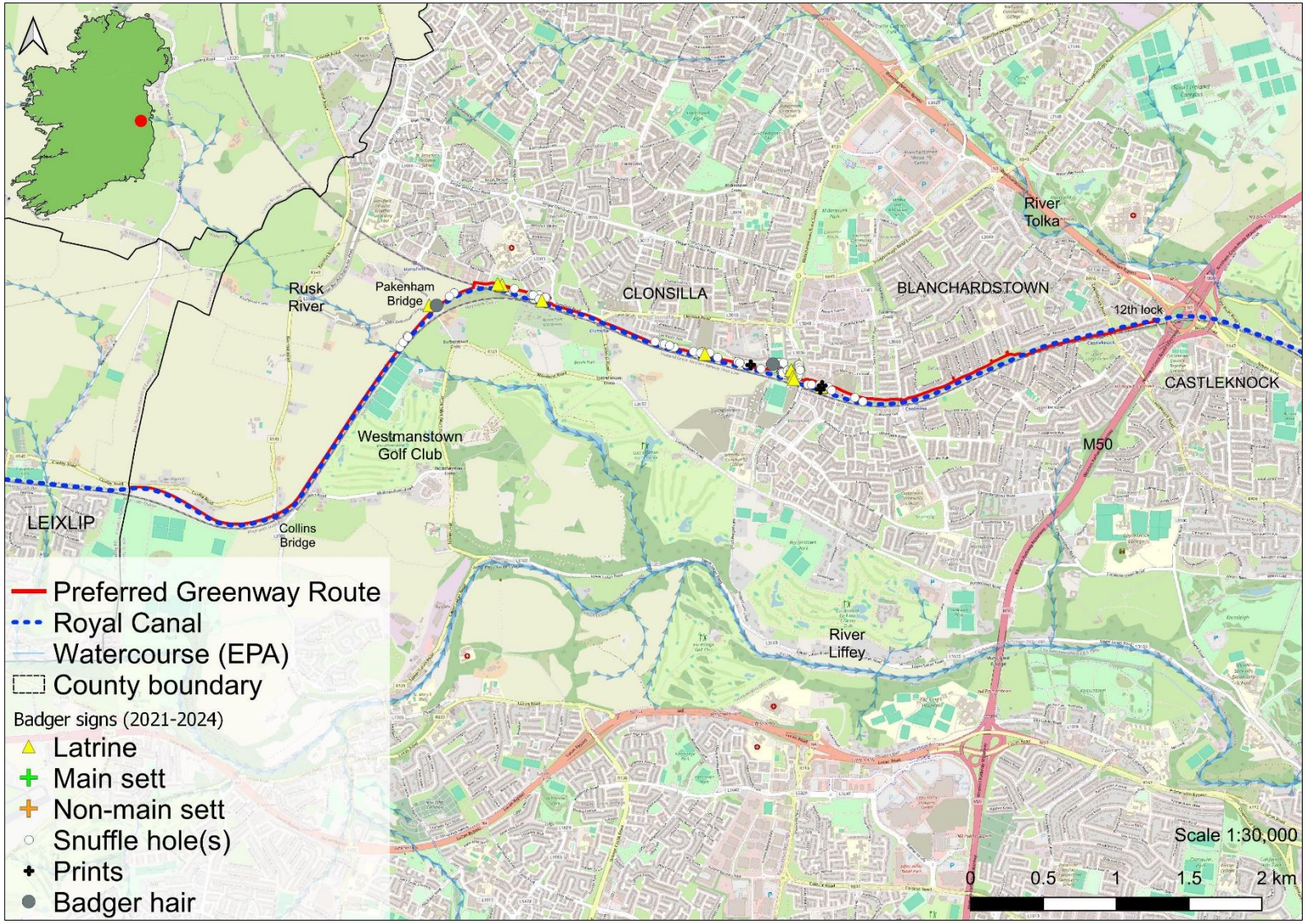


Figure 3.2 Overview of all badger signs recorded by Triturus as part of the Royal Canal Urban Greenway in the 2021-2024 period (**sett locations redacted**)

4. Results

4.1 Badger signs (2025)

A total of *n*=38 badger signs were recorded within the survey area during the current 2025 survey, comprising a total of 8.5km linear canal corridor and adjoining habitats (**Table 4.1; Figures 4.1 & 4.2; supplementary data**). An artificial badger sett (near [redacted] [redacted]) and a total of 3 no. mammal burrows (not suitable for or utilised by badger) were also recorded.

The findings were similar to previous surveys both in terms of the number of signs recorded and sign distribution. The majority of mapped trails (used and or created by badger) and activity/foraging areas (defined by trails and snuffle holes) were the same as previous years, with some slight alterations only. Badger signs were again largely confined to three discreet areas, namely the vicinity of Pakenham Bridge and Hansfield (north bank of canal) (**Figures 4.3 & 4.4**); the Old School House at Porterstown (north bank) (**Figure 4.5**) and the grassland/woodland habitat in the Glen Garbh/Sheepmoor Lane area (**Figures 4.6 & 4.7**). Badger signs were separated (west to east) by approximately 3.3km along the canal corridor and were associated with areas of lower human activity given badger prefer areas of lower disturbance for sett location with nearby accessible foraging sites. No signs were identified between i) the Kildare/Dublin border and Westmanstown, ii) Hansfield and the Village or iii) Sheepmoor Lane and 12th lock, Castleknock.

Badger signs were recorded in two new areas during the April 2025 survey, namely in an arable crop field south of the Rusk River (opposite Westmanstown Sports Centre) and derelict lands along the Milestown Road, south of the canal (**Figure 4.3**). One new non-main sett (single entrance) had been excavated at [redacted] since the 2024 survey (**Figure 4.6; Plate 4.1**). The location and activity status of the other *n*=11 setts (3 no. main setts & 8 no. non-main setts) was unchanged since 2024. All setts (active or inactive) were confined to a small area of woodland near [redacted], a (connected) woodland area at [redacted] ([redacted]) and west of [redacted] (i.e. in the vicinity of the proposed Greenway route) (**Figures 4.6, 4.7 & 4.8**).

As per previous surveys, snuffle hole sites (*n*=22) accounted for the majority of all signs recorded and were identified in both adjoining woodland and grassland habitats but not along the existing canal towpath. Nevertheless, based on sign distribution and trails, utilisation of the canal towpath by commuting badger was evident in some areas (see Discussion).

The commuting and or foraging routes of badgers in the vicinity of the proposed Greenway, as inferred by sign distribution and visual cues, were very similar to those mapped in previous Stage 2 surveys (**Figures 4.3-4.7**).

An artificial badger sett was identified in a mature hedgerow alongside the Preferred Route north of [redacted] (ITM [redacted], [redacted]; **Plate 4.9, 4.10**). Whilst badger commuting and foraging routes (inclusive of snuffle holes) were present in the adjoining improved grassland, there was no sign of utilisation of the artificial sett at the time of survey. The site was scrubbing over and situated adjacent to the existing towpath (relatively high disturbance).

A full database of badger signs (inclusive of setts) has been provided as supplementary data rather than included in this report.

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Table 4.1 Summary of the badger signs recorded along the Royal Canal survey area in the April 2025, February 2024 and November 2021-May 2022 surveys

Badger sign	Total no.		
	April 2025	Feb 2024	Nov 2021-May 2022
Snuffle hole	22	28	52
Sett (non-main)	9	8	5
Sett (main)	3	3	3
Latrine	3	2	7
Prints	0	0	2
Badger hair	0	0	2
Artificial sett	1	0	0
Total	**38**	**41**	**71**

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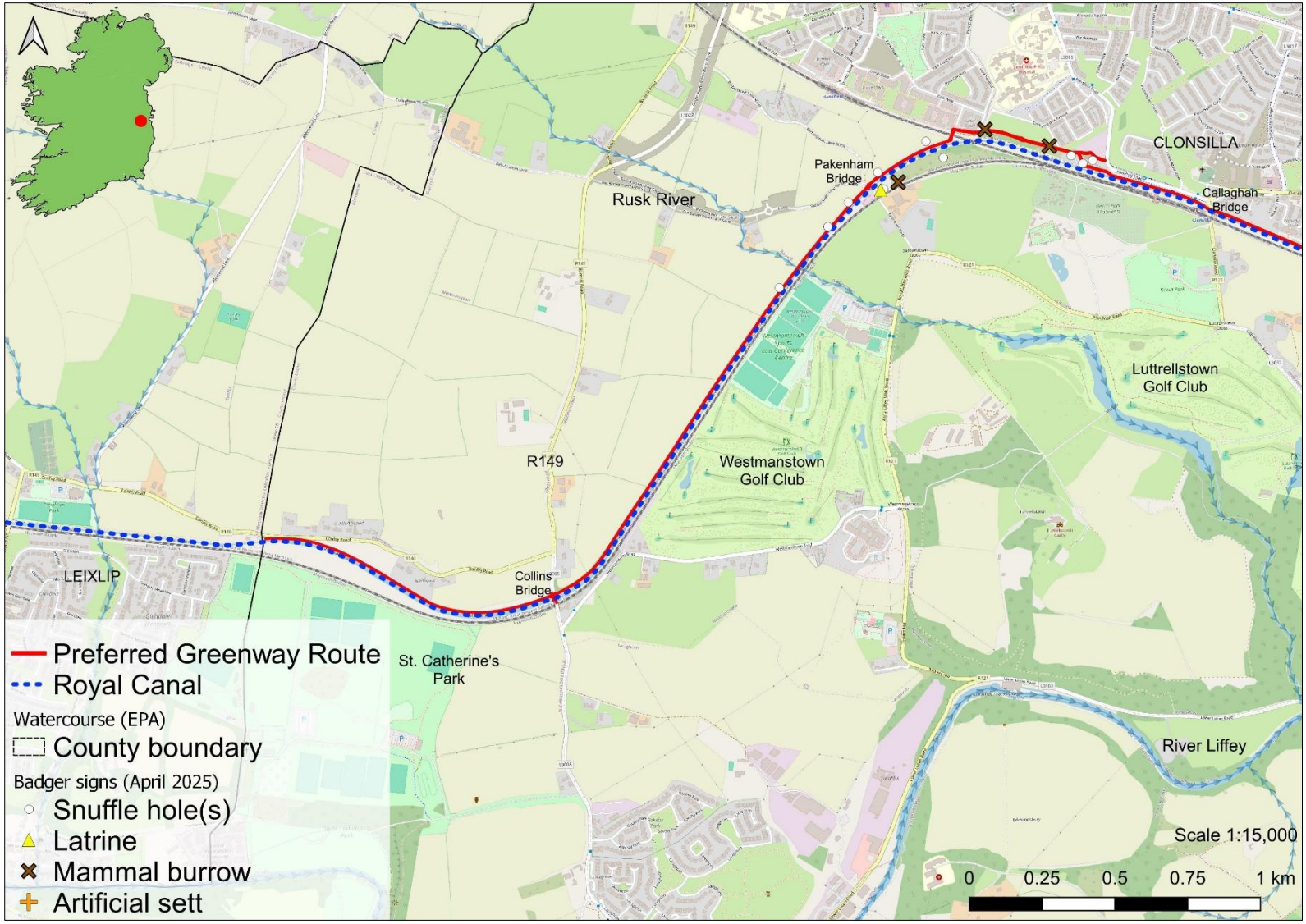


Figure 4.1 Overview of the badger signs recorded in April 2025 (Leixlip to Clonsilla) (**sett locations redacted**)

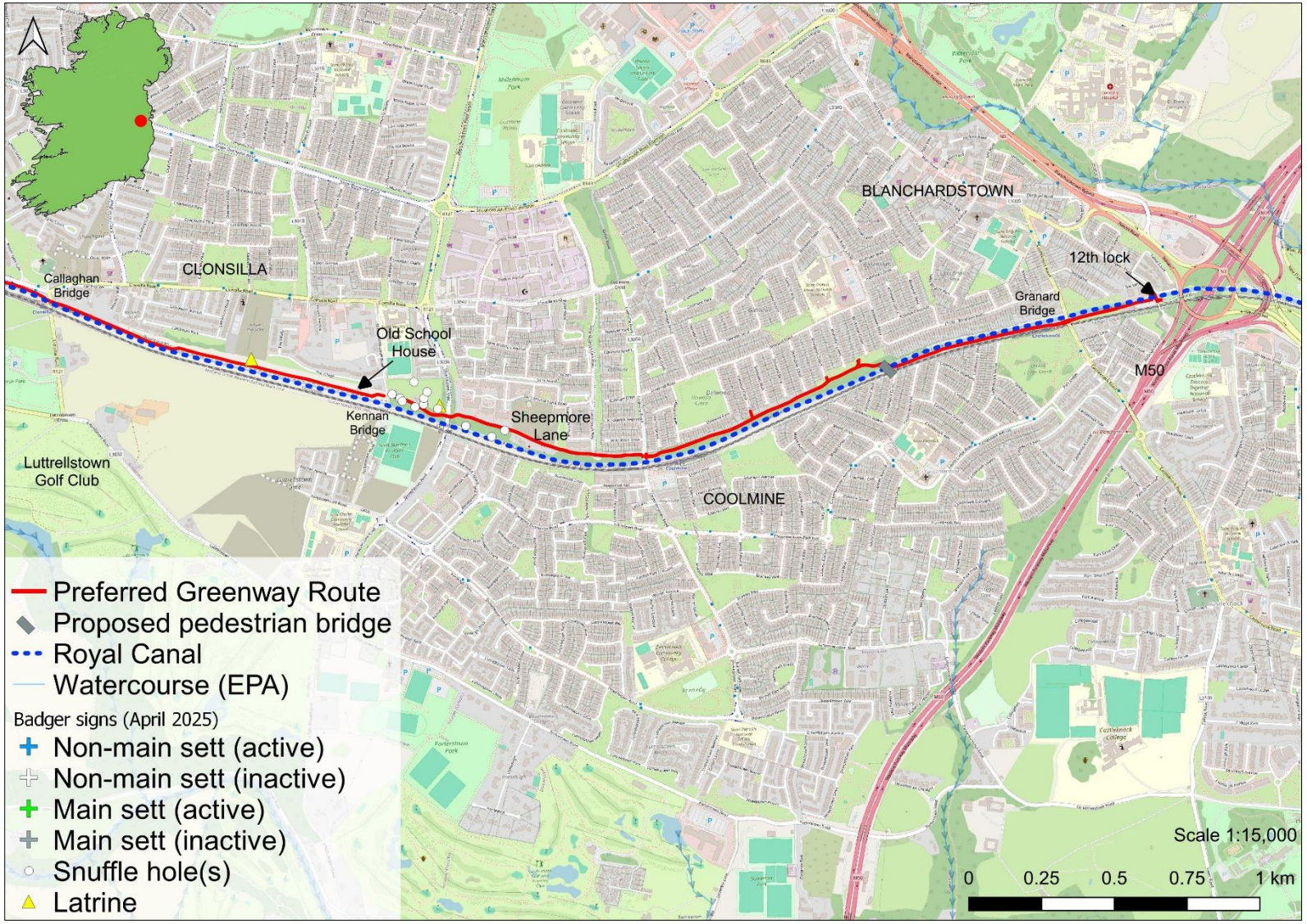


Figure 4.2 Overview of the badger signs recorded in April 2025 (Clonsilla to 12th lock) (**sett locations redacted**)



Figure 4.3 Location of the badger signs recorded near Pakenham Bridge, April 2025 (**sett locations redacted**)

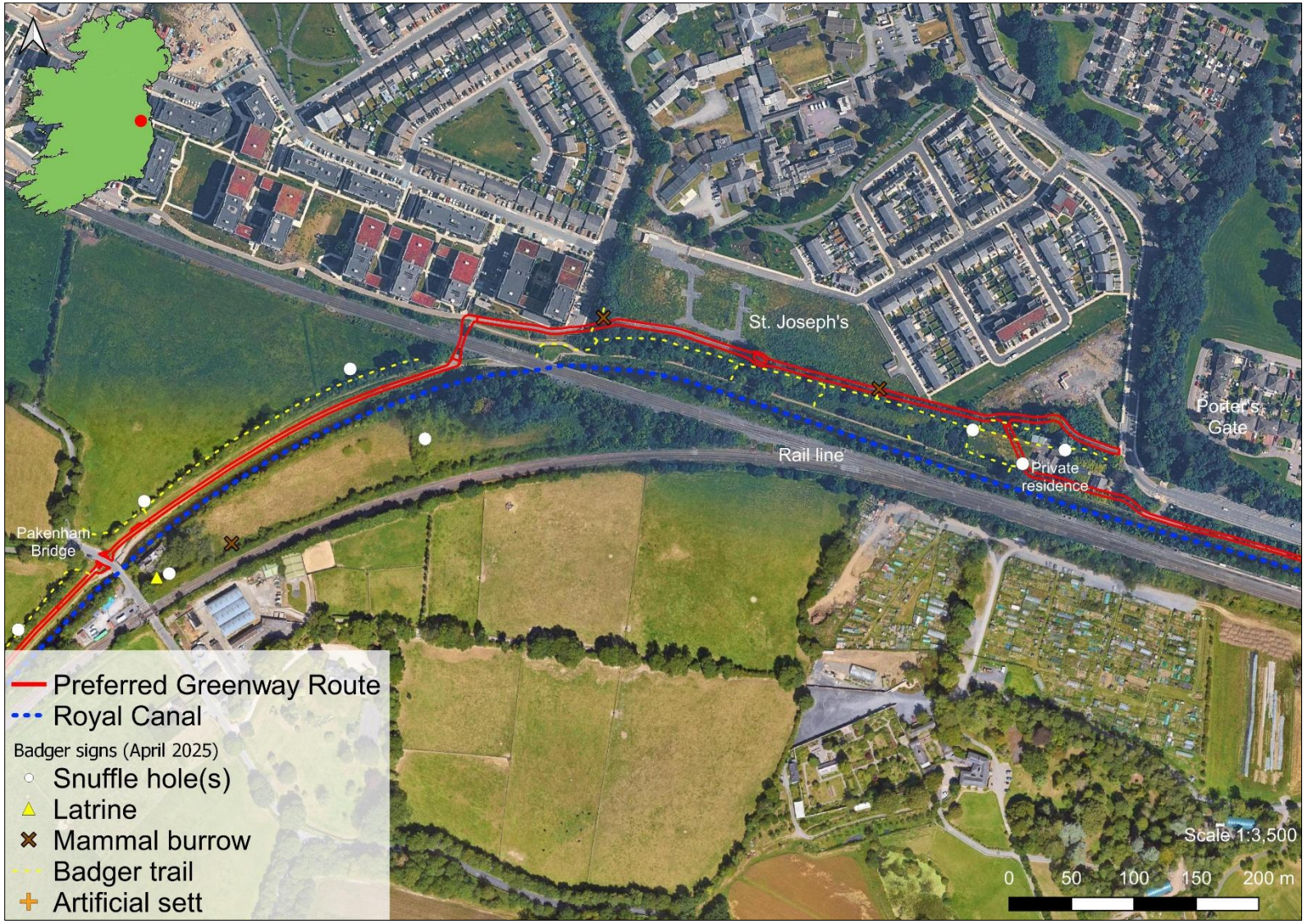


Figure 4.4 Location of the badger signs recorded near St. Joseph's, Hansfield, April 2025 (**sett locations redacted**)



Figure 4.5 Location of the badger signs recorded near the Old School House (Porterstown), April 2025 (**sett locations redacted**)



Figure 4.6 Location of the badger signs recorded near Glen Garbh, Porterstown, April 2025 (**sett locations redacted**)



Figure 4.7 Location of the badger signs recorded near Sheepmoor Lane (**sett locations redacted**)



Plate 4.1 Recently excavated inactive non-main sett with large spoil heap on steep embankment at [redacted] (not present during 2024 survey)



Plate 4.2 Characteristic badger snuffle holes along hedgerow (field boundary) in pasture south of Pakenham Bridge, April 2025



Plate 4.3 View of two entrances to non-main sett NMS_1 in woodland at [redacted], April 2025



Plate 4.4 Entrance to the active non-main sett NMS_6 near [redacted], April 2025



Plate 4.5 Path recently cleared through dense bramble scrub to location of active non-main sett NMS_6 near [redacted], April 2025



Plate 4.6 Badgers recorded using main sett MS_3 at [redacted] in March 2024 – the sett again appeared active in April 2025 (based on badger signs)



Plate 4.7 Well-worn badger trail in residential garden at the now unoccupied property at St. Joseph's, Hansfield, April 2025 – a known inter-annual foraging area for badgers



Plate 4.8 A new badger foraging area was identified at a derelict house and grounds adjacent to Pakenham Bridge (south of Royal Canal) in April 2025



Plate 4.9 Artificial badger sett located in mature hedgerow adjoining pasture north of [redacted], April 2025



Plate 4.10 Image showing proximity of existing canal towpath and Preferred Greenway Route to the artificial badger sett near [redacted], April 2025 (**image redacted**)

5. Discussion & management recommendations

The April 2025 survey recorded a total of *n*=38 badger signs along approximately 8.5km of linear canal habitat (**Appendix A**). A similar number of signs were recorded compared to previous surveys (2022-24). The distribution of signs was also very similar, with concentrations again in the areas of Hansfield, Porterstown and Sheepmore Lane (**Figures 4.1 & 4.2**). Again, snuffle hole sites (*n*=22) (indicating foraging activity) accounted for the majority of all signs recorded (**Table 4.1**) and were identified in both adjoining woodland and grassland habitats but not along the existing canal towpath (where poorer quality foraging exists with higher disturbance levels). As per previous surveys, no badger signs were recorded west of Collin's Bridge north east of Sheepmoor Lane (**Figure 4.1**).

The commuting and or foraging routes of badgers in the vicinity of the proposed Greenway, as inferred by sign distribution and visual cues, were very similar to those mapped in previous surveys (**Figures 4.3-4.7).** Badgers typically have well-defined movement patterns and frequently use the same routes for foraging and commuting, often for generations (Kruuk, 1978), particularly along linear features such as field boundaries and hedgerows (Macgowan et al., 2022; O'Brien et al., 2016; Elliot et al., 2015). In several areas, this would appear to include the existing Royal Canal towpath (i.e. Greenway footprint) such as near Pakenham Bridge, Hansfield and the Old School House (where trails link from adjoining habitats to the towpath).

As per previous surveys, the detailed mapping of putative trails or paths (**Figures 4.3-4.7**) strongly suggests that badgers are commuting between connecting areas of habitat at Sheepmore Lane, Glen Garbh (Porterstown) and the Old School House (Porterstown), using both woodland/scrub habitat and linear features such as lanes and roads. The current observations mirror previous survey findings for this area and would fit within the known home ranges of Irish badgers (Gaughran et al., 2018; Elliot et al., 2015). Key foraging areas, as indicated by snuffle hole density and trails are present in grassland habitat to the north of Glen Garbh and in the vicinity of the Old School House, Porterstown. Connectivity for badgers (and other mammals) between and within these areas is already fragmented due to urbanisation (e.g. roads, fence lines) and should, therefore, be maintained (and if possible, improved) via mitigation measures implemented as part to the Greenway works. These and other specific measures to conserve and or improve badger habitat are outlined below in section 6. It should be noted that other important badger foraging areas are likely present south of the Royal Canal Preferred Greenway route, such as near Luttrelstown, Beechpark and St. Catherine's Park and north of the Greenway on St. Mochta's National School grounds (these were outside the scope of the current survey).

Despite some habitat suitability and good foraging opportunities throughout the survey area, there were large tracts of canal corridor and adjoining habitats where no badger signs were recorded (as per previous surveys). For example, there was no evidence of badger usage at the time of survey between the Kildare/Fingal County boundary to arable fields opposite Westmanstown Sports Centre (2.3km canal distance), Hansfield to grassland near the Old School House at Porterstown (1km linear distance) or Sheepmore Lane to the 12th lock (2.3km) (**Figures 4.1, 4.2**). This was considered to reflect the higher relative levels of human-related disturbance, poor/absent foraging habitats and separation between better-quality badger habitats.

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A total of 4 no. main setts and 8 no. non-main setts were identified during the survey. This included a newly excavated (i.e. since March 2024) non-main sett on a steeply sloping bank near the private residence at [redacted], immediately south of the Preferred Greenway route (**Figure 4.6; Plate 4.1**). With the exception of this new site, all sett locations had been previously recorded by Triturus in the November 2021 to March 2024 period. Whilst trail camera monitoring was beyond the scope of this repeat survey, a total of 4 no. setts (MS_3, NMS_1, NMS_5 & NMS_6) were considered active again in 2025 (**Table 5.1**), the same locations as the 2024 survey (which included trail camera monitoring). All active setts were located in lower disturbance areas which are known to be preferentially selected by badger for sett excavation (Smal, 1995) and also foraging (Huck et al., 2008).

The artificial badger sett identified in a mature hedgerow/treeline north of [redacted] (ITM [redacted], [redacted]) alongside the Preferred Greenway Route appeared inactive at the time of survey (no signs of recent use). However, given this is located in an area of regular badger foraging and commuting habitat, it may become utilised in the future.

Table 5.1 Summary of **active** badger setts as per April 2025

Sett ID	Sett type	Location	ITM x	ITM y	Notes
MS_3	Main sett	[redacted]	[redacted]	[redacted]	Largest entrance of largest main sett in woodland, on north side of sett. Signs of recent activity included fresh spoil at entrance, well-worn trails & nearby snuffle holes (foraging)
NMS_5	Non-main sett	[redacted]	[redacted]	[redacted]	Non-main sett on large mound under elder in woodland. 2 entrances with signs of entry at largest hole
NMS_1	Non-main sett	[redacted]	[redacted]	[redacted]	Non-main sett with 2 well used entrances and 2 other entrances, 1 infilling. No further excavations since March 2024 survey. Multiple well-worn paths in scrub and woodland emanating from sett
NMS_6	Non-main sett	[redacted]	[redacted]	[redacted]	Non-main sett under ivy & fallen mature elder with one heavily used entrance & fresh spoil. Many paths emanating from sett. 2 x paths recently cleared through dense scrub to access sett?

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6. Mitigation measures & recommendations

The current stage 1 and stage 2 survey has provided further clarification and verification on the utilisation of core badger habitat in the vicinity of the proposed Royal Canal Urban Greenway Scheme. In light of the similarities in badger sett locations and foraging habitats since the completion of initial surveys, the approach to mitigation and management follows previous recommendations by Triturus (Triturus, 2024, 2023). For convenience, these have been outlined again in the current report.

These measures will help to ensure badger movements can be accommodated without inadvertent segregation of populations or habitats and will also ensure the Greenway construction and operation will not impact on badger populations. The protection of the badger population(s) is particularly important given the scarcity of remaining populations in the suburban areas of Dublin.

The breeding and resting places of badger, as identified in this survey, are protected under provisions of the Irish Wildlife Acts 1976-2023. Therefore, as proposed Greenway works may disturb these areas (given close proximity), the National Parks and Wildlife Service (NPWS) must be consulted in advance of any works. The avoidance of undisturbed areas supporting the breeding areas of badger can first be achieved by the consideration of alternatives, avoidance by project design (changing the project design to retain areas used by species), altering the way in which activities or works are undertaken and or using appropriate methods or machinery to avoid impacts (NPWS, 2021).

In summary, the Royal Canal Urban Greenway should apply the following badger-specific mitigation. Further details are provided in sections 6.1 and 6.2.

- The TII Guidance on the '*Treatment of Badgers prior to the construction of national road schemes*' (Smal, 2006) states that no heavy machinery should be used within 30m of badger setts (unless carried out under licence). Lighter machinery (generally wheeled vehicles) should not be used within 20m of a sett entrance, while digging by hand or scrub clearance should not take place within 10m of sett entrances.

- No works should be undertaken within 50m of active setts, with a 150m exclusion zone for pile-driving within 150m of active setts during the breeding season (December to June inclusive).

- Avoid key areas of badger habitat (e.g. deciduous woodland at [redacted]/[redacted]) and situate greenway alignment along/on the least profitable areas of badger habitat (this may require route realignment in the vicinity of the 2 no. [redacted] setts – see below for further details).

- Keep areas of adjoining amenity grassland (foraging habitat) accessible to badger. The use of badger underpasses/tunnels may facilitate this access and should be considered underneath the Greenway route (as per Gaughran et al., 2021). However, access should be encouraged by other means (i.e. open fence lines, elevated boardwalk sections) near core territories (i.e. areas supporting main setts).

- Enhancement of foraging areas would be beneficial for badger. This could include the conversion of some areas of "secondary" or "other" habitat to primary badger foraging habitat

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(e.g. introduce grazing or mowing to rough grassland) (Highland Council, 2006). Planting of fruit-bearing hedgerows/treelines with elder, rowan, damson, sloes and crab apple would provide food for badger and enhance foraging opportunities given their know importance in badger diets (O'Brien et al., 2016).

- In the instance where on-site habitat retention or enhancement is not possible, compensatory habitat creation should be undertaken at off-site areas or by provisioning access to poorly accessible areas within the social groups' territory (Highland Council, 2006).

- Where 36 months or more has elapsed between obtaining statutory approval of the Greenway and initiation of the construction phase, an appropriate level of resurvey will be required because the baseline data may change during this time. This will allow adjustments to be made to the mitigation strategy specified in the EIS, if necessary (Smal, 2006).

- It is also recommended that once the main contractor is appointed an ecologist would undertake a pre-construction badger survey in advance of the works to ensure that there are no new badger setts within the relevant area.

6.1 Construction phase

Works should follow best practice guidance to minimise impacts to badger populations (i.e. Smal, 2005). To minimise any damage to the sett structures and minimise disturbance no heavy machinery should be used within 30m of badger setts during construction works. Lighter machinery (generally wheeled vehicles) should not be used within 20m of a sett entrance and light work, such as digging by hand or manual scrub clearance should not take place within 10m of sett entrances. During the badger breeding season (December to June inclusive), none of the above works should be undertaken within 50m of active setts nor blasting/pile driving within 150m of active setts (Smal, 2005).

In light of the preferred route alignment for the Greenway in the vicinity of identified setts (i.e. [redacted], [redacted] & [redacted]), temporary timber hoarding should be installed 30m from sett areas in a full radius during works as a means of screening from indirect disturbance (as per Smal, 2005). Access by badgers to foraging areas should not be blocked and the timber hoarding is primarily a disturbance screen to prevent noise and visual disturbance but also to prevent ingress of stored soil, construction materials and or disturbance to vegetation near setts. Please note that this only applies to [redacted], where important foraging habitat is located to the north of the proposed Greenway (i.e. no foraging habitat remaining to the north of [redacted] due to recent development).

Based on ongoing consultation between the ecologists and designers it is noted that the preferred Greenway alignment avoids more profitable areas of badger habitat and is cognisant of the location of identified breeding areas (setts). Whilst the majority of identified setts within the vicinity of the proposed Greenway were inactive at the time of survey, this does not mean these sites will not become active (occupied) again in the future. Therefore, pre-construction badger surveys of the identified 12 no. setts will be undertaken in advance of works commencement by a suitably qualified

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ecologist. This resurvey effort[1] would also detect any potential new badger setts excavated in the interim period.

The appointed Ecological Clerk of Works (EcoW) would ensure the badger mitigation measures are implemented including the implementation of the measures in the badger habitat management plan. These measures should be agreed with the NPWS. The measures should be mapped (and printed) to help ensure they are applied during site works.

The requirement for a derogation for indirect disturbance should be agreed with the NPWS, in consultation with the Fingal City Council (DCC) Biodiversity Officer, for the 4 no. active setts identified in 2024 and 2025 given that they are all located within 30m of the Preferred Greenway Route (**Figures 4.5-4.7**).

6.2 Operational phase

6.2.1 Badger passage (habitat connectivity)

Given high development pressures along the north bank of the Royal Canal within the vicinity of the proposed Royal Canal Urban Greenway, it is imperative to maintain habitat connectivity and free badger passage between breeding areas and key foraging habitats identified, such as the grasslands located at Glen Garbh (Porterstown), near the Old School House (Porterstown) and St. Joseph's, Hansfield (**Figures 4.3-4.7**). Should badgers be forced to alter their territorial and foraging ranges due to changes in access resulting from the Greenway, the risk of road traffic mortality will increase and there may be considerable demographic changes over time due to population segregation.

In light of the proposed design, the provision of access routes for badgers will be required where barriers to migration are predicted due to the installation of steel and timber palisade fencing along the Greenway route. This is of particular significance at natural bottlenecks, such as St. Joseph's, Hansfield.

A number of badger underpasses (tunnels) should be installed underneath the proposed Greenway route to maintain badger commuting routes and territories (as recommended by Gaughran et al., 2021). As per best practice (Smal, 2005), these should adhere to the following specifications;

- 600m diameter concrete pipes (culverts)with badger-resistant mesh fencing either side to guide and encourage badger entry to the underpass
- The exit and entrance to the underpass should be flush with badger-proof fencing and the invert set at ground level. A concrete surround will provide a solid connection to the uprights of the fence and inhibit any efforts to dig.
- Drainage should be adequate to prevent waterlogging at the entrances and within the underpass
- The entrances to the underpass should be planted with appropriate hedgerow planting to encourage badger use (e.g. holly, hawthorn, blackthorn – see section 6.2.2 below)

[1] Where 36 months or more has elapsed between obtaining statutory approval of the Greenway and initiation of the construction phase, an appropriate level of resurvey will be required because the baseline data may change during this time - this will allow adjustments to be made to the mitigation strategy, if necessary (Smal, 2006)

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- Underpasses and associated fencing should be checked periodically in the first two years post-works to ensure they have not become blocked and or waterlogged (i.e. assess efficacy)

The construction of an elevated boardwalk section of the Greenway at Glen Garbh, with ≥700mm clearance on the up-slope side, will facilitate the free passage of badgers along existing commuting/foraging routes, negating the requirement for underpasses in this area (**Figure 6.1**). Given the presence of an existing palisade fence between Glen Garbh and Sheepmore Lane (along the Diswellstown Road), it is anticipated that the elevated boardwalk in this area will improve habitat connectivity and badger passage.

However, an underpass is required to provide passage between Sheepmore Lane and Stationcourt, linking potential badger foraging areas (**Figure 6.2**). It is also recommended that 4 no. underpasses be installed in the vicinity of St. Joseph's, Hansfield to provision north-south and east-west connectivity to badger foraging habitats (**Figure 6.3**). This would include maintaining access to the foraging area south of the Deep Sinking rail bridge on the south side of the Royal Canal which badgers appear to traverse the rail line (under Harris fencing) to access.

It should be noted that the preservation of free badger passage should not rely solely on underpasses and should also be encouraged by other means (e.g. open fence lines) near core territories (i.e. areas supporting main setts). It is understood that no fences will be installed along the Greenway in the Old School House (Porterstown) area and this will help to maintain free badger passage. We have proposed a location near St. Joseph's/Porter's Gate for single point mammal access (i.e. a gap in fencing at ITM 705275, 738008) to ensure continued access to the existing canal towpath where the Greenway alignment would otherwise result in barriers to movement (**Figure 6.3).**

Table 6.1 Location of the recommended badger underpasses (presented east to west)

Location	ITM x	ITM y	Orientation
Sheepmore Lane	706674	737640	North-south
Hansfield	704600	738266	North-south
Hansfield	704484	738334	North-south
Hansfield	704237	738411	North-south
Hansfield	704149	738420	North-south

6.2.2 Hedgerow planting & management (habitat enhancement)

Whilst earthworms (in grasslands) form a major component of their diet, badgers are generalist and opportunistic feeders, with fruits and berries (such as blackberries, elderberries & sloes) a seasonally important dietary item in Ireland (O'Sullivan et al., 2019; Elliot et al., 2015; Byrne et al., 2012; Cleary et al., 2011; Boyle & Whelan, 1990) and elsewhere (Kurek, 2022, 2015; Balestrieri et al., 2015; Rosalino et al., 2005). This is particularly the case in more urban environments where grassland and other foraging habitats are becoming scarcer due to development pressures (Gomes et al., 2020). Furthermore, badgers are known to excavate their setts and latrines in hedgerows (preferring dense

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basal & shrub vegetation) and use hedgerows for over-ground movement around more rural landscapes (O'Brien et al., 2016), inclusive of the Royal canal corridor.

In light of this importance, the compensatory planting of fruit-bearing hedgerows would enhance badger foraging opportunities whilst also serving to screen the proposed Greenway from more sensitive areas, such as setts. Hedgerow planting is recommended at Glen Garbh and also in the vicinity of the Old School House, Porterstown (>50m from road) and St. Joseph's, Hansfield. In these locations this will not only screen the Greenway from badgers (reducing disturbance) but also enhance foraging habitat. Please see **Figures 6.2-6.4** for more details.

To improve overall biodiversity, only native/naturalised Irish species (ideally of local provenance) should be chosen for hedgerow planting. Suitable fruit/berry-bearing species for badger foraging include;

- hawthorn (*Crataegus monoygna*)
- blackthorn (*Prunus spinosa*)
- elder (*Sambucus nigra*)
- ivy (*Hedera hibernica*) [2]
- rowan (*Sorbus aucuparia*)
- holly (*Ilex aquifolium*)
- wild plum/damson (*Prunus domestica*)
- crab apple (*Malus sylvestris*)

Bramble/blackberry (*Rubus fruticosus* agg.), whilst native and routinely foraged by badgers, is not recommended for planting in this instance given its already local abundance and propensity to out-compete other species.

The management of planted hedgerows as part of Greenway maintenance should aim to maximise their fruit-bearing capacity. This would involve the cutting/coppicing of only the Greenway side given that uncut hedgerows (such as hawthorn) are significantly more prolific in terms of berry production (Graham et al., 2018).

6.2.3 Grassland management

An additional badger habitat enhancement measure is the installation and maintenance of earthen berms to increase the surface area of available grassland foraging habitat. This is of particular relevance in areas where the proposed Greenway will require land-take from existing badger foraging habitat, e.g. Old School House grassland. Earthen berms will provide a superior 3-dimensional foraging habitat compared to traditional flat areas of grassland, i.e. badgers could forage on the slopes of the berms as well as the top and along the bases. Grassy berms would result in more potential foraging habitat (greater surface area) for badgers per unit area compared to traditional grasslands. The berms should also be planted with appropriate native grass seed and wildflower mixes to increase biodiversity and badger foraging value. For example, this would also improve arthropod diversity, in addition to earthworms, and provide an improved prey resource for badgers.

[2] numerous badger latrines were found to contain abundant ivy berries during surveys undertaken for the Royal Canal Urban Greenway in 2022 & 2024 (Triturus data)

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Herbicides should not be used during Greenway maintenance or near badger foraging habitats (e.g. grasslands), thus in keeping with a more environmentally-conscious approach and Fingal County Council's wider policy to phase out the use of herbicides and implement alternative control methods[3].

Enhancement of foraging areas could also include the conversion of some areas of secondary or marginal habitat to primary badger foraging habitat, e.g. introduce grazing or mowing to rough grassland areas (as per Highland Council, 2006).

6.2.4 Badger monitoring (repeat every 5 years)

To assess and ensure efficacy of mitigation and management measures with regards to badgers, the Royal Canal Urban Greenway survey area should be monitored (re-surveyed) every 5 years to ensure badger populations are still extant and active. To ensure consistency of effort, the survey methodology and coverage should follow that outlined in this report.

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[3] https://www.oireachtas.ie/en/debates/debate/committee_on_public_petitions/2022-07-07/6/

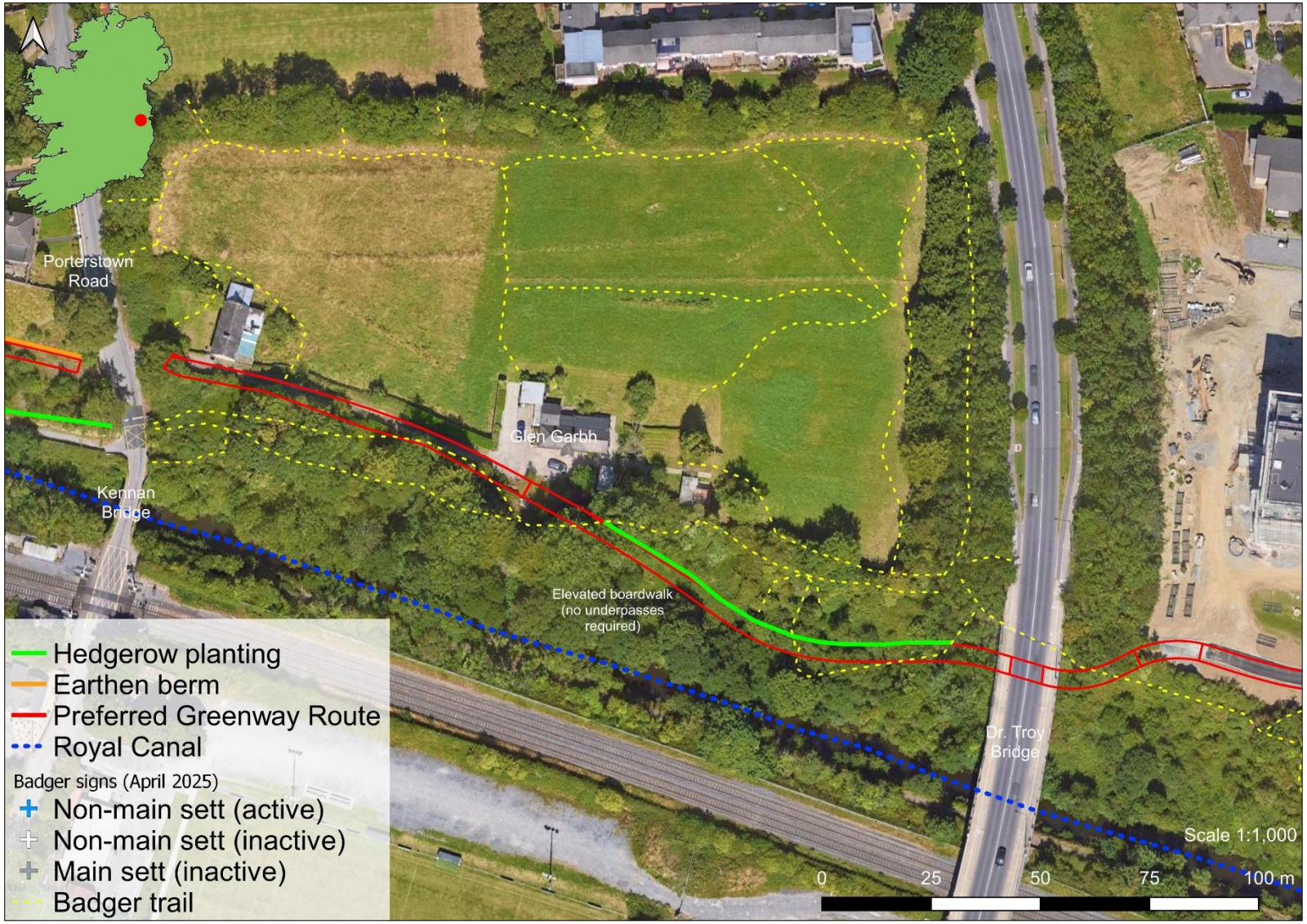


Figure 6.1 Recommended location of hedgerow planting near Glen Garbh (**sett locations redacted**)

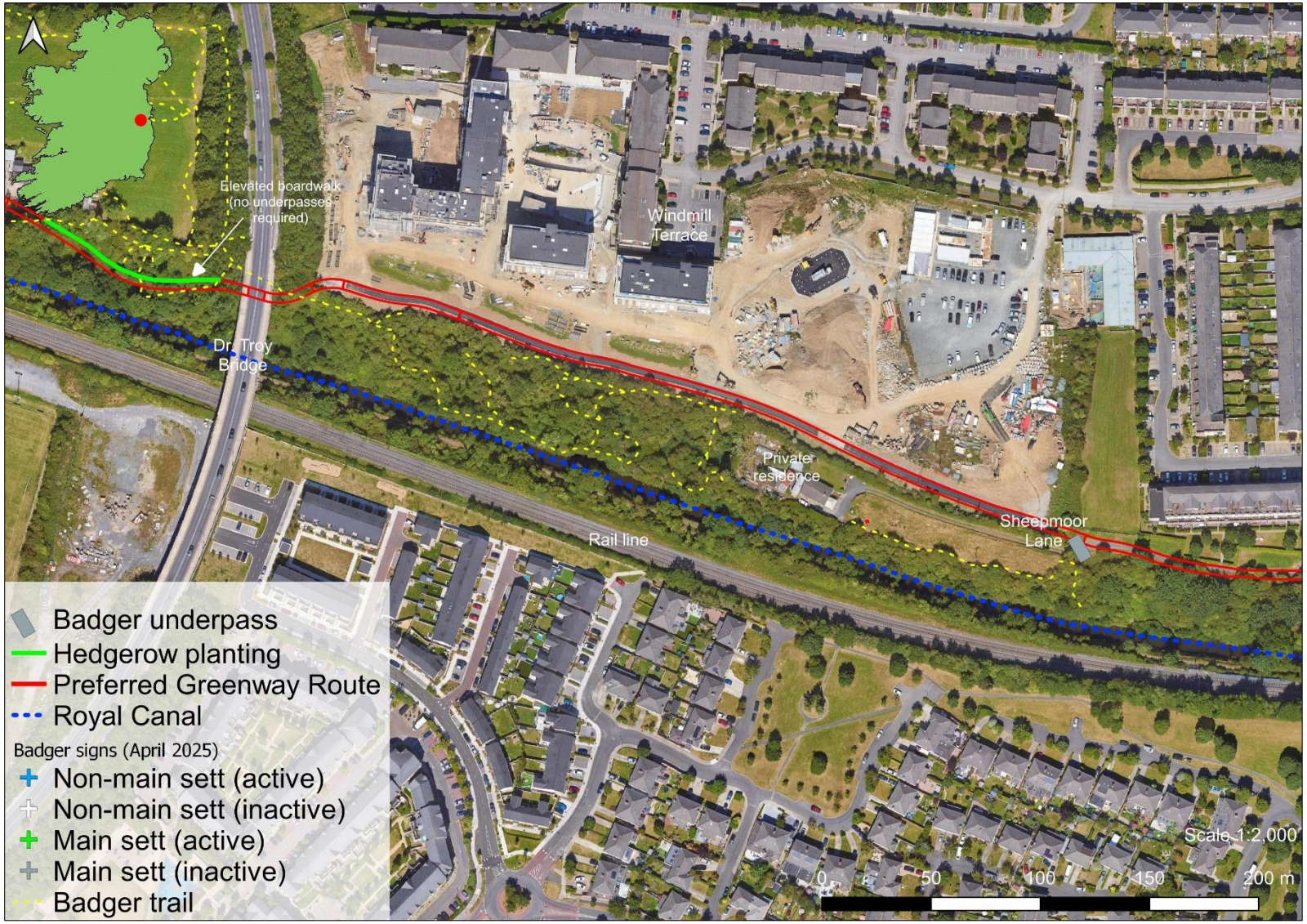


Figure 6.2 Recommended location of badger underpass near Sheepmore Lane (**sett locations redacted**)

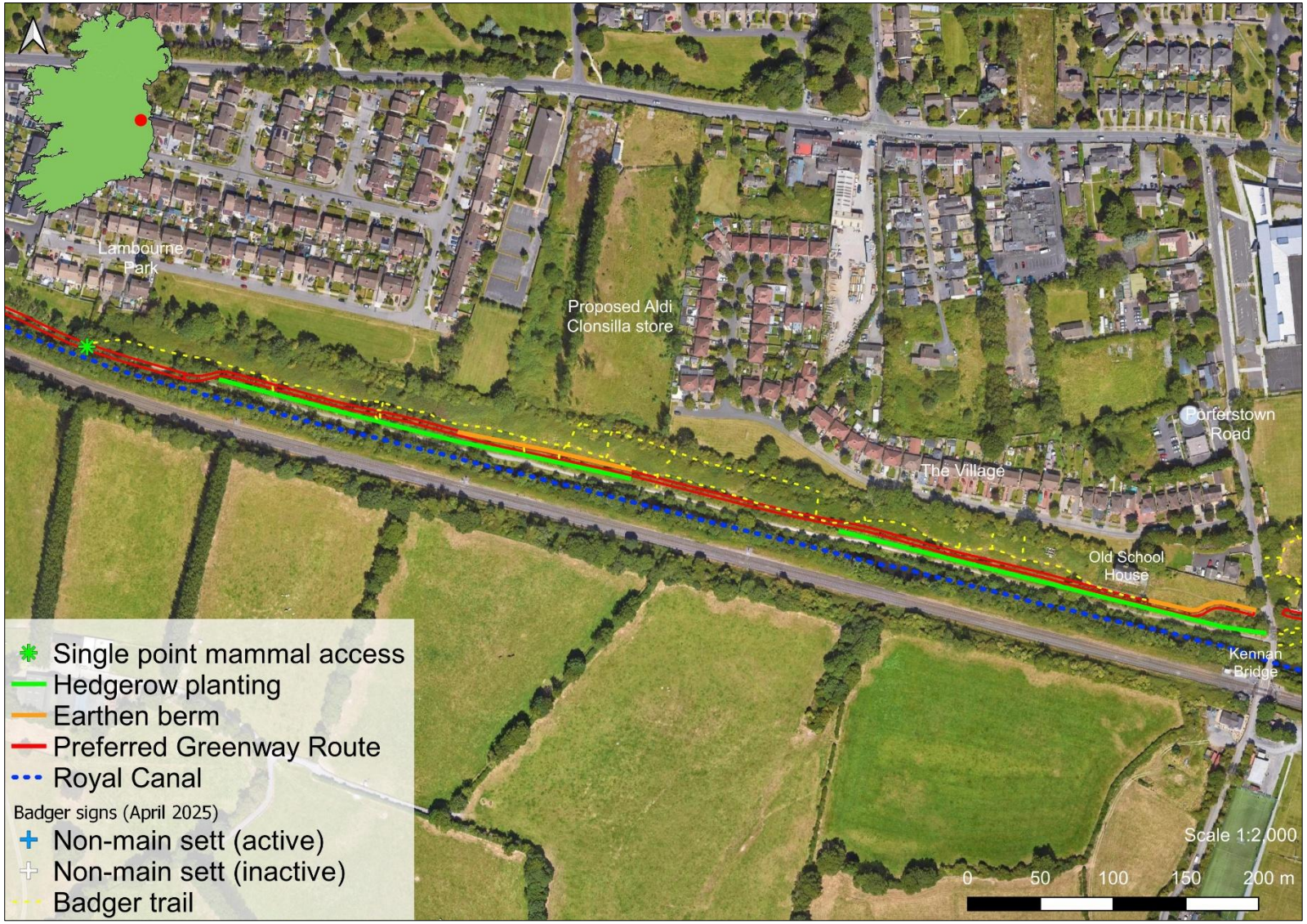


Figure 6.3 Recommended location of badger mitigation measures near the Old School House/The Village (**sett locations redacted**)

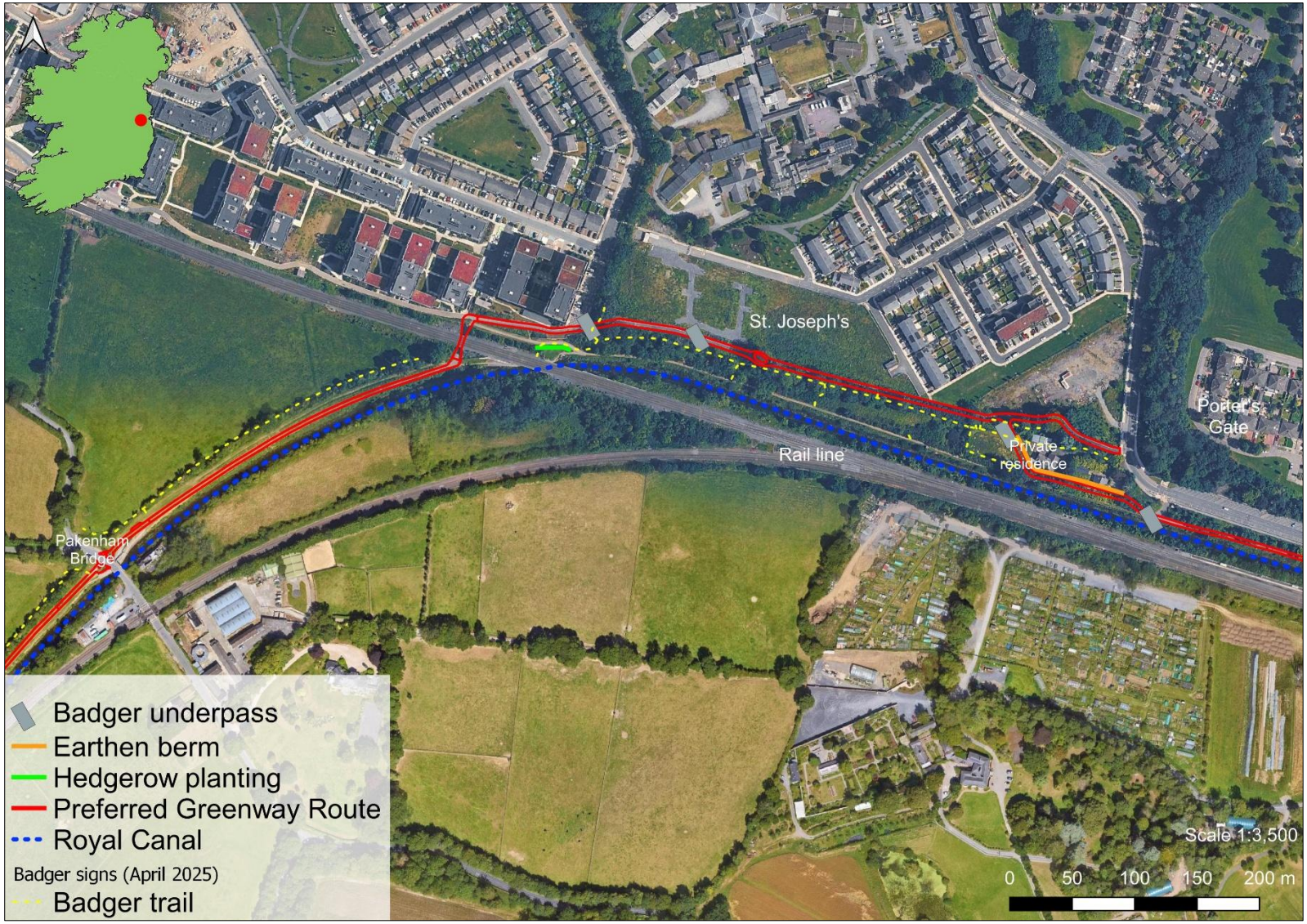


Figure 6.4 Recommended location of badger mitigation measures near St. Joseph's, Hansfield

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Royal Canal Urban Greenway otter (*Lutra lutra*) survey 2025

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Triturus

Prepared by Triturus Environmental Ltd. for DBFL

April 2025

Please note: given the location details of highly sensitive otter breeding & resting areas this report has been redacted by the authors to make it available to the public

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1. Introduction

1.1 Project background

Triturus Environmental Ltd. were commissioned by DBFL Consulting Engineers Ltd., on behalf of Fingal County Council and the National Transport Authority (NTA), to undertake an otter (*Lutra lutra*) survey of the Royal Canal between the Kildare/Fingal County boundary at Leixlip and the 12th lock, Castleknock, Co. Dublin. The baseline survey was completed to inform the proposed Royal Canal Urban Greenway Scheme and sought to update previous surveys completed in the 2021-2024 period. The survey was undertaken along 8.5km linear length of the Royal Canal corridor during April 2025.

The proposed scheme is an 8.1km-long shared pedestrian and cycle route which is to be constructed along /adjacent to the Royal Canal as it heads eastwards from the Kildare/Fingal County boundary to the Old Navan Road (near the 12th lock) to connect with a previously constructed Ashtown section of the Greenway. When complete, the Royal Canal Urban Greenway will deliver a continuous greenway from Dublin City's Docklands to Kildare and westwards towards the Shannon and Galway. Works will include the construction of a new 3-4m wide footpath, bridge installation, embankment works, localised removal of vegetation (i.e. for bridge construction), the installation of fencing and guardrails, lighting installation along said route and complementary landscaping and planting works (DBFL, 2021).

This baseline survey identified the most important areas for otters along the Royal Canal corridor relative to the proposed works. This was based on an assessments of sign distribution, in addition to observations on human-related disturbance and general aquatic and fisheries habitats. The distribution of these signs acted as an indicator regarding areas of canal and aquatic habitat used by otters, inclusive of potential breeding and resting areas (i.e. holts and couches). The data collated would inform otter-specific mitigation measures for the proposed Royal Canal Urban Greenway Scheme.

1.2 Legislative protection

The Eurasian otter (*Lutra lutra*) is a species of conservation concern and high priority having suffered major declines in its range and population throughout Europe since the 1950s. It is classified as 'near threatened' by the IUCN Red List with a decreasing population trend and, as such, is listed in Appendix I of CITES, Appendix II of the Bern Convention and Annexes II and IV of the EC Habitats Directive (92/43/EEC).

Otters, along with their breeding and resting places, are also protected under provisions of the Irish Wildlife Acts 1976-2023. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Directive 92/43/EEC, which is transposed into Irish law by the European Union (Birds and Natural Habitats) Regulations 2011-2021.

The protection of otters is outlined in Article 51(1) and (2):

Protection of fauna referred to in the First Schedule;

51.(1) *The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule.*

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51.(2) *Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a license granted by the Minister under Regulation 54, a person who in respect of the species referred to in Part 1 of the First Schedule (listed below). Items (b) and (d) may be considered most relevant to developments.*

- ***(a)*** *deliberately captures or kills any specimen of these species in the wild,*
- ***(b)*** *deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,*
- ***(c)*** *deliberately takes or destroys eggs of those species from the wild,*
- ***(d)*** *damages or destroys a breeding site or resting place of such an animal, or*
- ***(e)*** *keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive, shall be guilty of an offence.*

According to the NPWS (2021), '*it should also be noted that in the case of Regulation 51(d) any action resulting in damage to, or destruction of, a breeding or resting place of an animal may constitute an offence unless a derogation licence has been granted and this action does not need to be deliberate*'. Furthermore, '*breeding and resting places are protected even when the animals are not using them, once there is a high probability that they will return*' (CJEU Case C-477/19) (NPWS, 2021). Regulation 51(d) therefore places a strict responsibility of due diligence on anyone proposing to carry out an 'action or project' that can 'damage or destroy' the breeding place of Annex IV species.

In an Irish context, according to the most recent Article 17 reporting (NPWS, 2019), otter conservation status has improved, with the species now evaluated as being of 'Favourable' conservation status. Otters were considered to be previously 'Near Threatened' (Marnell, 2009) based on a 20-25% decline between 1980 and 2005 (Bailey & Rochford, 2006). However, the current conservation status is now of 'Least Concern' (Marnell et al., 2019).

1.3 Study area description

The Royal Canal is some 150km long and links the River Liffey in Dublin City with the River Shannon in Co. Longford. The canal is fed by Lough Owel, Co. Westmeath and flows east to Dublin and west to the Shannon. Though originally constructed for transport of goods (work was completed in 1817), the Royal Canal was closed to typical navigation in 1961. The present-day canal serves as a highly valuable recreational amenity site and regionally-important ecological corridor. The entire length of the Royal Canal is designated as a proposed Natural Heritage Area (pNHA) (site code: 002103) (NPWS, 1995).

The Royal Canal is known to support a range of fish species including pike (*Esox lucius*), perch (*Perca fluviatilis*), roach (*Rutilus rutilus*), rudd (*Scardinius erythropthalmus*), bream (*Abramis brama*), roach x bream hybrids, three-spined stickleback (*Gasterosteus aculeatus*), tench (*Tinca tinca*) and European eel (*Anguilla anguilla*) (McCloone, 2011; Tierney et al., 1999). These provide a good prey resource for otter.

Otters are widespread along the Royal Canal, including within the survey area (see section 3.1 for

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more details).

In terms of water quality, the WFD status of the Royal Canal within the survey area was under review at the time of report drafting.

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2. Methodology

2.1 Desktop review of otter records

A desktop review of published and unpublished data for the Royal Canal and connected habitats was undertaken in respect of otter. Data pertaining to otters held by the National Biodiversity Data Centre (NBDC) was also reviewed.

2.2 Otter sign surveys

Walkover and boat-based otter surveys of the Royal Canal, using total corridor otter survey (TCOS) methodology (see below), were undertaken on the 9th, 10th and 11th April 2024. This period is within the optimal period for surveys given a greater propensity for otter marking (pre-breeding) and a higher likelihood of sign detection due to decreased vegetation cover. The survey was completed during dry, mild, bright and settled conditions, which ensured that a good representation of habitat marked by otter could be recorded in the field, including territorial marking or marking of feeding and potential breeding areas.

The survey area comprised approximately 8.5km of linear canal corridor between the Kildare/Fingal County boundary and the M50, east of the 12th lock, Castleknock (**Figure 2.1**). Whilst survey effort was focused on the canal and immediate riparian corridor, adjoining habitats with suitability for otter were also surveyed, where present.

Each otter sign was logged by type, location (handheld GPS), condition and approximate age for later interpretation to distinguish differences in habitat use and activity. Spraints were subjectively assessed as either very fresh, fresh, mixed-age (recent and older spraints, typically indicative of a regular sprainting site) or old (spraint not recently deposited and degrading). Furthermore, indicative counts of spraint (i.e. number of individual spraints) and the number of sprainting sites (often separate clusters in one area) were noted. This helped indicate the frequency of otter marking, which can clarify levels of activity in particular areas, inclusive of breeding (holt) and resting (couch) areas.

2.3 Total corridor otter survey (TCOS) methodology

The survey broadly followed the best practice 'standard survey' methodology for otter as recommended by Bailey & Rochford (2006), Chanin (2003) and Lenton et al. (1980) (all based on observations by Erlinge, 1967). However, methodology differed in that the entire waterline was surveyed rather than the standard 500-600m sections selected at regular (5-8km) intervals from accessible points (e.g. bridges). The novel survey technique, known as a total corridor otter survey (TCOS) (Macklin et al., 2019), involved a continuous, unbiased survey effort along both banks of the Royal Canal, encompassing the entire channel and riparian zones. A boat (RIB) and kayak facilitated the survey of areas of channel or bank with poor access.

Total corridor survey methodology typically involves the use of two (or more) surveyors working independently (in tandem) along each respective bank of an individual watercourse (where practical). This also facilitates one to work from a more elevated position (e.g. bank top) with one surveying (with appropriate PPE such as a dry suit or chest waders) from within the channel/watercraft. This holistic,

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labour intensive approach greatly increases the likelihood of otter sign detection and facilitates a more accurate estimation of otter usage and activity at the river or catchment scale. This is especially true of more cryptic signs such as holts and couches that are often located in poorly accessible areas not covered by a standard survey approach.

2.4 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules. Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

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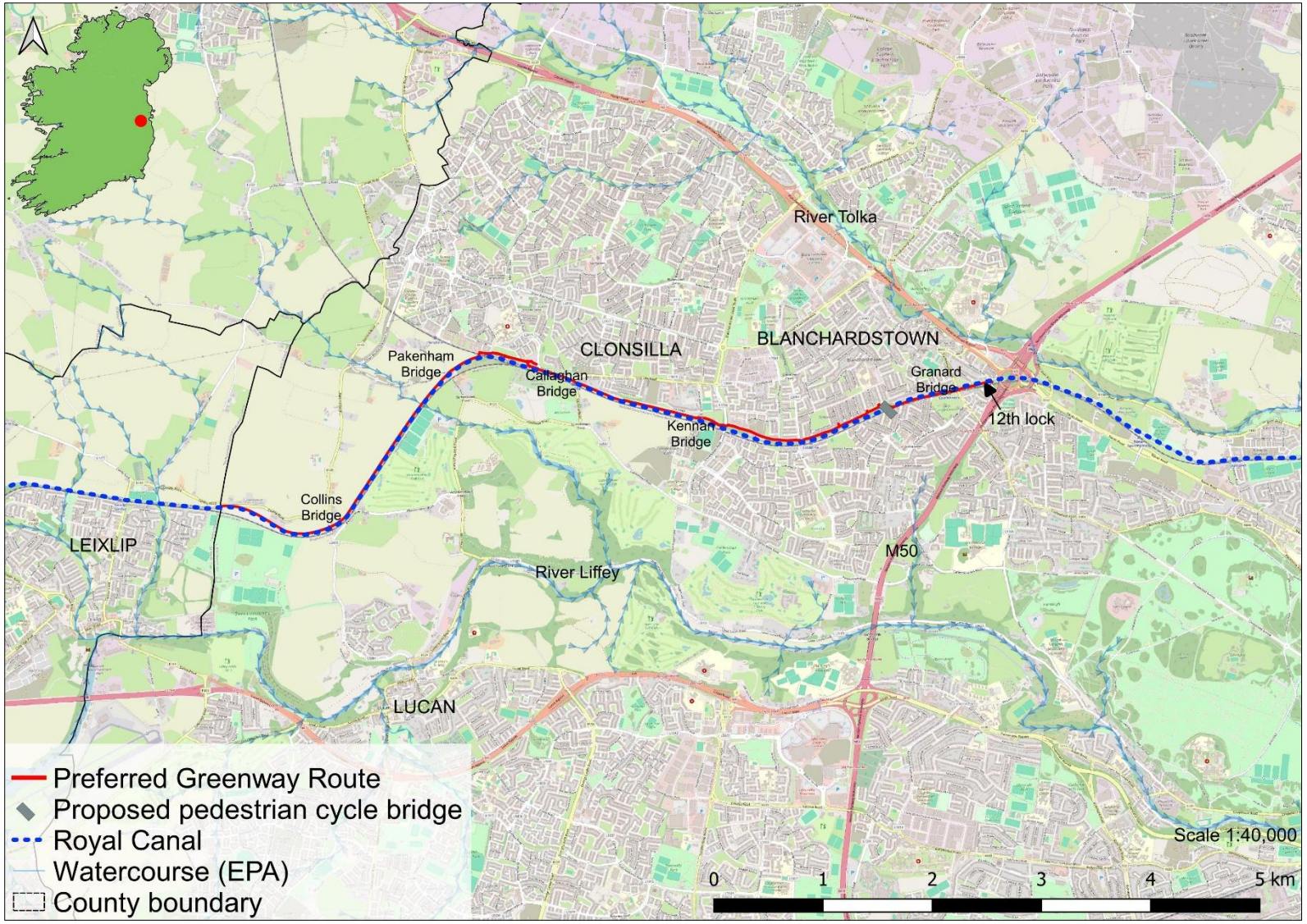


Figure 2.1 Overview of the Royal Canal Urban Greenway otter survey area (Kildare/Fingal County boundary to 12th lock)

3. Desktop review

A desktop review revealed a very low number of otter records within and in the vicinity of the survey area. Whilst otter records are available throughout the length of the Royal Canal (including Clonsilla, Maynooth etc.), public records within the survey area were limited to a live sighting in Clonsilla, east of Callaghan Bridge, in 2016 (NBDC data). A historical record was also available for the same area (1980). Many otter records along the canal within the vicinity of Dublin are anecdotal. It has previously noted that otter activity along the Royal Canal is much less evident that the neighbouring River Tolka or River Liffey (Keeley, 2004).

However, targeted otter surveys completed by Triturus along various sections of the Royal Canal in recent years (2019-2024) have revealed a significant number of otter signs, inclusive of breeding and resting areas. For example, a total of 14 no. signs, including spraint sites, slides, couches and two potential holts were recorded along the Royal Canal corridor within the current survey area in the November 2021-January 2022 period (Triturus, 2022). In the previous survey (2024), a total of 12 no. signs were recorded, with a potentially active holt identified (Triturus, 2024).

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4. Results

4.1 Otter records

A total of *n*=11 otter signs were recorded within the survey area during the current survey, comprising a total of 8.5km linear canal habitat (**Table 4.1; Figures 4.1-4.7; supplementary data**). This total was similar to that previously recorded in the survey area in 2024 (Triturus, 2024) and 2022 (Triturus, 2022) (**Table 4.1**). The number of signs identified equated to an average of 1.3 otter signs per kilometre of linear canal habitat, which is considered to be a relatively low density of signs in an Irish context (pers. obs.).

As per previous surveys, spraint sites (*n*=8) accounted for the majority of all signs recorded, with a low number of latrines also identified. A single previously identified holt was identified along the canal corridor in the current survey, i.e. no new holts identified in 2025. This was located in the sloping bank of a dry drainage ditch in woodland opposite [redacted] near [redacted], approximately 20m from the canal (**Figure 4.2**).

No couches (legally protected resting areas) were recorded during the survey. The recorded signs showed a strong positive correlation with lower disturbance areas (see Discussion).

Table 4.1 Summary of otter signs recorded along the Royal Canal survey area, April 2025, February 2024 and November 2021-January 2022

Otter sign	Total no.		
	April 2025	Feb 2024	Nov 2021-Jan 2022
Spraint site	8	10	9
Holt	1	1	2
Latrine	2	0	1
Slide	0	1	1
Prey remains	0	0	1
Total	**11**	**12**	**14**

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Plate 4.1 A potential otter holt in a dry drainage channel in woodland opposite [redacted], 2025



Plate 4.2 Regular inter-annual sprainting site on the ledge under Collin's Bridge



Plate 4.3 Another regular inter-annual marking site on a ledge under Kennan Bridge, an area with poor human accessibility



Plate 4.4 Open canal habitat with high disturbance levels between Collin's Bridge and Pakenham Bridge (few marking opportunities for otter), April 2025



Plate 4.5 Otter latrine site with urine scorching of grass along the towpath near Confey slipway, Leixlip, April 2025



Plate 4.6 High disturbance area near the 12th lock, Castleknock – an area sometimes used by commuting otters for but rarely used for marking

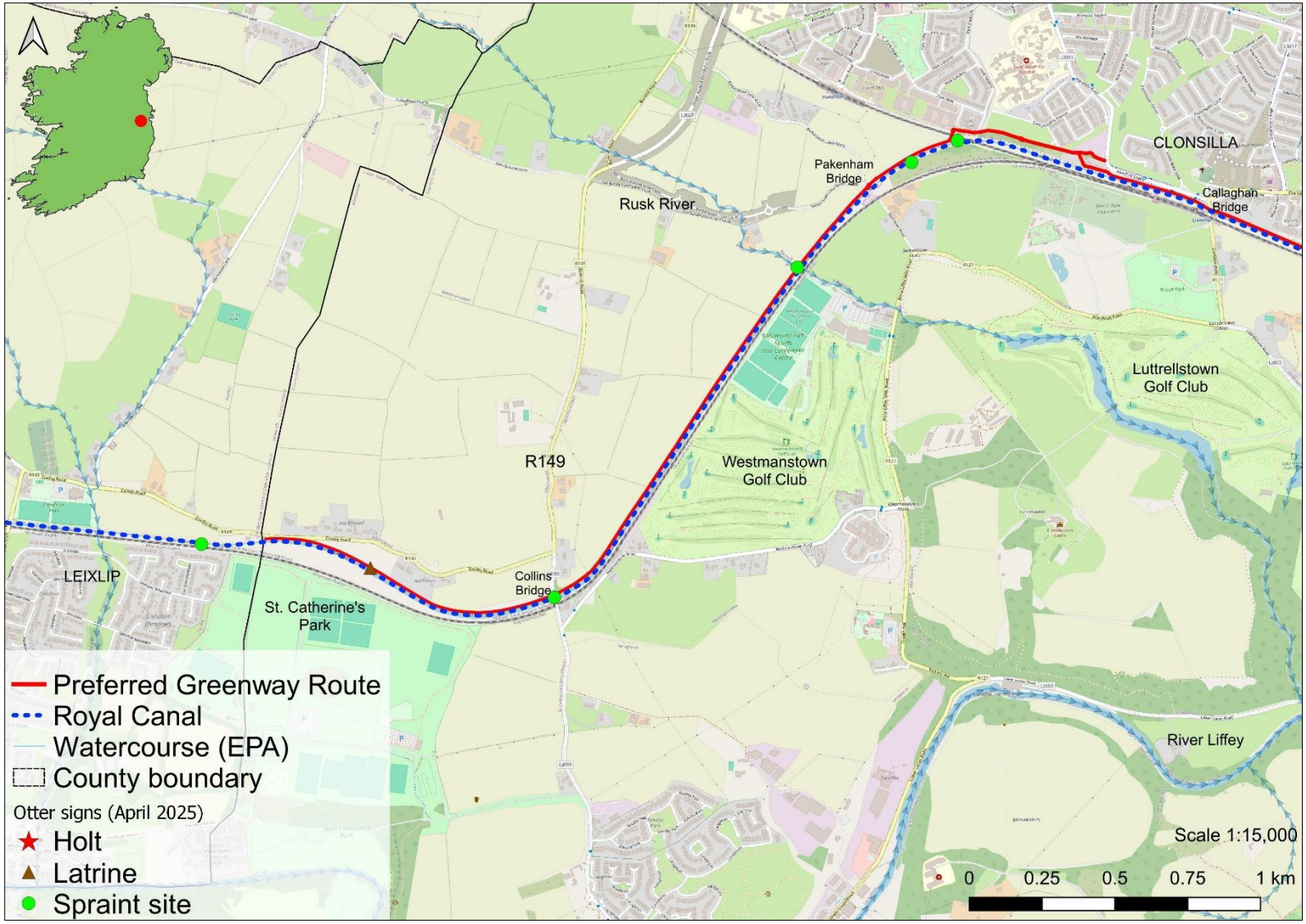


Figure 4.1 Overview of the otter signs recorded in April 2025 (Leixlip to Clonsilla) (**holt locations redacted**)

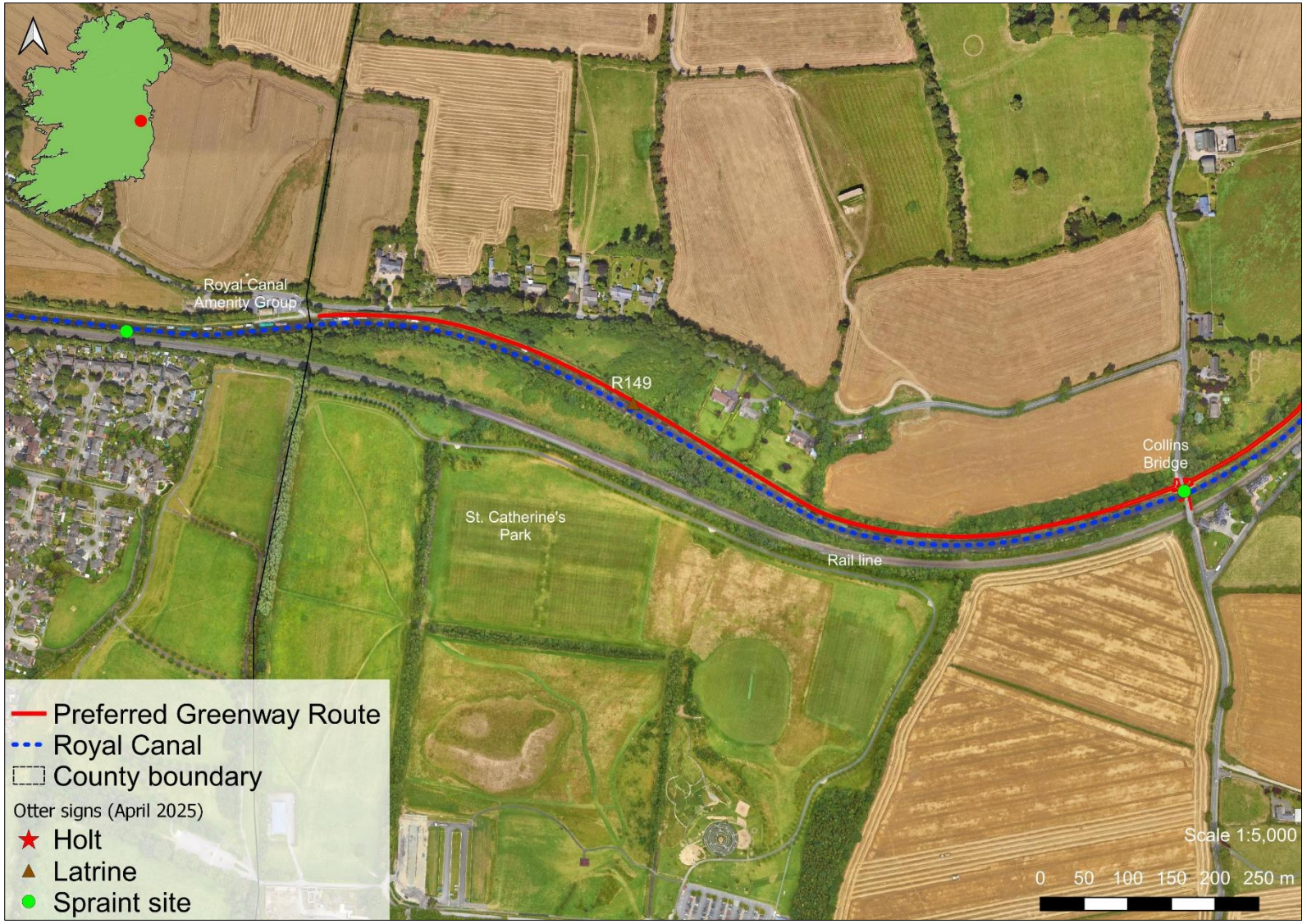


Figure 4.2 Otter signs recorded in the vicinity of Collins Bridge, April 2025 (**holt locations redacted**)

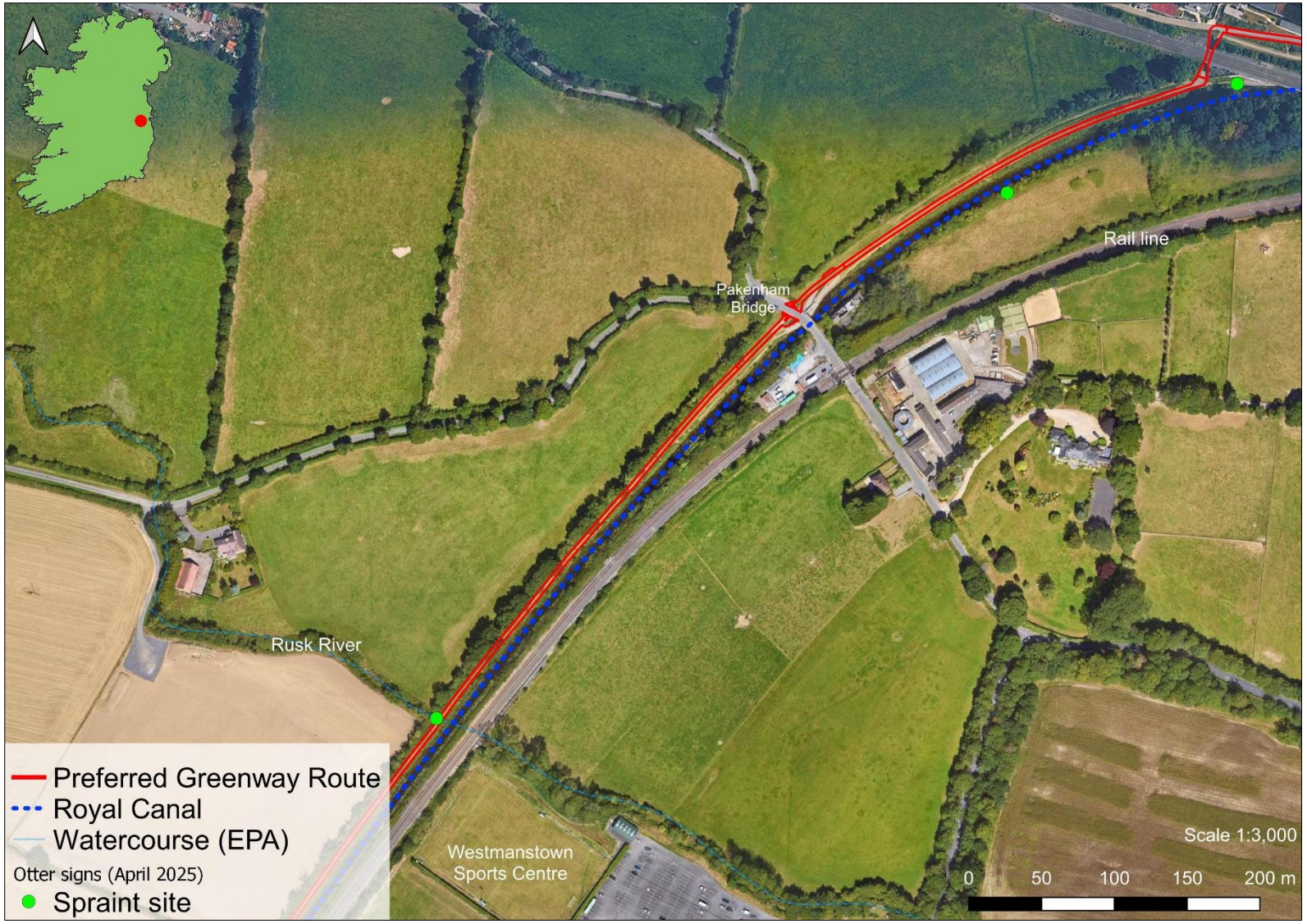


Figure 4.3 Otter signs recorded in the vicinity of Pakenham Bridge, April 2025

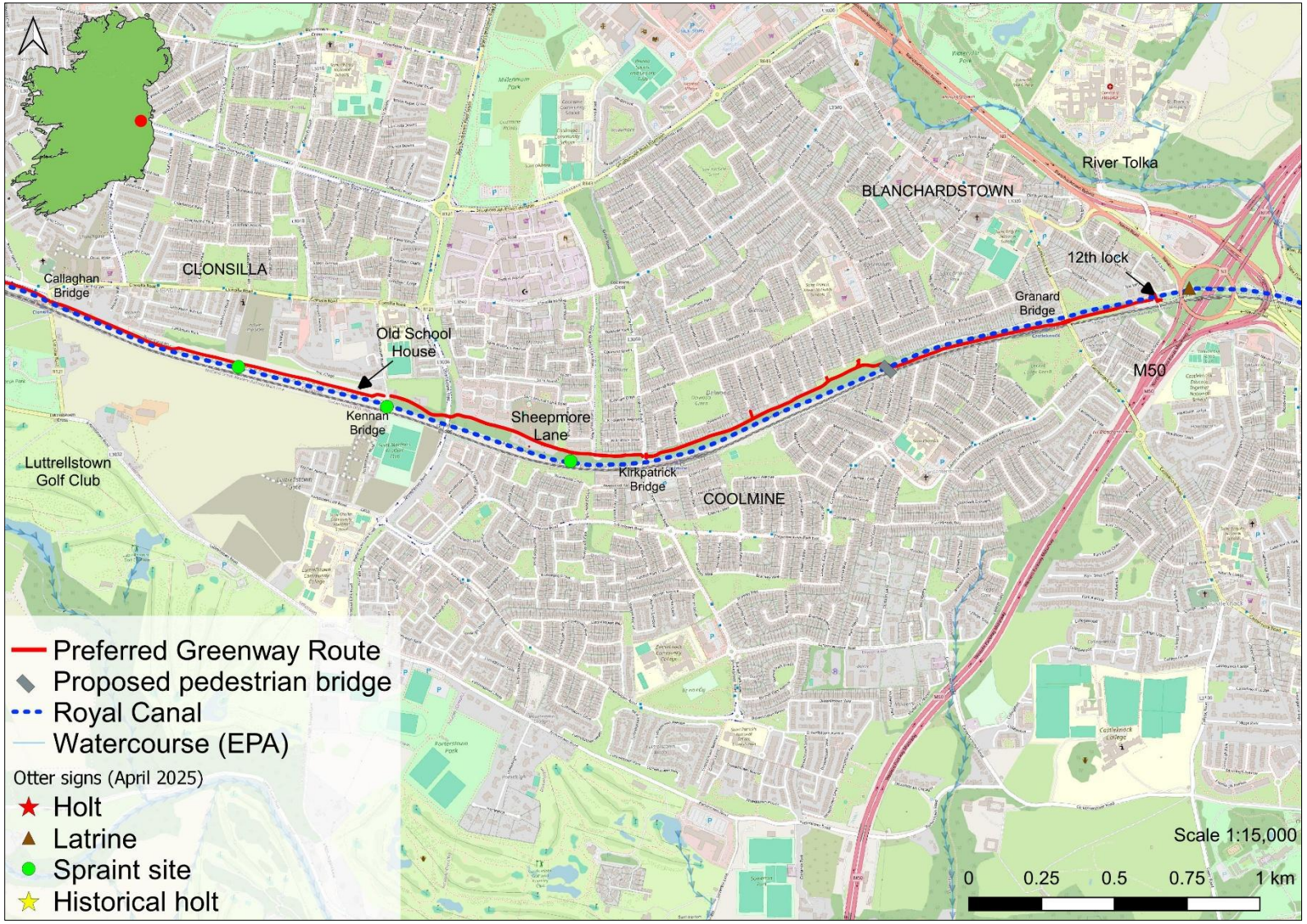


Figure 4.4 Overview of the otter signs recorded in April 2025 (Clonsilla to 12th lock) (**holt locations redacted**)



Figure 4.5 Otter signs recorded in the vicinity of Porterstown, April 2025



Figure 4.6 Otter signs recorded in the vicinity of Coolmine, April 2025 (**holt locations redacted**)

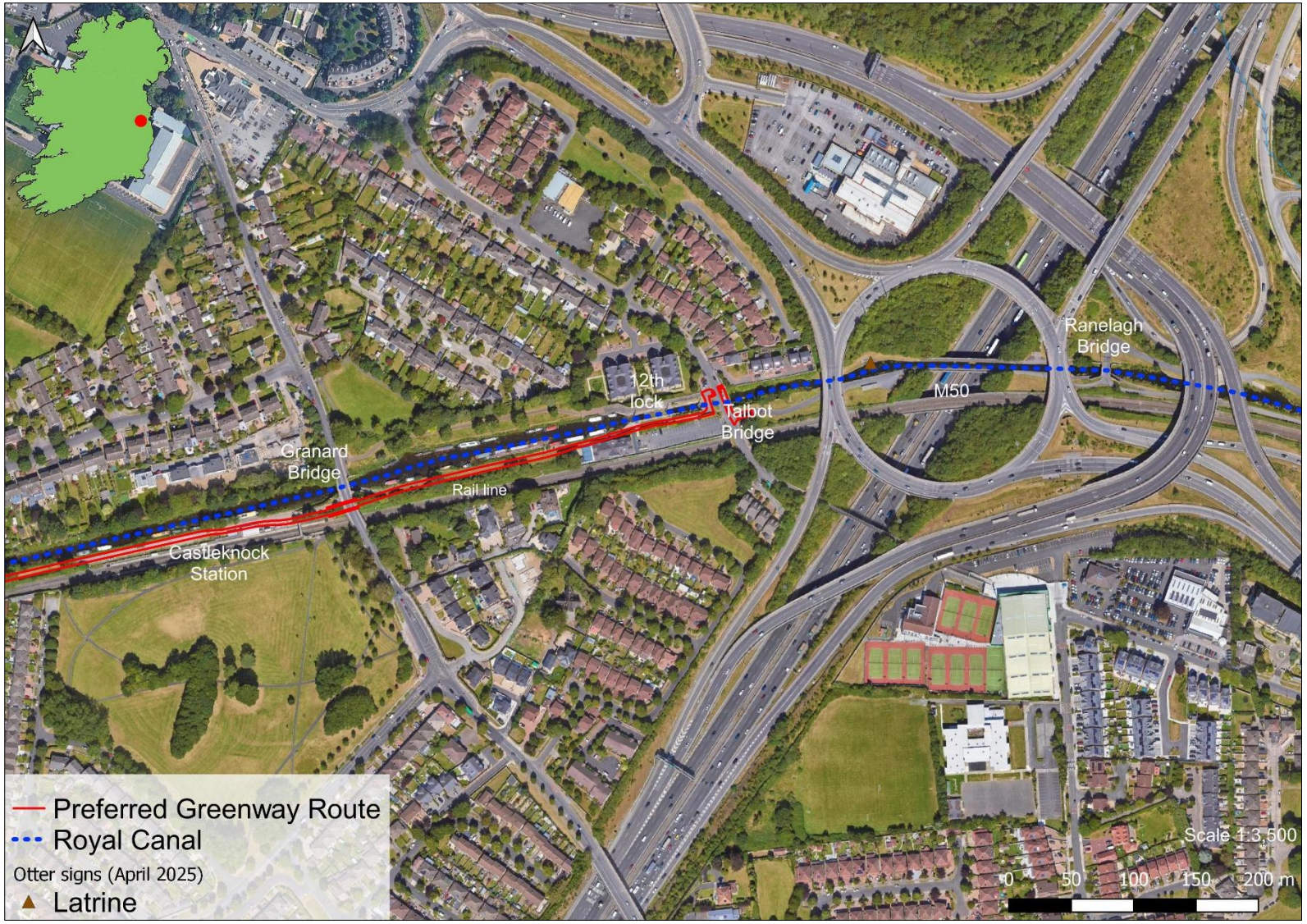


Figure 4.7 Otter signs recorded in the vicinity of the 12th lock, April 2025

5. Discussion & management recommendations

The current survey, utilising a comprehensive total coverage approach (TCOS methodology) from both bank and boat, has identified the most important areas for otter in vicinity of the proposed Royal Canal Urban Greenway. The results were very similar to previous data (2021-2024) in terms of the distribution and low frequency of otter signs along an 8.5km length of the Royal Canal. Incidentally, a greater frequency of otter signs (likely a proxy for increased otter activity) are known from the Royal Canal outside of the survey area, including eastwards between Castleknock and Broombridge and westwards between Maynooth and Kilcock (Triturus 2021-2024 data).

Whilst of value to otter, particularly in terms of foraging habitat (i.e. healthy fish stocks), the Royal Canal corridor is inherently homogenous with intermittent mature riparian vegetation, typically heavily modified (given its location in urban and peri-urban areas) and exposed to relatively high levels of human-related disturbance with towpaths and or DART/rail lines along much of the survey area (typically on the north and south banks, respectively). As outlined below, our findings suggest that otter sign distribution and the location of otter marking correlates strongly with less disturbed areas of habitat and lower levels of human-related disturbance, as noted previously in the survey area (e.g. Triturus, 2024, 2022). This includes areas of semi-natural fringe habitat that are poorly accessible to people and often on banks opposite the towpath. This pattern has clearly been identified in other Irish otter studies of urban and peri-urban areas, particularly throughout Dublin (e.g. Brazier & Macklin, 2020; Macklin et al., 2019), including along the Royal Canal (Triturus 2021-2024 data).

5.1 Otter breeding areas

As per the previous February 2024 survey, only a single holt was identified in the current survey. This was located in the sloping bank of a dry drainage ditch in low-disturbance woodland opposite [redacted] near [redacted], approximately 20m from the canal (**Figure 4.2; Plate 4.1**). The well-worn entrance again indicated some animal activity (as per 2024) although trail camera monitoring (under licence) would be required to confirm the presence of otter. Otter breeding areas (holts) are especially sensitive to direct human disturbance (Mason & Macdonald, 2009), with otter reproductive success known to be higher in less disturbed habitats; hence their preferential fidelity for low-disturbance areas (Scorpio et al., 2016; Ruiz-Olmo et al., 2011; Loy et at., 2009; Kruuk, 2006).

As noted in the previous survey report (Triturus, 2024), the 3 no. previously identified holts near [redacted] ([redacted] and [redacted]) were resurveyed in April 2025 but have been discounted from the current results given an absence of evidence of usage by otter and infilling entrances. Trail camera monitoring of these same locations in 2022 also failed to identify any utilisation by otter (Triturus, 2022). These holts can now be considered historical (**Figure** [redacted]). Whilst currently inactive and partially infilling/overgrowing with no signs of otter activity this does not mean these sites will not become active in the future (i.e. become re-excavated). This is especially so in light of the relative paucity of suitable breeding areas for otters along the Royal Canal corridor within the survey area.

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5.2 Otter sign distribution

Spraint sites (*n*=10) again accounted for the majority of all signs recorded (**Table 4.1**). These were typically associated with characteristic prominent areas including bridge ledges and, to a lesser degree, marginal boulders and grassy promontories. Generally, spraint sites were located in those areas of lowest relative disturbance, i.e. poor or no human accessibility. This was true even in survey sections exposed to high or very high overall levels of human disturbance (see Triturus, 2022 for mapped disturbance levels), e.g. bridges. Bridges are frequently marked by otters in higher disturbance habitats (Triturus data; Brazier & Macklin, 2020; Macklin et al. 2019) given a greater level of seclusion and cover relative to adjoining areas, and likely greater spraint (scent) preservation properties.

Several spraint sites, such as a derelict barge at Confey slipway, Collin's Bridge, the Rusk River culvert, Kennan Bridge and a boulder at Sheepmore Lane had been previously recorded in the 2021-2024 period and are evidently used as interannual marking areas. As a species, otters routinely mark the most prominent of features and are known to have a high level of marking site fidelity (Triturus data; Lampa et al., 2015; Remonti et al., 2011), a trait amplified in more homogenous/modified and disturbed habitats such as the Royal Canal.

There was a notable absence of signs in several extended reaches during the survey, such as and the 12th lock to Sheepmore Lane (2km), Porterstown to Piper's Court (1.5km) and the Rusk River culvert to Collin's Bridge (1.4km). These areas are relatively open/exposed with low riparian cover and higher levels of huma related disturbance with few marking opportunities/features. They are repeatedly found to support a low frequency of otter signs (Triturus data).

The deposition of spraint and other marking behaviour (e.g. scent marking via urination) is known to serve a variety of territorial and communicative functions in otter populations (Sittenthaler et al., 2020; Mumm & Knörnschild, 2018; Remonti et al., 2011; Kean et al., 2011; Hutchings & White, 2000; Kruuk, 1992). Sign marking, inclusive of spraint sites, latrines and anal jelly secretions, is routinely associated with prominent features (including holts & couches, where present), as well as at key foraging sites (Martin-Collado et al., 2020; Almeida et al., 2012; Guter et al., 2008; Kruuk, 2006; Macdonald & Mason, 1987; Erlinge, 1968). Should such suitable features be scarce or unavailable, or exposed to high levels of disturbance (such as along extended sections of the Royal Canal), otter signs may be sporadic or even absent entirely (Reuther et al., 2000) (e.g. between the 12th lock and Sheepmore Lane). This does not imply the absence of otter, rather habitat less appropriate to otter marking. Animals may regularly use lower value areas for foraging and or commuting between more amenable habitats (Hong et al., 2022; Van Looy et al., 2014; Kloskowski et al., 2013), as indicated by this and previous surveys of the Royal Canal.

5.3 Management recommendations

The otter data collated during this survey has added to the knowledge and baseline of the species along the Royal Canal corridor within Fingal County Council jurisdiction. The data will inform mitigation measures to protect otters and their habitat in light of the proposed completion of the Royal Canal Urban Greenway, as well as other future developments along the canal.

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Of particular note is the presence of an otter breeding area (holt) in woodland adjoining the preferred Greenway route, opposite [redacted]. Otters, along with their breeding and resting places, are protected under provisions of the Irish Wildlife Acts 1976-2023. Therefore, as proposed Greenway works will likely disturb this area (given the close proximity of <30m), a derogation licence will be required from the National Parks and Wildlife Service (NPWS) in advance of any works[1]. The avoidance of undisturbed areas supporting the breeding (and resting) areas of otters can be achieved by the consideration of alternatives, avoidance by project design (changing the project design to retain areas used by species), altering the way in which activities or works are undertaken and or using appropriate methods or machinery to avoid impacts (NPWS, 2021).

Whilst much of the Royal Canal within the survey area is exposed to higher levels of disturbance and, therefore, has reduced value for otter, such areas do support the species, as inferred by sign surveys over several years. As outlined above, even areas of canal with little inherent value are important to enable lateral and longitudinal colonisation, by allowing otters to commute between better habitats along riparian corridors (Hong et al., 2022; Macklin et al., 2019; Van Looy et al., 2014; Guter et al., 2008). The provision and retention of riparian tree cover (buffers) is particularly important for otter (Weinberger et al., 2019; Teresa et al., 2014; Remonti et al., 2011), especially in light of urbanisation and infrastructural developments (Hong & Joo, 2021). Well-developed and complex riparian zones can buffer anthropogenic (disturbance) impacts to otters and myriad other animals, facilitate healthy prey resources and likely play an increasingly important role in otter dispersion and commuting in light of climate change impacts (Cianfrani et al., 2018) and growing urbanisation pressures. These ecological corridors will provide avenues that allows wide-ranging animals to travel and genetic mixing to occur, whilst facilitating the movement of populations in response to environmental stressors, thus giving threatened species the opportunity to be replenished from other source areas (Liu et al., 2018; Walker & Craighead, 1997).

In summary, the Royal Canal corridor remains one of the most important ecological corridors in the vicinity of Dublin. As urban gentrification debates have been predominantly anthropocentric (Hubbard & Brooks, 2021), the development of Greenways that have putative 'trans-species' benefits must have the welfare of protected species central to their core philosophy to avoid inadvertent displacement by design.

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[1] Trail camera monitoring (under NPWS licence) would be required to confirm the presence or absence of otter at this holt location pre-construction

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Royal Canal (1st to 16th lock) otter survey 2025



Triturus

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Prepared by Triturus Environmental Ltd. for

Roughan & O'Donovan Consulting Engineers

February 2026

*** Given the content of highly sensitive and legally protected breeding & resting areas, the location of sensitive data has been redacted by the authors**

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1. Introduction

1.1 Project background

Triturus Environmental Ltd. were commissioned by Roughan & O'Donovan Consulting Engineers (ROD) to undertake annual baseline otter (*Lutra lutra*) surveys of the Royal Canal between the 1st lock (Spencer Dock, Dublin City) and the 16th lock (Kilcock, Co. Kildare). The survey area encompassed a total of 33km of the Royal Canal and associated corridors. In light of various proposed infrastructural projects in the vicinity of the Royal Canal in the coming years, it was deemed pertinent to complete annual baseline assessments of otter signs to better inform development design, mitigation and otter conservation.

The baseline survey helped to identify the presence of otters and map their range in the survey area by identifying the occurrence of field signs (e.g. holts, couches, spraints, prints and other signs). The distribution of these signs functioned as an indicator regarding areas of canal and aquatic habitat used by otters, including potential breeding areas. The survey was undertaken in the November-December 2025 period and this report constitutes the third of four annual reports (2023-2026 inclusive).

1.2 Legislative protection

The Eurasian otter is a species of conservation concern and high priority, having suffered major declines in its range and population throughout Europe since the 1950s. It is classified as 'near threatened' by the IUCN Red List with a decreasing population trend and, as such, is listed in Appendix I of CITES, Appendix II of the Bern Convention (Council of Europe, 1979) and Annexes II and IV of the EC Habitats Directive (92/43/EEC).

In Ireland, otters, along with their breeding and resting places, are protected under provisions of the Wildlife Acts 1976 to 2023. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Directive 92/43/EEC, which is transposed into Irish law by the European Union (Birds and Natural Habitats) Regulations 2011 to 2021 (S.I. No. 477 of 2011).

The protection of otters under S.I. No. 477 of 2011 is outlined in Article 51(1) and (2): Protection of fauna referred to in the First Schedule;

51.(1) *The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule.*

51.(2) *Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a license granted by the Minister under Regulation 54, a person who, in respect of the species referred to in Part 1 of the First Schedule (listed below). Items (b) and (d) may be considered most relevant to developments.*

- ***(a)*** *deliberately captures or kills any specimen of these species in the wild,*
- ***(b)*** *deliberately disturbs these species, particularly during the period of breeding, rearing, hibernation and migration,*
- ***(c)*** *deliberately takes or destroys eggs of those species from the wild,*

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(d) *damages or destroys a breeding site or resting place of such an animal, or*

(e) *keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive, shall be guilty of an offence.*

In an Irish context, according to the most recent Article 17 reporting (NPWS, 2025), otters remain at 'Favourable' conservation status with a stable trend. Otters were considered to be previously 'Near Threatened' (Marnell, 2009) based on a 20-25% decline between 1980 and 2005 (Bailey & Rochford, 2006). However, the current conservation status in Ireland is now of 'Least Concern' (Marnell et al., 2019). Otters remain 'Near Threatened' at a global level according to the IUCN Red List (Loy et al., 2022).

1.3 Study area description

The Royal Canal is some 150km long and links the River Liffey in Dublin City with the River Shannon in Co. Longford. The canal is fed by Lough Owel, Co. Westmeath and flows east to Dublin and west to the River Shannon. Though originally constructed for the transport of goods (work was completed in 1817), the Royal Canal was closed to typical navigation in 1961. The present-day canal serves as a highly valuable recreational amenity site and regionally important ecological corridor. The entire length of the Royal Canal is designated as a proposed Natural Heritage Area (pNHA) (site code: 002103) (NPWS, 1995).

The Royal Canal is known to support a range of fish species, including pike (*Esox lucius*), perch (*Perca fluviatilis*), roach (*Rutilus rutilus*), rudd (*Scardinius erythropthalmus*), bream (*Abramis brama*), roach x bream hybrids, three-spined stickleback (*Gasterosteus aculeatus*), tench (*Tinca tinca*) and Red-listed European eel (*Anguilla anguilla*) (Triturus data; McCloone, 2011; Tierney et al., 1999). These species provide a good prey resource for otter. Whilst white-clawed crayfish (*Austropotamobius pallipes*) are known from the western extent of the Royal Canal (NCPSP[1], EPA & NPWS data), no records are available for the canal in the vicinity of Dublin (NBDC, NPWS data, pers. obs.), despite some good physical habitat and physicochemical suitability.

In terms of water quality, the Royal Canal within and outside of the survey area was of good ecological potential under the 3rd cycle of the Water Framework Directive (WFD) in the 2019-2024 period.

Otters are widespread along the Royal Canal, including within the survey area (see section 3.1 for more details).

[1] National Crayfish Plague Surveillance Programme

2. Methodology

2.1 Desktop review of otter records

A desktop review of published and unpublished data for the Royal Canal and associated habitats was undertaken in respect of otter. Data pertaining to otters held by the National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre (NBDC) and Environmental Protection Agency (EPA) were also reviewed.

2.2 Otter signs

The annual survey area comprised approximately 33km of contiguous canal between the 1st lock at Spencer Dock (River Liffey confluence) and the 16th lock at Kilcock, Co. Kildare (**Figure 2.1**). Otter sign surveys of the Royal Canal, using total corridor otter survey (TCOS) methodology (see below), were undertaken in the November-December 2025 period. This period is considered optimal for surveys, given a greater propensity for otter marking (pre-breeding) and a higher likelihood of sign detection due to decreased vegetation cover. The survey was completed during dry, mild, bright and settled conditions, which ensured that a good representation of habitat marked by otter could be recorded in the field, including territorial marking or marking of feeding and potential breeding areas.

Each otter sign was logged by type, location (handheld GPS), condition and approximate age for later interpretation to distinguish differences in habitat use and activity. Spraints were subjectively assessed as either very fresh, fresh, mixed-age (recent and older spraints, typically indicative of a regular sprainting site) or old (spraint not recently deposited and degrading). Furthermore, indicative counts of spraint (i.e. number of individual spraints) and the number of sprainting sites (often separate clusters in one area) were noted. This helped indicate the frequency of otter marking, which can clarify levels of activity in particular areas, inclusive of breeding (holt) and resting (couch) areas.

2.3 Total corridor otter survey (TCOS) methodology

The survey broadly followed the best practice 'standard survey' methodology for otter as recommended by Bailey & Rochford (2006), Chanin (2003) and Lenton et al. (1980) (all based on observations by Erlinge, 1967). However, methodology differed in that the entire waterline was surveyed rather than the standard 500-600m sections selected at regular (5-8km) intervals from accessible points (e.g. bridges). The novel survey technique, known as a total corridor otter survey (TCOS) (Macklin et al., 2019), involved a continuous, unbiased survey effort along both banks of the Royal Canal, encompassing the entire channel and riparian zones. A boat or kayak facilitated the survey of areas of channel or bank with poor access.

Total corridor survey methodology typically involves the use of two (or more) surveyors working independently (in tandem) along each respective bank of an individual watercourse (where practical). This also facilitates one to work from a more elevated position (e.g. bank top) with one surveying (with appropriate PPE such as a dry suit or chest waders) from within the channel/watercraft. This holistic, labour-intensive approach greatly increases the likelihood of otter sign detection and facilitates a more accurate estimation of otter usage and activity at the river or catchment scale. This is especially

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true of more cryptic signs, such as holts and couches that are often located in poorly accessible areas not covered by a standard survey approach.

2.4 Biosecurity

A strict biosecurity protocol following IFI (2010) and the Check-Clean-Dry approach was adhered to during surveys for all equipment and PPE used. Disinfection of all equipment and PPE before and after use with Virkon™ was conducted to prevent the transfer of pathogens or invasive propagules. Any aquatic invasive species or pathogens recorded within or adjoining the survey areas were geo-referenced. All Triturus staff are certified in 'Good fieldwork practice: slowing the spread of invasive non-native species' by the University of Leeds.

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Figure 2.1 Overview of the Royal Canal otter survey area, 2025

3. Desktop review

The number of otter records within the survey area from resources like the National Biodiversity Data Centre (NBDC) and National Parks and Wildlife Service (NPWS) are low (<10, data not shown) and many otter records along the Royal Canal are anecdotal. It has been previously noted that otter activity along the Royal Canal is much less evident than in the neighbouring River Tolka or River Liffey (Keeley, 2004).

However, targeted otter surveys completed by Triturus along various sections of the Royal Canal in recent years (2019-2024) have revealed a significant number of otter signs, inclusive of legally protected breeding and resting areas. For example, a total of 39 no. signs, including spraint sites, slides, couches and a number of potential holts were recorded along the Royal Canal corridor between the M50 (12th lock, Castleknock) and the River Liffey confluence (Spencer Dock) in January 2022 (Triturus, 2022).

Previous annual otter surveys completed by Triturus in January to April 2023 and January-April and November 2024 recorded a total of *n*=54 and *n*=59 otter signs, respectively, within the 33km survey area (Triturus, 2024a; Triturus, 2024b). These surveys also recorded a low number of holts and couches.

Otter utilisation of the canal is widespread between Spencer Dock (River Liffey confluence) and Kilcock, Co. Kildare, although several areas repeatedly feature a greater concentration of otter marking (e.g. near Maynooth & 7th lock to Kennan Bridge) and are more valuable as breeding and resting areas. Many marking and breeding/resting sites along the Royal Canal are used inter-annually, as evidenced by previous surveys (pers. obs.).

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4. Results

4.1 Otter signs

A total of *n*=63 otter signs were recorded within the survey area during the current November-December 2025 otter survey, comprising a total of 33km of contiguous canal habitat (**Table 4.1; Figures 4.1-4.3**). This equated to a mean of 1.9 otter signs per kilometre of linear canal habitat (i.e. 64 signs along 33km of canal), a frequency similar to the 2024 survey (59 signs, 1.8 per km) and the 2023 survey (54 signs, 1.6 per km). A total of 30 no. of these otter sign/marking sites were at the same locations as 2024.

Signs were well distributed along the survey area, with many previously identified marking areas and features utilised again in 2025 (**Figure 4.1**). In keeping with the previous 2024 survey, no evidence of regular otter activity was recorded between the 1st lock (Spencer Dock) and the 6th lock at Phibsborough (**Figure 4.2**). However, a low number of old spraints were recorded in the vicinity of Croke Park, between the 1st and 2nd locks during the 2025 survey (**Figure 4.2**). A high number of signs were recorded between the 14th and 16th locks near Kilcock, consistent with the findings of the 2024 survey (**Figure 4.3**). This indicates the continued presence of a likely breeding territory in the vicinity of Bailey's Bridge (see Discussion for further detail).

The majority of signs were represented by spraint sites (39) and latrines[2] (9) with a low number of slides (5) and an anal jelly deposition also identified (**Table 4.1**). A total of 5 no. holts (breeding areas) were recorded along the canal corridor during the survey, all of which had been identified previously (i.e. no new holt sites identified). A low number of couches (resting areas, 5 no.) were recorded. All couches were at the same locations as per the 2023 and or 2024 surveys.

A database of all signs recorded is available from the authors, summarising sign type, age, frequency and specific location.

Table 4.1 Summary of the otter signs recorded in the Royal Canal survey area, November-December 2025 compared with previous years

	Total no. signs		
Otter sign	**2025**	**2024**	**2023**
Spraint site	39	28	36
Latrine	9	15	2
Holt	5	5	8
Couch	5	5	5
Slide	5	5	2
Anal jelly	1	1	1
Total	**63**	**59**	**54**

[2] Latrines are defined as regularly used faecal/spraint deposition sites with digging behaviour, often on sand, mud or grass (pers. obs.) and are often associated with resting places of otter (Findlay et al., 2023)

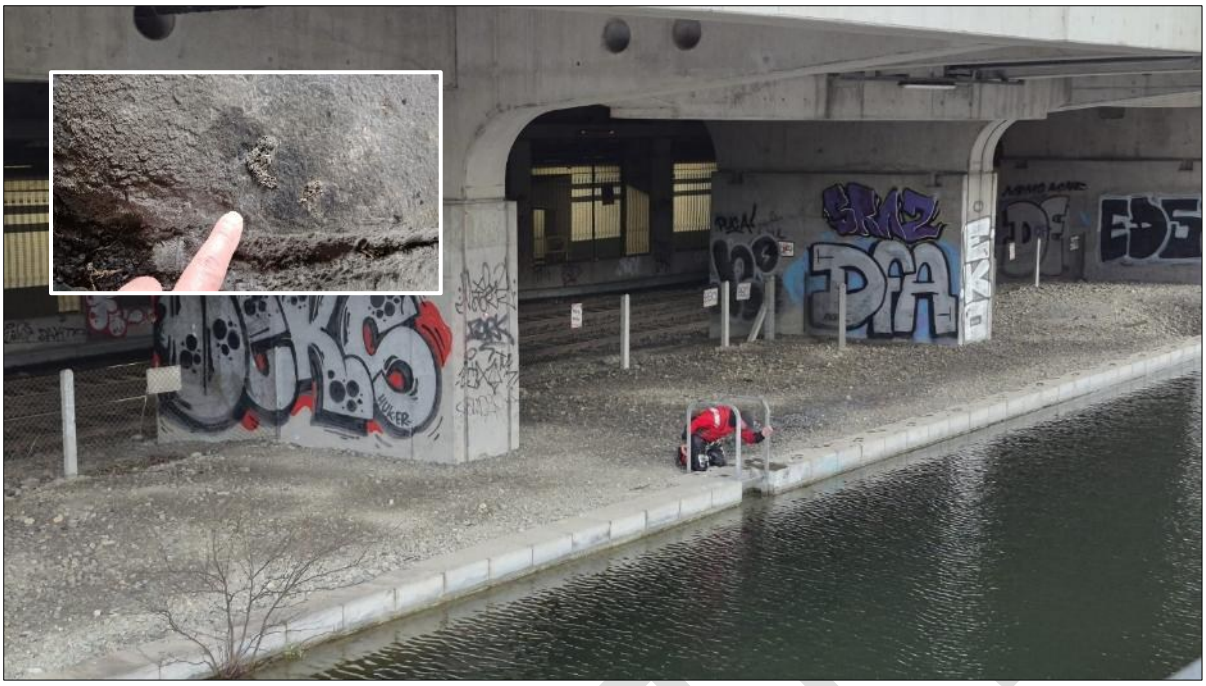


Plate 4.1 Inspecting an old sprainting site at a quay wall ladder under the overhang at Croke Park, December 2025



Plate 4.2 Recently completed Greenway construction works on the Royal Canal between the 1st and 2nd locks in December 2025 (poor quality otter habitat with high levels of disturbance)



Plate 4.3 Typical urban section of the Royal Canal west of the 6th Lock with narrow riparian zones and high levels of disturbance



Plate 4.4 Regular spraint site on boulder/grassy bank east of the R102 road crossing



Plate 4.5 Ongoing Royal Canal Urban Greenway works west of Callaghan Bridge, with significant clearance of riparian vegetation



Plate 4.6 Potential otter holt in [redacted] near [redacted] (previously identified in 2023 and 2024 & still inactive)



Plate 4.7 Regular sprainting site under Coolmine Pullway Bridge with mixed age spraint on discarded carpet



Plate 4.8 Regular latrine site on the grassy banktop with well-worn tracks to canal, west of Bailey's Bridge



Plate 4.9 Example of regular otter latrine (with urine scorching) on open grassy bank opposite the towpath/R148 road near Kilcock



Plate 4.10 Fresh spraint with anal jelly in grass verge below Shaw's Bridge, Kilcock

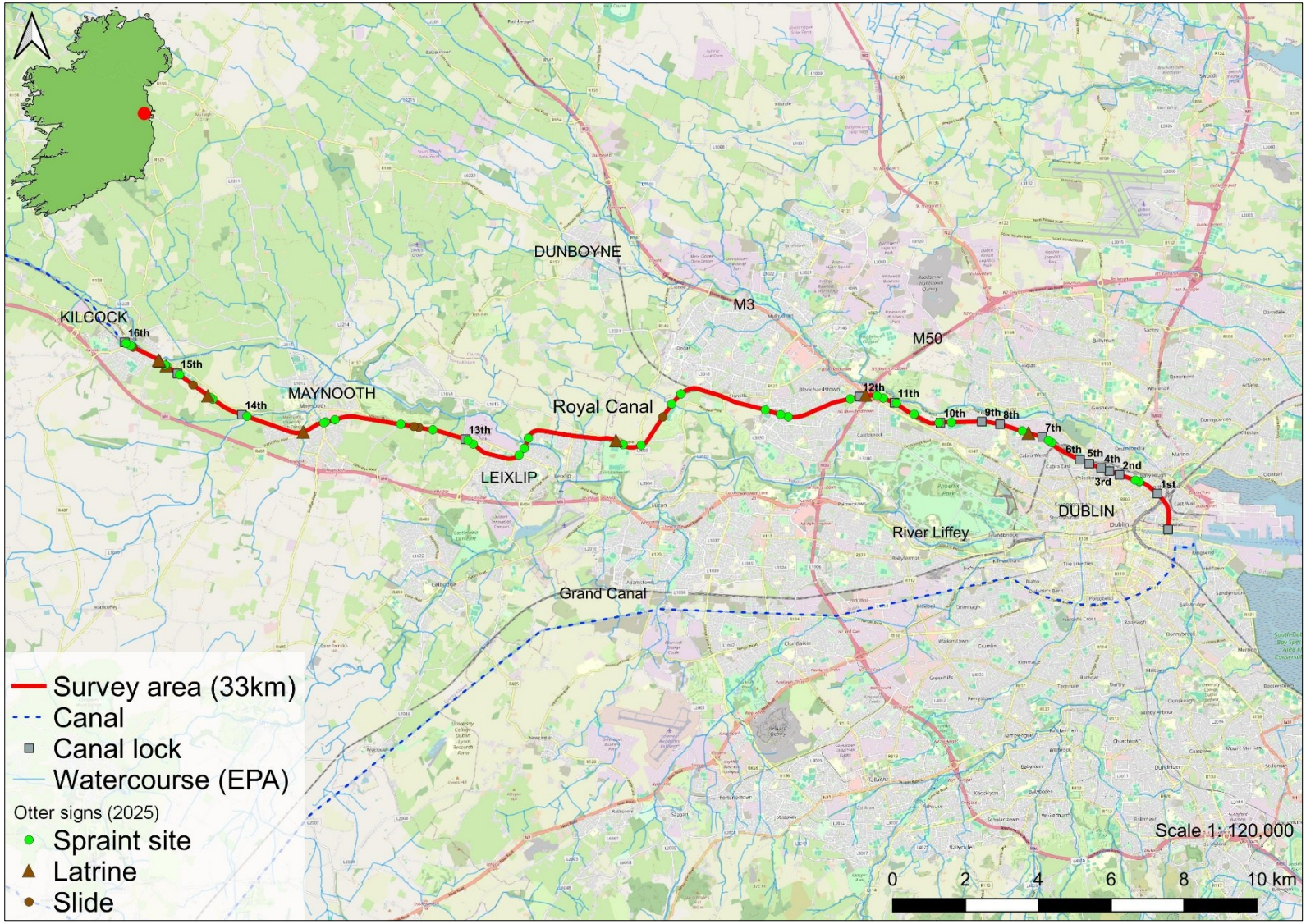


Figure 4.1 Overview of the otter signs recorded in the Royal Canal survey area, November-December 2025 (holts & couch sites redacted)

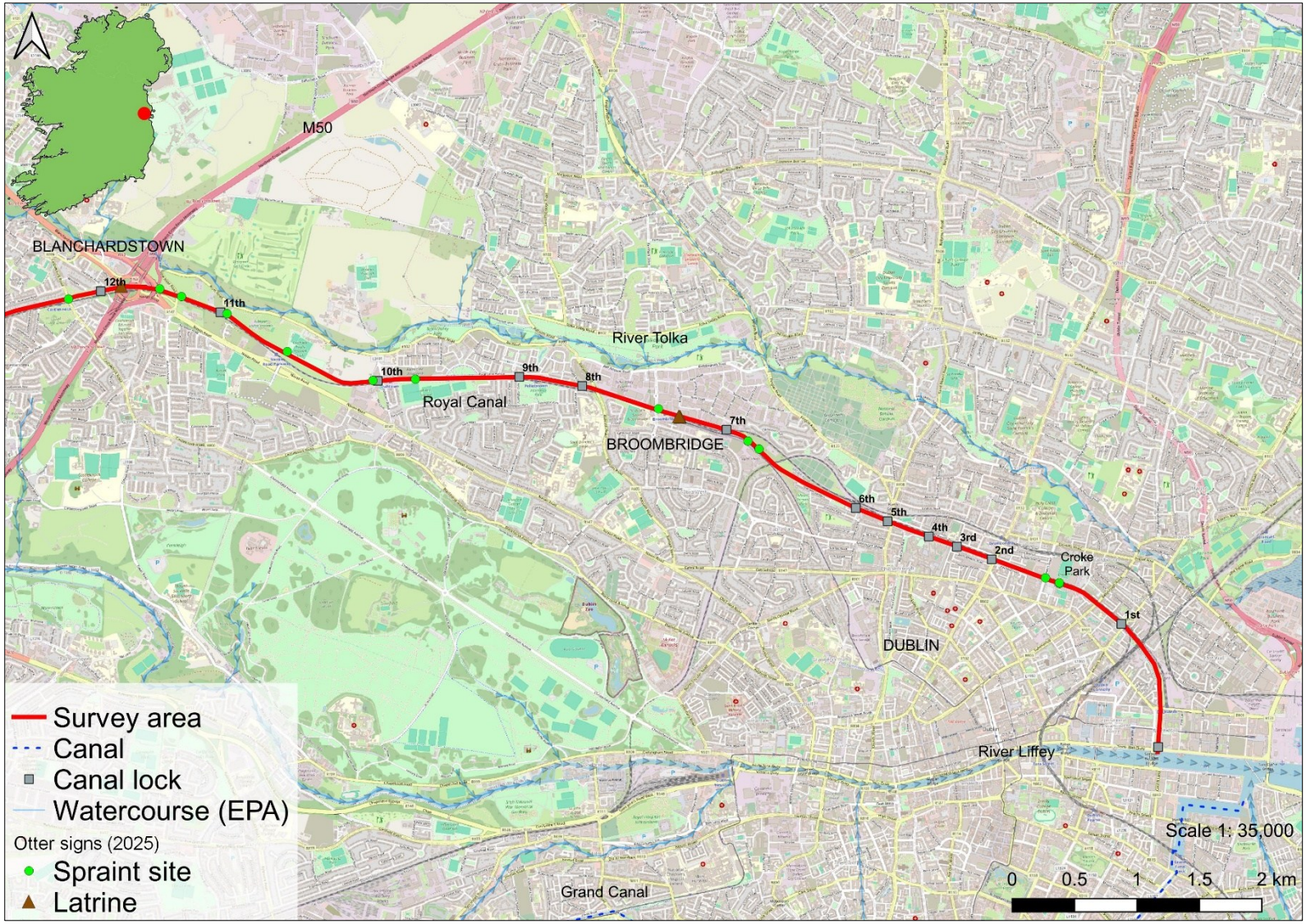


Figure 4.2 Otter signs recorded in the eastern extent of the survey area (1st lock to 12th lock) in 2025 (holts & couch sites redacted)

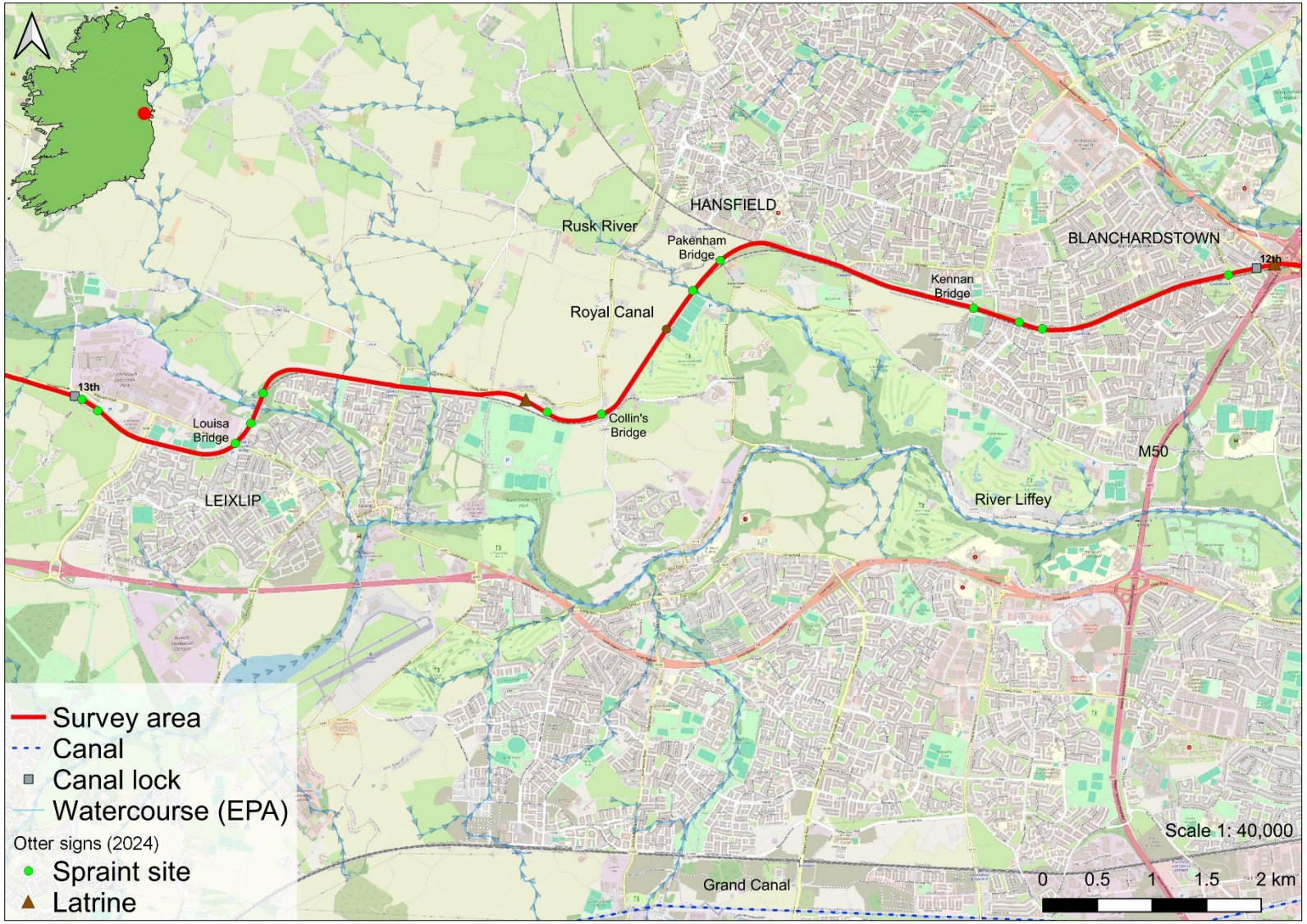


Figure 4.3 Otter signs recorded in the western extent of the survey area (12th lock to 13th lock) in 2025 (holts & couch sites redacted)

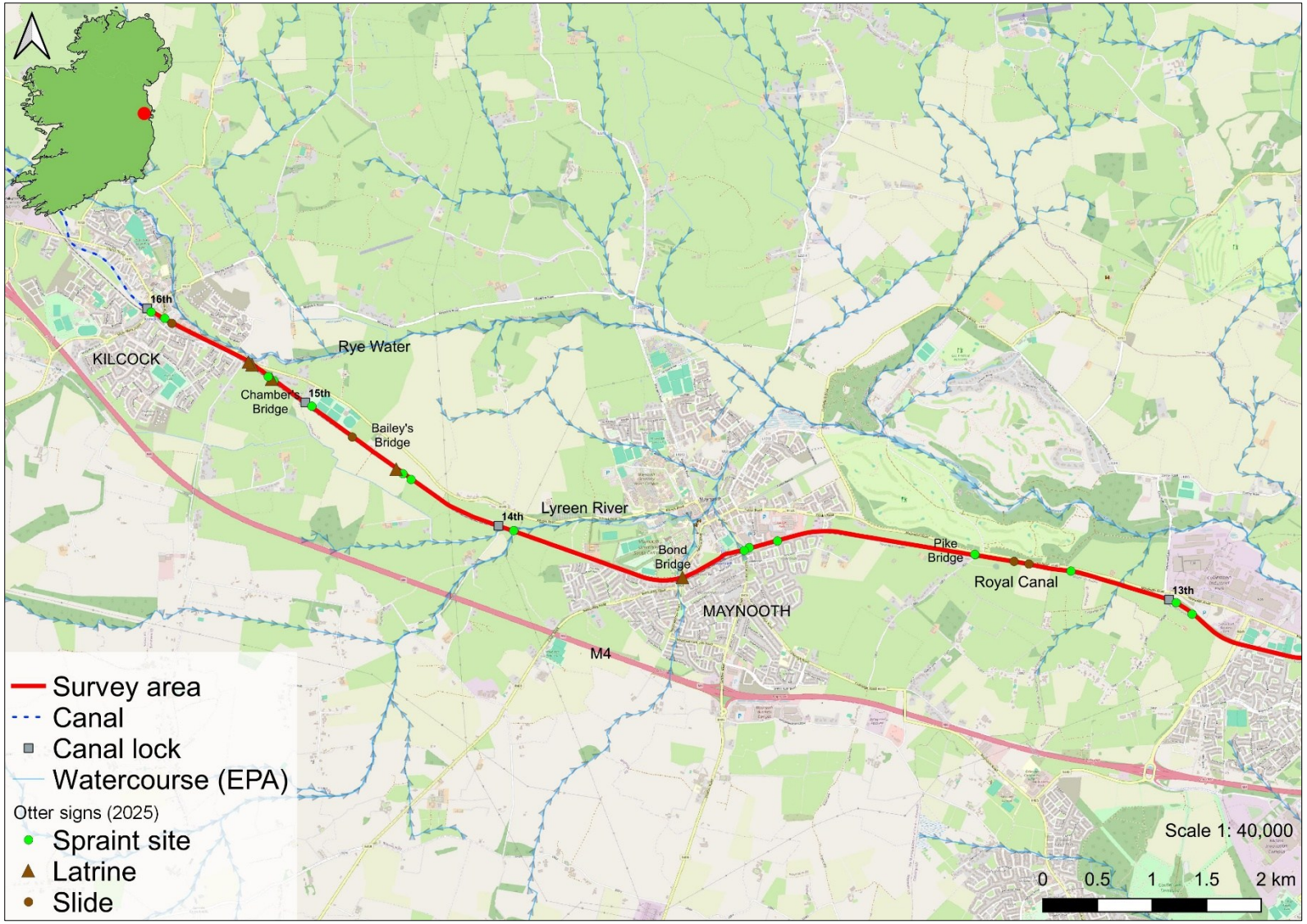


Figure 4.4 Otter signs recorded in the western extent of the survey area (13th lock to 16th lock) in 2025 (holts & couch sites redacted)

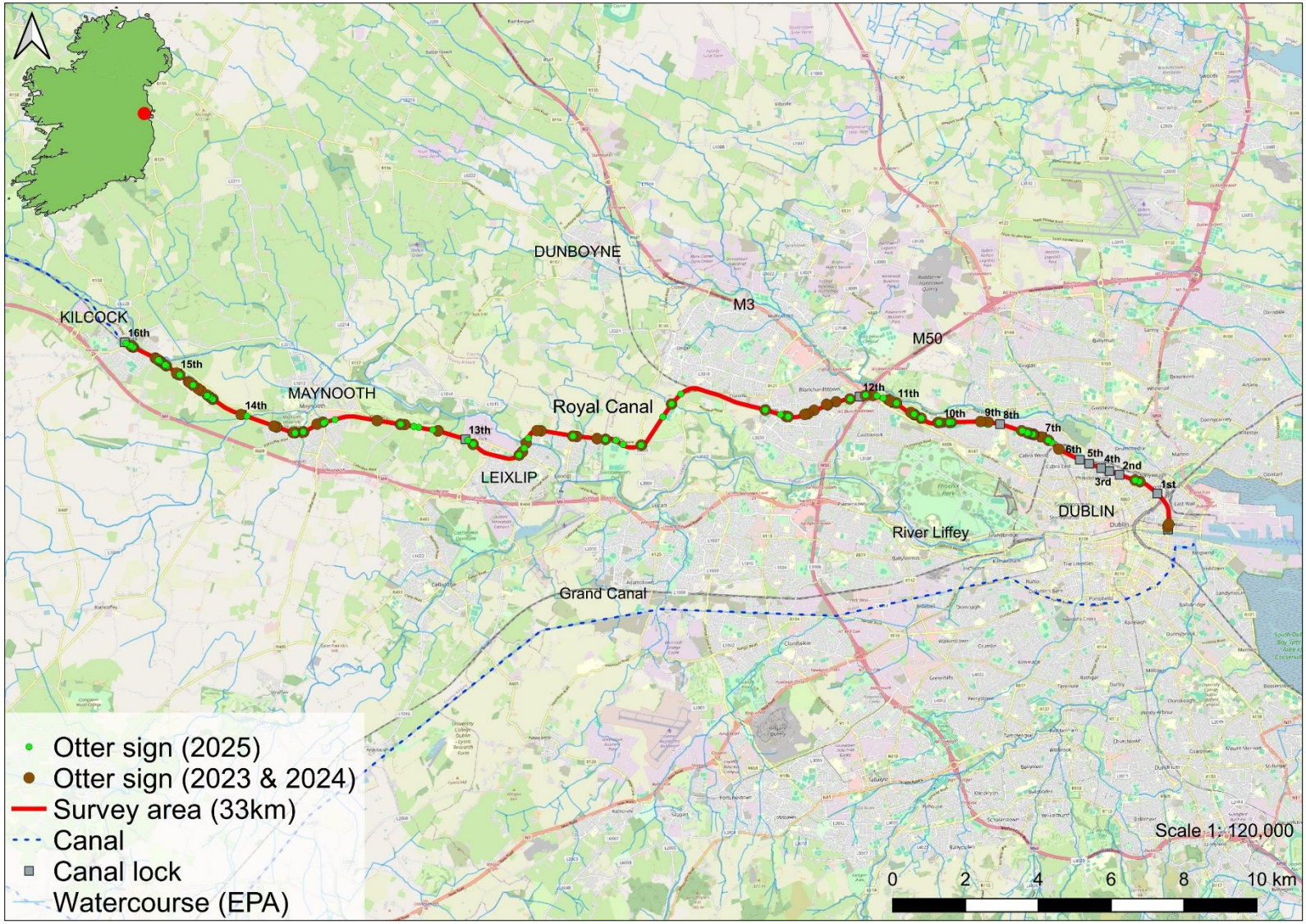


Figure 4.5 Summary and comparison of otter sign locations recorded in the Royal Canal survey area in 2023, 2024 & 2025

5. Discussion

The 2025 baseline otter survey builds on the previous knowledge of otter along the Royal Canal between the 1st and 16th locks. Our comprehensive approach, utilising total corridor otter survey (TCOS) methodology along both banks (inclusive of boat/kayak surveys), has facilitated the identification of the most important areas for otter along 33km of canal corridor. The current survey has again highlighted the propensity otters along the Royal Canal have for marking and using the same areas/sites inter- and intra-annually, with sign distribution and the location of key areas of habitat largely unchanged from previous surveys. The data collated will further inform mitigation measures to protect otters and their habitat in light of future developments along the Royal Canal.

Whilst of value to otter, particularly in terms of foraging habitat (i.e. healthy fish stocks), the Royal Canal corridor is inherently homogenous with intermittent mature riparian vegetation, typically heavily modified (given its location in urban and peri-urban areas) and exposed to relatively high levels of human-related disturbance with towpaths and DART lines along much of the survey area (typically on the north and south banks, respectively). As outlined below, our findings suggest that otter sign distribution and the location of otter marking correlate strongly with less disturbed areas of habitat and lower levels of human-related disturbance. This includes areas of semi-natural fringe habitat that are poorly accessible to people and often on banks opposite public access. This pattern is evident in other Irish otter studies of urban and peri-urban areas, particularly throughout Dublin (e.g. Brazier & Macklin, 2025; Brazier & Macklin, 2020; Macklin et al., 2019), including along the Royal Canal (Triturus, 2024a, 2024b, 2022).

5.1 Otter sign distribution (2025)

The 2025 survey recorded a total of *n*=63 otter signs along approximately 33km of contiguous canal habitat (**Table 4.1; Figures 4.1-4.3**). Signs, including spraint sites, latrines, slides, holts and couches, were well distributed along the survey area (**Figure 4.1**) with sign distribution similar to both 2023 and 2024 (**Figure 4.5**).

The localised changes observed during the 2024 survey (i.e. a marked increase in the number of signs recorded between the 14th and 16th locks near Kilcock) remained evident during the 2025 survey, indicating continued regular use of these sections of the canal by otter. A relatively high concentration of signs remained present between Broombridge and Castleknock, which is currently the primary area of otter activity east of the M50. Signs were more evenly distributed between Leixlip and Maynooth (**Figure 4.4**) but were scarce in the inner Dublin City area, east of the 7th lock (**Figure 4.2**). Similar distribution patterns of otter signs along the Royal Canal have been observed previously (Triturus data).

Few signs were observed between the 1st lock (Spencer Dock) and the 6th lock at Phibsborough (**Figure 4.1**), with only very old otter spraint recorded at Croke Park and under Bloody Sunday Bridge (**Plate 4.1**). Previous Greenway construction works between the 1st and 2nd locks that restricted access for surveys throughout 2024 had been completed prior to the current survey (**Plate 4.2**). However, high levels of disturbance, the paucity of suitable marking sites (e.g. for spraint deposition) and barriers to otter passage (i.e. particularly high locks) are likely to limit regular otter activity within these sections of the canal. Similarly, higher levels of disturbance and scarce marking opportunities resulted in the

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absence of signs between Kennan Bridge and Collin's Bridge (except for a spraint site on the Rusk River, flowing under the canal and a slide adjacent to the Westmanstown Sports Centre) (e.g. **Plate 4.5**). This c.4km section provides relatively poor quality fisheries habitat compared with elsewhere on the canal (high levels of shading, low wind fetch, low macrophyte cover, etc.) and poorer quality foraging habitat for otter, whose primary prey resource is fish (Krawczyk et al., 2016). These canal sections routinely contain a relatively low number of otter signs.

Otter sign intensity was often higher in the vicinity of riverine watercourses or watercourse crossings (aqueducts). For example, the low number of signs recorded between the 10th and 12th locks are situated close to the River Tolka (a highly important otter habitat) and those near Kilcock were located adjacent to the Rye Water (**Figure 4.2, 4.4**). A new sprainting site was identified in 2025 on the canal bank top near the Lyreen River culvert east of the 14th lock. It is likely that these areas provide improved otter prey resources[3] given a greater range of profitable foraging habitats in close proximity (i.e. canal plus river). This is supported by the regular cross-road movement of otters between the Royal Canal and the adjacent Rye Water, which resulted in the installation of Ireland's first 'otters crossing' road signage (**Plate 5.1**). Presumably the marking of such crossings and confluences by otters advertises their foraging value to conspecifics and provides easily recognisable features for other otters to detect and mark.



Plate 5.1 'Otter crossing' signage between the Royal Canal and the Rye Water River, Kilcock, Co. Kildare, an indication of high otter traffic between the respective watercourses (source: Sunday Times)

[3] sprainting activity increases significantly in areas with higher fish biomass availability (Almeida et al. 2012; Hutchings & White 2000)

5.2 Otter marking site fidelity

Many previously identified marking areas and features were utilised by otters again in 2025, i.e. inter-annual marking sites. These are visually highlighted in **Figure 4.5** above. A total of 30 no. otter sign/marking areas were at the same locations as 2024, with many also utilised in 2023. These included bridges such as Kennan Bridge, Collin's Bridge, Bond Bridge, Pike Bridge and other characteristic pronounced areas, including culverts, canal locks, tree root systems, marginal boulders and grassy promontories/tussocks. As a species, otters routinely mark the most prominent of features and are known to have a high level of marking site fidelity (Triturus data; Wang et al., 2021; Sittenthaler et al. 2020; Lampa et al., 2015; Remonti et al., 2011; Kruuk, 2006), a trait amplified in more homogenous/modified habitats such as the Royal Canal.

Generally, otter marking was located in those areas of lowest relative disturbance (poor or no human accessibility), such as the bank opposite public footpaths/Greenways. This was true even in survey sections with narrow riparian buffers (typically <10m) adjoined by higher overall levels of disturbance, such as roads or rail lines. Bridges are frequently marked by otters in higher disturbance habitats (Triturus data; Kraševec et al., 2022; Brazier & Macklin, 2020; Macklin et al., 2019), given a greater level of seclusion and cover relative to adjoining areas.

The deposition of spraint and other marking behaviour (e.g. scent marking via urination, typically observed as 'scorching' of vegetation due to high nitrogen concentrations; e.g. **Plate 4.9**) is known to serve a variety of territorial and communicative functions in otter populations (Sittenthaler et al., 2020; Mumm & Knörnschild, 2018; Remonti et al., 2011; Kean et al., 2011; Hutchings & White, 2000; Kruuk, 1992). Sign marking, inclusive of spraint sites, latrines and anal jelly secretions, is routinely associated with prominent features (including holts & couches, where present), as well as at key foraging sites (Martin-Collado et al., 2020; Almeida et al., 2012; Guter et al., 2008; Kruuk, 2006; Macdonald & Mason, 1987; Erlinge, 1968). Should such suitable features be scarce or unavailable, or exposed to high levels of disturbance (such as along extended sections of the Royal Canal), otter signs may be sporadic or even absent entirely (Kim & Hong, 2024; Reuther et al., 2000) (e.g. between Kennan Bridge and Collin's Bridge). As noted previously (Triturus, 2024a, 2024b), this does not imply the absence of otter, rather habitat less appropriate to otter marking. Animals may regularly use lower value areas for foraging and or commuting between more amenable habitats (Hong et al., 2022; Van Looy et al., 2014; Kloskowski et al., 2013), as indicated by this and previous surveys of the Royal Canal. The evaluation of areas for otter should remain cognisant of the overall quality and potential of otter habitat rather than simply inferring presence/absence based on detectable signs.

5.3 Breeding and resting areas

A total of 5 no. holts (potential breeding areas) were recorded along the canal corridor during the 2025 survey, all of which had been previously identified by Triturus in separate surveys during the 2020-2024 period. No new holts were identified in 2025. Otter activity was particularly high in the vicinity of [redacted] with multiple regular latrines, spraint sites, trails and slides. As postulated in 2024, it was considered highly likely that a new breeding territory has been established in this area. Based on observed signs, otters appeared to be traversing the rail line and accessing mature (albeit steep) field boundary hedgerows and treelines to the south of the track, likely accessing holt (breeding) areas. Further investigations in this area are required (with permission from Irish

Rail/larnród Éireann). No signs of recent otter utilisation were identified in 2025 at the other holt sites located near [redacted], [redacted] or [redacted], although trail camera monitoring would be required to confirm the utilisation of these sites by breeding otter.

Several previously identified holts near Ashtown (1) and Coolmine (3) again showed no signs of utilisation or activity in 2025 (as per 2024), with infilling occurring. Thus, these sites have not been included in the current database or mapping. As per previous surveys, no holts or couches were identified east of Broombridge, where human disturbance levels peaked (i.e. Dublin City), although an active holt is known near the Royal Canal-Liffey confluence in a quay wall at [redacted] (Triturus data, not shown). Despite the aforementioned inter-annual utilisation of marking, breeding and resting areas, otter behaviour can and does change based on various factors, and this reinforces the need for regular resurvey effort.

Whilst many of the identified holts showed no signs of otter use at the time of survey, this does not mean these locations will not become active or occupied in the future. This is especially so in light of the relative paucity of suitable breeding areas for otters along the Royal Canal corridor in terms of disturbance levels and excavation feasibility (e.g. compacted/modified banks). Continued annual otter monitoring along the Royal Canal will help to establish the status of existing holts and help detect the presence of newly excavated/utilised breeding areas.

A low number of couches (5) were identified during the 2025 survey (**Appendix A**). All couches were at the same locations as per the 2024 survey. All were regularly used by otter given the frequency of associated spraint deposition. Otters, along with their breeding (holts) and resting places (couches), are protected under provisions of the Wildlife Acts 1976 to 2023.

All holts (whether active or not) and couches identified in 2025 (and 2024) were located in areas with limited or no access to humans (i.e. under rail platforms, adjacent to the rail line corridor, heavy vegetation cover, steep banks, fencing, absence of towpaths etc.) and can be considered as the most important areas for otters within the survey area. This same disturbance-related trend regarding the location of breeding and resting areas has been repeatedly observed across the wider Dublin area in previous studies (Brazier & Macklin, 2025; Brazier & Macklin, 2020; Macklin et al., 2019), including along the Royal Canal (Triturus data). Otter breeding areas are especially sensitive to direct human disturbance (Mason & Macdonald, 2009), with otter reproductive success known to be higher in less disturbed habitats; hence their preferential fidelity for low-disturbance areas (Dettori et al., 2021; Martin-Collado et al., 2020; Scorpio et al., 2016; Ruiz-Olmo et al., 2011; Loy et at., 2009; Kruuk, 2006). Human disturbance also strongly influences resting (couch) site selection, with mature riparian vegetation and overhead cover (natural or otherwise) providing crucial shelter in higher disturbance landscapes (Tolrà et al., 2024; Weinberger et al., 2019), as corroborated in the current survey.

5.4 Management considerations

Despite many areas of the Royal Canal being open and subject to disturbance, they nonetheless remain important for otter colonisation by allowing otters to commute between core areas of habitat (Hong et al., 2022; Macklin et al., 2019; Van Looy et al., 2014; Guter et al., 2008). With high and increasing rates of suburbanisation, the Royal Canal remains one of the most important ecological corridors in the vicinity of Dublin.

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The current survey has identified and confirmed the most important areas for otter. The data will help to meet the requirements of local biodiversity policies and will facilitate the prioritisation of areas for otter conservation and future management, inclusive of legally-protected breeding and resting areas. Whilst Greenways and other developments adjoining waterways provide important socioeconomic benefits, they should aim to avoid conflict with all wildlife (Hubbard & Brookes, 2021), including otters, which require seclusion for breeding and resting.

Furthermore, given the high value of the canal for otter (as well as many other species), existing riparian buffers should be retained and conserved along the Royal Canal corridor. The provision and retention of riparian tree cover (buffers) is particularly important for otter (Kim & Hong, 2024; Weinberger et al., 2019; Teresa et al., 2014; Remonti et al., 2011), especially in light of urbanisation and infrastructural developments (Hong & Joo, 2021). The retention of some poorly accessible areas of canal corridor is especially warranted, as these are invariably the areas where holts and couches are situated. This will support local and national biodiversity objectives, thus helping to meet the conservation requirements for otter under the EU Habitats Directive (92/43/EEC) as an Annex II and Annex IV species.

Well-developed and complex riparian zones can buffer anthropogenic (disturbance) impacts to otters and myriad other animals, facilitate healthy prey resources and likely play an increasingly important role in otter dispersion and commuting in light of climate change impacts (Cianfrani et al., 2018) and growing urbanisation pressures. These ecological corridors will provide avenues that allow wide-ranging animals to travel and genetic mixing to occur, whilst facilitating the movement of populations in response to environmental stressors, thus giving threatened species the opportunity to be replenished from other source areas (Liu et al., 2018; Walker & Craighead, 1997). It appears that otters actively move between bordering rivers and the Royal Canal, and also longitudinally along the canal corridor. In the future, it will be important to maintain open linkages between nearby watercourses and the canal, inclusive of the River Tolka, Rye Water and Lyreen River, which appear to be important source contribution areas for canal otter populations.

Investigation into otter prey resources via modern genetic techniques (e.g. DNA metabarcoding) would provide valuable ecological data and help to target management and conservation objectives for both otters and aquatic habitats in general. Genetic sampling (of fresh spraints) would also help to clarify otter demographics and population status along the Royal Canal, elucidate movement between foraging habitats and potentially identify individual animals, thus facilitating more accurate population size estimates. Similar approaches have been successfully applied recently by Triturus and their associates in both Cork City and Dublin City.

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7. Appendix A – otter signs database

Data is withheld by the authors and available upon request

REDACTED



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KPMG

Royal Canal Urban Greenway

Environmental Impact Assessment Report

Appendix 8.6: Environmental Impact Assessment Report (EIAR) BNG Report in respect of Royal Canal Urban Greenway

October 2026



Environmental Impact Assessment Report (EIAR)

BNG Report

In respect of

The Royal Canal Urban Greenway

On behalf of

Fingal County Council

September 2026

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1 Introduction

1.1 Background

JBA Consulting Ireland Ltd. has been commissioned by DBFL Consulting Engineers, on behalf of Fingal County Council (FCC) to provide a planning stage note qualitatively assessing the Proposed Development's expected Biodiversity Net Gain (BNG) drawing on the Environmental Impact Assessment Report (EIAR), ecological surveys and landscape proposals.

1.2 Proposed Scheme

1.2.1 Description

The Royal Canal Urban Greenway is an 8.1km pedestrian and cycle route which is to be constructed along or adjacent to the Royal Canal as it heads eastwards from the Kildare County Boundary at Confey Slipway to Talbot Bridge, (Old Navan Road, near 12th Lock) where it will tie into the completed Ashtown Greenway, hereafter referred to as the Proposed Development. The Proposed Development forms part of the strategic Dublin–Galway cycle corridor (266 km), first identified in the National Cycle Network Scoping Study 2010, and will complete the missing link in the Royal Canal Greenway between Maynooth and Spencer Dock, Dublin.

1.2.2 Measures to Reduce Biodiversity Impact

The potential impacts of the Proposed Development have been avoided, reduced, and where required, offset following the mitigation hierarchy. A number of design considerations were made, including the route of the Proposed Development, the operational drainage layout, proposed lighting and landscape plans, and the construction methodology for the Proposed Development in order to minimise potential impacts to biodiversity, with specific emphasis on surface water impacts due to the highly sensitive nature of the Royal Canal. Additional measures to minimise impacts during the construction and operational phases of the Proposed Development have been detailed within the EIAR, with Chapter 8 (Biodiversity) including a range of mitigation measures to protect key ecological receptors (KERs).

To compensate the loss of woodland habitat, specifically due to the Proposed Development passing through a section of woodland on the northern bank of the Canal (Chainages +6250 - +7170 (Roselawn Woodland)), FCC have planned an offset for this loss, with the creation of approximately 7000m^2 of woodland adjacent to the Royal Canal, to the east of St Catherine's Park. Furthermore, FCC have also committed to conduct a full BNG assessment for the Proposed Development utilising Transport Infrastructure Ireland's BNG Toolkit (TII, 2025) and to provide further tree planting within the same location, to the east of St Catherine's Park, to achieve a biodiversity net gain. These measures aim to satisfy Objective GINHO9 – Greenways and Net Gain and Objective GINHO30 – Infrastructure and Net Biodiversity Gain of the FCC Development Plan (FCC, 2023).

2 Ecological Context

The Royal Canal ecological corridor is an important commuting route for non-volant mammals, bats, birds, terrestrial and aquatic invertebrates, fish, and amphibians. The corridor connects the Dublin city centre with the rural landscapes to the west of Dublin. The terrestrial and aquatic habitats within the corridor are also a vital foraging and refuge resource for these faunal groups in the face of agricultural and urban pressures within the surrounding area. The Royal Canal corridor is connected to the River Liffey corridor to its south by St Catherine's Park, allowing faunal species to commute between both corridors. The Royal Canal is designated as a proposed Natural Heritage Area (pNHA). The Royal Canal supports a range of rare species including the Floral Protection Order (FPO) species Opposite-leaved Pondweed *Groenlandia densa* and the Annex IV listed species Otter *Lutra lutra*. However, the ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. It also crosses through agricultural land and therefore provides a refuge for species threatened by modern farming methods.

The KERs identified within the Royal Canal ecological corridor along the Proposed Development includes the Royal Canal pNHA itself, rare macrophytes including the Floral Protection Order (FPO) species Opposite-leaved Pondweed, non-volant mammals including Otter and Badger *Meles meles*, Bats (including 6 species; Brown Long-eared Bat *Plecotus auritus*, Common Pipistrelle *Pipistrellus pipistrellus sensu lato*, Daubenton's Bat *Myotis daubentonii*, Leisler's Bat *Nyctalus leisleri*, Nathusius's Pipistrelle *Pipistrellus nathusii*, Natterer's Bat *Myotis nattereri*, and Soprano Pipistrelle *Pipistrellus pygmaeus*), breeding and riparian birds, amphibians, terrestrial and aquatic invertebrates, the critically endangered species Glutinous Snail *Myxas glutinosa*, White-clawed Crayfish *Austropotamobius pallipes*, and a range of fish species including the critically endangered European Eel *Anguila anguila*. A range of supporting habitats are present within the corridor along the Proposed Development including artificial structures which have roosting potential for bats and nesting potential for birds, earth banks, stonewalls and other stonework, recolonising bare ground, calcareous springs, reed and large sedge swamps, drainage ditches, agricultural grassland, amenity grassland, dry meadows and grassy verges, dry meadow and scrub mosaic, mixed broadleaved woodland, hedgerows, hedgerows and treelines over drainage ditches, mixed grassy verges and treelines, treelines, and scrub.

A detailed description of the baseline environment present along the Proposed Development, including a description of the habitats and KERs present is included within Sub-section 8.6 of Chapter 8 – Biodiversity of this EIAR.

3 Predicted Habitat Loss

The predicted habitat loss associated with the construction of the Proposed Development will be limited to the terrestrial habitats present within the Royal Canal ecological corridor. The aquatic habitats present within the Canal itself, and downstream watercourses are not anticipated to experience any losses/degradation following the implementation of the mitigation measures detailed in sub-section 8.9 of Chapter 8 – Biodiversity of this EIAR. The anticipated losses are summarised below.

It has been estimated that in total the construction phase will lead to a loss of 6800m^2 of woodland habitats, including those within the Royal Canal pNHA. Of this total, it is estimated that for the mixed broadleaved woodland habitat between the Old Schoolhouse and Coolmine Bridge (Chainages +5340 - +6250), including within the Royal Canal pNHA, approximately 1023m^2 of this habitat will be removed during the construction phase. It is estimated for the mixed broadleaved woodland habitat between Coolmine Road and Roselawn Road (Chainages +6300 - +7170), the area lost will be approximately 5780m^2. Approximately 1150m^2 of the scrub and scrub and meadow mosaic habitats between Chainages +4600 - +5200 will be lost during the construction phase. This loss includes six shrubs, 44 individual trees, and there will be twelve groups of trees that will be partially removed and 1 tree group that will be removed in its entirety. The tree groups include sections of woodland that were inaccessible and assessed from a distance, between the Old Schoolhouse and Coolmine Bridge (Chainages +5340 - +6250), and between Coolmine Road and Roselawn Road (Chainages +6300 - +7170).

Access to the pocket park and towpath will require the partial removal of treeline habitat between chainages +3270 - + 3290, and chainages +3600 - +3650. Tree removal within these sections will be minimal and the existing treelines will not suffer significant fragmentation. Furthermore, tree removal will occur between chainages +4550 - +4570 to the west of the Old Schoolhouse. The direct loss of trees from this habitat will partially fragment the treeline habitat which will have knock-on impacts for local faunal groups.

The trees to be removed include a mix of healthy, young, and dead trees, as well as Ash trees that have been infected by Ash dieback. While the loss of dead and/or dying trees is considered to be less ecologically impactful than the loss of healthy trees, these features provide important nesting, foraging, and/or roosting resources for local faunal groups and are an important feature of any woodland habitat.

There will also be a loss of five hedges along the Proposed Development, which have a total estimated length of 98m. However, one hedgerow (H8) is entirely comprised of invasive Cherry Laural, while another two hedges, H6 and H7, are comprised of non-native Portugal Laurel *Prunus lusitanica*. The other two hedges for removal (H34 and H35) are comprised of non-native *Pyracantha* species.

4 Avoidance and Minimisation

A number of measures have been incorporated into both the design and construction phase methodology to limit impacts to local biodiversity and retain as many trees and areas of local habitats as possible by limiting the footprint of the works. Furthermore, these measures aim to ensure connectivity within the Royal Canal ecological corridor is retained for local fauna.

Specific avoidance measures incorporated into the design of the Proposed Development are summarised in sub-section 8.9.1 of Chapter 8 – Biodiversity of this EIAR. This includes minimising the loss of trees along the Proposed Development through the alignment of the route, as well as considerations for reducing impacts to aquatic habitats. Furthermore, sub-section 8.9.3.2.1 details the five mammal underpasses which have been incorporated into the Proposed Development which will reduce the fragmentation of habitats along the northern bank of the Royal Canal.

Specific construction phase mitigation measures, including the location of the site compounds, construction of the Proposed Landmark Bridge, measures to protect retained trees and woodland, measures to minimise the loss of scrub and woodland habitats, and measures to reduce impacts to local faunal groups are described in detail in sub-section 8.9.2 of Chapter 8 – Biodiversity of this EIAR.

5 Offset and Habitat Management Measures

Offset and habitat management measures can be broadly split between the Proposed Development's Landscape Plan, habitat management measures, and offset woodland planting. These are described in more detailed in sub-sections 5.1, 5.2, and 5.3 below.

5.1 Landscape Plan and Habitat Enhancement

5.1.1 Landscape Planting

As part of the Proposed Landscape Plan, a total of 190 trees will be planted and approximately 2456m^2. of woodland area created along the Proposed Development. These trees will take several years to reach semi-maturity. Additionally, within the landscape plan, a total of 6841m^2 of meadow and shrub planting is planned along the Proposed Development. This will offset the loss of scrub and scrub and meadow mosaic habitats during the construction phase, which totals an estimated 1150m^2, after an initial period of ecological lag. There will also be the planting 619 linear metres of hedgerows along the Proposed Development. Furthermore, a pocket park will be created to the east of the Hansfield Railway Bridge, which will include native hedgerow planting, combined native grass and native wildflower planting, and native wildflower meadow creation.

Planting across the Proposed Development will be limited to native and habitat specific species. Trees within 3m of the Royal Canal will be restricted to riparian species such as Willow, Alder, Silver and Downy Birch and Pedunculate Oak. During the construction of the Proposed Development through the woodland areas, an ECoW/ woodland Ecologist will be present, and will ascertain the retention and translocation of any suitable trees and understory plants to areas cleared of non-native species. Species such as Bird Cherry, Wild Cherry, Wild Apple *Malus sylvestris*, Rowan, Sessile Oak, Common Hazel and Scots Pine will also be planted in these higher sections of woodland away from the Royal Canal to replace invasive or non-native species (see woodland management section below), as deemed appropriate. There will be no planting of non-native species within the pNHA woodlands.

Non-native night scented flowers must only be planted as perennials in containers and any non-native planting in open borders will be limited to amenity park areas. The provision of night scented flowers will attract invertebrates to the area which will encourage foraging of bats. Hedgerows will be made up of mainly Hawthorn (60%) and other native species such as Common Hazel and Elder *Sambucus nigra,* which will provide cover and screening for commuting mammals as well as an important alternative food source for Badger.

For a detailed description of the Proposed Landscape Plan, see Chapter 11 – Landscape and Visual of this EIAR.

5.1.2 Habitat Management

Included within sub-sections 8.9.2 and 8.9.3 of Chapter 8 – Biodiversity of this EIAR is a number of measures to manage the existing habitats present along the Proposed Development. This includes suitable management measures to enhance the existing dry calcareous grassland habitat present to the north of Pakenham Bridge (Chainages +2950 to +3100) and Plot 3, located near Callahan Bridge-Railway bridge (Chainages + 3770), including appropriate mowing regimes to allow these habitats to transition towards the Annex I grassland habitat type Lowland hay meadows [6510]. Dry calcareous grassland has been identified as a priority habitat within the Fingal Biodiversity Action Plan (BAP) 2022-2030 (FCC, 2023b), and as such, the appropriate operational management of these areas is a priority. Management will focus on preventing these areas from transitioning into scrub mosaic habitat.

Additional measures include the management of the woodland habitats present between Coolmine Road and Roselawn Road (Chainages +6300 - +7170) and between Kennan Bridge and Dr Troy Bridge (Chainages + 5450 - +5550). Management will focus on the removal of invasive and other non-native species, as well as the removal of refuse and waste that has accumulated in these areas. This will improve the quality of these woodland areas. Furthermore, long-term management will then focus on

leaving these areas as undisturbed as possible, with the exception of the periodic removal/treatment of any invasive species, allowing them to naturally develop. More broadly, for the length of the Proposed Development, invasive species will be monitored and managed during the Proposed Development's operational phase which will reduce pressure on local habitats. Management options for the planted hedgerows and created earth berms are also outlined within sub-section 8.9.3, with a specific emphasis on managing these areas for local Badger.

For a detailed description of the proposed habitat management measures, see sub-sections 8.9.2 and 8.9.3 of Chapter 8 – Biodiversity of this EIAR.

5.2 Offset Woodland Planting: St Catherine's Park

5.2.1 Overview

As part of the Biodiversity Net Gain (BNG) assessment for the Royal Canal Urban Greenway scheme, it is acknowledged that there will be an approximate loss of 4,344m^2 of tree cover within the scheme area, taking into account the proposed 2456m^2 of woodland planting within the Landscape Plan.

To compensate for this loss and deliver a measurable biodiversity enhancement, a two-phase biodiversity offset programme is proposed within St. Catherine's Park, utilising recently acquired lands at Coldblow, Lucan.

5.2.2 Phase 1: Advance Tree Planting (Winter 2026)

An area of approximately 7,000m^2 will be planted with native tree species along the northern boundary (see figure 1) of the newly acquired 60-acre landholding at Coldblow, Lucan, within St. Catherine's Park.

This advance planting will:

- Off set for the projected tree loss associated with the Royal Canal Urban Greenway scheme.
- Extend the existing tree line along the northern boundary of St. Catherine's Park.
- Strengthen and future-proof the biodiversity corridor adjoining the Royal Canal.
- Improve habitat connectivity by creating a continuous ecological corridor for wildlife movement.
- Enhance the long-term ecological resilience and landscape character of the area.

5.2.3 Phase 2: Additional Biodiversity Net Gain Measures (Winter 2027)

Upon completion of the Biodiversity Net Gain TII calculation and assessment, a further biodiversity offset programme will be undertaken within St. Catherine's Park during Winter 2027.

Phase 2 measures will include:

- Additional planting of native tree species.
- Establishment of native shrub planting areas.
- Creation of meadow habitats.
- Enhancement of habitat diversity and ecological value across the site.

These measures will provide additional biodiversity gains beyond the replacement of lost tree cover and will contribute to the long-term enhancement of the Royal Canal ecological corridor and the wider park environment. Creating a stronger, more resilient ecological network and lasting environmental benefits for both biodiversity along the Royal Canal Corridor and within Saint Catherines Park.

The Royal Canal Urban Greenway project team is committed to delivering a positive biodiversity outcome through the implementation of the above measures, ensuring that biodiversity loss is offset and that an overall net gain is achieved for the scheme in the adjoining St. Catherine's Park.

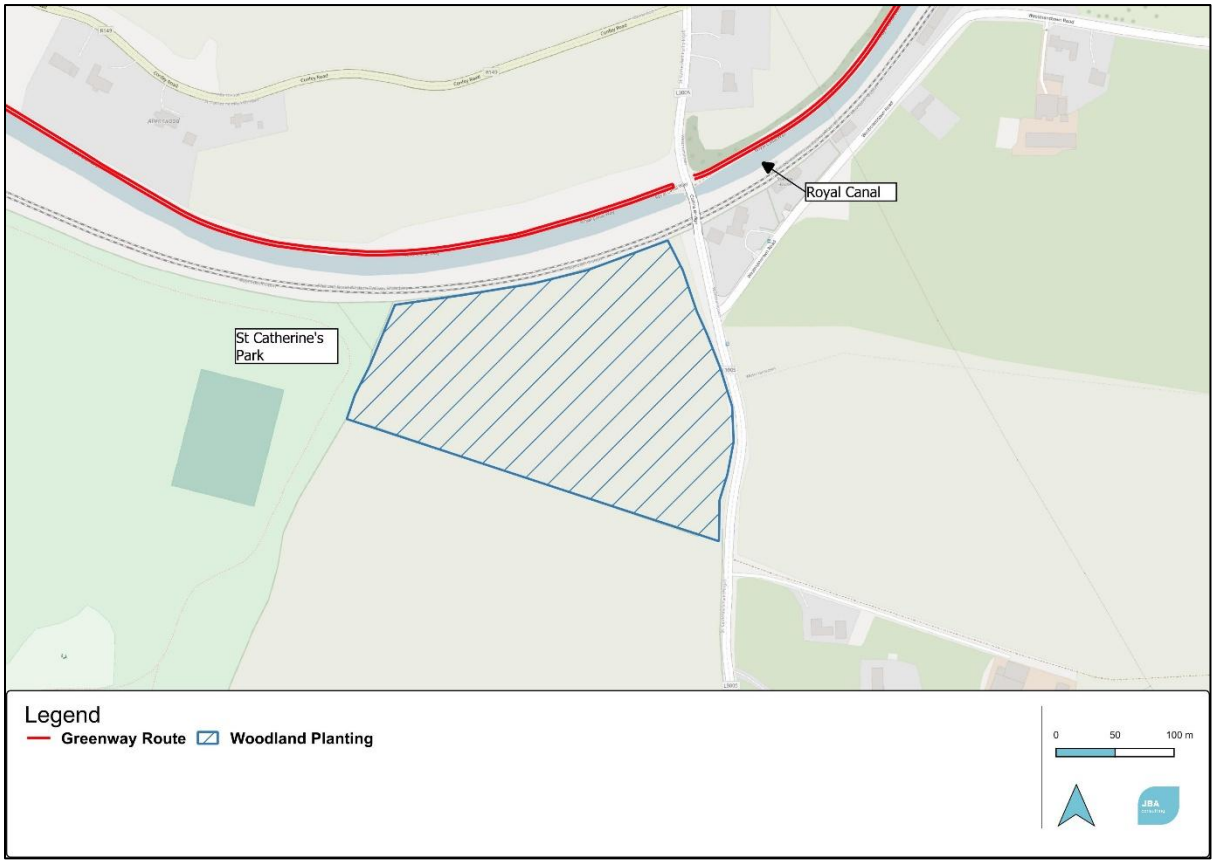


Figure 1 Proposed Woodland Planting Area adjacent to the Royal Canal, within St Catherine's Park

5.3 Expected Outcomes

The expected benefits of the measures outlined in sub-sections 5.1 and 5.2 include maintaining the existing connectivity within the Royal Canal ecological corridor along the Proposed Development, preventing the fragmentation of terrestrial habitats. Furthermore, the Landscape Plan will reduce the extent of losses to these habitats, although the loss of woodland habitat within the Royal Canal ecological corridor will still eclipse the proposed woodland planting area within the Landscape Plan. However, the woodland offset planting within St Catherine's Park will ensure the Proposed Development creates more woodland habitat than it loses. Additionally, the Proposed Development will have a net gain in overall trees and linear hedgerow length. After an initial ecological lag period as the planted trees, these areas will provide a host of benefits for local faunal groups. Furthermore, the offset woodland planting will strengthen the existing ecological corridor between the Royal Canal and River Liffey to the south, enhancing ecological connectivity within the greater Dublin area.

Operational maintenance of the Greenway and the associated landscaped areas will be intermittent and managed through operational arrangements to be made between Fingal County Council and Waterways Ireland, including through a memorandum of understanding for the Greenway.

6 Overall Biodiversity Outcome and Commitments

6.1 Summary Table

While FCC has committed to completing a detailed quantitative BNG assessment in the future, this planning report also provides an initial qualitative and quantitative assessment of the anticipated habitat losses and gains. This is summarised below in Table 1, which includes key habitat types where the largest areas will be lost as a result of the Proposed Development, as well as detailing relevant management measures, landscape and/or offset planting.

Other habitats, such as treelines will experience minor losses, while some habitats such as amenity grassland will only experience temporary losses. The key habitats where significant losses, in terms of area/length are anticipated due to the construction and footprint of the Proposed Development include the dry meadow and scrub habitats, hedgerows, and mixed broadleaved woodland habitat.

Table 1: Qualitative and quantitative comparison of key habitat losses with proposed planting plans, management measures, and offset planting

Habitat type	Expected losses (area/length)	Landscape Plan planting area/length	Management measures	Offsets	Overall estimated area/length change (+/-)
Dry meadows and Scrub mosaic (Mosaic: GS2/WS1)	1150m^2	6841m^2	• Planting plan outlined in Chapter 11 – Landscape and Visual of this EIAR. • Use of appropriate management measures, including mowing regimes and commitment to not using any herbicides as detailed in sub-sections 8.9.3.2.3 and 8.9.3.4 of Chapter 8 of this EIAR. • Long-term monitoring, management, and removal of Invasive non-native species, as detailed in sub-sections 8.9.2.2.17 and 8.9.3.6.6 of Chapter 8 of this EIAR.	None	+5691m^2
Hedgerows (WL1)	98m	619m	• Planting plan outlined in Chapter 11 – Landscape	None	+521m

			and Visual of this EIAR. • Appropriate hedgerows planting and management measures as detailed in sub-section 8.9.3.2.2 f Chapter 8 of this EIAR. • Long-term monitoring, management, and removal of Invasive non-native species, as detailed in sub-sections 8.9.2.2.17 and 8.9.3.6.6 of Chapter 8 of this EIAR.		
Mixed broadleaved woodland (WD1)	6800m^2	2456m^2	• Planting plan outlined in Chapter 11 – Landscape and Visual of this EIAR. • Appropriate management of woodland habitats outlined in sub-section 8.9.3.4.2 of Chapter 8 of this EIAR. • Long-term monitoring of woodland habitats in 8.9.3.6.2 Chapter 8 of this EIAR.	7,000m^2 (additional native woodland planting within St. Catherine's Park to be completed as detailed in sub-section 5.2)	+2656m^2

			• Long-term monitoring, management, and removal of Invasive non-native species, as detailed in sub-sections 8.9.2.2.17 and 8.9.3.6.6 of Chapter 8 of this EIAR.		

6.2 Conclusion

The Proposed Development is anticipated to have a long-term adverse impact of slight significance on local biodiversity, primarily due to the loss of woodland habitat from within the Royal Canal ecological corridor, as detailed in Chapter 8 of this EIAR. However, the commitment of FCC to create a new woodland area within St. Catherine's Park, alongside the Landscape Plan and habitat management measures outlined within this EIAR means overall, there will be net gain in terms of areas and lengths of habitats along and adjacent to the Proposed Development. Furthermore, these measures ensure that habitat connectivity within the Royal Canal ecological corridor is maintained. This is consistent with Objective GINHO9 – Greenways and Net Gain and Objective GINHO30 – Infrastructure and Net Biodiversity Gain of the FCC Development Plan (FCC, 2023) which require all greenway development to achieve an overall biodiversity net gain. While this assessment is primarily qualitative, initial figures support this conclusion. Furthermore, FCC has committed to complete a full BNG assessment using the TII BNG Toolkit (TII, 2025) in the future. The exact details of the long-term management for the greenway are yet to be agreed, although it is understood at this point in time the operational maintenance of the Greenway and the associated landscaped areas will be intermittent and managed through operational arrangements to be made between FCC and WI, including through a memorandum of understanding for the Greenway.

References

FCC (2023) Fingal Development Plan 2023-2029 Consolidated Version. Available at: https://www.fingal.ie/sites/default/files/2026-05/fingal-development-plan-2023-2029-written-statement-consolidated-1.pdf

TII (2025) Transport Infrastructure Ireland Biodiversity Metric Tool for Road, Greenway and Light Rail Projects: User Guide Document. GE-ENV-01112.