SHANNON TOWN AND ENVIRONS FLOOD RELIEF SCHEME

Office of Public Works Ground Investigation Works
Screening for Appropriate Assessment

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Contents

Tables

Figures

Appendices

GLOSSARY

Term	Meaning
Annex I habitat	Habitat types listed on Annex I of the EU Habitats Directive whose conservation requires the designation of Special Areas of Conservation.
Annex II species	Species listed on Annex II of the EU Habitats Directive whose conservation requires the designation of Special Areas of Conservation.
Annex IV species	Species listed on Annex IV of the EU Habitats Directive which are afforded strict protection under EU and national legislation.
Appropriate Assessment	An assessment carried out under Article 6(3) of the Habitats Directive as to whether or not a proposed development would adversely affect the integrity of a European site
Appropriate Assessment Conclusion Statement	The determination by the competent or public authority under Article 6.3 of the Habitats Directive on an appropriate assessment and the reasons for the determination.
Biodiversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (UN Convention on Biological Diversity 1992).
Birds Directive	Council Directive 2009/147/EC on the conservation of wild birds
Catchment	An area of land contributing to a river, lake or other waterbody
Competent Authority	The term 'Competent Authority' is construed in accordance with section 177S of the Planning and Development Act 2000 as amended.
Cumulative Impacts	The addition of many minor or significant effects, including effects of other plans and projects, to create larger, more significant effects
Designated sites	Sites which have special status as protected areas because of their natural and cultural importance.
Disruption	Disruption caused to species or habitats for which the European site is selected.
Disturbance	Disturbance caused to species or habitats for which the European site is selected.
Ecology	The study of the inter-relationships between living organisms and their environment
Effect	The consequence of the impact on the environment
European Commission	The Commission of the European Communities.
European site	'European site' has the meaning given to it by section 177R of Part XAB. Collective term used when referring to nature conservation sites protected under the Habitats or Birds Directives (SACs or SPAs).
Ex situ	Outside – usually in the context of ex situ effects (or outside effects) on a European site. For example, abstraction of water from a river upstream of a European site located on the river could have an ex situ effect on the site.
Fragmentation	Impacting the connectivity of the site due to the works fragmenting the area which will have a direct impact to species or habitats.
Groundwater Vulnerability	Groundwater vulnerability denotes the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities
Habitat	A place in which a particular plant or animal lives. Often used in a wider sense, referring to major assemblages of plants and animals found together such as woodlands or grassland.
Habitats Directive	Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EU Habitats Directive).
Impact	Changes to the environment resulting from the implementation of project.
In situ	Inside or within – usually in the context of in situ effects (or effects within) on a European site. For example, constructing a marina on the lakeshore in a European site could have an in-situ effect.
Indirect Impact	Impacts on the environment, which are not a direct result of the project, often produced away from (the site) or as a result of a complex pathway.
Loss	Impact relating to loss of habitat, significance directly relating to the percentage of loss.
Magnitude	The size, extent and duration of an impact.
Mitigation Measures	Measures designed to avoid, reduce, remedy or offset impacts. These measures can mitigate impacts.
Moderate Effect	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.

Term	Meaning
Monitoring	The observation, measurement and evaluation of environmental data over a period of time, to assess the efficiency of control measures. This is typically a repetitive and continued process carried out during construction, operation or decommissioning of a project.
Natura 2000	The Natura 2000 network is defined under the Habitats Directive 92/43/EEC (Article 3) and the Birds Directive 2009/147/EC (Article 4) as a coherent European ecological network of Special Areas of Conservation (SAC) and Special Protection Areas (SPA).
Natura Impact Statement (NIS)	'Natura impact statement' shall be construed in accordance with section 177T of the Planning and Development Act 2000 (as amended). The report of a scientific examination of a plan or project and the relevant European sites, to identify and characterise any possible implications for the site in view of the site's conservation objectives, to enable a consent authority to carry out an appropriate assessment.
Non-statutory stakeholder	Organisations with whom the regulatory authorities may choose to engage who are not designated in law but are likely to have an interest in a proposed development.
Pathway	The route by which an effect is conveyed between a source and a receptor.
Precautionary principle	A principle underlying the concept of sustainable development which implies that prudent action be taken to protect the environment even in the absence of scientific certainty.
Prescribed bodies	Organisations that are required to be consulted by the Regulatory Authorities, and who also have a duty to respond to that consultation within a set deadline. This includes consultees that the Applicant is required to consult with. Not all consultees will be statutory consultees.
Priority Annex I habitat	Annex I habitat types which are in danger of disappearance, and for which the European Community has particular responsibility in view of the proportion of their natural range which falls within the territory. Priority habitats are indicated by an asterisk (*) in Annex I of the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
Priority species	Species for the conservation of which the Community has particular responsibility in view of the proportion of their natural range which falls within the territory, these priority species are indicated by an asterisk (*) in Annex II of the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. At present, Ireland does not have any priority species.
Public Authority	The term 'Public Authority' is construed in accordance with Part 1(2)(1) of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I No 477/2011 as amended
Qualitative effect	An effect on the environment which cannot be measured precisely but can be determined by expert judgement
Quantitative effect	An effect on the environment that can be stated in figures/measurements
Receptor	The Special Conservation Interests (SCI) of SPAs or QI SACs for which conservation objectives have been set for the European sites being assessed.
Screening for Appropriate Assessment (AA)	The screening of a plan or project to establish if an appropriate assessment of the plan or project is required. The Screening for AA assesses whether, in view of best scientific knowledge, if the proposed development, individually or in combination with other plans or projects is likely to have a significant effect on a European site.
SEVESO Site	The catastrophic accident in the Italian town of Seveso in 1976 prompted the adoption of legislation the so-called Seveso-Directive (Directives 82/501/EEC - 2012/18/EU). The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implement the Seveso III Directive (2012/18/EU).
Significant Effect	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Source	The individual element of the proposed works that has the potential to impact on a European site, its qualifying features and its conservation objectives
Source-Pathway-Receptor model	A source-pathway-receptor model is a standard tool used in environmental assessment. In order for an effect to be likely, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism results in no likelihood for the effect to occur.
Special Areas of Conservation (SACs)	SACs are sites designated under European Communities Directive 92/43/EEC known as the 'Habitats Directive'. This requires the conservation of important, rare or threatened habitats and species across Europe. SACs are composed of sites hosting the Qualifying Interest (QI) habitat types listed in Annex I and/or species listed in Annex II (under Habitats Directive Article 3).
Special Protection Areas (SPAs)	SPAs are sites designated under the European Communities Directive 2009/147/EC, known as the 'Birds Directive', to conserve the habitats of certain migratory or rare birds. SPAs are composed of sites supporting Special Conservation Interests (SCI) comprising Annex I bird species, regularly occurring migratory species and the supporting wetland habitats (under Article 4 Birds Directive).
Swallow Hole	A place where surface stream disappears underground in a limestone region.
Water Framework Directive (WFD)	The Water Framework Directive (2000/60/EC) requires all member states of the EU protect and improve the quality of their water within their respective states. This aims to achieve good ecological status of at least good by 2027 at the latest. It applies to rivers, lakes, groundwater, and transitional coastal waters.
Zone of Influence (ZOI)	The ZoI of the proposed development is determined by assessing the project's requirements and deliverables against the sensitive environmental receptors within the project footprint, in addition to environmental receptors that could be connected to and subsequently impacted by the project through abiotic and biotic vectors. The ZoI is identified using a source-pathway-receptor model of effects.

1 INTRODUCTION

RPS Consulting Engineers have been commissioned to assist in the delivery of the Shannon Town and Environs Flood Relief Scheme (FRS), hereafter referred to as the Shannon FRS. The objective of this project is the identification, design and submission (for planning consent) of a Flood Scheme, that is technically, socially, environmentally and economically acceptable, to alleviate the risk of flooding to the Community of Shannon to a determined Standard of Protection, and to procure, manage and oversee the construction of that Scheme, see **Figure 1-1** for Shannon Town and Environs FRS study area.

The overall project is divided into five stages which are as follows:

- **Stage I:** Identification and Development of a Preferred Scheme
- **Stage II:** Planning process
- **Stage III:** Detailed Construction Design, Compilation of Work Packages and the Preparation of Tenders for Contracts
- **Stage IV:** Construction Supervision and Project Management Services
- **Stage V:** Handover of Works

The project is currently at Stage I. As part of the works, it is proposed to conduct site investigation works to inform the geotechnical assessment, otherwise known as Ground Investigation (GI) works. The proposed GI works assessed in this report will contribute to the identification and development of a preferred scheme as well as the detailed design as the project progresses.

1.1 Consent Process

The overall proposed GI works for the project will consist of two sets of GI works, this is the result of the works taking place within lands (flood embankments) under two separate ownerships/control. As a result, there will be two separate statutory approval processes and AA for the proposed GI works in accordance with relevant legislation:

1. Bunratty Rineanna Embankment Scheme – Office of Public Works (OPW) has maintenance responsibilities of said embankment and therefore the OPW is the public authority in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 as amended and will conduct the AA on the application for consent. The works will be carried out under the Arterial Drainage Act 1945.
2. Shannon Airport Embankment Scheme – Shannon Airport Authority (SAA) has ownership of said embankment and therefore Clare County Council is the competent authority under the Planning and Development Act 2000 as amended, who will conduct the AA on the planning application.

This AA Screening is for the GI works on the Bunratty Rineanna Embankment Scheme and the OPW is therefore the public authority.

The proposed GI works, for the individual applications and cumulatively, are not of a type of project listed Annex I or Annex II of the EIA Directive 2011 as amended or specified under Article 24 of the European Communities (Environmental Impact Assessment) Regulations 1989 (S.I. No. 349 of 1989), as amended and are therefore not subject to EIA. The proposed GI works will contribute to the identification and development of a preferred scheme, however they do not constitute an individual element of the overall development, which will be subject to EIA. Therefore, the applications for consent cannot be construed as "project splitting" a term used to describe splitting up a project to avoid or circumvent the obligations of the EIA Directive.

The term "project splitting" is not relevant to AA as all plans and projects not directly connected with or necessary to the management of a European site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, is subjected to AA of its implications for the site in view of the site's conservation objectives. Therefore, both applications for the GI works will be subject to AA by the relevant competent (public) authority and the in-combination effects of same will also be considered in both assessments.

Figure 1-2 shows the proposed works area for SAA and **Figure 1-3** shows the proposed works area for the OPW maintained embankments.

RPS has prepared a Screening for Appropriate Assessment (AA) Report to provide the OPW, as the public authority, the necessary scientific information required to carry out the Screening for AA, in view of best scientific knowledge and in view of the conservation objectives of the site, if the GI works, individually or in combination with other plans or projects are likely to have a significant effect on a European site.

1.2 Legislative Context for Appropriate Assessment

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as "The Habitats Directive", provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000.

The Natura 2000 network is defined under the Habitats Directive 92/43/EEC (Article 3) and the Birds Directive 2009/147/EC (Article 4) as a coherent European ecological network of Special Areas of Conservation (SAC) and Special Protection Areas (SPA). SACs are composed of sites hosting the Qualifying Interest (QI) habitat types listed in Annex I and/or species listed in Annex II (under Article 3 Habitats Directive). SPAs are composed of sites supporting Special Conservation Interests (SCI) comprising Annex I bird species, regularly occurring migratory species and the supporting wetland habitats (under Article 4 Birds Directive). The purpose of the network is to enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.

The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Act, 2000, as amended and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended. In Ireland, these SAC and SPA sites are included within the meaning of 'European site' as per section 177U of the Planning and Development Act, 2000 as amended and Part 1(2) of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

Articles 6(3) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of Natura 2000 [*European*] sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

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

1.2.1 Role of the Public Authority

In accordance with Regulation 42 of the European Communities (Birds and Natural Habitats) Regulations 2011 S.I No 477/2011 as amended, the Screening for AA of an application for consent for proposed development shall be carried out by the public authority, namely the OPW, to assess in view of best scientific knowledge and in view of the conservation objectives of the site, if the GI works, individually or in combination with other plans or projects are likely to have a significant effect on a European site.

1.3 Statement of Authority

This report has been prepared by Sheila Murphy BSc, MSc, ACIEEM and reviewed by Paula Kearney BSc, CEcol MCIEEM. Sheila is a Senior Project Ecologist with RPS, and she holds a BSc (Hons) in Environmental Science, and MSc in Biodiversity and Conservation, she is an associate member of CIEEM (ACIEEM). Paula is Technical Director in Ecology with RPS and holds a BSc Ecology and is a Chartered Ecologist (CEcol) and full member of CIEEM (MCIEEM), with 19 years' experience in ecological assessment and AA.

1.4 Site Location

The site location of the proposed GI works is within the Shannon Town and Environs Flood Relief Scheme study area, encompassing Shannon Town and Shannon Airport.

The scheme study area consists of:

- The area within which physical works are proposed to be constructed, accessed and maintained as part of any feasible scheme;
- Areas that are intended to benefit from, and be protected by, any such scheme; and
- Lengths of river channel / watercourse upstream and downstream that are likely to be impacted hydraulically by such scheme.

Figure 1-1 below shows the proposed scheme are, see **Appendix A** for the locations of the proposed GI works within the study area. **Figure 1-2** shows the proposed works area for SAA and **Figure 1-3** shows the proposed works area for the OPW maintained embankments.

Figure 1-1: Shannon Flood Relief Scheme Study Area

Figure 1-2: Shannon Airport Authority Works Area

Figure 1-3: OPW Works Area

2 METHODOLOGY

2.1 Appropriate Assessment Methodology

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) of that Directive. The methodology followed in relation to this assessment has had regard to the following guidance and legislation:

Guidance

- EC (2000). *Communication from the Commission on the Precautionary Principle*. Office for Official Publications of the European Communities, Luxembourg;
- EC (2002). *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*, Office for Official Publications of the European Communities, Luxembourg. European Commission;
- EC, 2007b, *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC*. European Commission;
- DoEHLG (2009, rev. 2010) *Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities.* Department of the Environment, Heritage and Local Government;
- EC (2013). *Interpretation Manual of European Union Habitats*. Version EUR 28. European Commission, Luxembourg;
- Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. & Fuller, R.J. 2013. *Bird Atlas 2007–11: The Breeding and Wintering Birds of Britain and Ireland*. BTO Books, Thetford;
- NPWS (2013). Ireland's Summary Report for the period 2008 – 2012 under Article 12 of the Birds Directive. National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland;
- EC (2018). *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*, Office for Official Publications of the European Communities, Luxembourg;
- CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Chartered Institute of Ecology and Environmental Management;
- NPWS (2019), *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments* Volume 2. Version 1.0. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland; and
- NPWS (2019), *The Status of EU Protected Habitats and Species in Ireland. Species Assessments* Volume 3, Version 1.0. Unpublished Report, National Parks and Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Legislation

- European Union (Environmental Impact Assessment and Habitats) Regulations 2011 S.I No 473/2011 as amended,
- European Communities (Birds and Natural Habitats) Regulations 2011 S.I No 477/2011 as amended;
- Planning and Development Act 2000, as amended;
- Planning and Development Regulations 2001, as amended; and
- Recent Irish and European case law on the Habitats Directive.

2.2 Stages of Appropriate Assessment

The Department of the Environment Heritage and Local Government guidelines (DoEHLG, 2010)[1] outlines the European Commission's methodological guidance (EC, 2002) promoting a four-stage process to complete the AA and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in **Figure 2-1** below, and an outline of the steps and procedures involved in completing each stage follows. Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

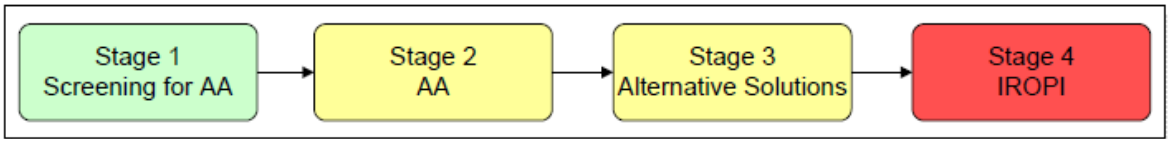

Figure 2-1: Four Stages of Appropriate Assessment

2.2.1 Stage 1 – Screening for Appropriate Assessment

Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

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

In complying with the obligations under Article 6(3) and following the EC2002 and EC2018 Guidelines, this AA has been structured as a stage by stage approach as follows:

Stage 1 - Screening for AA

- Description of the project;
- Identification of European sites potentially affected;
- Identification and description of individual and cumulative impacts likely to result;
- Assessment of the significance of the impacts identified above on site integrity;
- Exclusion of sites where it can be objectively concluded that there will be no significant effects; and
- Screening conclusion.

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

2.2.2 Stage 2 – Appropriate Assessment (Natura Impact Statement)

The aim of Stage 2 of the AA process is to identify any adverse impacts that the plan or project might have on the integrity of relevant European sites. As part of the assessment, a key consideration is 'in combination' effects with other plans or projects. Where adverse impacts are identified, mitigation measures

[1] Now the Department of Culture, Heritage and the Gaeltacht

can be proposed that would avoid, reduce or remedy any such negative impacts and the plan or project should then be amended accordingly, thereby avoiding the need to progress to Step 3.

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The proponent of the plan or project will be required to submit a Natura Impact Statement, i.e. the report of a targeted professional scientific examination of the plan or project and the relevant European sites, to identify and characterise any possible implications for the site in view of the site's conservation objectives, taking account of in-combination effects. This should provide information to enable the public authority to carry out the AA.

If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed to Stage 3, or the plan or project should be abandoned. The competent or public authority must make a determination to that effect before proceeding to the next stage.

2.2.3 Stage 3 – Alternative Solutions

If it is not possible during the stage 2 to reduce impacts to acceptable, non-significant levels by avoidance and/or mitigation, stage 3 of the process must be undertaken which is to objectively assess whether alternative solutions exist by which the objectives of the plan or project can be achieved. Explicitly, this means alternative solutions that do not have negative impacts on the integrity of a European site. It should also be noted that EU guidance on this step of the process states that, 'other assessment criteria, such as economic criteria, cannot be seen as overruling ecological criteria' (EC, 2002). In other words, if alternative solutions exist that do not have negative impacts on European sites; they should be adopted regardless of economic considerations.

The process must return to Stage 2, as any alternative proposal must be subject to a Stage 2 AA before it can be subject to the Article 6(4) test. If it can be demonstrated that all reasonable alternatives have been considered and assessed, the AA progresses to Stage 4.

2.2.4 Stage 4 – Imperative Reasons for Overriding Public Interest (IROPI)

This stage of the process is undertaken when it has been determined that negative impacts on the integrity of a European site will result from a plan or project and there are no alternative solutions. At this stage of the AA process, it is the characteristics of the plan or project itself that will determine whether or not the public authority can allow it to progress. This is the determination of IROPI.

Stage 4 of the process defines and describes these compensatory measures. The Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister of Housing, Planning and Local Government.

In the case of European sites that include in their qualifying features 'priority' habitats or species, as defined in Annex I and II of the Directive, the demonstration of 'over-riding public interest' is not sufficient and it must be demonstrated that the plan or project is necessary for 'human health or public safety, to beneficial consequences of primary importance for the environment or , further to an opinion from the Commission, to other imperative reasons of overriding public interest'.

For the proposed project, a Screening for AA is presented in **Section 5**.

2.3 Study Area and Zone of Influence

2.3.1 Study Area

The study area is Shannon Town and Shannon Airport in County Clare as shown in **Figure 1-1**.

2.3.2 Establishing a Zone of Influence

The identification of relevant European sites to be included in this report was based on the identification of the Zone of Influence (ZoI) of the proposed development using a source-pathway-receptor model of effects, and the likely significance of any identified effects.

2.3.2.1 Source- Pathway-Receptor Model

The likely effects of the proposed development on any European site from has been assessed using a source-pathway-receptor model, where:

- A 'source' is defined as the individual element of the proposed works that has the potential to impact on a European site, its qualifying features and its conservation objectives:
- A 'pathway' is defined as the means or route by which a source can affect the ecological receptor; and
- A 'receptor' is defined as the SCI of SPAs or the QI of SACs for which conservation objectives have been set for the European sites being assessed.

A source-pathway-receptor model is a standard tool used in environmental assessment. In order for an effect to be likely, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism results in no likelihood for the effect to occur. The source-pathway-receptor model was used to identify the European sites, and their QIs/SCIs, to which the proposed development site could be potentially linked.

2.3.2.2 Zone of Influence

Determination of the project's ZoI was achieved by assessing the project's requirements and deliverables against the ecological receptors within the project footprint, in addition to all ecological receptors that could be connected to and subsequently impacted by the project through abiotic and biotic vectors.

The proximity of the proposed development to European sites, and more importantly QIs/SCIs of the European sites, is of importance when identifying potentially likely significant effects. A conservative approach has been used, which minimises the risk of overlooking distant or obscure effect pathways, while also avoiding an over reliance on buffer zones (e.g. 15 km), within which all European sites should be considered. This approach follows the DoEHLG 2010 guidance on AA which states that:

"*For projects, the distance could be much less than 15 km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects*" (DoEHLG, 2010; p.32, para 1).

The proposed development has been evaluated based on an identified ZoI with regard to the potential impact pathways to ecological feature (e.g. mobile and static). The ZoI of the proposed development on mobile species (e.g. birds, mammals, and fish), and static species and habitats (e.g. saltmarshes, woodlands, and flora) is considered differently. Mobile species have 'range' outside of the European site in which they are QI/SCI. The range of mobile QI/SCI species varies considerably, from several metres (e.g. in the case of whorl snails *Vertigo* spp.), to hundreds of kilometres (in the case of migratory wetland birds). Whilst static species and habitats are generally considered to have ZoIs within close proximity of the proposed development, they can be significantly affected at considerable distances from an effect source; for example, where an aquatic QI habitat or plant is located many kilometres downstream from a pollution source.

Hydrological linkages between a proposed development and European site (and their QIs/SCIs) can occur over significant distances, however any effect will be site specific depending on the receiving water environment, nature of the linkage and consequent nature of the potential impact. The study area is located in the Ballygirreen sub catchment area SC_010 (ID 27_11) within Shannon Estuary North (ID 27) Catchment area. As a precautionary measure, a reasonable worst-case ZoI for water pollution from the proposed development site extends downstream to the Upper Shannon Estuary.

Hydrogeological linkages between a proposed development and European site (and their QIs/SCIs) are highly variable based on the characteristics of the groundwater body, construction methodologies, operational practices, and the presence of groundwater dependant habitats and species. The study area is located within the Tulla-Newmarket-on-Fergus (IE_SH_G_229) groundwater body. As a precautionary measure, a reasonable worst-case ZoI for water pollution from the proposed ground investigation works in this instance is considered to comprise the entirety of each groundwater body the proposed works overlies.

The zone of influence is therefore combined to capture 15km around the proposed development and includes hydrological and hydrogeological connectivity, see **Figure 2-2**.

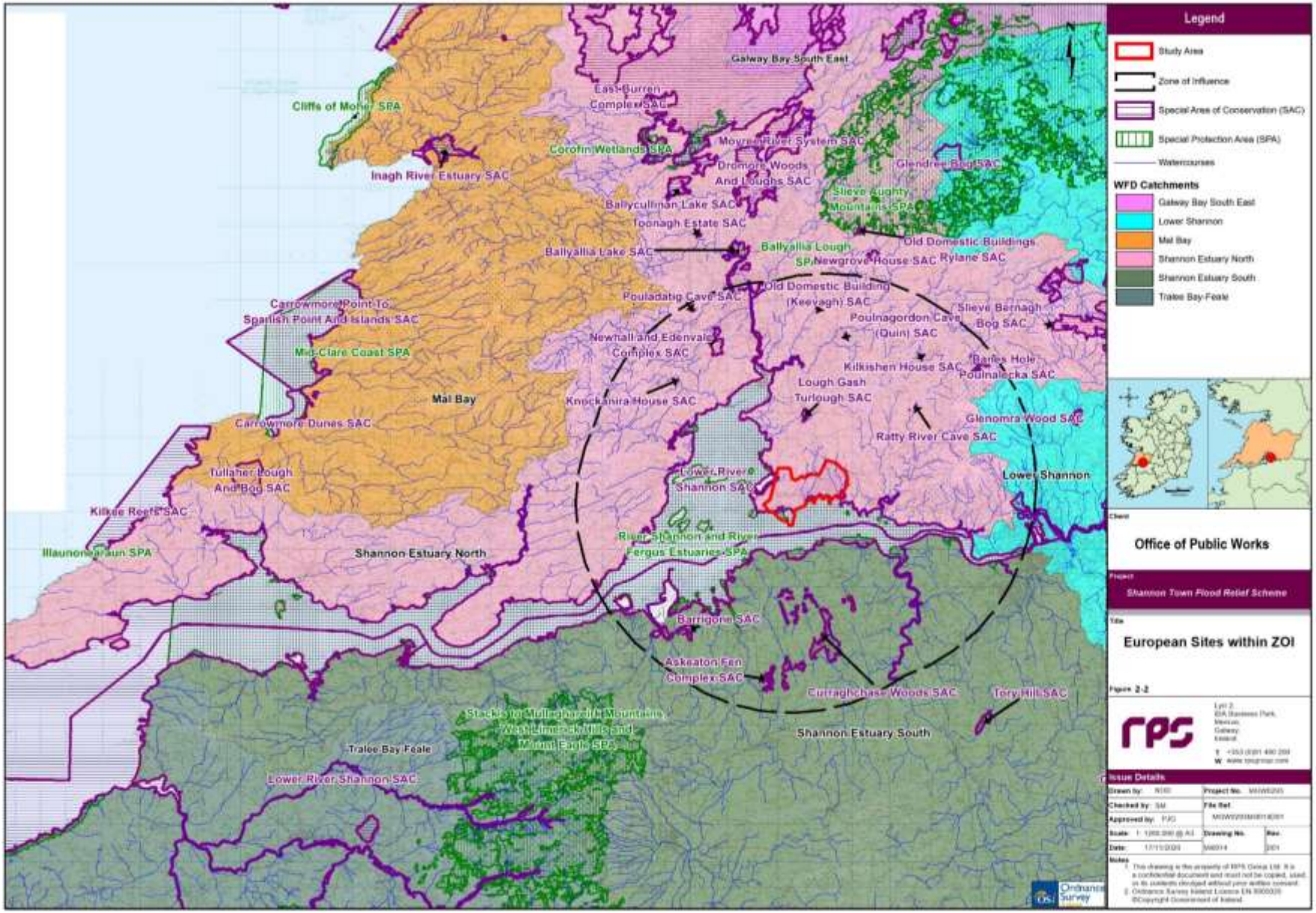

Figure 2-2: Zone of Influence

2.4 Desk Study

A desk study was completed to assess the potential for the QI and SCI of European sites to occur within the ZoI, given their ecological requirements identified by Balmer *et al*. (2013) for SCIs, and the National Parks and Wildlife Service (NPWS) for QIs (NPWS, 2019, Volumes 1, 2 &3).

SCI birds and mobile QI species can travel many kilometres from their core areas, and desktop surveys assessed the potential presence of such species beyond the defined boundaries of the European sites for which they are listed as QIs/SCIs. Desktop studies had particular regard for the following sources:

- Information on the location, nature and design of the proposed project;
- Department of Housing, Planning, Community and Local Government – online land-use mapping www.myplan.ie/en/index.html;
- Environmental Protection Agency (EPA) online interactive mapping tools (https://gis.epa.ie/EPAMaps) and (https://www.catchments.ie/maps/) for water quality data including surface and ground water quality status, and river catchment boundaries;
- Information on ranges of mobile QI populations in Volume 1 of NPWS' Status of EU Protected Habitats and Species in Ireland (NPWS, 2019a), and associated digital shapefiles obtained from the NPWS Research Branch;
- Inland Fisheries Ireland mapping (http://wfdfish.ie/);
- BirdWatch Ireland (https://birdwatchireland.ie/) ;
- Mapping of European Site boundaries and Conservation Objectives for relevant sites, available online from the NPWS included site synopsis, Natura 2000 Data form and Conservation Objective Supporting Documents where available (https://www.npws.ie/protected-sites);
- Distribution records for QI and SCI species of European sites held online by the National Biodiversity Data Centre (NBDC) www.biodiversityireland.ie;
- Geohive online Environmental Sensitivity Mapping tool (https://airomaps.geohive.ie/ESM/);
- Boundaries for catchments with confirmed or potential freshwater pearl mussel (FWPM) *Margaritifera* populations in GIS format available online from the NPWS;
- Geological Survey Ireland (GSI) (https://www.gsi.ie/en-ie/Pages/default.aspx); and
- Any local surveys of flora, fauna and habitat available using the Heritage Councils mapping website (https://heritagemaps.ie/WebApps/HeritageMaps/index.html)
- Information on the River Basin Management Plan 2018 – 2021 - https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf; and
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie.

2.5 Walkover Surveys and Site Visits

Following a full desktop study of available biological information pertaining to the study area, ecological site walkovers were conducted by RPS Ecologists on the 28th September 2020.

The data collected during this survey provided detailed information on the existing environment. The survey assessed the potential for QIs/SCIs of European sites within the ZoI of the proposed development and invasive species listed in the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 as amended, to occur within the proposed development boundary.

Under Regulation 49(2) of the 2011 Regulations, it is an offence to plant, disperse, allow or cause to disperse, spread or otherwise cause to grow in any place, any plant included in Part 1 of the Third Schedule without a licence from the Minister for Culture, Heritage and the Gaeltacht.

The findings of the site visit are provided in **Section 4.1.**

3 PROJECT DESCRIPTION

3.1 Need for the Proposed GI Works

The GI works are required to inform the option selection and design of the proposed Shannon Town and Environs Flood Relief Scheme FRS. The objective of the GI works is to establish ground conditions within the study area and contribute towards the option selection process for the proposed FRS.

3.2 Location of the Proposed GI Works

The GI sites are primarily located within or adjacent to existing flood embankments on the edge of the River Shannon estuary in proximity to residential and industrial areas. **Figure 1-3** illustrates the GI works within the OPW owned embankments.

3.3 Proposed GI Works

The proposed preliminary GI works will consist of the following:

- 24 No. Borehole Cable Percussion
- 19 No. Cone Penetration Tests
- 3 No. Borehole Rotary Core
- 21 No. Groundwater Standpipes.

The proposed works will take approximately 4 months to complete, see **Appendix A** for details of GI locations and **Table 3-1** for the GI locations and proximity to European sites.

Table 3-1 GI Locations and proximity to European Sites

Location ID	Easting (ITM)	Northing (ITM)	Depth (m)	Remarks	SAC	SPA
BH/CPT179	541427	661156	15	Rotary pre-drill for CPT may be required.	Adjoining	Within
BH/CPT181	541554	661306	15	Rotary pre-drill for CPT may be required.	Within	Within
BH/CPT183	541750	661320	15	Rotary pre-drill for CPT may be required.	Within	Within
BH/CPT185	541947	661285	15	Rotary pre-drill for CPT may be required.	Within	Adjoining
BH/CPT187	542106	661166	15	Rotary pre-drill for CPT may be required.	Within	Adjoining
BH/RC155	539618	661206	20	Groundwater standpipe	Within	Adjoining
BH/RC158	539766	661130	20	Groundwater standpipe	Within	Adjoining
BH156	539660	661180	15	Groundwater standpipe	Within	Adjoining
BH160	539849	660972	15	Groundwater standpipe	Within	Within
BH161	539950	661119	15	Groundwater standpipe	Within	Within
BH164	540110	661251	15	Groundwater standpipe	Within	Within
BH165	540218	661284	15	Groundwater standpipe	Within	Within
BH167 (GEOBOR)	540357	661347	20	Groundwater standpipe	Within	Within
BH171	540735	661285	15	Groundwater standpipe	Within	Within
BH172	540790	661305	15	Groundwater standpipe	Within	Within
BH175	541008	661299	15	Groundwater standpipe	Within	Within
BH177	541090	661255	15	Groundwater standpipe	Within	Adjoining
BH178	541369	661075	15	Groundwater standpipe	Adjoining	Adjoining
BH180	541478	661242	15	Groundwater standpipe	Adjoining	Adjoining
BH182	541651	661329	15	Groundwater standpipe	Within	Within
BH184	541849	661306	15	Groundwater standpipe	Within	Within
BH186	542031	661231	15	Groundwater standpipe	Within	Within

Location ID	Easting (ITM)	Northing (ITM)	Depth (m)	Remarks	SAC	SPA
BH188	542377	660823	15	Groundwater standpipe	Within	Within
BH190	542543	660814	15	Groundwater standpipe	Within	Within
CPT152	539448	661204	15	Rotary pre-drill for CPT may be required.	Within	Adjoining
CPT153	539547	661230	15	Rotary pre-drill for CPT may be required. Groundwater standpipe	Within	Adjoining
CPT154	539601	661230	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT159	539784	661074	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT162	539987	661169	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT163	540064	661219	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT166	540273	661315	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT168	540423	661343	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT169	540518	661297	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT170	540638	661233	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT173	540861	661329	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT174	540961	661320	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT176	541053	661277	15	Rotary pre-drill for CPT may be required.	Within	Within
CPT189	542428	660824	15	Rotary pre-drill for CPT may be required.	Within	Within
RC157	539693	661160	20	Groundwater standpipe	Within	Within

3.3.1 GI Works Methodology

3.3.1.1 Boreholes

Two types of borehole methods will be implemented in the GI works, including cable percussive and rotary along with Cone Penetration Testing (CPT). The following gives a detailed description on how each method will be undertaken.

3.3.1.1.1 Borehole Cable Percussion (BH)

- The rig will generally arrive to site on a lowloader truck or towed behind a 4WD vehicle and is unloaded close to the investigation location. Depending on the type of rig and ground conditions it can be wheeled manually, towed (using a 4WD vehicle in areas of soft ground) or tracked to the proposed investigation location.
- The proposed location is cleared for underground services using utilities mapping, cat and genny equipment and/or a GPR survey.
- The drillers will set up a working area around the investigation location, approximately 2-3 m either side of the rig, with approximately 5-10 m in front of the mast for working rod set/up storage. This working area will include space for the tripod base of the rig, and may include space for vehicle parking, equipment and tool storage, temporary sample storage, rod racks, IBC/tank for water supply and runoff, and drill casings and rods etc.
- The investigation location is generally dug by hand to 1.2m for safety. The size of this pit is dependent on the diameter of the boreholes, usually approximately 1530mm diameter casings are used, so the pit is usually less than 1m^2.
- Drilling commences and uses a cutting drill bit to generate soil samples. Occasionally small amounts of water (by bucket) are introduced to the borehole to aid drilling. No other drilling fluids or lubricants would be used.
- Disturbed soil samples/arisings are collected in buckets/bags as they are generated for logging by a geologist/engineer and taken to the site office or logging shed if the engineer is not present. Soil

samples can also be stored for geotechnical and environmental testing. Special equipment can be used if specified to collect undisturbed samples at the base of each run. Standard penetration tests (SPTs) are conducted downhole at agreed depth intervals using rods and a hammer attached to the rig.

- Once the desired depth has been reached (maximum of 20m specified) the drilling rods are withdrawn, and slotted PVC/HDPE tubes are installed to the desired depth (determined by the supervising engineer) if a standpipe installation is specified at this location.
- The hole is backfilled using the excess drill arisings and a bentonite seal if required. If a standpipe is to be installed the backfill will comprise pea gravel or filter sand and a bentonite seal, and the standpipe may be grouted in place using a cement mix if required. A lockable cap is installed either flush with the ground surface or upstanding depending on the requirements.
- The standpipe is developed by purging three well volumes of water from it, normally poured off within the vicinity of the investigation location and non-destructive permeability testing may be undertaken.
- The rig is removed from the investigation location and the access ways are restored to previous state, which may require re-seeding, concrete or asphalt backfill or plant replacement depending on the requirements of the accommodation works and planning rules. Unavoidable damage such as rutting by machinery must be reinstated by the Contractor. All surfaces should be reinstated to their original condition to the satisfaction of the Investigation Supervisor

3.3.1.1.2 Borehole Rotary Core (RC)

- The rig will generally arrive to site on a lowloader truck and is unloaded close to the investigation location. Depending on the type of rig and ground conditions it can be, towed (using a 4WD vehicle in areas of soft ground) or tracked to the proposed investigation location. An external air compressor may be required and may also be towed to the investigation location.
- The proposed location is cleared for underground services using utilities mapping, cat and genny equipment and/or a GPR survey.
- The drillers will set up a working area around the investigation location, approximately 2-3 m either side of the rig, with approximately 5-10 m in front of the mast for working rod set/up storage. This working area may include space for vehicle parking, equipment and tool storage, temporary sample storage, rod and sample racks, IBC/tank for water supply and runoff, and drill casings and rods etc.
- The investigation location is generally dug by hand to 1.2m for safety. The size of this pit is dependent on the diameter of the boreholes, specified in this instance at 75mm minimum diameter core, so the pit is usually less than $1m^2$.
- The rotary core rig is capable of cable percussive drilling if required by fitting an alternative drill bit to the rig. Drilling commences and uses a cutting drill bit to generate the overburden soil samples. Occasionally water and/or drilling fluids are introduced to the borehole to aid drilling.
- Disturbed and/or undisturbed soil samples/arisings derived from the overburden drilling (open holing or otherwise) are collected in buckets/bags/core boxes as they are generated for logging by a geologist/engineer and taken to the site office or logging shed if the engineer is not present. Special equipment can be used if specified to collect undisturbed samples at the base of each run. Standard penetration tests (SPTs) are conducted downhole at agreed depth intervals using rods and a hammer attached to the rig.
- When rock is encountered the drill bit will be changed and a rock coring installed onto the rig. Rock is cored and may require the addition of water and/or drilling fluids to the hole.
- Rock core is retrieved from the hole in lengths determined by the rod lengths and is stored in core boxed marked by depth for logging.
- Once the desired depth has been reached (maximum of 50m specified) the drilling rods are withdrawn and slotted PVC/HDPE tubes are installed to the desired depth (determined by the supervising engineer) if a standpipe installation is specified at this location.
- The hole is backfilled using the excess drill arisings and a bentonite seal if required.
- If a standpipe is to be installed the backfill will comprise pea gravel or filter sand and a bentonite seal, and the standpipe may be grouted in place using a cement mix if required. A lockable cap is installed either flush with the ground surface or upstanding depending on the requirements.

- The standpipe is developed by purging three well volumes of water from it, normally poured off within the vicinity of the investigation location and non-destructive permeability testing may be undertaken.
- The rig is removed from the investigation location and the access ways are restored to previous state, which may require re-seeding, concrete or asphalt backfill or plant replacement depending on the requirements of the accommodation works and planning rules. Unavoidable damage such as rutting by machinery must be reinstated by the Contractor. All surfaces should be reinstated to their original condition to the satisfaction of the Investigation Supervisor.

3.3.1.1.3 Cone Penetration Test (CPT)[2]

- Cone penetration test rigs vary in size, from small portable rigs to large truck-mounted trigs.
- A cone penetration test rig pushes a steel cone (about 32mm wide) into the ground, generally up to 20m below the surface or until the cone reaches a hard layer.
- The steel cone contains an electronic measuring system that records tip resistance and sleeve friction.
- As the cone is pushed into the ground, the soil responds with differing degrees of resistance. This resistance is recorded using force sensors in the tip.
- At the same time as the sensors are recording resistance at the cone tip, sensors in the friction sleeve are recording sleeve friction along a 100mm length.
- Some cones also have a pore water transducer, which records water pressure in the soil. These readings can be used to determine ground water responses as the cone is pushed through the soils.
- A cone penetration test typically takes between 30 minutes and three hours. As the cone goes into the ground, measurements are constantly sent back to the rig and recorded on computer.
- A small rotary rig will be on standby to progress the investigations through the starter layer / rockfill present at the base of the existing embankment.

3.4 Description of European Sites

3.4.1 European sites within the Zone of Influence

There are 14 European sites located within ZoI of the proposed works, see **Figure 3.1** and **Table 3.1**, these are as follows:

1. River Shannon and River Fergus Estuaries SPA (Site Code: 004077);
2. Lower River Shannon SAC (Site Code: 002165);
3. Lough Gash Turlough SAC (Site Code: 000051);
4. Knockanira House SAC (Site Code: 002318);
5. Newhall and Edenvale Complex SAC (Site Code: 002091);
6. Pouladatig Cave SAC (Site Code: 000037);
7. Poulnagordon Cave (Quin) SAC (Site Code: 000064);
8. Kilkishen House SAC (Site Code: 002319);
9. Danes Hole, Poulnalecka SAC (Site Code: 000030);
10. Ratty River Cave SAC (Site Code: 002316);
11. Curraghchase Woods SAC (Site Code: 000174);
12. Askeaton Fen Complex SAC (Site Code: 002279);
13. Barrigone SAC (Site Code: 000432); and
14. Old Domestic Building (Keevagh) SAC (Site Code: 002010).

[2] https://www.eqc.govt.nz/sites/public_files/images/What%20is%20a%20cone%20penetration%20test.pdf

3.4.2 Assessment of Connectivity

The assessment of connectivity between the European sites and the proposed works follows the potential source-pathway-receptor model, which identifies the source of likely significant impacts, if any, the pathway (land, air, hydrological, hydrogeological pathways, etc) along which those impacts may be transferred from the source to the receiving environmental receptors (i.e. European sites and/ or features for which the sites are designated).

Figure 3.1 shows the European sites within the ZoI of the proposed works. **Table 3-2** provides details on the distance and connectivity from the proposed works.

Where it is evident that there is no connectivity between the proposed works and receptors (i.e. European sites and/ or features for which the sites are designated), the receptors are excluded from the AA process. Similarly, where connectivity exists between the proposed work and receptors but is deemed not to result in likely significant effects to the receptor, the receptor can be screened out (i.e. likely significant effects to receptors can be excluded.

In contrast to the above, where it is not possible to exclude likely significant effects to European sites on the basis of best scientific knowledge, a more detailed scientific assessment of the proposed works in the form of a Natural Impact Statement (NIS) is required to inform the AA.

Table 3-2: European Sites within the ZoI of the Study Area

Site Name & Code	Qualifying Interest Habitats and Species (*=Priority Habitat)[3]	Distance from Study Area[4]	Connectivity	Sites Brought Forward for Further Assessment
River Shannon & River Fergus SPA (004077)	Cormorant (*Phalacrocorax carbo*) [A017] Whooper Swan (*Cygnus cygnus*) [A038] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Scaup (*Aythya marila*) [A062] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Greenshank (*Tringa nebularia*) [A164] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Wetland and Waterbirds [A999]	Within the study area.	There is potential direct connectivity between the study area and the SPA. The study area is located within Ballygirreen_Sc_010 (ID 27_11) sub-catchment area, which includes the River Shannon & River Fergus Estuaries SPA. There is potential direct connectivity from the study area to the River Shannon estuary via surface water run-off and overland flow. There is also potential hydrological connectivity into the River Shannon via the Urlan Beg_010 river network. The SPA intersects numerous groundwater bodies (GWB) on the along the it's boundary. One of many GWBs it intersects, is the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). The study area is located within the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). Surface water drainage is mainly westwards, except in the south of the GWB, where rivers drain south to the Fergus Estuary or to the Crompaun River.[5] Therefore, there is potential for hydrogeological connectivity to occur between the SPA and study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. However, as the study area is located within an urban environment the emissions released during the construction phase of the proposed	**Yes** Potential source-pathway-receptor connectivity exists; therefore, this site will be carried forward for further assessment. **Annex I Habitats:** There are no Annex I habitats associated with the SPA. **Annex II species:** Some GI sites are proximal to the Upper Shannon Estuary banks therefore there is potential for impacts to the qualifying species of the SPA as a result of potential reduction in water quality and disturbance via human activity and noise associated with the works.

[3] Sourced from Site Synopsis Form for each European Sites NPWS website, accessed 30/6/20
[4] Nearest straight-line distance "as the crow flies" measured via distance calculator tools in GIS.
[5] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/TullaNewmarketOnFergusGWB.pdf

			scheme are unlikely to have an impact on the SAC.	
Lower River Shannon SAC (002165)	**Qualifying Habitats** Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] **Qualify Species** *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096]	Within the study area.	The SAC is partially located within the same WFD sub-catchment as the study area; Ballygirreen_Sc_010 (ID 27_11). There is potential direct connectivity from the study area to the River Shannon estuary via surface water run-off and overland flow. There is also potential hydrological connectivity into the River Shannon via the Urlan Beg_010 river network which flows into the estuary. The SAC intersects numerous groundwater bodies (GWB) on the along the it's boundary One of many GWBs it intersects, is the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). The study area is located within the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). Surface water drainage is mainly westwards, except in the south of the GWB, where rivers drain south to the Fergus Estuary or to the Crompaun River. Therefore, there is potential for hydrogeological connectivity to occur between the SPA and study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. However, as the study area is located within an urban environment the emissions released during the construction phase of the proposed scheme are unlikely to have an impact on the SAC.	**Yes** Potential source-pathway-receptor connectivity exists; therefore, this site will be carried forward for further assessment. **Annex I Habitats:** Most of the GI sites are located within the boundary of the SAC, with potential for surface water run-off and overland flow to Annex I habitats. Therefore, potential impacts are to habitats are anticipated. **Annex II species:** Most of the GI sites are located on the embankments bordering the SAC, therefore there is potential for impacts to the qualifying species of the SAC as a result of potential reduction in water quality and disturbance via human activity and noise associated with the works.

	Lampetra fluviatilis (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]			
Lough Gash Turlough SAC (000051)	Turloughs [3180] Rivers with muddy banks with *Chenopodion rubri p.p*. and *Bidention p.p*. vegetation [3270]	8.3km north of the study area	The SAC is located within the same WFD sub-catchment as the study area; Ballygirreen_Sc_010 (ID 27_11). However, due to its location and distance upstream of the proposed works, there is no potential for hydrological connectivity. The SAC is located in the GWDTE-Lough Gash Turlough (IE_SH_G_259) GWB. The study area is located within the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). There is no potential for hydrogeological connectivity to occur between the SAC and study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located north of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.
Knockanira House SAC (002318)	*Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	11.1km north west of the study area.	The SAC is located Owenslieve_SC_010 (ID 27_9) in sub-catchment. There is no hydrological connectivity between the study area and SAC. The SAC is located in the Lissycasey GWB (IE_SH_G_148), north west of the study area. The study area is located within the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). There is no potential for hydrogeological connectivity to occur between the SAC and study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located north west of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.

Newhall and Edenvale Complex SAC (002091)	**Qualifying Habitats** Caves not open to the public [8310] **Qualifying Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	10.2km north west of the study area	The SAC is located in the Fergus_SC_050 (ID 27_10) sub-catchment. There is no hydrological connectivity between the study area and SAC. The SAC is located in both the Ennis (IE_SH_G_080) and the Lissycasey (IE_SH_G_148) GWBs. The study area is located within the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). There is no potential for hydrogeological connectivity to occur between the SAC and study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located north west of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.
Pouladatig Cave SAC (000037)	**Qualifying Habitats** Caves not open to the public [8310] **Qualifying Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	14.2km north west of the study area	The SAC is located in the Fergus_SC_050 (ID 27_10) sub-catchment. There is no hydrological connectivity between the study area and SAC. The SAC is located in the Ennis (IE_SH_G_080) GWB, located north of the study area. The study area is located within the Tulla-Newmarket-on-Fergus GWB (IE_SH_G_229). There is no potential for hydrogeological connectivity to occur between the SAC and study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is 14.2km upstream of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.
Poulnagordon Cave (Quin) SAC (000064)	**Qualifying Habitats** Caves not open to the public [8310] **Qualifying Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	10.2km north of the study area	The SAC is located in the Rine_SC_010 (ID 27_6) sub-catchment north of the study area. There is no hydrological connectivity between the study area and the SAC. This SAC is located in the Kilkishen (IE_SH_G_121) GWB, a different GWB to the study area. There is therefore no	**No** SAC is located north of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be

			potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	carried forward for further assessment as part of this report.
Kilkishen House SAC (002319)	*Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	11.1km north east of the study area	The SAC is located in the Rine_SC_010 (ID 27_6) sub-catchment north of the study area. There is no hydrological connectivity between the study area and the SAC. This SAC is located in the Kilkishen (IE_SH_G_121) GWB, a different GWB to the study area. There is therefore no potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located north east and upstream of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.
Danes Hole, Poulnalecka SAC (000030)	**Qualifying Habitats** Caves not open to the public [8310] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] **Qualifying Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	12.8km east of the study area	The SAC is located within in the Owenogarney_SC_010 (ID 27_13) sub-catchment area. There is no hydrological connectivity between the study area and the SAC. This SAC is located within the Tulla-Newmarket-on-Fergus (IE_SH_G_229) GWB. It is located east of the study area, with flow in the GWB mainly westwards or south towards the Shannon, there is no potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located 12.8km east of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.
Ratty River Cave SAC (002316)	**Qualifying Habitats**	7.6km north east of the study area	The SAC is located within the Owenogarney_SC_010 (ID 27_12) sub-	**No**

	Caves not open to the public [8310] **Qualifying Species** *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]		catchment area. There is no hydrological connectivity between the study area and the SAC. This SAC is located within the Tulla-Newmarket-on-Fergus (IE_SH_G_229) GWB. It is located east of the study area, with flow in the GWB mainly westwards or south towards the Shannon, there is no potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	SAC is located north east of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.
Curraghchase Woods SAC (000174)	**Qualifying Habitats** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0] **Qualifying Species** *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	7.1km south of the study area	The SAC is located within two sub-catchment areas; Greanagh_SC_010 (ID 24_16) and Dee(Newcastlewest_SC_050) (ID 24_18). There is no hydrological connectivity between the study area and the SAC. The SAC is located in the Askeaton (IE_SH_G_010) GWB, a different GWB to the study area. There is therefore no potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located to the south of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.
Askeaton Fen Complex SAC (002279)	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Alkaline fens [7230]	5.2km south of the study area.	The SAC is located within two sub-catchment areas; Greanagh_SC_010 (ID 24_16) and Dee(Newcastlewest_SC_050) (ID 24_18). There is indirect connectivity to the SAC complex via the River Shannon and the following waterbodies; Deegerty_010 (IE_SH_24D320860), Deegerty_020 (IE_SH_24D320950), Dromlohan_010 (IE_SH_24D330670) and Deel(Newcastlewest_140).	**No** SAC is located to the south of the study area and a source-pathway-receptor connectivity via direct river systems exists between the proposed works and the designated site. However, due to the direction of the flow within the watercourses towards the Upper Shannon Estuary, the SAC as a result is not located downstream of the works

			This SAC is located across three GWBs; Askeaton North Fens (IE_SH_G_245), Askeaton South Fens (IE_SH_G_249) and Askeaton (IE_SH_G010), different GWBs to the study area. All three are located south of the River Shannon estuary. In the western part of the GWB, groundwater flow is generally northwards to the Shannon Estuary, although more locally, groundwater flow will be more east-west to the nearest surface water course. In the southeast of the GWB, groundwater flow is to the southeast.[6] There is therefore no potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	therefore the site will not be carried forward for further assessment as part of this report.
Barrigone SAC (000432)	**Qualifying Habitats** *Juniperus communis* formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] Limestone pavements [8240] **Qualifying Species** *Euphydryas aurinia* (Marsh Fritillary) [1065]	11km south west of the study area	The SAC is located in the Shanagolden (stream)_SC_010 (ID 24_5). There is no hydrological connectivity between the study area and the SAC. The SAC is located within two GWBs; Industrial Facility (P0035_04) (IE_SH_G_252) and Askeaton (IE_SH_G_010). The study area is located in a different GWB, therefore, there is no potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located south west of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.

[6] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/AskeatonGWB.pdf

Old Domestic Building (Keevagh) SAC (002010)	*Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	Approximately 12.6km north of the study area.	The SAC is located in the Rine_SC_010 (ID 27_6) sub-catchment north of the study area. There is no hydrological connectivity between the study area and the SAC. The SAC is located in the Kilkishen (IE_SH_G_121) GWB, the study area is located in a separate GWB to the south. Therefore, there is no potential hydrogeological connectivity to occur between the SAC and the study area. Dust and vehicle emissions can travel up to 5km via land and air pathways. The SAC is greater than 5km from the study area. Therefore, there is no potential for connectivity to the SAC in this respect.	**No** SAC is located north of the study area and source-pathway-receptor connectivity via direct river systems does not exist between the proposed works and the designated site. This is due to existing barriers to connectivity or distance of GI works from potential vectors. Therefore, the site will not be carried forward for further assessment as part of this report.

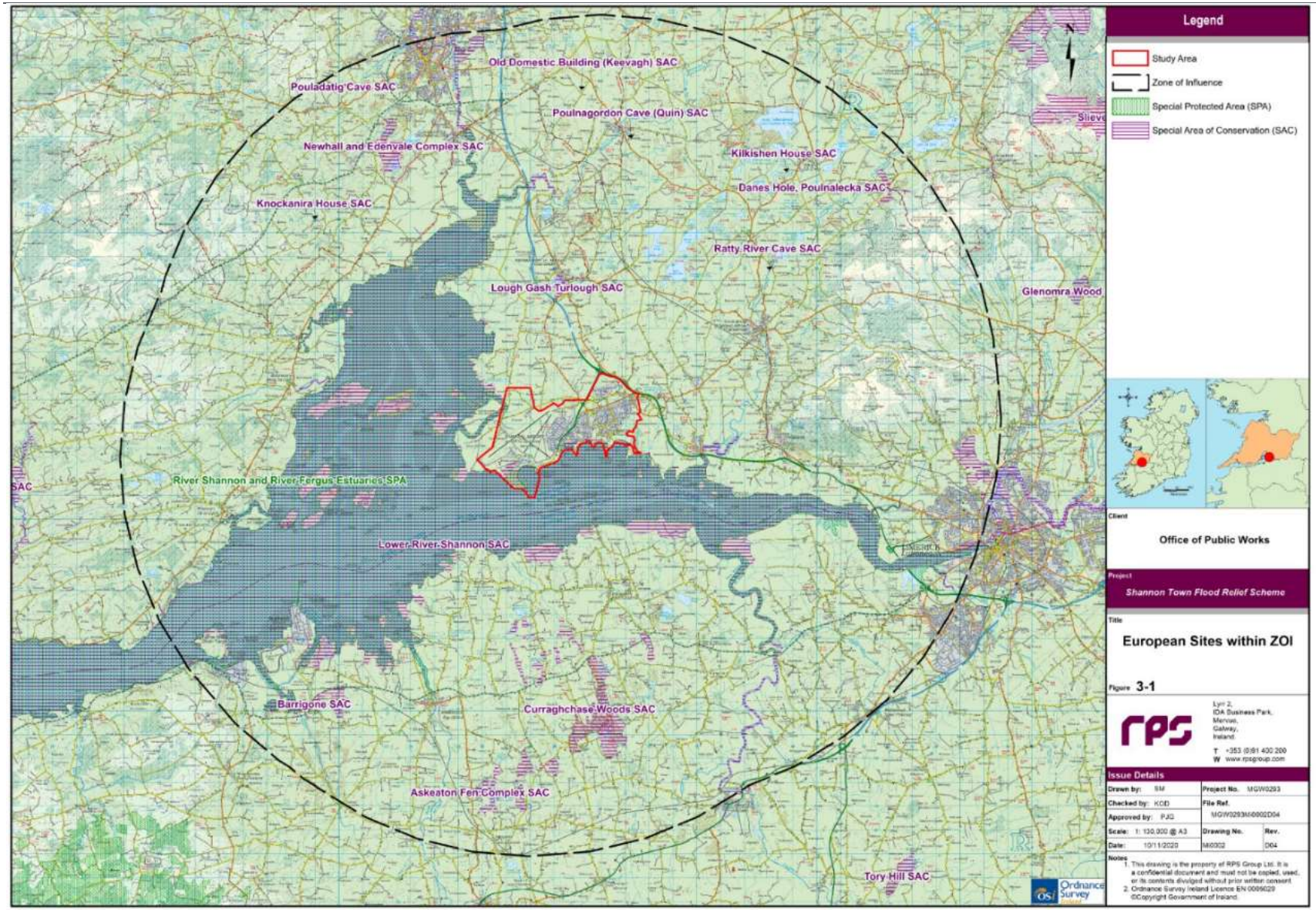

Figure 3-1: European Sites within the ZoI

3.4.3 Assessment of Connectivity Conclusion

Due to potential for direct and indirect connectivity with the proposed works, the two European sites listed below are brought forward in the screening assessment. The remaining European sites located within the ZoI of the proposed works do not support connectivity and therefore are not considered further in this assessment. The European sites being assessed in this Screening for AA report are as follows:

- Lower River Shannon SAC (Site Code: 002165); and
- River Shannon & River Fergus Estuaries SPA (Site Code: 004077)

3.4.4 Conservation Objectives of European Sites

The integrity of a European site (referred to in Article 6(3) of the EU Habitats Directive) is determined based on the conservation status of the qualifying features of the European Site(s) as set out above.

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as SAC and SPA. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

Favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing; and
- The specific structure and functions which 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 dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- The natural range of the species is neither being reduced nor is 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.

3.4.4.1 Conservation Objectives of the Lower River Shannon SAC (Site Code: 002165)

Site Specific Conservation Objectives have been published for the features of Qualifying Interest of the Lower River Shannon SAC and are available on the NPWS website, as follows;
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf

In addition, numerous Conservation Objectives supporting documents for the Lower River Shannon SAC are also available on the NPWS website[7].

Table 3-3 and Table 3-4 provides detail on the conservation condition of the QIs of the site as per the Natura 2000 Data Form (NPWS, 2018) for the site.

[7] https://www.npws.ie/protected-sites/sac/002165

Table 3-3: Lower River Shannon SAC Qualifying Habitats

Habitat/Species Code	Annex I Qualifying Habitat/ Annex II Qualifying Species	Representativity[8]
1110	Sandbanks which are slightly covered by sea water all the time	B
1130	Estuaries	A
1140	Mudflats and sandflats not covered by seawater at low tide	A
1150	Coastal lagoons	A
1160	Large shallow inlets and bays	A
1170	Reefs	B
1220	Perennial vegetation of stony banks	A
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	A
1310	Salicornia and other annuals colonising mud and sand	C
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	A
1410	Mediterranean salt meadows (*Juncetalia maritim*i)	A
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	C
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	B
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	B

Table 3-4: Lower River Shannon SAC Qualifying Species

Habitat/Species Code	Annex I Qualifying Habitat/ Annex II Qualifying Species	Population Significance[9]
1029	*Margaritifera margaritifera* (Freshwater Pearl Mussel)	C
1095	*Petromyzon marinus* (Sea Lamprey)	C
1096	*Lampetra planeri* (Brook Lamprey)	C
1099	*Lampetra fluviatilis* (River Lamprey)	C
1106	*Salmo salar* (Salmon)	C
1349	*Tursiops truncatus* (Common Bottlenose Dolphin)	C
1355	*Lutra lutra* (Otter)	C

3.4.4.2 Conservation Objectives of River Shannon and River Fergus Estuaries SPA (Site Code: 004077)

Site specific Conservation Objectives have been published for the features of Qualifying Interest of River Shannon and River Fergus Estuaries SPA and are available on the NPWS website, as follows; https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf

[8] Representativity gives a measure of 'how typical' a habitat type is. Representativity is ranked on a scale from A to D as follows; A - Excellent, B -Good, C – Significant and D - Non-significant.
[9] Population Significance is this regard relates to the size and density of a species population present within the designated site in relation to that species populations present within the national territory scale. The significance categories are divided into four alphabetised groups: A: 100% >=p>15%; B: 15% >= p> 2%; C: 2% >=p> 0%; D: Non-significant population.

In addition, numerous Conservation Objectives supporting documents for River Shannon and River Fergus Estuaries SAC are also available on the NPWS website[10].

Table 3-5 provides detail on the conservation condition of the QIs of the site as per the Natura 2000 Data Form (NPWS, 2018) for the site.

Table 3-5: River Shannon and River Fergus Estuaries SPA

Habitat/Species Code	Annex I Qualifying Habitat/ Annex II Qualifying Species	Population Significance[11]
A017	Cormorant (*Phalacrocorax carbo*)	C
A038	Whooper Swan (*Cygnus cygnus*)	C
A046	Light-bellied Brent Goose (*Branta bernicla hrota*)	C
A048	Shelduck (*Tadorna tadorna*)	B
A050	Wigeon (*Anas penelope*)	B
A052	Teal (*Anas crecca*)	B
A054	Pintail (*Anas acuta*)	B
A056	Shoveler (*Anas clypeata*)	C
A062	Scaup (*Aythya marila*)	C
A137	Ringed Plover (*Charadrius hiaticula*)	C
A140	Golden Plover (*Pluvialis apricaria*)	B
A141	Grey Plover (*Pluvialis squatarola*)	B
A142	Lapwing (*Vanellus vanellus*)	B
A143	Knot (*Calidris canutus*)	B
A149	Dunlin (*Calidris alpina*)	B
A156	Black-tailed Godwit (*Limosa limosa*)	B
A157	Bar-tailed Godwit (*Limosa lapponica*)	B
A160	Curlew (*Numenius arquata*)	C
A162	Redshank (*Tringa totanus*)	B
A164	Greenshank (*Tringa nebularia*)	C
A179	Black-headed Gull (*Chroicocephalus ridibundus*)	-

3.4.5 Potential Pressures and Threats to European Sites

Table 3-6 presents threats, pressures and activities that represent negative impacts to each European site as quoted on the Natura 2000 Data Form (2018) for the Lower River Shannon SAC[12].

Table 3-6: Potential Pressures and Threats to Lower River Shannon SAC

European Site	Threat Code[13]	Threat Type	Rank[14]	i (inside)/ o (outside)/ b (both)
Lower River Shannon SAC	F03.01	Hunting	L	i
	B	Sylviculture, forestry	L	i
	A08	Fertilisation	M	o
	A04	Grazing	M	i
	H04	Air pollution, air-borne pollutants	M	o
	E01	Urbanised areas, human habitation	M	o
	G01.01	Nautical sports	L	i
	E03	Discharges	M	i
	J02.01.02	Reclamation of land from sea, estuary or marsh	M	o

[10] https://www.npws.ie/protected-sites/spa/004077
[11] Population Significance is this regard relates to the size and density of a species population present within the designated site in relation to that species populations present within the national territory scale. The significance categories are divided into four alphabetised groups: A: 100% >=p>15%; B: 15% >= p> 2%; C: 2% >=p> 0%; D: Non-significant population.
[12] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF002165.pdf
[13] Threat codes sourced from Natura 2000 data form and follow reference list provided on threats, pressures and activities for European Sites http://cdr.eionet.europa.eu/help/natura2000
[14] H – High, M – Medium, L - Low

European Site	Threat Code[13]	Threat Type	Rank[14]	i (inside)/ o (outside)/ b (both)
	C01.03.01	Hand cutting of peat	L	i
	J02.01	Landfill, land reclamation and drying out, general	L	i
	I01	invasive non-native species	L	i
	J02.12.01	Sea defense or coast protection works, tidal barrages	L	i
	A08	Fertilisation	M	i
	K02.03	Eutrophication (natural)	M	o
	F01	Marine and Freshwater Aquaculture	L	i
	E03	Discharges	M	o
	D01.01	Paths, tracks, cycling tracks	L	i
	C01.01.02	removal of beach materials	L	i
	J02.01.01	Polderisation	M	i

Table 3-7 presents threats, pressures and activities that represent negative impacts to each European site as quoted on the Natura 2000 Data Form (2018) for the River Shannon and River Fergus Estuaries SPA[15].

Table 3-7: Potential Pressures and Threats to River Shannon and River Fergus Estuaries SPA

European Site	Threat Code[16]	Threat Type	Rank	i (inside)/ o (outside)/ b (both)
River Shannon and River Fergus Estuaries SPA	A08	Fertilisation	H	o
	E01	Urbanised areas, human habitation	H	o
	E03	Discharges	H	i
	E02	Industrial or commercial areas	H	o
	D03.02	Shipping lanes	M	i
	G01.01	Nautical sports	M	i
	F01	Marine and Freshwater Aquaculture	M	i

[15] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004077.pdf
[16] Threat codes sourced from Natura 2000 data form and follow reference list provided on threats, pressures and activities for European Sites http://cdr.eionet.europa.eu/help/natura2000

4 EXISTING ENVIRONMENT

4.1 Biodiversity

4.1.1 Habitats

Preliminary site walkover surveys were conducted on the 28th September 2020. Using the preliminary site walkover surveys and analysis of aerial imagery, habitats were classified according to the Guidelines set out in 'A Guide to Habitats in Ireland' (Fossitt, 2000) which classifies habitats based on the vegetation present and management history. The classification is a standard system for identifying, describing and classifying wildlife habitats in Ireland. The habitats found with the study and their potential correspondence with Annex I habitats is also identified.

Analysis of aerial photography, and site surveys identified a mosaic of habitat types within the study area. The proposed GI works take place along an existing coastal embankment. The embankment supports a combination of habitats including sections of the Shannon Loop walk (BL3), rough wet grassland (GS4)/grassy verge (GS2) grazing grounds and patchy scrub (WS1) development. Drainage ditches (FW4) run parallel along the north of the embankment (BL2), separating the structure from sections of the loop walk, local roads, broadleaved woodlands (WD1), conifer woodlands (WD3) pockets and amenity grassland (GA2). The broadleaved woodlands support an understory of ornamental planting in places. South of the embankment supports reed and large reed swamp (FS1), upper and lower saltmarsh (CM1/CM2) and mud shore (LS4). The saltmarshes and mud shore are both Annex I habitats and correspond with the QI habitats of the Lower River Shannon SAC including *Atlantic salt meadows (Glauco-Puccinellietalia maritimae)* [1330] and *Mudflats and sandflats not covered by seawater at low tide* [1140], see **Table 4-1** for habitat types recorded in the study area.

Table 4-1: **Habitat Types Recorded within the Study Area**

Habitat Type	Ecological Importance
Drainage Ditches (FW4)	Local Importance (higher value)
Depositing/Lowland Rivers (FW2)	Local Importance (higher value)
Reed & Large Sedge Swamps (FS1)	Local Importance (higher value)
Amenity Grassland (GA2)	Local Importance (lower value)
Grassy Verge (GS2)	Local Importance (lower value)
Broadleaved Woodland (WD1)	Local Importance (higher value)
Conifer Woodland (WD3)	Local Importance (higher value)
Scrub (WS1)	Local Importance (higher value)
Hedgerow (WL1)	Local Importance (higher value)
Treelines (WL2)	Local Importance (higher value)
Buildings & Artificial Surfaces (BL3)	Local Importance (lower value)
Earthbanks (BL2)	Local Importance (lower value)
Lower Saltmarsh (CM1)	Local Importance (higher value)
Upper Saltmarsh (CM2)	International Importance
Saline Pond (CW1)	Local Importance (higher value)
Mud Shore (LS4)	International Importance

4.1.2 Invasive Species

A search of National Biodiversity Data Centre (NBDC) online database was conducted for records of invasive species listed on the Third Schedule to the EC Birds and Natural Habitats Regulations 2011, as amended.

Invasive species recorded on NBDC for grid squares R35, R36 and R45 are displayed in **Table 4-2** below. Invasive species were recorded within the scheme area on the site walkover survey and are shown in **Table 4-3** below.

Table 4-2: Invasive Species records on NBDC Clare Biological Records Centre Dataset

Common Name	Scientific Name	Grid Square	Designation
Greylag Goose	*Anser anser*	R36	Feral/hybrid Greylag Goose invasive and listed in Regulation S.I. 477 (Ireland) (winter migrants protected under the Wildlife Acts and EU Birds Directive)
Jenkins' Spire Snail	*Potamopyrgus antipodarum*	R36	Medium Impact Invasive Species
American Mink	*Mustela vison*	R36	Medium Impact Invasive Species
European Rabbit	*Oryctolagus cuniculus*	R36	Medium Impact Invasive Species
Ruddy Duck	*Oxyura jamaicensis*	R36	High Impact Invasive Species, Regulation S.I. 477 (Ireland)
Japanese Knotweed	*Fallopia japonica*	R35, R36, R46	High Impact Invasive Species, Regulation S.I. 477
Traveller's-joy	*Clematis vitalba*	R46	Medium Impact Invasive Species
Sycamore	*Acer pseudoplatanus*	R46	Medium Impact Invasive Species
Giant Hogweed	*Heracleum mantegazzianum*	R35, R46	High Impact Invasive Species, Regulation S.I. 477
Himalayan Knotweed	*Persicaria Wallichii*	R36	Medium Impact Invasive Species, Regulation S.I. 477
Common Cord-grass	*Spartina anglica*	R35	High Impact Invasive Species, Regulation S.I. 477
Indian Balsam	*Impatiens glandulifera*	R35	High Impact Invasive Species, Regulation S.I. 477

Table 4-3: Invasive Species recorded within the Scheme Area

Common Name	Scientific Name	Grid References (ITM)	Designation
Himalayan Honeysuckle	*Leycesteria formosa*	539204 660893 539199 660862	Medium Impact Invasive Species
Himalayan Balsam	*Persicaria Wallichii*	540554 661330	High Impact Invasive Species, Regulation S.I. 477
Common Cord-grass	*Spartina anglica*	539212 660653 538485 660238	High Impact Invasive Species, Regulation S.I. 477
Greylag Goose	*Anser anser*	12 foraging on the mudflats	Feral/hybrid Greylag Goose invasive and listed in Regulation S.I. 477 (Ireland) (winter migrants protected under the Wildlife Acts and EU Birds Directive)

4.1.3 Fauna in the Study Area

4.1.3.1 Mammals

A search of NBDC online database was conducted for records of Annex II, IV and V species protected under the EU Habitats Directive and QI species of the proximal European sites, located within Grid Squares R35, R36 and/or R46. NBDC maps was then searched to determine if these records occurred within the study area. The following species were recorded on NBDC within the grid squares:

- Common Bottlenose Dolphin (*Tursiops truncatus*) [1349] and otter (*Lutra lutra*) [1355] are protected under both Annex II and Annex IV of the EU Habitats Directive and are QI species of the Lower River Shannon SAC. Common Bottlenose dolphin habitat is located within the Shannon estuary, however their commuting and foraging habitat does not extend immediately south of the study area. The habitats in close proximity to the works provide suitable foraging and commuting habitat for otter. No signs of otter or resting sites including holts, couches etc were recorded during field surveys. However, the species is likely to occur within the study area.

- Sea Lamprey (*Petromyzon marinus*) [1095], Brook Lamprey (*Lampetra planeri*) [1096], River Lamprey (*Lampetra fluviatilis*) [1099] and Salmon (*Salmo salar*) [1106] are listed under Annex II of the EU Habitats Directive and are a QI species of the Lower River Shannon SAC. The salmon, sea lamprey, brook lamprey and river lamprey, have all been observed spawning in the lower Shannon or its tributaries. Due to the River Shannon being a migratory route for salmon and lamprey any impacts on water quality and hydrology on fish passage as a result of proposed works needs to be assessed.

- Freshwater Pearl Mussel (*Margaritifera margaritifera*), is listed on Annex II and Annex V of the Habitats Directive owing to its threatened status and dramatic decline. The freshwater pearl mussel occurs abundantly in parts of the Cloon River. The Cloon River is located approximately 20km westward of the study area. The Cloon population is confined to the main channel and is distributed from Croany Bridge to approximately 1.5km upstream of Clonderalaw Bridge (Ross, 2008; DEHLG, 2010)

4.1.3.2 Birds

There were a number of bird species recorded for grid square R35, R36 and/or grid square R46 on the NBDC. Bird species listed on Annex I of the Birds Directive 2009/147/EC recorded within these grid squares include Common Kingfisher (*Alcedo atthis)*, Greater White-fronted Goose (*Anser albifrons),* Short-eared Owl (*Asio flammeus),* Dunlin *(Calidris alpina),* Hen Harrier *(Circus cyaneus),* Corn Crake *(Crex crex),* Whooper Swan *(Cygnus cygnus),* Little Egret *(Egretta garzetta),* Merlin *(Falco columbarius),* Peregrine Falcon *(Falco peregrinus),* Great Northern Diver *(Gavia immer),* Mediterranean Gull *(Larus melanocephalus),* Little Gull *(Larus minutus),* Bar-tailed Godwit *(Limosa lapponica),* Red-necked Phalarope *(Phalaropus lobatus),* Ruff *(Philomachus pugnax),* European Snipe *(Pluvialis apricaria),* Common Tern *(Sterna hirundo),* Sandwich Tern *(Sterna sandvicensis)* and Arctic Tern *(Sterna paradisaea*). These records were checked on NBDC maps to determine if they occurred within the study area. All records either occurred within the study area or the location of the record within the grid square was not specified. There is potential for all these species to occur within the study area.

Of the species recorded within the study area, Dunlin, Whooper Swan and Bar-tailed Godwit are SCI species of the River Shannon and River Fergus Estuaries SPA

4.2 Surface Water

The study area is located in the Ballygirreen_SC_010 (ID 27_11) sub-catchment, which is part Shannon Estuary North (ID 27) catchment area. The Shannon Estuary North catchment includes the area drained by the River Fergus and all streams entering tidal water between Thomond Bridge and George's Head, Co. Clare, draining a total area of 1,658km².

There are two river water bodies, Boheraroan_010 and Urlan Beg_010, in the Ballygirreen_SC_010 sub-catchment that are comprised of a number of smaller streams with no inputting water body and flow directly

to the Fergus and Upper Shannon Estuary. These water bodies are under review due to their unassigned status.[17]

The EPA online mapping and River Quality Monitoring dataset (River Q Values 1971-2018)[18] indicates that there are no monitoring stations at these watercourses therefore no water quality Q-values available.

Table 4-4 below presents the water quality of the rivers within the vicinity of the study area. Surface water within the vicinity of the study area is mapped in **Figure 4-1**.

Table 4-4: Most Recent Water Quality Status of Rivers in the vicinity of the Study Area

Receiving watercourse/ waterbody	EPA Name/ Common Name	International River Waterbody Code	Station Name	EPA Q-value 2018 (macro-invertebrate quality)	River Waterbody WFD Status 2013-2018	WFD Risk Scores
Upper Shannon Estuary	Boheraraoan	IE_SH_27B670560	No Monitoring Station	NA	Unassigned	Under Review
Upper Shannon Estuary	Urlan_Beg	IE_SH_27U010950	No Monitoring Station	N/A	Unassigned	Under Review
Upper Shannon Estuary	Clonloghan	IE_SH_27U010950	No Monitoring Station	NA	Unassigned	Under Review
Upper Shannon Estuary	Killulla	IE_SH_27U010950	No Monitoring Station	N/A	Unassigned	Under Review
Upper Shannon Estuary	Mogullaan	IE_SH_27U010950	No Monitoring Station	NA	Unassigned	Under Review
Upper Shannon Estuary	Lisconor	IE_SH_27U010950	No Monitoring Station	NA	Unassigned	Under Review
Upper Shannon Estuary	Clonmoney West	IE_SH_27U010950	No Monitoring Station	NA	Unassigned	Under Review
Upper Shannon Estuary	Ballycasey Beg	IE_SH_27U010950	No Monitoring Station	NA	Unassigned	Under Review

[17] https://catchments.ie/wpcontent/files/subcatchmentassessments/27_11%20BALLYGIRREEN_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf

[18] https://gis.epa.ie/EPAMaps/ Accessed: September 2020

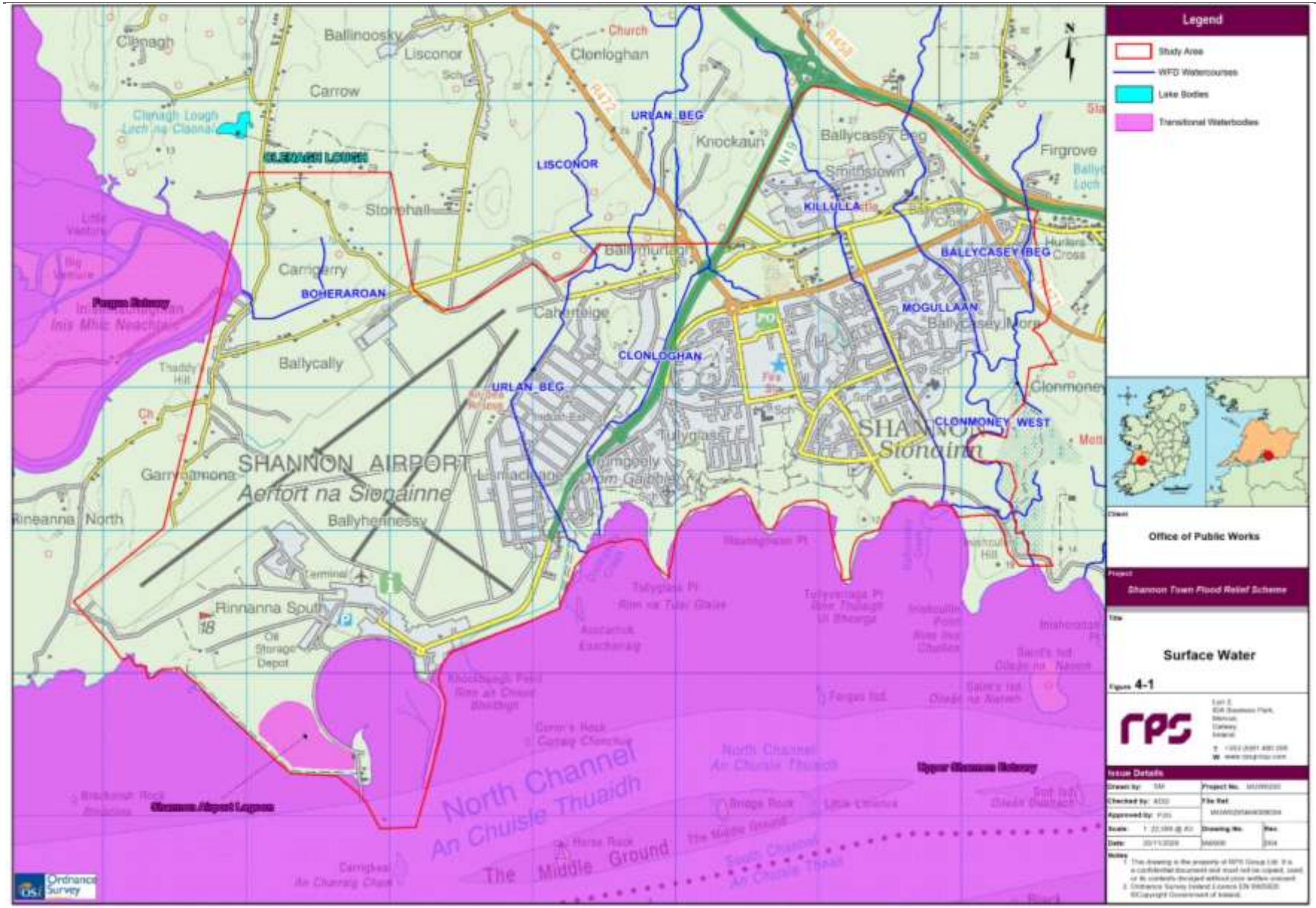

Figure 4-1: Surface Water in the Study Area

4.3 Groundwater

The study area is located completely within the Tulla-Newmarket on Fergus GWB. Groundwater flow is mainly westwards or south towards the Shannon within this GWB. There are four European sites that intersect this GWB including River Shannon and River Fergus Estuaries SPA, Lower River Shannon SAC, Danes Hole, Poulnalecka SAC and Ratty River Cave SAC.

River Shannon and River Fergus Estuaries SPA and Lower River Shannon SAC are located within the study area, therefore there is potential for direct hydrogeological connectivity. Danes Hole, Poulnalecka SAC and Ratty River Cave SAC are located east of the study area, therefore there is no potential hydrogeological connectivity to occur.

4.4 Flooding

A search of the Office of Public Works Past Floods Database website (https://www.floodinfo.ie/) was carried out to obtain information on the flood history of the study area. The OPW indicative flood maps were used to identify areas that had the potential for significant flooding within the study area and to identify areas where hazards of flooding are likely due to historical flooding of those areas. The OSI Historical[19] Mapping dataset was also consulted to investigate whether any areas are liable to flooding.

The CFRAM mapping illustrates the extents of the low (1 in 1000 yr), medium (1 in 100 yr) and high (1 in 10 yr) probability flood extents. Medium Probability flood events have approximately a 1-in-a-100 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 1%. **Figure 4-2** below illustrates both the river (blue) and coastal (green) predicted Medium Probability flood extents. Historical flood events within proximity to the study area are outlined in **Table 4-5** and illustrated in **Figure 4-3** below.

Figure 4-2: Flooding Probability (1-in-a-100)[20]

[19] https://www.osi.ie/products/professional-mapping/historical-mapping/ Accessed: October 2020
[20] Source: Flood Maps website. Accessed October 2020 (https://www.floodinfo.ie/map/floodmaps/)

Table 4-5: Historical Flood Events within Shannon Town Region

Flood Event	Flood Type	Flood Source
Shannon Carrigerry Clare	Recurring	Coastal/ Estuarine Waters
Ballycally	2005	Run-off

Figure 4-3: Flood Events in Proximity to the Study Area (Source: https://www.floodinfo.ie/map/floodmaps/[21])

4.5 Soils, Geology and Hydrogeology

The Geological Survey of Ireland (GSI) online database (www.gsi.ie) was consulted for available edaphic, geological and hydrological information of the site and its environs. The study area is predominately composed of Ballysteen Formation, with Waulsortian Limestone to the north-west and bands of Ballymartin Formation and Lower Limestone Shale to the north-east. **Table 4-6** provides a detail outline of the bedrock composition within the study area. The bedrock geology map for the scheme area is provided in **Figure 4-4**.

Table 4-6: Bedrock Geology Formations occurring within the Scheme Area.

Bedrock Geology	Description	Lithological Description	System	Series
Ballymartin Formation	Limestone & dark-grey calcareous shale	Interbedded weakly nodular grey muddy bioclcastic limestones and dark grey calcareous shaly mudstones.	Carboniferous	Dinantian

[21] Accessed 21st September 2020. Hazard icons indicate flood events.

Bedrock Geology	Description	Lithological Description	System	Series
Ballysteen Formation	Dark muddy limestone, shale	Irregularly bedded and nodular bedded argillaceous bioclastic limestones (wackestones and packstones), interbedded with fossiliferous calcareous shales. It represents a widespread development throughout Westmeath and Longford.	Carboniferous	Dinantian
Lower Limestone Shale	Sandstone, mudstone & thin limestone	The standard succession for this unit is in the Limerick Province where it is based on coastal sections on the Shannon Estuary and on the Pallaskenry borehole (LI-68-10). It comprises the Mellon House, Ringmoylan, Ballyvergin and Mallymartin formations.	Carboniferous	Dinantian
Old Red Sandstone (undifferentiated)	Red conglomerate, sandstone & mudstone	Red mudstones, siltstones and sandstones, and poorly sorted, polymict pebble conglomerates and breccias	Devonian-Carboniferous	n/a
Waulsortian Limestones	Massive unbedded lime-mudstone	Sometimes informally called "reef" limestones, although inaccurate. Dominantly pale-grey, crudely bedded or massive limestone.	Carboniferous	Dinantian

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities. The study area is largely made up of a *low* groundwater vulnerability towards the south of the study area, bordering the Upper Shannon Estuary. A band of moderate groundwater vulnerability to the north separates pockets of *extreme, moderate and high* groundwater vulnerability along the northern boundary of the study area. There are also areas within the study area that have *rock at or near the surface or Karst*, see **Figure 4-5** for the groundwater vulnerability within the study area.

The study area is predominantly within a *Locally Important Aquifer – Bedrock which is moderately productive only in local zones*. A section of the study area is also located within a *Locally Poor Aquifer – Bedrock unproductive except for local zones.* A search of the Teagasc soils database was conducted to establish the underlying soils in the study area[22]. The predominant soil types within the study area are Made and Tidal Marsh. The study area is dominated by the subsoils Made (Made) and Estuarine sediments (MEsc.) The other subsoils with the study area are as follows; Alluvium undifferentiated (A); C=cutover peat (Cut), fen peat (FenPt), bedrock at surface (Rck); limestone till – C=Carboniferous (TLs) and water.

[22] http://gis.teagasc.ie/soils/map.php Accessed: October 2020

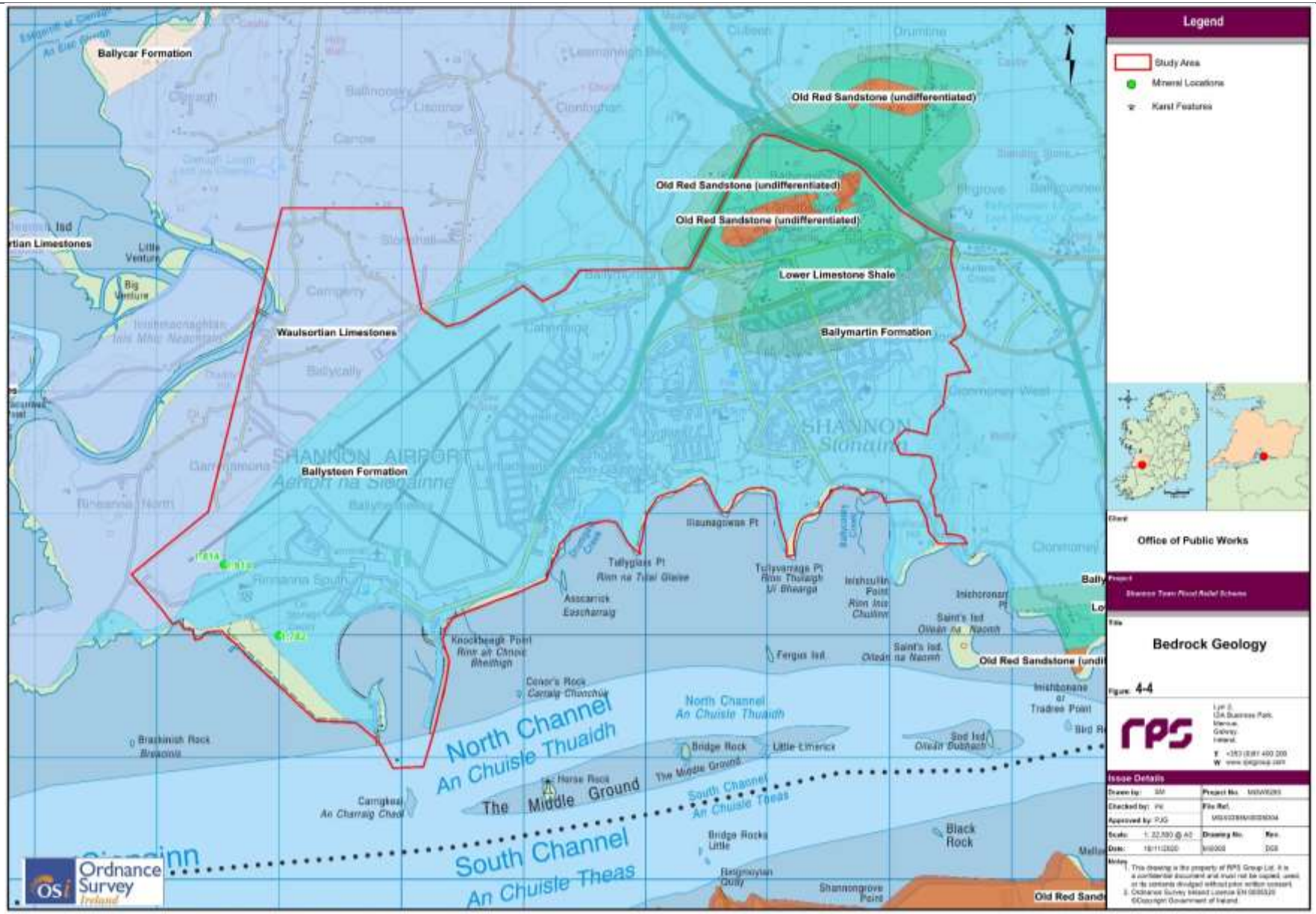

Figure 4-4: Bedrock Geology

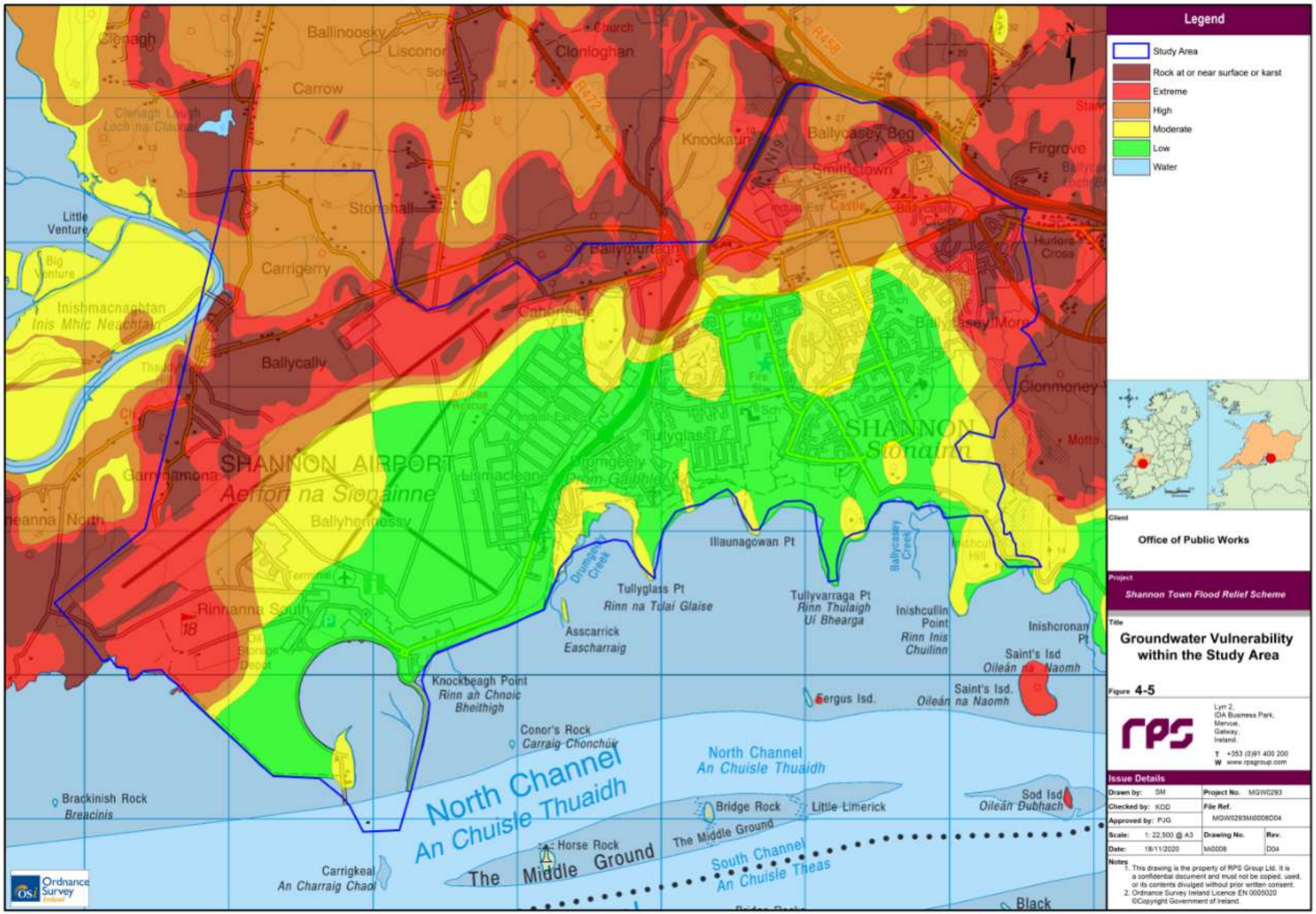

Figure 4-5: Groundwater Vulnerability

5 APPROPRIATE ASSESSMENT SCREENING

5.1 Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the European Sites

This Screening for AA report comprises an assessment of the likely significant effects of GI works on the Shannon Flood Relief Scheme. GI works are required to inform option selection and design for the project. The GI works will be undertaken using various ground investigation methods including borehole cable percussion, borehole rotary cores and cone penetration tests.

The duration of fieldwork that includes boreholes and CPTs is expected to take up to 4-5 months to complete.

All works on site will be accessed from the local road network and existing assess points to the agricultural fields and embankments.

The cable percussion and rotary core boreholes may require the use of water to aid drilling. Therefore, the potential impacts arising from the proposed works include the following:

- Noise disturbance from the plant and site personnel;
- Visual impacts;
- Air pollution from releasing dust and vehicle emissions;
- Vibration from drilling equipment; and
- Water pollution as a result of silted water and drilling fluids runoff to neighbouring watercourses from GI works and rutted soil.

Several watercourses within the study area flow into the European sites including Urlanbeg, Clonloghan, Killula and Mogullan. The GI locations which are in proximity to watercourses or conduits to European sites (namely Lower Shannon River SAC and River Shannon and River Fergus Estuaries SPA), were scrutinised to identify whether there was a risk of likely significant effects to European sites.

Each GI site was checked for its proximity to European sites and potential pathways to European sites via overland flow to rivers/streams/drains. Where sites are located adjacent to watercourses, a review of whether existing barriers to prevent connectivity to the watercourse are present i.e. topography, watercourses berms/embankments and existing infrastructure. The proposed method of GI works at each location and potential impacts were reviewed.

However, due to the nature of the proposed GI works, the location of investigation sites and the presence of numerous drainage ditches lining the coastal embankments, the proposed works assessed in this report are anticipated to result in likely significant effects to the proximal European sites. An assessment of the potential impacts to the qualifying interests of proximal European sites is provided in **Table 5-1.**

Table 5-1: Potential Impacts to the Qualifying Interests of European Sites

Site Name & Code	Qualifying Interest (QI) Habitats and Species	Connectivity to GI Works	Direct Impacts	Indirect Impacts
Lower River Shannon SAC	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	Yes – Connectivity to GI works via watercourses within the study area.	GI works are proposed within the boundary of the SAC. **Direct Impact**	Direct impacts to aquatic QI habitats from pollutants entering watercourses to Upper Shannon Estuary. QI habitats with potential to undergo impacts include; Estuaries [1130], Mudflats and Sandflats [1140], Coastal Lagoons [1150] and Atlantic Salt Meadows [1330]. Given the nature and scale of the works, and the presence of a source-pathway-receptor, there is potential for impacts to occur between the GI locations and the Lower River Shannon SAC. **Direct Impact**.

Site Name & Code	Qualifying Interest (QI) Habitats and Species	Connectivity to GI Works	Direct Impacts	Indirect Impacts
	Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Salmo salar* (Salmon) [1106] *Tursiops truncatus* (Common Bottlenose Dolphin) [1349] *Lutra lutra* (Otter) [1355]	Yes – Connectivity to GI works via watercourses within the study area.	No otter holts were recorded in proximity to the GI sites. However, due to the location of the GI works within the SAC boundary and adjacent to the coastal waters, there is potential for direct impacts to occur. **Direct Impact.**	Direct impacts affecting otter and dolphin may potentially arise as a result of reduced food supply i.e. where impacts affecting water quality may result in reduced macroinvertebrate and fisheries production. The otter is dependent on fish stocks, which are ultimately dependent on water quality. However, given the nature and scale of the works, and the presence of a source-pathway-receptor, there are potential impacts anticipated between the GI locations and the Lower River Shannon SAC. **Direct Impact.**
River Shannon and River Fergus Estuaries SPA	Cormorant (*Phalacrocorax carbo*) [A017] Whooper Swan (*Cygnus cygnus*) [A038] Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Scaup (*Aythya marila*) [A062] Ringed Plover (*Charadrius hiaticula*) [A137] Golden Plover (*Pluvialis apricaria*) [A140] Grey Plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Black-tailed Godwit (*Limosa limosa*) [A156] Bar-tailed Godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Greenshank (*Tringa nebularia*) [A164]	Yes – Connectivity to GI works via watercourses within the study area.	No instream works are proposed as part of the GI works. However, due to the location of the GI works within the SAC boundary and adjacent to the coastal waters, there is potential for direct impacts to occur. **Direct Impact.**	Potential impact to wintering birds during the GI works due to noise and visual disturbance from GI plant and personnel on site. Direct impacts affecting the QI species may potentially arise as a result of reduced food supply i.e. where impacts affecting water quality may result in reduced macroinvertebrate and fisheries production. **Direct Impact**.

5.2 Describe any likely direct, indirect or secondary impacts of the project on the European Sites

The proposed GI works will be undertaken within the European sites including Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

As outlined in **Table 5-1**, due to the nature and scale of the works, proposed GI methodologies, Location within the SAC and SPA boundaries, and distance from waterbodies between the proposed works and Upper Shannon Estuary, there is potential for source-pathway-receptor impacts. Consequently, there is potential for direct or impacts to European sites within the study area.

Table 5-2: Likely direct, indirect or secondary impacts of the project on the European Sites

Criteria	Discussion
Size and Scale	GI works are proposed within the boundaries of European sites. Although the works are temporary and small in scale and they have potential to have negative effects to proximal European sites.
Land Take	There will be no land-take from European sites as part of the proposed GI works. All excavations will be backfilled, other than locations where the installation of standpipes are required. These locations are within habitats that are not constituent QI or SCI habitats of the SAC or SPA. The standpipes are small in diameter and will result in a *de minimus* land take within the European sites.
Distance from European Sites or Key Features of the Site	The proposed GI works are located within the footprint of European sites; Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. Due to the nature of the proposed GI works, there is potential for source-pathway-receptors from the specific GI locations to outlined European sites, therefore potential for direct significant negative effects to proximal European sites.
Resources Requirements	Fuel will be consumed by plant equipment, with potential for water to be required for various practices detailed as part of the methodology (i.e. drill lubrication). There is potential for impacts to occur to European sites in this regard.
Emissions	The proposed GI works may result in emissions to the receiving environment. As a result, due to the nature and location of the proposed GI works there is potential for a source-pathway-receptor connectivity between waterbodies and onsite conduits (drains/ditches) adjoining the existing embankment.
Excavation Requirements	The proposed preliminary GI works will consist of Borehole Cable Percussion (shell and auger), Borehole Rotary Cores and Cone Penetration Tests. The boreholes will require the excavation of an investigation pit which is dug by hand to 1.2m. The boreholes and the investigation pits will be backfilled post works and a slotted PVC/HDPE standpipe installed if required. If a standpipe is to be installed the backfill will comprise pea gravel or filter sand and a bentonite seal, and the standpipe may be grouted in place using a cement mix if required. A lockable cap is installed either flush with the ground surface or upstanding depending on the requirements. A number of the GI sites are located within European sites, but will be on made ground within the SAC or in habitats that are not constituent QI or SCI habitats of the SAC or SPA. However, due to the proximity of the European sites there is potential for likely significant effects.
Transport Requirements	Access and egress to the GI sites will be via existing infrastructure and field access. Given the locations of proposed GI works along flood plains, drainage ditches and embankments there is potential for significant effects to identified European sites.
Duration of construction, operation and decommissioning	The duration of fieldwork that includes boreholes and CPTs is expected to take up to 4-5 months to complete. Potential impacts will be temporary and localised. Therefore, the GI works will not result in significant negative effects to proximal European sites.

5.2.1 In Combination Cumulative Impacts with Other Plans and Projects in the Area

As part of the screening for an AA, potential for in combination cumulative effects with the proposed GI works and other relevant projects and plans in the region must also be considered at this stage. These plans and projects are considered further in this respect, see **Table 5-3** below.

Table 5-3: Cumulative Impacts Associated with Shannon Flood Relief Scheme GI Works

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT ASSESSMENT
LAND USE AND SPATIAL PLANS		
Clare County Development Plan 2017-2023	**Goal X** A County Clare that builds on the strategic location and natural resources of the Shannon Estuary by facilitating and maximising its potential for various forms of development while managing the estuarine and natural environment in full compliance with all relevant EC Directives. **Goal XI** A County Clare that maximises and manages the economic, social and recreational potential of the Atlantic Coastline and Shannon Estuary while protecting the coastal zone and its resources and adapting to and managing the challenges of climate change including flooding and sea-level rise **CDP2.1 Development Plan Objective: Appropriate Assessment, Strategic Environmental Assessment and Strategic Flood Risk Assessment.** It is an objective of the Development Plan: a) To require the preparation and assessment of all planning applications in the Plan area to have regard to the information, data and requirements of the Natura Impact Report, SEA Environmental Report and Strategic Flood Risk Assessment Report contained in Volume 10 of this Development Plan; b) To require projects to be fully informed by ecological and environmental constraints at the earliest stage of project planning and any necessary assessment to be undertaken, including assessments of disturbance to species, where required; c) To require compliance with the objectives and requirements of the Habitats Directive, the Bird Directive, Water Framework Directive, all other relevant EU Directives and all relevant transposing legislation. **CDP8.21 Development Plan Objective: Water Framework Directive.** It is an objective of Clare County Council: a) To facilitate the implementation of the Shannon River Basin Management Plan and the Western River Basin Management Plan (together with any subsequent National River Basin Management Plan) for groundwaters and surface waters in the Plan area as part of the implementation of the EU Water Framework Directive; b) To protect groundwater resources in accordance with the statutory requirements and specific measures as set out in the relevant River Basin Management Plan; c) To consider proposals for development where it can be clearly demonstrated that the development will meet the requirements of the relevant River Basin Management Plan. **CDP8.22 Development Plan Objective: Protection of Water Resources.**	A number of strategies, policies and objectives are set out in the Clare County Development Plan 2017 – 2023 for the protection of the natural environment. There are a number of objectives and policies that identify the requirement of proposed developments to take cognisance of the various national and international legislation ensuring that plans and projects put mechanisms in place to avoid any significant negative impacts occurring to qualifying interests (habitats and species) of designated sites. Specifically, those related to habitat protection and coastal development; - CDP2.1 Development Plan Objective: Appropriate Assessment, Strategic Environmental Assessment and Strategic Flood Risk Assessment - CDP11.14 Development Plan Objective: Building on the Shannon Estuary as an Environmental Asset It is an objective of Development Plan: - CDP12.1 Development Plan Objective: Environmental Designations in Coastal Areas. - CDP12.12 Development Plan Objective: Coastal Erosion and Flooding. - CDP14.2 Development Plan Objective: European sites. - CDP14.3 Development Plan Objective: Requirement for Appropriate Assessment under the Habitats Directive.

It is an objective of the Development Plan: To protect the water resources of County Clare having regard to the requirements of the relevant EU Directives;

a) To ensure that developments that would have an unacceptable impact on water resources, including surface water and groundwater quality and quantity, designated sources protection areas, coastal and transitional waters, river corridors and associated wetlands are not permitted;
b) In areas of potable groundwater resources or over vulnerable aquifer areas, development proposals will only be considered if the applicant can clearly demonstrate that the proposed development will not pose a risk to the quality of the underlying groundwater;
c) To protect groundwater resources, in accordance with statutory requirements and specific measures as set out in the Shannon and Western River Basin Management Plans;
d) To ensure that proposals for development which infringe on a river boundary, or an associated habitat, including their connection by groundwater, will only be considered where it can be clearly demonstrated that:

- The character of the area will be conserved;
- An acceptable physical riparian zone will be maintained with all natural vegetation preserved;
- There will be no impact on the ecological, aquatic or fishing potential of the waters or associated waters;
- All proposals are in compliance with the requirements of the Habitats Directive, where appropriate.

CDP11.1 Development Plan Objective: Integrated Development of the Shannon Estuary.
It is an objective of Clare County Council: To co-operate with the relevant agencies to facilitate, encourage and promote development, economic growth and employment in environmentally-suitable areas along the Shannon Estuary, by implementing the Strategic Integrated Framework Plan for the Shannon Estuary.

CDP11.2 Development Plan Objective: Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary.
It is an objective of the Development Plan: To support and implement the interjurisdictional Strategic Integrated Framework Plan (SIFP) for the Shannon Estuary in conjunction with the other relevant local authorities and agencies. All proposed developments shall be in accordance with the Birds and Habitats Directive, Water Framework Directive and all other relevant EU Directives. All proposed developments shall incorporate the Mitigation Measures as contained in the SIFP – Volume 7 of this Plan - for ensuring the integrity of the Natura 2000 Network.

CDP11.14 Development Plan Objective: Building on the Shannon Estuary as an Environmental Asset It is an objective of Development Plan:

a) To facilitate appropriate development which is compatible with the areas of the estuary which are designated under the Habitats and Birds Directives, whilst ensuring that the environment is protected, conserved and maintained and, where possible, restored, ensuring the dual goals of economic development and environmental conservation can be achieved;

b) To ensure that all proposed developments are in accordance the Birds and Habitats Directive, Water Framework Directive and all other relevant EU Directives;
c) To ensure that all proposed developments do not compromise the achievement of the objectives of the River Basin Management Plans, prepared in accordance with the Water Framework Directive and the Flood Risk Management Plans prepared in accordance with the Floods Directive;
d) To work in partnership with all relevant statutory and other bodies to support and facilitate the preparation of an Integrated Environmental Management Plan for the Shannon Estuary.

CDP12.1 Development Plan Objective: Environmental Designations in Coastal Areas.
It is an objective of the Development Plan: To require proposals for development which may impact on a European site to submit a Natura Impact Statement in accordance with the requirements of the Habitats Directive as part of any planning application. Objective CDP2.1 also refers.

CDP12.4 Development Plan Objective: Integrated Coastal Zone Management.
It is an objective of Clare County Council: To work in collaboration with local communities and relevant stakeholders in the preparation and implementation of an Integrated Coastal Zone Management Plan for the coastal and estuarine areas of the County.

CDP12.12 Development Plan Objective: Coastal Erosion and Flooding.
It is an objective of Clare County Council:
a) To engage with the OPW to develop appropriate strategies for the management of identified coastal flood and erosion hazards and associated risks;
b) To have regard to the Clare County Strategic Flood Risk Assessment, CFRAM Flood Risk Management Plans (when available), the OPW Coast Protection Strategy Study, and any updated version/more detailed local studies, in the assessment of development applications in coastal areas; To permit developments only where the Council is satisfied that they will not be at risk from coastal erosion or inundation in the future;
c) To permit developments only where the Council is satisfied that it will not result in an increase in coastal erosion or increase the risk of inundation, either at the subject site or at another location in the vicinity;
d) To prohibit developments outside the boundaries of existing settlements where such development could not be adequately defended over the lifetime of the development without the need to construct additional or new coastal defences;
e) To seek funding for coastal defence works based on the outcome of detailed Coastal Erosion and Flood Risk Management Studies undertaken in areas identified as being at risk from coastal flooding; To ensure full compliance with the requirements of the Habitats Directive with regard to developments in the coastal area;
f) To have regard to any future adopted Integrated Coastal Zone Management Plan for the coastal and estuarine areas of the County, undertaken in accordance with the Habitats and SEA Directive.

CDP 12.13 Development Plan Objective: Coastal Squeeze.

It is an objective of the Development Plan: To ensure that coastal squeeze is taken into consideration in formulating and assessing coastal development proposals.

CDP14.2 Development Plan Objective: European Sites.

It is an objective of the Development Plan:

a) To afford the highest level of protection to all designated European sites in accordance with the relevant Directives and legislation on such matters;
b) To require all planning applications for development that may have (or cannot rule out) likely significant effects on European sites in view of the site's Conservation Objectives, either in isolation or in combination with other plans or projects, to submit a Natura Impact Statement in accordance with the requirements of the EU Habitats Directive and the Planning and Development Act, 2000 (as amended);
c) To recognise and afford appropriate protection to any new or modified SPAs or SACs that are identified during the lifetime of this Plan, having regard to the fact that proposals for development outside of a European site may also have an indirect effect.

CDP14.3 Development Plan Objective: Requirement for Appropriate Assessment under the Habitats Directive.

It is an objective of the Development Plan:

a) To implement Article 6(3) and where necessary Article 6(4) of the Habitats Directive and to ensure that Appropriate Assessment is carried out in relation to works, plans and projects likely to impact on European sites (SACs and SPAs), whether directly or indirectly or in combination with any other plan(s) or project(s). All assessments must be in compliance with the European Communities (Birds and Natural Habitats) Regulations 2011;
b) To have regard to 'Appropriate Assessment of Plans and Projects in Ireland – Guidelines for Planning Authorities 2009' or any updated version.

CDP14.4 Development Plan Objective: Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs).

It is an objective of the Development Plan:

a) To actively promote the conservation and protection of areas designated as an NHA (including proposed sites) and to only consider proposals for development within or affecting an NHA where it can be clearly demonstrated that the proposed development will not have a significant adverse effect on the NHA or pNHA;
b) To identify and afford appropriate protection to any new, proposed or modified NHAs identified during the lifetime of this Plan.

CDP14.7 Development Plan Objective: Non-Designated Sites.

It is an objective of Clare County Council:

a) To ensure the protection and conservation of areas, sites, species and ecological networks/ corridors of biodiversity value outside of designated sites throughout the County and to require an ecological assessment to accompany development proposals likely to impact on such areas or species;

b) To ensure that available habitat mapping is taken into consideration in any ecological assessment undertaken;
c) To complete the Habitat Mapping of the County (in accordance with A Guide to Habitats in Ireland – The Heritage Council 2000) in order to identify and record the natural habitats of the County at a detailed level and afford appropriate protection to areas of importance, as required.

CDP14.9 Development Plan Objective: Environmental Impact Assessment.
It is an objective of Clare County Council:
a) To implement the EIA Directive, ensuring that all elements/stages or components of the project are included in one overall assessment and all reasonable alternatives are taken into consideration in choosing the option with the least environmental impact;
b) To have regard to 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessments (2013)' when considering proposals for which an EIA is required;
c) To ensure full compliance with the requirements of the EU Habitats Directive, SEA Directive and associated legislation/regulations, including the associated European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), European Communities (Environmental Assessment of Certain Plans and Programmes) regulations 2004-2011, and the European Communities (Environmental Impact Assessment) Regulations 1989–2011 (or any updated/superseding legislation).

CDP14.11 Development Plan Objective: Habitat Protection.
It is an objective of the Development Plan:
a) To protect and promote the sustainable management of the natural heritage, flora and fauna of the County through the promotion of biodiversity, the conservation of natural habitats and the enhancement of new and existing habitats;
b) To promote the conservation of biodiversity through the protection of sites of biodiversity importance and wildlife corridors, both within and between the designated sites and the wider Plan area;
c) To ensure that there is no net loss of potential Lesser Horseshoe Bat feeding habitats, treelines and hedgerows within 3km of known roosts.

CDP14.12 Development Plan Objective: Urban Ecology.
It is an objective of the Development Plan: To encourage and, where appropriate, enhance the provision of biodiversity features in urban areas through the preparation of local area plans/ settlement plans, green infrastructure strategies and through the development management process.

CDP14.13 Development Plan Objective: Habitat Fragmentation.
It is an objective of the Development Plan: To ensure that development proposals support and enhance the connectivity and integrity of habitats in the Plan area by incorporating natural features into the design of development proposals.

CDP14.19 Development Plan Objective: Wetlands.

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT ASSESSMENT
	It is an objective of the Development Plan: To manage, enhance and protect the wetlands in County Clare having regard to the 'County Clare Wetlands Survey (2008)', the 'Planning and Development Regulations 2001 (as amended)' and 'Drainage and Reclamation of Wetlands – Draft Guidelines for Planning Authorities, 2011' and any subsequent guidance documents. **CDP14.26 Development Plan Objective: Alien and Invasive Species.** It is an objective of the Development Plan: a) To raise awareness of the threat of alien invasive species and take all necessary steps to prevent the spread of non-native invasive species and noxious weeds in the Plan area, including requiring landowners, developers and boat operators to adhere to best practice guidance in relation to their control; b) To require all development proposals to address the presence or absence of invasive alien species on the proposed development site and to require the preparation of an Invasive Species Management Plan where such species are present; c) To implement the requirements of EU Regulations 1143/2014 on the Prevention and Management of the Introduction and Spread of Invasive Alien Species.	
River Basin Management Plan for Ireland 2018-2021	The objectives of the RBMP are to • Prevent deterioration; • Restore good status; • Reduce chemical pollution; and • Achieve water related protected areas objectives	The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each water body. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of the RBMP and achievement or maintenance of environmental objectives which will be set for the receiving water bodies will have a positive impact on water dependent habitats and species within European sites.
Inland Fisheries Ireland Corporate Plan 2016-2020	High Level Objectives: **Objective 1 – Fish:** 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 recreation angling product, and that pristine aquatic habitats are also enjoyed for other recreational uses. **Objective 2 - Habitats:** To develop and improve fish habitats and ensure that the conditions required for fish populations to thrive are sustained and protected. **Objective 3 – Stakeholders:** 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. **Objective 4 – Our People:** We will invest in our people to achieve operational excellence and become one of the best places to work. **Objective 5 – Corporate Management:** IFI will promote a culture of value for money and continual evaluation of its performance in a measurable, transparent and accountable	Implementation and compliance with the objectives of the IFI corporate plan will result in net positive in-combination effects to European sites.

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT ASSESSMENT
	manner.	
Major Accident Emergency Plans		
Seveso II Sites	**CDP8.36 Development Plan Objective: SEVESO III Directive.** It is an objective of the Development Plan: To control the following, for the purposes of reducing the risk or limiting the consequences of a major accident (regard will be had to the provisions of the SEVESO III Directive and any regulations, under any enactment, giving effect to that Directive) - The siting of Major Accident Hazard sites; - The modification of an existing Major Accident Hazard site; or - Specified development in the vicinity of a Major Accident Hazard site. There are three Seveso II Sites in Shannon; Upper Tier - Shannon Aviation Fuels, Shannon International Airport Lower Tier - Enva Ireland Ltd, Shannon - UCB Manufacturing Ireland Ltd., Shannon	No Impact
EPC IPC/IE Licensed Facilities	There are three EPA-licensed sites within 1km of the proposed works within Shannon Free Zone, namely: - International Aerospace Coatings Ltd (Coatings) (IPC Licence No.P0497-02) - Element Six Limited (Synthetic materials) (IPC Licence No. P0533-01) - Heraeus Metal Processing Limited (Metals) (IPC Licence No. P0145-01)	These facilities are required by the EPA to comply with the conditions of their licences. Therefore, there will be no im-combination effects with this sites.
Other Plans and Projects		
Local Planning Applications	Given the large geographical area that the proposed Shannon Town and Environs Flood Relief Scheme covers as part of this project, it is not appropriate to include an exhaustive list of submitted planning applications. Cognisance will be given to any local planning applications associated with the proposed GI works and compliance with planning policies and objectives within the County Development plan will be adhered to. **Shannon Airport Authority – Shannon Town and Environs Flood Relief Scheme (FRS) Ground Investigation Works** It is proposed to conduct site investigation works to inform the geotechnical assessment, otherwise known as Ground Investigation (GI) works as part of the overall Shannon Town & Environs Flood Relief Scheme.	Adherence to the policies and objectives of the Clare County Development Plan 2017 - 2023 ensure that local planning applications and subsequent grant of planning comply with the core strategy of proper planning and sustainability and with the requirements of relevant EU Directives and environmental considerations, there is no potential for in-combination effects on European sites. Adherence to proper and regulation planning procedures cognisant of European sites and in accordance with the County Development plan will not contribute to significant negative effects to European sites.
	Planning Reference 191006: Shannon Airport Authority Embankment Refurbishment An application in process for refurbishment works to existing coastal defence embankments at Shannon Airport, Shannon, Rineanna South, Co Clare. The proposed works include different combinations of armouring, top-soiling and grassing along the embankments. A Natura Impact Statement has been prepared and is included in the application.	In the event the proposed application is granted, works will take place in compliance with the conditions of planning and therefore there should be no in-combination effects with European sites.

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT ASSESSMENT
	Shannon Airport Authority – Shannon Airport Embankment Scheme Ground Investigation Works Shannon Airport Authority propose to conduct Ground Investigation to inform the geotechnical assessment on the Shannon Airport embankments, to inform the option selection and design of the proposed Shannon Town and Environs Flood Relief Scheme.	There is potential for cumulative effects to proximal European sites with **Shannon Airport Embankment Scheme Ground Investigation Works** in-combination with the SAA Shannon Airport Embankment Scheme GI works, in the absence of measures to mitigate likely significant effects to European sites.

5.2.2 Conclusion of Cumulative and In-Combination Impacts Assessment

There is potential for in-combination effects with other plans and projects identified for the region and study area as detailed in **Table 5-3. T**he proposed GI works on the SAA embankment scheme and the Shannon Airport Authority's proposed embankment refurbishment works have potential to contribute to cumulative impacts to the identified European sites, in combination with the proposed GI works.

5.3 Describe any likely changes to the site arising as a result of the following:

Table 5-4: Risk of Likely Effects on European Sites

Site Name	Reduction of Habitat Area	Disturbance to Key Species	Habitat or Species Fragmentation	Reduction in Species Density	Changes in Key Indicators of Conservation Value (Water Quality, etc.)	Climate Change
Lower River Shannon SAC **River Shannon and River Fergus Estuaries SPA**	A number of the proposed GI locations are within the boundary of the SAC and SPA. However, the works will not be located within the QI habitats of the European site. Therefore, there will be no reduction of Annex I habitats.	There is potential for disturbance to key species, due to the nature of the works and their location within the SAC/SPA. There is potential to cause significant effects to the QI and SCI species of European sites.	There is no potential for fragmentation or reduction in habitat due to the nature of the proposed works, therefore there will be no fragmentation of sensitive species in this regard.	Potential reduction to key species, due to the nature of the works and their location within the SAC/SPA. There is potential to cause significant effects to the QI and SCI species of European sites.	There is potential for direct or indirect impacts to the local water quality as a result of run-off and overland flow of pollutants arising from the proposed works, as a result there are potential impacts to European sites.	None. There will be no significant effects to the European sites in this regard.

5.4 Describe any likely impacts on the European Sites as a whole in terms of interference with key relationships that define the structure and function of the site:

Given the nature of the proposed works and the presence of a source-pathway-receptor connectivity between the proposed works and the European site network, there is potential for negative impacts to occur to European sites.

5.5 Provide indicators of significance as a result of the identification of effects set out above in terms of:

5.5.1 Loss

There will be no land-take from European sites as part of the proposed GI works. All excavations will be backfilled, other than locations where the installation of standpipes is required. These locations are within

habitats that are not constituent QI or SCI habitats of the SAC or SPA. The standpipes are small in diameter and will result in a *de minimus* land take within the European sites.

There is potential for loss of QI habitats/species due to the proposed works as a result of surface water run-off and overland flow of material into the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA. This may lead to potential loss of QI habitats/species bordering and intersecting with the study area.

5.5.2 Fragmentation

The magnitude, intensity and integrity of fragmentation in this respect will be negligible in this case as works are localised to the footprint of the GI locations and the study area. No loss will occur to the European Site network.

5.5.3 Disruption

There is potential for disruption to occur to QI species of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA due to the location of the proposed works, within and or bordering the European sites. However, due to the nature of the works it is anticipated these disruptions will be temporary and short-term in nature.

5.5.4 Disturbance

There is potential for disturbance to occur to QI species of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA due to the location of the proposed works, within and or bordering the European sites. However, due to the nature of the works it is anticipated these disruptions will be temporary and short-term in nature.

5.5.5 Change to key elements of the site

There is potential for the proposed ground investigation works to present changes in key indicators of conservation value to the European Site network, namely water quality, as a result of surface water run-off and overland flow impacting upon the QI habitats and species of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

5.5.6 Describe from the above those elements of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.

There is potential for direct, indirect and cumulative impacts to the identified European sites as a result of the proposed GI works.

There is potential source-pathway-receptor connectivity between the proposed works and the identified European sites, due to the presence of existing conduits in the form of drainage ditches and lagoons along the coastal embankment and minor watercourse flowing into the estuary. In addition, some of the proposed GI works are located within the SAC and SPA boundaries, therefore there is potential for visual and noise effects to cause disturbance to the QI and SCI species as a result of the proposed works.

There is also potential for in-combination effects with other plans and projects identified for the region and study area as detailed in **Table 5-3**, namely the proposed GI works on the SAA embankment scheme and the Shannon Airport Authority's proposed embankment refurbishment works have potential to contribute to cumulative impacts to the identified European sites, in combination with the proposed GI works.

6 CONCLUSION

The Screening for AA Report has examined potential likely significant effects as a result of the ground investigation works for the Shannon Town and Environs Flood Relief Scheme to European sites.

Proximal European sites were identified within the ZoI of the study area (see **Table 3-2**), of which two were carried forward for further assessment; Lower River Shannon SAC (Site Code: 002165) and River Shannon and River Fergus Estuaries SPA (Site Code: 004077).

There is potential for direct, indirect and cumulative effects to the identified European sites as a result of the proposed GI works.

There is source-pathway-receptor connectivity between the proposed works and European sites, due to the presence of existing conduits in the form of drainage ditches and lagoons along the coastal embankment and minor watercourse flowing into the estuary. In addition, the proposed GI works are located within or proximal to the SAC and SPA boundaries with potential for visual and noise effects to cause disturbance to the QI and SCI species as a result of the proposed works.

The GI works proposed to be undertaken on the SAA embankment scheme, along with SAA's proposed embankment refurbishment works also have potential to contribute to cumulative impacts to the identified European sites, in combination with the proposed GI works.

It cannot be excluded, on the basis of objective information, that the proposed OPW GI Works for the Shannon Town and Environs Flood Relief Scheme, Co. Clare, individually or in combination with other plans or projects, will have a significant effect on a European Site.

Therefore, it is concluded that a Natura Impact Statement is required to inform Stage 2 Appropriate Assessment.