Limerick Smarter Travel
Canal Refurbishment Main Contract & Rhebogue Neighbourhood development

Screening for Appropriate Assessment Report

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1. INTRODUCTION AND BACKGROUND

The current document provides an Appropriate Assessment (Stage 1 Screening) of proposed works associated with the Limerick Smarter Travel Project. A description of the proposed works is provided below in Section 1.1. This document assesses whether this development is likely to have a significant effect on the Natura 2000 site network, either on its own or in combination with other projects or plans. Effects upon the conservation objectives and qualifying interests (including habitats and species) within the affected designated areas are considered.

Appropriate Assessment is required under Article 6 of the Habitats Directive (92/43/EEC), in instances where a plan or project may give rise to significant effects upon a Natura 2000 site. Natura 2000 sites are those identified as sites of European Community importance designated under the Habitats Directive (1992) or the Birds Directive (2009).

The current document meets this requirement by providing a Screening Assessment of the development and follows the guidance for screening published by the National Parks and Wildlife Service (NPWS 2009) '*Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities'*.

According to NPWS (2009), screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the EU Habitats Directive:

(1) Whether a plan or project is directly connected to or necessary for the management of the site, and
(2) Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

The current Screening Assessment therefore sets out to determine whether the proposed project, alone or in combination with other plans and projects, is likely to have significant effects on the Natura 2000 sites within the study area.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). When assessing the significance of potential effects, NPWS (2009) recommends that "*a precautionary approach is fundamental and, in cases of uncertainty, it should be assumed the effects could be significant*".

1.1 Description of the proposed works

The flagship scheme for Limerick Smarter Travel proposes the development of a 1.5km shared cycleway and river walk that will encourage users to commute from the city centre and Corbally to the University and Castletroy area. An established public right of way, the route is under the ownership of Waterways Ireland and leased to Limerick City and County Council. To compliment the scheme it is proposed to refurbish an existing pathway that runs from Limerick City Centre to Guinness Bridge along the bank of the City Canal. The works proposed include the following;

- Repair and upgrade of existing lighting (from Lelia St to Park Bridge)
- Provision of lighting from Park Bridge to Guinness Bridge (ducting in place)
- Provision of outdoor seating and bike stands at three locations from Lelia Street to Guinness
- Bridge

- Provision of exercise machines at two locations along the route
- Provision of signage & route markers along the route
- Painting of Guinness Bridge and other gates
- Replace gate at Rheboge and Lelia Street

1.3 Legislative context

The current assessment takes account of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora - '*The Habitats Directive'* which was transposed into Irish law by the '*European Community (Natural Habitats) Regulations 1997*' (S.I. No. 94/1997). The most recent transposition of this legislation is the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). The Birds Directive (2009/147/EC) which is now included in the former Regulations seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs) whereas the Habitats Directive does the same for habitats and other species groups within Special Areas of Conservation (SACs). It is the responsibility of each member state to designate SPAs and SACs, both of which will form part of Natura 2000, a network of protected areas throughout the European Community. Article 6, paragraphs 3 and 4 of the EC 'Habitats' Directive (1992) state that:

- *6(3) Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

- *6(4) If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*

Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest.

In addition the European Court of Justice in Case C-127/02 (the "Waddenzee Ruling") has made a relevant ruling in relation to Appropriate Assessment:

"*any plan or project not directly connected with or necessary to the management of the site is to be subject to an appropriate assessment of its implications for the site in view of the site's conservation objectives if it cannot be excluded, on the basis of objective information, that it will have a significant effect on that site, either individually or in combination with other plans or projects" and that the plan or project may only be authorised "where no reasonable scientific doubt remains as to the absence of such effects*".

2. METHODOLOGY

2.1 Desk study and ecological field survey

The desktop study identified the Natura 2000 sites within a 15km radius of the proposed development and assessed whether these was any possibility of significant adverse effects on the conservation interests of the designated sites with respect to the qualifying interests (species and habitats) of these sites. Information sources reviewed as part of the current assessment included the online designated sites viewer on the website of the National Parks and Wildlife Service (www.npws.ie), as well as protected species data held on the NPWS online database. A site walkover survey of the proposed development site and surrounding lands was also undertaken within the proximity of the site and the land interest associated with the development.

2.2 Appropriate Assessment Methodology

This Screening for Appropriate Assessment Report follows the guidance published by the National Parks and Wildlife Service (NPWS 2009) '*Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities'*. Based on these guidelines, the Appropriate Assessment process is a four-staged approach described below:

- *Stage One: Screening / Test of Significance* - the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

- *Stage Two: Appropriate Assessment* - the consideration of the impact of the project or plan on the integrity of the Natura 2000 site, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

- *Stage Three: Assessment of Alternative Solutions* - the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site; and

- *Stage Four: Assessment Where Adverse Impacts Remain* - an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

The safeguards set out in Article 6(3) and (4) of the Habitats Directive are triggered not by certainty but by the possibility of significant effects. Thus, in line with the precautionary principle, it is unacceptable to fail to undertake an appropriate assessment on the basis that it is not certain that there are significant effects.

2.2.1 Stage 1: Screening

Following the guidelines set out by DoEHLG (2009) Appropriate Assessment Stage 1: Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3); i.e. whether a plan or project can be excluded from Appropriate Assessment requirements because it is directly connected with or necessary to the management of the site; and the potential effects of a project or plan, either alone or in combination with other projects or plans, on a Natura 2000 site in view of its conservation objectives, and considering whether these effects will be

significant. According to DoEHLG (2009), screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3) of the EU Habitats Directive:

- Whether a plan or project is directly connected to or necessary for the management of the site; and
- Whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

The proposed Canal Refurbishment Main Contract development does not comply with the first screening test (i.e. the proposed works are not directly connected to or necessary for the management of any Natura 2000 site). The current Screening Assessment therefore sets out to determine whether the proposed project, alone or in combination with other plans and projects, is likely to have significant effects on the Natura 2000 sites within the study area. If the effects are deemed to be significant, potentially significant, or uncertain, or it the screening process becomes overly complicated, then the process must proceed to Stage 2 i.e. a Natura Impact Statement. When assessing the significance of potential effects, the DoEHLG Guidelines (2009) recommend that "*a precautionary approach is fundamental and, in cases of uncertainty, it should be assumed the effects could be significant*". Screening can result in the following possible conclusions or outcomes:

- *AA is not required.* Screening, followed by consultation and agreement with the NPWS, establishes that the plan or project is directly connected with or necessary to the nature conservation management of the site.
- *No potential for significant effects / AA is not required.* Screening establishes that there is no potential for significant effects and the project or plan can proceed as proposed. However, no changes may be made after this as this will invalidate the findings of screening. Documentation of the AA screening process, including conclusions reached and how decisions were made, must be kept on file.
- *Significant effects are certain, likely or uncertain.* The plan or project must either proceed to Stage 2 (AA), or be rejected. Rejection of a plan or project that is too potentially damaging and/or inappropriate ends the process and negates any need to proceed to Stage 2 (AA).

The required elements of a Screening Report included in the current report are as follows:

- **Description of plan or project -** Identification of relevant Natura 2000 sites and compilation of information on their qualifying interests and conservation objectives. Include the potential for a plan or project, whether it is within or outside a Natura 2000 site, to have direct, indirect or cumulative effects. Desk study information for the conservation interests is available from the NPWS;
- **Assessment of likely effects** – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary. A precautionary approach is fundamental and, in cases of uncertainty, it should be assumed the effects could be significant. As a guide, any element of a plan or project that has the potential to affect the conservation objectives of a Natura 2000 site, including its structure and function, should be considered significant.

According to DoEHLG (2009), another possible option is to recommence the screening process with a modified plan or project that removes or avoids elements that posed obvious risks. For example, it could potentially arise during the screening assessment that an alternative design option that avoids the designated site, or has a less significant effect (i.e. avoids Annex 1 habitats) could become apparent. This highlights the iterative process of screening a plan or project when new alternatives

that may not have any impact are being considered. However, according to the DoEHLG Guidelines (2009) repeated or complicated screening exercises are not recommended as they point to the risk of significant effects and the need for Stage 2 (AA).

3. STAGE 1: SCREENING / TEST OF SIGNIFICANCE

3.1 Description of the proposed development

3.2. Identification of relevant Natura 2000 Sites

3.2.1 Screening of Natura 2000 Sites within 15km of the study area

The current Screening Assessment has identified the designated Natura 2000 sites within a 15km radius of the proposed dredging works. These are presented in Table 2 and also shown on the map in Figure 1. Sites in close proximity to or directly/indirectly connected to the proposed scheme are identified for assessment in the current Screening Report. The qualifying interests of these sites are detailed below.

A candidate Special Area of Conservation (cSAC) is a statutory designation, which has a legal basis under the EU Habitats Directive (92/43/EEC) as transposed into Irish law through the European Communities (Natural Habitats) Regulations, 1997. The main implication of this designation is that any project likely to have a significant adverse impact on the integrity of the cSAC may only be carried out for "*imperative reasons of overriding public interest, including those of a social or economic nature".*

3.2.2 Description of Natura 2000 sites likely to be affected by the proposed project

The only site potentially affected by the proposed development is the Lower River Shannon SAC (site code 002165), designated under the Habitats Directive (92/43/EEC). The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both priority habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same Directive – Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter. The NPWS site synopsis for the site is presented in Appendix 2.

Annex I habitats occurring within the study area of the proposed development include floating river vegetation within the River Shannon channel and the priority habitat alluvial wet woodland. The footprint of the proposed development includes existing pathways and tracks utilised by pedestrians, cyclists and fishermen adjacent to the Park canal and the River Shannon corridor.

The River Shannon within the study area supports migratory populations of Atlantic salmon, sea lamprey and river lamprey; with resident populations of otter, brook lamprey and white-clawed crayfish also occurring.

Table 2 Summary details of the designated Natura 2000 sites located within 15km of the proposed development area.

Natura Site	Distance (km)	Notes	Included in the current Screening Assessment
Lower River Shannon cSAC (2165)	Proposed works would be within and adjacent to this site	Annex I Habitats: Lagoons (priority); sandbanks; estuaries; mudflats and sand flats; large shallow inlets and bays; reefs; vegetation of stony banks; vegetated sea cliffs; *Salicornia* mudflats; Atlantic salt meadows; Mediterranean salt meadows; floating river vegetation. Annex II species: Freshwater pearl-mussel, sea lamprey, brook lamprey; river lamprey; bottlenose dolphin, otter.	Included as the proposed works would take place within and adjacent to the designated area.
River Shannon and River Fergus estuaries SPA (4077)	1.5km west, over 2km downstream	The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl. The site also has vast expanses of intertidal flats an Annex 1 habitat on the E.U Habitats Directive.	Not included due to distance between this site and the proposed works and the absence of pathways for significant impacts with regard to the conservation interests of the site.
Glenomra Wood cSAC (1013)	8km north	Deciduous semi-natural woodland and is of considerable conservation significance as it is of a type listed on Annex I of the EU Habitats Directive. Three Red Data Book mammals occur in the site: Badger (*Meles meles*), Pine Marten (*Martes martes*) and Hare (*Lepus timidus hibernicus*).	Not included as there is no connection between this site and the proposed works
Ratty River Cave cSAC (2316)	15km northwest	Cave, a habitat listed on Annex I of the EU Habitats Directive, and also an important winter roost and a breeding site of the Lesser Horseshoe Bat (*Rhinolophus hipposideros*), a species listed on Annex II of the EU Habitats Directive.	Not included as there is no connection between this site and the proposed works
Danes Hole, Poulnalecka cSAC (0030)	15km northwest	Small fossil cave in the banks of the Ahaclare River, a winter hibernation site and also a mating site of the Lesser Horseshoe Bat (*Rhinolophus hipposideros*), a species listed on Annex II of the EU Habitats Directive.	Not included as there is no connection between this site and the proposed works
Slieve Bernagh Bog cSAC (2312)	15km north	Designated for priority Annex I and Annex I listed peatland habitats.	Not included as there is no connection between this site and the proposed works
Slievefelim to Silvermines Mountains SPA (4165)	13km east	SPA site designated for Hen Harrier listed on Annex I of the EU Birds Directive.	Not included as there is no connection between this site and the proposed works
Tory Hill cSAC (0439)	14km southwest	Wooded limestone hill with grasslands and scrubland facies, and fens listed on Annex I of the E.U. Habitats Directive	Not included as there is no connection between this site and the proposed works
Glenstall Wood cSAC (1432)	13km east	Killarney Fern (*Trichomanes speciosum*), a rare species that is listed on Annex II of the EU Habitats Directive and that is also protected under the Flora (Protection) Order, 1999 occurs at the site.	Not included as there is no connection between this site and the proposed works

3.3 Screening Assessment of Likely Effects

3.3.1 Assessment of likely direct impacts affecting the Natura 2000 site

Parts of the proposed development are located within the Lower River Shannon cSAC while other sections border and lie adjacent to this designated site. Likely direct impacts of the project arising by virtue of the size and scale and land-take of the project have been identified as not likely to be significant due to the limited extent and footprint of the development, extending over an existing path network. The works involve painting Guinness Bridge and provision of signage and route markers along the route. This potential impacts from these types of works within a disturbed suburban area would also not be considered to have the potential to have significant impacts (i.e. impacts would be

considered to be consistent with existing and emerging trends, as per EPA, 2002). There would be the potential for moderate, but not significant impacts. Moderate potential impacts identified would include the potential for localised water pollution during the works, or the potential for the introduction or spread of non-native invasive species. However, these would not be considered to have the potential to have significant effects on the conservation interests of the Lower Shannon cSAC.

The canal walkway refurbishment component does not incur any resource requirements with respect to the cSAC, neither are there any likely direct impacts arising from emissions. In relation to excavation requirements and transportation requirements, there would be no direct impacts on the cSAC involving earthworks or moving of materials would be carried out within the cSAC. No works are required in the aquatic environment of the River Shannon which would have the potential to directly affect the aquatic ecological interests of the cSAC. Impacts are identified with respect to water quality but these only have the potential to be moderate and not significant, and can be fully avoided with careful work practices (as expected).

The construction phase of the development is identified as being short-term, while the operational phase is considered to be in line with the ongoing right-of-way and pedestrian access at the site, which has been evaluated as not currently resulting in significant adverse effects on the cSAC. It is considered that with upgrading of the existing track, ongoing human use of this site will be mainly confined to the amenity walkway/cycleway and will avoid increased trampling within the more sensitive habitats of the cSAC.

Likely changes to the cSAC arising from the walkway/cycleway with regard to habitat loss are evaluated as being none. Any assessment of direct impacts affecting this habitat during the operational phase must take account of the existing pathways and pedestrian traffic in the study area. The study area already has significant colonisation by non-native invasive flora (particularly Himalayan balsam *Impatiens glandulifera* and Japanese knotweed *Fallopia japonica.*

The construction of the proposed walkway/cycleway is considered unlikely to give rise to any significant direct impacts with regard to disturbance to key species. The proposed development is not likely to result in direct changes to the cSAC with regard to a reduction in species density or changes in key indicators of conservation value.

There are no direct impacts affecting the cSAC with regard to climate change arising from the project. The project will have no further direct impacts on the cSAC as a whole with respect to interference with the key relationships defining the structure and function of the site.

The operational phase of the proposed walkway/cycleway development is not likely to result in any significant direct impacts affecting the conservation objectives or qualifying interests the Lower River Shannon cSAC and will be in line with the current amenity use of the study area.

3.3.2 Assessment of likely indirect impacts affecting the Natura 2000 site

The proposed works near the cSAC are confined to a relatively narrow strip of land. Indirect impacts are limited to construction phase impacts with regard to the landscaping required as part of the proposal: machinery that would be used. It is considered that the impacts of the proposed development with regard to habitat loss and fragmentation are restricted to within the footprint of the works areas, site compounds and access tracks. There are therefore no indirect impacts affecting habitat loss / reduction in habitat area or impacts affecting the structure and function of terrestrial habitats within the study area.

Potential indirect impacts arising from the project have been identified with regard to water quality arising from machinery on site (i.e. pollution potential or suspended solids, the use of concrete for signs etc. within close proximity to the River Shannon and Park canal.

Indirect impacts arising from the spread of non-native invasive species within the works area is considered to be a disputable point; with regard to the extensive presence of Himalayan balsam within the works area. This species is now considered to have reached an epidemic scale within the Lower River Shannon; however, there is no direct cSAC management plan in place with respect to the eradication or control of this species.

The construction phase of the proposed development gives rise to the potential for indirect disturbance to species listed as qualifying interests of the cSAC and also the potential for changes in key indicators of conservation value (water quality etc.). Any impacts affecting water quality are considered likely to have implications for the water-dependant Annex II species listed as qualifying interests of the SAC with regard to the structure and function of these populations.

The operational phase of the proposed development is not considered likely to result in any significant indirect impacts affecting the conservation objectives or qualifying interests the Lower River Shannon cSAC, with regard to the existing pattern of usage presently and the fact that the current amenity usage of the study area is not responsible for affecting the conservation status of the qualifying interests of the site.

3.3.3 Assessment of likely cumulative impacts affecting the Natura 2000 site

There is a potential for this project to have cumulative impacts with other sections of the Limerick Smarter Travel project. However, a Natura Impact Statement along with an Ecological Impact Assessment has been completed for the adjoining Route 2 Section of the project (ECOFACT, 2014a &b). The proposed refurbishment works along the Park Canal are relatively minor are not predicted to have the potential to have significant direct or indirect impacts. They are also relatively minor in relation to the proposed Route 2 works, which are subject to an Appropriate Assessment, and would not be considered to have the potential to increase the risk to the Lower Shannon cSAC if considered cumulatively with the other parts of the Limerick Smarter Travel project.

Other pressures on the Lower Shannon cSAC which could act cumulatively with the current proposal would include the spread of non-native invasive species, the operation of the GAA grounds in the study area, and ongoing urbanisation. However, due to the relatively minor scale of the proposed development it is not considered likely to add significantly to these existing pressures.

Table 2 Impact assessment for the conservation interests of the Lower River Shannon cSAC.

	Natura Code	Item Description	Construction phase Potential impacts	Operational phase Potential impacts	Significance affecting the integrity of the cSAC
Annex II Species	1095	Sea lamprey *Petromyzon marinus*	There are no works in the aquatic habitats of the cSAC. Therefore no direct impacts on lampreys would be likely to occur. Lampreys don't use the Park canal for spawning and juvenile lampreys are also not thought to be present. The works near the Shannon are very minor. Therefore it is concluded that there could not be any impacts at a scale that could affect the conservation status of lampreys in the cSAC.	No impacts	No impacts
	1106	Atlantic salmon *Salmo salar*	Again there are no works proposed for within in the aquatic habitats of the cSAC. Therefore no direct impacts on salmon would be likely to occur. Salmon again don't use the Park canal for spawning or nursery reasons. The works near the Shannon are very minor, but again these are no salmon spawni9ng are nursery areas here. Therefore it is concluded that there could not be any impacts at a scale that could affect the conservation status of salmon in the cSAC.	No impacts	No impacts
	1096	Brook lamprey *Lampetra planeri*	As for Sea lamprey	No impacts	No impacts
	1099	River lamprey *Lampetra fluvialitis*	As for Sea lamprey	No impacts	No impacts
	1092	White-clawed crayfish *Austropotamobius pallipes*	Only very small numbers of crayfish occur in the Park canal and this part of the River Shannon (ECOFACT, 20124a). However as there are no works proposed for in the local aquatic areas this species could not be affected directly. The scale are works are assessed as being too small to have the scope of affecting this species indirectly through water pollution.	No impacts	Not significant, not affecting the integrity of the SAC
	1029	Freshwater pearl mussel *Margaritifera margaritifera*		No impacts	No impacts
	1303	Lesser horseshoe bat *Rhinolophus hipposideros*	This species is unlikely to occur in the study area due to its suburban nature and existing lighting (i.e. from GAA playing field).	No impacts	No impacts
	1349	Bottle-nosed Dolphin *Tursiops truncatus*	No impacts		No impacts
	1355	Otter *Lutra lutra*	According to ECOFACT (2014) otter activity levels are low in the affected area, and there are no	No impacts	Not significant, not affecting the integrity of the SAC

	Natura Code	Item Description	Construction phase Potential impacts	Operational phase Potential impacts	Significance affecting the integrity of the cSAC
			holts present. Therefore it is predicted that otters would not be affected at a level that would affect their conservation status, with reference to the relatively small scale of the proposed works and existing background disturbance.		
Annex I Habitats	3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	No impacts. This habitat does not occur in the study area.	No impacts	No impacts
	1150	Coastal Lagoons	No impacts	No impacts	No impacts
	91EO	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae)	No impacts. This habitat does not occur in the immediate study area.	No impacts	Not significant, not affecting the integrity of the SAC
	6410	*Molinia* meadows on calcareous, peaty or clavey-silt-laden soils (*Molinion caeruleae*)	No impacts. This habitat does not occur in the study area.	No impacts	No impacts
	1110	Sand banks	No impacts	No impacts	No impacts
	1220	Perennial vegetation of stony banks	No impacts	No impacts	No impacts
	1230	Sea cliffs	No impacts	No impacts	No impacts
	1160	Large shallow inlets and bays	No impacts	No impacts	No impacts
	1170	Reefs	No impacts	No impacts	No impacts
	1130	Estuaries	No impacts	No impacts	No impacts
	1140	Tidal mudflats	No impacts	No impacts	No impacts
	1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	No impacts	No impacts	No impacts
	1310	*Salicornia* and other annuals colonising mud and sand	No impacts	No impacts	No impacts

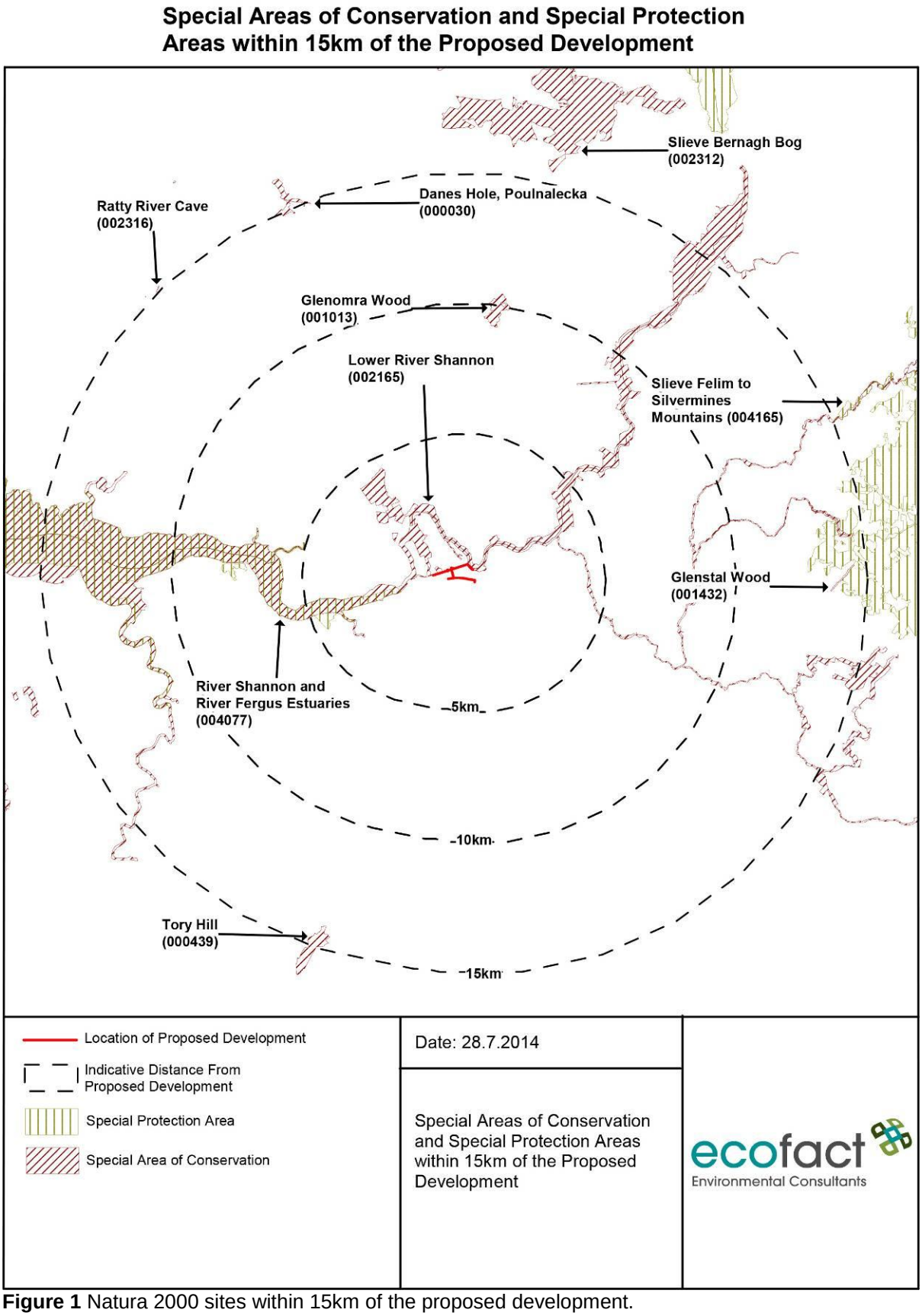

Figure 1 Natura 2000 sites within 15km of the proposed development.

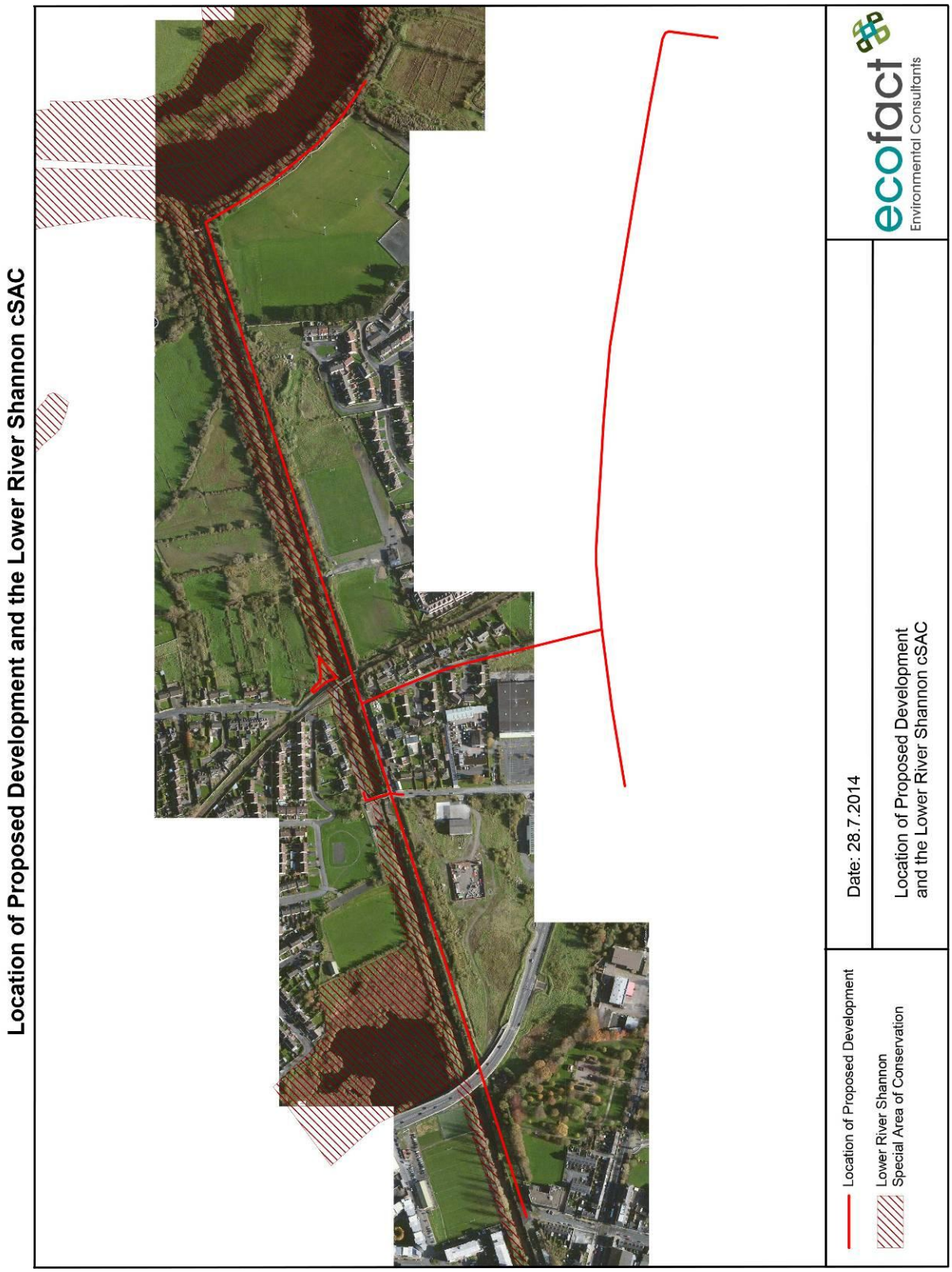

Figure 2 Location of the proposed development in relation to the Lower River Shannon candidate Special Area of Conservation (Site Code 2165).

3.4 Screening statement with conclusions

According to NPWS (2009), the Appropriate Assessment Screening exercise can either identify that an Appropriate Assessment is not required; or that there is no potential for significant effects (i.e. Appropriate Assessment is not required); or that significant effects are certain, likely or uncertain (i.e. the project must either proceed to Stage 2 (AA) or be rejected).

From the examination of the information available it is considered that the proposed canal refurbishment works and Rhebogue Neighbourhood development located within and adjacent to the Lower River Shannon cSAC site designation does not have the potential to result in significant impacts to the Natura 2000 site network, specifically in relation to impacts affecting the conservation interests of the Lower River Shannon cSAC. This is due to the relatively small scale of the proposed development located on an existing busy walkway/cycleway and existing urban area of Rhebogue. Most of the proposed development is located outside the cSAC boundary and the only parts located within the Lower River Shannon cSAC located on existing roadway/bridges. The proposal has the potential to localised disturbance impacts and water quality impacts, but these impacts would be below the levels that would be considered significant. The proposal has the potential to introduce and disperse non-native invasive species. However, this potential impact is assessed as moderate negative only, and therefore not-significant. This is based on the fact that both components of this proposal are located within existing developed areas, and the risk in relation to non-native invasive species would not be increases above background levels. There is the potential for cumulative impacts when considered with the overall Limerick Smarter Travel scheme; however this scheme on its own would not cause significant impacts and the adjoining Route 2 scheme was subject to Appropriate Assessment.

Therefore, based on the information provided, the current Screening Assessment has determined that the proposal does not need to progress to Stage 2 with regard to the Lower River Shannon cSAC i.e. an Appropriate Assessment is not required.

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NPWS (2011) *Conservation objectives for Lower River Shannon SAC [002165].* Generic Version 3.0. Department of Arts, Heritage & the Gaeltacht.

PLATES

Plate 1 View of the Park canal from Guinness Bridge with the existing pathway visible in the left of the photo. The canal (FW3) habitat in this part of the study area is adjoined and occurs as a mosaic with riparian woodland (WN5) comprising largely of willow and alder.

Plate 2 Habitats at the western extent of the study area within Limerick City borough comprise mostly of buildings and artificial surfaces (BL3), amenity grassland (GA2), treeline

Plate 3 View of the existing cycleway/walkway from Pa Healy road at the western end of the proposed development. Habitats characterising this area include buildings and artificial surfaces (BL3), wet grassland (GS4), amenity grassland (GA2), recolonising bare ground (ED3) and scrub (WS1).

Appendix 1 Drawings of proposed development

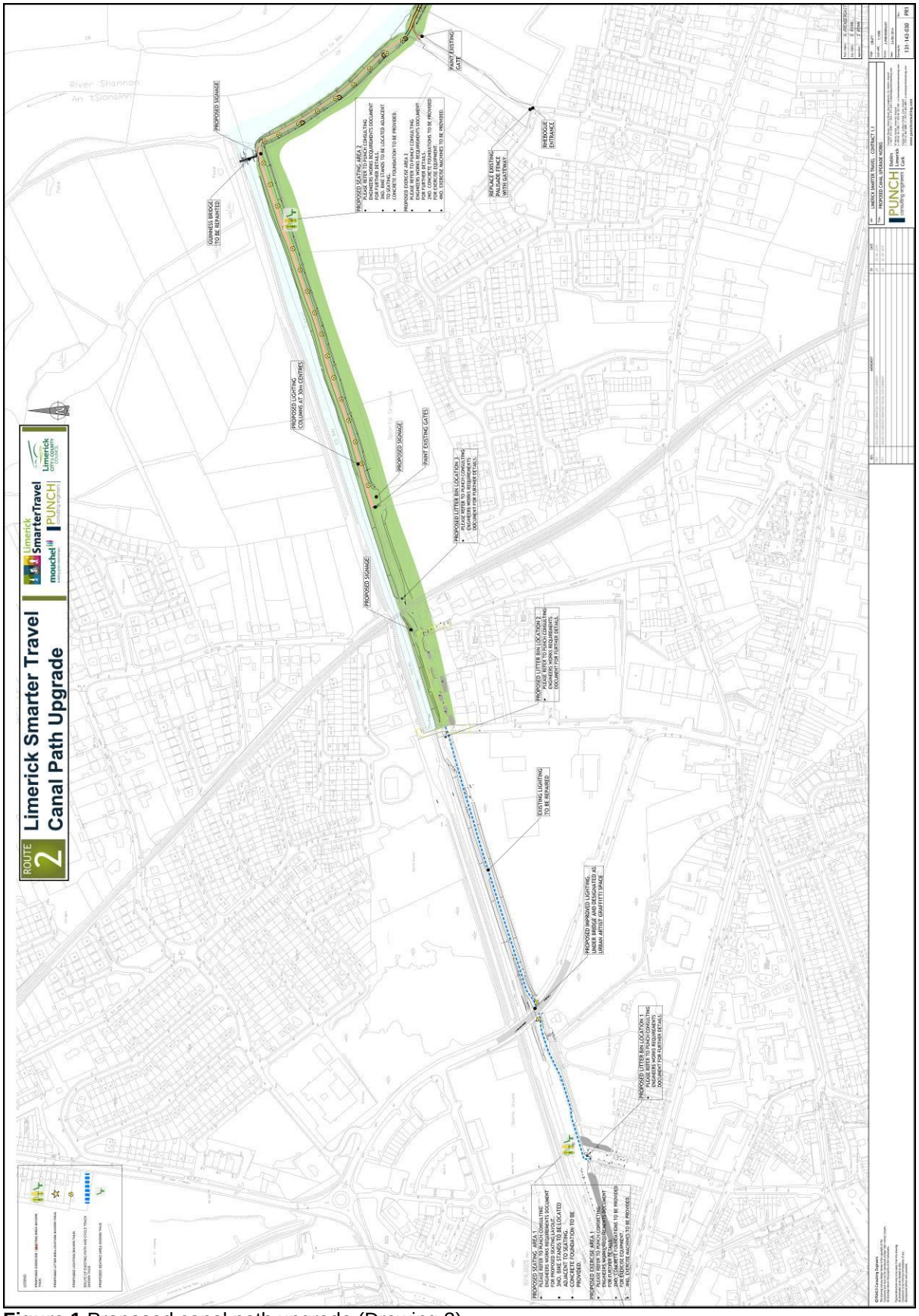

Figure 1 Proposed canal path upgrade (Drawing 3).

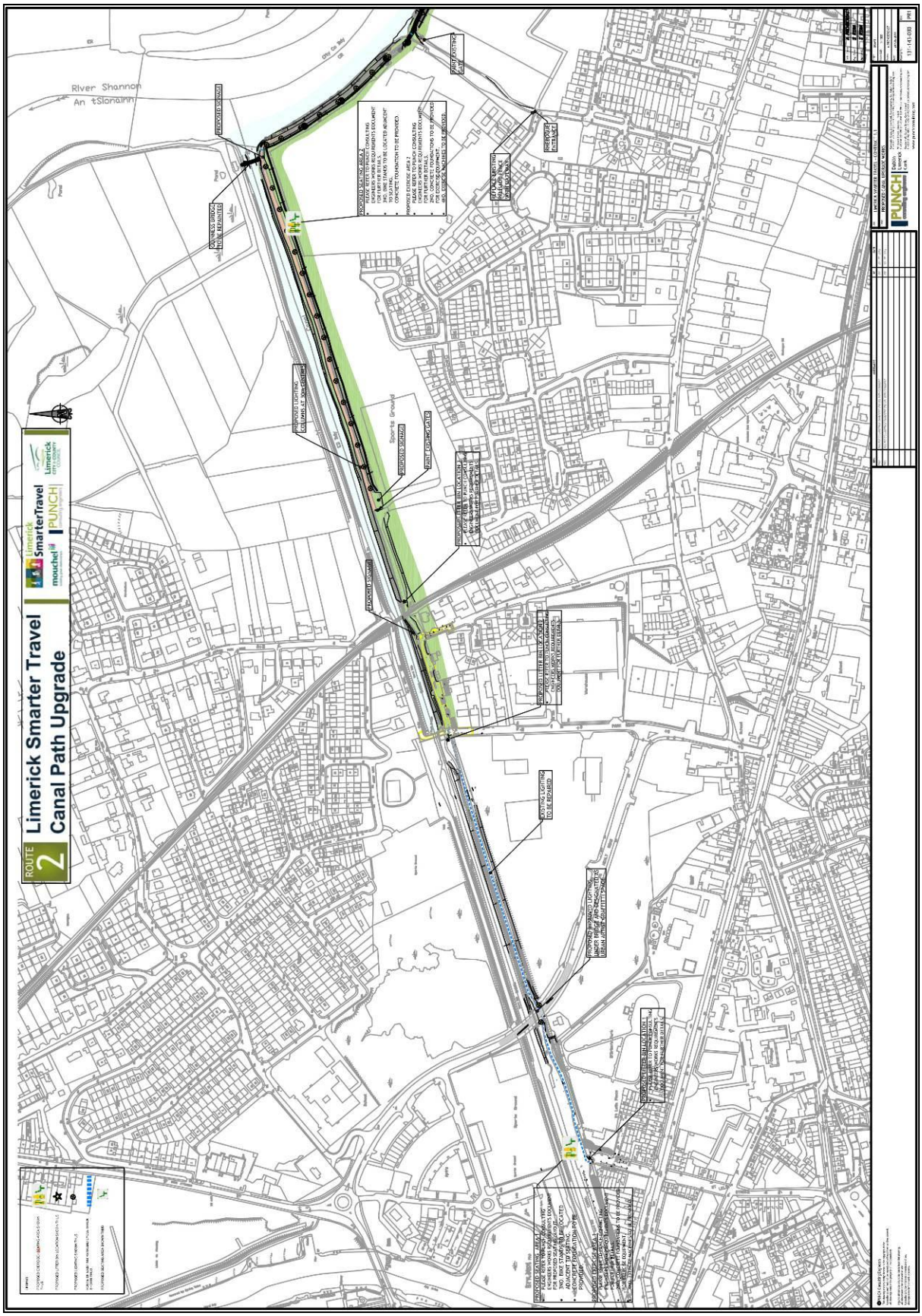

Figure 2 Proposed canal path upgrade (Drawing 2).

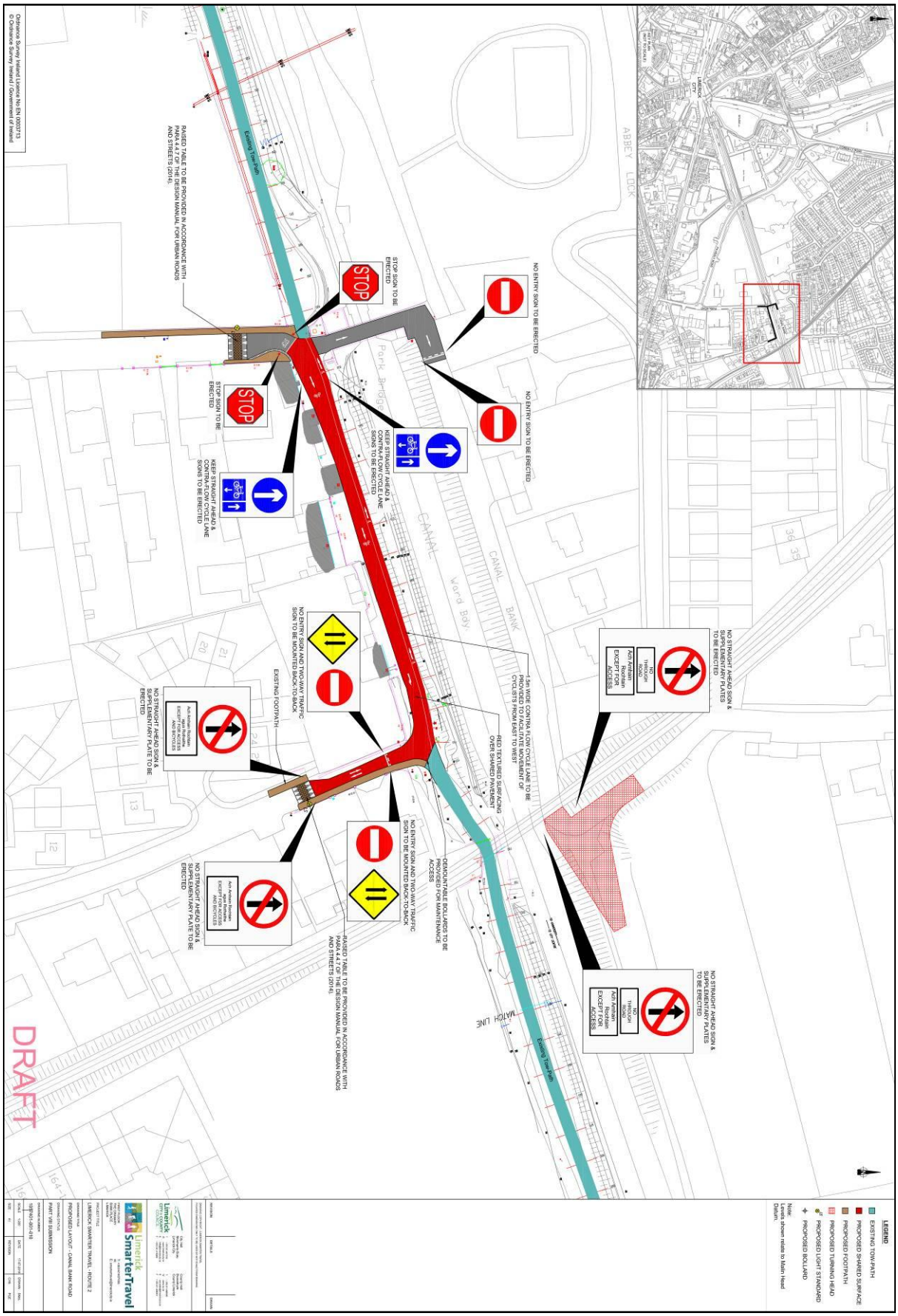

Figure 3 Proposed canal path upgrade (Drawing 3).

Figure 3 Improvement Proposals – Rhebogue Road & Hymee's Boreen

Appendix 2 Canal Refurbishment Main Contract Works Requirement Report

Appendix 3 Rhebogue Neighbourhood Greenway Planning Report

Rhebogue Neighbourhood Greenway

Part 8 Planning Report

July 2014 Proposed Development

Design Approach and Methodology

The proposed design has been prepared in the context of the following:

- Limerick Smarter Travel Rhebogue Cycle Streets Feasibility Report (2013),;
- Limerick Smarter Travel Stage 2 Bid Document (2010);
- Limerick City Councils Limerick City Development Plan (2010–2016);
- The Department of Transport's Smarter Travel – A Sustainable Transport Future (2009-2020); and
- The Department of Transport's National Cycle Policy Framework (2009-2020).

The designs have been prepared with reference to relevant guidance documents, including the following:

- Design Manual for Urban Roads and Streets (DMURS) issued by the DTTAS and the Department for Environment, Community and Local Government (2013);
- Traffic Signs Manual, issued by the Department of Transport (2010);
- Traffic Management Guidelines, issued by the Department of Transport, the Dublin Transportation Office, and the Department of the Environment and Local Government (2003);
- National Cycle Manual, published by the National Transport Authority (2011);
- Handbook for Cycle-friendly Design, published by Sustrans (2014);

- Guidance on the use of Tactile Paving Surfaces, produced by the Scottish Executive Department of the Environment, Transport and the Regions (1998); and
- Analysis of 30 km/h Zones, issued by Copenhagenize Consulting (2012).

DMURS is about street design within urban areas (cities, towns, villages). Previously the design of roads has been primarily focused on facilitating the passage of the largest volume of vehicular traffic. This led to considerations that pedestrian safety be best achieved by modal segregation. Whilst appropriate for inter-urban roads, neither traffic volume nor modal segregation is necessarily the most desirable within urban areas. The manual aims to put well-designed streets at the heart of sustainable communities. It focuses on streets as attractive places (existing and new) with designs appropriate to context, character and location. The principles, approaches and standards set out in the Manual apply to the design of all urban streets similar to Rhebogue Road (that is streets and roads with a speed limit of 60 km/hr or less). The Manual ensures the implementation of previous planning policy guidelines, which had place making and sustainable communities at their core. It represents a major change in the design and/ or upgrading of roads and streets in urban areas and replaces existing design standards and its use will be mandatory.

The manual has provided the tools to ensure a better balance is achieved on in the redesign of Rhebogue Road between all modes of transport and road users and so encourage more people to walk, cycle or use public transport. It also aims to lower traffic speeds, and create a built environment that promotes healthy lifestyles. DMURS uses practical examples of public realm strategies from Irish cities towns to show how these issues can be designed for and managed successfully in Rhebogue.

Designing a Neighbourhood Greenway for Rhebogue

There is a clear distinction between the design of a road and a street. The main function of a road is to distribute traffic. A street is multi-functional and is a place to live, work, walk, cycle, interact and spend time. Rhebogue Road and Hymee's Boreen are streets (also known as a Local Roads) and should be redesigned accordingly.

The site extents are shown in Drawing No. LST-R3-L1-01, provided in Appendix C.

The aim of this Rhebogue Neighbourhood Greenway design is to create streets that control vehicle speeds. This would be achieved firstly by altering the streets physical geometry, visual appearance and incorporating provisions for pedestrians, cyclists and frontage activity. Such an approach facilitates the introduction of 30 km/h speed limit. This would be enhanced by the inclusion of signs and vertical and horizontal traffic calming measures.

When designing Rhebogue Neighbourhood Greenway the first step involved determining the appropriate cycle facility required for Rhebogue. Given the existing characteristics of Rhebogue Road and Hymee's Boreen (i.e. road width, existing pinch points, etc.) it was necessary to consider providing for cyclists in a mixed traffic environment.

The National Cycle Manual (2011) recommends the following hierarchical approach designers should follow:

- Traffic reduction;
- Traffic calming;
- Junction treatment and traffic management;
- Redistribution of carriageway;
- Cycle lanes and cycle tracks;
- Cycleway (public roads for the exclusive use of cyclists and pedestrians).

The Rhebogue Neighbourhood Greenway design does not purposely include for traffic reduction. However, it is assumed that the preceding steps (traffic calming, and junction treatment and traffic management) would result in traffic reduction along Rhebogue Road, as the road would no longer be utilised as a 'rat-run,' for example.

Entry Treatment

In the first instance, speed would be reduced by altering the appearance of the Rhebogue Road on the approach to this residential zone, using a proposed entry/gateway treatment and by the inclusion of a 30 km/h speed limit zone within the area itself. The planned (currently under construction along the Old Dublin Road part of Route 3, Phase 1 works) entry gateway is located at the Rhebogue Road/ Old Dublin Road junction. The entry treatment when complete will include a raised tabletop junction and will mark the change from one type of road to another to make drivers aware of a change in nature of the road.

The proposed gateway treatment is shown in Drawing No. LST-R3-L1-02, provided in Appendix C.

Old Dublin Road includes a two-way cycle facility, which is currently being upgraded as part of the Route 3 Phase 1 works. The initial straight stretch of Rhebogue Road proposals, to just before its junction with Cluainte na Réabóige, would also include cycle lanes to both sides of the carriageway. These cycle lanes would terminate/ begin just before Rhebogue Road forms a horizontal curve to the northwest.

The cycle lanes are shown in Drawing No. LST-R3-L1-08 provided in Appendix A.

From this location, the proposed design includes a reduced carriageway width and traffic calming measures, detailed further in the following sections.

Speed Reduction (30 km/h Zone)

At present Rhebogue Road is located within the 50 km/h urban speed limit of Limerick City. The fatality risk at 50 km/h is more than twice as high as the risk at 40 km/h and more than five times higher than the risk at 30 km/h. The first 30 km/h zone started as a pilot project in Buxtehude, Germany in 1983. After that, several other 30 km/h zones were implemented all over Europe. Since then, these zones have become very popular globally. At 30 km/h, the probability of a cyclist surviving a collision with a motor vehicle is 95%; at 50 km/h, the chance is 50% (Copenhagenize Consulting, 2012).

According to DMURS where vehicle movement priorities are low, such as on local streets, lower speed limits should be applied (i.e. 30 km/h). Table 4.1 of DMURS provides a design speed selection matrix, which indicates the links between place, movement, and speed that need to be considered in order to achieve an effective and balanced design speed solution. Rhebogue Road is a local suburban street and therefore a 30 km/h speed limit is deemed appropriate for Rhebogue Neighbourhood Greenway.

Driver Feedback Signage

Driver Feedback Signage would also be included along Rhebogue Road. This sign consists of a solar powered driver feedback sign showing 'your speed'. These signs have been used with in Limerick City very effectively in recent years (up to 20% reduction in speed) (LST Bid document, 2010). Feedback from the community has been positive, as many drivers are not fully aware of their speed in and about their locality. It is proposed to erect two of these permanent signs along Rhebogue Road, as appropriate.

Traffic Calming

Traffic calming is one important application in safe street design. Traffic calming measures include:

- Street dimensions;
- Junction treatment; and
- Physical features.

Street Dimensions

In the first instance, traffic would be calmed by reducing the width of the road. Section 4.4.1 of DMURS sets out the appropriate carriageway widths by reducing the size of individual lanes to meet prominent user needs. The standard carriageway widths for Rhebogue Road and Hymee's Boreen, local roads, should be between 5.0 and 5.5 metres, accordingly. Therefore, the design includes the

provision of a 5.0 metres carriageway along Rhebogue Road (from its junction with Cluainte na Réabóige, to where the existing road becomes a one-way street) and along the extent of Hymee's Boreen, as shown in Drawing No. LST-R3-P2-03 to LST-R3-P2-14, provided in Appendix C.

Junction Treatment

The Rhebogue Neighbourhood Greenway design includes proposed tabletop junction treatments at seven junctions. These include T-junctions, crossroad junctions, and staggered junctions. These junctions would have the following effects:

- Reduction in speed;
- Cyclists and pedestrians right of way through minor road junctions;
- Significantly improve safety;
- Highlight conflict areas;
- Highlight 30 km/h zone; and
- Improve cycle times and directness.

The proposed tabletop junction locations are shown in Figure 7 and detailed in Table 1.

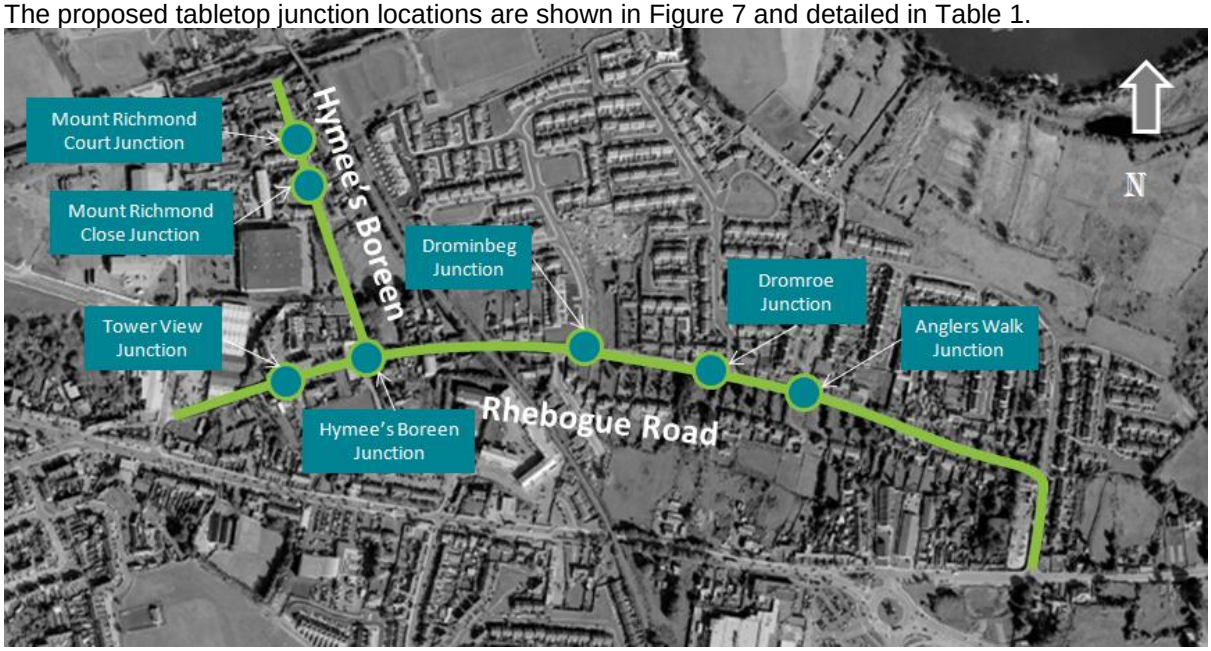

Figure 1 Proposed Tabletop Junction Locations

Table 1 Proposed Tabletop Junctions Details

Junction No.	Proposal Detail	Drawing Reference
Junction No. 1 (Angler's Walk access)	Priority controlled raised T-junction, 4.5 metre radii, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-05
Junction No. 2 (Dromroe access)	Priority controlled raised T-junction, 4.5 metre radii, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-05
Junction No. 3 (Drominbeg access)	Priority controlled raised staggered junction, 4.5 metre radii, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-07
Junction No. 4 (Hymee's Boreen access or Pumphouse Cross)	Priority controlled raised crossroads junction, 4.5 metre radii, in contrasting surface, including uncontrolled at level crossing points, and 23 metre visibility splays	LST-R3-L1-09

Junction No. 5 (Tower View access)	Priority controlled raised T-junction, 4.5 metre radii, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-10
Junction No. 6 (Mount Richmond Close access)	Priority controlled raised T-junction, 4.5 metre radii, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-13
Junction No. 7 (Mount Richmond Court access)	Priority controlled raised T-junction, 4.5 metre radii, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-14

Drawing No.s LST-R3-L1-05, LST-R3-L1-07, LST-R3-L1-09, LST-R3-L1-10, LST-R3-L1-13, and LST-R3-L1-14, are provided in Appendix C.

Figure 8 provides an early concept visual for the proposed tabletop junctions (note these visuals are subject to detailed design).

Figure 2 Proposed Tabletop Junction Early Concept Visual

Junction Radii

Section 4.3.3 of DMURS recommends where turning movements out from an Arterial or Link Street into a local street corner radii may be reduced to 4.5 metres. Consequently, all seven proposed raised junctions include 4.5 metre radii.

Junction Priority

DMURS also recommends that priority junctions in urban areas should be designed as STOP junctions. The document states that *"The attention of a driver should not solely be focused on approaching vehicles and acceptance gaps. The pedestrian/ vulnerable users should be higher in the*

movement hierarchy". Consequently, all seven proposed raised junctions have been redesigned as STOP junctions.

Junction Visibility

DMURS provides guidance on appropriate visibility splays at junctions in urban areas. A maximum X distance (distance along the minor arm) of 2.4 metres, and a Y distance (distance a driver exiting the minor road can see to both sides of the major arm) of 23 metres which corresponds to the design speed of 30 km/h should be used, as shown in Drawing No. LST R3-L1-09, for example. The same principles of sightlines in the vertical plane apply to direct accesses as given in NRA TD 9 for stopping sight distances. Thus, visibility in the vertical plane throughout each junction would be provided from a driver's eye height 1.05m to 2.00m positioned at the set back distance in the direct access to an object height of between 0.26m and 1.05m. This will ensure that a vehicle approaching on the national road is easily identified at night and that, for example, a child can be identified walking along an adjacent footway.

Physical Features

The aim of this traffic calming scheme is to minimise accelerating and braking at and between features. With reference to the Traffic Management Guidelines, it is recommended that features should be located as regularly and frequently as practicable (70-100 metres). Therefore, the Rhebogue Neighbourhood Greenway design includes a number of proposed horizontal vertical deflections to slow vehicles between the proposed raised junctions. These deflections require drivers to slow down and to navigate obstacles, at less than 100 metre intervals along the extent of Rhebogue Road and Hymee's Boreen.

Rail Over Bridge Improvements

The design includes an existing natural traffic calming facility via the existing rail overbridge. It is proposed to include raised tabletops on approach to the rail over bridge from both directions, including revised YIELD signs and road markings on approach from both sides. It is assumed that driving courtesy would prevail at this location. Drivers approaching from opposite directions will be able to see each other and yield (without sudden breaking), if necessary. It is proposed to include a shared surface through the existing pinch-point to allow the safe movement and priority to pedestrians and cyclists through the bridge. The proposed design is detailed in Drawing No.'s LST-R3-L1-0X provided in Appendix C.

Raised Tables

The existing road includes speed ramps. However, it is possible to constrain speeds without the need for ramps. Therefore, the proposed design includes the removal of all existing ramps along Rhebogue Road and Hymee's Boreen. DMURS recommends that raised tables should be provided to promote lower design speeds, slow turning vehicles at junctions, and to enable pedestrians to cross safely. Opportunities have been identified to use these horizontal alignment constraints to keep low speeds down instead. These horizontal constraints, or raised tables, would have the following effects:

- Reduction in speed;
- Improve safety;
- Highlight 30 km/h zone;
- Removal of long straights that encourage speeds; and
- Provide opportunities for scheme enhancement including hard and soft landscaping, where possible.

The proposed design includes four raised tables. The proposed raised table locations are shown in Figure 9, and are detailed in Table 2.

Figure 3 Proposed Raised Table Locations and Complete Scheme

Table 2 Proposed Raised Table Details

Pinch-point No.	Detail	Drawing No.
Raised Table No. 1	Raised shared surface table, 5.0 metre in length, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-03
Raised Table No. 2	Raised shared surface table, 5.0 metre in length, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-04
Raised Table No. 3	Raised shared surface table, 5.0 metre in length, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-06
Raised Table No. 4	Raised shared surface table, 5.0 metre in length, in contrasting surface, including uncontrolled at level crossing points	LST-R3-L1-12

Drawing No.'s LST-R3-L1-03, LST-R3-L1-04, LST-R3-L1-06, and LST-R3-L1-12, are provided in Appendix C.

Figure 10 provides an early concept visual for the proposed raised tables (note these visuals are subject to detailed design).

Figure 4 Proposed Tabletop Junction Early Concept Visual

Pedestrians

The design includes continuous footpaths to both sides of Rhebogue Road and Hymee's Boreen, where possible. There are a number of restricted areas where it is not possible to provide footpaths to both sides of the reduced carriageway. However, in these instances appropriate uncontrolled crossing points would be provided to direct pedestrians.

Public Lighting

The National Cycle Manual recommends that public lighting (70w Son-t lanterns, 6 to 8 metres in height) should be provided at 34-metre intervals in residential areas to enable road users, including cyclists, to see each other, as well as objects on or next to the road, at a reasonable distance. The design provides proposed new streetlights on the southern side of Rhebogue Road to meet the recommended standards, as required.

Signage

The design includes appropriate signage and road markings as required and with reference to the Traffic Signs Manual.

APPENDIX 2 NPWS Site Synopsis

SITE NAME: LOWER RIVER SHANNON cSAC
SITE CODE: 002165

Qualifying interests:

Annex I habitats

- Sandbanks which are slightly covered by sea water all the time [1110]
- Estuaries [1130]
- Mudflats and sandflats not covered by seawater at low tide [1140]
- Coastal lagoons [1150]
- Large shallow inlets and bays [1160]
- Reefs [1170]
- Perennial vegetation of stony banks [1220]
- Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
- *Salicornia* and other annuals colonizing mud and sand [1310]
- *Spartina* swards (*Spartinion maritimae*) [1320]
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
- *Molinia* meadows on calcareous, peaty or clavey-silt-laden soils (*Molinion caeruleae*) [6410]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]

Annex II species

- Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]
- Sea lamprey (*Petromyzon marinus*) [1095]
- Brook lamprey (*Lampetra planeri*) [1096]
- River lamprey (*Lampetra fluviatilis*) [1099]
- Salmon (*Salmo salar*) [1106]
- Bottle-nosed dolphin (*Tursiops truncatus*) [1349]
- Otter (*Lutra lutra*) [1355]

This very large site stretches along the Shannon valley from Killaloe to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus Estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. The Shannon and Fergus flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones redominate (except at Kerry Head, which is formed from Old Red Sandstone). The eastern sections of the Feale catchment flow through Namurian Rocks and the western stretches through Carboniferous Limestone. The Mulkear flows through Lower Palaeozoic Rocks in the upper reaches before passing through Namurian Rocks, followed by Lower Carboniferous Shales and Carboniferous Limestone. The Mulkear River itself, immediately north of Pallas Green, passes through an area of Rhyolites, Tuffs and Agglomerates. Rivers within the subcatchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear

include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahernahallia.

The site is a candidate SAC selected for lagoons and alluvial wet woodlands, both habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for floating river vegetation, *Molinia* meadows, estuaries, tidal mudflats, Atlantic salt meadows, Mediterranean salt meadows, *Salicornia* mudflats, sand banks, perennial vegetation of stony banks, sea cliffs, reefs and large shallow inlets and bays all habitatslisted on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Bottle-nosed Dolphin, Sea Lamprey, River Lamprey, Brook Lamprey, Freshwater Pearl Mussel, Atlantic salmon and Otter.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon estuary (considered to be a line across the narrow strait between Kilcredaun Point and Kilconly Point). Within this main unit there are several tributaries with their own 'sub-estuaries' e.g. the Deel River, Mulkear River, and Maigue River. To the west of Foynes, a number of small estuaries form indentations in the predominantly hard coastline, namely Poulnasherry Bay, Ballylongford Bay, Clonderalaw Bay and the Feale or Cashen River Estuary.

Both the Fergus and inner Shannon estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. The smaller estuaries also feature mudflats, but have their own unique characteristics, e.g. Poulnasherry Bay is stony and unusually rich in species and biotopes. Plant species are typically scarce on the mudflats, although there are some Eel-grass beds (*Zostera* spp.) and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community, which has been noted from the inner Shannon and Fergus estuaries, is a *Macoma-Scrobicularia-Nereis* community.

In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate: swards of Common Cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and Club-rushes (*Scirpus maritimus, S. tabernaemontani* and *S. triquetrus*). In addition to the nationally rare Triangular Club-rush (*Scirpus triqueter*), two scarce species are found in some of these creeks (e.g. Ballinacurra Creek): Lesser Bulrush (*Typha angustifolia*) and Summer Snowflake (*Leucojum aestivum*).
Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus Estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. Characteristic species occurring include Common Saltmarsh Grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea-milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Long-bracted Sedge (*Carex extensa*), Lesser Seaspurrey (*Spergularia marina*) and Sea Arrowgrass (*Triglochin maritima*). Areas of Mediterranean salt meadows, characterised by clumps of Sea Rush (*Juncus maritimus*) occur occasionally. Two scarce species are found on saltmarshes in the vicinity of the Fergus Estuary: a type of robust Saltmarsh-grass (*Puccinellia foucaudii*), sometimes placed within the compass of Common Saltmarsh-grass (*Puccinellia maritima*) and Hard-grass (*Parapholis strigosa*).

Saltmarsh vegetation also occurs around a number of lagoons within the site. The two which have been surveyed as part of a National Inventory of Lagoons are Shannon Airport Lagoon and

Cloonconeen Pool. Cloonconeen Pool (4-5 ha) is a natural sedimentary lagoon impounded by a low cobble barrier. Seawater enters by percolation through the barrier and by overwash. This lagoon represents a type which may be unique to Ireland since the substrate is composed almost entirely of peat. The adjacent shore features one of the best examples of a drowned forest in Ireland. Aquatic vegetation in the lagoon includes typical species such as Beaked Tasselweed (*Ruppia maritima*) and green algae (*Cladophora* sp.). The fauna is not diverse, but is typical of a high salinity lagoon and includes six lagoon specialists (*Hydrobia ventrosa, Cerastoderma glaucum, Lekanesphaera hookeri, Palaemonetes varians, Sigara stagnalis* and *Enochrus bicolor*). In contrast, Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of Stonewort (*Chara canescens* and *Chara cf. connivens*).

Most of the site west of Kilcredaun Point/Kilconly Point is bounded by high rocky sea cliffs. The cliffs in the outer part of the site are sparsely vegetated with lichens, Red Fescue, Sea Beet (*Beta vulgaris*), Sea Campion (*Silene maritima*), Thrift and Plantains (*Plantago* spp.). A rare endemic Sea Lavender (*Limonium recurvum* subsp. *pseudotranswallinum*) occurs on cliffs near Loop Head. Cliff-top vegetation usually consists of either grassland or maritime heath. The boulder clay cliffs further up the estuary tend to be more densely vegetated, with swards of Red Fescue and species such as Kidney Vetch (*Anthyllis vulneraria*) and Bird's-foot Trefoil (*Lotus corniculatus*).

The site supports an excellent example of a large shallow inlet and bay. Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top and below this each of the shores has different characteristic species giving a range of different shore types in the cSAC.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps to ridged bedrock with gullies of sand between the ridges to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae. Flowing into the estuaries are a number of tidal rivers.

Other coastal habitats that occur within the site include the following:

- Stony beaches and bedrock shores - these shores support a typical zonation of seaweeds (*Fucus* spp., *Ascophyllum nodosum* and kelps).
- Shingle beaches - the more stable areas of shingle support characteristic species such as Sea Beet, Sea Mayweed (*Matricaria maritima*), Sea Campion and Curled Dock (*Rumex crispus*).
- Sandbanks which are slightly covered by sea water at all times – there is a known occurrence of sand/gravel beds in the area from Kerry Head to Beal Head.
- Sand dunes - a small area of sand dunes occurs at Beal Point. The dominant species is Marram Grass (*Ammophila arenaria*).

Freshwater rivers have been included in the site, most notably the Feale and Mulkear catchments, the Shannon from Killaloe to Limerick (along with some of its tributaries, including a short stretch of the

Kilmastulla River), the Fergus up as far as Ennis, and the Cloon River. These systems are very different in character: the Shannon being broad, generally slow-flowing and naturally eutrophic; the Fergus being smaller and alkaline; while the narrow, fast-flowing Cloon is acid in nature. The Feale and Mulkear catchments exhibit all the aspects of a river from source to mouth. Seminatural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, however, improved grassland is most common. One grassland type of particular conservation significance, *Molinia* meadows, occurs in several parts of the site and the examples at Worldsend on the River Shannon are especially noteworthy. Here are found areas of wet meadow dominated by rushes and sedges and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (*Sisyrinchium bermudiana*) and Pale Sedge (*Carex pallescens*).

Floating river vegetation characterised by species of Water-crowfoot (*Ranunculus* spp.), Pondweeds (*Potamogeton* spp.) and the moss *Fontinalius antipyretica* arepresent throughout the major river systems within the site. The rivers contain an interesting bryoflora with *Schistidium alpicola* var. *alpicola* recorded from in-stream boulders on the Bilboa, new to county Limerick.

Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50m wide on the banks and somewhat wider on the largest island. The most prominent woodland type is gallery woodland where White Willow (*Salix alba*) dominates the tree layer with occasional Alder (*Alnus glutinosa*). The shrub layer consists of various willow species with sally (*Salix cinerea* ssp. *oleifolia*) and what appear to be hybrids of *S. alba* x *S. viminalis.* The herbaceous layer consists of tall perennial herbs. A fringe of Bulrush (*Typha* sp.) occurs on the riverside of the woodland. On slightly higher ground above the wet woodland and on the raised embankment remnants of mixed oak-ash-alder woodland occur. These are poorly developed and contain numerous exotic species but locally *t*here are signs that it is invading open grassland. Alder is the principal tree species with occasional Oak (*Quercus robur*), Elm (*Ulmus glabra, U. procera*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and the shrubs Guelder-rose (*Viburnum opulus*) and willows. The ground flora is species-rich.

Woodland is infrequent within the site; however Cahiracon Wood contains a strip of old Oak woodland. Sessile Oak (*Quercus petraea*) forms the canopy, with an understorey of Hazel and Holly (*Ilex aquifolium*). Great Wood-rush (*Luzula sylvatica*) dominates the ground flora. Less common species present include Great Horsetail (*Equisetum telmeteia*) and Pendulous Sedge (*Carex pendula*).

In the low hills to the south of the Slievefelim Mountains, the Cahernahallia River cuts a valley through the Upper Silurian rocks. For approximately 2km south of Cappagh Bridge at Knockanavar, the valley sides are wooded. The woodland consists of Birch (*Betula* spp.), Hazel, Oak, Rowan (*Sorbus aucuparia*), some Ash (*Fraxinus excelsior*) and Willow (*Salix* spp.). Most of the valley is not grazed by stock, and as a result the trees are regenerating well. The ground flora feature prominent Greater wood-rush and Bilberry (*Vaccinium myrtillus*) with a typical range of woodland herbs. Where there is more light available, Bracken (*Pteridium aquilinum*) features.

The valley sides of the Bilboa and Gortnageragh Rivers, on higher ground north east of Cappamore, support patches of semi-natural broadleaf woodland dominated by Ash, Hazel, Oak and Birch. There is a good scrub layer with Hawthorn, Willow, Holly and Blackthorn (*Prunus spinosa*) common. The herb layer in these woodlands is often open with a typically rich mixture of woodland herbs and ferns. Moss species diversity is high. The woodlands are ungrazed. The hazel is actively coppiced in places. There is a small area of actively regenerating cut away raised bog at Ballyrorheen. It is situated approx. 5km north west of Cappamore Co. Limerick. The bog contains some wet areas with good

moss (*Sphagnum*) cover. Species of particular interest include the Cranberry (*Vaccinium oxycoccos*) and the White Sedge (*Carex curta*) along with two other regionally rare mosses including *S. fimbriatum*. The site is being invaded by Birch (*Betula pubescens*) scrub woodland. Both commercial forestry and the spread of rhododendron has greatly reduced the overall value of the site. A number of plant species that are Irish Red Data Book species occur within the site; several are protected under the Flora (Protection) Order, 1999:

- Triangular Club-rush (*Scirpus triquetrus*) - in Ireland this protected species is only found in the Shannon Estuary, where it borders creeks in the inner estuary.
- Opposite-leaved Pondweed (*Groenlandia densa*) - this protected pondweed is found in the Shannon where it passes through Limerick City.
- Meadow Barley (*Hordeum secalinum*) - this protected species is abundant in saltmarshes at Ringmoylan and Mantlehill.
- Hairy Violet (*Viola hirta*) - this protected violet occurs in the Askeaton/Foynes area.
- Golden Dock (*Rumex maritimus*) - noted as occurring in the River Fergus Estuary.
- Bearded Stonewort (*Chara canescens*) - a brackish water specialist found in Shannon Airport lagoon.
- Convergent Stonewort (*Chara connivens*) - presence in Shannon Airport Lagoon to be confirmed.

Overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found but none were seen in 1993/94. Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96); Teal (2,319; 1995-96); Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100; 1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1062; 1995/96), Curlew (1504; 1995/96), Redshank (3228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95).

This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank. A number of species listed on Annex I of the E.U. Birds Directive breed within the site. These include Peregine Falcon (2-3 pairs), Sandwich Tern (34 pairs on Rat Island, 1995), Common Tern (15 pairs: 2 on Sturamus Island and 13 on Rat Island, 1995), Chough (14-41 pairs, 1992) and Kingfisher. Other breeding birds of note include Kittiwake (690 pairs at Loop Head, 1987) and Guillemot (4010 individuals at Loop Head, 1987)

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary consisting of at least 56-68 animals (1996). This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. Otter, a species also listed on Annex II of this directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey

(*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*). The three lampreys and Salmon have all been observed spawning in the lower Shannon or its tributaries. The Fergus is important in its lower reaches for spring salmon while the Mulkear catchment excels as a grilse fishery though spring fish are caught on the actual Mulkear River. The Feale is important for both types. Twaite Shad is not thought to spawn within the site. There are few other river systems in Ireland which contain all three species of Lamprey. Two additional fish of note, listed in the Irish Red Data Book also occur, namely Smelt (*Osmerus eperlanus*) and Pollan (*Coregonus autumnalis pollan*). Only the former has been observed spawning in the Shannon.

Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs abundantly in parts of the Cloon River.

There is a wide range of landuses within the site. The most common use of the terrestrial parts is grazing by cattle and some areas have been damaged through overgrazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus Estuary). Further, reclamation continues to pose a threat as do flood relief works (e.g. dredging of rivers). Gravel extraction poses a major threat on the Feale. In the past, Cord-grass (*Spartina* sp.) was planted to assist in land reclamation. This has spread widely, and may oust less vigorous colonisers of mud and may also reduce the area of mudflat available to feeding birds.

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory - except in the upper estuary, reflecting the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences by industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats. Fishing is a main tourist attraction on the Shannon and there are a large number of Angler Associations, some with a number of beats. Fishing stands and styles have been erected in places. The River Feale is a designated Salmonid Water under the E.U. Freshwater Fish Directive. Other uses of the site include commercial angling, oyster farming, boating (including dolphin-watching trips) and shooting. Some of these may pose threats to the birds and dolphins through disturbance. Specific threats to the dolphins include underwater acoustic disturbance, entanglement in fishing gear and collisions with fast moving craft.

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 E.U. Habitats Directive, including the priority habitat lagoon, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.