Comhairle Cathrach & Contae Luimnigh

Limerick City & County Council

Limerick City Greenway (UL to NTP)

APPROPRIATE ASSESSMENT

SCREENING REPORT

December 2024

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1 INTRODUCTION AND BACKGROUND TO PROJECT

1.1 BACKGROUND

Ryan Hanley was appointed by Limerick City and County Council (LCCC) to prepare a Stage 1 Appropriate Assessment (AA) Screening Report for the proposed Limerick City Greenway (UL to NTP) Project, Co. Limerick.

The purpose of the AA Screening is to determine the potential for likely significant effects, if any, that the proposed works for the Limerick City Greenway (UL to NTP) Project, may have, alone or in combination with other plans or projects on European Sites (Special Areas of Conservation (SAC) and Special Protection Areas (SPA), within the potential zone of influence of the works.

This report constitutes an Appropriate Assessment Screening in accordance with Article 6.3 of the EU Habitats Directive (92/43/EEC), for works to be completed for the Limerick City Greenway Project (UL to NTP), Co. Limerick.

1.2 THE REQUIREMENT FOR APPROPRIATE ASSESSMENT

The requirement for Appropriate Assessment is set out in the EU Habitats Directive (92/43/EEC) in Article 6 (3) which states:

"*Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives.*"

The Habitats Directive is transposed in Ireland by the European Communities (Birds and Natural Habitats) Regulations, 2011 (consolidating the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in recent CJEU Judgements) (hereafter referred to as the Habitats Regulations) and the Planning and Development (Amendment) Act, 2010.

1.3 THE AIM OF THIS REPORT

This Screening for Appropriate Assessment (Stage 1) has been prepared in accordance with current guidance and provides the information required in order to establish whether or not the proposed development is likely to have significant adverse effects on the European Sites in the context of their conservation objectives and specifically on the habitats and species for which the European Sites have been designated.

By undertaking the ecological impact assessment in a step-by-step manner in relation to the habitats and species of the European Sites, this report seeks to inform the screening process required as the first stage of the process pursuant to Article 6.3 of the EU Habitats Directive.

1.4 STATEMENT OF AUTHORITY

Breda Quinn is an Ecologist for Ryan Hanley, joining in 2021 and compiled this AA Screening report. Breda has over 4 years' post graduate experience as a professional ecologist. Breda has completed many Appropriate Assessment Screenings, Natura Impact Statements, Ecological Impact Assessments, Environmental Impact Assessment Screenings, and Invasive Species Summary Reports across a range of projects with Ryan Hanley. Breda has extensive field survey experience, with expertise in breeding and wintering bird surveying and invasive alien plant species surveys.

Trevor Stafford joined Ryan Hanley as Senior Ecologist in 2018 and reviewed this Screening report. Trevor has over 17 years' post graduate experience as a professional ecologist. Trevor has extensive field and technical experience in assessing the ecological impacts of plans and projects as required under EU Directives.

2 THE APPROPRIATE ASSESSMENT PROCESS

2.1 STAGES OF ARTICLE 6 ASSESSMENT

The European Commission's guidance promotes a staged process, as set out below, the need for each being dependent upon the outcomes of the preceding stage.

(1) Screening

(2) Appropriate Assessment

(3) Assessment of Alternative Solutions

(4) Assessment where no alternative solutions remain and where adverse impacts remain.

- The "IROPI test" (Imperative Reasons of Over-riding Public Interest) and compensatory measures.

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures.

Stage 1 of the process is intended to identify whether the project is 'likely to have a significant effect' upon a European site, referred to as 'Screening for Appropriate Assessment'.

If the screening process identifies effects to be significant, potentially significant or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). Screening is undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided though the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan or project. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no impact.

Section 177U of the Planning and Development Act 2010 states that; "the competent authority shall determine that an appropriate assessment of the proposed development is not required if it can be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will not have a significant effect on a European site."

Stage 2 of the process considers any potential impacts in greater detail including whether further mitigation measures are required. If an adverse impact upon the site's integrity cannot be ruled out then Stage 3 will need to be undertaken to assess whether alternative solutions exist. If no alternatives exist that have a lesser effect upon the European Site/s in question, the project can only be implemented if there are 'imperative reasons of overriding public interest', as detailed in Article 6(4). In essence, the work at Stage 1 will determine whether further stages of the process are required.

This report includes the testing required under Stage 1: Screening for Appropriate Assessment.

2.2 GUIDANCE

Article 6(3) of the EU Habitats Directive (92/43/EEC) defines the requirement for Appropriate Assessment of certain plans and projects. In order to inform the requirements of this Screening Report the following guidance documents have been referred to:

- DoEHLG Circular NPWS 1/10 & PSSP 2/10 Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities.
- DoEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Department of the Environmental Heritage and Local Government.

- European Commission (2018) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.
- European Commission (2000) Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg. European Commission.
- European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC
- European Commission (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.
- European Commission (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/49/EEC; clarification of the concepts of: Alternative solutions, Imperative reasons of overriding public interest, Compensatory Measures, Overall Coherence, Opinion of the Commission.
- European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No.477 of 2011).
- Office of the Planning Regulator (2021) Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.

2.3 REPORT FORMAT

In complying with the obligations under Article 6(3) and to be consistent with the Guidance for Planning Authorities, this report has been structured as follows:

- Description of the Plan/Project;
- Identification of European Sites, and the associated Conservation Objectives, which may be potentially affected;
- Identification and description of individual and cumulative effects likely to result from the Plan/Project;
- Assessment of the significance of the effects identified above;
- Exclusion of site where it can be objectively concluded that there will be no significant effects.

2.4 APPROACH TO AA SCREENING USING THE SOURCE » PATHWAY » RECEPTOR MODEL

The consideration of likely significant effects upon a European site is based on the Source » Pathway » Receptor Model. This model identifies the following:

- **Source** - aspects of the project which are the causes of effects upon the European site and its qualifying interests/conservation objectives, both directly and indirectly.
- **Pathway** - functional link or medium between the proposed development and a European site; pathways can occur via water, as in hydrological and hydrogeological; or via air, as in audible or visual, or by transmission shock, vibration, emissions, or other causes of effects.
- **Receptor** – a European site (SAC/SPA) and its qualifying interests (QIs) or special conservation interests (SCIs), including named, defined habitat types or species of flora and fauna.

3 DESCRIPTION OF THE PROJECT

3.1 GENERAL

The proposed Greenway forms part of a larger cycleway plan, as mentioned in the Limerick Shannon Metropolitan Area Transport Strategy (LSMATS) 2040. The focus of the LSMATS is to promote cycling as a realistic choice as a mode of transport in the Limerick Metropolitan Area, making it an attractive location for cyclists of all ages and abilities by proposing the development of a consistent, clear, and continuous network of urban and suburban cycle networks throughout the area.

3.2 LOCATION

The proposed 4.48km long and 3.5-4.3m wide Limerick City Greenway (UL to NTP) will pass through the townlands of Dromroe, Sreelane, and Castletroy in Co. Limerick. The proposed Greenway will be constructed on existing gravel paths, in green fields, and adjacent to public roads and it will provide new shared paths, cycle lanes, and footpaths to be used by all members of the public including vulnerable users. There will be a new all access ramp at Plassey Beach to replace existing steps. It will connect to an existing shared path at the River Groody bridge, and to cycle lanes and footpaths on Plassey Park Road. All elements of this project will be constructed for permanent local and visitor recreational and commuting use. Refer to Figure 3.1.

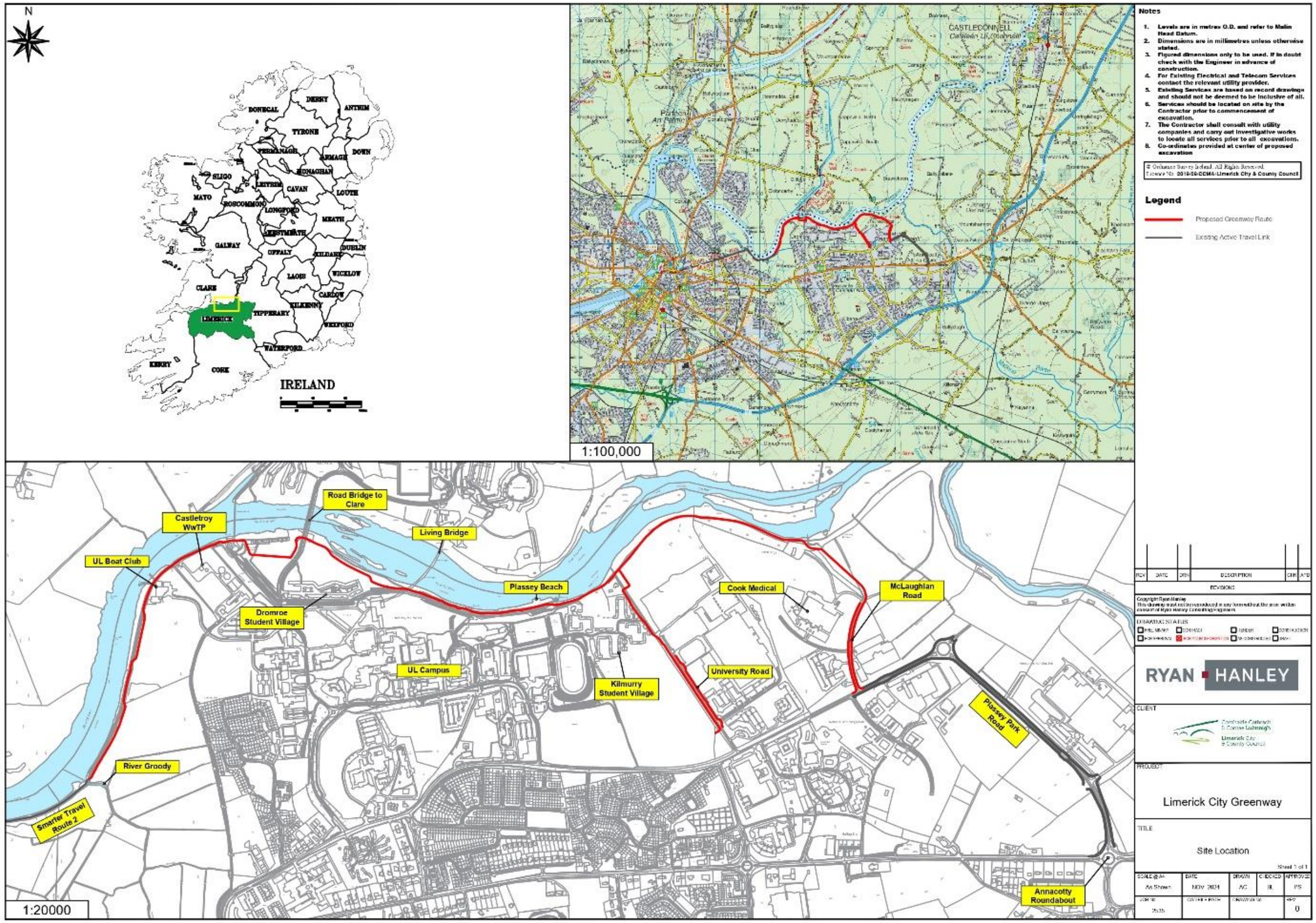

FIGURE 3-1: LOCATION OF PROPOSED WORKS

3.3 PROPOSED WORKS

The proposed route commences west from the existing River Groody bridge at the confluence of the River Groody with the River Shannon (CH 0). The proposed Greenway route will run adjacent to an existing narrow walking track along the southern bank of the River Shannon. The proposed Greenway will rejoin this existing Active Travel path where it is 3.5m wide and will cross an existing bridge (CH 400). A new steel parapet will be installed above the low stone parapet on this existing bridge to replace the existing parapet which currently narrows the bridge.

The route will pass by the UL Boat Club and extend eastwards to an existing concrete bridge which will be replaced by a 4.8m long steel bridge deck (Bridge No. 1 @ CH 795). A new 9.6m long steel and concrete bridge will be constructed alongside an existing stone bridge (Bridge No. 2 @ CH 970). The existing bridge across the Plassey Mill race will be replaced with a new 5.4m long steel bridge (Bridge No. 3 @ CH 1000) and an amenity space is proposed adjacent to the Plassey Mill (CH 1010). Access for a future connection to the Blackbridge across the River Shannon to Co. Clare will be provided. The existing bridge across the overspill for the Plassey Mill race will be replaced with a new 5.1m long steel bridge (Bridge 4 @ CH 1050).

The route turns southeast and will continue behind a collection of fishing huts and crosses a section of mixed broadleaved woodland and amenity grassland (approx. CH 1050 – CH 1250). The proposed route will replace an existing gravel path going north towards Drumroe Village University Bridge and turn east to continue along the River Shannon past the Drumroe Student Village. The proposed Greenway route will replace the existing gravel path, pass under the Living bridge (CH 1650), and meander between the River Shannon and the Plassey Mill race to avoid mature trees until it reaches Plassey Beach.

A 12.8m long steel bridge is proposed to replace the existing concrete bridge at the mouth of the Plassey Mill race (CH-2200 – CH-2245). This new bridge will facilitate wheelchair users and cyclists to cross the Plassey Mill race whereas the existing bridge is narrow and has steps. There will be a new ramp for people to walk down, wheelchair users and buggies/children's scooters from the proposed Greenway to Plassey Beach providing an amenity that provides access to all. There will be new seating and planting areas provided at the beach.

The proposed Greenway route then passes north of Kilmurray Student Village and reaches a junction (CH 2250). The route south provides access to University Road and to Plassey Park road. The proposed Greenway runs south past the eastern boundary of the Kilmurray Student Village and crosses the entrances to Kilmurry Village and the UL Gaelic grounds where it changes from a shared 3.5m wide greenway to Active Travel infrastructure with separate footpaths and cycle lanes along the eastern and western side of University Road. The proposed cycle lanes and footpaths will tie into Active Travel infrastructure which has been constructed along Plassey Park Road as part of the Limerick Metropolitan Cycle Network Study.

The proposed Greenway continues route east at (CH 2250) and traversers amenity grassland and scrub areas where there is an unpaved desire line before turning south (CH 3100) to traverse more grassland and scrub areas, then turns south to join connect to McLaughlan Road in the National Technology Park (NTP) at CH 3500. This section of the route is subject to extensive flooding and it lies within Flood Zone A, so drainage along and under the proposed Greenway has been designed to ensure the path can be utilised as soon as possible after flooding events.

The proposed 3.5m wide greenway changes to Active Travel infrastructure with separate footpaths and cycle lanes along the eastern and western side of McLaughlan Road. The proposed Active Travel

infrastructure will connect to existing Active Travel infrastructure on Plassey Park Road. An existing raised table will be converted to a Toucan crossing to prioritise crossings for pedestrians and cyclists.

Site clearance includes a range of vegetation clearing, topsoil and subsoil stripping and mounding, and removal of existing infrastructure items which are obstacles to the proposed path. Trees that need to be removed as part of site clearing will be reused onsite during the works, including used to mount Bird and Bat boxes and in the construction of bug hotels. In accordance with LCCC policy for tree replanting, five trees will be planted to compensate for every tree that will be removed.

Temporary construction compounds will be required during the construction period to accommodate workforce and vehicle movements and stockpiling of construction materials. The proposed compound locations have been selected because of their proximity to public roads for delivery access and as locations which are considered to pose minimal intrusion on the environment and community. There will be 4 No. temporary compounds (and 1 No temporary working area) to support the construction of the proposed greenway, and reinstatement of the temporary compounds and working area will be done following the completion of the construction phase in each section before moving to the next section. Materials will be delivered to the compounds along public roads. Within the compounds there will be separation between works and delivery areas, to ensure invasive species cannot be transported off site and to keep public roads clean of debris.

Construction will be carried out in 5 No. Sections and the construction work in each section will be directly supplied by an adjoining compound. The works construction vehicles will be confined to a section area and its compound. Work in adjoining sections will be prohibited to minimise the impact of temporary section closures on users of the existing paths. The entire length of each section will be closed to the public and there will be temporary pedestrian diversion routes around each section.

Temporary haul roads are required to facilitate the construction of the proposed path. Approximately 3.9km of haul roads will be developed along the proposed greenway route and will subsequently form the subbase layers of the proposed path. Approximately 0.3km of haul roads that will not coincide with the proposed greenway route (i.e. they are required to connect construction compounds and the temporary works area to existing roads) will be reinstated following the works in that section.

The proposed path will interface with existing roads at several locations along the route. The features which define interfaces with roads relate to improving the safety of pedestrians, cyclists and motorists interacting at these points. The proposed cycle lanes and footpaths will be segregated from roads, and road crossings will prioritise pedestrians and cyclists by use of raised tables.

Temporary traffic control measures in the form of a static lane closure will be required as part of the construction work on University Road in the University of Limerick, and McLaughlan Road in the National Technology Park in Castletroy.

The path composition is in accordance with TII document on *Rural Cycleway Design* DN-GEO-03047[1].

A total of 5. No new bridges and new culvert crossings on which the proposed path will lie/cross, are included as part of the works. Refer to Figure 3.2.

A total of 26 No. culverts are proposed to be constructed under the proposed path. Open shallow drains to direct surface water to culverts under the path will be constructed alongside the greenway, in

[1] TII Publications: Design DN-GEO-03047 Rural cycleway design

greenfield sites where existing drainage is not present, or in locations where the path severs the natural drainage routes. Positive drainage will be maintained along existing roads and gullies will be adjusted to suit new kerb lines.

There will be energy efficient public lighting that will provide a suitable level of light for use by cyclists and pedestrians whilst creating minimal light spillage onto adjacent environmentally sensitive locations.

Ancillary and amenity elements are included as part of the proposed development which include fencing, signage, cycle track markings, information boards, bike racks and benches.

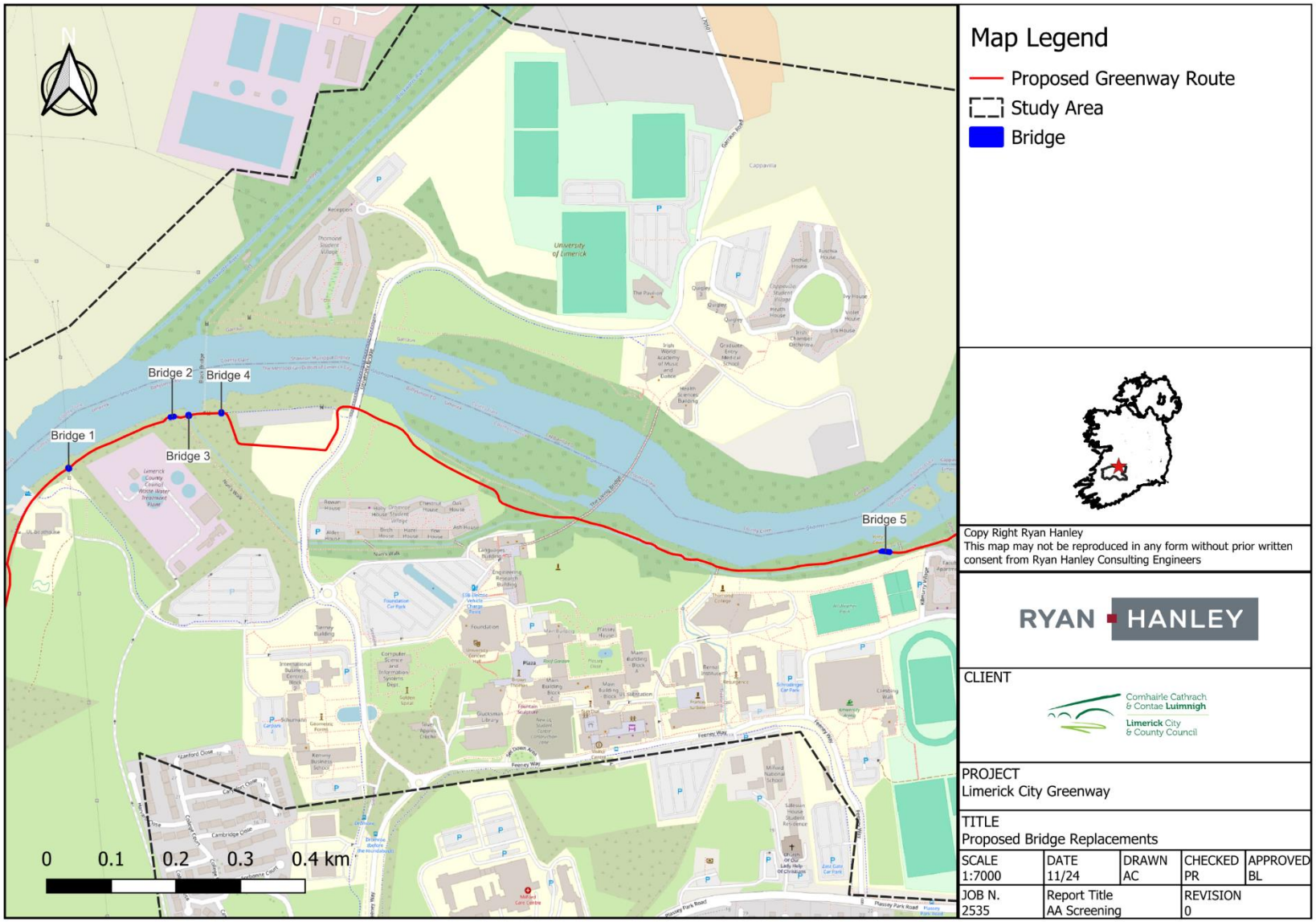

FIGURE 3-2: LOCATIONS FOR NEW BRIDGE AND REPLACEMENT BRIDGE DECKS

4 DESCRIPTION OF THE RECEIVING ENVIRONMENT

The study area was examined in detail via a desktop study using aerial photography and National Biodiversity Data Centre biodiversity maps to collate baseline information of the study area. In addition, site walkover surveys of the proposed greenway route were undertaken in November 2020, May and June 2021, April 2022, April, June, October, November 2023, and January, February, March, June, July 2024 where species and habitats relevant to the works locations, or of ecological interest were recorded. The works lie within a mixture of amenity and green field areas that are zoned for development. The area immediately surrounding the proposed route is a mixture of built land in the form of private dwellings, University of Limerick campus, recreational areas, and an IDA campus known as The National Technology Park, as well grassland areas.

There are no instream works proposed (See Figure 4.1). The works will take place along the Western banks of the River Shannon (Lower) (EPA code: IE_SH_25S012600) downstream of its confluence with the River Mulkear (EPA code: IE_SH25M040590)

The works transverse six 1km Grid Squares of the Biodiversity Ireland Database; R6057, R6058, R6158, and R6258. These Grid Squares contained records of the Annex I species; Common Kingfisher (*Alcedo atthis*), Annex II species; European Otter (*Lutra lutra*) and records of the invasive plant species Giant Hogweed (*Heracleum manteegazzianum*), Water Fern (*Azolla filiculoides*), Japanese knotweed (*Fallopia japonica*) and Himalayan Balsam (*Impatiens glandulifera*). During the walkover surveys of the proposed greenway route the Third Schedule listed invasive species Himalayan Balsam and Giant Hogweed were recorded within the area. Throughout the wider footprint area, these species are abundant and an invasive species management plan is being implemented to restore native biodiversity.

The works occur within and directly adjacent to the Lower River Shannon SAC. No instream works will occur and all works will be carried out along and at a safe distance from the river banks.

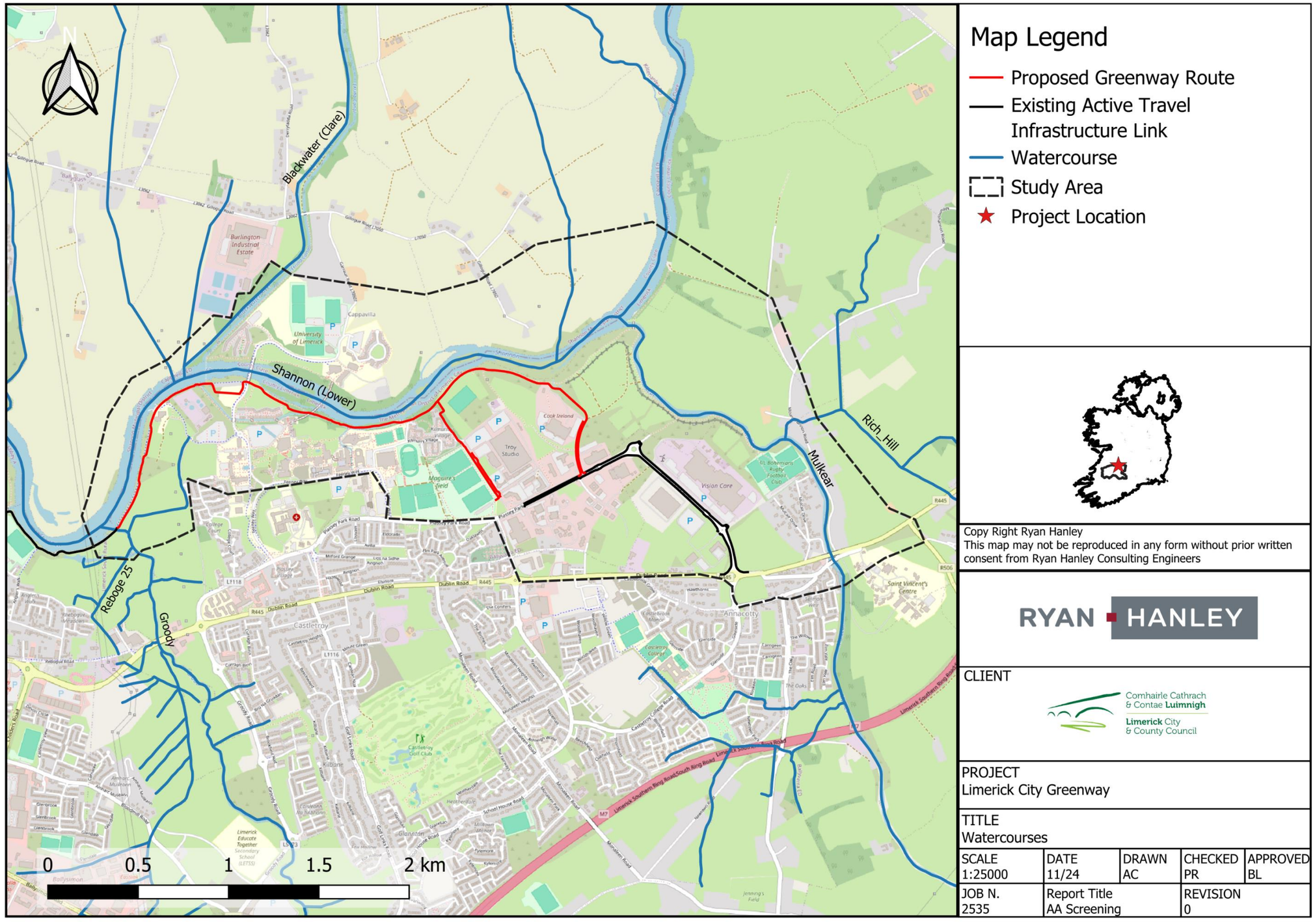

FIGURE 4. 1 RECEIVING WATERBODIES IN THE VICINITY OF THE PROPOSED WORKS

4.1 HABITATS AND FLORA

The study area was examined in detail via a desktop study using aerial photography and National Biodiversity Data Centre biodiversity maps to collate baseline information of the study area. In addition, site walkover surveys were undertaken from 2020 to 2022 where species and habitats of interest were recorded. The following paragraphs describe the terrestrial and aquatic habitats and rarer flora within and adjacent to the proposed works area, according to the classification detailed in 'A Guide to Habitats in Ireland' (Fossitt, 2000) and cross referenced with Annex I habitats where required.

The dominant habitats within and adjacent to the proposed development is Buildings and Artificial Surfaces (BL3), Depositing/Lowland Rivers (FW2), Amenity Grassland (improved) (GA2), Riparian Woodland (WN5) and Mixed broadleaved woodland (WD1). Some other habitats were identified but with less presence in the area.

4.2 INVASIVE SPECIES

The NBDC grid squares show records of High Impact invasive plant species under Regulation S.I. 477/2011. These include Giant Hogweed (*Heracleum mantegazzianum*), Indian Balsam (*Impatiens glandulifera)* and Japanese knotweed (*Fallopia japonica*).

Field survey for invasive plant species were carried out during 2020, 2021, 2023 and 2024. Stands of Giant Hogweed and Himalayan Balsam were identified along the length of the proposed greenway route interspersed with one another within the Study Area. An Invasive Species Management plan is being implemented to control their spread, as part of LCCC's objective to restore native biodiversity Additionally, the non-native species Winter Heliotrope (*Petasites fragrans*) and Cherry laurel (*Prunus laurocerasus*) were recorded, however, these species are not listed on the Third Schedule.

Other invasive species found in the Study Area, according to NBDC records include Water fern (*Azolla filiculoides*), Greylag goose (*Anser anser*), Jenkins' spiral snail (*Potamopyrgus antipodarum*), Butterfly bush (*Buddleja davidii*), Japanse rose (*Rosa rogusa*), Greater white-toothed shrew (*Cocidura russula*), Cherry laurel (*Prunus laurocerasus*), European rabbit (*Oryctolagus cuniculus*) and Dace (*Leuciscus leuciscus*).

4.3 OTTER

The Eurasian otter is a species of conservation concern and high priority having suffered major declines in its range and population throughout Europe. It is classified as 'near threatened' by the IUCN Red List with a decreasing population trend and, as such, is listed in Appendix 1 of CITES, Appendix II of the Bern Convention (Council of Europe, 1979) and Annexes II and IV of the EC Habitats Directive (92/43/EEC).

In respect of conservation measures and status, a total of 44. No SACs have been designated for the otter comprising river channels, coastline (including off-shore islands), lakes and blanket bog systems. Threats to otters in Ireland, categorized three principal risks: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. The Overall Status (Article 17 reporting) of otter is therefore considered to be Favourable, unchanged since the previous reporting period (NPWS, 2019).

During the walkover surveys undertaken during May 2021 and July 2024, the Study Area watercourses were searched for signs of Otter. The Otter survey was undertaken along the route of the proposed greenway, following the river Shannon's bank. There were no definitive sights for Otter, such as spraints, tracks, holt or couch sites but potential trails were observed. Some areas of the path were considered suitable for Otter. Otter requires suitable bankside vegetation as cover for their holts.

Populations of Otter in the Shannon (Lower), where the proposed greenway works will take place, are unlikely to be significantly affected as there will be no impacts on foraging and commuting habitats of the species.

It should be noted that while no Otters or field signs of Otters were recorded along the River Shannon it should be considered that habitats are suitable for Otter and that the species might be present in these areas.

4.4 SALMON

The Atlantic salmon is protected under Annex II and V of the EU Habitats directive. The Irish salmon population generally comprises fish that spend two years (small numbers spend one or three years) as sub-adults in freshwater before going to sea as smolts. Inland Fisheries Ireland (IFI, 2022) in its statistics report recorded a total number of salmon caught by all methods (commercial and angling, including catch and release) which resulted in 26,715 which represents a decrease of 14.2% on the total salmon catch recorded in 2021.

Atlantic salmon (*Salmo salar*) has experienced long term decline in global populations and significant decreases in numbers returning to Irish rivers since 1970 falling from over 1.5 million to under 200,000. In less than 20 years. The linear model showed in IFI's report on the status of salmon stocks (IFI, 2023) indicates a moderate decline in mean abundance of salmon which has become more marked since 2007. Since 2020, the declining trend became more evident with 2023 showing the lowest value in the whole time series.

During the Aquatic Ecological Appraisal (AEA) undertaken by APEM in 2023, it was observed that in some areas along the banks of the River Shannon the slow-flowing aquatic habitat with marginal tree cover, undercut banks and shelter from the main channel may provide suitable refugia for salmonids. Just downstream of The Living Bridge, an island network splits the main Shannon River, and a small channel (approximately 3 m wide) breaks off and follows the left-hand bank for approximately 350m. This channel is characterised by faster-flowing run flow typology which may offer suitable habitat for salmonids due to the presence of cobble and gravel substrate with boulders, offering both refugia and foraging habitat for juvenile salmon and potentially offering suitable spawning habitat for adults.

4.5 WATER QUALITY

The two main waterbodies within the Study Area are the River Shannon (Lower River Shannon_060) and the River Mulkear (Mulkear (Limerick)_050). The Study Area sits within the Lower Shannon (25D) Catchment which covers an area of 1,041 km² and includes the lower reaches of the River Shannon to Limerick City and the catchment of the Mulkear River.

According to the latest EPA data (2016-2021) the Lower River Shannon_060 has a status of 'Moderate' with current risk being reviewed. The Mulkear (Limerick)_050 upstream from Dublin Road (R445) has a status of 'Good' and its risk status is also being reviewed.

These waterbodies are within the 25D_9 Shannon [Lower]_SC_090 sub-catchment which has significant pressures related to urban run-off, agriculture and domestic waste water. Main impacts related to those pressures include nutrient impact pollution, organic pollution and habitat morphological impact.

5 EUROPEAN SITES

5.1 DESIGNATED SITES IN THE VICINITY OF THE PROJECT

Section 3.2.3 of the Guidance for Planning Authorities (DoEHLG, 2010) states that the approach to screening can be different for different plans and projects and will depend on the scale and the likely effects of the project. A key variable that will determine whether or not a particular European Site is likely to be negatively affected is its physical distance from the project site and whether there are any pathways for effect linking the project to these sites.

Using the source » pathway » receptor approach and having regard for the location, the nature and small size and scale of the proposed project it is considered for the purpose of this screening exercise that the likely Zone of Influence (ZoI) on designated sites is the zone immediately around the construction site and any sites with a hydrological connection downstream of the works, where distance would be dependent on the qualifying interests of the site. **Table 5. 1** below details European sites with potential source » pathway » receptor links to the proposed works and whether a potential interaction has been identified.

TABLE 5. 1 EUROPEAN SITES WITH POTENTIAL SOURCE » PATHWAY » RECEPTOR LINKS TO THE PROPOSED WORKS

Site Name	Site Code	Distance from Works	Potential Interaction
Lower River Shannon SAC	002165	Within and directly adjacent to works	Yes, some of the proposed works are located in lands adjacent to the Rivers Shannon which form part of this SAC. There is a potential interaction between the works and this site and therefore this site is **screened in** for further assessment.
River Shannon and River Fergus Estuaries SPA	004077	3.7 km southwest and 8 km downstream	No. There is a hydrological connection between the proposed works and the River Shannon and River Fergus Estuaries SPA as some of the works are being undertaken in lands adjacent to the River Shannon which forms part of the SPA approximately 5.5 km downstream of the works. Owing to the distance between the proposed works and this designated site, the scale and nature of the works, and the dilution potential of the river, it is considered that any potential discharges (silt/sediment/hydrocarbon) resulting from the works will not result in any negative interactions with the qualifying interests of this SPA and this site is **screened out** for further assessment.

As outlined in Table 5.1, there is potential for interactions to occur between the proposed works and one European Site, the Lower River Shannon SAC due to some of the proposed works being located within and directly adjacent to the boundary of this site. As such, the Lower River Shannon SAC is considered for further assessment with regards to its Conservation Objectives and Qualifying and/or Special Conservation Interests and the remaining European site is screened out and not considered further in this report as detailed in **Table 5. 1.**

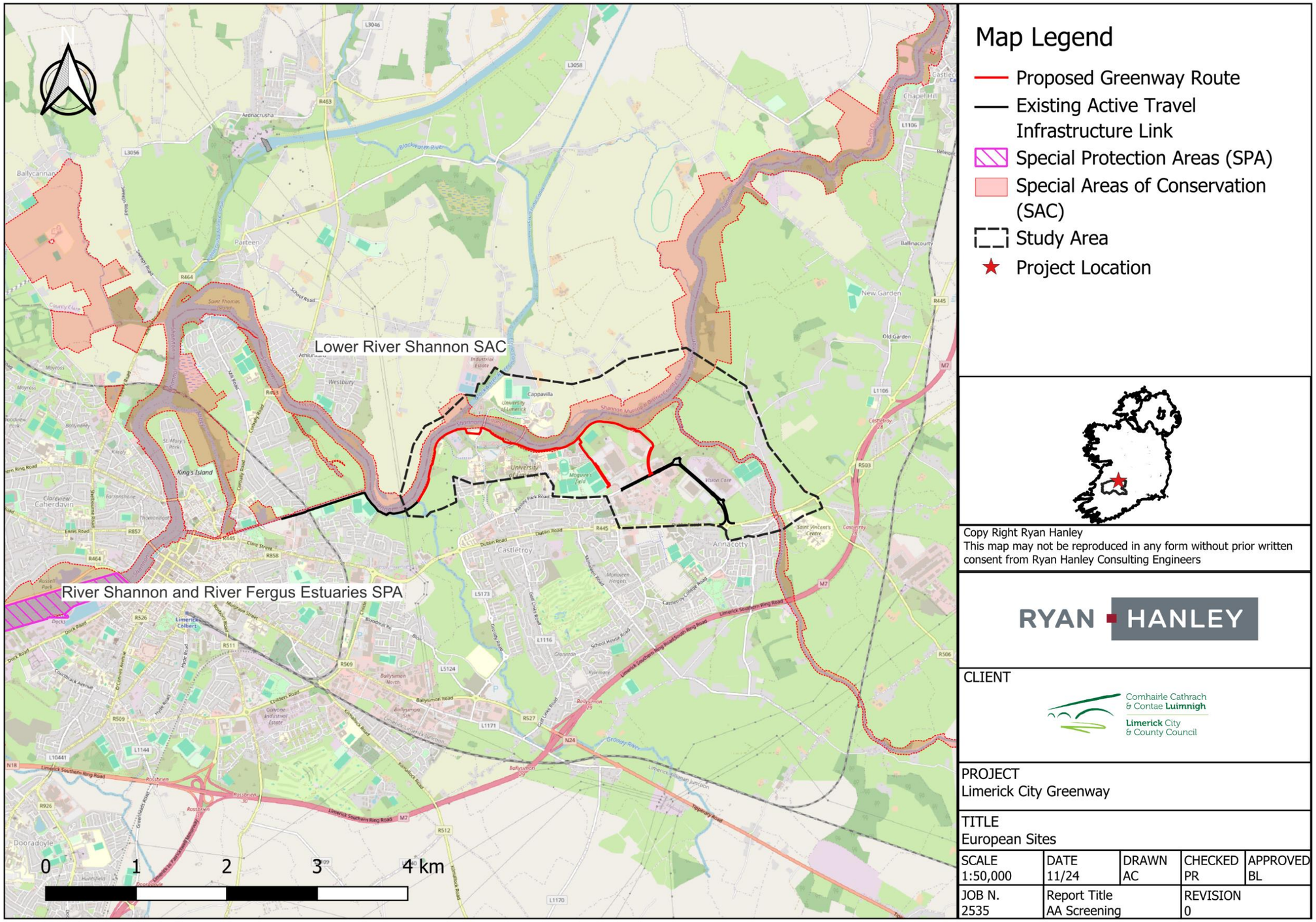

FIGURE 5. 1 EUROPEAN SITES WITHIN THE ZONE OF INFLUENCE OF THE PROPOSED WORKS

5.2 Description of European Sites and Current Trends in the Absence of the Proposed Development

Lower River Shannon SAC (taken from the Site Synopsis, dated 16/12/2013)

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/Kerry Head, a distance of some 120 km. The site encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon, the freshwater stretches of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the EU Habitats Directive, including the priority habitats lagoon and alluvial woodlands, the only known resident population of bottle-nosed dolphin in Ireland and all three species of lamprey.

Table 5. 2 Lower River Shannon SAC Conservation Objectives

Site name	Code	Conservation Objectives	Threats to the site (Natura 2000 Data Sheet – September 2018)
Lower River Shannon SAC (002165)	[1110]	To maintain the favourable conservation condition of Sandbanks which are slightly covered by sea water all the time	▪ Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels) ▪ Drainage ▪ Mixed source marine water pollution (marine and coastal) ▪ Extraction of minerals (e.g. rock, metal ores, gravel, sand, shell) ▪ Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions) ▪ Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) ▪ Mowing or cutting of grasslands ▪ Conversion from other land uses to commercial / industrial areas (excluding drainage and modification of coastline, estuary and coastal conditions) ▪ Changes in terrain and surface of agricultural areas ▪ Forestry ▪ Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species
	[1130]	To maintain the favourable conservation condition of Estuaries	
	[1140]	To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide	
	[1150]*	To restore the favourable conservation condition of Coastal lagoons	
	[1160]	To maintain the favourable conservation condition of Large shallow inlets and bays	
	[1170]	To maintain the favourable conservation condition of Reefs	
	[1220]	To maintain the favourable conservation condition of Perennial vegetation of stony banks	
	[1230]	To maintain the favourable conservation condition of Vegetated sea cliffs	
	[1310]	To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand	
	[1330]	To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	
	[1410]	To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*)	

Site name	Code	Conservation Objectives	Threats to the site (Natura 2000 Data Sheet – September 2018)
	[3260]	To maintain the favourable conservation condition of **Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation**	▪ Wind, wave and tidal power, including infrastructure ▪ Invasive alien species of Union concern
	[6410]	To maintain the favourable conservation condition of Molinia meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caeruleae*)	
	[91E0]	To restore the favourable conservation condition of **Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)**	
	[1029]	To restore the favourable conservation condition of **Freshwater Pearl Mussel**	
	[1095]	To restore the favourable conservation condition of **Sea Lamprey**	
	[1096]	To maintain the favourable conservation condition of **Brook Lamprey**	
	[1099]	To maintain the favourable conservation condition of **River Lamprey**	
	[1106]	To restore the favourable conservation condition of **Salmon**	
	[1349]	To maintain the favourable conservation condition of **Bottlenose Dolphin**	
	[1355]	To restore the favourable conservation condition of **Otter**	

*Indicates a priority habitat under the Habitats Directive

Bold habitats and species have a potential link to the proposed works and are screened for likely significant effects in the next section of this report.

As some of the proposed works are located directly within and adjacent to the boundary of this SAC, there is potential for interactions to arise on the above listed Qualifying Interests stemming from construction phase activities. An evaluation of the potential likely significant effects to arise on the Lower River Shannon SAC is assessed further in Section 6 below.

6 SCREENING FOR LIKELY SIGNIFICANT EFFECTS (LSE) WITH REGARD TO CONSERVATION OBJECTIVES OF EUROPEAN SITES

In order to determine whether the proposed works are likely to have a significant effect on European Sites, the project is assessed and followed by a determination of whether there is a risk that the effects identified could be significant. If the effects of a proposal are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated then the process must proceed to a full Appropriate Assessment and the provision of a Natura Impact Statement.

A desk study, summarised in the previous section, has been carried out to determine the potential source » pathway » receptor chains which could have a significant effect on the qualifying interests and conservation objectives of the Lower River Shannon SAC. An evaluation of the potential for the proposed works to give rise to likely significant effects on the Qualifying Interests for the Lower River Shannon SAC is detailed in **Table 6. 1**and below.

6.1 CONSTRUCTION AND OPERATIONAL STAGE LIKELY SIGNIFICANT EFFECTS

All works will occur along the riverbank of the River Shannon Co. Limerick. There are a number of potential source » pathway » receptor chains, which could have a direct or indirect effect on the conservation objectives within the zone of influence of the proposed works.

In assessing the proposed project, the following general potential effects have been considered during the construction stage with regard to the screening for impact, in the absence of mitigation measures, on the conservation objectives of the Lower River Shannon SAC:

- Direct loss or damage of habitats or species;
- Impacts from surface water runoff or water quality impacts as a result of sediment and pollutants released during works;
- Spread of invasive species; and
- Disturbance of species during construction.

No instream works are proposed, however, there is potential for hydrocarbon spillage and silt release into the Lower River Shannon SAC to occur during the construction works which may impede on water quality given the close proximity to which the works are located within the SAC boundary and within proximity to the River Shannon.

Given that the works to be carried out are works and will not have a long-term effect on the receiving environment it is considered that there will be no operational impacts as there are no alterations to the operational character or requirements of the existing site.

6.2 Presence Within the SAC/Zone of Influence/Likely Significant Effects

Table 6. 1 Likely Significant Effects of the Works for the Limerick City Greenway (UL to NTP) on The Lower River Shannon SAC

European Site	Qualifying Interests and Conservation Objectives	Likely Significant Effect (LSE)	Screening for LSE
Lower River Shannon SAC (002165)	To maintain the favourable conservation condition of Estuaries (1130)	This marine habitat area was estimated as 24,273ha and has been mapped within this SAC (NPWS, 2012) approximately 3.2 km downstream of the proposed works. No habitat associated with this qualifying interest identified in proximity to the works during the walkover surveys and no instream works are proposed. Risk of hydrocarbon spillage and silt release during the works is low and likely to be of short duration. Potential runoff would be subject to dilution within the River Shannon, any accidental discharge would be imperceptible on the river function as it would be of a short duration and not exceeding storm-related cumulative effects experienced at a catchment level. This evaluation takes account of the baseline environmental conditions of the works site and the sensitivity of estuaries habitats to any potential change in water quality which could reasonably arise in the local context within the SAC. On the basis of objective information provided in the Project Description, which outlines the proposed work elements and nature of construction requirements, the potential for significant effects on this qualifying interest can be excluded. Given the small size, scale and nature of the works and distance to this habitat there is no potential for likely significant effects on estuaries habitat.	Screened Out for AA
	To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260)	The conservation objectives supporting document for water courses of plain to montane levels in the Lower River Shannon SAC states that the full distribution of this habitat and its sub-types in this site are currently unknown (NPWS, 2012). The closest site of water courses of plain to montane levels habitat mapped is located approximately 1 km downstream from the works in the Limerick (Park) Canal. The sub-type identified is Opposite-leaved pondweed (*Groenlandia densa*). This habitat is known to be present along the River Shannon and was observed during the aquatic ecological appraisal walkover survey. This is within the ZoI of the works and the potential for likely significant effects on this QI as a result of the proposed construction works cannot be ruled out at this stage.	**Screened in AA**

	To maintain the favourable conservation condition Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) (6410)	This habitat has been recorded on the eastern bank of the Shannon, just north of Castleconnell, while the full extent of this habitat in this site is currently unknown (NPWS, 2012). The Castleconnell site is located approximately 11 km upstream of the works. No habitat associated with this qualifying interest identified in proximity to the works. Given the significant distance between the works and the Molinia meadows habitat associated with this SAC it is considered that there are no potential for likely significant effects on 6410 habitats associated with this SAC as a result of the proposed works.	Screened Out for AA
	To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) (91E0)	This habitat has been recorded from five sites within the SAC (NPWS, 2012) and occurs along the Shannon restricted to narrow bands where the ground is subject to flooding or flushing. There is potential for alluvial woodlands to occur along the main channel of the River Shannon in proximity to the proposed works. Part of the greenway route crosses a section of this habitat and there will be some habitat loss in the form of tree felling resulting in a likely significant effect on the attribute related to the woodland structure. Furthermore the presence of Third Schedule invasive species (Giant Hogweed and Himalayan Balsam) can result in the spreading of these within the habitat, affecting the vegetation composition. There is an Invasive Species Management Plan to treat and control the spreading of these species along the route. On the basis of objective information provided in the Project Description, which outlines the proposed work elements and nature of construction requirements, the potential for likely significant effects on this qualifying interest cannot be excluded.	**Screened in for AA**
	To restore the favourable conservation condition of *Margaritifera margaritifera* (Freshwater Pearl Mussel) (1029)	The freshwater pearl mussel population of this SAC are located within the Cloon River in Co. Clare and is confined to the main channel of the Cloon River from Croany Bridge to approximately 1.5 km upstream of Clonderalaw Bridge (NPWS, 2012). This population is located approximately 71 km downstream of the proposed works within a different river catchment and no instream works are proposed. Given the significant distance between the works and the freshwater pearl mussel population associated with this SAC it is considered that there are no likely significant effects on this species associated with this SAC as a result of the proposed works.	Screened Out for AA

	To restore the favourable conservation condition of *Petromyzon marinus* (Sea Lamprey) (1095)	The River Shannon provides suitable habitat for these species. Its current conservation status in the Atlantic region is 'Bad' and faces pressures such as modification of hydrological flow, point pollution to surface and groundwater, closure or restricted access to site/habitat, among others. Juvenile lamprey habitat was present during the aquatic ecological appraisal survey, characterised by the silted marginal habitat along the banks of the River Shannon. Sea lamprey was recorded in the vicinity of the proposed works according to NBDC records (NBDC, 2023a). Considering that suitable habitat for sea lamprey is present within the ZoI of the proposed works, it must be assumed that there is possible presence of this species in the area, by taking into account the precautionary principle. Therefore, potential for likely significant effects on this QI as a result of the proposed construction works cannot be ruled out at this stage.	**Screened in for AA**
	To maintain the favourable conservation condition of *Lampetra planeri* (Brook Lamprey) (1096) To maintain the favourable conservation condition of *Lampetra fluviatilis* (River Lamprey) (1099)	Brook and River Lamprey juveniles are indistinguishable in the field, so they are considered together here. Artificial barriers can block or cause difficulties to both brook and river lampreys' migration, both up- and downstream, thereby possibly limiting species to specific stretches and creating genetically isolated populations. Other threats to this species include siltation rate changes, point sources pollution of surface waters, diffuse pollution to surface water, invasive species. Although no instream works will take place as part of the proposed works there is a risk of hydrocarbon spillage and silt release during works. Potential runoff could affect sedimentation and water quality, having a direct effect on these species. This evaluation takes account of the baseline environmental conditions of the works site and the sensitivity of brook and river lamprey and their associated habitats to any potential change in water quality which could reasonably arise in the local context within the SAC. On the basis of objective information provided in the Project Description, which outlines the proposed work elements and nature of construction requirements, the potential for significant effects on this qualifying interest cannot be excluded at this stage.	**Screened in for AA**
	To restore the favourable conservation condition of *Salmo salar* (Salmon) (1106)	Artificial barriers can block Salmons' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas. Weirs and dams on the Shannon main channel can restrict access to spawning areas for Salmon. Its current conservation status in the Atlantic region is 'Bad' and its classified as 'Vulnerable' under IUCN Red List. Pressures to this species include mixed	**Screened in for AA**

		sources of pollution to surface and groundwater, modification of hydrological flow or physical alteration of waterbodies, temperature changes, among others. Risk of hydrocarbon spillage and silt release during the proposed works can have a direct effect on water quality. A water quality of Q4 'Good' is one of the targets for salmon conservation. This evaluation takes account of the baseline environmental conditions of the works site and the sensitivity of salmon and their associated habitats to any potential change in water quality which could reasonably arise in the local context within the SAC. On the basis of objective information provided in the Project Description, which outlines the proposed work elements and nature of construction requirements, the potential for likely significant effects on this qualifying interest cannot be excluded.	
	To restore the favourable conservation condition of *Lutra lutra* (Otter) (1355)	The current range of Otter in the Shannon catchment is estimated at 70.5%. During the ecological walkover suitable otter habitat was observed at numerous locations along the proposed greenway route. A dedicated otter survey was undertaken in May 2021 and July 2024 and no definite signs of otters were found in the area. Potential effects that could arise from the proposed works include temporary disturbance/displacement of the species during the works and effects to water quality resulting from surface runoff, spillage of hydrocarbons, cementitious materials and other sources of pollutants, which could have an indirect effect on the species by affecting prey abundance. This evaluation takes account of the baseline environmental conditions of the works site and the sensitivity of otter prey and habitat to any potential change in water quality which could reasonably arise in the local context and within the SAC boundary. On the basis of objective information provided in the Project Description, which outlines the proposed work elements and nature of construction requirements, likely significant effects on this qualifying interest cannot be excluded.	**Screened in for AA**

6.3 CUMULATIVE IMPACTS WITH OTHER PLANS/PROJECTS

In order to fully assess the potential impact of the proposed development on European Sites, the project must be assessed alone or in combination with existing activities and proposed plans for the region. Myplan.ie and the Limerick Development Plan 2022 – 2028 were consulted in order to determine if there were any other plans or projects in the area which could result in cumulative impacts.

The Limerick Development Plan has objectives relating to the protection, conservation management and restoration of European Sites. In its Land Use Zoning objectives related to semi natural and open spaces, it states that the plan will protect Natura 2000 designated sites, proposed sites and flood plains. With this objective it recognises the importance and need for protection of these areas for their protected species, habitats and ecosystems. It highlights that within these areas, development will be prohibited in order to maintain the integrity of the site. The plan is accompanied by an Appropriate Assessment Natura Impact Statement based on the Draft Development Plan (https://www.limerick.ie/sites/default/files/media/documents/2022-07/Appropriate-Assessment-Natura-Impact-Statement.pdf). It concludes that "*The risks to the qualifying interests, special conservation interests and conservation objectives of the Natura 2000 site have been addressed by the inclusion of mitigation measures, through policy measures such as non-encroachment of zoning on Natura 2000 sites in the case of zoning objectives and in relation to implementation of Article 6 elsewhere (…) Having incorporated mitigation measures, it is concluded that the Draft Limerick Development Plan is not anticipated to give rise to any significant adverse effects on designated European sites, alone or in combination with other plans or projects.*"

The review of the Limerick City & County Council planning register documented relevant general development planning applications in the vicinity of the proposed greenway, most of which relate to the provision and/or alteration of one-off housing and other structures. No potential for cumulative impacts on European Sites were identified when considered in conjunction with the current proposal.

The Castletroy WwTP Upgrade Project is an element of Irish Water's 2017-2021 Investment Plan, whereby 52 Wastewater 'Above Ground' (i.e., treatment) projects were identified. The planning application (permitted by An Bord Pleanála 12/10/2023, Case reference: PA91.316168) for the upgrade works at Castletroy WwTP will cater for the 10-year growth projections from 45,000 PE to 77,500 PE, which includes a future IDA load of 5,500 PE. There will be provision made in the infrastructural development of the plant (i.e. tank sizing and pipework) for the 25-year growth projections of 81,100PE. Planning Decision, Procurement and Construction is scheduled between 2023-2026. The potential cumulative impacts with the Limerick City Greenway (UL to NTP) should be considered if the construction programmes overlap.

An application for a single storey, Golf Academy Building (15697) was approved and Extension of Duration granted in 2021. This proposal lies directly adjacent to the existing riverside path and the proposed path adjacent to the UL Boathouse. Should this development proceed, the proposal shows tree planting inside the development boundary which is immediately adjacent to the existing riverside path. The potential cumulative impacts with the Limerick City Greenway (UL to NTP) should be considered if the construction programmes overlap.

There are several projects (both nearing completion and those which have planning permission) in the vicinity of the Kilmurry student village and University Road area.

The works for Planning Ref no 18252 (c) have been carried out, i.e., . '*widening of Plassey Park road for the length within the National Technology Park from the Annacotty roundabout to the vicinity of the junction of Plassey Park road with Milford road. (d) Addition of cycle lanes on Plassey Park road. (e) also as part*

of the proposed works are new boundary fences, footpaths, pedestrian crossings, relocation of affected public lighting columns, landscaping and all associated site works and services.

A planning application (208003) proposed upgrades to the existing walking and cycling facilities on both Plassey Park Road & Plassey Road, in conjunction with upgrades to minor road junctions, bus stops, new road surfacing, installation of LED public lighting & surface water drainage works. This development also proposed cycle lanes and footpaths along the southern half of University Road, which is nearing completion, as well as a pedestrian crossing. The proposed Limerick City Greenway (UL to NTP) development has taken into consideration these works and the combined projects will provide a continuous pedestrian and cycle facility along the length of University Road and connecting to Kilmurry student village.

Closer to the river Shannon, and east of Kilmurry Village, the proposed Limerick City Greenway (UL to NTP) runs through green space slightly inland from the river's edge. Adjacent to this there is a permitted development (2360712) which consists of two pitches, a rugby pitch and a training pitch, a small changing building to the west. North of the pitches, several biofiltration ponds are connected by a swale. Tree planting is proposed adjacent to the north of to the pitches. The northern site boundary appears to run immediately adjacent to the existing informal pedestrian path but no works are proposed here, and the tree clumps appear to be retained. An alternative linked path runs through the existing /meadow' area which is adjacent to the proposed Limerick City Greenway (UL to NTP), and adjacent to the biofiltration ponds, connecting with the Greenway on the western side. These two proposals will add a more formal layout to what is currently an informal pitch area, and a more informal area with clumps of shrubs and several trees nearer the water's edge. Elements introduced include hard surfacing, wider path and a building in the form of changing rooms. The potential cumulative impacts with the Limerick City Greenway (UL to NTP) should be considered in the EIAR if the construction programmes overlap, but overlaps are expected to be very minor.

There are no known additional plans/projects on-going or proposed (at the time of this study) which in combination with the proposed project may give rise to any form of cumulative impact on the European Sites.

7 DISCUSSIONS AND CONCLUSION

The screening for Appropriate Assessment has identified and assessed for potential likely significant effects which are likely to occur as a result of the proposed construction of the Limerick City Greenway (UL to NTP) in the context of the Lower River Shannon SAC and its Qualifying Interests and Conservation Objectives.

It is determined, in the absence of mitigation, there will be potential for likely significant effects on the above listed protected site in view of the site's conservation objectives either alone or in combination with other plans and/or projects. This assessment is based on the consideration of:

1. Relevant qualifying interests, their sensitivities and Conservation Objectives;
2. Potential source pathways between European Sites identified and the proposed project;
3. The temporary and localised (small-scale) nature of the proposed project.

The detailed screening in Table 6.1 identified that in the absence of mitigation there are likely significant effects from the proposed development on each of the following habitats and species:

- [1106] Atlantic salmon (*Salmo salar*);
- [1355] Otter (*Lutra lutra*);
- [1095] Sea lamprey (*Petromyzum marinus*);
- [1096] Brook lamprey (*Lampetra planeri*);
- [1099] River lamprey (*Lampetra fluviatilis*);
- [91E0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*); and
- [3260] Watercourses of plain to montane levels with the *Ranunculus fluitans* and *Callitricho-Batrachion* vegetation;

The Screening report evaluates the objective information presented in the Project Description, taking consideration of the proposed works elements; however, the evaluation does not presuppose that the construction requirements specified in the design, or to be implemented on site by the Contractor, are integral to avoid or reduce harmful effects on any European Site. Therefore, it is considered that in accordance with Article 6(3) of the Habitats Directive, the proposed works for the construction of the Limerick City will result in likely significant effects on the European site, in the absence of mitigation, having regard to the site's conservation objectives. Consequently, a **Stage 2 Appropriate Assessment is deemed to be necessary**, requiring the preparation of a **Natura Impact Statement (NIS).**

8 REFERENCES

DEHLG (2010). Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities. Produced by the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin.

European Commission (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.

European Commission (2018) Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC.

European Commission (2000) Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg. European Commission.

European Commission (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC

European Commission (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/49/EEC; clarification of the concepts of: Alternative solutions, Imperative reasons of overriding public interest, Compensatory Measures, Overall Coherence, Opinion of the Commission.

European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No.477 of 2011).

King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K., Cassidy, D. (2011). Red Lists Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Kruuk, H. (2006). *Otters – ecology, behaviour, and conservation*. Oxford University Press, Oxford, UK.

National Biodiversity Data Centre.

National Biodiversity Data Centre (2023a) Accessed from: https://records.biodiversityireland.ie/stats/taxon-stats?county_name=Limerick&date_range=2021-01-01%2000:00:00|2021-12-31%2023:59:59

NPWS (2012) Conservation Objectives: Lower River Shannon SAC 002165. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Lower River Shannon SAC (002165) Conservation objectives supporting document- marine habitats. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Lower River Shannon SAC (002165) Conservation objectives supporting document- coastal habitats. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Lower River Shannon SAC (002165) Conservation objectives supporting document- lagoon habitats. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Lower River Shannon SAC (002165) Conservation objectives supporting document- water courses. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Lower River Shannon SAC (002165) Conservation objectives supporting document-woodland habitats. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2012) Conservation Objectives: River Shannon and River Fergus Estuaries SPA 004077. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht

NPWS (2013) Article 17 Habitat Conservation Assessments (Vol. 2) Version 1.1. The Status of EU Protected Habitats and Species in Ireland.

NPWS (2013) Article 17 Species Conservation Assessments (Vol. 3) Version 1.1. The Status of EU Protected Habitats and Species in Ireland.

NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

NRA (2008) Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Road Schemes.

Office of Planning Regulator (2021). Appropriate Assessment Screening for Development Management

Reid, N., Hayden, B., Lundy, M.G., Pietravalle, S., McDonald, R.A. & Montgomery, W.I. (2013) National Otter Survey of Ireland 2010/12. Irish Wildlife Manuals No. 76. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

TEGOS (2023). The Status of Irish Salmon Stocks in 2023 with Catch Advice for 2024. Report of the Technical Expert Group on Salmon (TEGOS) to the North-South Standing Scientific Committee for Inland Fisheries. 60 pp.