Ecological Impact Assessment

Cork City to Viaduct Greenway Phase I

Prepared for Cork City Council

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5th April 2023

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Ecological Impact Assessment

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Revision Control Table

Revision	Description	Prepared by	Checked by	Date
D1	Ecological Impact Assessment	KB	KB	28/11/2022
D2	Ecological Impact Assessment	KB	KB	28/11/2022
F1	Ecological Impact Assessment	KB	KB	03/01/2023
F2	Ecological Impact Assessment	KB	KB	05/04/2023

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1 Introduction

Greenleaf Ecology was commissioned by Cork City Council to undertake an Ecological Impact Assessment (EcIA) of the proposed Cork City to Viaduct Greenway Phase 1 (hereafter referred to as 'the proposed development').

The purpose of this EcIA is to:

- Establish baseline ecological data for the proposed development site;
- Determine the ecological value of the identified ecological features;
- Identify, describe and assess the likely significant effects of the proposed development on ecological features; and
- Propose effective mitigation measures to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on ecological features.

1.1 Statement of Competence

This screening for Ecological Impact Assessment (EcIA) has been prepared by Karen Banks. Karen is an ecologist with 16 years' experience in the field of ecological assessment. She holds a BSc (Hons) in Environment and Development from Durham University and is a full member of the Chartered Institute of Ecology and Environmental Management. Karen has extensive experience in the production of Ecological Impact Assessments (EcIA) including those for transport infrastructure, small to large scale housing and mixed-use developments, flood alleviation schemes and wind farms.

1.2 Project Description

1.2.1 Location of Proposed Development

Phase I of the Cork City to Viaduct Greenway is located between Chetwynd Reservoir and Kinsale Road Roundabout. The Greenway will be circa. 2.9km in length with another circa 0.9km of linking infrastructure proposed to connect it to existing facilities along the N40. There is an area of circa 5.68ha within the red line boundary. The route of the Greenway is shown in Figure 1-1 and is described in the following sections.

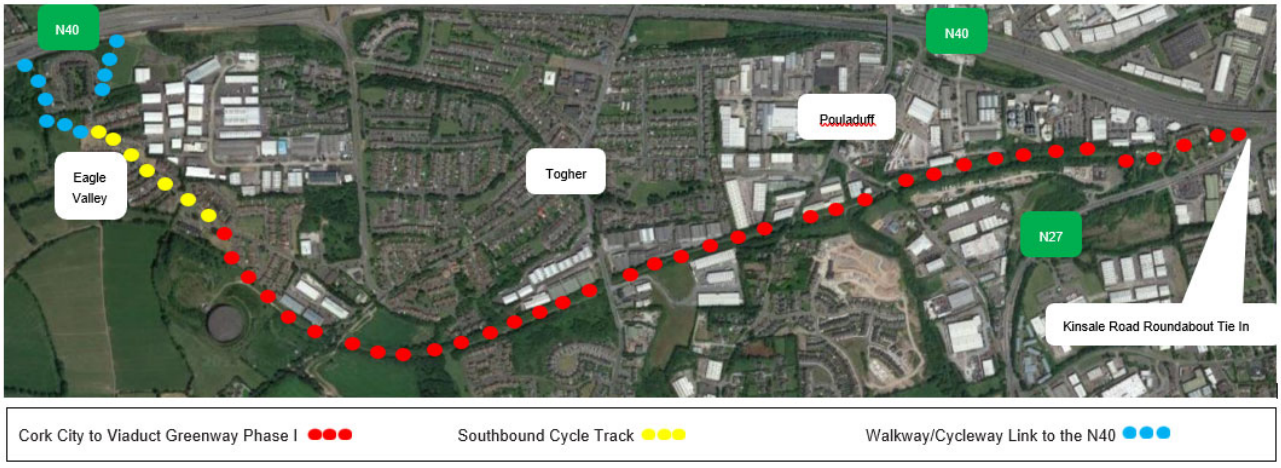

Figure 1-1: Location of the proposed development

1.2.2 Eagle Valley to Spur Hill

The greenway commences within an open space area of Eagle Valley adjacent to the main spine road and to the cul-de-sac which accommodates house numbers 43 – 54. The greenway will form a junction with the main spine road and associated footpaths, thereby providing direct access for cyclists and pedestrians. From here the greenway travels south through part of the current open space area to enter the adjoining Irish Water Chetwynd reservoir site. There are associated site development and landscaping works proposed

within the open space immediately adjoining the greenway so that it can be both physically accommodated at an appropriate gradient as well as visually absorbed into this area.

Within the reservoir site the greenway will pass under electricity overhead lines, traverse an area of open space and cross over an existing 4m wide concrete access road serving the Chetwynd reservoir. The greenway will run eastwards parallel with, and on the southern side of, the access road towards Spur Hill. Before Spur Hill the greenway will deviate from the access road. The greenway continues eastwards to cross under the Spur Hill railway bridge. The reservoir access road will continue to join with Spur Hill approximately 40m to the north at its current location. No structural works are required at the bridge, but the stonework will be cleaned and repaired.

To accommodate the section of greenway and the access road running parallel, it is necessary to move the access road approximately 1.7m northwards for a distance of circa 300m.

In order to maintain security within the reservoir site it is necessary to control public access from the greenway. This requires 2m high palisade fencing to be introduced. For most of the route within the reservoir site the fence is required on the southern side of the greenway only, with open access to the access road on its northern side. At the western part of the greenway within the reservoir site the fence is necessary on both sides of greenway separating it from the access road and the various reservoir infrastructure. To facilitate this security arrangement the existing gate to the reservoir at Spur Hill will be removed and a new gate introduced where the fencing on both sides of the greenway commences. In addition, there will be gates provided on either side of the greenway where it crosses the access road.

There will be a need to clear circa 600m^2 of shrubbery and gorse within the Chetwynd Reservoir site.

At Eagle Valley, wildflowers and ornamental planting will be provided. Landscaping will be limited within the Chetwynd Reservoir site due to space limitations.

There will be a requirement to excavate circa 460m^3 of earth for the construction of the track but 60m^3 of this material will be reused for fill material for reprofiling the embankments. This leaves a net volume of circa 390m^3 that will need to be transported off site.

The construction of the extension to the concrete road within the Chetwynd Reservoir site will require approx. 510m^2 of concrete road.

1.2.3 Spur Hill to L-2454 Togher Road

After crossing under Spur Hill bridge the proposed greenway will continue eastwards along the route of the former railway line to Togher Road (L-2454) which it will meet at grade. This part of the route is currently largely overgrown with an existing dirt track. There is heavy/thick vegetation consisting mostly of briars and gorse on both sides of an existing track. There will therefore be a need for clearance of gorse and scrub.

The horizontal alignment initially from Spur Hill heading east will have a prolonged curve until it reaches the point with Fernwood Crescent to the south. The remainder of the section up to Togher Road (L-2454) being straight.

Generally, there will be 0.75 to 1.0m landscaped verges with wildflowers and ornamental planting and it will tie into the existing shrubbery/vegetation and open space areas to the northwest of Fernwood Crescent. The Greenway will run to the north of Fernwood Crescent but at a lower level with a tree lined boundary and this should result in no impact on their vista views northwards from properties backing onto the greenway. The greenway will pass immediately adjacent to a public open space area of Fernwood Crescent from which access onto to the greenway will be possible.

The terrain from Spur Hill to Togher Road (L-2454) is uneven and undulating, with steep localized slopes. This will require reprofiling along a significant proportion of this section of the greenway to get an adequate standard of longitudinal profile for the proposed greenway.

There will be a requirement to excavate circa 640m^3 of earth for the construction of the track but 50m^3 of this material will be reused for fill material. This leaves a net volume of circa 590m^3 that will need to be transported off site.

1.2.4 Togher Road (L-2454) to Lehenaghmore Road (L-2455)

The greenway will cross Togher Road (L-2454) via a new toucan crossing, which will have all necessary associated warning signage, lining and traffic lights.

From Togher Road (L-2454) to Lehenaghmore Road (L-2455) the proposed greenway works will comprise the replacement and widening of an existing substandard paved walkway. The horizontal alignment of this section of the greenway will be predominately straight.

The greenway will cross beneath Lehenaghmore Road (L-2455) bridge. This bridge will not be altered but the stonework will be cleaned and repaired. A 3m pedestrian and cyclists' access path will be provided to the western side of Lehenaghmore Road (L-2455) on the southern side of the greenway. This access path is already approved and will be provided as part of the approved Lehenaghmore Road (L-2455) Improvement Scheme by Cork City Council.

Generally, there will be 0.75 to 1.0m landscaped verges with wildflowers and ornamental planting that will integrate with existing shrubbery/vegetation on the edges of the former West Cork Railway corridor. Proposed planting will be limited initially after Togher Road (L-2454) due to the provision of steep embankments to the northern side of the Greenway and a boundary wall and fencing to the Westgate Business Park on the southern side of the Greenway.

There will be a requirement to excavate circa 650m^3 of earth for the construction of the track but 30m^3 of this material will be reused for fill material. This leaves a net volume of circa 620m^3 that will need to be transported off site.

There will be a requirement to deconstruct a small area of existing wall / pillars and 1m high fencing to the south side of the entrance to the Westgate Business Park and reconstruct the pillar to the south of the new Greenway.

1.2.5 Lehenaghmore Road (L-2455) to Forge Hill

From Lehenaghmore Road (L-2455) the greenway runs eastwards to Forge Hill where it will pass under the railway bridge and road. A 3m pedestrian and cyclists' access path will be provided to the eastern side of Lehenaghmore Road (L-2455) on the southern side of the greenway. As with the access path on the western side of Lehenaghmore Road (L-2455), this is already approved and will be provided as part of the approved Lehenaghmore Road (L-2455) Improvement Scheme by Cork City Council.

At the western half of this section of the route the greenway will replace a dirt track. At the eastern part from Farm Lawn housing estate, the greenway will be accommodated along the route of an existing paved service access road. The existing service access road provides gated / fenced access to Farm Lane. This access will remain gated.

The Forge Hill bridge will not be altered but the stonework will be cleaned and repaired. No pedestrian or cycle access is proposed from Forge Hill.

The horizontal alignment will be predominately straight except for two slight curves in the alignment to the west of the Forge Hill railway bridge.

Generally, there will be 0.75 to 1.0m landscaped verges with wildflowers and ornamental planting, which will tie in with the existing trees and shrubbery on the periphery of the former West Cork Railway corridor.

There will be a requirement to excavate circa 650m^3 of earth for the construction of the track but circa 20m^3 of this material will be reused for fill material for reprofiling the embankments. This leaves a net volume of circa 630m^3 that will need to be transported off site.

Thick vegetation, consisting mainly of briars and gorse, restricts access to the Forge Hill Bridge and disconnects the existing corridor. The vegetation will be removed to accommodate the greenway.

1.2.6 Forge Hill to Kinsale Road Roundabout

The section of greenway from Forge Hill to Kinsale Road roundabout runs through a number of different landscape types. Travelling east from Forge Hill its passes firstly through the site of a former Travellers accommodation scheme, onward through an overgrown stretch of the former railway alignment, to the south of an existing Travellers accommodation and yard site, crossing Hazelwood Grove access road at grade before running to the south of Hazelwood Grove residential properties and eventually meeting with Kinsale Road roundabout.

Immediately to the east of Forge Hill Road is the site of the former Travellers' residential scheme. While largely demolished and partially cleared there are significant amounts of construction and demolition waste present on this site along with parts of former buildings still intact and significant areas of hardstand. There will be a need for site clearance of gorse and vegetation and the removal of existing hardstanding areas associated with the remains of abandoned accommodation units.

When cleared, this area will accommodate both the greenway and a new 50 space car park on the northern side of the greenway. Vehicular access will be provided by upgrading an existing access to Forge Hill which previously served the Travellers accommodation scheme. Bike parking and bicycle repair facilities will be provided at this car park.

Public realm/landscape measures will be included at this car park location.

From the car park, the greenway will continue east in a predominantly straight horizontal alignment along the former railway corridor firstly through an overgrown area and then to the south of a Travellers accommodation and yard site. To ensure the privacy and security of the residents of this site, post and panel fencing and associated landscaping are proposed. From here the greenway crosses the access road to Hazelwood Grove and runs through the open space area to the south of No. 1 to No. 8 Hazelwood Grove. It will be necessary to acquire approx. 25m^2 of land from the rear garden of No. 4 Kinsale Road. A new wall will be built along the new setback boundary. At the eastern end of Hazelwood Grove, it runs alongside the boundary of the rear garden of the 'The Cottage', property. The horizontal alignment of the Greenway will be curved over the last circa 75m, in the vicinity of the 'The Cottage' on approach to Kinsale Road Roundabout. In this area the route is mainly accommodated within a public green space area facing the South Link slip road and roundabout. To achieve appropriate vertical alignment however, and to allow safe tie-in to the pedestrian footpath at the Kinsale Road roundabout, it will be necessary to acquire approx. 200m^2 of land from the rear garden of 'The Cottage' property. A new boundary wall will be built along the new setback boundary.

The proposed development terminates at the existing signalised pedestrian/cyclist crossing, which crosses the N40 westbound on-slip at the junction with the N27/R851 Frankfield Road.

Generally, there will be 0.75 to 1.0m landscaped verges with wildflowers, ornamental planting and low grass planting.

There will be a requirement to excavate circa 1,200m^3 of earth for the construction of the track but 50m^3 of this material will be reused for fill material. This leaves a net volume of circa 1,150m^3 that will need to be transported off site.

1.2.7 Links to the Greenway

Link from the N40 to Eagle Valley via Undeveloped Land

It is proposed to provide a 4m wide combined walkway/cycleway between the N40 (an existing walkway/cycleway at the edge of the carriageway) and the spine road in Eagle Valley, via undeveloped lands including along a former residential access road to the abandoned Garrane house. The first 170m of this walkway/cycleway from the N40 walkway /cycleway goes along this former access road, which comprises elements of disused pavement surfacing and unbound stone material. There are a number of existing mature trees running alongside this access road and there is heavy/thick vegetation consisting mostly of briars and gorse that overhangs sections of this existing access road. The horizontal alignment of the walkway/cycleway will be curved over the first 50m but then remains straight up for the next 120m. Generally, there will be 0.75 to 1.0m landscaped verges with wildflowers and ornamental planting and it will tie into the existing tree lined environment.

The proposed walkway/cycleway then turns sharply to the east of the former residential access and crosses over an open drainage channel (associated with the adjacent field) to be bridged by a simple single span structure and crosses an open field towards Eagle Valley. There are associated landscaping works proposed within this open field immediately adjoining the walkway/cycleway so that it can be both physically accommodated at an appropriate gradient as well as visually absorbed into this area. Once within Eagle Valley it will cross an open space area, to the south of No. 271A Eagle Valley and connect to a proposed new cycle track on the opposite side of the spine road, via a raised table crossing. Appropriate levels of landscape screening will be provided adjacent to the properties.

Link from the N40 to Eagle Valley Via Garrane Darra

It is proposed to provide a 4m wide combined walkway /cycleway between the N40 (the existing walkway/cycleway at the edge of the carriageway) and the Garrane Darra residential complex, via an existing gravel walkway along the edge of a former disused football field. There are a number of mature trees along the eastern side of the walkway and there will be a requirement to remove a section of the existing fence in order to complete the link to the N40. There will be a requirement to reprofile the ground levels in the vicinity of the tie in with the N40 walkway/cycleway to accommodate the new walkway/cycleway. Generally, there will be 0.75 to 1.0m landscaped verges with wildflowers and ornamental planting and it will tie into the existing tree lined environment.

Works along the Eagle Valley Spine Road

It is proposed to resurface a circa 451m length of the spine road within Eagle Valley and provide new traffic lane markings and signage to accommodate a new cycle track on the northern side of the road. The new road markings will indicate two traffic lanes of minimum 3.0m wide and a min 1.5m wide southbound segregated on-road cycle track. A raised table crossing will be provided at the southern extent of the cycle track to safely connect the on-road cycle track to the main Greenway from Eagle Valley to Kinsale Road Roundabout which commences at the existing green open space area on the opposite side of the road.

1.2.8 Other measures

- Realigned boundary walls
- Seating and viewing point areas
- Relocation of two ESB overground poles and wires.

- New public lighting along the route.
- Any potential future SI works
- Landscaping and biodiversity measures
- Removal and / or treatment of isolated areas of Japanese knotweed and other invasive species.

1.2.9 Drainage

The proposed drainage will be over the edge drainage, where the design level crossfall will result in all surface water running off into the adjacent verges. There will be a gully and carrier pipe drainage at the new car park to the east of Forge Hill. Surface water run-off from the new car park will pass through a bypass interceptor before discharge to the existing surface water network at Forge Hill. An existing surface water drainage system is in place on the road network within Eagle Valley.

1.2.10 Construction Compound

The construction compound will be located to the east of Forge Hill.

1.3 Site Enabling Works

1.3.1 Ground clearance

There will be a requirement to clear circa 22,000m^2 of vegetation (shrubbery and gorse) across the extent of the scheme.

There will be a requirement to remove three mounds of soil that are located under the former railway bridges at Spur Hill, Lehenaghmore Road (L-2455) and Forge Hill. There will be a requirement to treat and potentially remove limited Japanese knotweed to the west of Forge Hill and to treat a further stand to the east of Forge Hill.

1.3.2 Demolition works

The following elements of the Proposed Development will lead to demolition works:

Site of Former Travellers' Accommodation Units: Immediately to the east of Forge Hill is the site of a former Travellers' accommodation units. While largely demolished and partially cleared there are significant amounts of construction and demolition waste present on this site along with parts of former buildings still intact and significant areas of hardstand. There will be removal of circa 1,360m^2 of hand standing area associated with the former accommodation units.

Boundary Walls/Fences: There is a need to deconstruct a small amount of the existing wall / pillars and 1m high fencing to the south side of the entrance to the Westgate Business Park. Parts of rear boundary walls of two residents at Kinsale Road will also need to be removed and replaced along a slightly set back boundary.

Chetwynd Reservoir Concrete Road: Additionally, within the Chetwynd Reservoir site and to the west of Spur Hill there will be a need to break up and reuse and/or remove circa 510m^2 of the southern side of the existing concrete road.

Additionally, to facilitate links to the N40, small sections of fence will need to be removed.

1.3.3 Land take requirements

There will be land take from two residential properties, between Hazelwood Grove and Kinsale Road Roundabout.

1.3.4 Landscaping and Biodiversity

A significant part of the works will be the landscaping and development of focal points and open spaces along the scheme to provide enhanced recreational and community value in line with the recommendations stated in the Greenway and Cycle Routes Ancillary Infrastructure Guidelines.

The core environmental aim of the proposed Greenway is "*To ensure the Greenway functions as a biodiversity/wildlife corridor and to enhance the ecological, environmental, cultural and built heritage resources of the route*." Landscaping will seek to achieve an improved public realm while maintaining and protecting existing biodiversity features and identify areas which would benefit from enhancement.

1.3.5 Operational Phase

The entire scheme will have public lighting to enhance the quality of the routes from a security perspective. The new lantern fittings will adopt an advanced intelligent light control system which will have automatic dimming and sensor control which will allow increased illumination when pedestrian and cyclists go past but they will dim accordingly when there are no users on the Greenway.

Only maintenance vehicles will be allowed to access the greenway. This will be on a regular basis for waste collection and landscaping at appropriate frequency. Access will also be provided as required for repair or upgrade works.

2 Methodology

2.1 Relevant Policy and Legislation

This report has been prepared with regards to the following legislation, policy documents and guidelines as relevant:

- CIEEM (2017) Guidelines for Ecological Report Writing. Chartered Institute of Ecology and Environmental Management, Winchester;
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester;
- DoEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government;
- European Communities (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission;
- EC (2021) Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg;
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. European Commission;
- EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission;
- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency;
- EPA (2003), Advice Notes on current practice in the preparation of Environmental Impact Statements. Environmental Protection Agency;
- Fossitt, J., 2000. A Guide to Habitats in Ireland. The Heritage Council, Kilkenny;
- HA (2001) DMRB Volume 10 Section 4 Part 4 - Ha 81/99 - Nature Conservation Advice in Relation to Otters. The Highways Agency;
- National Parks and Wildlife Service (NPWS) (2013) The Status of EU Protected Habitats and Species in Ireland. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland;
- NPWS (2014) Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters. Department of Arts, Heritage and Gaeltacht.
- NRA (2008) Environmental Impact Assessment of National Road Schemes – A Practical Guide Rev. 1. National Roads Authority;
- NRA (2009) Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2. National Roads Authority;
- NRA (2008) NRA Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes). National Roads Authority; and
- NRA Environmental Assessment and Construction Guidelines (both adopted and draft versions).

This EcIA was also completed in accordance with the following legislation:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive (79/409/EEC

as amended (Birds Directive)) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011;
- European Communities (Environmental Impact Assessment) Regulations, 1989 to 2006;
- European Communities (Environmental Liability) Regulations, 2008 (S.I. No. 547 of 2008);
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 84 of 1988);
- Flora Protection Order, 2015;
- Planning and Development Act, 2000 (as amended);
- Roads Acts 1993 to 2007(as amended);
- Water Framework Directive (2000/60/EC); and
- Wildlife Acts.

2.2 Study Area and Zone of Influence

Determination of this project's Zone of Influence (ZoI) was achieved by assessing all elements of the proposed project against the ecological features within the project footprint, in addition to all ecological receptors that could be connected to and subsequently impacted by the project through impact pathways. To this end, the ZoI extends outside of the proposed greenway footprint to include ecological features connected to the project through proximity and connectivity through features such as watercourses. Following consideration of the characteristics of the proposed works, as described in Section 1.3 and Section 1.4, the ZoI for significant impacts to fauna is considered to extend no more than 150m from the proposed development to take account of disturbance during construction. For aquatic ecology, the ZoI extends to the estuarine and coastal waterbodies within Cork Harbour to account for hydrological connectivity via watercourses crossed by the proposed greenway.

2.3 Desk Study

The following sources of published material were consulted as part of the desk study for the EcIA:

- Review of the National Parks & Wildlife Service (NPWS) natural heritage database for designated areas of ecological interest and sites of nature conservation importance within and adjacent to the study area;
- Review of Ordnance Survey maps and ortho-photography;
- Review of the National Biodiversity Data Centre (NBDC) database[1] for records of rare and protected species within a 0.5km radius of the proposed development site, including:
    - Annex I habitats, Annex II species and their habitats, and Annex IV species and their breeding sites and resting places (wherever they occur) as identified in the EU Habitats Directive;
    - The presence of species of flora and fauna as identified and strictly protected under the European Communities (Birds and Natural Habitats) Regulations, 2011; and
    - Species of fauna and flora which are protected under the Wildlife Acts (as amended), 'Protected species and natural habitats' as defined in the Environmental Liability Directive (2004/35/EC) and European Communities (Environmental Liability) Regulations, 2008;
- Review of the Cork City Development Plan 2022-2028;
- 1:50,000 Ordnance Survey (OS) Map; Discovery Series;
- Environmental Protection Agency mapping (https://gis.epa.ie/EPAMaps/);
- Environmental Impact Assessment Portal (https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal).

[1] Search undertaken on 25/11/2022

2.4 Field Surveys

Walkover surveys of the site of the proposed greenway were carried out by ecologist Ms Karen Banks between February 2022 and September 2022 and the proposed links to the greenway were surveyed on 31st March 2023. Areas highlighted during the desktop assessment, for example, the woodland habitats fringing the former West Cork Railway corridor, were investigated further, and a habitat survey was carried out. Habitats on site were classified in accordance with the Heritage Council publication 'A Guide to Habitats in Ireland' (Fossitt, 2000). The classification is a standard scheme for identifying, describing and classifying wildlife habitats in Ireland. The classification is hierarchical and operates at three levels, using codes to differentiate habitats based on the plant species present. Species recorded in this report are given both their Latin and common names, following the nomenclature as given in the 'New flora of the British Isles' (Stace, 2021).

A survey for invasive species was conducted during the ecology walkover surveys in July 2022, September 2022 and March 2023. These surveys included the identification and mapping of Invasive Alien Species (IAS). This survey was conducted in accordance with the NRA publication "Guidelines for the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads".

The site walkovers undertaken between February 2022 and March 2023 also included an assessment of the presence, or likely presence, of protected species. The survey was conducted in accordance with the standard protected species survey guidelines contained in the National Roads Authority publication 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (2008). The surveys were conducted for areas of habitat that might support birds or protected mammals in addition to recording any field signs, such as well-used pathways, droppings, places of shelter and features or areas likely to be of particular value as foraging resources. Any badger setts present were recorded during the site walkover, along with potential pine marten den sites and otter holts. In addition, the suitability of the habitat for pygmy shrew, hedgehog, hares, Irish stoat, pine marten, amphibians and invertebrates were recorded.

2.4.1 Avifauna

Breeding bird surveys of the proposed site were undertaken on 11th April 2022 and 7th June 2022. The entire proposed greenway route was surveyed, taking into account suitable habitat areas as previously identified in the desktop study and site walkover. All species that were seen or heard were recorded. All bird locations, numbers and behaviour were recorded by annotating field maps and taking notes. Breeding evidence such as singing males, agitated behaviour, carrying food and recently fledged young was recorded. The breeding status of all species encountered during surveys were classified into four categories: Confirmed (Br), Probable (Pr), Possible (Po) and Nonbreeder (N), based on British Trust for Ornithology (BTO) categories of breeding evidence, as detailed in Table 2-1. The survey was conducted under dry, calm and light weather conditions.

Table 2-1: BTO categories of breeding bird evidence

Breeding status	**Confirmed breeder (Br)**	**Probable breeder (Pr)**	**Possible breeder (Po)**	**Non-breeder (N)**
Observed behaviours	Distraction display or injury feigning (DD)	Pair in suitable nesting habitat (P)	Observed in suitable nesting habitat (H)	Flying Over (F)
	Used nest or eggshells found from current season (UN)	Permanent Territory (T)	Singing Male (S)	Migrant (M)
	Recently fledged young or downy young (FL)	Courtship and Display (D)		Summering non-breeder (U)

	Adults entering or leaving nest site indicating occupied nest (ON)	Visiting probable nest site (N)		
	Adult carrying faecal sac or food for young (FF)	Agitated Behaviour (A)		
	Nest containing eggs (NE)	Brood patch of incubating bird (I)		
	Nest with young seen or heard (NY)	Nest Building or excavating nest hole (B)		

2.4.2 Badger Survey

A badger survey was conducted within the proposed greenway route on 15th March 2022 and the proposed greenway links on 31st March 2023. The badger survey was conducted in accordance with Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009).

Field signs of badger activity are characteristic and sometimes quite obvious and can include tufts of hair caught on barbed wire fences and scrub, conspicuous badger paths, footprints, small excavated pits or latrines in which droppings are deposited, scratch marks on trees, and snuffle holes, which are small scrapes where badgers have searched for insects and plant tubers (NRA, 2009).

Notes were made on signs of other mammals in order to deduce the likelihood of faint tracks and/or feeding signs belonging to badgers. The objectives of the badger survey were to:

- Confirm whether or not badger setts occur within the area surveyed.
- Confirm where possible the status of any setts identified in survey.
- Describe field signs of badger activity.

2.4.3 Bat Survey

Bat surveys of the proposed greenway route were undertaken between February 2022 and September 2022 and the proposed greenway links were surveyed in March 2023 in accordance with the following guidelines:

- Bat Conservation Ireland, (2010). *Guidance notes for Planners, Engineers, Architects, and Developers*;
- BTHK. (2018). *Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals*. Pelagic Publishing, Exeter UK;
- Collins, J. (ed.) (2016). *Bat Surveys for Professional ecologists: Good Practice Guidelines (3rd ed.)*. The Bat Conservation Trust, London; and
- Marnell, F., Kelleher, C. & Mullen, E. (2022) *Bat mitigation guidelines for Ireland v2*. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

2.4.3.1 Preliminary Roost Assessment

Trees

The trees within and immediately adjacent to the proposed greenway were surveyed for potential roost sites and signs of bats on 15th March 2022; the proposed links to the greenway were surveyed on 31st March 2023. A detailed inspection of the exterior of trees was undertaken to look for features that bats could use for

roosting (Potential Roost Features, or PRFs) from ground level. The aim of the survey was to determine the actual or potential presence of bats and the need for further survey and/or mitigation.

A detailed inspection of each tree within the site and its immediate environs was undertaken. The inspection was carried out in daylight hours from ground level, and information was compiled about the tree, PRFs and evidence of bats. All trees, or groups of trees, with PRFs were numbered and a description of each PRF observed was recorded. PRFs that may be used by bats include:

- Rot holes;
- Hazard beams;
- Other horizontal or vertical cracks or splits (e.g. frost cracks) in stems or branches;
- Lifting bark;
- Knotholes arising from naturally shed branches or branches previously pruned back to the branch collar;
- Man-made holes (e.g. flush cuts) or cavities created by branches tearing out from parent stems;
- Cankers in which cavities have developed;
- Other hollows or cavities;
- Double leaders forming compression forks with included bark and potential cavities;
- Gaps between overlapping stems or branches;
- Partially detached ivy with stem diameters in excess of 50mm; and
- Bat or bird boxes.

Signs of a bat roost (excluding the actual presence of bats), include:

- Bat droppings in, around or below a PRF;
- Odour emanating from a PRF;
- Audible squeaking at dusk or in warm weather; and
- Staining below the PRF.

It should be noted that bats or bat droppings are the only conclusive evidence of a roost and many roosts have no external signs. This survey and evaluation was undertaken at ground level. Trees were categorised according to the highest suitability PRF present. The criteria for categorisation of suitability for bats is described further in Table 2-2.

Structures

No buildings are present within the proposed site. The proposed greenway crosses three bridges and two culverts.

Visual Inspection: A visual inspection of the bridges was undertaken during the hours of daylight by bat worker Ms Karen Banks. The bridge structure, including undersides or arches, parapets, wing walls, spandrel walls, cut-waters, abutments/piers etc., was searched for signs of bat roosting, including for example;

- Bat droppings: these accumulate under established roosting and access locations.
- Feeding remains: discarded insects parts such as moth wings under feeding perches.
- Bat corpses or skeletons.
- Fur oil/grease staining: natural oils in bats' fur rubs onto regularly used surfaces.
- Urine staining.
- Scratch marks: from bats movements in and out of perching/roosting locations.
- Lack of spider webs in holes and crevices: may indicate bats passing.
- Characteristic smells of bats may sometimes (rarely) be detectable
- Pupae of bat parasites such as *Nycteribia kolenatii* may (rarely) be present

Surveys involved examination of crevices with a strong, narrow-beamed torch, and an endoscope if necessary/beneficial. Close-focusing binoculars were used to inspect crevices that were not accessible.

Assessment of Bat Roost Potential: Even in a bridge that is sometimes used by bats, once-off surveys will not necessarily reveal the bridge as a bat roost. This is because occupation of roosts in bridges may be very transient, and bat signs may fall and wash away in rain/ the watercourse or fade over time. Therefore, a precautionary approach should be taken; one-off surveys may prove presence of a roost but cannot prove absence of a roost.

A simple way of assessing whether a bridge is likely to host bat roosts, at least during some part of the year, is that developed by Billington and Norman (1997). It uses four grades, as described below, to describe the presence, or likely presence of bats.

- Grade 0 = no potential for bats. These are bridges where there are no opportunities for bats to roost in cracks/crevices or under dense ivy cover. Reinforced concrete slab bridges and masonry bridges that have been well-pointed or concreted often fall under this category.
- Grade 1 = crevices possibly of use to bats. These are bridges that have a relatively low number of crevices that bats could potentially use, but which may be sub-optimal due to exposure to weather or light, for example. The possibility that bats could use these crevices cannot be entirely ruled out, but roosting is considered to be quite unlikely.
- Grade 2 = ideal crevices but no bats. There are substantial cracks/crevices with suitable dimensions (usually at least 15cm deep), which are dark, dry and sheltered, and as such offer good roosting opportunities. While no physical evidence for bats is confirmed, it is considered likely that bats could use crevices in the bridge.
- Grade 3 = evidence of bats. Bats themselves are observed in the bridge, or evidence such as bat droppings or other field signs are observed.

Table 2-2: Suitability of Habitats for Bats

Suitability	Description: Roosting Habitats	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as gappy hedgerow or un-vegetated stream, but isolated, i.e., not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only- the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.

Suitability	Description: Roosting Habitats	Commuting and Foraging Habitats
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

2.4.3.2 Bat Activity Survey

Bat activity surveys were conducted within the proposed greenway route using an Anabat Walkabout detector, which records bat echolocation calls directly on to an internal SD memory card. Each time a bat is detected, an individual time-stamped (date and time to the second) file is recorded. Data were then downloaded and all recordings were analysed using the Anabat Insight spectrogram sound analysis software Version 2.0.1. Dusk activity surveys (from sunset, for a minimum of 90 minutes) were conducted. These surveys enable a determination of the approximate numbers and species of bats present within the site, areas used for foraging and commuting routes to and from roosts. The approximate flying height and direction taken by bats were estimated and detailed where possible.

Assessment of bat activity was undertaken in May, July and September 2022. A total of 3 dusk activity surveys were completed and were undertaken on 3rd May, 24th July and 20th September 2022. Each survey was conducted in appropriate weather conditions (avoiding periods of very heavy rain, strong winds (> Beaufort Force 5), mists and dusk temperatures below (10°C)).

Table 2-3: Cork City to Viaduct Greenway Phase I: Bat Activity Survey Dates and Conditions

Survey Date	Times	Weather conditions
03/05/2022	21:00- 23:05, sunset 21:01	Precipitation: none, temperature at sunset: 12°C, wind F3, oktas 8
24/07/2022	21:30- 23:33, sunset 21:35	Precipitation: none, temperature at sunset: 15°C, wind F3, oktas 6
20/09/2021	19.32- 21.40, sunset 19.36	Precipitation: none, temperature at dusk: 13°C, wind F2, oktas 6

In order to supplement the information gathered from the manual activity surveys, a passive monitoring system of bat detection was also deployed for this survey scheme (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for later analysis). This results in a far greater sampling effort over a shorter period of time. Bats are identified by their ultrasonic calls. The passive detectors record bat ultrasonic calls on a continuous basis and store the information onto an internal SD card. Each time a bat is detected, an individual time-stamped (date and time to the second) file is recorded. Passive monitoring was completed in May, July and September 2022 using the Anabat Express and Anabat Swift bat monitors. The passive monitoring survey was undertaken in accordance with *Bat Surveys for Professional ecologists: Good Practice Guidelines* (Collins, J. (2016)). One Anabat Express monitor and two Anabat Swift monitors were deployed for the survey and were positioned in woodland edge habitat at six different locations (illustrated in Figure 2-1) within the proposed site. The monitoring also included one additional location adjacent to the Tramore River to account for this location as an option during the route selection stage. The detectors were set to record from approximately 30 minutes before sunset until sunrise and recorded for 5 nights at each location. Data were then downloaded

and bat echolocation calls were later analysed by the Anabat Insight software analysis programme version 2.0.1. Each time-stamped file was analysed and the species of bat recorded was noted as a bat pass.

The location of the passive monitors is illustrated in Figure 2-1.

Figure 2-1: Cork City to Viaduct Phase I- location of passive bat monitors

2.4.4 Otter Survey

Otter surveys were conducted on 15th March 2022 and 20th of September 2022 within the footprint of the proposed greenway route and in accessible areas of watercourses crossed by the proposed route for a distance of c.150m upstream and downstream of the proposed site.

The riverbanks were searched for field signs including:

- Sleeping and resting places including holts, couches and natal dens;
- Breeding sites;
- Spraints;
- Pathways/ trails;
- Slides;
- Hairs;
- Footprints; and
- Food remains.

Natal dens tend to be well hidden and therefore can be hard to locate. Survey for natal dens was undertaken by searching for field signs including:

- A heavily used path or paths from the water into dense cover or an enclosed structure;
- Bedding within the structure which may consist of grass, ferns or reeds (bedding may also be present in other types of resting places);
- A latrine containing a large number of spraints at the den or within 2m of it (however, it is important to note that there are often no droppings at a natal den as the female will excrete in the water to ensure that there are no signs of occupation near the natal den);
- A cub play area which may be a well-worn area around a tree or on a bank; and
- Different sized otter prints.

2.5 Impact Assessment Criteria

The information gathered from desk study and survey has been used to make an ecological impact assessment (EcIA) of the proposed development upon the identified ecological features. The EcIA has been undertaken following the methodology set out in CIEEM (2018). EcIA is based upon a source-pathway-receptor model, where the source is defined as the individual elements of the proposed development that have the potential to affect identified ecological features. The pathway is defined as the means or route by which a source can affect the ecological features. An ecological feature is defined as the species, habitat or ecologically functioning unit of natural heritage importance. Each element can exist independently, however an effect is created where there is a linkage between the source, pathway and feature.

A significant effect is defined in CIEEM (2016) as:

"*an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'…. or for biodiversity in general*".

Further, BS 42020:2013 states that if an effect is sufficiently important to be given weight in the planning balance or to warrant the imposition of a planning condition, e.g. to provide or guarantee necessary mitigation measures, it is likely to be "significant" in that context at the level under consideration. The converse is also true: insignificant effects would not warrant a refusal of permission or the imposition of conditions.

The geographical reference used for ecological valuation follows NRA (2009) *Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2.*, as detailed in Appendix A.

Ecological features might also be important because they play a key functional role in the landscape as 'stepping stones' for migratory species to move during their annual migration cycle, as well as for species to move between sites, to disperse populations to new locations, to forage, or move in response to climate change.[2] Features of lower ecological value are not assessed.

2.6 Survey Constraints

All terrestrial ecology surveys were undertaken within the appropriate timeframes and in suitable conditions. No constraints on terrestrial ecology survey information gathered to inform this EcIA are noted.

[2] Ref Article 10 of the Habitats Directive: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31992L0043:EN:HTML

3 Receiving Environment

3.1 Designated Sites

A review of European designated sites within a 15km radius of the proposed development was undertaken (www.npws.ie). Special Areas of Conservation (SACs) are sites of international importance due to the presence of Annex I habitats and / or Annex II species listed under the EU Habitats Directive. Special Protection Areas (SPAs) are designated for birds based on the presence of internationally significant populations of listed bird species.

A review of nationally designated sites within a 10km radius of the proposed development was also undertaken. Natural Heritage Areas (NHAs) are sites deemed to be of national ecological importance and are afforded protection under the Wildlife Acts. The proposed Natural Heritage Area (pNHA) have not been statutorily proposed or designated; however they do have some protection under agri-environmental farm planning schemes such as Rural Environment Protection Scheme (REPS 3 and 4) and Agri Environmental Options Scheme (AEOS), Forest Service requirement for NPWS approval for afforestation grants in pNHA lands and recognition of the value of pNHAs by Planning and Licensing Authorities.

There are two European sites within 15km of the proposed site. The proposed site is located c.2.6km west of Cork Harbour SPA and c.9.2km west of Great Island Channel SAC. A review of nationally designated sites indicates that there are no Natural Heritage Areas within 10km of the proposed development. There are fifteen proposed Natural Heritage Area (pNHAs) within 10km of the proposed development, the closest of which is the Cork Lough, which is located c.1.5km to the north of the proposed site. A list of designated sites recorded within 10km of the proposed development is presented in Table 3-1. European Sites are illustrated in Figure 3-1 and proposed Natural Heritage Areas are illustrated in Figure 3-2.

A Screening for Appropriate Assessment Report (Greenleaf Ecology, 2023) addressing likely significant effects on European designated sites (SACs and SPAs) within a 15km radius of the proposed development is provided as a separate report with the current planning application.

Table 3-1: European sites within 15km and nationally designated Sites within 10km of the of the proposed greenway

Site Name and Code	Qualifying Interests/ Conservation Interest	Distance from Proposed Works (km)[3]	Connectivity
Great Island Channel SAC (001058)[4]	**Annex I Habitats** Mudflats and sandflats not covered by seawater at low tide (1140) Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)	9.2km	There is potential remote and indirect connectivity via the crossing of two watercourses which flow into the open waters of Cork Harbour c.4.1km downstream at its closest point and, potentially, this SAC which is located a further 6.1km along the coast.

[3] Distance measured "as the crow flies"

[4] NPWS (2014) Conservation Objectives: Great Island Channel SAC 001058. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Site Name and Code	Qualifying Interests/ Conservation Interest	Distance from Proposed Works (km)[3]	Connectivity
Cork Harbour SPA (004030)[5]	**Bird Species:** Little grebe (*Tachybaptus ruficollis*) [wintering] Great crested Grebe (*Podiceps cristatus*) [wintering] Cormorant (*Phalacrocorax carbo*) [wintering] Grey heron (*Ardea cinerea*) [wintering] Shelduck (*Tadorna tadorna*) [wintering] Wigeon (*Anas penelope*) [wintering] Teal (*Anas crecca*) [wintering] Pintail (*Anas acuta*) [wintering] Shoveler (*Anas clypeata*) [wintering] Red-breasted Merganser (*Mergus serrator*) [wintering] Oystercatcher (*Haematopus ostralegus*) [wintering] Golden Plover (*Pluvialis apricaria*) [wintering] Grey Plover (*Pluvialis squatarola*) [wintering] Lapwing (*Vanellus vanellus*) [wintering] Dunlin (*Calidris alpina*) [wintering] Black-tailed Godwit (*Limosa limosa*) [wintering] Bar-tailed Godwit (*Limosa lapponica*) [wintering] Curlew (*Numenius arquata*) [wintering] Redshank (*Tringa totanus*) [wintering] Black-headed Gull (*Chroicocephalus ridibundus*) [wintering] Common Gull (*Larus canus*) [wintering] Lesser Black-backed Gull (*Larus fuscus*) [wintering] Common Tern (*Sterna hirundo*) [breeding] Wetlands	2.6km	There is potential remote and indirect connectivity via the crossing of two watercourses which flow into Cork Harbour SPA c.4.1km downstream at its closest point.
Ballincollig Cave pNHA (001249)	Ballincollig is situated approximately 5km west of Cork City on a linear depression, based on limestone. The site is relatively species rich, with some uncommon native and introduced plants. It is also an example of natural habitat in an area of intensive agriculture and also rapid urbanisation. It contains cave deposits that are interesting from a geological viewpoint.	5.4km	There is no connectivity via surface water, groundwater or any other pathway.

[5] NPWS (2014) Conservation Objectives: Cork Harbour SPA 004030. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Site Name and Code	Qualifying Interests/ Conservation Interest	Distance from Proposed Works (km)[3]	Connectivity
Blarney Lake pNHA (001798)	This site is situated 1km south west of Blarney, close to Blarney Castle. Blarney Lake is an artificial lake surrounded by a narrow band of woodland. A recent survey of the lake noted a good deal of waterfowl on the lake including Tufted Duck, Teal and Mallard. This site contains an interesting wetland community which is one of three closely situated rich and varied sites.	6.4km	There is no connectivity via surface water, groundwater or any other pathway
Ardamadane Wood pNHA (001799)	Ardamadane Wood is located north of Blarney village, 6km north-west of Cork City. It is situated along the banks of the River Martin. This site comprises mainly dry deciduous woodland of Sessile Oak (*Quercus petraea*) and Downy Birch (*Betula pubescens*) with some scrub woodland and improved agricultural grassland.	7.4km	There is no connectivity via surface water, groundwater or any other pathway
Glanmire Wood pNHA (001054)	Glanmire Wood occurs on the east bank of the Glashaboy River, immediately south of Glanmire village. The main habitat of interest is mixed broad-leaved woodlands dominated by oak (Quercus sp.), beech (Fagus sylvatica) and sycamore (Acer pseudoplatanus) with a few conifers. This site is of interest because this type of woodland is rare in east Cork.	6.3km	There is no connectivity via surface water, groundwater or any other pathway
Great Island Channel pNHA (001058)	See Great Island Channel SAC	9.2km	There is potential remote and indirect connectivity via the crossing of two watercourses which flow into the open waters of Cork Harbour c.4.1km downstream at its closest point and, potentially, this pNHA which is located a further 6.1km along the coast.

Site Name and Code	Qualifying Interests/ Conservation Interest	Distance from Proposed Works (km)[3]	Connectivity
Rockfarm Quarry pNHA (001074)	Rock Farm Quarry is located c. 9km west of Cork City on the southern shore of Little Island in the River Lee estuary. The area is of considerable interest botanically because of its species diversity and the presence of 'rarities' for the region, such as Dense-flowered Orchid and Portland Spurge.	8.3km	There is no connectivity via surface water, groundwater or any other pathway
Cork Lough pNHA (001081)	This small lake is situated in the north-west of Cork City, 1km north of the River Lee. The site is a N.H.A. of local importance for its bird community.	1.5km	There is no connectivity via surface water, groundwater or any other pathway
Lee Valley pNHA (000094)	This site occupies five separate sections of the valley of the River Lee, immediately to the west of Cork City. A diverse range of semi-natural habitats occurs here, including wet broadleaved woodland, wet grassland, dry broadleaved woodland, unimproved dry grassland, freshwater marsh and wetland bird species.	2.3km	There is no connectivity via surface water, groundwater or any other pathway
Shournagh Valley pNHA (000103)	This site includes two lower sections of the Shournagh River c. 8km west of Cork City – this river flows south-east to join the River Lee which then flows through the City. Habitats present include wet woodland and dry broadleaved woodland of regional conservation importance.	4.7km	There is no connectivity via surface water, groundwater or any other pathway

Site Name and Code	Qualifying Interests/ Conservation Interest	Distance from Proposed Works (km)[3]	Connectivity
Blarney Castle Woods pNHA (001039)	This site is situated 1km south-west of Blarney in the grounds of Blarney Castle. The wood is bounded to the north by the Blarney River and to the south by the parklands surrounding the castle. The wood is situated on limestone which is exposed in several places. The influence of the nearby limestone gives the woodland at Blarney a rich soil able to support a wide variety of plants and animals. The woodland is of interest for its birdlife. Woodcock occur within the woodlands during winter.	6.7km	There is no connectivity via surface water, groundwater or any other pathway
Douglas River Estuary pNHA (001046)	This is a large site situated in the north-west corner of Cork Harbour, stretching from Blackrock to Passage West. It is an integral part of Cork Harbour, which contains several other NHAs. This site occurs within the upper harbour and consists of extensive mudflats, formed from fine silts, bisected by the Douglas River. Damp grassland occurs on part of the southern side, extending to some low islands which are inundated in extreme tides. This site is of interest because it is an essential part of the Cork Harbour complex and contains much higher densities of waders than would be expected from its relative size. It is ranked as the second most important area within the harbour.	2.6km	There is potential remote and indirect connectivity via the crossing of two watercourses which flow into Douglas River Estuary pNHA c.4.1km downstream at its closest point.
Blarney Bog pNHA (001857)	Blarney Bog is a small area of Reed Canary-grass (*Phalaris arundinacea*) fen, situated in the flat valley floor of the River Blarney. The area as a whole is used by a variety of bird species. Birds noted to be breeding in the site include Sedge and Grasshopper Warblers, Reed Bunting, Stonechaff, Meadow Pipet, Snipe and Mallard. In the water Snipe and Mallard are seen feeding in the area and also Teal. Hen Harriers, a species listed in Annex I of the E.U. Birds Directive and also a Red Data Book species whose status is threatened in Ireland, are regularly seen in this area, hunting over the wetter ground and sometimes nesting in the reedbeds.	5.7km	There is no connectivity via surface water, groundwater or any other pathway
Monkstown Creek (Site Code: 001979)	See Cork Harbour SPA	2.5km	Remote and tenuous indirect connectivity via the crossing of two watercourses which flow into Douglas River Estuary c.4.1km downstream at its closest point. Monkstown Creek is located c.5.1km along the coast from Douglas River Estuary and forms part of Cork Harbour SPA.
Owenboy River (Site Code: 001990)	See Cork Harbour SPA	8.8km	Remote and tenuous indirect connectivity via the crossing of two

Site Name and Code	Qualifying Interests/ Conservation Interest	Distance from Proposed Works (km)[3]	Connectivity
			watercourses which flow into Douglas River Estuary c.4.1km downstream at its closest point. Owenboy River is located c.13.8km along the coast from Douglas River Estuary and forms part of Cork Harbour SPA.
Dunkettle Shore pNHA (001082)	This site is located at the mouth of Glashaboy River, where it meets the Lee estuary, on the eastern edge of Cork city. It is adjacent to Glanmire Wood, N.H.A., and is an integral part of Cork harbour, which contains several other NHAs. The site is of value because its mudflats provide an important feeding ground for waterfowl and it acts as a significant roost for birds in the upper harbour. Furthermore, it is an integral part of Cork harbour which is an internationally important wetland, regularly holding flocks of over 20,000 waterfowl.	6.2km	Remote indirect connectivity via the crossing of two watercourses which flow into Douglas River Estuary c.4.1km downstream at its closest point. Dunkettle Shore is located c.0.1km to the north of Douglas River Estuary and forms part of Cork Harbour SPA.

Figure 3-1: European Sites within 15km of the proposed greenway

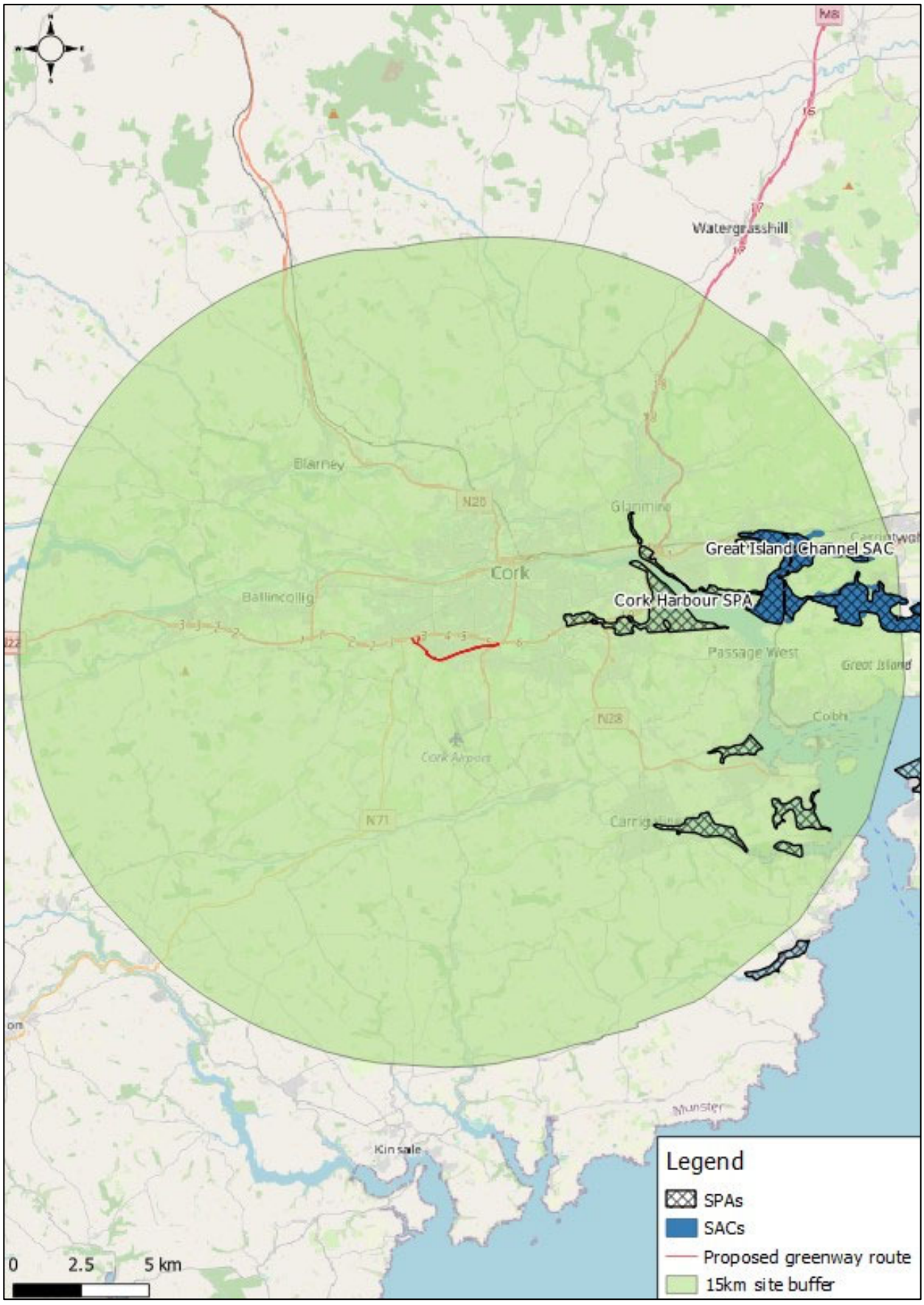

Figure 3-2: Nationally designated sites within 10km of the proposed greenway

3.2 Terrestrial Ecology

3.2.1 Habitats

A description of the habitats recorded at the proposed site is presented below.

3.2.1.1 Buildings and Artificial Surfaces (BL3)

The proposed greenway is located along the former West Cork Railway corridor, which includes areas of built land in the form of existing hardstanding, paved walkways and the local road network. The proposed greenway links also include built land in the form of a walkway, a disused access road and existing roads.

3.2.1.2 Lowland Depositing Rivers (FW2)

The proposed greenway will cross two small streams: the Douglas (Lee) and the Lehenagh Beg. Both of these watercourses are 1st order streams that are culverted underneath the former West Cork Railway corridor.

The Douglas (Lee) stream is located to the east of Spur Hill. This watercourse is c.1m wide (wet width), spreading to c.6m width prior to flowing into a culvert under the former railway corridor. A large bank vegetated with mixed broadleaved woodland is present above the culvert, adjacent to the former railway corridor.

The Lehenagh Beg stream is culverted under the former railway corridor to the west of Forge Hill. This watercourse is c.0.75m wide and is heavily overgrown with Willow and Bramble.

3.2.1.3 Drainage Ditch (FW4)

The proposed link from the N40 to Eagle Valley via undeveloped land crosses a drainage ditch located to the west of an agricultural field. The ditch supports running water over a silty substrate, with vegetation in the ditch including Fool's Water-cress (*Apium nodiflorum*) and Sweet-grass (*Glyceria* spp). The water in the ditch flows in a northerly direction adjacent to the disused access road towards the N40.

3.2.1.4 Improved agricultural grassland (GA1)

The proposed link from the N40 to Eagle Valley via undeveloped land crosses a field of improved grassland, which supports dominant Perennial Rye-grass (*Lolium perenne*) with occasional Sweet Vernal-grass (*Anthoxanthum odoratum*), Yorkshire Fog (*Holcus lanatus*), White Clover (*Trifolium repens*), Common Mouse-ear (*Cerastium fontanum*), Dandelion (*Taraxacum* agg.) and Creeping Buttercup (*Ranunculus repens*), with Soft Rush (*Juncus effusus*) locally abundant in waterlogged areas.

3.2.1.5 Amenity grassland (GA2)

Amenity grassland is present at the east of the site at the verge of the South Ring Road and in a domestic garden; and is also present at the west of the site at Eagle Valley and lands to the east of Garrane Darra. The grassland was mown short, and grasses were not identified to species level. Forbs present included Daisy (*Bellis perennis*), Dandelion (*Taraxacum* agg.), Ribwort Plantain (*Plantago lanceolata*), Red Clover (*Trifolium pratense*) and White Clover (*T. repens*).

3.2.1.6 Dry meadows and grassy verges (GS2)

The former railway corridor has re-colonised in small areas, and is fringed by, grass species including False Oat-grass (*Arrhenatherum elatius*), Cock's-foot (*Dactylis glomerata*), Perennial Rye-grass (*Lolium perenne*), Yorkshire Fog (*Holcus lanatus*), Sweet Vernal (*Anthoxanthum odoratum*) and Common Bent (*Agrostis capillaris*). Forbs present typically included Dandelion, Hedge Woundwort (*Stachys sylvatica*), Yarrow (*Achillea millefolium*), Self-heal (*Prunella vulgaris*), Ribwort Plantain and Daisy. Small areas of grassland present at Chetwynd and to the east of Forge Hill also supported Common Knapweed

(*Centaurea nigra*), Common Bird's-foot-trefoil (*Lotus corniculatus*), Ox-eye Daisy (*Leucanthemum vulgare*) and Lesser Hawkbit (*Leontodon saxatilis*).

3.2.1.7 Mixed broadleaved woodland (WD1)

For most of its length, the former railway corridor at the proposed site is fringed with mixed broadleaved woodland comprising frequent Sycamore (*Acer pseudoplatanus*) and occasional Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Larch (*Larix* spp.), Willow (*Salix cinerea*), Alder (*Alnus glutinosa*) and Elder (*Sambucus nigra*).

3.2.1.8 Scrub (WS1)

Scrub is encroaching the former railway line to the east of Forge Hill and to the west of Togher Road. Gorse is abundant in these areas, with Bramble (*Rubus fruticosus*), Willow, Ash, Sycamore and Butterfly Bush (*Buddleja davidii*) also present. Scrub is also present to the west of the proposed greenway link between the N40 and Garrane Darra.

3.2.1.9 Re-colonising bare ground (ED3)

An area of hardstanding to the east of Forge Hill is recolonising with scrub and invasive species including Butterfly Bush, Traveller's Joy (*Clematis vitalba*), Himalayan Honeysuckle (*Leycesteria formosa*), Bramble, Willow and Ash.

3.2.1.10 Treeline

The proposed link from the N40 to Eagle Valley via undeveloped land runs along a former access road that is lined by trees including Alder, Willow and occasional Ash and Butterfly Bush (*Buddleja davidii*).

3.2.2 Species

This section describes the species that have been recorded historically within 0.5km of the proposed greenway, species recorded during the site surveys and also the potential for the proposed site to support protected species. Species records extracted from the National Biodiversity Data Centre (NDBC) database are included in Appendix B.

3.2.2.1 Amphibians

The NBDC hold general historical records of common frog from the 10km OS grid square within which the site is located (W66), last recorded in 1979. There is no suitable breeding habitat for amphibians at the proposed greenway and its immediate environs. The drainage ditch adjacent to the proposed link from the N40 to Eagle Valley via undeveloped lands provides suitable habitat for breeding common frog. However, no evidence of amphibians was observed during the site surveys.

3.2.2.2 Birds

A number of protected species of bird have been recorded within 0.5km of the proposed site (see Appendix B), including wetland and waterbird species typical of the coastal and estuarine habitats present within Cork Harbour. No Annex I bird species or SCI for Cork Harbour SPA were recorded during the site walkovers and breeding bird surveys undertaken in 2022.

The findings of the breeding bird survey completed at the proposed greenway on 11th April 2022 and 7th June 2022 are presented in Table 3-2.

Avifaunal species recorded along the proposed greenway route reflected the habitats present. The woodland and scrub habitats fringing the proposed site supported passerines such as Robin, Wren, Great Tit, Chaffinch, Chiffchaff and Dunnock and several Blackbird were recorded, as well as single sightings of Blackcap and Bullfinch. Herring Gull, Swallow and House Martin were also recorded flying over the proposed greenway. No birds were confirmed as breeding at the proposed site, however a number of species are considered to be potentially breeding as they were present in suitable habitat or were singing. Of the bird species recorded at the proposed greenway, Greenfinch, Herring Gull,

House Sparrow, House Martin, Starling and Swallow are on the Amber List of the Birds of Conservation Concern (BoCCI) list (Moderate Conservation Concern); the remaining species are on the Green List (Least Conservation Concern). No species of High Conservation Concern were recorded at the proposed site.

Table 3-2: Cork City to Viaduct Greenway Phase I- Results of breeding bird survey (April and June 2022)

Common Name	Species Name	Transect 11th April 2022 (Yes/No)	Breeding Evidence[6]	Transect 7th June 2022 (Yes/No)	Breeding Evidence[7]	BOCCI
Blackbird	*Turdus merula*	Y	Po (H & S)	Y	Po (H & S)	**Green**
Blackcap	*Sylvia atricapilla*	N	-	Y	Po (S)	**Green**
Bullfinch	*Pyrrhula pyrrhula*	N	-	Y	Po (H)	**Green**
Buzzard	*Buteo buteo*	N	N (F)	Y	N (F)	**Green**
Chaffinch	*Fringilla coelebs*	Y	Po (H)	Y	Po (H)	**Green**
Chiffchaff	*Phylloscopus collybita*	Y	Po (s)	Y	Po (S)	**Green**
Dunnock	*Prunella modularis*	Y	Po (S & H)	N	-	**Green**
Great Tit	*Parus major*	Y	Po (s)	Y	Po (H)	**Green**
Greenfinch	*Chloris chloris*	Y	Po (H)	N	-	**Amber**
Herring Gull	*Larus argentatus*	Y	N (F)	Y	N (F)	**Amber**
House Sparrow	*Passer domesticus*	Y	Po (S)	Y	Po (H)	**Amber**
Hooded Crow	*Corvus cornix*	Y	N (F)	Y	N (F)	**Green**
House Martin	*Delichon urbicum*	N	-	Y	N (F)	**Amber**
Magpie	*Pica pica*	Y	N (F)	Y	Po (H)	**Green**
Robin	*Erithacus rubecula*	Y	Po (s)	Y	Po (H)	**Green**
Rook	*Corvus frugilegus*	Y	N (F)	Y	N (F)	**Green**
Starling	*Sturnus vulgaris*	N	-	Y	Po (H)	**Amber**
Swallow	*Hirundo rustica*	Y	N (F)	N	-	**Amber**
Wood Pigeon	*Columba palumbus*	Y	N (F)	N	-	**Green**
Wren	*Troglodytes troglodytes*	Y	Po (s)	Y	Po (H)	**Green**

3.2.2.3 Flora

The NBDC database does not hold any records of rare or protected species of vascular plants within 0.5km of the proposed site. The Flora Protection Order (2015) bryophyte Haller's Apple-moss (*Bartramia halleriana*) has been recorded historically (last recorded in 1845) in the 10km OS gid square W66. This species predominantly grows in dry rock crevices in cliffs and crags; the habitats at the proposed site are not suitable to support this species.

No rare or protected species of flora were recorded within the site during the site surveys.

3.2.2.4 Invasive Species

The NBDC database holds records of four invasive species included in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), namely Water Fern (*Azolla filiculoides*), Indian/ Himalayan Balsam (*Impatiens glandulifera*), Japanese

[6] In accordance with BTO categories of breeding bird evidence, see Table 2-1

[7] In accordance with BTO categories of breeding bird evidence, see Table 2-1

Knotweed (*Fallopia japonica*) and Three-cornered Garlic (*Allium triquetrum*) from the vicinity of the site.

Cherry Laurel (*Prunus laurocerasus*), which is considered to be a 'High Impact' species by Invasive Species Ireland, but is not listed in the Third Schedule, has been recorded in the vicinity of the proposed site. Species also recorded in the vicinity of the site include Butterfly-bush (*Buddleja davidii*), Himalayan Honeysuckle (*Leycesteria Formosa*), Sycamore (Acer pseudoplatanus) and Traveller's Joy (Clematis vitalba), which are listed as 'Medium' impact species but are not listed in the Third Schedule.

One plant species listed in the Third Schedule of the EU Birds and Natural Habitats Regulations 2011, as amended, was recorded during field surveys within the proposed site: Japanese knotweed was present to the west and east of Forge Hill (Plate 3-1). The location of Japanese Knotweed at the proposed site is illustrated in Figure 3-3.

Plate 3-1: Japanese Knotweed present to the east of Forge Hill

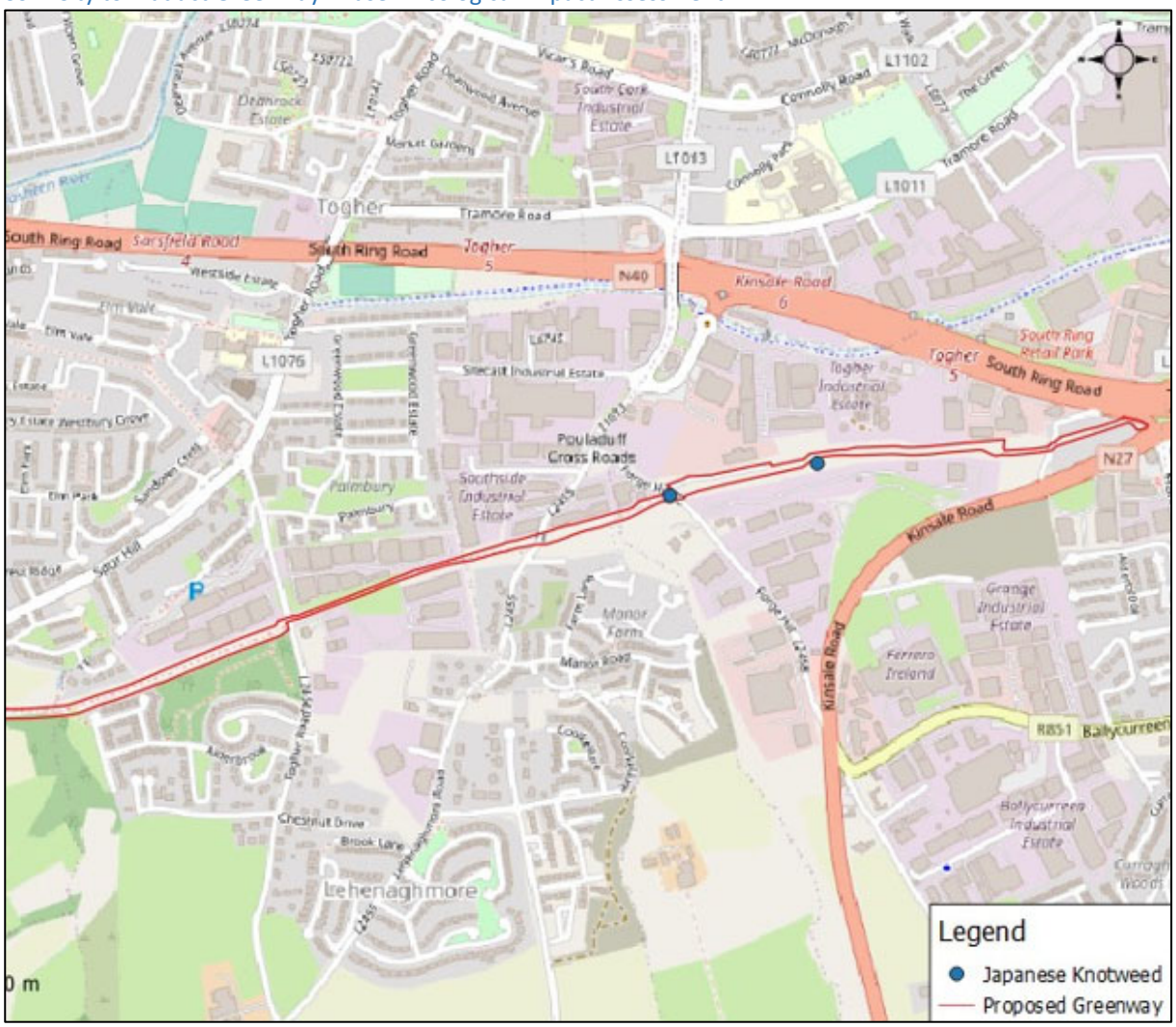

Figure 3-3: Cork City to Viaduct Greenway Phase I- location map of Japanese Knotweed

A number of non-Third schedule listed invasive plant species were also recorded from the survey area including Butterfly-bush and Himalayan honeysuckle, both of which were recorded scattered throughout the proposed site; and Bamboo (*Pseudosasa japonica*), which was recorded to the west of Togher Road.

3.2.2.5 Invertebrates

The NBDC database holds a historical record of Marsh Fritillary (*Euphydras aurinia*) from OS grid square W66, last recorded in 1984. No protected species of invertebrate were recorded during the site surveys undertaken in 2022 and the habitats present at the proposed site are not suitable to support Marsh Fritillary.

3.2.2.6 Bats

A review of existing bat records within the environs of the proposed site (sourced from Bat Conservation Ireland's National Bat Records Database and the National Lesser Horseshoe Bat Database) reveals that, currently, no species have been observed within a 0.5km radius. Pipistrelle species, soprano pipistrelle, Leisler's, brown long-eared and Daubenton's bat have been recorded within a 4km radius of the site, as shown in Table 3-3. There are no existing records of roosting bats from the proposed site and its environs.

The bat landscape association model (Lundy *et al,* 2011) suggests that the proposed site is part of a landscape that is of high suitability for soprano pipistrelle, common pipistrelle, brown long-eared and Leisler's bat; moderate to high suitability for whiskered, Daubenton's and natterer's bat; and low suitability for Nathusius' pipistrelle. The proposed site is outside of the core distribution range for lesser horseshoe bat (Roche *et al*, 2014).

Table 3-3 below outlines records of each bat species within the proposed site and its wider environs.

Table 3-3: Bat Records from the Proposed Site and Its Environs[8]

Common Name	Scientific Name	Present (Y/N)	Date of Last Record	Location of Known Roost (to 1km OS Grid Square Resolution)
Pipistrelle spp.	*Pipistrellus pipistrellus sensu lato*	Y	22/05/2016	None
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Y	22/05/2016	None
Nathusius's Pipistrelle	*Pipistrellus nathusii*	N	-	-
Leisler's Bat	*Nyctalus leisleri*	Y	22/05/2016	None
Brown Long-eared Bat	*Plecotus auritus*	Y	23/07/2007	None
Daubenton's Bat	*Myotis daubentonii*	Y	22/05/2016	None
Whiskered Bat	*Myotis mystacinus*	N	-	-
Natterer's Bat	*Myotis nattereri*	N	-	-
Lesser Horseshoe Bat	*Rhinolophus hipposideros*	N	-	-
Brandt's Bat	*Myotis brandtii*	N	-	-

Preliminary Bat Roost Assessment

No trees within the proposed site were being used as roost sites during the course of the surveys undertaken in 2022. A total of two trees adjacent to the proposed link to the greenway from the N40 to Eagle Valley via undeveloped lands were categorised as being of moderate suitability for roosting bats (as defined in Table 2-2) as they contained one or more potential roost features, but none are

[8] https://maps.biodiversityireland.ie/Map

suitable for use by larger numbers of bats on a regular basis due to their size and lack of protected, sheltered conditions.

The former railway corridor crosses over the Douglas (Lee) and the Lehenagh Beg streams via concrete culvert pipes; these structures are not suitable as roosting or resting places for bats.

Plate 3-2: Concrete pipe culvert at the Douglas (Lee) stream

The proposed greenway will pass under the existing railway bridges at Forge Hill, Lehenaghmore Road and Spur Hill. These bridges have been pointed throughout and no features likely to be used as roosting or resting places for bats were recorded within the bridge structures. The railway bridges at Forge Hill, Lehenaghmore Road and Spur Hill are all classified as Grade 0.[9]

Plate 3-3: Railway bridge present at Spur Hill

[9] *0 = no potential (no suitable crevices); 1 = crevices present may be of use to bats; 2 = crevices ideal for bats but no evidence of usage; and 3 = evidence of bats (e.g. bats present, droppings, grease marks, urine staining, claw marks or the presence of bat fly pupae) (Billington and Norman, 1997)

Bat Activity Survey

Four bat species were recorded during passive monitoring undertaken in May, July and September 2022. The most frequently recorded species was common pipistrelle, followed by soprano pipistrelle then Leisler's bat. These species were all recorded foraging across the site, with higher levels of activity recorded adjacent to Spur Hill (PM4 and PM7). Leisler's bat was recorded early in the evening in July on PM4 recording to the west of Spur Hill and at sunset in May on PM3, located between Togher Road and Spur Hill. Common pipistrelle was recorded early in the evening (c.3 minutes after sunset) in May 2022 on PM3 and c.18 minutes past sunset in September on PM7, recording to the east of Spur Hill. As noted previously, no potential bat roosts were recorded within the proposed site, however these results indicate the likely presence of a Leisler's bat and common pipistrelle roost in the vicinity of the site.

Whiskered bat and *Myotis* species of bat (unidentifiable to species level) were recorded in low numbers commuting and foraging in July on PM4 and a small number of calls that were not of sufficient quality to enable call identification were also recorded on PM5 (Table 3-4).

The calls recorded on the passive monitors are summarised in Table 3-4. The location of the passive detectors is illustrated in Figure 2-1.

Table 3-4: Cork City to Viaduct Greenway Phase I- summary table of total bat passes recorded on the passive monitors, May, July and September 2022.

Species	May 2022			July 2022		September 2022		Total
	PM1	PM2	PM3	PM4	PM5	PM6	PM7	
Common Pipistrelle	89 (96%)	152 (30%)	229 (73%)	3302 (85%)	170 (62%)	83 (33%)	818 (62%)	4,843 (73%)
Soprano Pipistrelle	4 (4%)	29 (6%)	15 (5%)	503 (13%)	13 (5%)	120 (48%)	500 (38%)	1,184 (18%)
Pipistrelle species[10]	0	0	0	2 (0%)	82 (30%)	0	0	84 (1%)
Leisler's	0	331 (65%)	70 (22%)	88 (2%)	0	45(18%)	11 (1%)	545 (8%)

[10] *Pipistrellus* spp. which have frequency of maximum energy, FMAXE, of c. 50kHz which cannot reliably be assigned to Common Pipistrelle (typical FMAXE of c. 45kHz) or Soprano Pipistrelle (FMAXE c. 55kHz)

Whiskered	0	0	0	3 (0%)	0	0	0	3 (0%)
Myotis Species	0	0	0	9 (0%)	0	0	0	9 (0%)
No ID	0	0	0	0	8 (3%)	0	0	8 (0%)
Total	93 (100%)	512 (100%)	314 (100%)	3,907 (100%)	273 (100%)	248 (100%)	1,329 (100%)	6,676 (100%)

The bat activity transect surveys undertaken in May, July and September 2022 recorded three species of bat within the proposed site. These species were common pipistrelle, soprano pipistrelle and Leisler's bat.

The most frequently recorded species was common pipistrelle, flowed by soprano pipistrelle then Leisler's bat. Common and soprano pipistrelle were recorded c.10 minutes after sunset between Togher Road and Spur Hill in July, indicating the likely presence of a summer roost for these species in the vicinity of that area. Common and soprano pipistrelle were recorded foraging along the woodland and scrub edge habitats located to the east of Forge Hill and between Togher Road and Spur Hill.

Leisler's bat was recorded early in the evening (c.2 minutes after sunset) commuting overhead to the east of Forge Hill in May. This species was recorded commuting/ foraging across the site in low numbers.

A low level of bat activity was recorded between Forge Hill and Togher Road.

3.2.2.7 Otter

The NBDC database holds records of otter from Tramore River, c.0.2km to the north of the proposed site, last recorded in 2012.

The streams crossed by the proposed greenway are not suitable to support a sustained foraging resource for otter and are extensively culverted downstream of the proposed site, thereby limiting the value of the streams as commuting habitat for otter. No evidence of otter was recorded at the proposed site during the site surveys.

3.2.2.8 Other Mammals

The NBDC hold records of badger, sika deer and hedgehog from a 0.5km radius of the proposed site.

The former railway embankments would provide suitable habitat for badger. However, no evidence of badger (for example droppings, paw prints etc) was recorded during the site surveys undertaken in 2022.

No evidence of hedgehog was recorded during the site surveys undertaken in 2022. However, the former railway embankments and domestic gardens fringing the proposed site would provide suitable habitat for this species.

No evidence of sika deer was recorded during the course of the site surveys. The habitats present at the proposed site are not suitable to support this species.

Table 3-5: Ecological Features within the Zone of Influence of the Proposed Development

Site/ Habitat/ Species	Ecological Value[11]	Ecological Feature
European Site	International. The proposed site supports indirect hydrological connectivity to Cork Harbour SPA and Great Island Channel SAC.	Yes
Natural Heritage Area	National. The proposed site supports hydrological connectivity to Douglas Estuary pNHA.	Yes
Buildings and artificial surfaces (BL3)	Negligible	No
Lowland depositing rivers (FW2)	The streams within the proposed site are extensively culverted and overgrown and would be of low fisheries value. However, these watercourses do provide some connectivity in the landscape and habitat for invertebrates, avifauna and mammals. Local importance (higher value).	Yes
Drainage ditch (FW4)	Local importance (lower value). The drainage ditch at the proposed site is not of fisheries value and does not support a diverse flora. However, it does provide connectivity in the landscape and is considered to be of local importance to avifauna and small mammals as a viable foraging habitat.	No
Improved agricultural grassland (GA1)	Local importance (lower value). A habitat of low ecological value for flora, habitats and non-volant mammals comprising poor floristic diversity.	No
Amenity grassland (GA2)	This habitat is intensively managed and species poor and is of local importance (lower value).	No
Dry meadows and grassy verges (GS2)	This habitat is of relatively low floristic diversity, however, it would provide habitat for invertebrates, avifauna and small mammals. In the context of the built land and intensively managed grassland present in the environs of the site, this habitat is considered to be of local importance (higher value).	Yes
Broadleaved woodland (WD1)	The woodland fringing the former railway corridor provides suitable habitat for foraging and commuting bats, birds and small mammals.	Yes
Scrub (WS1)	The scrub fringing the former railway corridor provides suitable habitat for foraging and commuting bats, birds and small mammals.	Yes
Treelines (WL2)	Local importance (higher value). Linear woodland habitats such as hedgerows and treelines provide valuable ecosystem services for other semi-natural habitats and faunal species in the locality in terms of cover, refuge and connectivity.	Yes
Recolonising bare ground (ED3)	As it occurs at the proposed site, this habitat supports a number of invasive species and is of relatively low floristic diversity. Local importance (lower value).	No
Amphibians & Reptiles	No evidence of amphibians and reptiles was recorded within the site.	No
Avifauna	Avifauna as they occur within the proposed site are considered to be of local importance (higher value).	Yes

[11] In accordance with NRA (2009) Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2. National Roads Authority

Bats	No potential roosting habitat was recorded within the site. However, bats commute to the site to forage along the woodland and scrub fringing the former railway corridor. Bats, as they occur at the site, are considered to be of Local Importance (higher value).	Yes
Otter	No evidence of otter was recorded within the site and the watercourses crossed by the proposed greenway are unsuitable to support this species.	No
Badger	No evidence of badger was recorded within the proposed site. However, the former railway embankments provide suitable habitat for this species.	Yes
Hedgehog	No evidence of hedgehog was recorded within the proposed site. However, the former railway embankments and domestic gardens fringing the site provide suitable habitat for this species.	Yes
Other ground mammals	No evidence of other protected species of ground mammal was observed within the site and there is limited suitable habitat for other mammals within the proposed site.	No

4 Potential Impacts of the Proposed Development

This section identifies the potential impact of the proposed development on habitats and species of conservation value (i.e. ecological features as outlined in Table 3-5) that have been identified as present, or that have the potential to be present, within the zone of influence of the proposed development.

4.1 Construction Phase

The ecological features that, in the absence of mitigation, may potentially be impacted by the construction phase of the proposed development and the significance of these impacts are set out in the following sections.

4.1.1 Designated Sites

Potential impacts on European sites are considered in the report to inform Screening for Appropriate Assessment (AA) accompanying the Planning Application (AA Screening, Greenleaf Ecology, 2023). The proposed Greenway will cross 2 no. watercourses that support remote hydrological connectivity to Cork Harbour SPA and Great Island Channel SAC. However, these watercourses will be crossed via existing culverts, no instream works are required. No SCI for Cork Harbour SPA were recorded during the site surveys and the proposed Greenway is set back from this SPA by c. 2.6km. In view of these factors, the Report to Inform AA Screening concludes that the proposed Greenway does not have the potential for Likely Significant Effects upon European Sites, either alone or in-combination with other plans and/or projects.

The proposed greenway supports hydrological connectivity to five pNHAs within a 10km radius, namely Douglas River Estuary pNHA, Dunkettle Shore pNHA, Monkstown Creek pNHA and Owenboy River pNHA, all of which are also designated as part of Cork Harbour SPA; and Great Island Channel pNHA, which is also designated as Great Island Channel SAC and so are considered within the screening for AA.

4.1.2 Habitats

4.1.2.1 Lowland Depositing Rivers

The streams at the proposed site are extensively culverted a short distance downstream of the site and are of low fisheries value. No instream works, excavation from within the riverbed or land take from within the streams are required as the proposed greenway will cross these streams via existing culverts. There is potential for the proposed works to result in adverse impacts on water quality within the streams as a result of sediment laden runoff during excavation and spillage of deleterious substances such as hydrocarbons.

In view of the proposed project design (i.e. no instream works, crossing of the streams via existing culverts), works methodology as detailed in Section 1.2, the likelihood of significant sediment, hydrocarbon or concrete loss is low. In consideration of the nature, size and scale of the proposed works, potential impacts as a result of the export of sediment and small amounts of potentially damaging waterborne pollutants (e.g., wet cement and hydrocarbons) during the construction phase would be limited to a temporary adverse, but not significant, effect on aquatic habitats locally.

4.1.2.2 Dry meadows and grassy verges

Most of the dry meadows and grassy verges habitat present along the proposed greenway was located on areas fringing the site. However, the proposed works will require some removal of this habitat in overgrown parts of the site, primarily located to the east of Forge Hill and between Togher Road and Spur Hill. This grassland habitat is of relatively low floristic diversity and is considered to be of

conservation value in the context of the built land and highly modified habitats generally present in the environs of the site. The proposed landscaping plan generally includes for 0.75 to 1.0m landscaped verges to include a pollinator friendly seed mix. As such, the loss of dry meadows and grassy verge habitat would be limited to a minor adverse effect locally.

4.1.2.3 Broadleaved Woodland

The proposed greenway will require the removal of 18 trees, predominantly comprising self-seeded recently colonised Willow, that are in direct conflict with the footprint of the proposed development. A further 32 trees have been recommended for removal based on their physiological and structural condition. Landscaping proposals for the proposed greenway improvement scheme include the planting of c.32 standard trees predominantly of native provenance. In view of these factors, the loss of broadleaved woodland would be limited to a minor adverse effect at the local level.

4.1.2.4 Scrub

The proposed greenway will require the removal of scrub, predominantly comprised of Gorse and Bramble, that has developed at the periphery of the site and in overgrown sections of the site between Togher Road and Spur Hill. Landscaping proposals include for the retention of scrub where feasible and the supplemental planting of native species of shrub where required. As such, the loss of scrub would be limited to a minor adverse effect at the local level.

4.1.2.5 Treelines

No works are required to the treeline fringing the proposed link from the N40 to Eagle Valley via undeveloped land. Therefore, there will be no impact on treelines during the construction phase.

4.1.3 Species

4.1.3.1 Avifauna

No SCI species for Cork Harbour SPA, Annex I bird species or birds of High Conservation Concern on the Birds of Conservation Concern (BoCCI) list were recorded during the site surveys. Accordingly, no potential for likely significant effects on the SCI of Cork Harbour SPA has been identified during construction.

Breeding birds are protected under the Wildlife Acts. It is an offence to disturb birds while on their nest, or to wilfully take, remove, destroy, injure or mutilate their eggs or nests.

The proposed development will require the removal of broadleaved woodland and scrub fringing the site that may potentially support bird species. If the tree and scrub removal works are not timed appropriately, nests containing eggs or young chicks could be destroyed. This would result in a temporary adverse effect on birds at the local level.

Indirect effects on birds associated with the proposed development may include potential visual and noise disturbance during the construction works. In the absence of mitigation this impact would be temporary and reversible.

4.1.3.2 Bats

Loss of Roosting Habitat

Two trees supporting moderate potential for roosting bats were recorded within the treeline fringing the proposed link from the N40 to Eagle Valley via undeveloped land. No works are proposed to these trees, therefore there will be no loss of roosting habitat.

Loss of Foraging Habitat

As detailed above, there will be a minor loss of broadleaved woodland and scrub fringing the site during the construction phase. In addition to the planting of native species of tree and shrub, landscape planting will also include the enhancement of the adjacent grass verges along the proposed greenway through the use of a wildflower seed mix, with the aim of attracting invertebrates, which will in turn benefit bats. In view of these factors, it is anticipated that the proposed development will have a minor short-term adverse effect on foraging bats and a neutral effect in the long-term as the landscape planting matures.

Lighting

Woodland edge and scrub habitat provides important flyways and feeding sites for bats within the proposed site. Artificial lighting at night may have an adverse effect on foraging bats as light-averse bats may be repelled from lit areas and restrict their use of commuting or feeding space. In the absence of mitigation, disturbance of bats due to lighting used during the construction phase, should it be required, would have an indirect, significant negative impact at the local level. The impact would be temporary and would persist for the duration of construction.

4.1.3.3 Badger

No evidence of badger was recorded within the proposed site. However, badgers create new setts regularly, and the site provides suitable habitat for foraging and sett excavation on the embankments for the former railway corridor. There is potential for disturbance to badgers during construction work. In the absence of mitigation, the construction of the proposed development has the potential to impact upon badger if present at the time of construction. This would be a temporary impact that would be significant at a local level.

4.1.3.4 Hedgehog

As detailed above, there will be a minor loss of broadleaved woodland and scrub fringing the site during the construction phase. However, woodland habitat will be maintained at the site boundary and suitable habitat for hedgehog will remain in domestic gardens located adjacent to the proposed greenway. Given these factors, the loss of potential foraging and shelter habitat to facilitate the proposed development is not expected to result in a significant adverse effect on hedgehog.

4.1.3.5 Invasive Species

As detailed in Section 3.2.2.4, a number of invasive alien plant species (IAPS) were recorded during the site surveys. One IAPS listed in the Third Schedule[12] was recorded in the immediate environs of the proposed site: Japanese Knotweed was recorded directly adjacent to the proposed greenway to the east of Forge Hill and within the footprint of the proposed development to the west of Forge Hill. Therefore, there is potential for the proposed works to result in the spread of invasive plant species listed in the Third Schedule.

4.2 Operational Phase

The ecological features that, may potentially be impacted by the operational phase of the proposed development and the significance of these impacts are set out in the following sections.

4.2.1 Designated Sites

No adverse effects on designated sites will occur during the operational phase.

[12] http://www.irishstatutebook.ie/eli/2011/si/477/made/en/print

4.2.2 Habitats

4.2.2.1 Lowland depositing rivers

During the operational phase, the proposed drainage for the greenway will be over the edge drainage and run-off from the car park will pass through a bypass interceptor before discharging to the existing surface water drainage network at Forge Hill. No adverse effects on watercourses crossed by the proposed greenway will occur during the operational phase.

4.2.2.2 Dry meadows and grassy verges

During the operational phase, it is proposed to manage the grassy verges of the greenway as wildflower meadows. As such, there is potential for the proposed development to result in an increase in floristic diversity within this habitat and to result in a positive effect in the long-term.

4.2.2.3 Broadleaved Woodland

No adverse effects on broadleaved woodland will occur during the operational phase.

4.2.2.4 Scrub

No adverse effects on scrub will occur during the operational phase.

4.2.2.5 Treelines (WL2)

No adverse effects on treelines will occur during the operational phase.

4.2.3 Species

4.2.3.1 Avifauna

There is potential for disturbance impacts on birds as a result of noise, lighting and human presence during movements associated with operation activities. Given the nature, scale and location of the proposed development, no likely significant effects on SCI for Cork Harbour SPA will occur during the operational phase.

In view of the nature and scale of the proposed development, and the habituation of the bird species currently present at the proposed greenway to human presence, effects on local bird populations are expected to be slight.

4.2.3.2 Bats

Artificial lighting at night may have an adverse effect on commuting and foraging bats. Further, a row of lights along the greenway may form a barrier which fragments the landscape and constrains flyways and therefore also the use of nearby roosts and feeding grounds.[13]

Habitat degradation due to the use of artificial lighting at night may result in a long-term to permanent, irreversible significant negative impact on bats. In the absence of mitigation this would be significant at a local level.

4.2.3.3 Badger

No adverse effects on badger will occur during the operational phase.

4.2.3.4 Hedgehog

No adverse effects on hedgehog will occur during the operational phase.

[13] Voigt, C. *et al* (2018): Guidelines for consideration of bats in lighting projects. EUROBATS Publication Series No. 8. UNEP/EUROBATS Secretariat, Bonn, Germany.

4.2.3.5 Invasive Species

There will be no disturbance to, or spread of, invasive species during the operational phase.

5 Mitigation

As with any development, all measures necessary should be taken to ensure comprehensive protection of local ecological features, in the first place by complete impact avoidance and as a secondary approach through mitigation by reduction and remedy.

A comprehensive construction method statement must be prepared by the contractor and reviewed and approved by the relevant statutory authorities e.g. Cork City Council, as necessary before any works take place. This will be informed by the specific mitigation measures detailed in Table 5-1 and the guidance documents and best practice measures listed below:

- H. Masters-Williams et al (2001) Control of water pollution from construction sites. Guidance for consultants and contractors (C532). CIRIA.
- Murnane et al (2002) Control of Water Pollution from Construction Sites - Guide to Good Practice. SP156.
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5.1 Construction Phase

Table 5-1: Table of Construction Phase Mitigation Measures

Objective(s)	Measure	Details of Mitigation
Best Practice Pollution Prevention Measures		
Control of sediment loss	Best practice during construction (silt control measures)	▪ The Contractor will be required to implement industry best practice pollution prevention measures in accordance with guidance documents (for example CIRIA 2001 Guideline Document C532 Control of Water Pollution from Construction Sites), during construction in order to control the risk of pollution to surface waters. ▪ There will be no direct discharge of surface water from any element of the works without suitable attenuation and treatment. ▪ Excavations: Water will be prevented from entering local excavations. Personnel and/or plant will not disturb water in a local excavation. The means of dewatering excavations in the event there is ingress will include settlement tanks or a silt buster stream if required to ensure that any dewaterings do not increase background suspended solids levels in the receiving environment. No excavations will be required within any watercourse. ▪ Spoil heaps: Spoil heaps will be located, protected and stabilised in a way that will avoid the risk of contamination of drainage systems and local watercourses. ▪ Site roads will be kept free from dust and mud deposits. In dry weather dust suppression measures will be utilised. ▪ Excavated material will be segregated into inert, non-hazardous and/or hazardous fractions. ▪ The excavation and handling of inert material will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment.

Objective(s)	Measure	Details of Mitigation
		▪ Silty water management: Water will not be pumped directly into surface water drains or watercourses. Adequate provision for dealing with very silty water will be put in place (see "Excavations" in first paragraph above).
Avoid hydrocarbon loss to water	Best practice during construction (hydrocarbons)	Routine practice and procedures to prevent pollution of the environment will apply throughout the duration of the construction phase. These include: ▪ A CEMP will be prepared and implemented by the appointed Contractor. ▪ During the construction stage, standard construction and site management practices will be implemented by the Contractor through the CEMP. ▪ All material including oils, solvents and paints will be stored within temporary bunded areas or dedicated bunded containers. ▪ Refuelling will take place in a designated bunded area away from surface water gullies, drains and water bodies, in the event of refuelling outside of this area, fuel will be transported in a mobile double skinned tank. ▪ All machinery and plant used will be regularly maintained and serviced and will comply with appropriate standards to ensure that leakage of diesel, oil and lubricants is prevented. ▪ Spill kits and hydrocarbon absorbent packs will be available and drip trays will be used during refuelling. ▪ Ongoing monitoring of the water receptors throughout the works. ▪ Mobile plant will be refuelled in the construction compounds, on an impermeable surface away from any drains or watercourses. A spill kit will be available at this location. ▪ Hoses and valves will be checked regularly for signs of wear and turned off and securely locked when not in use. ▪ Generators, diesel pumps and similar equipment will be placed on drip trays to collect minor spillages. These will be checked regularly, and any accumulated oil removed for disposal. ▪ Fuel will be stored in the temporary construction compound, which will be located to the east of Forge Hill and to the west of the L-2454 Togher Road. All chemical and fuel filling locations will be protected from potential spillages through the provision of appropriate protection measures including bunded areas and double skinned bowser units with spill-kits. ▪ Protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with the TII/NRA document "Guidelines for the crossing of watercourses during the construction of National Road Schemes".

Objective(s)	Measure	Details of Mitigation
Avoid concrete loss to water	Best practice during construction (concrete)	▪ Best practice will be employed in bulk-liquid concrete management addressing pouring and handling; secure shuttering / form-work and using adequate curing times. ▪ Where shuttering is used, measures will be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils. ▪ Disposal of raw or uncured waste concrete will be controlled using approved waste disposal and/or concrete wash-out pits to ensure that seepage to drains from the site is avoided. ▪ Cement dust must be controlled as it is alkaline and harmful if enough of it settles on drainage water and is transported to nearby watercourses. Activities which result in the creation of cement dust must be controlled by dampening down areas. ▪ In the event of a spillage on site, the material will be contained (using an absorbent material such as sand or soil or commercially available booms). All spillages will be reported to the project manager who will inform the relevant authorities in the event of a significant occurrence. No concrete works will take place over watercourses. ▪ Implementation of An Environmental Incident and Emergency Response Plan including spill prevention control procedures. In the event of a spillage on site, the material will be contained (using an absorbent material such as sand or soil or commercially available booms). All spillages will be reported to the project manager who will inform the relevant authorities in the event of a significant occurrence.
Species		
Avifauna	Timing of works	Where practicable, no clearance of trees on site will occur during the bird breeding season from 1st March to 31st August. Pre-construction bird surveys will take place prior to works commencing where works during the breeding season are unavoidable. If any active nests are discovered then work in the immediate vicinity of the nest will cease and an appropriate buffer zone shall be established which will be left in place until it has been confirmed that the young have fledged.
Bats	Appropriate use of lighting	Where construction lighting is required, lighting will be directed away from all woodland habitats to be retained. Directional lighting (i.e. lighting which only shines on the proposed project and not nearby countryside) will be used to prevent overspill. This will be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.
	Protection of roosting habitat	It is not proposed to remove any trees recorded as supporting potential as roosting or resting places for bats for the proposed works. However, as a precaution, pre-construction Potential Roost Feature (PRF) inspection/presence absence surveys of all trees scheduled for felling shall be undertaken. Following this examination, should any of the trees be

Objective(s)	Measure	Details of Mitigation
		identified as a bat roost then a derogation licence application will be made to the NPWS to exclude the bats and fell the tree. Where bats are recorded roosting in the trees scheduled for felling, the following mitigation will be required: ▪ Timing: tree-felling can be undertaken from late August to late October/early November and all works should ideally be undertaken in this period. During this period bats are still capable of flight having not entered hibernation and undertaking works in this period may reduce the risks of tree-felling if proper measures are undertaken. To carry out the works any later in the bat season creates an additional risk that bats may be in hibernation and thus unable to fly out from a tree that is being felled, although bats can be removed by hand by a licenced bat handler if required. Additionally, disturbance during winter may reduce the likelihood of survival as the bats' body temperature is too low and they may have to consume too much body fat to survive. Trees to be felled under the supervision of the bat specialist (as identified during the pre-construction survey) will be examined and where bats are found, they will be translocated to an area where bat boxes will already be installed on appropriate trees within the scheme area. The proposed process for felling the trees with PRFs is outlined below:- ▪ The bat specialist will be present during the tree felling works; ▪ Works will be undertaken in mild weather to ensure that if bats are found during works that they can be released or safely removed; ▪ Tree(s) identified as having potential to support bats will be surveyed during the daytime for bats prior to felling, on the day the felling is due to take place. The bat specialist will inspect all potential bat roost features of the tree, including those above ground level. This will require the services of a qualified arborist to climb the trees/ use a cherry picker and fell the tree in sections and lower potential roost features slowly to the ground to allow the bat specialist to inspect them. This will include visual inspection as well as use of an endoscope to inspect cavities/crevices; ▪ The arborist will be briefed on the technique to be followed prior to the commencement of operations. Felling will follow best practice and mitigation measures, including wedging open cracks/crevices prior to load removal and cutting limbs in sections and lowering to the ground. Trees will only be felled in longer sections if the bat worker is satisfied that there are no potential roost features present; ▪ When using a chainsaw, the rate of fall of branches will not be accelerated by the use of a chain and vehicle; ▪ Any bats found in the trees will be removed by hand to a bat box and will then be relocated to the bat

Objective(s)	Measure	Details of Mitigation
		boxes installed in advance of works. Notes of any such activities will be maintained; ▪ The tree and/or tree sections will be left on the ground for a minimum period of 24 hours to enable any unidentified bats residing in deeper crevices to make good their escape during night time hours.
	Protection of bat habitat	Felling of mature trees shall be avoided where practicable. Measures provided for the protection of trees as provided in the tree survey report undertaken for the proposed development (Green Tree Arborist, 2022) shall be implemented.
Badger	Pre-construction survey	A pre-construction survey shall be undertaken prior to the commencement of construction to identify active badger setts occurring within the site. In the event of badger setts being identified within proximity to the proposed works area, the following mitigation measures are proposed to ensure no disturbance of the local badger population during the construction phase of the proposed works (NRA 2005):- ▪ A buffer distance of 10m from sett entrances should be employed in instances where light works such as digging by hand or in the event of scrub clearance. ▪ A buffer distance of 20m from Badger sett entrances should be incorporated where light machinery (generally wheeled vehicles) are in operation within the site. ▪ A buffer distance of 30m from Badger setts should be employed where heavy machinery is in operation within the site. ▪ None of the above activities should be undertaken within 50m of active setts during the breeding season (1st December to 31st June inclusive). ▪ In the unforeseen event that the project requires works to be undertaken within the recommended buffer distances outlined above, further measures as outlined in NRA (2009) will be adopted in liaison with local NPWS staff.

5.1.1 Invasive Species

The Third Schedule IAPS species Japanese Knotweed is located adjacent to and within the footprint of the proposed works.

Where feasible, the proposed works shall be sited to avoid all Third Schedule[14] invasive non-native species. Great care will be taken at all times to ensure that plant material (i.e. fragments of stems, leaves and roots) is not spread while carrying out the proposed works.

The infested area shall be fenced-off and appropriate signage erected by a suitably qualified ecologist/ IAPS management specialist.

The contractor shall include measures to avoid the spread of IAPS within the CEMP. The IAPS measures within the CEMP will contain the intended construction methodology for avoiding the spread of viable

[14] http://www.irishstatutebook.ie/eli/2011/si/477/made/en/print

reproductive material of Japanese Knotweed and other species (i.e. leaves, stems and roots) and will follow best practice guidance documents. The CEMP shall include appropriate biosecurity measures to avoid the introduction of invasive alien plant species into the site. Management options for the control of Japanese Knotweed are as follows:

There are four main management options for Japanese Knotweed:

1. Best practice avoidance and biosecurity measures;
2. Physical or mechanical control;
3. Chemical control;
4. Excavation and burial on-site or disposal off-site.

The Japanese Knotweed is located within the footprint of the proposed development to the west of Forge Hill and adjacent to the proposed development to the east of Forge Hill (Figure 3-3). The current preferred option for the stand located within the footprint of the proposed development to the west of Forge Hill is physical control. The current preferred option for the stand located adjacent to the proposed Greenway to the east of Forge Hill is chemical control. Should chemical control not be feasible, for example, if the infestation spreads into the footprint of the proposed works prior to commencement of construction, physical control of the infestation can be undertaken.

General Protective Measures

In addition to the measures outlined above for Japanese Knotweed, the following best practice avoidance measures shall be implemented by the Contractor which will help to contain and/or prevent the introduction of invasive species on the site as follows:

- All plant and equipment employed for the proposed development (e.g. diggers, tracked machines, footwear etc.) shall be thoroughly cleaned down using a power washer unit, and washed into a dedicated and contained area prior to arrival on site and on leaving site to prevent the spread of invasive species. A sign off sheet shall be maintained by the Contractor to confirm cleaning;
- Material gathered in the dedicated and contained clean down area shall be appropriately treated as contaminated material on site;
- For any material entering the site, the supplier shall provide an assurance that it is free of invasive species;
- Ensure all site users are aware of invasive species measures and prevention and treatment methodologies;
- Provision of toolbox talks before works begin on the site; and
- Adequate site hygiene signage shall be erected in relation to the management of non-native invasive material.

5.2 Operational Phase

Table 5-2: Table of Operational Phase Mitigation

Objective(s)	Measure	Details of Mitigation
Bats	Appropriate use of lighting.	The protection of dark refuges is essential for bats, particularly in urban and suburban areas. Careful design of the lighting will be important to ensure that the greenway does not create barriers for bats commuting and foraging in the study area, while maintaining health and safety requirements for human use. This is particularly important for bat foraging/commuting habitat within, and at the edge of, retained woodland and stream habitats at the site.

		The following general principles, which accord with the relevant verified measures set out in the BCT Lighting Guidelines (BCT, 2018), shall be implemented: ▪ Lighting design will be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting shall be used within the proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas. ▪ Dark buffer zones will be used to separate habitats or features from lighting by forming a dark perimeter around them. This shall be used for habitat features noted as foraging areas for bats (i.e. woodland edge and stream). ▪ Buffer zones will be used to protect dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided into zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected. Luminaire design is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following will be considered when choosing luminaires. This is taken from the most recent BCT Lighting Guidelines (BCT, 2018). ▪ All luminaires used will lack UV/IR elements to reduce impact. ▪ LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability. ▪ A warm white or red spectrum (<2700 Kelvins is recommended to reduce the blue light component of the LED spectrum). ▪ Luminaires shall feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats. ▪ The use of specialist bollard or low-level downward directional luminaires shall be used in bat sensitive areas to retain darkness above. ▪ Column heights will be carefully considered to minimise light spill. The shortest column height allowed shall be used where possible. ▪ Only luminaires with an upward light ratio of 0% and with good optical control will be used. ▪ Luminaires will always be mounted on the horizontal, i.e. no upward tilt. For the proposed greenway, it is proposed to use lanterns with a spectrum of 2,200K. The lanterns will operate from dusk to dawn with a facility to dim the light output at less busy times or operate on a presence detection system. The maximum light spill at a distance of 10m is c.1 lux and the lights have an upward light ratio of 0%.

5.3 Enhancement

Bird Boxes

In order to enhance the site for nesting birds, it is recommended that a number of bird boxes are placed throughout the site. Several types of nest boxes should be installed at suitable locations to favour a variety of bird species.

Open-fronted boxes will provide enhanced nesting opportunities for species such as robins, pied wagtails and spotted flycatchers. Boxes with entrance holes (26mm and 32mm) are suitable for tits, wren and tree sparrows.

Bird boxes should be mounted so that they face between the south-east and north to avoid direct sunlight. They should be tilted forwards so that rain is directed away from the entrance.

It is recommended that three 1B Schwegler nest boxes (five 32mm and five 26mm holes) and three 2H Schwegler robin boxes are installed[15].

Bat Boxes

Providing bat boxes will increase opportunities for roosting bats within the proposed site. The woodland fringing the proposed greenway route to the east of Forge Hill and between Togher Road and Spur Hill would be suitable. The final box locations will be confirmed on site with the bat specialist.

A total of 12 no. bat boxes are recommended, to be placed on existing trees. The Schwegler 1FF bat box is ideal, due to the open bottom design preventing the build-up of bat droppings[16].

5.4 Monitoring

Lighting

The lighting shall be monitored after installation for light spill on to sensitive habitats. Should there be light spill on to sensitive bat habitats, such as woodland edge or treelines, the lighting design shall be reviewed and modified as required.

Bat Boxes

Bat boxes will be checked for a minimum of 2 years after erection by a bat specialist as decided by Cork City Council. After installation, the boxes shall be inspected in summer and autumn for two years. Any boxes not showing signs of occupation after that time may be re-located to alternative locations adjacent to the greenway.

5.5 Residual Impacts

With the effective implementation of the mitigation built into the project design and the specific mitigation measures provided in Section 5 of this report, no significant residual impacts on terrestrial and aquatic ecology are expected to occur as a result of the proposed greenway.

[15] See https://www.nhbs.com/1b-schwegler-nest-box

[16] For an example of the 1FF please see: https://www.nhbs.com/1ff-schwegler-bat-box-with-built-in-wooden-rear-panel

6 Conclusion

Provided that the mitigation measures provided in Section 5 of this report are effectively implemented, there will be no significant adverse ecological effects as a result of the proposed Cork City to Viaduct Greenway Phase I.

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Appendix A Geographical Reference for Ecological Assessment

Ecological Valuation
International Importance:
'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
Proposed Special Protection Area (pSPA).
Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended).
Features essential to maintaining the coherence of the Natura 2000 Network.
Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
Resident or regularly occurring populations (assessed to be important at the national level) of the following:
Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
Biosphere Reserve (UNESCO Man & the Biosphere Programme, 1971).
Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
Biogenetic Reserve under the Council of Europe.
European Diploma Site under the Council of Europe.
Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance:
Site designated or proposed as a Natural Heritage Area (NHA).
Statutory Nature Reserve.
Refuge for Fauna and Flora protected under the Wildlife Acts.
National Park.
Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
Resident or regularly occurring populations (assessed to be important at the national level) of the following:
Species protected under the Wildlife Acts; and/or
Species listed on the relevant Red Data list.
Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.
County Importance:
Area of Special Amenity.
Area subject to a Tree Preservation Order.
Area of High Amenity, or equivalent, designated under the County Development Plan.
Resident or regularly occurring populations (assessed to be important at the County level) of the following:
Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
Species protected under the Wildlife Acts; and/or
Species listed on the relevant Red Data list.
Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
County important populations of species or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared.
Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.

Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (higher value): Locally important populations of Priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (lower value): Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Appendix B NBDC Protected and Invasive Species Records from a 0.5km Radius of the Site

Species name	Date of last record	Designation
Common Frog (*Rana temporaria*)	31/12/1979	Annex V, Wildlife Acts
Barn Owl (*Tyto alba*)	31/07/1972	Wildlife Acts, Birds of Conservation Concern - Red List
Barn Swallow (*Hirundo rustica*)	06/06/2016	Wildlife Acts, Birds of Conservation Concern - Amber List
Black-headed Gull (*Larus ridibundus*)	06/03/2020	Wildlife Acts, Birds of Conservation Concern - Red List
Black-tailed Godwit (*Limosa limosa*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Canada Goose (*Branta canadensis*)	29/02/1984	High Impact Invasive Species, Invasive Species Regulation S.I. 477 (Ireland), Wildlife Acts
Common Coot (*Fulica atra*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Goldeneye (*Bucephala clangula*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Kestrel (*Falco tinnunculus*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Kingfisher (*Alcedo atthis*)	17/08/2016	Wildlife Acts, Annex I Bird Species, Birds of Conservation Concern - Amber List
Common Linnet (*Carduelis cannabina*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Pheasant (*Phasianus colchicus*)	31/12/2011	Wildlife Acts
Common Pochard (*Aythya ferina*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Redshank (*Tringa totanus*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Red List
Common Snipe (*Gallinago gallinago*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Starling (*Sturnus vulgaris*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Swift (*Apus apus*)	06/06/2016	Wildlife Acts, Birds of Conservation Concern - Amber List
Common Wood Pigeon (*Columba palumbus*)	06/03/2020	Wildlife Acts
Eurasian Curlew (*Numenius arquata*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Red List
Eurasian Oystercatcher (*Haematopus ostralegus*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Eurasian Teal (*Anas crecca*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Amber List
Eurasian Woodcock (*Scolopax rusticola*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
European Golden Plover (*Pluvialis apricaria*)	31/12/2011	Wildlife Acts, Annex I Bird Species, Birds of Conservation Concern - Red List

European Nightjar (*Caprimulgus europaeus*)	31/07/1972	Wildlife Acts, Annex I Bird Species, Birds of Conservation Concern - Red List
Great Black-backed Gull (*Larus marinus*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Great Cormorant (*Phalacrocorax carbo*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Herring Gull (*Larus argentatus*)	31/07/1991	Wildlife Acts, Birds of Conservation Concern - Red List
House Martin (*Delichon urbicum*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
House Sparrow (*Passer domesticus*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Jack Snipe (*Lymnocryptes minimus*)	31/12/2011	Wildlife Acts
Little Egret (*Egretta garzetta*)	31/12/2011	Wildlife Acts, Annex I Bird Species
Little Grebe (*Tachybaptus ruficollis*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Amber List
Mallard (*Anas platyrhynchos*)	31/12/2011	Wildlife Acts
Merlin (*Falco columbarius*)	31/12/2011	Wildlife Acts, Annex I Bird Species, Birds of Conservation Concern - Amber List
Mew Gull (*Larus canus*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Mute Swan (*Cygnus olor*)	31/07/1991	Wildlife Acts, Birds of Conservation Concern - Amber List
Northern Lapwing (*Vanellus vanellus*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Red List
Northern Pintail (*Anas acuta*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Red List
Northern Shoveler (*Anas clypeata*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Red List
Peregrine Falcon (*Falco peregrinus*)	31/12/2011	Wildlife Acts, Annex I Bird Species
Rock Pigeon (*Columba livia*)	31/12/2011	Wildlife Acts
Ruff (*Philomachus pugnax*)	31/12/2011	Wildlife Acts, Annex I Bird Species, Birds of Conservation Concern - Amber List
Sand Martin (*Riparia riparia*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Sky Lark (*Alauda arvensis*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Spotted Flycatcher (*Muscicapa striata*)	31/07/1991	Wildlife Acts, Birds of Conservation Concern - Amber List
Stock Pigeon (*Columba oenas*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Amber List
Water Rail (*Rallus aquaticus*)	29/02/1984	Wildlife Acts, Birds of Conservation Concern - Amber List
Yellowhammer (*Emberiza citrinella*)	31/12/2011	Wildlife Acts, Birds of Conservation Concern - Red List
Water Fern (*Azolla filiculoides*)	31/12/1950	Medium Impact Invasive Species, Invasive Species Regulation S.I. 477 (Ireland)
Butterfly-bush (*Buddleja davidii*)	04/07/2022	Medium Impact Invasive Species
Cherry Laurel (*Prunus laurocerasus*)	22/05/2020	High Impact Invasive Species
Himalayan Honeysuckle (*Leycesteria formosa*)	22/05/2020	Medium Impact Invasive Species

Indian Balsam (*Impatiens glandulifera*)	08/06/2020	High Impact Invasive Species, Invasive Species Regulation S.I. 477 (Ireland)
Japanese Knotweed (*Fallopia japonica*)	21/12/2020	High Impact Invasive Species, Invasive Species Regulation S.I. 477 (Ireland)
Sycamore (*Acer pseudoplatanus*)	22/05/2020	Medium Impact Invasive Species
Three-cornered Garlic (*Allium triquetrum*)	10/04/2019	Medium Impact Invasive Species, Invasive Species Regulation S.I. 477 (Ireland)
Traveller's-joy (*Clematis vitalba*)	08/10/2020	Medium Impact Invasive Species
Marsh Fritillary (*Euphydryas aurinia*)	31/12/1984	Annex II
Budapest Slug (*Tandonia budapestensis*)	30/07/2005	Medium Impact Invasive Species
Common Garden Snail (*Cornu aspersum*)	31/12/1907	Medium Impact Invasive Species
Keeled Slug (*Tandonia sowerbyi*)	30/07/2005	Medium Impact Invasive Species
Wrinkled Snail (*Candidula intersecta*)	31/12/1914	Medium Impact Invasive Species
Haller's Apple-moss (*Bartramia halleriana*)	31/12/1845	Flora Protection Order 2015 Schedule B (Mosses)
Brown Rat (*Rattus norvegicus*)	17/08/2016	High Impact Invasive Species, Invasive Species >> Regulation S.I. 477 (Ireland)
Eurasian Badger (*Meles meles*)	31/12/2004	Wildlife Acts
European Otter (*Lutra lutra*)	29/02/2012	Annex II, Annex IV, Wildlife Acts
Raccoon (*Procyon lotor*)	21/05/2013	High Impact Invasive Species, Invasive Species EU Regulation No. 1143/2014
Sika Deer (*Cervus nippon*)	31/12/2008	High Impact Invasive Species, Invasive Species Regulation S.I. 477 (Ireland), Wildlife Acts
West European Hedgehog (*Erinaceus europaeus*)	27/09/2020	Wildlife Acts