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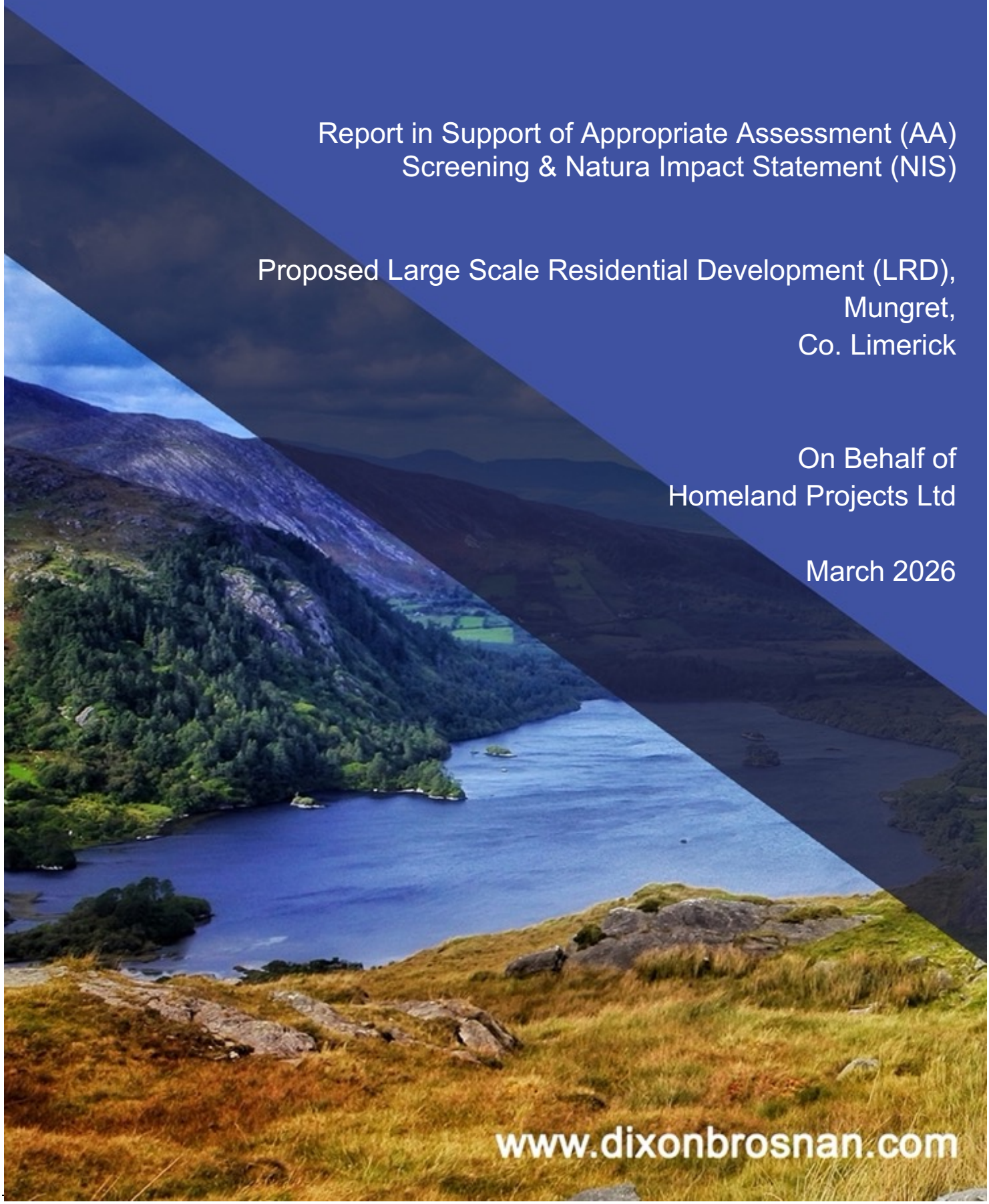
# Report in Support of Appropriate Assessment (AA) Screening & Natura Impact Statement (NIS)

## Proposed Large Scale Residential Development (LRD), Mungret, Co. Limerick

On Behalf of
Homeland Projects Ltd

March 2026



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| Project | Report in Support of Appropriate Assessment (AA) Screening & Natura Impact Statement (NIS) Proposed Large Scale Residential Development (LRD) at Mungret, Co. Limerick | |
|---|---|---|
| Client | Homeland Projects Ltd | |
| Project Ref. | 26015 | |
| Report No. | 26015.02 | |
| Client Ref. | - | |
| Date | Revision | Prepared By |
| 30/03/26 | First draft | Sorcha Sheehy PhD |
| | | Carl Dixon MSc |
| | | |

DixonBrosnan Lios Ri Na hAoine, 1 Redemption Road, Cork.

Tel 086 851 1437| carl@dixonbrosnan.com | www.dixonbrosnan.com

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# 1. Introduction

## 1.1 Background

The information in this report has been compiled by DixonBrosnan Environmental Consultants, on behalf of the applicant. It provides information on and assesses the potential for a large-scale residential development (LRD) at Mungret, Co. Limerick, hereafter referred to as the “proposed development”, to impact on any Natura 2000 sites within its likely zone of impact. The information in this report forms part of and should be read in conjunction with the planning application documentation for the proposed development.

The Birds Directive (2009/147/EC) and the Habitats Directive (92/43/EEC) put an obligation on EU Member States to establish the Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites comprises Special Areas of Conservation (SACs, including candidate SACs) and Special Protection Areas (SPAs). SACs are selected for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are selected for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is selected correspond to the qualifying interests of the sites and from these the conservation objectives of the site are derived. The Birds and Habitats Directives set out various procedures and obligations in relation to nature conservation management in Member States in general, and of the Natura 2000 sites and their habitats and species in particular. A key protection mechanism is the requirement to consider the possible nature conservation implications of any plan or project on the Natura 2000 site network before any decision is made to allow that plan or project to proceed. Not only is every new plan or project captured by this requirement but each plan or project, when being considered for approval at any stage, must take into consideration the possible effects it may have in combination with other plans and projects when going through the process known as Appropriate Assessment (AA).

The obligation to undertake Appropriate Assessment (AA) derives from Article 6(3) and 6(4) of the Habitats Directive, and both involve a number of steps and tests that need to be applied in sequential order. Article 6(3) is concerned with the strict protection of sites, while Article 6(4) is the procedure for allowing derogation from this strict protection in certain restricted circumstances. As set out in Section 177U of the Planning and Development Act 2000 as amended, a screening for appropriate assessment of an application for consent for the proposed development must be carried out by the competent authority to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on any European site. Each step in the assessment process precedes and provides a basis for other steps. The results at each step must be documented and recorded carefully so there is full traceability and transparency of the decisions made.

## 1.2 Report Background

The purpose of this report is to inform the AA process as required under the Habitats Directive (92/43/EEC) in instances where a plan or project may give rise to significant impacts on a Natura 2000 site. This report aims to inform the Appropriate Assessment process in

determining whether the development, both alone and in combination with other plans or projects, are likely to have a significant impact on the Natura 2000 sites in the study area, in the context of their conservation objectives and specifically on the habitats and species for which the sites have been designated.

This report has been prepared with regard to the following guidance documents, where relevant.

- *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC (European Commission (EC), 2018);*
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodical*
- *Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission (EC), 2021);*
- *Guidance Document on Article 6(4) of the Habitats Directive 92/43/EEC (European Commission, (EC) 2007);*
- *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (Department of Environment, Heritage and Local Government, 2010 revision);*
- *Appropriate Assessment under Article 6 of the Habitats Directive; Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10 (Department of Environment, Heritage and Local Government, 2010);*
- *Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive (International Workshop on Assessment of Plans under the Habitats Directive, 2011);*
- *Commission notice Guidance document on wind energy developments and EU nature legislation, (EC 2020);*
- *Communication from the Commission on the precautionary principle. European Commission (2000)*
- *Assessment of plans & projects in relation to N2K sites – Methodological Guidance (EC 2021);*
- *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive (EC 2021)*
- *CJEU Case C 164/17 Edel Grace Peter Sweetman v An Bord Pleanála,*
- *EC Commission Notice 2021/C 437/01 'Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'.*
- *OPR Practice Note PN03 Planning Conditions (2022)*

- *People Over Wind and Peter Sweetman v. Coillte Teoranta (People Over Wind) [2018] C-323/17*
- *Holohan v An Bord Pleanála (C-461/17)*
- *Sweetman v An Bord Pleanála (C-258/11)*
- *Grace and Sweetman v An Bord Pleanála (C-164/17)and*
- *Kelly -v- An Bord Pleanála & anor [2019] IEHC 84*

### 1.3 Authors of the Report

This report was prepared by Carl Dixon MSc (Ecological Monitoring) and Dr. Sorcha Sheehy PhD (Ecology/ornithology).

Carl Dixon MSc (Ecology) is a senior ecologist who has over 25 years' experience in ecological and water quality assessments. Carl Dixon holds an Honours Degree (BSc) in Ecology and a Masters (MSc) in Ecological Monitoring from UCC. Prior to setting up DixonBrosnan Environmental Consultants in 2000, Carl set up and ran Core Environmental Services which included Rural Environmental Protection Scheme (REPS) planning for landowners and ecological assessments. Carl has particular experience in freshwater ecology including electrofishing fish stock assessments and water quality assessments. He also has considerable experience in habitat mapping and mammal ecology including survey work and reporting in relation to badgers and bats. Other competencies include surveys for invasive species and bird surveys. Carl has extensive experience with regards to EIAR and NIS mitigation and impact assessment. He has particular experience in large-scale industrial developments with extensive experience in complex assessments as part of multi-disciplinary teams. Such projects include gas pipelines, incinerators, electrical cable routes, oil refineries and quarries.

Dr. Sorcha Sheehy PhD (ecology/ornithology) is an experienced ecological consultant specialising in bird behaviour. Sorcha received a BSc in Applied Ecology from UCC and subsequently went on to receive a PhD in behavioural ornithology at UCC. During her PhD research, Sorcha studied bird-aircraft collision with a particular focus on bird behaviour, included field-based behavioural observations at airports, bird cadaver examination and collision classification and the use of radar tracking to model collision risk. Sorcha has worked for over 15 years in a professional ecology role and specialises in the coordination of ecology projects and assessments. She has coordinated and contributed to Habitats Directive Assessments (AA screenings and NIS) and Environmental Impact Assessment Reports (EIAR) for a range of small and large-scale projects with particular expertise in assessing impacts on birds. Notable projects include Arklow Bank Wind Park, Shannon Technology and Energy Park and Waste to Energy Facility Ringaskiddy.

## 2. Regulatory Context and Appropriate Assessment Procedure

### 2.1 Regulatory Context

The Habitats Directive (Council Directive 92/43/EEC on the *Conservation of Natural Habitats and of Wild Fauna and Flora*) aims to maintain or restore the favourable conservation status of habitats and species of community interest across Europe. The requirements of this

directive is transposed into Irish law through the European Communities (Birds and Natural Habitats Regulations; S.I. No. 477 of 2011).

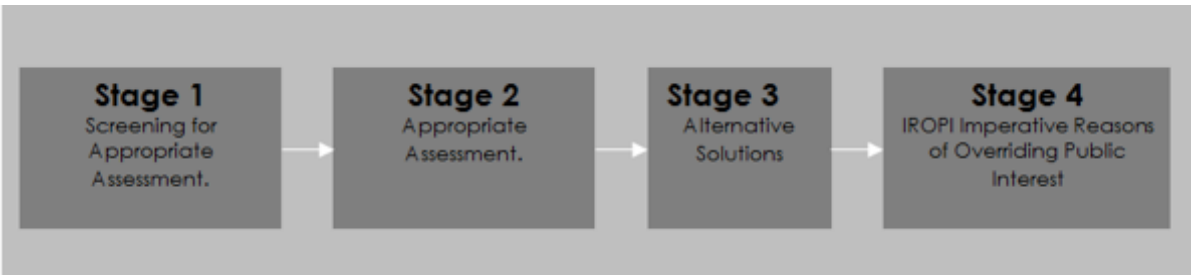
Under the Directive a network of sites of nature conservation importance have been identified by each Member State as containing specified habitats or species requiring to be maintained or returned to favourable conservation status. In Ireland the network consists of SACs and SPAs, and also candidate sites, which form the Natura 2000 network.

Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the *Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter 'the Habitats Directive') requires that, any plan or project not directly connected with or necessary to the management of a designated 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. A competent authority (e.g. the EPA or Local Authority) can only agree to a plan or project after having determined that it will not adversely affect the integrity of the site concerned.

The possibility of a significant effect on a designated or "European" site has generated the need for an appropriate assessment to be carried out by the competent authority for the purposes of Article 6(3). A Stage Two Appropriate Assessment is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The first (Screening) Stage for appropriate assessment operates merely to determine whether a (Stage Two) Appropriate Assessment must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

## 2.2 Appropriate Assessment Procedure

The assessment requirements of Article 6(3) establish a stage-by-stage approach. This assessment follows the stages outlined in the 2001 European Commission publications "Assessment of plans and projects significantly affecting Natura 2000 sites: methodological guidance on the provisions of Articles 6(3) and 6(4) of the Habitats Directive 92/43/EEC" (2001) and Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (Draft) Office for Official Publications of the European Communities, Luxembourg (EC, 2015);




The stages are as follows:

Stage One: Screening — the process which identifies any appreciable 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 on the integrity of the Natura 2000 site of the project or plan, 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. It is confirmed that no reliance is placed by the developer on Stage Three in the context of this application for development consent;

Stage Four: Assessment where no alternative solutions exist and 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 (it is important to note that this guidance does not deal with the assessment of imperative reasons of overriding public interest). Again, for the avoidance of doubt, it is confirmed that no reliance is placed by the developer on Stage Four in the context of this application for development consent.

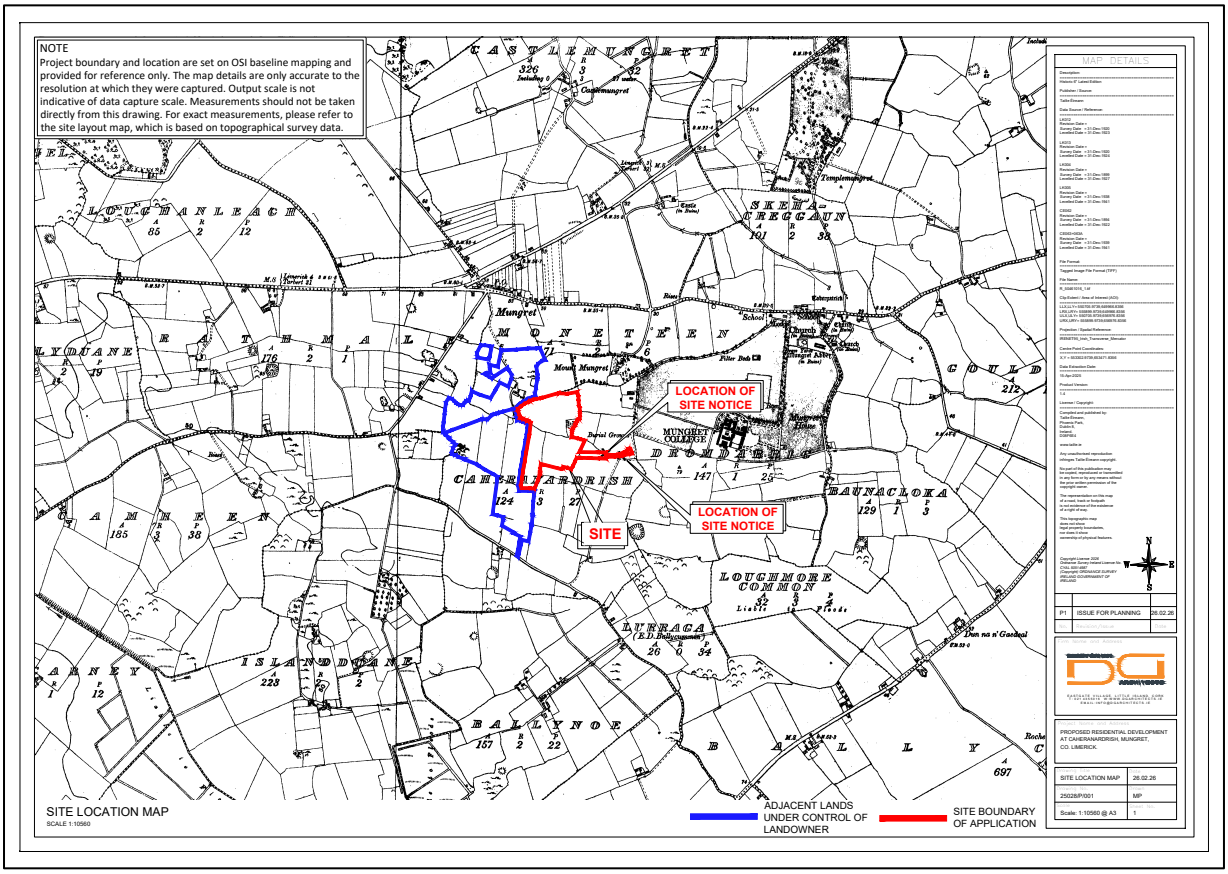
It is the responsibility of the competent authority to make a decision on whether or not the proposed development should be approved, taking into consideration any potential impact upon any Natura 2000 site within its likely zone of impact.

# 3. Receiving Environment

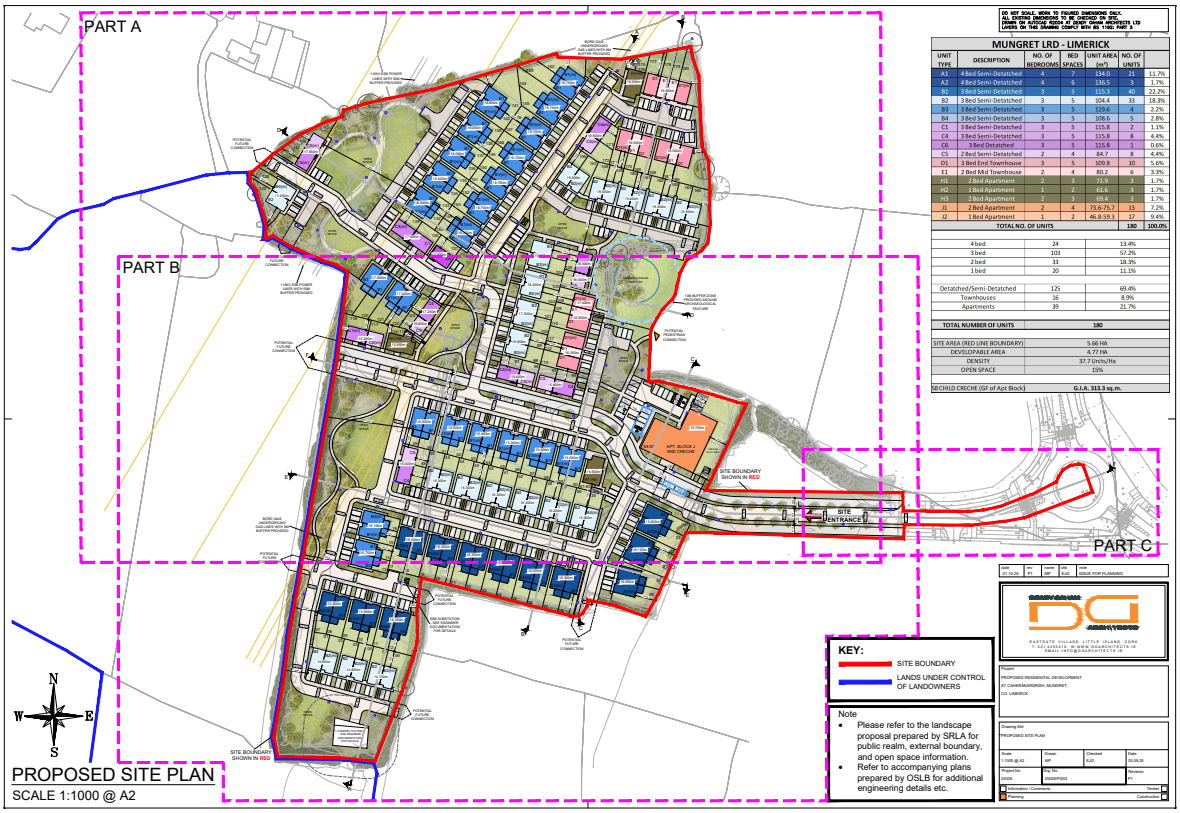
## 3.1 Existing site

The proposed development site covers an area of 5.66ha and is located in Mungret c.6km southwest of Limerick City Centre (**Figure 1**). The site itself is located approximately 1km south of Mungret village.

The Mungret Park Road provides access to the site from the east and Mungret College is located to the east of the site. Lands in the vicinity are largely agricultural, with some areas of scattered residential development along the northeastern boundary. St. Paul's GAA club ground is located along the northern boundary of the site.




## Figure 1. Proposed development site location | Source Deady Gahan




## Figure 2. Proposed site layout | Source Deady Gahan Architects

### 3.2 Proposed development

The development will consist of a Largescale Residential Development (LRD), comprising of 182no. residential dwellings as follows: 141no. houses consisting of 104no. detached/semi-detached dwellings (24no. 4-beds, 78no. 3-beds and 2no. 2-beds), 37no. townhouses (18no. 3-beds and 19no. 2-beds) and 41no. apartment units across 1no. triplex unit (2no. 2-beds and 1no. 1-bed) and a five-storey apartment building (13no. 2-beds and 25no. 1-beds) with a crèche with capacity to accommodate 70no. children at ground floor level.

The proposed development will include the provision for car parking, including EV charging points and bicycle parking. The proposed development will also include the provision of private, communal, and public open spaces; internal roads and pathways; pedestrian and cyclist routes; hard and soft landscaping and boundary treatments; waste storage; plant; signage; a new vehicular and pedestrian access onto the Mungret Park Road; public lighting; substations; all associated site development works; and all drainage and foul sewer infrastructure and network works including a pumping station and connections to the existing networks and nature-based suds measures.

The proposed site layout is included in **Figure 2**.

### 3.3 Wastewater

There is an existing 225mm diameter foul line located within the Mungret Link Road to the southeast of the subject site. This foul sewer was installed as part of the Mungret Park Road works (Mungret LIHAF Road) and services the lands adjacent to the Mungret Park Road (Mungret LIHAF Road).

This existing foul line and receiving network eventually discharges to the Limerick Wastewater Treatment Plant.

A pre-connection feasibility enquiry was made to Uisce Éireann to confirm whether there is adequate capacity in the public network to accommodate the proposed Large-scale Residential Development (CDS 25001670). The proposed connection was deemed feasible without upgrades.

It is proposed that this development will be serviced internally by 150mm and 225mm diameter foul sewers and will include the provision of services connections, inspection chambers etc. throughout the site. Due to the topography of the site, and invert levels of the existing foul sewer infrastructure mentioned above, it is not possible to connect to the existing infrastructure by means of gravity. It is thus proposed to include a foul sewer pump station within the development in order to lift foul sewer through pumping to the existing foul sewer. The proposed foul sewer pumping station has been designed in accordance with Uisce Éireann's Code of Practice for Wastewater Infrastructure. The design incorporates dual submersible pumps operating on a duty/standby arrangement, with ductile iron pipework to IS EN 598. Adequate emergency storage has been provided in line with development scale, together with odour and septicity control measures. A dedicated metered power supply, automated controls, and provision for telemetry/remote monitoring have been included, alongside appropriate alarm and call-out systems. Safe vehicular access for maintenance, tanker removal of wet well contents, and lifting/handling equipment have been integrated.

Flood risk, site security, fencing, and odour setback requirements have also been addressed to ensure the pumping station is fit for purpose and fully compliant with Uisce Éireann standards. Foul sewers have been designed in accordance with the Uisce Éireann 'Standard Details for Wastewater infrastructure' and 'Code of Practice for Wastewater Infrastructure'. In addition, foul sewers have been designed to the Building Regulations 1997, as amended, (referred to within as 'the Building Regulations') and specifically in accordance with the principles and methods set out in EN 752:2008 and DOE 'Recommendations for Site Development Works' (1998).

In addition, HR Wallingford 'Tables for the Hydraulic Design of Pipes, Sewers and Channels' and Water UK/WRc 'Sewers for Adoption – 6th Edition' have been applied. Values for roughness of uPVC pipes were obtained from Wallingford "Tables for the Hydraulic Design of Pipes, Sewers and Channels" and Wavinsewer systems catalogue.

Using the Uisce Éireann guidelines and parameters, the estimated peak discharge from the development has been calculated as 5.82 l/s with the average discharge being 0.97 l/s.

Foul sewer shall be constructed to comply with the requirements of the Building Regulations 1997 in accordance with the recommendations contained in the Technical Guidance Documents, Section H (revised 2005) and the Uisce Éireann Code of Practice and Standard Details for Wastewater Infrastructure.

Refer to drawing no. 24051-OSL-11-DR-C-1130 to 1134 in **Appendix 2** for further details.

### 3.4 Surface Water

There is an existing 300mm diameter surface water sewer located within the Mungret Link Road to the southeast of the subject site. This surface water sewer was installed as part of the Mungret Park Road works (Mungret LIHAF Road) and services the lands adjacent to the Mungret Park Road (Mungret LIHAF Road).

This surface water sewer drains to a large soakaway located in the lands directly north of the Mungret Link Road and was designed, as part of the Mungret LIHAF Extension works, to accommodate future development of the lands to the east of the Mungret Link Road

It is proposed to service the proposed development by means of a connection to the existing 300mm diameter surface water pipe located within the Mungret Link Road to the southeast of the subject site. Interception, treatment, attenuation, and discharge control of surface water run off generated by, or as a result of this development is elaborated on further in the text and headings that follow.

Surface water management for the proposed development is designed to comply with the 'Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Technical Document - Volume 2, New Developments, 2005' and the 'Greater Dublin Regional Code of Practice for Drainage Works, V6.0 2005'. CIRIA Design Manuals C753, C697 and C609 have also been consulted to design the surface water drainage system within the site.

The GDSDS guidelines require the following four main criteria to be provided by the development's surface water design;

- Criterion 1: River Water Quality Protection - satisfied by providing interception storage and treatment of run-off within the SuDS features e.g. permeable paving, tree pits, swales and detention basins.

- Criterion 2: River Regime Protection – satisfied by attenuating run-off with flow control device prior to discharge to the outfall.

- Criterion 3: Level of Service (flooding) for the site – satisfied by the site being outside the 1000 year coastal and fluvial flood levels. Pluvial flood risk addressed by development designed to accommodate a 100-year storm as per GDSDS. Planned flood routing for storms greater than 100-year level considered in design and development run-off contained within site.

- Criterion 4: River flood protection – attenuation provided within the SuDS features e.g. permeable paving construction, swales, tree pits and detention basin A new surface water sewer network shall be provided for the proposed development which will be entirely separate from the foul sewer network. Surface water run-off from roof areas and hardstanding areas are designed to be collected by gravity pipe network. Surface water will be collected and discharged via a mixture of traditional and Sustainable Urban Drainage Systems (SuDS) to the existing 225mm diameter surface water sewer. Each unit will have its own independent connection to the surface water network.

Due to the topography of the site, and invert levels of the existing surface water sewer infrastructure mentioned above, it is not possible to connect to the existing infrastructure by means of gravity. It is thus proposed to include a surface water pump station within the development in order to lift surface water through pumping to the existing surface water sewer. The proposed surface water sewer pumping station has been designed in accordance with Uisce Éireann's Code of Practice for Wastewater Infrastructure. The design incorporates dual submersible pumps operating on a duty/standby arrangement, with ductile iron pipework to IS EN 598. Adequate emergency storage has been provided in line with development scale, together with odour and septicity control measures. A dedicated metered power supply, automated controls, and provision for telemetry/remote monitoring have been included, alongside appropriate alarm and call-out systems. Safe vehicular access for maintenance, tanker removal of wet well contents, and lifting/handling equipment have been integrated. Flood risk, site security, fencing, and odour setback requirements have also been addressed to ensure the pumping station is fit for purpose and fully compliant with Uisce Éireann standards.

The minimum diameter of the mainline surface water sewers is 225mm and minimum horizontal and vertical separation distances between proposed drainage and other services are as per the Uisce Éireann Code of Practice and Standard

It is proposed that the surface water will discharge via attenuation tanks, a class 1 bypass separator (with kiosk, alarm/messaging system and vent pipes) and flow control device prior to discharging to the existing surface water network.

The surface water drainage network has been analysed for the risk of flooding for the 1 in 5-year, 1 in 30-year and 1 in 100-year rainfall events by means of simulating such events through hydraulic modelling in InfoDrainage. The InfoDrainage Simulation uses the Wallingford

Procedure, time/area full hydrograph methodology, including energy and momentum equations for dynamic analysis of surface water networks. The site drainage network is modelled as one system where all flows, capacities, water levels, surcharged manholes etc are determined throughout the network for each critical storm duration. Therefore, the final combined discharge rate to the existing sewer from the outlet will be kept at (or below) the total permissible discharge rate defined.

An increase of 30% in rainfall has been included to account for climate change and 10% for urban creep. The hydraulic analysis of the proposed surface water network as designed confirmed;

- No surcharging or flooding in the 1 in 5-year rainfall event
- No flooding in the 1 in 30-year rainfall event
- No flooding and protection of properties in the 1 in 100-year rainfall event

Refer to drawing 24051-OSL-11-DR-C-1120, Proposed Surface Water Layout, drawings 24051-OSL-11-DR-C-1121 to 1124 for the Proposed Surface Water Longitudinal Sections.

Surface water layouts are shown in **Appendix 2**.

# 4. Stage 1. Appropriate Assessment Screening

## 4.1 Introduction

This section contains the information required for the competent authority to undertake screening for AA for the proposed development.

The aims of this section are to:

- Determine whether the proposed development is directly connected with, or necessary to, the conservation management of any Natura 2000 sites;
- Provide information on, and assess the potential for the proposed development to significantly effect on Natura 2000 Sites (also known as European sites); and
- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.

The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.

## 4.2 Zone of Impact

The likely Zone of Impact (ZoI) comprises the area within which the proposed development may potentially affect the conservation objectives or qualifying interests (QI) of a Natura 2000 site. There is no recommended distance and guidance from the National Parks and Wildlife Service (NPWS) recommends that the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, the sensitivities of the ecological receptors, and the potential for in-combination effects (cumulative).

In ecological and environmental impact assessment, for an effect to occur there must be a risk enabled by having a source (e.g. construction works at a proposed development site), a 'receptor' (e.g. SAC or other ecologically sensitive feature), and a pathway between the source and the receptor (e.g. a watercourse which connects the proposed development site to the SAC). A 'receptor' is defined as the Special Conservation Interest (SCI) of SPAs or Qualifying Interest (QI) of SACs for which conservation objectives have been set for the European sites being screened.

Consideration is therefore given to the source-pathway-receptor linkage and associated risks between the proposed development and Natura 2000 sites. For a significant effect to occur there needs to be an identified risk whereby a source (e.g. contaminant or pollutant arising from construction activities) affects a particular receptor (i.e. Natura 2000 site) through a particular pathway (e.g. a watercourse which connects the proposed development with the Natura 2000 site).

The identification of risk does not automatically mean that an effect will occur, nor that it will be significant. The identification of these risks means that there is a possibility of environmental or ecological damage occurring. The level and significance of the effect depends upon the nature of the consequence, likelihood of the risk and characteristics of the receptor.

The precautionary principle is applied for the purposes of screening to ensure that consideration and pre-emptive action is undertaken where there is a lack of scientific evidence. It is noted that mitigation measures are not taken into account in the AA screening assessment process.

### 4.3 Desktop Study

A desktop review facilitates the identification of the baseline ecological conditions and key ecological issues relating to Natura 2000 sites and facilitates an evaluation assessment of potential in-combination impacts. Sources of information used for this report include reports prepared for the Mungret area and information from statutory and non-statutory bodies. The following sources of information and relevant documentation were utilised:

- National Parks & Wildlife Service (NPWS) - www.npws.ie
- Environmental Protection Agency (EPA) – www.epa.ie
- National Biodiversity Data Centre (NBDC)– www.biodiversityireland.ie
- Limerick Biodiversity Action Plans 2025-2030;
- Limerick Development Plan 2022-2028.
- Birdwatch Ireland - http://www.birdwatchireland.ie/
- Invasive Species Ireland - http://www.invasivespeciesireland.com/
- *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011)
- *A Guide to Habitats in Ireland* (Fossitt, 2000)

- Limerick D0013-01 Wastewater Treatment Plant (WWTP) Annual Environmental Report 2024.
- *Bird Census Techniques* Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S.H. (2000)
- *Bird Monitoring Methods - a Manual of Techniques for Key UK Species.* Gilbert, G., Gibbons, D.W. & Evans, J. (1998) and
- *Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)* European Union, 2017.

### 4.4 Field Study

Site surveys were carried out on the on the 4th September 2025, 5th September 2025, 9th October 2025, 17th October 2025, 25th November 2025, 11th December 2025, 19th February 2026 and 5th March 2026. The survey assessed the potential for all Qualifying Interests (QIs)/ Special Conservation Interests (SCIs) of European sites and third schedule invasive species to occur within the proposed site. The following surveys relevant to this appropriate asssement were completed:

The following surveys were conducted:

- **Habitat surveys:** Habitats were mapped according to the classification scheme outlined in the Heritage Council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and following the guidelines contained in *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). Habitats were cross referenced with Habitats Directive Annex I habitats. The site was also surveyed for invasive species and rare floral species (Wyse *et al.,* 2016; Stace 2019). Habitat surveys were completed on the 5th September 2025 and 5th March 2026
- **Non-volant mammals**: A general mammal survey was carried out in conjunction with the habitat survey following TII guidelines (TII 2005b, TII 2005c, TII 2008). General mammal surveys were completed between September 2025 and March 2026. Surveys for mammals rely on detecting signs of their presence. These include burrows, spraints, tufts of hair, anal gland secretions, paths, slides, footprints and remains of prey items. Trail camera surveys were also conducted around a woodland copse within the site. Trail cameras left in-situ between the 9th and 17th October 2025.
- **General bird surveys:** General bird surveys, based on the BTO Common Bird Census (CBC) methodology (Bibby *et al*. 2000 and Gilbert 1998) which aims to capture a snapshot of bird activity within the study area, were completed. It is noted that these were completed between August and March and specific breeding bird survey was not completed. The aim of the bird surveys was to identify any valuable bird habitats within the site boundary
- **Wintering Birds.** Winter bird surveys were carried out in winter 2025/2026 between October and March (see dates above). These surveys focused on grassland habitats within the proposed development site as well as grassland habitats on the boundary of the site which could provide potential foraging or roosting habitats for wintering

waterbirds and waders. The survey methodology was based on that used by the British Trust for Ornithology (BTO), Wetland Bird Survey (WeBS) and also that for the Irish Wetland Bird Survey (I-WeBS), as outlined in Gilbert et al. (1998). The winter bird survey was undertaken using 8.5×45 binoculars and a Hawke Endurance Ed Spotting Scope 15-45×60 spotting scope, using a combination of transect and vantage point counts.

### 4.5 Natura 2000 Sites

In accordance with the European Commission Methodological Guidance (EC 2018), a list of Natura 2000 sites that can be potentially affected by the proposed development has been compiled. All SACs, candidate SAC's (cSAC) and SPAs sites within the likely zone of impact of the proposed development have been identified in **Table 1** and shown in **Figure 3**.

While the proposed development site is located within the River Shannon catchment, there are no watercourses within the proposed development site. The closest watercourse is Barnakyle Stream c.1.7km southwest. The Dock Road Estuary (part of the Lower River Shannon SAC) is located c. 2.4km northeast. Both watercourses ultimately drain into the Shannon Estuary which forms part of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

During operation, surface water will discharge to an existing surface water network and ultimately drain into a soakaway north of the Mungret Link Road. The site gradient means that surface water from the site will largely flow north towards the Shannon Estuary (See Section 4.8.5). While there is no direct surface water connection between the proposed development site and the Shannon Estuary, there is a potential hydro-geological connection as groundwater flow within the proposed development site (and the Mungret Link Road soakaway) is to the north (as detailed in **Section 4.8.5**). Therefore, contaminated surface water run-off/discharges and groundwater during the construction or operational phases could potentially impact on water quality within the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Wastewater from the site will ultimately discharge into the Shannon Estuary via the Limerick Wastewater treatment plant (WWTP). This could potentially impact on water quality within the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Therefore, surface water run-off/discharges during the construction or operational phases as well as wastewater discharges from the proposed development could potentially impact on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Given the proximity of these European sites, habitats within or near the proposed development area could also potentially provide *ex-situ* foraging grounds for QI/SCI species outside the European site boundaries. The proposed development could result in the loss of or disturbance to *ex-situ* habitats.

**Table 1. Designated sites and their location relative to the proposed development site**

| Natura 2000 Sites | Site Code | Distance at closest point and potential source-pathway-receptor link | Qualifying Interests<br><br>(* denotes a priority habitat) |
|---|---|---|---|
| Special Area of Conservation (SAC) | | | |
| Lower River Shannon SAC | 002165 | 2.2km north<br><br>Although unlikely given the absence of a direct hydrological connection, a source-pathway-receptor link has been identified between the source (proposed development) and the receptor (Lower River Shannon SAC) via a potential pathway (impacts on water quality, loss of/disturbance to *ex situ* habitats, disturbance or spread of invasive species during construction or operational phase and wastewater discharges during operation). | Habitats<br><br>1110 Sandbanks which are slightly covered by sea water all the time<br><br>1130 Estuaries<br><br>1140 Mudflats and sandflats not covered by seawater at low tide<br><br>1150 Coastal lagoons*<br><br>1160 Large shallow inlets and bays<br><br>1170 Reefs<br><br>1220 Perennial vegetation of stony banks<br><br>1230 Vegetated Sea cliffs of the Atlantic and Baltic coasts<br><br>1310 Salicornia and other annuals colonising mud and sand<br><br>1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)*<br><br>1410 Mediterranean salt meadows (*Juncetalia maritimi)*<br><br>3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation<br><br>6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) |

| Natura 2000 Sites | Site Code | Distance at closest point and potential source-pathway-receptor link | Qualifying Interests<br><br>(* denotes a priority habitat) |
|---|---|---|---|
| | | | 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*<br><br>Species<br><br>1029 Freshwater Pearl Mussel (*Margaritifera margaritifera*)<br><br>1099 River Lamprey (*Lampetra fluviatilis*)<br><br>1349 Common Bottlenose Dolphin (*Tursiops truncatus*)<br><br>1355 Otter (*Lutra lutra*)<br><br>1096 Brook Lamprey (*Lampetra planeri*)<br><br>1095 Sea Lamprey (*Petromyzon marinus*)<br><br>1106 Salmon (*Salmo salar*) |
| Tory Hill SAC | 000439 | 9.4km south. No hydrological or other connection identified. No likely significant pathway for impact | Habitats<br><br>6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)<br><br>7210 Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae**<br><br>7230 Alkaline fens |
| Askeaton Fen Complex SAC | 002279 | 10.2km southwest. No hydrological or other connection identified. No likely significant pathway for impact | Habitats<br><br>7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae* |

| Natura 2000 Sites | Site Code | Distance at closest point and potential source-pathway-receptor link | Qualifying Interests<br><br>(* denotes a priority habitat) |
|---|---|---|---|
| | | | 7230 Alkaline fens |
| Curraghchase Woods SAC | 000174 | 12.1km southwest. No hydrological or other connection identified.<br><br>There are no known Lesser Horseshoe Roosts in the vicinity of Mungret. The populations in Curraghchase SAC will not be impacted following the 2.5km Zone of Influence for foraging and commuting routes. | Habitats<br><br>91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)*<br><br>91J0 *Taxus baccata* woods of the British Isles*<br><br>Species<br><br>1016 Desmoulin's Whorl Snail (*Vertigo moulinsiana*)<br><br>1303 Lesser Horseshoe Bat (*Rhinolophus hipposideros*) |
| Special Protection Area (SPA) | | | |
| River Shannon and River Fergus Estuaries SPA | 004077 | 2.1km north.<br><br>A source-pathway-receptor link has been identified between the source (proposed development) and the receptor River Shannon and River Fergus Estuaries SPA) via a potential pathway (impacts on water quality, loss of/disturbance to *ex situ* habitats, disturbance or spread of invasive species during construction or operational phase and wastewater discharges during operation). | Birds<br><br>A017 Cormorant (*Phalacrocorax carbo*)<br><br>A038 Whooper Swan (*Cygnus cygnus*)<br><br>A046 Light-bellied Brent Goose (*Branta bernicla hrota*)<br><br>A048 Shelduck (*Tadorna tadorna*)<br><br>A050 Wigeon (*Anas penelope*)<br><br>A052 Teal (*Anas crecca*)<br><br>A054 Pintail (*Anas acuta*) |

| Natura 2000 Sites | Site Code | Distance at closest point and potential source-pathway-receptor link | Qualifying Interests<br><br>(* denotes a priority habitat) |
|---|---|---|---|
| | | | A056 Shoveler (*Anas clypeata*)<br><br>A062 Scaup (*Aythya marila*)<br><br>A137 Ringed Plover (*Charadrius hiaticula*)<br><br>A140 Golden Plover (*Pluvialis apricaria)*<br><br>A141 Grey Plover (*Pluvialis squatarola*)<br><br>A142 Lapwing (*Vanellus vanellus*)<br><br>A143 Knot (*Calidris canutus*)<br><br>A149 Dunlin (*Calidris alpina*)<br><br>A156 Black-tailed Godwit (*Limosa limosa*)<br><br>A157 Bar-tailed Godwit (*Limosa lapponica*)<br><br>A160 Curlew (*Numenius arquata*)<br><br>A162 Redshank (*Tringa totanus*)<br><br>A164 Greenshank (*Tringa nebularia*)<br><br>A179 Black-headed Gull (*Chroicocephalus ridibundus*)<br><br>Habitats<br><br>Wetlands |

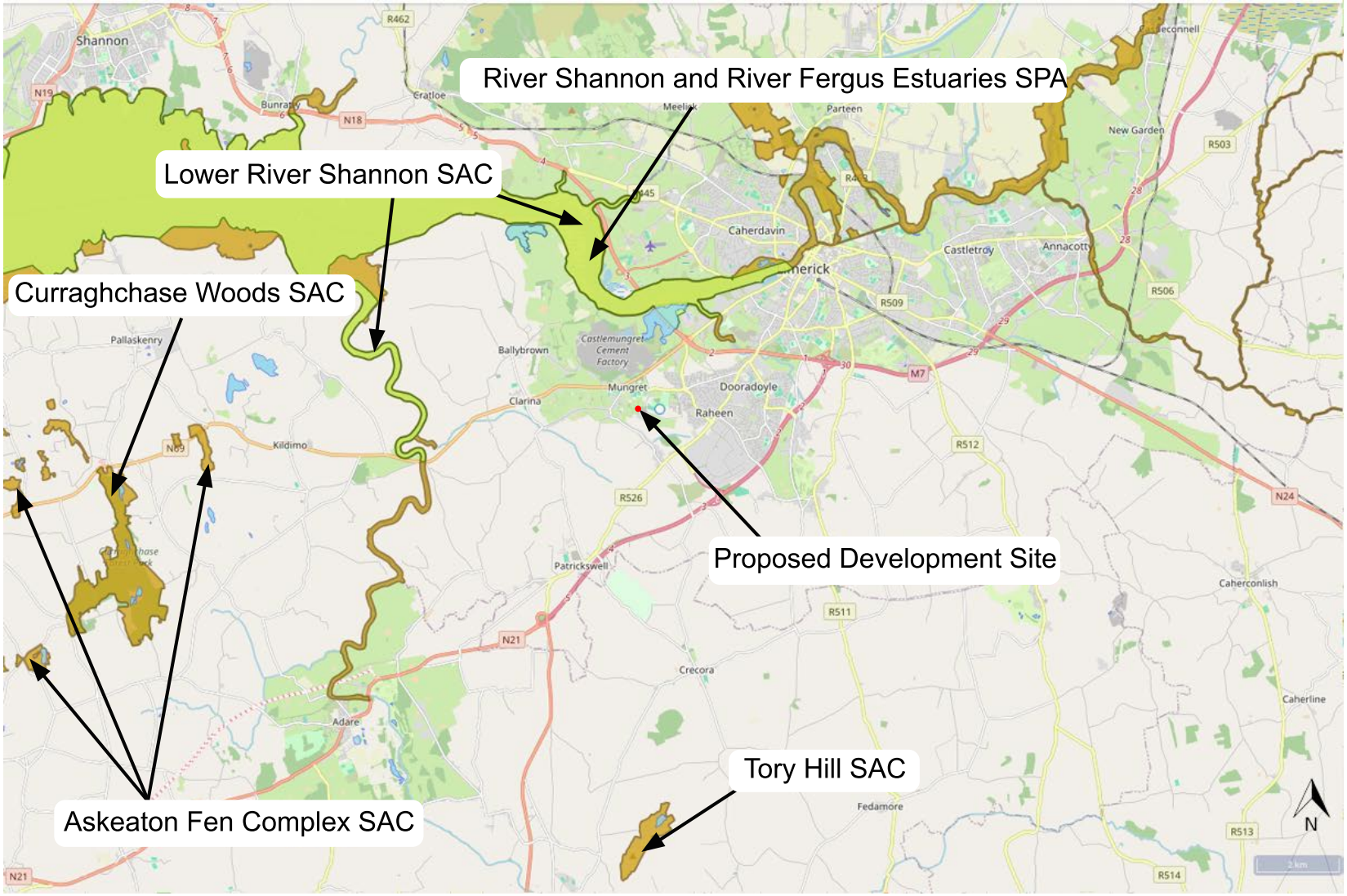



**Figure 3. Location of the development site boundary and Natura 2000 sites located within potential likely zone of impact of the site | Source: EPA Envision mapping https://gis.epa.ie/EPAMaps/) | Not to scale**

### 4.6 Natura 2000 Site – Site Synopses, qualifying interests and conservation objectives

#### 4.6.1 Lower River Shannon SAC

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 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.

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 habitats lagoon and alluvial woodland, 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.

A full site synopsis for the Lower River Shannon SAC is included as **Appendix 1** of this report.

#### 4.6.2 River Shannon and River Fergus Estuaries SPA

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. This SPA has vast expanses of intertidal flats which contain a diverse macro- invertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

A full site synopsis for this European site is included as **Appendix 1** of this report.

### 4.7 Natura 2000 sites – Features of interests and conservation objectives.

The EU Habitats Directive contains a list of habitats (Annex I) and species (Annex II) for which SACs must be established by Member States. Similarly, the EU Birds Directive contains lists of important bird species (Annex I) and other migratory bird species for which SPAs must be

established. Those that are known to occur at a site are referred to as ‘qualifying interests’ and are listed in the Natura 2000 forms which are lodged with the EU Commission by each Member State. A ‘qualifying interest’ is one of the factors (such as the species or habitat that is present) for which the site merits designation. The National Parks and Wildlife Service (NPWS) are responsible for the designation of SACs and SPAs in Ireland.

The conservation objectives for the relevant sites are detailed in the following publications:

*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) 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.*

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network. European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status sites designated as Special Areas of Conservation and Special Protection Areas. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Favourable conservation status of a habitat is achieved when its natural range, and area it covers within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis. The species and/or habitats listed as qualifying interests for Lower River Shannon SAC, River Shannon and River Fergus Estuaries SPA are included in **Tables 2 - 4**.

### Table 2. Qualifying habitats of Lower River Shannon SAC.

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

### Table 3. Qualifying Species for Lower River Shannon SAC

| Species Code | Species | | Conservation Objective |
|---|---|---|---|
| 1349 | Common Bottlenose Dolphin | *Tursiops truncatus* | Maintain |
| 1095 | Sea Lamprey | *Petromyzon marinus* | Restore |
| 1099 | River Lamprey | *Lampetra fluviatilis* | Maintain |
| 1106 | Atlantic Salmon | *Salmo salar* | Restore |
| 1029 | Freshwater Pearl Mussel | *Margaritifera margaritifera* | Restore |
| 1096 | Brook Lamprey | *Lampetra planeri* | Maintain |
| 1355 | Otter | *Lutra lutra* | Restore |

**Table 4. Qualifying interests for the River Shannon & River Fergus Estuaries SPA**

| Species code | Species | Scientific name | Conservation objective |
|---|---|---|---|
| A017 | Cormorant | *Phalacrocorax carbo* | Maintain |
| A038 | Whooper Swan | *Cygnus cygnus* | Maintain |
| A046 | Light-bellied Brent Goose | *Branta bernicla hrota* | Maintain |
| A048 | Shelduck | *Tadorna tadorna* | Maintain |
| A050 | Wigeon | *Anas penelope* | Maintain |
| A052 | Teal | *Anas crecca* | Maintain |
| A054 | Pintail | *Anas acuta* | Maintain |
| A056 | Shoveler | *Anas clypeata* | Maintain |
| A062 | Scaup | *Anas marilla* | Maintain |
| A137 | Ringed Plover | *Charadrius hiaticula* | Maintain |
| A140 | Golden Plover | *Pluvialis apricaria* | Maintain |
| A141 | Grey Plover | *Pluvialis squatarola* | Maintain |
| A142 | Lapwing | *Vanellus vanellus* | Maintain |
| A143 | Knot | *Calidris canutus* | Maintain |
| A149 | Dunlin | *Calidris alpine* | Maintain |
| A156 | Black-tailed Godwit | *Limosa limosa* | Maintain |
| A157 | Bar-tailed Godwit | *Limosa lapponica* | Maintain |
| A160 | Curlew | *Numenius arquata* | Maintain |
| A162 | Redshank | *Tringa tetanus* | Maintain |
| A164 | Greenshank | *Tringa nebularia* | Maintain |
| A179 | Black-headed Gull | *Chroicocephalus ridibundus* | Maintain |
| A999 | Wetland and Waterbirds | | Maintain |

Restore = Restore favourable conservation condition, Maintain = Restore favourable conservation condition

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, “Wetland and Waterbirds” may be included as a Special Conservation Interest for some SPAs that have been designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a further objective is to maintain or restore the favourable conservation condition of the wetland habitat within the River Shannon and River Fergus Estuaries SPA as a resource for the regularly occurring migratory waterbirds that utilise it.

## 4.8 Baseline Data

### 4.8.1 Habitats

Habitat mapping was carried out in line with the methodology outlined in the Heritage Council Publication, *Best Practice Guidance for Habitat Survey and Mapping* (Heritage Council, 2011). The terrestrial and aquatic habitats within or adjacent to the proposed development site was classified using the classification scheme outlined in the Heritage council publication *A Guide to Habitats in Ireland* (Fossitt, 2000) and cross referenced with Annex I Habitats where required.

A current overview of habitats recorded within the site is shown in **Figure 4** and the habitats recorded on site are described in **Table 5.** Photographs of the site are also included below.

**Table 5. Habitat present within proposed development site**

| Habitats | Comments |
|---|---|
| Hedgerow WL1/Treeline WL2<br><br>H01 | The hedgerow is quite overgrown and with a number of taller Hawthorn. Includes dense, mature Hawthorn but parts of the boundary have become gappy in the absence of management. Blackthorn and Hawthorn are the dominant species with occasional mature Ash.<br><br>This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period.<br><br>Burdock noted along this boundary. There are some sections of old stone wall remaining at the base of the hedgerow although this is largely in poor condition. Understorey species include Ivy, Herb Robert, Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass.<br><br> <br><br>Plate 1. Crumbling stone wall along base |

| Habitats | Comments |
|---|---|
| | <br><br>Plate 2. Mature Ash along this boundary |
| Hedgerow WL1<br><br>H02 and H03 | The hedgerow is quite overgrown and with a number of taller, mature Hawthorn. Parts of the boundary have become gappy in the absence of management. Blackthorn and Hawthorn are the dominant species with occasional semi-mature Sycamore and Elder. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Cocksfoot, False oat grass, Ivy, Cleavers, Nettle, Sorrell, Knapweed, Hogweed.<br><br>The northern part of this hedgerow (H02) is visible on the 1st edition mapping. The full hedgerow (H02 and H03) is visible on the 2nd edition mapping (1888-1915)<br><br> <br><br>Plate 3. Hedgerow 6 along western site boundary |
| Hedgerow WL1<br><br>H05 | This is a moderate to high quality hedgerow consisting of a slightly overgrown hedge with some dry meadows and grassy verge habitat along its periphery. This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period.<br><br>Blackthorn and Hawthorn are the dominant species. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass, Ivy, Woodrush, Cleavers, Wild rose, Nettle, Sorrell, Knapweed, Hogweed, Bindweed.<br><br>A number of the Hawthorn are quite old with some deadwood standing at the base. The hedgerow is undermanaged and the Hawthorn have become overmature. |

| Habitats | Comments |
|---|---|
| | <br><br>Plate 4. Hedgerow 1 runs through the centre of proposed development site |
| Hedgerow WL1 H07 | Species mix is broadly similar to H05 but not as well developed.<br><br>Hawthorn are the dominant species with a number of overmature Hawthorn present. Blackthorn also present. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass, Ivy, Woodrush, Cleavers, Wild rose, Nettle, Sorrell, Knapweed, Hogweed, Bindweed.<br><br>This hedgerow is visible on the 1st edition mapping, the layout remaining largely unchanged since that period.<br><br>Fertilizer drift evident.<br><br> <br><br>Plate 5. Hedgerow 2 runs along southern boundary |
| Hedgerow WL1<br><br>H06 AND H08 | This hedgerow runs through the centre of the proposed development site and is visible on the 1st edition mapping with the layout remaining largely unchanged since that period.<br><br>The western side of this hedgerow is not well developed and is dominated by Hawthorn and Bramble with a proportion of Blackthorn. Dry meadows and grassy verge habitat runs along the base. Understorey species include Bent grass, Ribwort plantain, Meadow grass and Yarrow. |

| Habitats | Comments |
|---|---|
| | The eastern side of the boundary is better quality with dense Hawthorn and Blackthorn. Immature Elm are present in the understory. In some areas, Hawthorn scrub is encroaching into the adjoining grassland.<br> <br>Plate 6. Western side of H3 at centre of the site<br> <br>Plate 7. Eastern side of H3 at centre of the site |
| Hedgerow WL1<br><br>H09 | This is an overgrown hedgerow dominated by Blackthorn. Other tree species include Hawthorn, Wild rose and Hazel. Understorey species include Field thistle, Cow parsley, Hogweed, Bramble, Meadowsweet, Cocksfoot, False oat grass, Ivy, Woodrush, Cleavers, Wild rose, Nettle, Sorrell, Knapweed, Hogweed, Bindweed.<br><br>This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period.<br> |

| Habitats | Comments |
|---|---|
| | Plate 8. Hedgerow 4 located along north-eastern boundary |
| Treeline WL2<br><br>T1<br><br>GROUP 2 ON TREE SURVEY | This group of mature trees is located at the east of the site and consists primarily of Ash and Sycamore. A number of the Ash are severely affected by Ash dieback. Some of the more mature Ash are in fairly good condition.<br><br>This hedgerow is visible on the 1st edition mapping and the layout remaining largely unchanged since that period.<br><br> <br><br>Plate 9. Treeline along eastern boundary |
| Treeline T2<br><br>Group 2-9 (Tree Survey) | Broadband of scrub dominated by Blackthorn in particular which forms dense thickets. Occasional Sitka spruce along its length. Occasional Hawthorn. Understorey includes Lesser celandine, Lords and ladies, Cleavers, Wood rush.<br><br> <br><br>Plate 10. Treeline running along northern boundary of access track |
| Improved agricultural grassland GA1 | Improved agricultural grassland covers most of the site. This is intensively managed and dominated by common grassland and herbaceous species. A slightly more diverse grassland has developed adjoining the field margins, with characteristics of dry meadows and grassy verge GS2. Species recorded include Broadleaved dock, Buttercup, Sorrel, Field thistle, Creeping buttercup, Silverweed, Great plantain, Curled dock, Willowherb, Yorkshire fog and Yarrow.<br><br>It is noted that GS2 has links with the Annex I: Corresponds to the annexed habitat, 'lowland hay meadows (Alopecurus |

| Habitats | Comments |
|---|---|
| | pratensis, Sanguisorba officinalis) (6510)'. However, the habitat mosaic within the proposed development site is not an example of this Annex I habitat.<br><br> <br><br>Plate 11. Improved agricultural grassland covers much of the site<br><br> <br><br>Plate 12. More diverse grassland in some parts of site. |
| Mixed broadleaved woodland WD1 | A small copse of broadleaved woodland dominated by Ash and Sycamore has developed around an archaeological feature (enclosure LI013-005). The woodland has developed on a raised embankment which is heavily overgrown with Hawthorn and Blackthorn understorey is shaded with Umbellifers, Nettle, Wood avens, Cow parsley, Primrose, Wild rose, Herb Robert, immature Sycamore.<br><br> <br><br>Plate 13. Woodland copse at east of site |

| Habitats | Comments |
|---|---|
| Buildings and artificial surfaces BL1 | Footpaths and access roads associated with Mungret Community College are located along the eastern boundary of the site. Small areas of amenity grassland GA2 are present along the road boundary.<br><br>A short section of fencing is located at the northeast corner of the site adjoining a playing pitch. The grassland along the base of the fence is slightly overgrown and more diverse than the adjoining grassland.<br><br> <br><br>Plate 14. Roads and footpaths associated footpaths<br><br> <br><br>Plate 15. Metal fence at northeast of site |

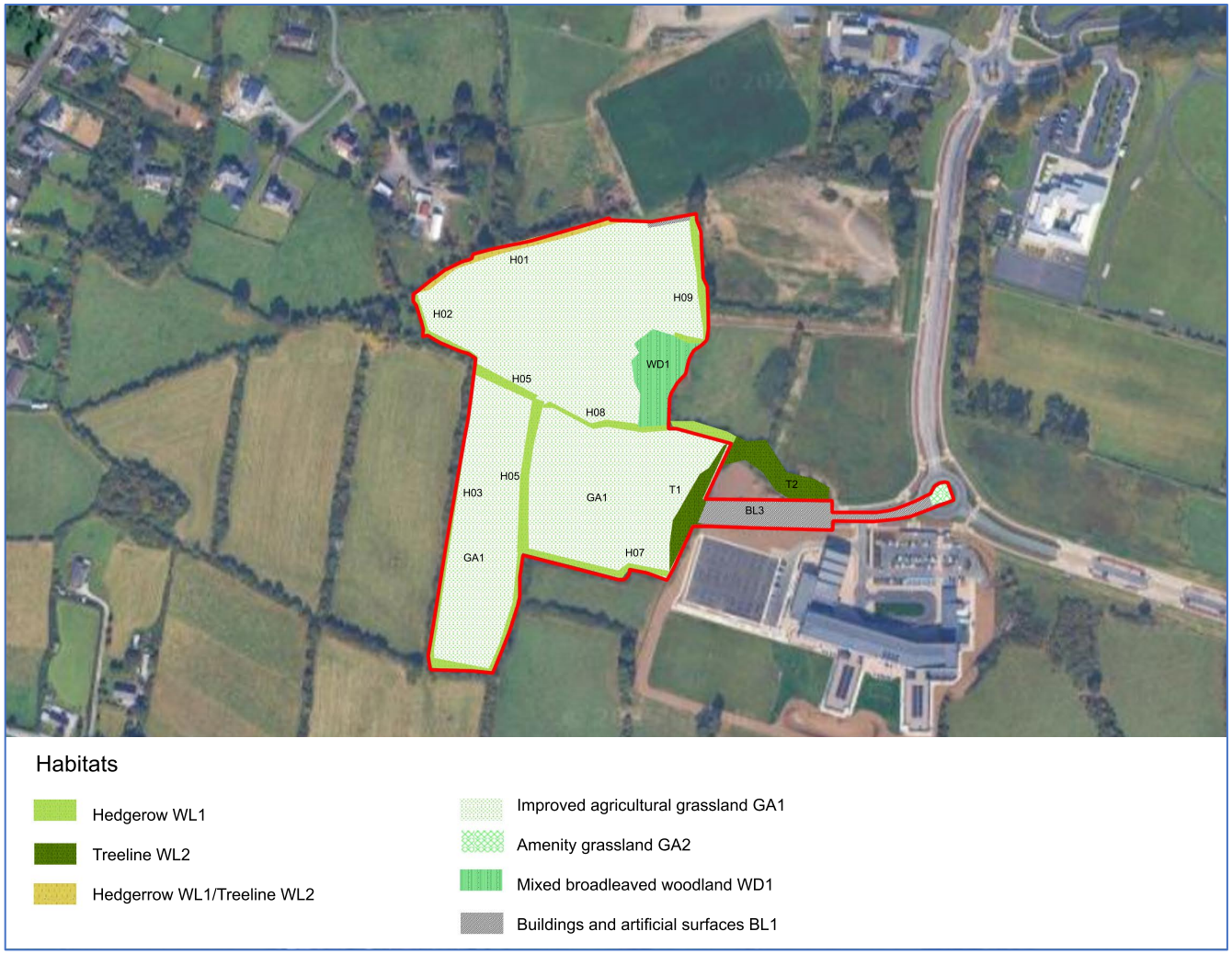



**Figure 4. Habitat recorded within proposed development site boundary (Fossitt 2000)**

### 4.8.2 Otters

Otters, along with their breeding and resting places are protected under the provisions of the Wildlife Act 1976, as amended by the Wildlife (Amendment) Act, 2000. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Direct which is transposed into Irish law in the European Communities (Natural Habitats) Regulations (S.I 94 of 1997), as amended. Otters are also listed as requiring strict protection in Appendix II of the Berne Convention on the Conservation of European Wildlife and Natural Habitats and are included in the Convention on International Trade of Endangered species (CITES).

Although rare in parts of Europe they are widely distributed in the Irish countryside in both marine and freshwater habitats. Otters are solitary and nocturnal and as such are rarely seen. Thus, surveys for Otters rely on detecting signs of their presence. These include spraints (faeces), anal gland secretions, paths, slides, footprints and remains of prey items. Spraints are of particular value as they are used as territorial markers and are often found on prominent locations such as grass tussocks, stream junctions and under bridges. In addition, they are relatively straightforward to identify.

Otters occasionally dig out their own burrows but generally they make use of existing cavities as resting placing or for breeding sites. Suitable locations include eroded riverbanks, under trees along rivers, under fallen trees, within rock piles or in dry drainage pipes or culverts etc. If ground conditions are suitable the holt may consist of a complex tunnel and chamber system. Otters often lie out above ground especially within reed beds where depressions in the vegetation called “couches” are formed (NRA, 2008). Generally, holts or resting areas can be located by detecting signs such as spraints or tracks.

In contrast natal holts which are used by breeding females can be extremely difficult to locate. They are often located a considerable distance from any aquatic habitats and Otters may also use habitats adjoining small streams with minimal or no fish populations. In addition, natal holts are usually carefully hidden and without obvious sprainting sites. Otters do not have a well-defined breeding season. It is noted that Otters are largely nocturnal, particularly in areas subject to high levels of disturbance as evidenced by the presence of Otters in the centre of Cork City (Sleeman and Moore 2005). The site of the proposed development lies within Ordnance Survey National Grid 10km square R55 (hectad). The National Biodiversity Data Centre (NBDC) online database provides data on the distribution of mammals, birds, and invertebrates within Irish 10km grid squares.

A review of existing records showed that Otter or signs of Otter have been recorded on 11 occasions within grid square R55, the most recent being in January 2023 (Source NBDC November 2025). There are no mapped watercourses within or in the vicinity of the proposed development site. The closest stream/river is the Barnakyle Stream located c.1.5km south of the proposed development site. As discussed in **Section 4.2,** the Loughmore Common Turlough is located c.440m southeast. A road kill survey in the vicinity of the site had two records of dead Otters along nearby roads (2008 and 2009), suggesting that Otters use habitats in the wider area. However, there are no watercourses within the proposed development site and no wetland habitats which could provide potential foraging habitat for Otter.

Site surveys were carried out to identify any signs of Otter within 150m of the proposed development site i.e. holts, couches, burrows, spraints, tufts of hair, anal gland secretions, paths, slides, footprints and remains of prey items. No signs of Otter recorded within 150m of the proposed development site.

A trail camera survey was carried out to identity which species were using this area over a 9-day period between the 9th and 17th of October 2025. Two trail cameras were positioned near the hole entrance and along the boundary of the woodland. Otter were not recorded in any of the trail camera surveys. Overall, the proposed development site is of low value for Otter.

### 4.8.3 Birds

#### General bird surveys

The NBDC lists the following Annex I bird species for hectad R55, Corncrake (*Crex crex*). Golden Plover (*Pluvialis apricaria*), Hen Harrier (*Circus cyaneus*), Kingfisher (*Alcedo atthis*), Little Egret (*Egretta garzetta*), Mediterranean Gull (*Ichthyaetus melanocephalus*), Merlin (*Falco columbarius*), Peregrine (*Falco peregrinus*), Red-necked Phalarope (*Phalaropus lobatus*), Red-throated Diver (*Gavia stellata*), Sandwich Tern (*Thalasseus sandvicensis*), Short-eared Owl (*Asio flammeus*) and Whooper Swan (*Cygnus cygnus*). The proposed development site does not contain habitats suitable for Annex I bird species.

General bird surveys were carried out at the proposed development site. During the survey, all birds seen or heard within the development site were recorded. Certain bird species are listed by BirdWatch Ireland as Birds of Conservation Concern in Ireland (BOCCI). These are bird species suffering declines in population size. BirdWatch Ireland and the Royal Society for the Protection of Birds have identified and classified these species by the rate of decline into Red and Amber lists (Gilbert *et al.* 2021). Red List bird species are of high conservation concern and the Amber List species are of medium conservation. Green listed species are regularly occurring bird species whose conservation status is currently considered favourable. Species recorded during the site visits are shown in **Table 6**.

**Table 6. Bird Species recorded during site survey**

| Species | | Birds Directive Annex | BOCCI | |
|---|---|---|---|---|
| | | I | Red List | Amber List |
| Barn owl | *Tyto alba* | | x | |
| Blackbird | *Turdus merula* | | | |
| Blue Tit | *Cyanistes caeruleus* | | | |
| Bullfinch | *Pyrrhula pyrrhula* | | | |
| Buzzard | *Buteo buteo* | | | |
| Chaffinch | *Fringilla coelebs* | | | |

| Species | | Birds Directive Annex | BOCCI | |
|---|---|---|---|---|
| | | I | Red List | Amber List |
| Goldcrest | *Regulus regulus* | | | x |
| Goldfinch | *Carduelis carduelis* | | | |
| Great Tit | *Parus major* | | | |
| House martin | *Delichon urbicum* | | | x |
| Jackdaw | *Corvus mondedula* | | | |
| Magpie | *Pica pica* | | | |
| Pheasant | *Phasianus colchicus* | | | |
| Redwing | *Turdus iliacus* | | x | |
| Robin | *Erithacus rubecula* | | | |
| Rook | *Corvus frugilegus* | | | |
| Song thrush | *Turdus philomelos* | | | |
| Sparrowhawk | *Accipiter nisus* | | | |
| Swallow | *Hirundo rustica* | | | x |
| Woodpigeon | *Columba palumbus* | | | |
| Wren | *Troglodytes troglodytes* | | | |

Two Red list species were recorded during the site surveys i.e. Barn owl and Redwing.

A Barn Owl was recorded overflying the site in October 2025, during dusk bat surveys. During the site surveys, an area of Black poplar trees c. 25m west of the proposed development site was identified as providing potential a nesting site for Barn owl. During the March 2026 surveys, a number of fresh Barn owl pellets were recorded around the base of these trees indicating that birds are activity nesting in this area. While the proposed development site itself does not provide nesting habitat, the grassland onsite is likely to provide foraging habitat for Barn Owl. Barn Owl (*Tyto alba*) is a Red-listed Bird of Conservation Concern in Ireland due to extensive population declines over recent decades (Gilbert *et. al.* 2021).

Redwing are facing significant pressures from habitat loss and climate-driven migration changes. They rely on Irish farmland and hedgerows for survival during winter, making them vulnerable to urban expansion and environmental changes. While Redwing populations has fluctuated in the past, including a notable decline between 2008-2014. However, over the past ten years (three generations), the well-monitored European breeding population has increased by 12% (Birdlife.org). Native species, such as Hawthorn and Blackthorn, within the proposed development site, are likely to provide wintering foraging habitats for Redwing.

Three other BOCCI species i.e. the amber list species House martin, Swallow and Goldcrest, were recorded during site surveys. It is noted there are no buildings suitable for nesting Swallow or House martin within the proposed development site.

The proposed development site also supports a range of common bird species i.e. Blackbird, Wren, Robin, Song thrush etc. High quality, largely native treelines and hedgerows along the site boundary provide high value nesting and foraging habitats for birds.

It is noted that, with the exception of Cormorant, the conservation objectives of the River Shannon and River Fergus Estuaries SPA relate to wintering bird numbers. There is no potential for Cormorant breeding within the proposed development.

Overall, the proposed development site provides locally valuable habitat for a range of bird species.

### Winter bird surveys

The proposed development site is located in proximity to a number of areas potentially important for wintering birds. The Loughmore Common Turlough pNHA is located c.440m southwest, the Inner Shannon Estuary - South Shore pNHA is located 1.3km north and the River Shannon and River Fergus Estuaries SPA is located 2.1km north. The primary purpose of the winter bird surveys was to assess usage of pastureland within the proposed development site by wintering wading birds and waterfowl.

Most species recorded during the winter bird surveys were common, passerine species such as Wren, Robin, Blackbird, Stonechat etc. These species were recorded within the grassland and hedgerow/treelines within the proposed development site. Redwing (a red list species) was recorded foraging at the site during the winter months. Gulls were occasionally recorded overflying the site. However, no wading birds or waterfowl were recorded within the proposed development site.

No SCI bird species for the River Shannon and River Fergus Estuaries SPA were recorded during the winter surveys. There is no habitat within the red line boundary which would be considered of high value for wintering birds.

Loughmore Common Turlough provides suitable winter habitat for Lapwing and Golden Plover, and Snipe breed here. It is noted that DixonBrosnan previously carried out winter bird surveys at the pNHA in 2023. The conclusions of this survey noted the following:

A total of nineteen species were recorded from the site visits during the DixonBrosnan winter bird surveys.

*One Annex I bird species was recorded i.e., Little Egret. Three red list species were recorded i.e., Snipe, Meadow Pipit and Redwing were recorded as well as a number of amber list species i.e., Black-headed Gull, Cormorant, Goldcrest, Greenfinch, Lesser Black-backed Gull, Linnet and Starling.*

*Birds recorded were typical of the grassland mosaic and hedgerow habitat within the study site. The site does not appear to be an important feeding or roosting site for qualifying interests of the nearby River Shannon and River Fergus Estuaries SPA and, with the exception of*

*overflying Cormorant, no SCI species were recorded at Loughmore Common Turlough during site visits.*

*The semi-natural grassland provides valuable habitat for the red list species Meadow Pipit and Snipe. Both species are suffering significant declines due to reduction in habitat. The site also supports a range of common bird species.*

While the grassland at the proposed development site could potentially provide foraging habitat for this species, given the availability of similar types of grassland in the surrounding landscape alongside higher values habitat within the SPA, this is unlikely to form critical foraging habitat for SCI species for the River Shannon and River Fergus Estuaries SPA.

### 4.8.4 Invasive Species

Non-native plants are defined as those plants which have been introduced outside of their native range by humans and their activities, either purposefully or accidentally. Invasive non-native species are so-called as they typically display one or more of the following characteristics or features: (1) prolific reproduction through seed dispersal and/or re-growth from plant fragments; (2) rapid growth patterns; and, (3) resistance to standard weed control methods.

Where a non-native species displays invasive qualities and is not managed it can potentially: (1) out compete native vegetation, affecting plant community structure and habitat for wildlife; (2) cause damage to infrastructure including road carriageways, footpaths, walls and foundations; and, (3) have an adverse effect on landscape quality.

The Birds and Natural Habitats Regulations 2011 (SI 477 of 2011), Section 49(2) prohibits the introduction and dispersal of species listed in the Third Schedule, which includes Japanese Knotweed and Himalayan Balsam, as follows: “any person who plants, disperses, allows or causes to disperse, spreads or otherwise causes to grow [….] shall be guilty of an offence.”

No third schedule or other invasive species were recorded within the proposed development site.

### 4.8.5 Water Quality

#### River Basin Management Plan for Ireland 2022-2027 (3rd Cycle)

The Water Framework Directive (WFD) sets out the environmental objectives which are required to be met through the process of river basin planning and implementation of those plans. Specific objectives are set out for surface water, groundwater and protected areas. The challenges that must be overcome in order to achieve those objectives are very significant. Therefore, a key purpose of the River Basin Management Plan (RBMP) is to set out priorities and ensure that implementation is guided by these priorities.

The EPA has published an updated draft Catchment Assessment for each of our 46 catchments. These assessments provide an overview of the situation in the catchment, draw comparison between Cycle 2 and Cycle 3, and will help support the draft River Basin Management Plan 2022-2027 public consultation process. The third cycle RBMP, which was published in July 2022, aims to build on the progress made during the second cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with

an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations). The former measure has resulted in significant progress in terms both of compliance levels and of the impact of urban wastewater on water quality. The latter provides a considerable environmental baseline which all Irish farmers must achieve and has resulted in improving trends in the level of nitrates and phosphates in rivers and groundwater. It is acknowledged, however, that sufficient progress has not been made in developing and implementing supporting measures during the first and second cycles.

Overall, RBMP assesses the quality of water in Ireland and presents detailed scientific characterisation of our water bodies. The characterisation process also takes into account wider water quality considerations, such as the special water-quality requirements of protected areas. The characterisation process identifies those water bodies that are *At Risk* of not meeting the objectives of the WFD, and the process also identifies the significant pressures causing this risk. Based on an assessment of risk and pressures, a programme of measures has been developed to address the identified pressures and work towards achieving the required objectives for water quality and protected areas. Data relating to the watercourses in the vicinity of the proposed development site are provided in **Table 7** and the location of these shown in **Figure 5.**

**Table 7. WFD Status**

| **Catchment: Shannon Estuary South (HA 24)**<br><br>**Ballynaclogh_SC_010 subcatchment** |
|---|
| This catchment includes the area drained by the Rivers Deel and Maigue and all streams entering tidal water in Shannon Estuary between Kilconly Point and Thomond Bridge, Limerick, draining a total area of 2,033km². The largest urban centre in the catchment is the southern part of Limerick City. The other main urban centres in this catchment are Newcastle West, Charleville, Kilmallock Rathkeale and Mungret. The total population of the catchment is approximately 112,430 with a population density of 55 people per km². This catchment is predominantly lowlying, flat and underlain by limestones with the exception of a few isolated hills. This geology provides a significant groundwater resource in the catchment. The steep scarp delineating the western edge of the catchment denotes an abrupt change in geology to shales, which are found on the high ground along the catchment boundary.<br><br>*2nd Cycle summary*<br><br>There are four river water bodies in this sub-catchment. East Carrig_010 and Ballynaclogh_010 are under REVIEW due to their unassigned status.<br><br>The remaining two water bodies are AT RISK: Barnakyle_ 010 and Barnakyle_020. The Barnakyle_010 is at Poor ecological status (2013-2015) with the likely driver being nutrients from agricultural activities and also the groundwater influence. IFI note that they have had some small fish kills on Barnakyle_010 which they suspect resulted from the use of herbicides. The Barnakyle_020 is also at Poor ecological status. There was historically an issue with municipal wastewater however this has been remedied through pumping the wastewater to the town. However both baseline concentration and annual average phosphate concentrations remain elevated above the EQS for Good. The significant pressure(s) is unknown and further characterisation is required.<br><br>Groundwater is likely to be At Risk in central Limerick, so the groundwater risk will need to be reviewed with potential for local catchment assessment.<br><br>**3rd Cycle Summary** |

| Catchment: Shannon Estuary South (HA 24)<br><br>Ballynaclogh_SC_010 subcatchment | | | |
|---|---|---|---|
| **Waterbody** | **River Waterbody WFD Status 2019-2024** | **River Waterbodies Risk** | **Significant issues (significant pressures)** |
| **BARNAKYLE_020** | **Moderate** | **At risk** | **None listed** |
| **Maigue Estuary** | **Moderate** | **At risk** | **Nutrients (Agriculture)** |
| **Limerick Dock** | **Poor** | **At risk** | **Morphological (HYMO)** |
| **Upper Shannon Estuary** | **Poor** | **At risk** | **Nutrients (ag)** |

Source: EPA envision mapping and www.catchments.ie

### Urban Wastewater Treatment Directive

The Wastewater Discharge (Authorisation) Regulations 2007 (S.I. 684 of 2007) gives effect to the requirements of the Urban Wastewater Treatment Directive (Directive 91/271/EEC) and the Water Framework Directive (2000/60/EC) in Ireland. The Urban Wastewater Treatment Directive (UWWTD) lays down the requirements for the collection, treatment and discharge of urban wastewater and specifies the quality standards which must be met — based on agglomeration size — before treated wastewater is released into the environment.

The priority objective for this river basin planning cycle is to secure compliance with the Urban Wastewater Treatment Directive and to contribute to the improvement and protection of waters in keeping with the water-quality objectives established by this Plan. Achieving this objective entails addressing waste-water discharges and overflows where protected areas (i.e., designated bathing waters, shellfish waters and Freshwater Pearl-Mussel sites) or high-status waters are at risk from urban waste-water pressures.

As part of the proposed development wastewater discharging from the proposed development will be conveyed to the Limerick WWTP (D0013) for treatment prior to discharging into the Shannon Estuary.

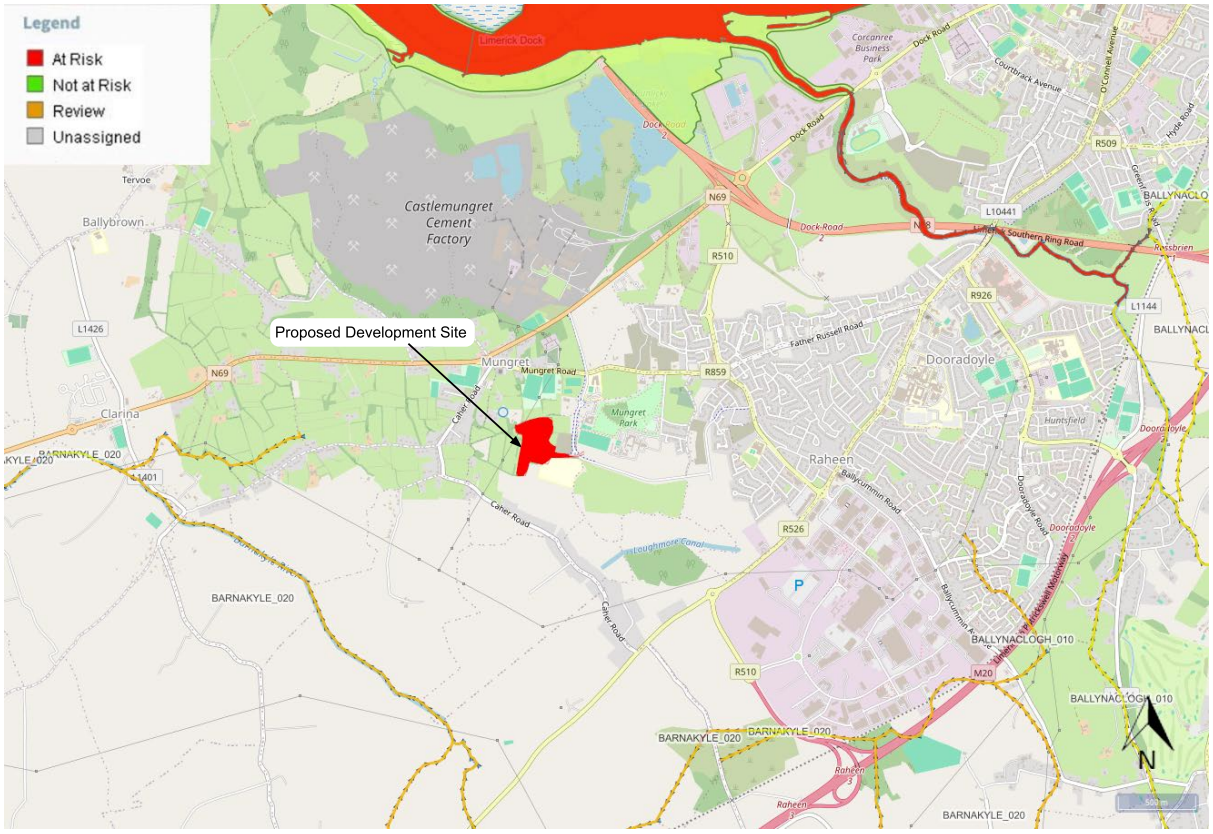



**Figure 5. WFD waterbodies in the vicinity of the proposed development WFD Status | Source: EPA Envision mapping https://gis.epa.ie/EPAMaps/) | not to scale**

IE Consulting was requested by Homeland Projects Ltd. to undertake a hydrological and hydrogeological study for a proposed Large-scale Residential Development (LRD) at Caheranardrish, Mungret, Co. Limerick.

The study mainly investigated the risk that activities associated with the proposed development, during construction and operation might impact the nearby proposed Natural Heritage Area (pNHA) of Loughmore Turlough, which is discussed in further detail in the Ecological impact assessment (EcIA) which accompanies this planning application. However, the assessment also looks at the potential hydrological and hydrogeological connections to the Shannon Estuary and European sites associated with the estuary.

## Hydrological assessment

IE Consulting completed a hydrological assessment for the proposed development which considered the existing surface and groundwater water regime of the proposed development site and the wider area, with particular focus on the hydrological and hydrogeological functioning of Loughmore Common Turlough.

The proposed development site and the surrounding area are located within the wider catchment of the River Shannon. While the River Shannon exerts a significant influence on regional groundwater conditions, it is sufficiently distant from the site that it does not directly influence local surface water processes. At a local scale, surface water hydrology is controlled primarily by the site topography, soil conditions and surface water drainage pathways.

A review of the topographic data indicates that there is a possibility of surface water runoff from the existing undeveloped site towards Loughmore Common Turlough. However, the contributing surface runoff area is relatively small (about 0.1 % of the total catchment area) and does not represent a significant hydrological input to the Turlough system. Modification of this flow, as part of the proposed development, will not significantly impact recharge to the Turlough.

### Hydrogeological assessment

The main groundwater flow direction will be from south to north towards the River Shannon. The active dewatering in Mungret Quarry will create an increased groundwater gradient, which means that the groundwater velocity to the north, will be greater. The site is shown on **Figure 6** below showing the locations of Loughmore Turlough, the groundwater flow direction and the Quarry. As can be seen the site is downgradient of the Turlough and upgradient of the quarry, meaning there will be no groundwater flow from the proposed development site to the south.

**Figure 6. Groundwater Flow Direction**

The proposed development site is underlain by Carboniferous limestone bedrock, which forms a locally important aquifer. Groundwater flow within this aquifer is primarily controlled by fractures and hydraulic gradients rather than local topography.

At a regional scale, groundwater flow is directed towards the River Shannon, which represents the principal groundwater discharge zone in the area. The River Shannon, together with the large-scale quarry operated by Irish Cement Ltd. to the north of the site, exerts a strong hydraulic control on groundwater levels. The quarry, which extends to elevations of approximately –27 m OD, is likely to act as a localised groundwater sink, further reinforcing groundwater flow towards the north.

Loughmore Common Turlough responds to seasonal fluctuations in groundwater levels. During periods of high rainfall, groundwater levels rise and exceed ground level within the Turlough depression, resulting in seasonal flooding. During drier periods, groundwater levels decline, and water drains from the turlough via swallow holes and karst conduits, causing the turlough to partially or fully dry out.

Infiltration from the proposed surface water attenuation measures will recharge the underlying limestone aquifer. However, due to the regional groundwater gradient towards the River Shannon and the influence of the nearby quarry, infiltrated water is expected to migrate northwards rather than towards Loughmore Common Turlough.

A conceptual hydrogeological model, as shown in **Figure 7**, has been developed to illustrate the relationship between the proposed development site, Loughmore Common Turlough, the quarry, and the River Shannon. The conceptual model demonstrates that groundwater flows beneath the site consistently discharge towards the River Shannon under both winter high groundwater levels and summer low groundwater levels.

On this basis, the proposed development will not adversely affect groundwater flow patterns supporting the hydrological functioning of Loughmore Common Turlough.

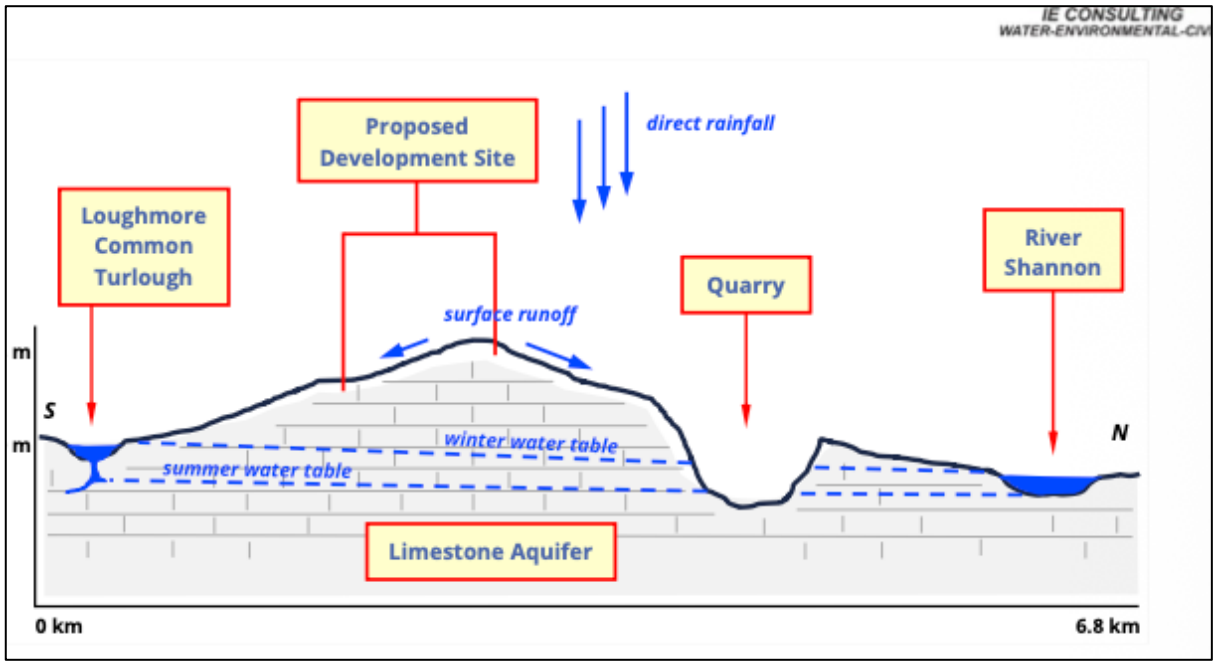


**Figure 7. Conceptual Hydrogeological Model**

## 4.9 Potential Effects of Proposed Development on Natura 2000 Sites

### 4.9.1 Potential Effects from Loss of Habitat

Any habitat loss of Natura 2000 sites or deterioration in habitat quality would reduce the extent of habitat available for QI/SCI species. This could potentially decrease the viability of existing QI habitats and increase the pressure on existing habitat and may result in further deterioration.

The proposed development is not located within a designated site. As the proposed development site is located outside the boundary of any Natura 2000 sites, there will be no direct loss of habitat within Natura 2000 sites.

While the grassland at the proposed development site could potentially provide foraging habitat for SCI birds (from the River Shannon and River Fergus Estuaries SPA), given the availability of similar types of grassland in the surrounding landscape and the distance from the SPA (2.1km), this is unlikely to form critical foraging habitat for this species. Winter bird surveys completed in 2025/2026 found no signs of SCI birds using the site as a foraging or roosting area. Improved agricultural grassland is not a limiting factor around Mungret and no likely significant effects from the removal of this habitat have been identified.

There will be no likely significant effects on the conservation objectives of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA as a result of habitat loss or fragmentation and this has been screened out from further assessment.

### 4.9.2 Potential Effects from surface water runoff during construction and operation

There is no formal surface water network within the subject lands. There is no existing storm water network within the subject lands. However, as discussed in section 4.8.5, there is a potential hydrological and hydrogeological connection to the Shannon Estuary.

During construction there are potential sources of pollution from excavation and drainage from the site resulting from runoff and erosion from site earthworks and temporary stockpiles. The presence of fuels, lubricants and other chemicals from construction activities also have the potential to temporarily affect the surface/groundwater regime of the area if not managed properly. There is no direct natural hydrological connection between the site and the European sites. However, an indirect pathway exists via the surface water drainage network, which ultimately discharge to the wider catchment (See **Section 4.8.5**). Therefore, the proposed development has the potential to impact on water quality within the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA as well as qualifying species which use aquatic habitats.

As outlined in **Section 3.4**, it is proposed to service the proposed development by means of a connection to the existing surface water pipe located within the Mungret Link Road. This pipe ultimately drains to a large soakaway and this water will percolate to ground and will move north in accordance with the groundwater gradient, which in turn will be accentuated by pumping in the Quarry. Similarly, any infiltration within the proposed development site, will enter the water table, and move northwards towards the Shannon Estuary. It is noted that

there will be no risk to the Loughmore Common Turlough, because it is to the south and upgradient of the site and groundwater flow will be to the north.

In the absence of mitigation, surface water runoff from the proposed development has the potential to carry pollutants to receiving waters. Given the indirect hydrological connectivity to European sites via surface water and drainage networks, the potential for significant effects cannot be excluded. Likely significant effects on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA from surface water runoff during construction and operation cannot be ruled out. Potential surface water impacts on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are screened in for further assessment in the Stage 2 NIS.

### 4.9.3 Potential Effects from noise and disturbance

Potentially increased noise and disturbance associated with the proposed development could cause disturbance/displacement of terrestrial fauna. If of sufficient severity, there could be impacts on reproductive success.

The proposed development is potentially located c.2.2km from the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. There are no watercourses within or adjacent to the proposed development site which could provide potential foraging habitat for Otter. The closest watercourse, the Barnakyle Stream is located 1.5km south. No signs of Otter were recorded within the proposed developments site and there will be no direct impacts on local watercourses. Given the above there is no potential for disturbance to Otter within the Lower River Shannon SAC. It is noted that there are no aquatic habitats within the proposed development and therefore no potential for disturbance impacts on aquatic QI species i.e., Freshwater Pearl Mussel, Sea Lamprey, River Lamprey, Atlantic Salmon will occur.

While SCI birds from the River Shannon and River Fergus Estuaries SPA could potentially forage at the site, site surveys carried out over 6 months and the distance of the proposed development from foraging habitats for SCI birds, indicate that the proposed development site is not valuable for SCI birds. Surveys found no evidence that this site is used by wintering waterfowl or wading birds. The site is located near a built up, sub-urban setting and any birds which use lands in the vicinity are subject to existing disturbance. Given the location of the site c.2.1km from the SPA, the absence of valuable habitats for SCI birds within the site and the existing sub-urban setting, no disturbance impacts to SCI birds have been identified.

It is noted that, with the exception of Cormorant, the conservation objectives of the River Shannon and River Fergus Estuaries SPA relate to wintering bird numbers. There is no potential for Cormorant breeding (or disturbance) within the proposed development.

No likely significant disturbance effects have been identified for Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Potential significant effects on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA have been screened out from further assessment.

### 4.9.4 Potential Effects from wastewater discharges

The proposed development could potentially result in an increase in nutrients discharging to the Shannon Estuary via the Limerick Wastewater Treatment Plant (WWTP). Increased

nutrients can potentially impact on estuarine habitats by changing baseline ecological conditions and increasing algal growth, which in turn could impact on feeding success for birds and mammals listed as qualifying interests for the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Wastewater from the proposed development will be conveyed for treatment to Limerick WWTP. The Limerick agglomeration is served by a wastewater treatment plant with a Plant Capacity Population Equivalent (P.E.) of 186,233. The agglomeration consists of one primary discharge point which discharges to the Shannon Estuary, within the Lower River Shannon SAC.

The WWTP obtained a discharge licence (Reg: D0013-01) from the EPA and has assigned emission limit values (ELV's) for a range of parameters to ensure a high degree of protection to surrounding waters. The discharge licence assigns ELV's for chemical oxygen demand (COD), total suspended solids (TSS), biological oxygen demand (BOD), total nitrogen, Ammonia, pH and orthophosphate. The ELVs are set based on the full design capacity (P.E. 186,233) and are aimed at providing a high degree of protection to the receiving waterbody and to ensure the receiving waterbody is capable of accommodating the proposed discharge without causing or exacerbating a breach in the relevant standards.

The most recent Annual Environmental Report (AER) for Limerick WWTP was reviewed (AER 2024). The results of the 2024 effluent monitoring is included in **Table 8**. The annual mean hydraulic loading is less than the peak Treatment Plant Capacity. The annual maximum hydraulic loading is less than the peak Treatment Plant Capacity.

**Table 8. Effluent monitoring summary from Limerick WWTP 2024 AER (Source EPA)**

| Parameter | WWDL ELV (Schedule A) | ELV with Condition 2 Interpretation included Note 1 | Interim % reduction from influent concentration | Number of sample results | Number of exceedances | Number of exceedances with Condition 2 Interpretation included | Annual Mean | Overall Compliance (Pass/Fail) |
|---|---|---|---|---|---|---|---|---|
| Total Nitrogen mg/l | N/A | N/A | N/A | 66 | N/A | N/A | 17.67 | |
| Nitrate (as N) mg/l | N/A | N/A | N/A | 55 | N/A | N/A | 9.97 | |
| Fats, Oils and Greases mg/l | N/A | N/A | N/A | 3 | N/A | N/A | 0.8 | |
| Ammonia-Total (as N) mg/l | N/A | N/A | N/A | 66 | N/A | N/A | 4.2 | |
| Total Phosphorus (as P) mg/l | N/A | N/A | N/A | 66 | N/A | N/A | 2.86 | |
| Conductivity @25°C µS/cm | N/A | N/A | N/A | 51 | N/A | N/A | 789 | |
| Temperature °C | N/A | N/A | N/A | 65 | N/A | N/A | 13.69 | |
| Ammonia-Total (as NH3) mg/l | N/A | N/A | N/A | 66 | N/A | N/A | 5.11 | |
| Nitrite (as N) mg/l | N/A | N/A | N/A | 55 | N/A | N/A | 0.18 | |
| Kjeldahl Nitrogen mg/l | N/A | N/A | N/A | 66 | N/A | N/A | 8 | |

Notes:
1 – This represents the Emission Limit Values after the Interpretation provided for under Condition 2 of the licence is applied
2 – For pH the WWDA specifies a range of pH 6 - 9

In relation to ongoing monitoring of water quality, the 2024 AER also noted the following:

- The coastal/transitional ambient monitoring results meet the required EQS. The EQS relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009. The WWTP discharge was compliant with the ELV's set in the wastewater discharge licence.
- Based on ambient monitoring results a deterioration in BOD, E. Coli, Enterococci (Intestinal), ortho-phosphate, and Total Phosphorus concentrations downstream of the effluent discharge is noted.
- A deterioration in water quality has been identified, however it is not known if it or is not caused by the WWTP.
- Other causes of deterioration in water quality in the area are unknown.
- The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive (WFD) status.
- The discharge from the wastewater treatment plant does not have an observable impact on the coastal/transitional water quality.

It is noted that the proposed occupancy of the housing development is approximately 527 PE. In 2024 the agglomeration PE for Limerick WWTP was 141,439PE with remaining capacity of 44,794PE. The additional effluent of the proposed development would increase this to 511.4PE. This would increase with agglomeration PE to 141,966PE with a headroom of 44,270PE. A Pre-Connection Enquiry was submitted to Uisce Eireann for the proposed development. The response noted the following on connection to wastewater infrastructure was feasible without infrastructural upgrade.

The addition of the effluent discharge from the proposed development to the Limerick WWTP is well within the operational design capacity. Based on the most recent AER the ELV's in the discharge are compliant with the EPA licence and the current discharge does not have an observable negative impact on the WFD status of surrounding waterbodies/watercourses. WWTP is compliant with UWWTD and will not adversely affect European sites.

No significant effects on local water quality from the increased wastewater discharges have been identified and no impact on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA are predicted to occur.

### 4.9.5 Potential Effects from spread of invasive species

No third schedule or other invasive species were recorded within the proposed development site. No likely significant effects on the qualifying interests and conservation objectives for European sites from the spread of invasive species will occur and this will be screened out from further assessment.

### 4.9.6 In-combination Effects

In-combination (cumulative) impacts refer to a series of individual impacts that may, in combination, produce a significant effect. The underlying intention of this in- combination provision is to take account of in-combination impacts from existing or proposed plans and projects and these will often only occur over time.

The known threats to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA invasive species, agriculture, urbanisation, grazing pressures and discharges.

In-combination impacts refer to a series of individual impacts that may, in combination, produce a significant effect. The underlying intention of this in combination provision is to take account of in-combination impacts from existing or proposed plans and projects and these will often only occur over time.

Article 6(3) of the Habitats Directive requires that:

*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.*

It is therefore required that the potential impacts of the proposed development are considered in-combination with any other relevant plans or projects. An assessment of plans and projects with the potential for in-combination effects in association with the proposed development was undertaken. A search of planning applications in the vicinity of the proposed development was undertaken in March 2026 to examine projects with potential for in-combination effects (Source: Limerick City and County Council, An Bord Pleanála, EPA). Other projects or developments which could potentially cause in-combination impacts are listed in **Table 9**.

**Table 9. Other developments near site and potential in-combination impacts**

| Plans and Projects | Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network | |
|---|---|---|
| River Basin Management Plan 2022-2027 | The project should comply with the environmental objectives of the Irish RBMP which are to be achieved generally by 2027.<br>• Ensure full compliance with relevant EU legislation<br>• Prevent deterioration<br>• Meeting the objectives for designated protected areas<br>• Protect high status waters<br>Implement targeted actions and pilot schemes in focus sub-catchments aimed at: targeting water bodies close to meeting their objective and addressing more complex issues which will build knowledge for the third cycle. | The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination impacts with the proposed development. |
| Inland Fisheries Ireland Corporate Plan 2021-2025 | To ensure that Ireland's fish populations are managed and protected to ensure their conservation status remains favourable. That they provide a basis for a sustainable world class recreational angling product, and those pristine aquatic habitats are also enjoyed for other recreational uses. | The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive on-combination effects to European sites. The implementation of this corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not |

| Plans and Projects | Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network | |
|---|---|---|
| | To develop and improve fish habitats and ensure that the conditions required for fish populations to thrive are sustained and protected.<br><br>To grow the number of anglers and ensure the needs of IFI's other key stakeholders are being met in a sustainable conservation focused manner.<br><br>EU (Quality of Salmonid Waters) Regulations 1988. All works during development and operation of the project must aim to conserve fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems and protect spawning Salmon and trout. | contribute to in-combination or cumulative impacts with the proposed development. |
| Irish Water Capital Investment Plan 2020-2024 | Proposals to upgrade and secure water services and water treatment services countrywide. | Likely net positive impact due to water conservation and more effective treatment of water. It will not contribute to in-combination impacts with the proposed development. |
| Water Services Strategic Plan (WSSP, 2015) | Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and biodiversity requirements through reducing:<br><br>• Habitat loss and disturbance from new / upgraded infrastructure;<br><br>• Species disturbance;<br><br>• Changes to water quality or quantity; and<br><br>• Nutrient enrichment /eutrophication. | The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Irish Water's short, medium and long-term objectives and identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of |

| Plans and Projects | Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network | |
|---|---|---|
| | | upgrades and new builds within the Irish Water owned assets.<br><br>The overarching strategy was subject to AA and highlighted the need for additional plan/project environmental assessments to be carried out at the tier 2 and tier 3 level. Therefore, significant in-combination effects can be ruled out. |
| **Other developments in the vicinity** | Limerick City and County Council, An Bord Pleanála and EPA planning database was consulted to identify any proposed or permitted developments in proximity to the proposed developments site (March 2026).<br><br>The following developments were noted. Smaller developments, including one off houses, changes to existing dwellings etc are not listed here.<br><br>2660173 Mungret Link Road. Caheranardrish, Mungret A new athletics facility comprising an indoor running track, gymnasium, changing rooms and associated ancillary spaces, along with an outdoor running track, astro-turf pitches with fencing, a car parking area, together with all associated site development works and services such as; appropriate lighting, floodlighting, regrading and landscaping. The proposal also includes the installation of roof-mounted solar photovoltaic panels on the athletics building. Decision due 15th April 2026<br><br>2561231 Dromdarrig, Mungret Large-scale Residential Development (LRD) comprising of the construction of 169 no. residential units (comprising of 145 no. houses and 24 no. apartments), 1 no. creche, 1 no. pumping station, 3 no. ESB substations and all associated development works including footpaths, cycle paths, car and bicycle parking, drainage, fencing, bicycle and bin stores, lighting and landscaping/amenity areas at Dromdarrig, Mungret, Co. Limerick. Further Information Requested 27th January 2026<br><br>2660050 Bunlickey, Castlemungret Construction of 5 standalone warehouse blocks with 1 block subdivided into 2 warehouses, 3 blocks subdivided into 3 warehouses and 1 standalone warehouse, ESB Substation, new entrance to existing access roadway, internal roadway network and car parking, Foul and Storm water networks, connection to necessary services and | As noted above, no likely significant effects from noise or disturbance have been identified with the project and therefore, no potential in-combination effects have been identified for noise and disturbance.<br><br>In the absence of mitigation, the potential for significant in-combination effects on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA with other projects from emissions to water during construction and operation cannot be ruled out.<br><br>No other significant in-combination impacts have been identified. There are no projects which could have a potential significant in-combination effect along with the proposed development. |

| Plans and Projects | Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network | |
|---|---|---|
| | all associated and ancillary site works Further Information Requested 13th March 2026<br><br>22471 (APB-314013-22) Rathmale Mungret Construction of 21 no. dwellings Granted by ABP 22nd January 2024<br><br>2360662 (ABP-318797-24) Rathmale Mungret<br><br>Limerick Redevelopment of an existing grass club pitch to provide a synthetic all-weather pitch with associated surface water attenuation, lighting, facility fencing, netting and all associated site development works. Granted by ABP 1st October 2024<br><br>238004 (Part 8) Loughanleagh Rathmale and Castlemungret Improvement works that comprise of 550m of revised road layout on the N69 and 90m of realigned side road L1403 Decided on 18th September 2023<br><br>2461282 (ABP-322851-25)Lands at Rathmale Mungret Large-Scale Residential development of 139no. residential units along with the provision of a creche. Granted by ACP 24th September 2025<br><br>257025 Skehacreggaun Mungret EOD for Planning ref. 20/1115: construction on SITE 2 of 96no. residential units Granted 26th November 2025<br><br>257026 Skehacreggan Mungret EOD for Planning ref. 20/1115: construction on SITE 2 of 96no. residential units. The modification results in a total of 69 units on the wider site as permitted under ref. no. 20/1115. Modifications to the permitted scheme under Reg. Ref. 20/1115. No changes are proposed to the permitted entrance, Block 1 apartment block, the creche and associated areas. Granted 26th November 2025<br><br>267014 Ballykeeffe, Raheen 5-year permission for the construction of 384no. residential units (202no. houses, 182no. apartments), creche and associated site works. Original Planning Ref. No. 22/313124 Granted on 19th March 2026<br><br>2660245 Ballykeeffe Raheen Co. Limerick Modifications to development previously granted planning permission under Reg. Ref. ABP-313124-22. The modifications for permission consist of development of 58 no. 2 bedroom apartment units, an increase of the overall | |

| Plans and Projects | Key Policies/Issues/Objectives Directly Related to the Conservation of the European Network | |
|---|---|---|
| | apartment units within the subject apartment block from 42 no. apartments as permitted previously. Decision due 29th April 2026<br><br>2561246 Regeneron Ireland DAC,Raheen Business Park Refurbishment and extension of existing outbuildings and construction of an Event Centre building within the associated courtyard, located on the campus of the existing production facility. Further Information Requested 30th January 2026<br><br>2660084 The IDA Business & Technology Park,Raheen Additions, modifications and alterations to previously permitted Biopharmaceutical Manufacturing Campus (Planning Register Reference Number 22190 and as amended by planning reference 23152 and 2461160). Decision due 25th March 2026<br><br>25323893 (ABP-323893-25) Roches Avenue,Raheen Business Park,Limerick. The construction of a new 110/38kV/MV electrical substation and various related elements. Decision due 1st June 2026The Adare Bypass Phase 1A of the overall Foynes to Limerick Road (including Adare Bypass) Project, will extend between the new interchange junctions at Adare and Croagh (Currently under construction). The Project was awarded to Sisk Sorensen Joint Venture in December 2024, works commenced in January 2025 and the project completion is scheduled for June 2027, ahead of the Ryder Cup at Adare Manor. | |

The main in-combination threats to the Shannon Estuary and its associated European sites are from the accumulation of agricultural run-off, municipal wastewater discharges, and industrial pollutants, which reduce water quality. These, combined with rising sea levels and intense storm surges, accelerate coastal erosion and threaten the estuary's sensitive habitats.

As noted in **Section 4.9.4**, the proposed development will connect Limerick WWTP which currently has significant capacity for this additional discharge (based on most recent EPA data). The Limerick WWTP has considerable headroom available for the current and other permitted/proposed developments in the Limerick city area. The WWTP is currently not having an observable negative effect on water quality or on the Water Framework Directive status within Shannon Estuary and no effects of cumulative wastewater loading for the proposed development have been identified. Therefore, no likely significant in-combination impacts due to foul effluent discharges from the proposed development have been identified.

As noted above, no likely significant  effects from noise or disturbance have been identified with the project and therefore, no potential in-combination effects have been identified for noise and disturbance.

However, in the absence of mitigation, the potential for significant in-combination effects on Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA with other projects from surface water emissions to water during construction and operation cannot be ruled out.

## 4.10 Screening of Relevant Natura 2000 Sites and Qualifying Interests/Special Conservation Interests

### 4.10.1 Overview of Screening

Based on the precautionary principle, the likelihood of significant effects to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA cannot be ruled out. Screening conclusions with regards to the qualifying species and habitats for relevant Natura 2000 sites are provided in **Table 10**. No significant effects on the conservation objectives of any other Natura 2000 sites are predicted to occur. Sites/QIs/SCIs that are screened in for further assessment are highlighted in bold.

### Table 10. Screening of relevant European sites

| Natura 2000 Site | Qualifying Interest | Potential Impacts | Screened In/Out |
|---|---|---|---|
| **Lower River Shannon SAC** | **Habitats**<br><br>1110 Sandbanks which are slightly covered by sea water all the time<br><br>1130 Estuaries<br><br>1140 Mudflats and sandflats not covered by seawater at low tide<br><br>1150 Coastal lagoons*<br><br>1160 Large shallow inlets and bays<br><br>1170 Reefs<br><br>1220 Perennial vegetation of stony banks<br><br>1230 Vegetated Sea cliffs of the Atlantic and Baltic coasts<br><br>1310 Salicornia and other annuals colonising mud and sand<br><br>1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)<br><br>1410 Mediterranean salt meadows (*Juncetalia maritimi)*<br><br>3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation | These habitats are located downstream of the proposed development site and are potentially connected to the proposed development site via surface water runoff/discharges (and groundwater).<br><br>Potential impacts on these habitats could occur due to surface water impacts during the construction and operational phase.<br><br>It is noted no disturbance effects or loss of habitat have been identified. Effects from spread of invasive species and wastewater discharges have also been screened out. | Screened in |

| Natura 2000 Site | Qualifying Interest | Potential Impacts | Screened In/Out |
|---|---|---|---|
| | 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)<br><br>91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*<br><br>**Species**<br><br>1029 Freshwater Pearl Mussel (*Margaritifera margaritifera)*<br><br>1099 River Lamprey (*Lampetra fluviatilis*)<br><br>1349 Common Bottlenose Dolphin (*Tursiops truncatus*)<br><br>1355 Otter (*Lutra lutra*)<br><br>1096 Brook Lamprey (*Lampetra planeri*)<br><br>1095 Sea Lamprey (*Petromyzon marinus*)<br><br>1106 Salmon (*Salmo salar*) | | |
| **River Shannon and River Fergus Estuaries SPA** | **Birds**<br>A017 Cormorant (*Phalacrocorax carbo*)<br>A038 Whooper Swan (*Cygnus cygnus*)<br>A046 Light-bellied Brent Goose (*Branta bernicla hrota*)<br>A048 Shelduck (*Tadorna tadorna*)<br>A050 Wigeon (*Anas penelope*)<br>A052 Teal (*Anas crecca*)<br>A054 Pintail (*Anas acuta*)<br>A056 Shoveler (*Anas clypeata*)<br>A062 Scaup (*Aythya marila*)<br>A137 Ringed Plover (*Charadrius hiaticula*) | The SPA is located downstream of the proposed development site and is potentially connected to the proposed development site via the surface water runoff/discharges and groundwater.<br><br>It is noted no disturbance effects or loss of habitat have been identified. Effects from spread of invasive species and wastewater discharges have also been screened out. | Screened in |

| Natura 2000 Site | Qualifying Interest | Potential Impacts | Screened In/Out |
|---|---|---|---|
| | A140 Golden Plover (*Pluvialis apricaria)*<br>A141 Grey Plover (*Pluvialis squatarola*)<br>A142 Lapwing (*Vanellus vanellus*)<br>A143 Knot (*Calidris canutus*)<br>A149 Dunlin (*Calidris alpina*)<br>A156 Black-tailed Godwit (*Limosa limosa*)<br>A157 Bar-tailed Godwit (*Limosa lapponica*)<br>A160 Curlew (*Numenius arquata*)<br>A162 Redshank (*Tringa totanus*)<br>A164 Greenshank (*Tringa nebularia*)<br>A179 Black-headed Gull (*Chroicocephalus ridibundus*)<br>Habitats<br>A999 Wetlands | | |

### 4.10.2 Screening conclusion

The aims of this screening section of this report were as follows:

- Determine whether the proposed development, alone or in combination with other projects, is likely to have significant effects on Natura 2000 sites in view of their conservation objectives.
- Provide information on and assess the potential for the proposed development to significantly impact on Natura 2000 Sites (also known as European sites).
- Determine whether the proposed development is directly connected with, or necessary to the conservation management of any Natura 2000 sites.

It has been objectively concluded that:

- The proposed development is not directly connected with, or necessary to the conservation management of any Natura 2000 sites.
- On the basis of objective information, likely significant effects from the proposed development on European sites cannot be ruled out. There is potential for the proposed development to significantly impact the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA via impacts on water quality from surface water runoff/discharges during construction and operation.
- The proposed development, alone or in combination with other projects could potentially impact on QI/SCI species and habitats within the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.
- It has been concluded beyond reasonable scientific doubt, based on objective information, and considering the conservation objectives of the relevant European sites, that significant impacts from the project, individually or in combination with other plans and projects, on the following Natura 2000 sites can be excluded:
    - Curraghchase Woods SAC – site code 000174
    - Tory Hill SAC – site code 000439
    - Askeaton Fen Complex SAC – site code 002279

On the basis of objective information and in view of best scientific knowledge, the possibility of likely significant effects from the proposed project on the European sites Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, cannot be ruled out and therefore an Appropriate Assessment is required.

# 5. Stage 2. Natura Impact Statement (NIS)

## 5.1 Introduction

**Sections 3 and 4** of this report are relevant to informing the Natura Impact Statement (NIS) in that the proposed development and receiving environment is described in sufficient detail. In **Section 4**, the likely zone of impact (ZoI) of the proposed development and the European sites within the ZoI were identified. Likely significant effects on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA were identified in **Section 4**. This NIS now examines and analyses, in light of the best scientific knowledge, with respect to these Natura 2000 sites within the likely zone of impact of the proposed development, the potential effect sources and pathways, how these could impact on the QI/SCI habitats and species and whether the predicted effects would adversely affect the integrity of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

Mitigation measures are set out within the NIS and ensure that any effects on the conservation objectives of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA will be avoided during the proposed development such that there will be no risk of adverse effects on these European sites.

## 5.2 Status of Qualifying Interests (Qis) and Special Conservation Interests (SCIs) for Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA

### 5.2.1 Lower River Shannon SAC

The Natura 2000 Standard Data Form for the SAC lists the *negative impacting threats and pressures* and *positive impacting activities/management* affecting the site. The existing pressures, threats or activities that impose negative impact on the sites are:

- Discharges (E03)
- Air pollution, air-borne pollutants (H04)
- Fertilisation (A08)
- Urbanised areas, human habitation (E01)
- Eutrophication (natural) (K02.03)
- Grazing (A04)
- Polderisation (J02.01.01)
- Reclamation of land from sea, estuary or marsh (J02.01.02)

The above pressures, threats or activities impose moderate negative impacts on the site.

The Lower River Shannon SAC is designated for a total of twenty-one Annex I Habitat and Annex II species. These Annex I Habitat and Annex II species are listed in **Table 11**. A detailed description of the site is included in the Site Synopsis report (NPWS, 2013) which is included in **Appendix 1** while a description of conservation features for which potential significant effects could not be ruled out in the screening exercise is presented below**.**

**Table 11. Lower River Shannon SAC.**

| Qualifying Interest | | Site Conservation Objective (NPWS 2012) | National Status (NPWS 2019) |
|---|---|---|---|
| Annex I marine habitats | Mudflats and sandflats not covered by seawater at low tide [1140] | To maintain the favourable conservation condition | Overall Conservation Status is assessed as Inadequate<br><br>Overall Trend in Conservation Status is assessed as Deteriorating |
| | Large shallow inlets and bays [1160] | To maintain the favourable conservation condition | Overall Conservation Status is assessed as Inadequate<br><br>Overall Trend in Conservation Status is assessed as Deteriorating |
| | Estuaries [1130] | To maintain the favourable conservation condition | Overall Conservation Status is assessed as Inadequate<br><br>Overall Trend in Conservation Status is assessed as Deteriorating |
| | Reefs [1170] | To maintain the favourable conservation condition | Overall Conservation Status is assessed as Bad<br><br>Overall Trend in Conservation Status is assessed as Stable |
| | *Coastal lagoons [1150] | To restore the favourable conservation condition | Overall Conservation Status is assessed as Bad<br><br>Overall Trend in Conservation Status is assessed as Deteriorating |
| | Perennial vegetation of stony banks [1220] | To maintain the favourable conservation condition | Overall Conservation Status is assessed as Inadequate<br><br>Overall Trend in Conservation Status is assessed as Stable |
| | Salicornia and other annuals colonising mud and sand [1310] | To maintain the favourable conservation condition | Overall Conservation Status is assessed as Favourable<br><br>Overall Trend in Conservation Status is assessed as Stable |
| | Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] | To restore the favourable conservation condition | Overall Conservation Status is assessed as Inadequate<br><br>Overall Trend in Conservation Status is assessed as Deteriorating |

| Qualifying Interest | | Site Conservation Objective (NPWS 2012) | National Status (NPWS 2019) |
|---|---|---|---|
| | Mediterranean salt meadows (*Juncetalia maritimi*) [1410] | To restore the favourable conservation condition | Overall Conservation Status is assessed as Inadequate<br><br>Overall Trend in Conservation Status is assessed as Deteriorating |
| | *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] | To maintain the favourable conservation condition | Overall Status is assessed as Favourable<br><br>Overall Trend in Conservation Status is assessed as Stable |
| Annex II marine species | *Lampetra planeri* (Brook Lamprey) [1096] | To maintain the favourable conservation condition | Overall Conservation Status is assessed as Favourable<br><br>Overall Trend in Conservation Status is assessed as Stable |
| Annex I fish species | *Salmo salar* (Salmon) [1106] | To restore the favourable conservation condition | Overall Status is assessed as Inadequate<br><br>Overall Trend in Conservation Status is assessed as Stable |
| Annex I diadromous fish species | *Lampetra fluviatilis* (River Lamprey) [1099] | To maintain the favourable conservation condition | Overall Status is Unknown (data deficient species) |
| | *Petromyzon marinus* (Sea Lamprey) [1095] | To restore the favourable conservation condition | Overall Conservation Status is assessed as Unknown<br><br>Overall Trend in Conservation Status is unknown |
| | | | |
| Annex I Mammal | *Lutra lutra* (Otter)* [1355] | To restore the favourable conservation condition | Overall Conservation Status is assessed as Favourable<br><br>Overall Trend in Conservation Status is assessed as Improving |
| | Common bottlenose dolphin | To restore the favourable conservation condition | Overall Conservation Status is assessed as Favourable<br><br>Overall Trend in Conservation Status is assessed as Improving |

*Qualifying Interest Annex I Habitats*

*Marine/ Coastal Annex I Habitats*

The SAC supports examples of the following Annex I habitats for which significant effects could not be screened out in the screening exercise: 1140 Mudflats and sandflats not covered by seawater at low tide, 1160 Large shallow inlets and bays, 1130 Estuaries, 1170 Reefs,

1110 Sandbanks which are slightly covered by sea water all the time, 1150 *Coastal lagoons, 1220 Perennial vegetation of stony banks, 1310 Salicornia and other annuals colonising mud and sand, 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and 1410 Mediterranean salt meadows (*Juncetalia maritimi*)]. A total of 10 community types have been identified within the Annex I habitat 1130, 1140, 1160 and 1170 (see **Table 12**).

The site is an example of a large shallow inlet and bay. The site supports littoral sediment communities in the mouth of the Shannon Estuary occurring 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.

The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and are 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 populations of the Purple Sea Urchin *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 then characterised by coralline crusts and red foliose algae.

**Table 12. Community types within Annex I habitat of the Lower River Shannon SAC.**

| Community type | 1130 | 1140 | 1160 | 1170 |
|---|---|---|---|---|
| Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. Community | | ✓ | ✓ | |
| Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex | ✓ | ✓ | ✓ | |
| Estuarine subtidal muddy sand to mixed sediment with gammarids community complex | ✓ | | | |
| Subtidal sand to mixed sediment with *Nucula nucleus* community complex | ✓ | | ✓ | |
| Subtidal sand to mixed sediment with *Nephtys* spp. community complex | ✓ | | ✓ | |
| Fucoid-dominated intertidal reef community complex | | | ✓ | ✓ |
| Mixed subtidal reef community complex | | | ✓ | ✓ |
| Faunal turf-dominated subtidal reef community | ✓ | | ✓ | ✓ |
| Anemone-dominated subtidal reef community | ✓ | | ✓ | ✓ |
| *Laminaria*-dominated community complex | ✓ | | ✓ | ✓ |

*Qualifying Interest Annex II Species*

*Bottlenose Dolphin*

The Lower River Shannon SAC is one of five sites designated for bottlenose dolphins in Irish waters. Studies on the resident bottlenose dolphin population in Shannon Estuary have been occurring since 1993 by the Irish Whale and Dolphin Group (IWDG) and by the National Parks and Wildlife Service (NPWS) of Ireland as part of the EU's obligation to ensure conservation of this species (Blázquez *et al.,* 2020).

Bottlenose dolphins in the Shannon Estuary prefer areas with the greatest slope and depth (Ingram and Rogan 2002). Two critical habitat areas occur within Shannon Estuary that at least part of the population migrates between throughout the year; the larger of the two areas is located near the mouth of the estuary closest to Kilcredaun, and the smaller is located off Moneypoint. In general, a smaller proportion of the population is found in the eastern part of the estuary compared to the western part (Baker *et al.,* 2018). The distribution of sightings in 2018 showed that dolphin presence throughout the estuary was similar to past studies, but noted greater activity within the inner estuary where it constricts near Tarbert/Killimer and farther upriver (Ingram and Rogan 2002; Rogan et al., 2018). Baker et al., (2018) found that only 25% of the population regularly uses the inner estuary; those dolphins were also seen in the outer estuary. Within the critical habitat areas, the dolphins appear to most commonly be found near northern-facing slopes (Garagouni et al., 2019). Dolphin distribution in the estuary is also correlated with tide level, with higher presence in bottleneck areas during ebb and slack low tides (Garagouni et al., 2019).

*Fish Species*

*Atlantic Salmon Salmo salar*

Salmon spend their juvenile phase in rivers before migrating to sea to grow and mature. To complete their life cycle they home to predetermined natal rivers (philopatric behaviour) to spawn. Smolts typically head out to sea between March and June and adults return to the river between March and August. There are no spawning sites at the project area; however, adult fish will pass through the site when travelling up the river to spawn or on return to the sea or as smolts on their first migration to the sea. A number of rivers that flow into the Shannon Estuary are fished for salmon. These include the River Fergus, Castleconnell Salmon Fishery, River Mulchair, River Maigue and the River Deel.

*Sea Lamprey Petromyzon marinus, River Lamprey Lampetra fluviatilis and Brook Lamprey Lampetra planeri*

Both sea lamprey (Petromyzon marinus) and river lamprey (Lampetra fluviatilis) are QIs of the Lower River Shannon SAC and have the potential to occur within the project area. Unlike salmon, spawning sea lamprey and river lamprey do not home to predetermined natal rivers (philopatric behaviour). As adults in the marine environment, sea lamprey and river lamprey parasitise various species of marine and anadromous fish. After the parasitic phase, which lasts between 2 – 3 years, river lamprey and sea lamprey migrate upstream to spawn, selecting rivers and streams through positive rheotaxis (swimming into an oncoming current) and attraction to pheromonal cues (bile acids) from larval conspecifics located upstream (. Lamprey spawning habitat requires a gravel bottom with swift-running water and nearby

sheltered areas with muddy bottoms for the larvae. Once in the vicinity of spawning gravels, they hide under stones or among vegetation, with sea lamprey congregating at spawning gravels to spawn in May and June, and river lamprey spawning in March and April. Hatching occurs two weeks after egg deposition and within a further one to three weeks the ammocoete larvae emerge from the spawning substrate and burrow into muddy beds in sheltered areas. Ammocoetes (larvae) are relatively immobile and remain in the muddy beds for between 3 – 8 years. The population of larvae present in the muddy beds, which comprise multiple age classes, filter feed on organic matter until the onset of metamorphosis (Dawson et al., 2015). Larvae metamorphose into non-feeding adults that migrate downstream to the marine environment. The Brook Lamprey (Lampetra planeri) are a freshwater species occurring in streams and occasionally in lakes in northwest Europe, particularly in basins associated with the North and Baltic seas. Spawning occurs in the rivers in March and April.

*Otter*

Otters, along with their breeding and resting places, are protected under the provisions of the Wildlife Act 1976, as amended. Otters have additional protection because of their inclusion in Annex II and Annex IV of the Habitats Directive which is transposed into Irish law in the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. Otters are also listed as requiring strict protection in Appendix II of the Berne Convention on the Conservation of European Wildlife and Natural Habitats and are included in the Convention on International Trade of Endangered species (CITES).

Otters are widespread in Ireland and found in a variety of aquatic habitats, both freshwater and marine, but always requiring access to fresh water. Their territorial nature results in frequent marking of territories with droppings ('spraints'), which can usually be readily identified and are often placed in conspicuous locations. Otters breed in burrows, called 'holts', and also use safe places to rest above ground during the day ('couches'). Holts are often found under tree root systems near water, but can be located some distance from water. Otters feed on a variety of prey, usually fish and crustaceans, but occasionally also taking birds and small mammals. It is noted that otters are largely nocturnal, particularly in areas subject to high levels of disturbance as evidenced by the presence of otters in the centre of Irish cities. Thus, they are able to adapt to increased noise and activity levels; however, breeding holts are generally located in areas where disturbance is lower.

Otters are a conservation feature of the Lower River Shannon SAC (site code 002165). The range of Otter in the areas surveyed within the Lower River Shannon is 73.53% over an area of 684 km2. This has fallen from 100% occurrence in 1980/1981. Otter's main source of prey within the Shannon are frogs (42.9%), followed by stickleback (35.7%) and salmonids (21.4%) (Bailey and Rochford 2006). Coastal otters feed predominately on marine species but may also travel inland via estuaries to feed on brackish or freshwater food resources (Weir & Bannister, 1977). Reid et al. (2013) found otters living along coasts have a greatest niche breath than those in freshwater systems which encompasses a wide variety of intertidal prey though pelagic fish are rarely taken.

Each adult otter has its own home range, which it marks with its faeces (spraints) at prominent locations. When groups of otters are evident, they usually consist of a female and her young. Range sizes vary widely according to the quality of the foraging habitat and other resources, such as suitable sites for otter dens (holts). Their ranges may alter seasonally to include sites

of abundant prey. The average distribution density of otters is approximately one otter per 10 km on many Irish watercourses, but this will vary from as little as one otter per 50 km of river to, perhaps, as much as one otter per 2 km of river or coastline (NRA 2008).

### 5.2.2 River Shannon and River Fergus SPA

The Natura 2000 Standard Data Form for the SPA lists the negative impacting threats and pressures and positive impacting activities/management affecting the site. The existing pressures, threats or activities that impose moderate negative impact on the site are:

- Shipping lanes (D03.02)
- Nautical sports (G01.01)
- Marine and Freshwater Aquaculture (F01)

The above pressures, threats or activities impose moderate negative impacts on the site.

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. The site has vast expanses of intertidal flats which contain a diverse macroinvertebrate community which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

*Bird Species and Wetlands*

The SPA is designated for a total of twenty-one bird species. The site is also designated for the habitat Wetland. **Table 13** lists conservation features for which there is potential for significant effects (as identified in the screening assessment). The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA. A detailed description of the site is included in the Site Synopsis report (NPWS, 2015) which is included in Appendix 1.

**Table 13.** Special Conservation Interests the River Shannon and River Fergus Estuaries SPA (NPWS, 2012).

| Special Conservation Interest | Conservation Objective |
|---|---|
| Cormorant (*Phalacrocorax carbo*) [A017] | To maintain the favourable conservation condition |
| Whooper Swan (*Cygnus cygnus*) [A038] | To maintain the favourable conservation condition |
| Shelduck (*Tadorna tadorna*) [A048] | To maintain the favourable conservation condition |
| Wigeon (*Anas penelope*) [A050] | To maintain the favourable conservation condition |
| Teal (*Anas crecca*) [A052] | To maintain the favourable conservation condition |
| Pintail (*Anas acuta*) [A054] | To maintain the favourable conservation condition |
| Shoveler (*Anas clypeata*) [A056] | To maintain the favourable conservation condition |
| Scaup (*Aythya marila*) [A062] | To maintain the favourable conservation condition |

| Special Conservation Interest | Conservation Objective |
|---|---|
| Ringed Plover (*Charadrius hiaticula*) [A137] | To maintain the favourable conservation condition |
| Golden Plover (*Pluvialis apricaria*) [A140] | To maintain the favourable conservation condition |
| Grey Plover (*Pluvialis squatarola*) [A141] | To maintain the favourable conservation condition |
| Lapwing (*Vanellus vanellus*) [A142] | To maintain the favourable conservation condition |
| Knot (*Calidris canutus*) [A143] | To maintain the favourable conservation condition |
| Dunlin (*Calidris alpina*) [A149] | To maintain the favourable conservation condition |
| Black-tailed Godwit (*Limosa limosa*) [A156] | To maintain the favourable conservation condition |
| Bar-tailed Godwit (*Limosa lapponica*) [A157] | To maintain the favourable conservation condition |
| Curlew (*Numenius arquata*) [A160] | To maintain the favourable conservation condition |
| Redshank (*Tringa totanus*) [A162] | To maintain the favourable conservation condition |
| Greenshank (*Tringa nebularia*) [A164] | To maintain the favourable conservation condition |
| Black-headed Gull (*Chroicocephalus ridibundus*) [A179] | To maintain the favourable conservation condition |
| Wetlands [A999] | To maintain the favourable conservation condition |

The conservation objectives for the breeding and wintering population of cormorant is defined and measured by eight attributes and targets. The conservation objectives for each of the remaining 20 wintering populations (non-breeding) of qualifying interest species are defined and measured by the same two attributes and targets. The conservation objective for wetland habitat is to maintain its favourable conservation condition in the SPA as a resource for the regularly-occurring migratory waterbirds that utilise it, defined and measured by 1 no. attribute and target (NPWS, 2012).

The Shannon estuary has been the focus of systematic waterbird monitoring since the early 1980s (Sheppard 1993) and more regularly since the mid-1990s (Crowe, 2005). Regular counts of this site are limited because of the extensive efforts required to undertake coordinated counts of such a large site, which has many areas of limited access. Nonetheless, counts have shown that the Shannon Estuary has held the largest numbers of waterbirds in Ireland (e.g. Colhoun, 2001). However, surveys in more recent years show that, for many species, there have been substantial declines in usage (NPWS, 2012, Birdwatch Ireland 2022).

The most detailed survey of the Shannon Estuary was carried out by MKO in 2017/2018 (MKO 2019). This survey covered 87 subsites within the Shannon Estuary. This survey found that the total number of SCI species recorded across all subsites ranged from 20 species in October to 10 species in June.

The MKO study found that most of the 21 conservation feature species were present in all the winter months (October-March) with pintail and scaup being the only species absent during these months. Over half of the conservation feature species remained present during the summer.

## 5.4 Assessment of Potential Effect Pathways

All potential effects would relate to direct and indirect effects to relevant habitats and fauna of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. The assessment of impacts is based on the EC (2018) *Managing Natura 2000 Sites: The Provision of Article 6 of the Habitats Directive 92/43/EEC*, professional judgement and criteria or standards where available.

The potential impacts associated with the development are discussed in the following section with respect to their likelihood to have had or to have significant impacts on Natura 2000 sites. As part of the assessment direct, indirect and in-combination impacts were considered.

As part of the assessment the potential for adverse effects associated with the development were reviewed as outlined below:

- Potential effects on water quality during construction
- Potential effects on water quality during operation
- Potential in-combination effects

### 5.4.1 Impacts on surface water quality during construction

During construction there are potential sources of pollution from excavation and drainage from the site resulting from runoff and erosion from site earthworks and temporary stockpiles. The presence of fuels, lubricants and other chemicals from construction activities also have the potential to temporarily affect the surface/groundwater regime of the area if not managed properly. These sources of pollution have the potential to impacts on water quality within the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA downstream.

In the absence of appropriate design and mitigation, high levels of silt in surface water run-off from construction works, could theoretically impact on fish species. If of sufficient severity, adult fish could theoretically be affected by increased silt levels as gills may become damaged by exposure to elevated suspended solids levels. Excessive siltation can cause eggs and fry to be smothered. In particular impacts on spawning lamprey and salmonids can be significant. If of sufficient severity, aquatic invertebrates may be smothered by excessive deposits of silt from suspended solids. In areas of stony substrate, silt deposits may result in a change in the macro-invertebrate species composition, favouring less diverse assemblages and impacting on sensitive species e.g. Salmonids, Lamprey etc. Aquatic plant communities may also be affected by increased siltation. Submerged plants may be stunted and photosynthesis may be reduced.

Inadvertent spillages of hydrocarbons during construction could introduce toxic chemicals into the aquatic environment via surface water run-off or groundwater contamination and have a direct toxicological impact on habitats and fauna.

Although impacts to the waters of the Shannon Estuary are unlikely given the separation distances a precautionary approach has been adopted and a range of mitigation measures have been specified during construction works to prevent impact on local water quality. Hydrocarbon and silt control measures are outlined in **Section 6** of this report as well as in

the Construction, Environmental, Management Plan (CEMP) which has been included with this application.

Mitigation measures outlined in **Section 6** will ensure there is no adverse effects on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA from surface water runoff during the construction phase. In the absence of such measures, there would be potential for contaminated runoff to reach downstream European sites. However, with the implementation of the proposed drainage design, the risk of pollutant transport is significantly reduced. On this basis, it is concluded that the proposed development will not result in adverse effects on the integrity of European sites.

Following the implementation of these mitigation measures, the proposed development will not adversely affect the integrity of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA due to surface water runoff during the construction phase.

### 5.4.2 Impacts on water quality during operation

There are no watercourses within the proposed development site. There is no formal surface water network within the subject lands.

As outlined in **Section 3.4**, it is proposed to service the proposed development by means of a connection to the existing surface water pipe located within the Mungret Link Road. This pipe ultimately drains to a large soakaway and this water will percolate to ground and will move north in accordance with the groundwater gradient, which in turn will be accentuated by pumping in the Quarry. Similarly, any infiltration on the site, will enter the water table, and move northwards towards the River Shannon.

A range of SuDS measures have been specified for the proposed development, including permeable paving, tree pits, swales and detention basins. The overall strategy aims to provide an effective system to mitigate the adverse effects of urban stormwater runoff on the environment by reducing runoff rates, volumes and frequency, reducing pollutant concentrations in stormwater, contributing to amenity, aesthetics and biodiversity enhancement and allow for the maximum collection of rainwater for re-use where possible. In addition, SuDS features aim to replicate the natural characteristics of rainfall runoff for any site by providing control of run-off at source and this has been achieved by the current proposals.

As part of the proposed development, the topography of the site will be altered, and the hydrology of the site will be altered. The proposed development incorporates a comprehensive surface water management strategy based on Sustainable Urban Drainage Systems (SuDS) including permeable paving, swales, tree pits, cellular attenuation, detention basins and other nature-based solutions.

These measures are designed to attenuate surface water runoff close to source, promoting infiltration, evaporation and temporary storage, and thereby reducing both runoff rates and volumes, also improving water quality and biodiversity.

The capacity of infiltration will be supplemented by collection in a storm network, attenuation and treatment using by-pass separators, and collection in a pump sump, which will deliver stormwater to the public storm sewer system.

The Groundwater recharge area for the Turlough will be mainly from the south, with a lesser contribution from the east and west. There will be no groundwater contribution from the north (including the proposed development site), due to the natural gradient being towards the Shannon, which will be accentuated by the active dewatering of the quarry.

Groundwater beneath the site is expected to be at approximately 10m O.D, which will be at least 4m below ground level at the lowest point. This means that groundwater levels will not interfere with infiltration, even with winter groundwater levels.

These measures are designed to ensure that post-development surface water runoff rates and volumes do not exceed existing hydrological conditions. The implementation of on-site attenuation and treatment function, will mean that under normal conditions the existing surface water regime will be maintained, allowing infiltration up to the infiltration capacity of the site. Extreme events will be managed by the storm sewer network, with a pumped discharge out of the catchment.

There will be no adverse effect on the hydrological functioning of Loughmore Common Turlough because of this proposed development.

OSL has prepared a Site Specific Flood Risk Assessment on behalf of Homeland Projects Ltd. The following conclusions were made;

- The site including all proposed residential dwellings is located in Flood Zone C as defined by the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices.
- Following the Flood Risk Assessment Stage 2 (Initial Flood Risk Assessment), it was determined that a Justification Test was not required.
- To prevent any potential of flooding within the vicinity from the proposed development, it is proposed to implement SuDS measures as discussed in the Infrastructure Report and Drainage Impact Assessment in order to limit the discharge from the site to the current discharge rates. The implementation of these SuDS measures will not increase the risk of flooding elsewhere. It is considered that the proposed development will have a negligible impact on the potential flood regime of the area.
- In conclusion, the proposed development is considered to have the required level of flood protection up to and including the 1% AEP storm event.

Given the proposed operational surface water design, including SuDS measures proposed and the existing network, it is concluded that following the implementation of operational design/mitigation measures the proposed development will have no adverse effect on the integrity of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA due to surface water discharges during the operational phase.

## 6. Mitigation Measures

The mitigation measures have been drawn up in line with current best practice and include an avoidance of sensitive habitats at the design stage and mitigation measures will function effectively in preventing significant ecological impacts, such that adverse effects on site

integrity Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA do not occur.

Mitigation measures are set out in accordance with the European Commission guidance on the: '*Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, (2001)'.* and '*Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive (2018)*.'

## 6.1 Construction Phase Mitigation Measures

All personnel involved with the project will receive an on-site induction relating to operations and the environmentally sensitive nature of nearby European sites and to re-emphasize the precautions that are required as well as the precautionary measures to be implemented. All staff and subcontractors have the responsibility to:

- Work to agreed plans, methods and procedures to eliminate and minimise environmental impacts,
- Understand the importance of avoiding pollution on-site, including noise and dust, and how to respond in the event of an incident to avoid or limit environmental impact;
- Respond in the event of an incident to avoid or limit environmental impact;
- Report all incidents immediately to their line manager;
- Monitor the workplace for potential environmental risks and alert the immediate line manager if any are observed; and
- Co-operate as required, with site inspections.

## 6.2 Sediment and water pollution control plan

An outline Construction Environmental Management Plan (oCEMP) has been prepared (by OSL-Butler Consulting Engineers) for the proposed development and this contains construction mitigation measures, which are also set out in this report.

All works carried out as part of these works will comply with all Statutory Legislation including the Local Government (Water Pollution) acts, 1977 and 1990. This standard is extremely strict, allowing any entry onto water of deleterious material or polluting matter is an offence. The contractor will co-operate in-full with the Environmental Department of the local authority.

As part of the overall construction methodology, the following issues will be addressed and have been identified as being of particular risk and/or concern to pollution.

***Contamination of Watercourse / Groundwater***

Although the proposed excavation works will temporarily increase the vulnerability of the underlying aquifer, the thickness of the low permeability subsoil and the shallow depths of excavation involved will minimise the risk to groundwater. There is a risk that ground water could become contaminated with lime from cement which subsequently finds its way into the local adjacent watercourses. The measures proposed to be put in place to mitigate any

potential damage from the effluent of contaminated ground water would be to create an exclusion zone, as far as reasonably practicable. Concrete batching will take place off site and wash down and wash out of concrete trucks will take place off site (at authorized concrete batching plant in full compliance with relevant planning and environmental consents).

Concrete trucks, cement mixers or drums/bins are only permitted to wash out in designated wash out area greater than 50m from sensitive receptors including drains and drainage ditches. Abstraction of water from watercourses will not be permitted. Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.

***Sediment & Erosion***

Similar to the above, adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from the site will be managed and controlled for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. A temporary positive drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction. A series of geotextile lined cascading, high level outfall, settling basins will be installed upstream of an agreed discharge point (as would be agreed with local authority during construction if and when required) by the appointed contractor. Alternatively, a 'siltbuster' silt control unit can be used on the outfall. This temporary surface water management facility will throttle runoff and allow suspended solids to be settled out and removed before water is discharged in a controlled manner an agreed outfall (as would be agreed with local authority during construction if and when required). All inlets to the cascading settling basins will be riprapped to prevent scour and erosion in the vicinity of the inlet. There will be:

- Minimisation of site disturbance
- Implementation of sediment control (as outlined above) audits. This programme and locations of sampling will be agreed with the local authority prior to the commencement of the proposed development.

***Discharge Licences***

It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area Engineer for implementation.

***Over Ground Oil / Diesel Storage***

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste Management Plan for the works. Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent watercourses and contained within constructed bunded areas e.g. placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental

spillage. Any accidental spillages will be dealt with immediately on site however minor by containment /removal form site. Surface water runoff from this bunded hardstanding area will discharge to a drain (subject to obtaining an approved discharge license) via a full retention petrol interceptor or to the on-site WWTP. Prior to the interceptor, a silt trap will be installed in order to remove the majority of suspended solids.

***Disposal of Wastewater off Site***

The construction compound will include adequate staff welfare facilities including foul drainage. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established. The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to ensure its disposal in a traceable manner to an authorised facility. These will be available for inspection by the Environment Section of the local authority at all times.

***Road Sweepers / Cleaning***

The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses from this activity.

***Waste Arisings***

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste Management Plan for the works.

***Construction Stage Dewatering***

Appropriate monitoring of groundwater levels during site works shall be undertaken. Standard construction phase filtering of surface water for suspended solids will be carried out. Unfiltered surface water discharges or runoff shall not be permitted from the site into the onsite watercourse during the works.

- Minimisation of the potential for erosion
- Prevention of sediment-contaminated water leaving the site

Such measures shall be undertaken as part of the site's discharge licence, when acquired. Temporary mounding and sediment control will be implemented to ensure silts do not enter the existing ditch during the construction stage.

***Water quality monitoring***

It is proposed to implement a programme for monitoring water quality at the outfall as part of the construction of this development, in agreement with the Planning Authority. Monitoring prior to, during and post construction works of surface water quality shall be undertaken to ensure minimum disturbance of water quality in the receiving environment.

During the construction phase, the monitoring programme will include daily checks, weekly inspections and monthly audits. This programme and locations of sampling will be agreed with the local authority prior to the commencement of the proposed development.

***Discharge Licences***

It will not be permitted to discharge into any newly constructed storm water systems or watercourse without adhering to the conditions of the discharge licence and agreeing the same with the Site Manager and Local Authority Area engineer for implementation.

***Over Ground Oil / Diesel Storage***

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste Management Plan for the works. Only approved storage system for oil / diesel within the site will be permitted, (i.e. all oil / diesel storage to be located within a designated area placed furthest away from adjacent watercourses and contained within constructed bunded areas e.g. placed on 150mm concrete slab with the perimeter constructed with 225mm solid blockwork rendered internally). The bunded area will accommodate the relevant oil / diesel storage capacity in case of accidental spillage. Any accidental spillages will be dealt with immediately on site however minor by containment /removal form site. Surface water runoff from this bunded hardstanding area will discharge to a drain (subject to obtaining an approved discharge license) via a full retention petrol interceptor or to the on-site WWTP. Prior to the interceptor, a silt trap will be installed in order to remove the majority of suspended solids.

***Disposal of Wastewater off Site***

The construction compound will include adequate staff welfare facilities including foul drainage. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established. The Site Management Team will maintain a record of all receipts for the removal of toilet or interceptor waste off site to ensure its disposal in a traceable manner to an authorised facility. These will be available for inspection by the Environment Section of the local authority at all times.

***Road Sweepers / Cleaning***

The cleaning of public roads in and around the subject site will be undertaken to reduce environmental impacts and care will be taken to prevent any pollution of watercourses from this activity.

***Waste Arisings***

Appropriate safe storage of all by-product and waste materials shall be implemented during the construction works in accordance with this Outline Construction and Environmental Management Plan and the Resource and Waste

***Management Plan for the works.***

***Construction Stage Dewatering***

Appropriate monitoring of groundwater levels during site works shall be undertaken. Standard construction phase filtering of surface water for suspended solids will be carried out. Unfiltered surface water discharges or runoff shall not be permitted from the site into the onsite watercourse during the works.

### 6.3 Surface water drainage works

The drainage infrastructure will be constructed and protected through the following measures:

- Hoarding or fencing to be provided to cordon-off completed infrastructure works: As is standard practice on construction sites, elements of works may be completed on a phased basis. As works are completed and handed over within each phase, this area will be enclosed with hoarding or fencing offset a safe distance from the line of the existing infrastructure and no further excavation works will be allowed within this area unless agreed with site management.

- Contractor to produce as-built construction records of drainage infrastructure. These records will be submitted to the engineer for approval in advance of handover. The as-built records will be reviewed and will need to be approved by the engineer before practical completion can be certified. The as-builts will be used by site personnel as a working record of where drainage infrastructure is located. The locations of these will be recorded on the as-built and will be marked out on the ground in advance of any works commencing in later stages. This methodology will be formally incorporated into a method statement to be completed by the groundworks sub-contractor before excavations commence.

- Marker tape to be provided on top of sewers running through live areas of site: As part of the methodology laying of drainage pipes, drainage works will have marker tape placed at a depth of 300mm above the pipe to warn the excavator and banksman of the service below. It is noted that the placing of marker tape over drainage lines is not a standard construction detail. However, the vulnerability of live drainage infrastructure serving a previous area of development within the proposed site is noted and these measures will form part of the works.

- Site personnel to be informed of works already completed and commissioned: As part of the Safe System of Work Plan (SSWP), site personnel will be made aware of the drainage lines which are in operation. A site- specific method statement will be required in all cases where it is deemed that there is a risk of damaging such services. Those involved in direct management and supervision of site-based excavations require relevant competencies to deliver safety standards on site. They will have health and safety training in order to design safe systems of work that are appropriate to specific site conditions. They will need to prepare clear and simple safety method statements that can be used and understood by site workers. Ongoing checks will be carried out to ensure that appropriate equipment has been provided and is being used correctly.

- Monitoring of excavation and prevention of undermining of infrastructure: Special care will be taken when digging above or close to the lines of services. The locations of these will be marked out on the ground in advance of any excavation being undertaken. The general principles outlined in the Health and Safety Authority document: ‘Code of Practice for Avoiding Danger from Underground Services’ will be followed to ensure

the safety of workers and to minimise the risk of damage to any existing pipelines or buildings.

- Water quality control of discharges to watercourse or drainage network: As detailed within the previous section, adjacent watercourses/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. This includes preventing any sediment laden water from entering the surface water outfalls serving a previous phase of the development. To prevent this from occurring surface water discharge from the site will be managed and controlled as detailed above for the duration of the construction works until the permanently attenuated surface water drainage system of the proposed site is complete. Any manholes will need to be securely covered and gullies fitted with a geotextile filter to allow protection of the surface water within the pipe. Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

### 6.15 Compound facilities/parking

The compound shall be entirely within the site boundaries. Site accommodation to be provided will include suitable washing / dry room facilities for construction staff, canteen, sanitary facilities, first aid room, office accommodation etc. Access to the compound will be security controlled and all site visitors will be required to sign in on arrival and sign out on departure.

The compound shall be constructed using a clean permeable stone finish and will be enclosed with security fencing. A permeable hardstand area will be provided for staff parking and these areas will be separate from designated machinery/plant parking.

A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.

A series of ‘way finding’ signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.

On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and sent for reuse as by-products or recovery at authorised facilities and the site compound area reinstated in full on completion of the works.

## 7. In-combination Impacts

Article 6(3) of the Habitats Directive requires that:

*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-combination impacts refer to a series of individually modest impacts that may in combination produce a significant impact. The underlying intention of this in combination provision is to take account of in-combination impacts from existing or proposed plans and projects and these will often only occur over time.

A range of mitigation measures will be implemented during construction to effectively prevent adverse effects on water quality during construction. The measures to be implemented will effectively prevent any significant discharges of hydrocarbons or excess levels of silt from the individual elements of the project thus ensuring that no in-combination impacts will occur. Furthermore, operational design measures will ensure there are no impacts on local water quality and therefore no in-combination impacts from operational surface water discharges will occur.

In the absence of mitigation, the proposed development has the potential to contribute to cumulative effects on water quality when considered in combination with other plans and projects within the catchment. However, having regard to the scale of the proposed development, the treatment of wastewater at a licensed facility, and the implementation of SuDS measures to control surface water runoff, it is concluded that the development will not contribute to adverse in-combination effects on the integrity of European sites.

# 8. Conclusions

The AA screening concluded, on the basis of objective information and in view of best scientific knowledge, the possibility of significant effects from the proposed project on European sites could not be ruled out and therefore an Appropriate Assessment was required. The AA screening concluded that there was potential for the proposed development to significantly impact the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, via surface water runoff/discharges during construction and operation and in-combination impacts.

The NIS has been prepared to inform and assist the competent authority to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

This NIS has examined and analysed, in light of the best scientific knowledge, with respect to Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA within the potential likely zone of impact of the proposed development, the potential effect pathways, how these could impact on qualifying species and habitats and whether the predicted effects would adversely affect the integrity of these European sites.

Mitigation measures are set out in **Section 6** of the NIS and they ensure that any effects on the conservation objectives of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA will be avoided during the proposed development such that there will be no risk of adverse effects on the integrity of these European sites.

It has been objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted effects from the proposed development and with the implementation of the mitigation measures proposed, that the construction and operation of the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in combination with other plans or projects. There is no reasonable scientific doubt in relation to this conclusion. The competent authority will make the final determination in this regard.

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# Appendices

# Appendix 1. Site synopses

**SITE NAME: RIVER SHANNON AND RIVER FERGUS ESTUARIES SPA SITE CODE: 004077**

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry.

The site has vast expanses of intertidal flats which contain a diverse macro- invertebrate community, e.g. Macoma-Scrobicularia-Nereis, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light- bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (57,133 - five year mean for the period 1995/96 to 1999/2000), a concentration easily of international importance. The site has internationally important populations of Light-bellied Brent Goose (494), Dunlin (15,131), Black-tailed Godwit (2,035) and Redshank (2,645). A further 17 species have populations of national importance, i.e. Cormorant (245), Whooper Swan (118), Shelduck (1,025), Wigeon (3,761), Teal (2,260), Pintail (62), Shoveler (107), Scaup (102), Ringed Plover (223), Golden Plover (5,664), Grey Plover (558), Lapwing (15,126), Knot (2,015), Bar-tailed Godwit (460), Curlew (2,396), Greenshank (61) and Black-headed Gull (2,681) - figures are five year mean peak counts for the period 1995/96 to 1999/2000. The site is among the most important in the country for several of these species, notably Dunlin (13 % of national total), Lapwing (6% of national total) and Redshank (9% of national total).

The site also supports a nationally important breeding population of Cormorant (93 pairs in 2010).

Other species that occur include Mute Swan (103), Mallard (441), Red-breasted Merganser (20), Great Crested Grebe (50), Grey Heron (38), Oystercatcher (551),

Turnstone (124) and Common Gull (445) - figures are five year mean peak counts for the period 1995/96 to 1999/2000.

Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn.

The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.

**Site Name: Lower River Shannon SAC Site Code: 002165**

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 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. Rivers within the sub-catchment 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 Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

[1110] Sandbanks
[1130] Estuaries
[1140] Tidal Mudflats and Sandflats
[1150] Coastal Lagoons*
[1160] Large Shallow Inlets and Bays
[1170] Reefs
[1220] Perennial Vegetation of Stony Banks
[1230] Vegetated Sea Cliffs
[1310] Salicornia Mud
[1330] Atlantic Salt Meadows
[1410] Mediterranean Salt Meadows
[3260] Floating River Vegetation
[6410] Molinia Meadows
[91E0] Alluvial Forests*
[1029] Freshwater Pearl Mussel (Margaritifera margaritifera) [1095] Sea Lamprey (Petromyzon marinus)
[1096] Brook Lamprey (Lampetra planeri)
[1099] River Lamprey (Lampetra fluviatilis)
[1106] Atlantic Salmon (Salmo salar)
[1349] Bottle-nosed Dolphin (Tursiops truncatus)
[1355] Otter (Lutra lutra)

The Shannon and Fergus Rivers flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate (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.

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 eelgrass (Zostera spp.) beds 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. For example, 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 Sea-spurrey (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 species Common Saltmarsh-grass (P. maritima) and Hard-grass (Parapholis strigosa).

Saltmarsh vegetation also occurs around a number of lagoons within the site, two of which have been surveyed as part of a National Inventory of Lagoons. 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 subsp. maritima), Sea Campion (Silene vulgaris subsp. maritima), Thrift and plantains (Plantago spp.). A rare endemic type of sea-lavender, Limonium recurvum subsp. pseudotranswallianum, 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 Common 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.

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 the Purple Sea Urchin 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 18 m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as Fucus spp., Ascophyllum nodosum and kelps), shingle beaches (with 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 (e.g. in the area from Kerry Head to Beal Head) and sand dunes (a small area occurs at Beal Point, where Marram – Ammophila arenaria is the dominant species).

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 is broad, generally slow flowing and naturally eutrophic; the Fergus is 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. Semi-natural habitats, such as wet grassland, wet woodland and marsh occur by the rivers, but improved grassland is the most common habitat type. 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 (Juncus spp.) and sedges (Carex spp.),

and supporting a diverse and species-rich vegetation, including such uncommon species as Blue-eyed Grass (Sisyrinchium bermudiana) and Pale Sedge (C. pallescens).

Floating river vegetation characterised by species of water-crowfoot (Ranunculus spp.), pondweeds (Potamogeton spp.) and the moss Fontinalius antipyretica are present 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 Co. 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 50 m 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 Rusty Willow (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 river side 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 there are signs that it is invading open grassland. Alder is the principal tree species, with occasional Pedunculate Oak (Quercus robur), elm (Ulmus glabra and U. procera), Hazel (Corylus avellana), Hawthorn (Crataegus monogyna) and the shrubs Guelder-rose (Viburnum opulus) and willows. The ground flora is species- rich.

While woodland is infrequent within the site, however Cahiracon Wood contains a strip of old oak woodland. Sessile Oak (Q. 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 2 km 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 features prominent Great wood-rush and Bilberry (Vaccinium myrtillus), along with a typical range of woodland herbs. Bracken (Pteridium aquilinum) is a feature in areas where there is more light available.

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 approximately 5 km north-west of Cappamore in Co. Limerick. The bog contains some wet areas with good cover of bog mosses (Sphagnum spp.). Species of particular interest include Cranberry (Vaccinium oxycoccos) and White Sedge (Carex curta), along with two regionally rare mosses, including the bog moss S. fimbriatum. The site is being invaded by Downy Birch (Betula pubescens) scrub woodland. Both commercial forestry and the spread of Rhododendron (Rhododendron ponticum) has greatly reduced the overall value of the site.

A number of plant species that are listed in the Irish Red Data Book occur within the site, and several of these are protected under the Flora (Protection) Order, 1999. These include Triangular Club-rush (Scirpus triquetrus), a species which is only found in Ireland only in the Shannon Estuary, where it borders creeks in the inner estuary. Opposite-leaved Pondweed (Groenlandia densa) is found in the Shannon where it passes through Limerick City, while Meadow Barley (Hordeum secalinum) is abundant in saltmarshes at Ringmoylan and Mantlehill. Hairy Violet (Viola hirta) occurs in the Askeaton/Foynes area. Golden Dock (Rumex maritimus) is noted as occurring in the River Fergus estuary. Finally, Bearded Stonewort (Chara canescens), a brackish water specialist, and Convergent Stonewort (Chara connivens) are both found in Shannon Airport Lagoon.

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 (1,062; 1995/96), Curlew (1,504; 1995/96), Redshank (3,228; 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 (4,010 individuals at Loop Head, 1987).

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be 140 ± 12 individuals. 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 species 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 land uses within the site. The most common use of the terrestrial parts is grazing by cattle, and some areas have been damaged through over-grazing 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 where it reflects the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences of 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 habitats lagoon and alluvial woodland, 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.

## Appendix 2. Drawings