

# SHANNON TOWN AND ENVIRONS FLOOD RELIEF SCHEME

Office of Public Works Ground Investigation Works  
Natura Impact Statement



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## REPORT

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## 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). 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 Planning Permission and Consent

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, and will seek consultation from National Parks and Wildlife Service (NPWS), on the likely significant impacts on the Lower Shannon SAC and SPA. The works will be carried out under the Arterial Drainage Act 1945.
2. Shannon Airport Embankment Scheme – Shannon Airport Authority 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 NIS is for the GI works on the Bunratty Rineanna Embankment Scheme. OPW as the Competent Authority under the Arterial Drainage Acts for NIS; will seek comments from NPWS and when these comments have been taken into account OPW will make the determination with regard to whether there will be “likely significant impacts” on the Lower Shannon SAC and SPA.

Clare County Council will consult through the planning process and will likewise make a determination in accordance with the European Communities (Birds and Natural Habitats) Regulations and SI477 on the likely significant impacts on the Lower Shannon SAC and SPA. Seeking approval for both NISs through the Arterial Drainage Act and the Planning Permission route within the P&D Acts will negate the requirement for approval from ABP as per Section 181A of the Planning and Development Act, while gaining statutory approval and complying with relevant planning legislation.

The Screening for AA report (see Section 1.2) prepared for the proposed GI works concluded that in the absence of mitigation the potential for likely significant effects on the European sites could not be excluded, therefore AA is required to be conducted by the competent (or public) authorities for the GI works, in this case the OPW for the Bunratty Rineanna Embankment Scheme.

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 and Schedule 5 Part 1 or Part 2 of the Planning and Development Regulations 2001 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 1-3** shows the proposed works area for Shannon Airport Authority and **Figure 1-2** shows the proposed works area for the OPW maintained embankments.

This NIS will inform the AA for the application for consent for the GI works on the Bunratty Rineanna Embankment Scheme. RPS has prepared a Screening for Appropriate Assessment (AA) Report (see **Appendix A**) and a Natura Impact Statement (NIS) in relation to the proposed GI works 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, if the proposed GI works, either individually or in combination with another plan and project is likely to have a significant effect on a European site and shall make a determination on the AA under Article 6(3) of the Habitats Directive 92/43/EEC, as to whether or not the proposed GI works would adversely affect the integrity of a European site.

## 1.2 Screening for Appropriate Assessment Concluding Statement

A Screening for AA Report was prepared by RPS on behalf of the OPW for the proposed GI works. The report has examined potential likely significant effects as a result of the proposed GI works to European Sites. Two European Sites are present within the Zone of Influence (Zol) of the proposed GI works, namely the Lower River Shannon Special Area of Conservation (SAC) (Site Code: 002165) and the River Shannon and River Fergus Estuaries Special Area of Conservation (SPA) (Site Code: 004077). There is hydrological connectivity to both of these European sites.

The Lower River Shannon is located immediately south of the proposed works, adjoining the proposed works location. It is designated as part of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA both of which the boundaries extend into the study area.

The Screening for AA report concluded that in the absence of mitigation the potential for likely significant effects on the European sites could not be excluded. This is owing to the following;

- (i) Potential for the proposed GI works to result in water quality degradation. A deterioration in water quality has the potential to indirectly impact aquatic QI species within the Lower River Shannon, namely salmon, brook lamprey, river lamprey, sea lamprey, common bottlenose dolphin, freshwater pearl mussel and otter. These species have conservation objective targets relating to water quality and/or habitat quality requirements.
- (ii) Indirect impacts to otter via a change in food resources owing to water quality deterioration could also not be excluded. There is a conservation objective target for otter that there should be no significant decline in fisheries resource.
- (iii) A deterioration in water quality has the potential to indirectly impact SCI species of the River Shannon and River Fergus SPA by negatively impacting upon food sources.
- (iv) Potential disturbance of QI species of the River Shannon and River Fergus SPA via noise and activity levels during GI works. The conservation objective target for numerous species within the SPA state; no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation.
- (v) In-combination impacts upon water quality during the GI works could also not be excluded. In the absence of mitigation, there is potential for significant negative effects through overland flow and run off due to the proposed works to the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

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

The Screening for AA report is provided in full in **Appendix A**.

### 1.3 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 Habitats Directive Article 3). 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) establishes the requirement for AA:

*Any plan or project not directly connected with or necessary to the management of the Natura 2000 site but likely to have a significant effect thereon, either individually or in combination with other plans 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.*

### 1.4 Scope of NIS

As the Screening for AA report has concluded that there is likely to be significant effects on a European site, Therefore, the NIS, for the purposes of Article 6(3) of the Habitats Directive and in accordance with Regulations 2(1) and 42(5)(a) of the European Communities (Birds and Natural Habitats) Regulations 2011, is a statement comprising the scientific examination of the project, and European sites (Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA), to identify and characterise any possible implications of the project individually or in combination with other plans or projects in view of the conservation objectives of the sites, and any further information including, but not limited to, any plans, maps or drawings, scientific information or data required by the OPW to enable the carrying out of an AA.

### 1.5 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.

### Figure 1-1 Shannon Flood Relief Scheme Study Area





Figure 1-2: 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) and 6(4) of that Directive. The methodology followed in relation to this assessment has had regard to the following guidance and legislation:

#### Guidance

- 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.
- CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Chartered Institute of Ecology and Environmental Management;
- DoEHLG (2009, rev. 2010). *Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities*. Department of the Environment, Heritage and Local Government;
- European Communities (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;
- EC (2007b). *Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC*. European Commission, Luxembourg;
- EC (2013). *Interpretation Manual of European Union Habitats*. Version EUR 28. European Commission, Luxembourg;
- 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. European Commission;
- 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;
- 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.

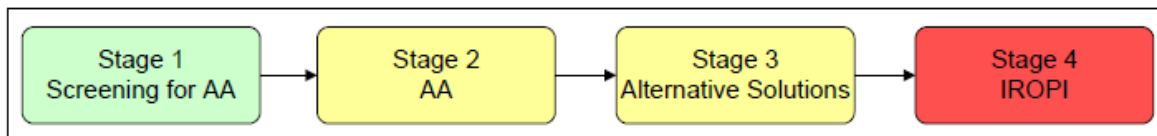
#### Legislation

- 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)<sup>1</sup> 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.

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 likely significant 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 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 likely significant 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 an NIS, which is a report of a targeted professional scientific examination of the implications of the plan or project, on its own or in combination with other plans or projects, on relevant European sites, in view of the site's conservation objectives. The NIS 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 public authority must make a determination to that effect before proceeding to the next stage.

<sup>1</sup> Now the Department of Culture, Heritage and the Gaeltacht

### 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 adversely affect 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 Reason of 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'.

## 2.3 Study Area and Zone of Influence

### 2.3.1 Study Area

The study area is Shannon Town and Environs 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 Zol of the proposed GI works 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 GI works 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 GI 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 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 GI works site could be potentially linked.

### 2.3.2.2 Zone of Influence

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

The proximity of the proposed GI works 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 over reliance on buffer zones (e.g. 15 km), within which all European sites should be considered. This follows Irish departmental 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 GI works has been evaluated based on an identified Zol with regard to the potential impact pathways to ecological feature (e.g. mobile and static). The Zol of the proposed GI works 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 Zols within close proximity of the proposed GI works, 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 GI works 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. As a precautionary measure, a reasonable worst-case Zol for water pollution from the proposed GI works site. In this case the Zol identified extends downstream to the River Fergus and River Shannon transitional waterbody. No additional European Sites intersect this extended Zol.

Hydrogeological linkages between a proposed GI works 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. As a precautionary measure, a reasonable worst-case Zol for water pollution from the proposed GI works site in this instance is considered to comprise the entirety of each groundwater body the proposed GI works overlies.

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



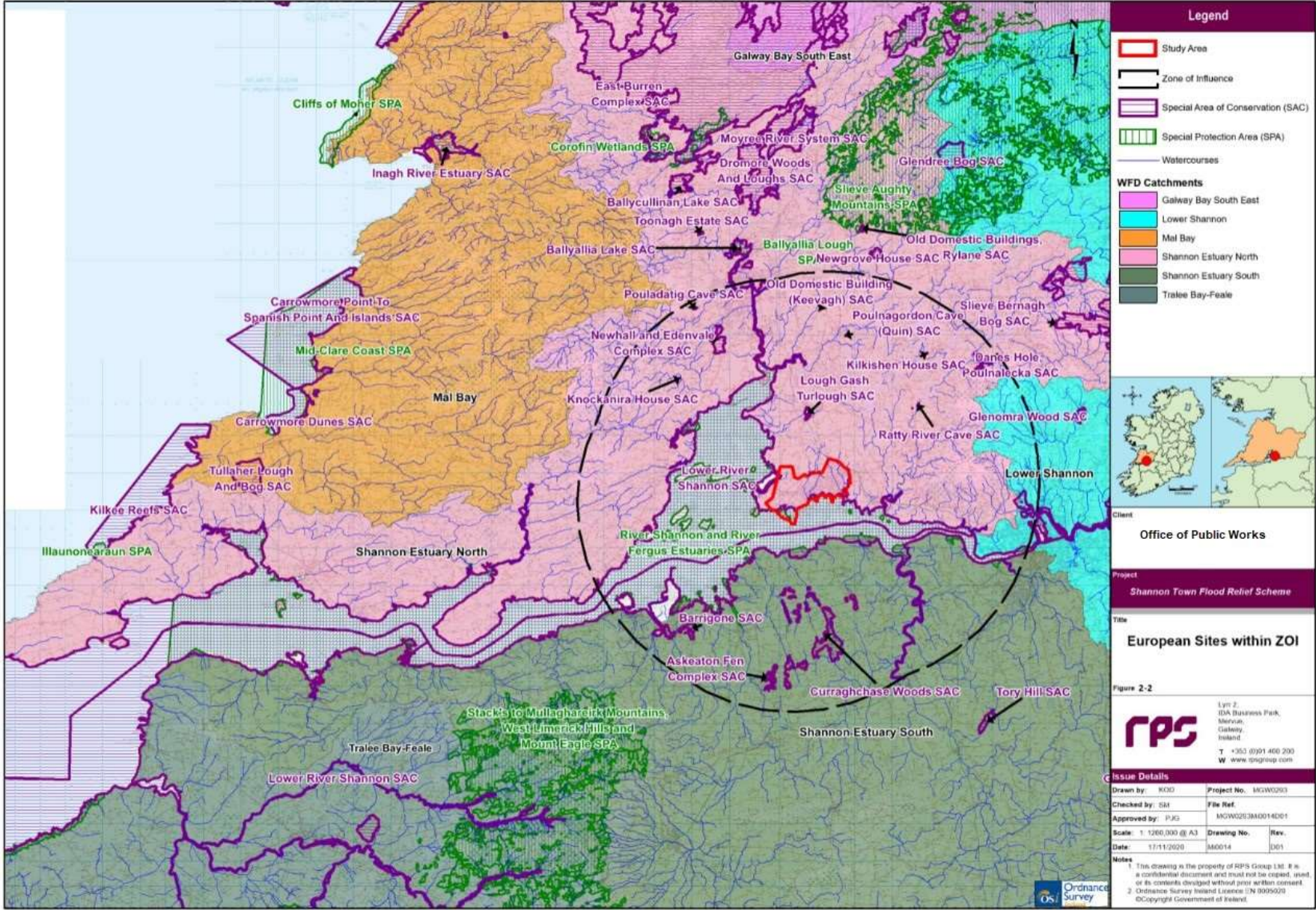


Figure 2-2: Zone of Influence



## 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 Zol, given their ecological requirements identified by Balmer *et al.* (2013) for SPA SCIs, and the National Parks and Wildlife Service (NPWS) for QIs (NPWS, 2019, Volumes 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](http://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](http://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>);
- 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](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](http://www.osi.ie).

## 2.5 Walkover Surveys and Site Visits

Following a full desktop study of available biological information pertaining to the study area, RPS ecologists carried out site walkover surveys 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 Zol of the proposed GI works 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 GI works 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 visits are provided in **Section 4.1**.

### 3 PROJECT DESCRIPTION

#### 3.1 Need for the Proposed GI Works

The GI works are 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. See **Figure 1-3** for the location of GI works within the OPW works area. **Figure 1-2** illustrates the GI works within the SAA owned embankments located to the west of the OPW works.

#### 3.3 Proposed GI Works

The location and proximity of the proposed GI works to European sites is provided in **Table 3-1** and 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 B** 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

Location ID	Easting (ITM)	Northing (ITM)	Depth (m)	Remarks	SAC	SPA
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
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; 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<sup>2</sup>.

- 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/arising 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<sup>2</sup>.
- 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/arising 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)<sup>2</sup>

- 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.

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<sup>2</sup> [https://www.eqc.govt.nz/sites/public\\_files/images/What%20is%20a%20cone%20penetration%20test.pdf](https://www.eqc.govt.nz/sites/public_files/images/What%20is%20a%20cone%20penetration%20test.pdf)



## 4 EXISTING ENVIRONMENT

### 4.1 Biodiversity

#### 4.1.1 Habitats

Site walkover surveys were conducted by RPS ecologists on the 28<sup>th</sup> 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 (Glaucopuccinellietalia 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 and Section 5.2 for further details on the Annex I habitats.

**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 (Annex Habitat [1130])
Saline Pond (CW1)	Local Importance (higher value)
Mud Shore (LS4)	International Importance (Annex Habitat [1140])

#### 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	<i>Anser anser</i>	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	<i>Potamopyrgus antipodarum</i>	R36	Medium Impact Invasive Species
American Mink	<i>Mustela vison</i>	R36	Medium Impact Invasive Species
European Rabbit	<i>Oryctolagus cuniculus</i>	R36	Medium Impact Invasive Species
Ruddy Duck	<i>Oxyura jamaicensis</i>	R36	High Impact Invasive Species, Regulation S.I. 477 (Ireland)
Japanese Knotweed	<i>Fallopia japonica</i>	R35, R36, R46	High Impact Invasive Species, Regulation S.I. 477
Traveller's-joy	<i>Clematis vitalba</i>	R46	Medium Impact Invasive Species
Sycamore	<i>Acer pseudoplatanus</i>	R46	Medium Impact Invasive Species
Giant Hogweed	<i>Heracleum mantegazzianum</i>	R35, R46	High Impact Invasive Species, Regulation S.I. 477
Himalayan Knotweed	<i>Persicaria Wallichii</i>	R36	Medium Impact Invasive Species, Regulation S.I. 477
Common Cord-grass	<i>Spartina anglica</i>	R35	High Impact Invasive Species, Regulation S.I. 477
Indian Balsam	<i>Impatiens glandulifera</i>	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	<i>Leycesteria formosa</i>	539204 660893 539199 660862	Medium Impact Invasive Species
Himalayan Balsam	<i>Persicaria Wallichii</i>	540554 661330	High Impact Invasive Species, Regulation S.I. 477
Common Cord-grass	<i>Spartina anglica</i>	539212 660653 538485 660238	High Impact Invasive Species, Regulation S.I. 477
Greylag Goose	<i>Anser anser</i>	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 see 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, see **Appendix B**. 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 see 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.

#### 4.1.4 Surface Water

The study area is located in the Ballygirreen sub-catchment (ID 27\_11), which is part Shannon Estuary North catchment area (ID 27). 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 1,658km<sup>2</sup>.

There are two river water bodies, Boheraroan and Urlan Beg River, in the Ballygirreen 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.<sup>3</sup>

<sup>3</sup>

[https://catchments.ie/wpcontent/files/subcatchmentassessments/27\\_11%20BALLYGIRREEN\\_SC\\_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf](https://catchments.ie/wpcontent/files/subcatchmentassessments/27_11%20BALLYGIRREEN_SC_010%20Subcatchment%20Assessment%20WFD%20Cycle%202.pdf)

## REPORT

The EPA online mapping and River Quality Monitoring dataset (River Q Values 1971-2018)<sup>4</sup> 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

<sup>4</sup> <https://gis.epa.ie/EPAMaps/> Accessed: September 2020



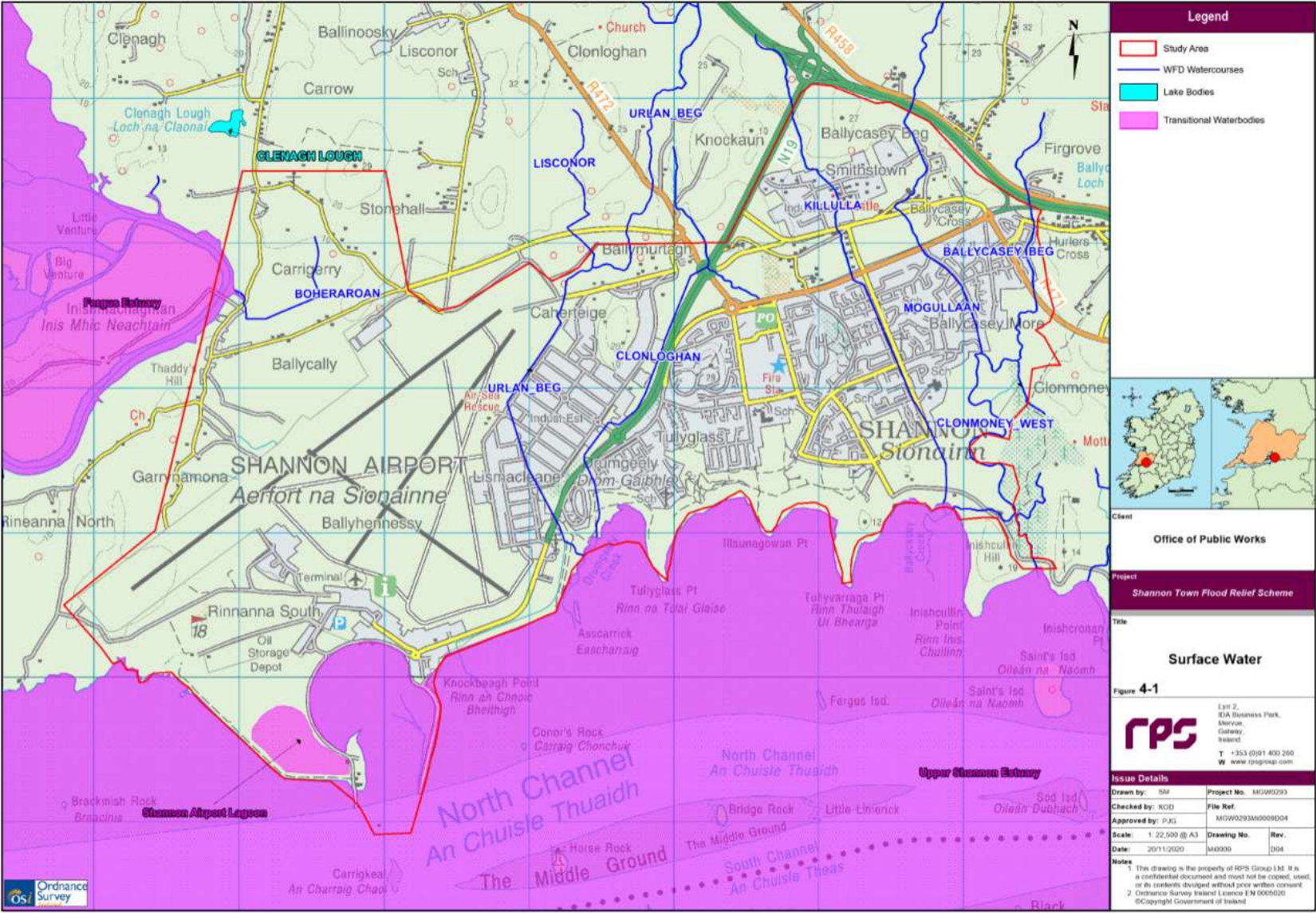


Figure 4-1: Surface Water



### 4.1.5 Flooding

A search of the OPW National Flood Hazard Mapping 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<sup>5</sup> 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 4-2** below.



**Figure 4-2: Flooding Probability (1-in-a-100)<sup>6</sup>**

**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

<sup>5</sup> <https://www.osi.ie/products/professional-mapping/historical-mapping/> Accessed: October 2020

<sup>6</sup> Source: Flood Maps website. Accessed October 2020 (<https://www.floodinfo.ie/map/floodmaps/>)

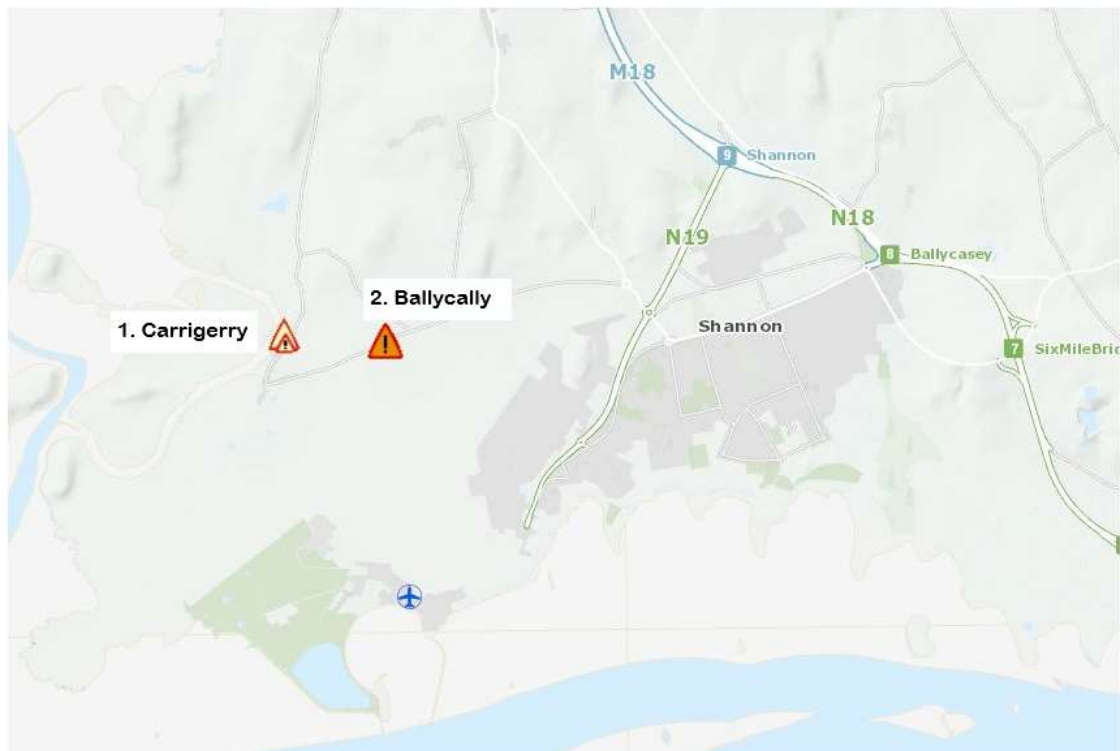


Figure 4-3: Flood Events in Proximity to the Study Area (Source: <https://www.floodinfo.ie/map/floodmaps/><sup>7</sup>)

#### 4.1.6 Soils, Geology and Hydrology

The Geological Survey of Ireland (GSI) online database ([www.gsi.ie](http://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

<sup>7</sup> Accessed 21<sup>st</sup> September 2020. Hazard icons indicate flood events.

composition within the study area. The bedrock geology map for the scheme area is provided in

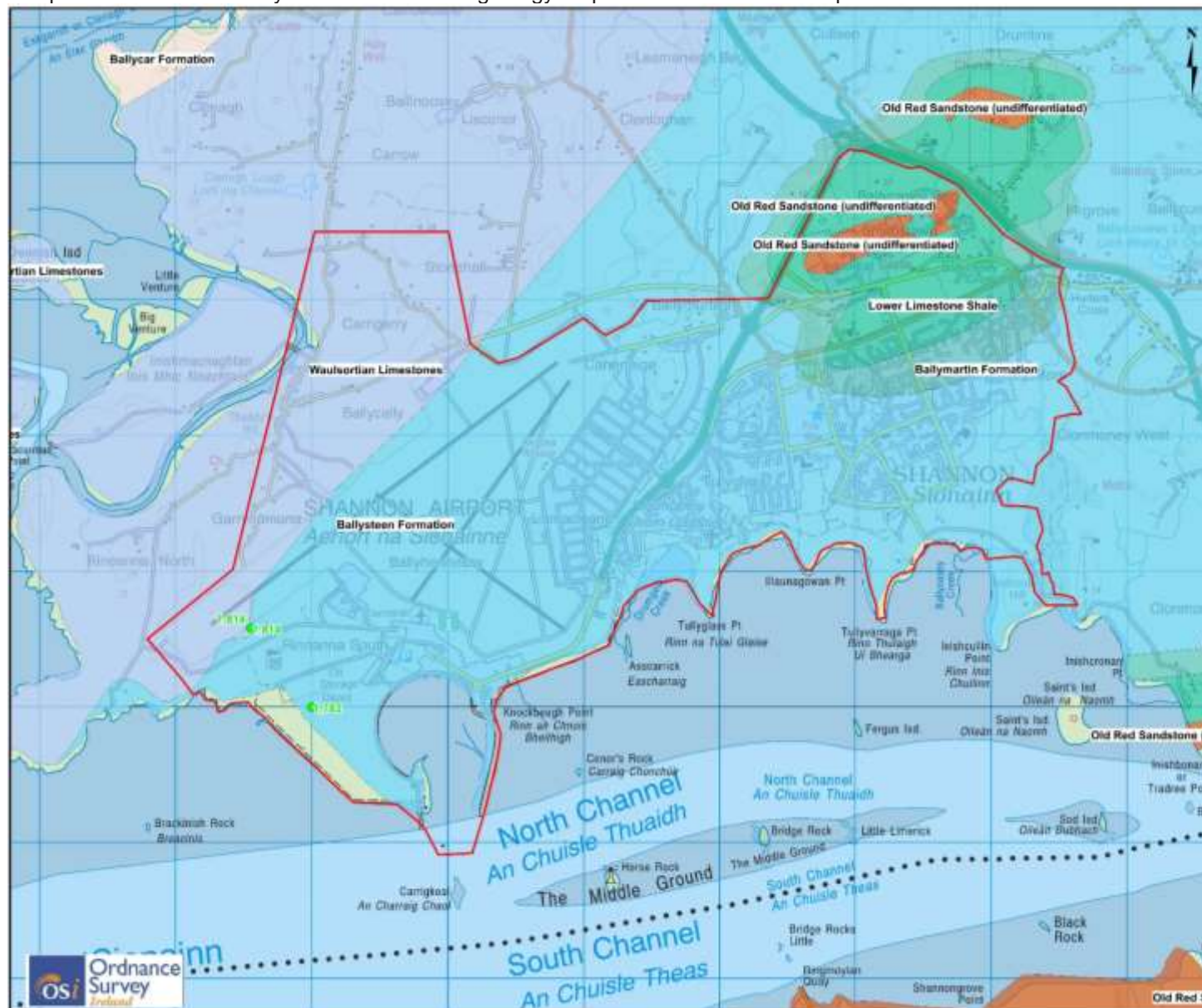


Figure 4-4.

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

Bedrock Geology	Description	Lithological Description	System	Series
<b>Ballymartin Formation</b>	Limestone & dark-grey calcareous shale	Interbedded weakly nodular grey muddy bioclastic limestones and dark grey calcareous shaly mudstones.	Carboniferous	Dinantian
<b>Ballysteen Formation</b>	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
<b>Lower Limestone Shale</b>	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	Carboniferous	Dinantian

Bedrock Geology	Description	Lithological Description	System	Series
		and on the Pallaskerry borehole (LI-68-10). It comprises the Mellon House, Ringmoylan, Ballyvergin and Mallymartin formations.		
<b>Old Red Sandstone (undifferentiated)</b>	Red conglomerate, sandstone & mudstone	Red mudstones, siltstones and sandstones, and poorly sorted, polymict pebble conglomerates and breccias	Devonian-Carboniferous	n/a
<b>Waulsortian Limestones</b>	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 display of 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<sup>8</sup>. 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.

<sup>8</sup> <http://gis.teagasc.ie/soils/map.php> Accessed: October 2020



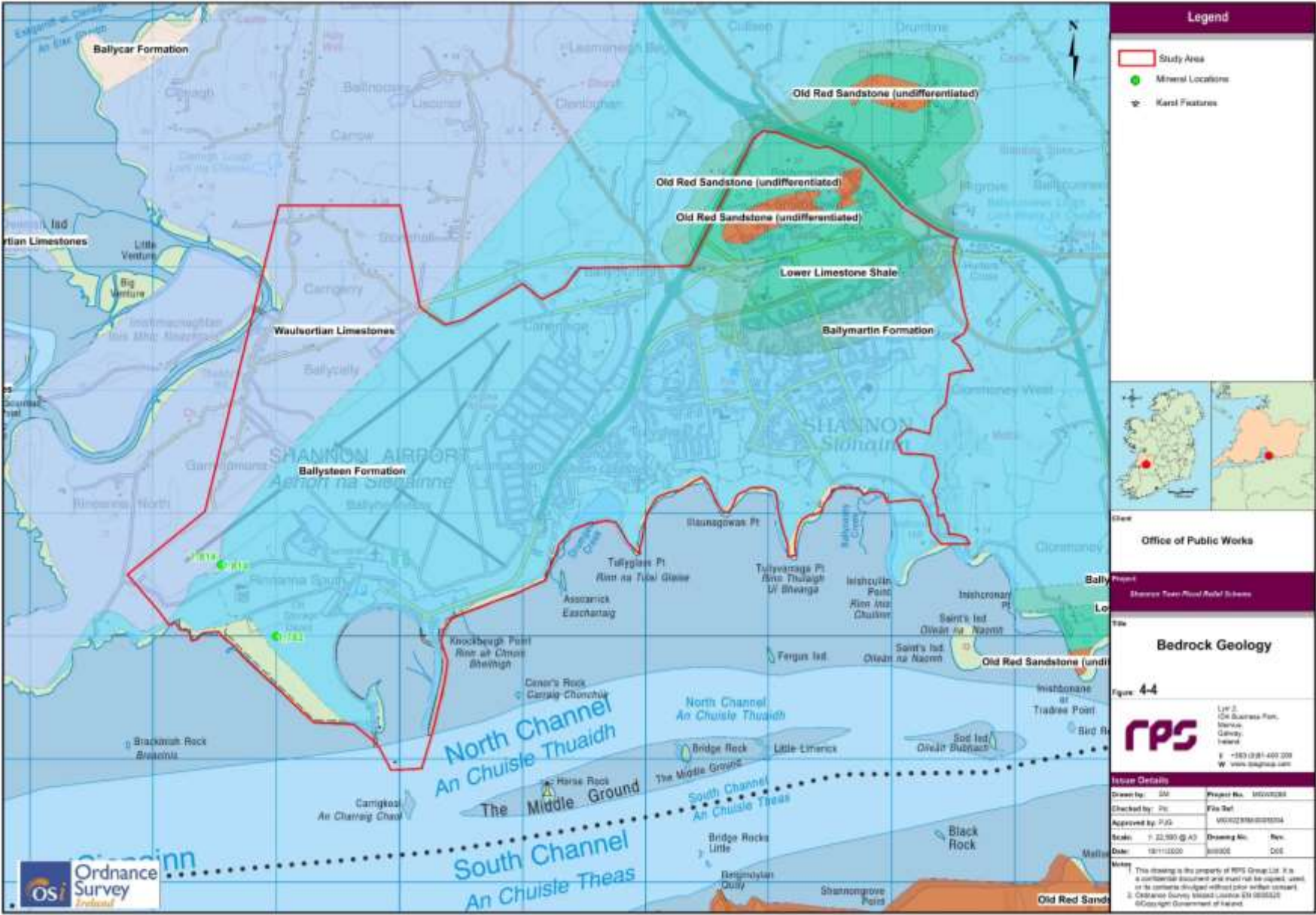


Figure 4-4: Bedrock Geology



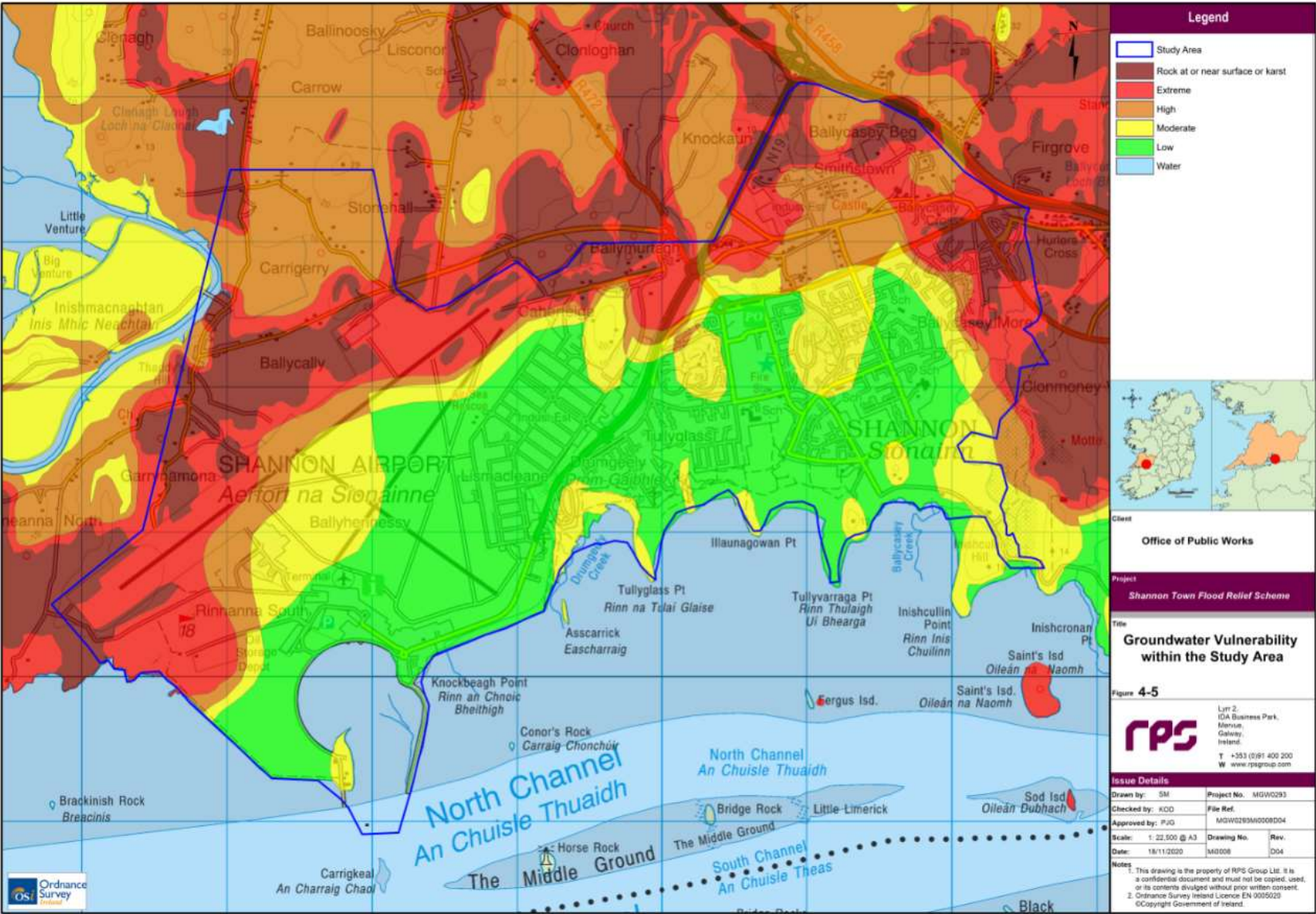


Figure 4-5: Groundwater Vulnerability

## 5 EUROPEAN SITES

### 5.1 European Sites within the Zol

There are 14 European sites located within Zol of the proposed works, see **Figure 5-1**, they 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. Poulmagordon 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)
14. Old Domestic Building (Keevagh) SAC (Site Code: 002010)

#### 5.1.1 Assessment of Connectivity

Connectivity between the European sites and the works area has been reviewed. 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).

Sites 3-14 identified within the Zol do not support connectivity to the proposed GI works through any environmental vectors. Taking this, as well as the structure and function of the sites and the characteristics and habitat requirements of the QI and SCI into account, these sites were not considered further in the Screening for AA Report (**Appendix A**).

The proposed GI works within the study area support connectivity to the Lower River Shannon SAC (Site Code: 002165) and the River Shannon and River Fergus Estuaries SPA (Site Code: 004077). Consequently, the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA are assessed further in this report.



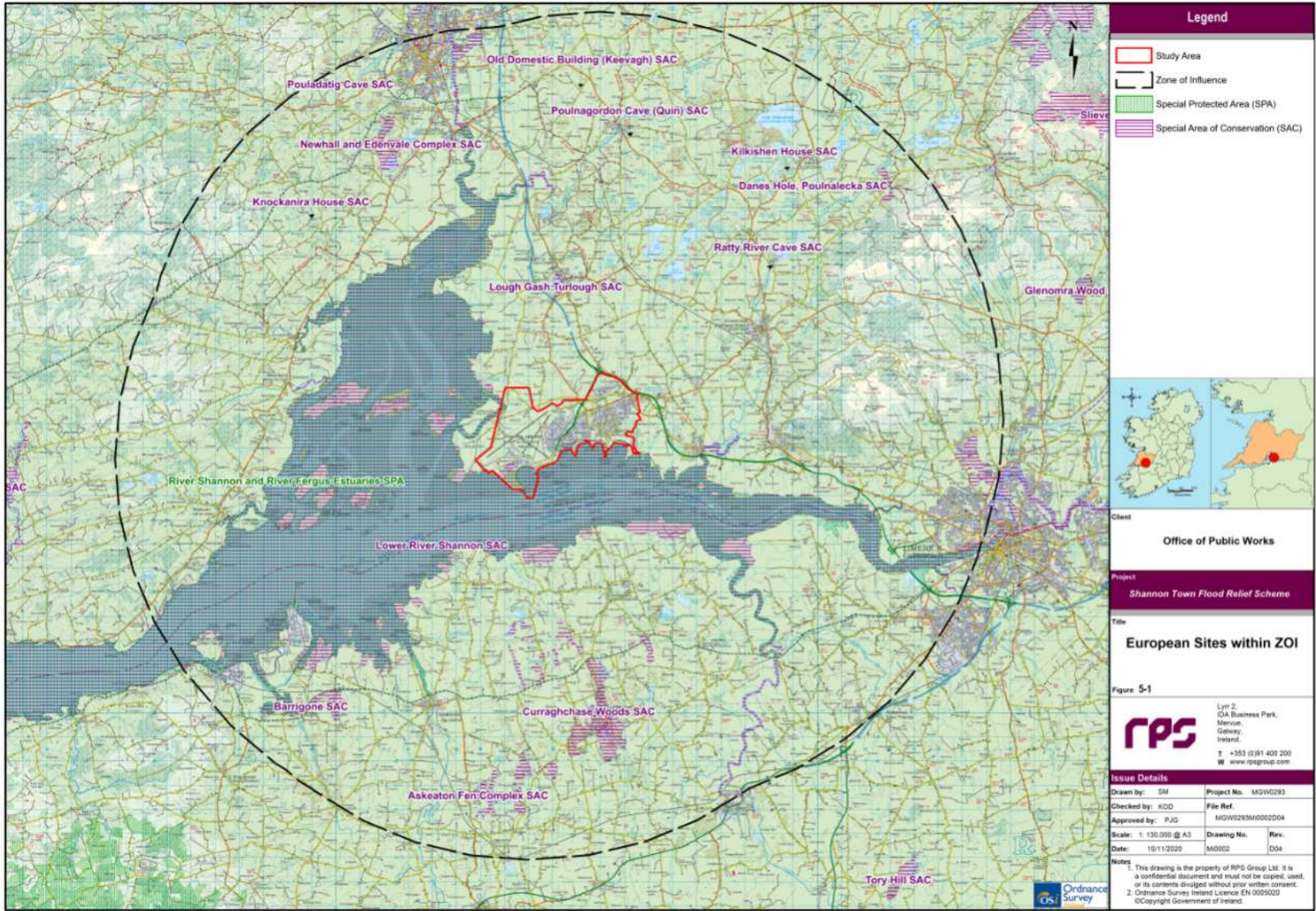


Figure 5-1: European Sites within the Zone of Influence

## 5.2 Conservation Objectives of European Sites

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 (namely the NPWS) 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.

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 Interest (QI) of SACs or the Special Conservation Interest (SCI) of SPAs. The QIs and SCIs for each site have been obtained through a review of the most recently published (web-published or otherwise) QIs, Special SCIs, Conservation Objectives (COs) and Site Specific Conservation Objectives (SSCOs) (where applicable) for these European sites. The data is summarised in the following section was the most up-to-date information available at the time of drafting this report in June 2020.

### 5.2.1 Conservation Objectives of the Lower River Shannon SAC

Relevant extracts from the NPWS Lower River Shannon SAC site synopsis are presented below (NPWS, 2013)<sup>9</sup>.

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The Shannon and Fergus Rivers flow through Carboniferous limestone as far as Foynes, but west of Foynes Namurian shales and flagstones predominate. The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary.

Both the Fergus and inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. Plant species are typically scarce on the mudflats, although there are some eelgrass (*Zostera* spp.) beds and patches of green algae (e.g. *Ulva* sp. and *Enteromorpha* sp.). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a *Macoma Scrobicularia-Nereis* community. In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified within the site, the most important of which are around the Fergus estuary.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species.

**Table 5-1** and **Table 5-2** provides detail on the conservation condition of the QIs of the site as per the Natura 2000 Data Form (NPWS, 2018) for the site.

<sup>9</sup> <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002165.pdf>



Table 5-1: Lower River Shannon SAC QI Habitats

Habitat Code	Annex I Habitats	Cover (ha)	Representativity <sup>10</sup>	Overall status and trend <sup>11</sup>	Conservation Objective
1110	Sandbanks which are slightly covered by sea water all the time	1353.2786	B	Favourable	Maintain
1130	Estuaries	24273.2751	A	Inadequate	Maintain
1140	Mudflats and sandflats not covered by seawater at low tide	8808.3004	A	Inadequate	Maintain
1150	Coastal lagoons	33.3752	A	Bad	Restore
1160	Large shallow inlets and bays	35288.2146	A	Bad	Maintain
1170	Reefs	21421.3014	B	Inadequate	Maintain
1220	Perennial vegetation of stony banks	683.3	A	Inadequate	Maintain
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	683.3	A	Inadequate	Maintain
1310	Salicornia and other annuals colonising mud and sand	0.2214	C	Favourable	Maintain
1330	Atlantic salt meadows ( <i>Glaucopuccinellietalia maritimae</i> )	495.43385	A	Inadequate	Restore
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	24.67105	A	Inadequate	Restore
3260	Water courses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i> vegetation	683.3	C	Inadequate	Maintain
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinia caerulea</i> )	683.3	B	Bad	Maintain
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )	15.5649	B	Bad	Restore

Table 5-2: Lower River Shannon SAC Qualifying Species

Species Code	Annex II Qualifying Species	Population Significance <sup>12</sup>	Overall Status and Trend <sup>13</sup>	Conservation Objective
1029	<i>Margaritifera margaritifera</i> (Freshwater Pearl Mussel)	C	Bad	Restore
1095	<i>Petromyzon marinus</i> (Sea Lamprey)	C	Bad	Restore
1096	<i>Lampetra planeri</i> (Brook Lamprey)	C	Favourable	Maintain
1099	<i>Lampetra fluviatilis</i> (River Lamprey)	C	Unknown	Maintain
1106	<i>Salmo salar</i> (Salmon)	C	Inadequate	Restore
1349	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin)	C	Favourable	Maintain
1355	<i>Lutra lutra</i> (Otter)	C	Favourable	Restore

<sup>10</sup> 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.

<sup>11</sup> [https://www.npws.ie/sites/default/files/publications/pdf/NPWS\\_2019\\_Vol1\\_Summary\\_Article17.pdf](https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf)

<sup>12</sup> Population Significance in 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.

<sup>13</sup> [https://www.npws.ie/sites/default/files/publications/pdf/NPWS\\_2019\\_Vol1\\_Summary\\_Article17.pdf](https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2019_Vol1_Summary_Article17.pdf)

## 5.2.2 Conservation Objectives of River Shannon & River Fergus Estuaries SPA

Relevant extracts from the NPWS River Shannon and River Fergus Estuaries site synopsis are presented below (NPWS, 2015)<sup>14</sup>.

The estuaries of the River Shannon and River Fergus form the largest estuarine complex in Ireland. The site comprises the entire estuarine habitat from Limerick City westwards as far as Doonaha in Co. Clare and Dooneen Point in Co. Kerry. The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries.

Site 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](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf)

In addition, numerous Conservation Objectives supporting documents for River Shannon and River Fergus Estuaries SAC are also available on the NPWS website<sup>15</sup>.

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

**Table 5-3: River Shannon & River Fergus Estuaries Species of Qualifying Interest**

Species Code	Annex II Qualifying Species	Population Significance	Overall Status <sup>16</sup>	Conservation Objective
A017	Cormorant ( <i>Phalacrocorax carbo</i> )	C	Amber	Maintain
A038	Whooper Swan ( <i>Cygnus cygnus</i> )	C	Amber	Maintain
A046	Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> )	C	Amber	Maintain
A048	Shelduck ( <i>Tadorna tadorna</i> )	B	Amber	Maintain
A050	Wigeon ( <i>Anas penelope</i> )	B	Red	Maintain
A052	Teal ( <i>Anas crecca</i> )	B	-	Maintain
A054	Pintail ( <i>Anas acuta</i> )	B	Red	Maintain
A056	Shoveler ( <i>Anas clypeata</i> )	C	Red	Maintain
A062	Scaup ( <i>Aythya marila</i> )	C	-	Maintain
A137	Ringed Plover ( <i>Charadrius hiaticula</i> )	C	Green	Maintain
A140	Golden Plover ( <i>Pluvialis apricaria</i> )	B	-	Maintain
A141	Grey Plover ( <i>Pluvialis squatarola</i> )	B	Amber	Maintain
A142	Lapwing ( <i>Vanellus vanellus</i> )	B	Red	Maintain
A143	Knot ( <i>Calidris canutus</i> )	B	Amber	Maintain
A149	Dunlin ( <i>Calidris alpina</i> )	B	Red	Maintain

<sup>14</sup> <https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004077.pdf>

<sup>15</sup> <https://www.npws.ie/protected-sites/spa/004077>

<sup>16</sup> [Birds of Conservation Concern in Ireland 2014-2019](#); Red Listed – High Conservation Concern, Orange Listed – Medium Conservation Concern

Species Code	Annex II Qualifying Species	Population Significance	Overall Status <sup>16</sup>	Conservation Objective
A156	Black-tailed Godwit ( <i>Limosa limosa</i> )	B	Amber	Maintain
A157	Bar-tailed Godwit ( <i>Limosa lapponica</i> )	B	Amber	Maintain
A160	Curlew ( <i>Numenius arquata</i> )	C	Red	Maintain
A162	Redshank ( <i>Tringa totanus</i> )	B	Red	Maintain
A164	Greenshank ( <i>Tringa nebularia</i> )	C	Green	Maintain
A179	Black-headed Gull ( <i>Chroicocephalus ridibundus</i> )	-	Red	Maintain

### 5.2.3 Potential Pressures and Threats to European Sites

**Table 5-4** 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<sup>17</sup>.

**Table 5-4: Potential Pressures and Threats to Lower River Shannon SAC**

European Site	Threat Code <sup>18</sup>	Threat Type	Rank <sup>19</sup>	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
	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 5-5** 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<sup>20</sup>.

**Table 5-5: Potential Pressures and Threats to River Shannon and River Fergus Estuaries SPA**

<sup>17</sup> <https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF002165.pdf>

<sup>18</sup> 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>

<sup>19</sup> H – High, M – Medium, L – Low

<sup>20</sup> <https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004077.pdf>

European Site	Threat Code <sup>21</sup>	Threat Type	Rank	i (inside)/ o (outside)/ b (both)
River Shannon and River Fergus 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

## 5.3 Proximity of QI and SCI of European Sites to the Study Area

### 5.3.1 QI Habitats of the Lower River Shannon SAC

The Lower River Shannon SAC is located within the boundaries of the study area and is designated for fourteen habitats, twelve of which are coastal habitats or influenced by water. Four Annex I habitats were recorded in the study area and within close proximity to the proposed works, these include; estuaries [1130], coastal lagoons [1150], mudflats and sandflats not covered by seawater at low tide [1140], and Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) [1330]. **Table 5-6** provides an assessment of the Lower River Shannon SAC QI habitats in proximity to the proposed works.

**Table 5-6: Lower River Shannon SAC - Assessment of QI Habitats within the Study Area**

Habitat Code	Habitats	QI Habitats within the Study Area
1110	Sandbanks which are slightly covered by sea water all the time	Sandbanks which are slightly covered by sea water all the time [1110] are not located within the study area. This Annex I habitat type is located approximately 55km downstream of the study area.
1130	Estuaries	This habitat area was estimated as 24,273ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive (NPWS 2013). Estuaries [1130] habitat is located immediately south of the study area and proposed works.
1140	Mudflats and sandflats not covered by seawater at low tide	Mudflats and sandflats not covered by seawater at low tide [1140] occur within the study area, with the total over habitat area was estimated using OSi data as 8,808ha within the SAC. Plant species are typically scarce on the mudflats, although there are some eelgrass ( <i>Zostera spp.</i> ) beds and patches of green algae (e.g. <i>Ulva sp.</i> and <i>Enteromorpha sp.</i> ). The main macro-invertebrate community which has been noted from the inner Shannon and Fergus estuaries is a <i>MacomaScrobicularia-Nereis</i> community.
1150	Coastal Lagoons	Coastal lagoons are present in the study area and located within Shannon Airport; Shannon Airport Lagoon (IL032). Shannon Airport Lagoon (2 ha) is an artificial saline lake with an artificial barrier and sluiced outlet. However, it supports two Red Data Book species of stonewort ( <i>Chara canescens</i> and <i>Chara cf. connivens</i> ) (NPWS 2013)
1160	Large shallow inlets and bays	Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. This habitat does not occur in the study area, it is located approximately 40km downstream at the mouth of the Shannon Estuary.
1170	Reefs	There are pockets of reef [1170] development approximately 170m south of the study area at Carrigkeal. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with gullies of sand

<sup>21</sup> 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>



Habitat Code	Habitats	QI Habitats within the Study Area
		between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand.
1220	Perennial vegetation of stony banks	This Annex I habitat type is not located within the study area. This habitat occurs approximately 36km west of the study area.
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	This Annex I habitat type is not located within the study area. This habitat occurs approximately 37km west of the study area.
1310	Salicornia and other annuals colonising mud and sand	Within Lower River Shannon SAC the areas of Salicornia habitat are limited. Based on data from Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). The habitat recorded at five of the ten subsites, giving a total estimated area of 0.223ha. This habitat was not recorded within or in proximity to the study area. This habitat occurs approximately 37km west of the study area.
1330	Atlantic salt meadows ( <i>Glaucopuccinellietalia maritimae</i> )	<p>The dominant type of saltmarsh present in the SAC is Atlantic salt meadow occurring over mud. Potential Atlantic Salt Meadows are recorded within the study area, with confirmed Atlantic Salt Meadows located approximately 0.7km downstream of the study area boundary.</p> <p>Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle 2009). Ten sub-sites that supported Atlantic salt meadow were mapped (119.36ha) and additional areas of potential saltmarsh (376.07ha) were identified from an examination of aerial photographs, giving a total estimated area of 495.43ha. Conservation objectives states “No decline or change in habitat distribution, subject to natural processes.”</p>
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	<p>Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Eight sub-sites that support Mediterranean salt meadow were mapped (22.379ha) and additional areas of potential saltmarsh (25.646ha) were identified from an examination of aerial photographs, giving a total estimated area of 48.025ha. Saltmarsh habitat also occurs at 11 other sub-sites within the SAC.</p> <p>However, as per mapping of Conservation Objectives for the SAC, this habitat is not recorded within the study area but is located approximately 12.5km downstream.</p>
3260	Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	<p>Water Courses of Plain Montane Levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260]. The description of this habitat is broad, covering rivers from upland bryophyte and macroalgal dominated stretches, to lowland depositing rivers with pondweeds and starworts (European Commission, 2007, Hatton-Ellis and Grieve, 2003).</p> <p>This habitat is not located within the study area, this habitat type is present approximately 16km east of the study area.</p>
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils ( <i>Molinion caeruleae</i> )	<p>This habitat has been recorded on the eastern bank of the Shannon, just north of Castleconnell, Co. Limerick (NPWS 2012). Full distribution of this habitat in this site is currently unknown and it almost certainly occurs elsewhere.</p> <p>Previous habitat surveys within the study have not recorded this habitat.</p>
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )	Conservation objectives mapping indicate Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> ) is present approximately 19km upstream, east of the study area. Alluvial woodland occurs on the banks of the Shannon and on islands in the vicinity of the University of Limerick. The woodland is up to 50 m wide on the banks and somewhat wider on the largest island. However, it is noted that further areas are likely to be present within the SAC.

### 5.3.2 QI Species of the Lower River Shannon SAC

The desktop and field assessment of the proximity of Lower River Shannon QI species to the study area, is provided in **Table 5-7**.

**Table 5-7: Lower River Shannon - Assessment of QI Species within the Study Area**

Species Code	Qualifying Species	Assessment of QI Species within the Study Area
1029	<i>Margaritifera</i> (Freshwater Pearl Mussel)	Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> ), 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 approx. 1.5km upstream of Clonderalaw Bridge (Ross, 2008; DEHLG, 2010)
1095	<i>Petromyzon marinus</i> (Sea Lamprey)	The sea lamprey ( <i>Petromyzon marinus</i> ), brook lamprey ( <i>Lampetra planeri</i> ) and river lamprey ( <i>Lampetra fluviatilis</i> ), have all been observed spawning in the lower Shannon or its tributaries. Conservation objective for all three species states "No decline in extent and distribution of spawning beds".
1096	<i>Lampetra planeri</i> (Brook Lamprey)	
1099	<i>Lampetra fluviatilis</i> (River Lamprey)	
1106	<i>Salmo salar</i> (Salmon)	Salmon has been observed spawning in the lower Shannon or its tributaries. Conservation objectives state the following: "No decline in number and distribution of spawning redds due to anthropogenic causes" and "at least Q4 at all sites sampled by EPA".
1349	<i>Tursiops truncatus</i> (Common Bottlenose Dolphin)	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. Critical areas, representing habitat used preferentially by bottlenose dolphin, should be maintained in a natural condition as outlined in the Conservation Objectives (NPWS, 2012).
1355	<i>Lutra</i> (Otter)	NBDC records (10km <sup>2</sup> ) which encompass the boundary of the study area and coastal area to the immediately to the south support records of otter within the area. NPWS conservation objective mapping highlights commuting buffer zones all along the study area boundary. There is a conservation objective target for otter that there should be no significant decline in fisheries resource.

### 5.3.3 SCI Species of the River Shannon and River Fergus Estuaries SPA

The desktop and filed assessment of the River Shannon and River Fergus Estuaries SPA SCI species is provided in **Table 5-8**.

**Table 5-8: River Shannon and River Fergus Species of Qualifying Interest – Desktop Assessment**

Species Code	Qualifying Species	Assessment of SCI Species within the Study Area
A017	Cormorant ( <i>Phalacrocorax carbo</i> )	The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit.
A038	Whooper Swan ( <i>Cygnus cygnus</i> )	
A046	Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> )	
A048	Shelduck ( <i>Tadorna tadorna</i> )	
A050	Wigeon ( <i>Anas penelope</i> )	
A052	Teal ( <i>Anas crecca</i> )	
A054	Pintail ( <i>Anas acuta</i> )	Conservation objectives target for Cormorant ( <i>Phalacrocorax carbo</i> ) states "Human activities should occur at levels that do not adversely affect the breeding cormorant population".
A056	Shoveler ( <i>Anas clypeata</i> )	
A062	Scaup ( <i>Aythya marila</i> )	Regards distribution the conservation objectives for all other Annex II bird species designated as part of the SPA, states the following "There should be no significant decrease in the range, timing or intensity of use"
A137	Ringed Plover ( <i>Charadrius hiaticula</i> )	
A140	Golden Plover ( <i>Pluvialis apricaria</i> )	

Species Code	Qualifying Species	Assessment of SCI Species within the Study Area
A141	Grey Plover ( <i>Pluvialis squatarola</i> )	of areas by golden plover other than that occurring from natural patterns of variation".
A142	Lapwing ( <i>Vanellus vanellus</i> )	
A143	Knot ( <i>Calidris canutus</i> )	
A149	Dunlin ( <i>Calidris alpina</i> )	
A156	Black-tailed Godwit ( <i>Limosa limosa</i> )	
A157	Bar-tailed Godwit ( <i>Limosa lapponica</i> )	
A160	Curlew ( <i>Numenius arquata</i> )	
A162	Redshank ( <i>Tringa totanus</i> )	
A164	Greenshank ( <i>Tringa nebularia</i> )	
A179	Black-headed Gull ( <i>Chroicocephalus ridibundus</i> )	

See **Table 5-9** which outlines the characteristics, requirements and specialities of non-breeding water-birds and species of specific conservation interest within the SPA. The table provides information of the winter distribution of the birds within the site, the foraging types, the food and prey requirements of the species and supporting habitat required by the bird species.

The ability of non-breeding bird species to utilise other or alternative habitats refers to the species ability to utilise other habitats adjacent to the site particularly during high tide. Birds with a score of '3' under this category are totally reliant on wetland habitats due to unsuitable surrounding habitats and/or species limited habitat requirements. These species include Shelduck (*Tadorna tadorna*), Teal (*Anas crecca*), Ringed Plover (*Charadrius hiaticula*), Grey Plover (*Pluvialis squatarola*), Knot (*Calidris canutus*), Dunlin (*Calidris alpina*), Greenshank (*Tringa nebularia*) and Shoveler (*Anas clypeata*). Therefore, these species may be particularly susceptible to noise and visual impacts during high tide during the wintering season.

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**Table 5-9: The Ecological Characteristics, Requirements & Specialities of non-breeding Waterbird and SCI species of the SPA<sup>22</sup>**

Species	Family (Group)	Winter Distribution <sup>A</sup>	Trophic Guild <sup>B</sup>	Food/Prey Requirements <sup>C</sup>	Principal Supporting habitat within site <sup>D</sup>	Ability to utilise other/alternative habitats <sup>E</sup>	Site Fidelity <sup>F</sup>
Whooper Swan <i>Cygnus Cygnus</i>	Anatidae (swans & geese)	Widespread	1,7	Wide	Lagoon and associated habitats, Intertidal mudflats and shallow subtidal	2	Moderate/High
Light-bellied Brent Goose <i>Branta bernicla hrota</i>	Anatidae (geese)	Localised	1,5,7	Highly Specialised	Intertidal mud and sand flats	2	High
Shelduck <i>Tadorna tadorna</i>	Anatidae (shelducks)	Localised	1,5	Wide	Intertidal mudflats and shallow subtidal	3	High
Wigeon <i>Anas Penelope</i>	Anatidae (dabbling ducks)	Widespread	1,5	Narrower	Intertidal mud and sand flats and sheltered and shallow subtidal	2	Weak
Teal <i>Anas crecca</i>	Anatidae (dabbling ducks)	Widespread	1	Wide	Intertidal mud and sand flats and sheltered and shallow subtidal	3	Weak
Cormorant <i>Phalacrocorax carbo</i>	Phalacrocoracidae (cormorants)	Widespread	3	Highly Specialised	Sheltered & shallow subtidal over sand and mud flats	1	Moderate
Ringed Plover <i>Charadrius hiaticula</i>	Charadriidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	High
Golden Plover <i>Pluvialis apricaria</i>	Charadriidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	Moderate
Grey Plover <i>Pluvialis squatarola</i>	Charadriidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	3	High
Lapwing <i>Vanellus vanellus</i>	Charadriidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	Moderate
Knot <i>Calidris canutus</i>	Scolopacidae (wading birds)	Localised	4	Narrower	Intertidal mud and sand flats	3	Moderate
Dunlin <i>Calidris alpina</i>	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	3	High
Black-tailed Godwit <i>Limosa limosa</i>	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	High
Bar-tailed Godwit <i>Limosa lapponica</i>	Scolopacidae (wading birds)	Localised	4	Wide	Intertidal mud and sand flats	2	Moderate
Curlew <i>Numenius arquata</i>	Scolopacidae (wading birds)	Widespread	4	Wide	Intertidal mud and sand flats	2	High
Greenshank <i>Tringa nebularia</i>	Scolopacidae (wading birds)	Intermediate	6	Wide	Intertidal mud and sand flats	3	High
Redshank	Scolopacidae (wading birds)	Intermediate	4	Wide	Intertidal mud and sand flats	2	High

<sup>22</sup> [https://www.npws.ie/sites/default/files/publications/pdf/004077\\_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc\\_V1.pdf](https://www.npws.ie/sites/default/files/publications/pdf/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf)



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Species	Family (Group)	Winter Distribution <sup>A</sup>	Trophic Guild <sup>B</sup>	Food/Prey Requirements <sup>C</sup>	Principal Supporting habitat within site <sup>D</sup>	Ability to utilise other/alternative habitats <sup>E</sup>	Site Fidelity <sup>F</sup>
<i>Tringa tetanus</i>							
Pintail <i>Anas acuta</i>	Anatidae (dabbling ducks)	Localised	1	Wide	Intertidal mud and sand flats and sheltered and shallow subtidal	2	Weak
Shoveler <i>Anas clypeata</i>	Anatidae (diving ducks)	Intermediate	1	Wide	Lagoon, brackish and freshwater lakes plus intertidal mud and sand flats	3	Moderate
Scaup <i>Aythya marila</i>	Anatidae (diving ducks)	Highly restricted	2	Wide	Subtidal	1	Unknown
Black-headed Gull <i>Chroicocephalus ridibundus</i>	Lariidae (gulls)	n/c	1,2,4,6,7	Wide	Intertidal flats & sheltered & shallow subtidal	2	Moderate

A Winter distribution: Very widespread (>300 sites); Widespread (200 – 300 sites); Intermediate (100 – 200 sites); Localised (50-100 sites); Highly restricted (<50 sites) (based on Crowe (2005).

B Waterbird foraging guilds. 1 = Surface swimmer, 2 = water column diver (shallow), 3 = water column diver (deeper), 4/5 = intertidal walker (out of water), 6 = intertidal walker (in water), 7 = terrestrial walker. Further details are given within Appendix 5.

C Food/prey requirements - species with a wide prey/food range; species with a narrower prey range (e.g. species that forage upon a few species/taxa only), and species with highly specialised foraging requirements (e.g. piscivores).

D Principal supporting habitat present within the SPA. Note that this is the main habitat used when foraging.

E Ability to utilise alternative habitats refers to the species ability to utilise other habitats adjacent to the site. 1 = wide-ranging species with requirement to utilise the site as and when required; 2 = reliant on site but highly likely to utilise alternative habitats at certain times (e.g. high tide); 3 = considered totally reliant on wetland habitats due to unsuitable surrounding habitats and/or species limited habitat requirements. Note, a score of 1 for sea ducks and divers relates to propensity for within-season movements although the site is an important part of the species' wintering range.

F Site fidelity on non-breeding grounds: Unknown; Weak; Moderate; or High (based on published information).

## 6 IMPACT ASSESSMENT

### 6.1 Characterising Impacts

*Significantly Affecting Natura 2000 Sites* (EC, 2002)<sup>23</sup>. When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented include:

- Direct and indirect effects;
- Short- and long-term effects;
- Construction, operational and decommissioning effects; and
- Isolated, interactive and cumulative effects.

Impacts that could potentially occur through the implementation of the project can be categorised under a number of impact categories as outlined in the EC (2002) document as follows:

- Loss/Reduction of habitat area;
- Disturbance to key species;
- Habitat or species fragmentation;
- Reduction in species density; and
- Changes in key indicators of conservation value such as decrease in water quality and quantity.

#### 6.1.1 Meaning of ‘Adversely Affects the Integrity of the Site’

The concept of the ‘integrity of the site’ is explained in the EC publication *Managing Natura 2000 sites: The provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC* (EC, 2018), as follows;

*‘It is clear from the context and from the purpose of the Directive that the ‘integrity of a site’ relates to the site’s conservation objectives. For example, it is possible that a plan or project will adversely affect the site only in a visual sense or only affect habitat types or species other than those listed in Annex I or Annex II for which the site has been designated. In such cases, the effects do not amount to an adverse effect for purposes of Article 6(3).*

*In other words, if none of the habitat types or species for which the site has been designated is significantly affected then the site’s integrity cannot be considered to be adversely affected. However, if just one of them is significantly affected, taking into account the site’s conservation objectives, then the site integrity is necessarily adversely affected’.*

A site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required. When looking at the ‘integrity of the site’, it is therefore important to take into account a range of factors, including the possibility of effects manifesting themselves in the short, medium and long-term.

From the Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC, 2002), the meaning of integrity is described as follows:

*‘The integrity of a site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site’s conservation objectives.*

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<sup>23</sup> 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*.  
[http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura\\_2000\\_assess\\_en.pdf](http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf)

From the Court in its ruling in case C-258/11<sup>24</sup> the precautionary principle should be applied for the purposes of the appraisal.

## 6.2 Potential Impacts Associated with the Proposed GI works

The QIs of the European sites; Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, are detailed in **Section 5** along with the main pressures and threats to these features. When determining the impacts on the QIs of the European site, the main threats and pressures on these habitats and species are assessed with regards to the potential impacts from the project.

Impacts associated with the proposed GI works during the proposed GI works are considered below.

### 6.2.1 Direct Impacts

The SSCOs identified for the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA have potential to be directly impacted as some of the proposed GI works will be located inside the boundary of these European sites.

### 6.2.2 Indirect Impacts

Potential indirect impacts during the proposed GI works are discussed below.

#### 6.2.2.1 Loss/Reduction of Habitat Area

The effects of habitat loss/reduction of QI habitats and species as a result of the proposed GI works has been assessed. The proposed GI works take place along an existing coastal embankment bordering and encroaching upon saltmarsh habitats, tidal mudflats and estuaries. 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.

Immediately south of the embankment and within the study area boundaries are the following Annex I habitats occur; potential Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) [1330], Mudflats and sandflats not covered by seawater at low tide [1140] and Estuaries [1130].

These habitats are of International Importance, and have potential to provide feeding, breeding or resting habitat for the QI species of the SAC and SPA. There is potential for habitat loss/reduction as a result in overland flow and surface water run-off, resulting in habitat degradation. These habitats provide a supporting function to the QI species of the European sites and their subsequent loss have potential to adversely affect the integrity of the European site.

A total of 21 No. standpipes are proposed, each standpipe and associated works (casing and fixing material) will consist of a total area 0.1256m<sup>2</sup> surface area remaining in situ. 19 No. standpipes are within the immediate boundary of the SAC. The remaining occur outside the SAC boundary. The 19 No. standpipes will be located on existing made ground, man-made embankments and grassy verges, none of the standpipes will be located within QI Annex I habitats.

The total area of SAC removal for the installation of 15 No. standpipes is approximately 2.4m<sup>2</sup> (0.00024 ha). The standpipes will be a temporary monitoring measure, with a projected in-situ timeline estimated at 2-5 years. The total area of the SAC is 68,300ha, therefore the loss of non-annexed habitat is considered *de minimus* and there is clearly no risk of adverse effect in the overall context of the SAC.

#### 6.2.2.2 Disturbance to Key Species

The effects of disturbance via noise, vibration, lighting, and human presence on the QI and SCI species, during the proposed GI works, have been assessed. There is potential for populations of QI species to be present within the proposed GI works such as otter and SCI bird species of the River Shannon and River Fergus Estuaries SPA.

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<sup>24</sup> Case C-258/11, *Sweetman & Ors. v An Bord Pleanála & Ors*

The surrounding environment is urbanised and otter are known to establish holts/couches in urbanised areas. Should otter be present it is considered they would be habituated to anthropogenic noise.

Unpublished observations have indicated that otters will rest under roads, in industrial buildings, close to quarries, and at other sites close to high levels of human activity. These observations clearly indicate that otters are very flexible in their use of resting sites and do not necessarily avoid 'disturbance' in terms of noise or proximity to human activity.

No removal of vegetation or suitable habitat for otter will be removed during the proposed works, as a result there will be no reduction in natural noise barriers. The works will take place during daylight hours, avoiding darkness and dawn when otters tend to be most active. Therefore, any noise as a result of construction/operation is not considered to result in significant disturbance impact to otter.

Disturbance to key SCI species of the River Shannon and River Fergus SPA will be short term and temporary, however as there is potential for effects from disturbance via noise, vibration, lighting and human presence as a result of the proposed works taking place during the wintering bird season.

The Estuarine & Coastal Studies (IECS) report (Cutts *et al.*, 2009)<sup>25</sup> defines disturbance in the general context as discrete events that disrupt ecosystem, community or population structures or in some way alter resource levels i.e. food and space. It may also influence the survival of individual birds and reduce the function of the site either for roosting or feeding. The report states that disturbance varies in its magnitude, frequency, predictability, spatial distribution and duration, and species vary greatly in their susceptibility to disturbance and this susceptibility is likely to vary with age, season, weather and the degree of previous exposure.

Effects on the bird population were observed via observations of flight responses and or behavioural changes. With respect to specific noise levels the following response descriptors are given:

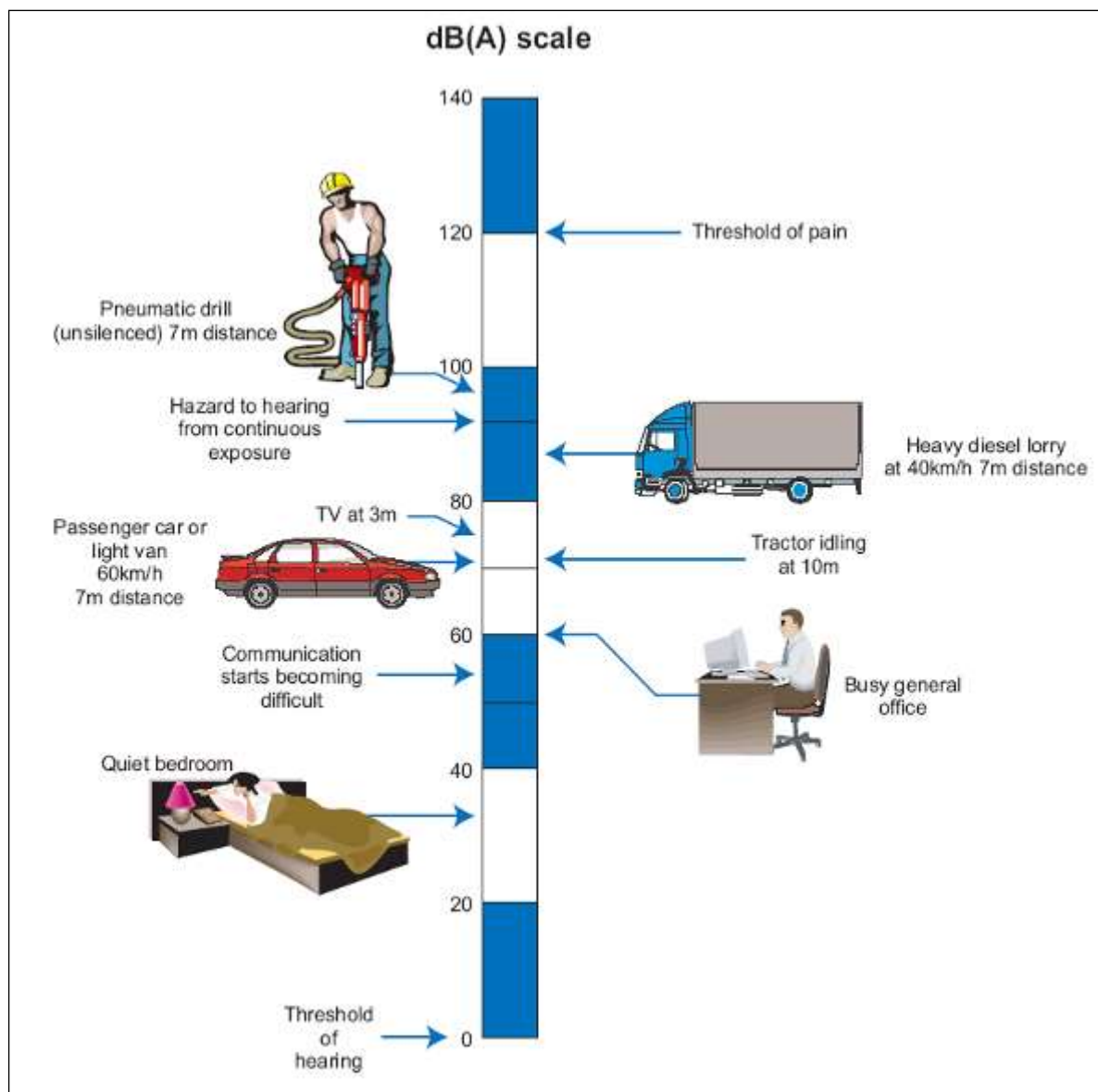
- Noise below 50 dB – low
- Regular noise 50 – 70 dB – low to moderate
- Irregular noise 50 – 70 dB – moderate
- Regular piling noise below 70 dB – moderate
- Irregular piling noise above 70 dB – moderate to high.

An indication of the level of common sounds on the dB (A) scale is presented in **Figure 6-1**.

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<sup>25</sup> Cutts, N., Phelps A., Burdon D. (2009) Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Institute of Estuarine and Coastal Studies (IECS) University of Hull. Report: ZBB710-F2009





**Figure 6-1: Level of Typical Common Sounds on the dB(A) Scale**

The noise levels associated with the machinery and equipment for the GI works comprising the Rotary Cores, Cone Penetration Tests and installation of the Groundwater Standpipes will be similar to a tractor idling at 10m or car at 7m from the receptor equating to approximately 70 dB which would result in a moderate response. However, this noise is already present in the wider industrial and residential area of the proposed GI works and therefore not considered significant. However, the noise emissions from the Borehole Cable Percussion (BHCP) (shell and auger) works may be intermittent but considerably louder than 70 dB and therefore a higher chance of behavioural change/response.

Therefore, there is potential for impact to bird species from all types of GI works on this section during the wintering season.

### 6.2.2.3 Habitat or Species Fragmentation

The effects of habitat fragmentation and/or destruction of QI habitats and species, during proposed GI works have been assessed.

The QI species or habitats of the SAC/SPA present within the proposed study area, are as outlined above. The effects of habitat fragmentation are, therefore, scoped out from further assessment and these effects are not predicted to adversely affect the integrity of European Sites within the Zol.

#### 6.2.2.4 Reduction in Species Density

The effects of a reduction in species density of QI habitats and species, during the proposed GI works, have been assessed. It has been determined that there is potential for adverse effects upon the integrity of the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA as a result of a reduction in species density through water quality deterioration via overland flow and surface water run-off.

There is also potential for the reduction in species density to occur in relation to noise and additional activity levels, in particular as a result of the proposed works taking place during the wintering bird season.

#### 6.2.2.5 Changes in Key Indicators of Conservation Value – Water Quality

The effects of pollution, from surface water runoff, QI habitats and species, during proposed GI works, have been assessed. During the proposed GI works and in the absence of mitigation these effects are predicted to adversely affect the integrity of European Sites within the Zol.

Due to the nature of the works and the requirement to use water during the borehole cable percussion (BHCP) and the borehole rotary core (BHRC) process there is potential for surface water run-off to occur. The topography of the site would lend to overland flow either into adjoining drainage conduits or directly into the estuary south of the embankment. Therefore, there is potential for silt laden runoff to enter the surface water network and ultimately the Lower River Shannon. It is considered that additional measures are required to protect water quality and the aquatic QIs.

The conservation objective for the Lower River Shannon SAC has water quality targets stipulated for designated QI species. There is a water quality target for salmon of at least a Q4 (Good). In the absence of mitigation, a degradation in water quality as a result of sediment laden run off from the site would be contrary to the conservation objectives for salmon to “*restore favourable conservation condition*”.

In addition, there are targets regarding the spawning habitats for the following QI species salmon, brook, river and sea lamprey. The target for all three lamprey species and twaite shad is “*No decline in extent and distribution of spawning beds*”. These species require clean gravels and the release of sediment as a result of the proposed GI works could potentially smother downstream spawning beds and degrade the habitat available for spawning. A degradation in water quality is therefore considered to potentially impact upon key conservation values for aquatic QIs resulting in a reduced species density.

There is potential for indirect impacts to otter via a change in food resources owing to water quality deterioration. There is a conservation objective target for otter that there should be no significant decline in fisheries resource and to “*restore favourable conservation condition*” (NPWS, 2012).

#### 6.2.2.6 Changes in Key Indicators of Conservation Value – Invasive Species

The effects of invasive species spread on QI habitats and species, during proposed GI works, have been assessed. In the absence of mitigation these effects are predicted to adversely affect the integrity of European Sites within the Zol.

Invasive species were identified within the proposed site boundary during the desktop and field survey. Therefore, there is potential for the proposed GI works to spread existing invasive species within the SAC and SPA. In the absence of mitigation there is the potential for Invasive Alien Plant Species (IAPS) to be further introduced and spread on site e.g. via contaminated imported topsoil or landscaping which includes IAPS.

There are a number of QI habitats within the Lower River Shannon SAC which have conservation targets relating to invasive species i.e. “*Negative indicator species, particularly non-native invasive species, absent or under control*”. These habitats include Alluvial forests [91EO] and *Molinia* meadows [6410], neither of which occur in the study area. See **Table 4-3** for invasive species recorded within the study area.

These habitats are not located within the proposed GI works site however riparian and water dependent habitats such as Alluvial forests are potentially located along the banks of the Shannon. A hydrological pathway has been established via the Lower River Shannon and drainage conduits. Therefore, should IAPS be imported on site it is considered there is a potential source-pathway- receptor to Annex I habitats of the Lower River Shannon SAC.

## REPORT

**Table 6-1: Summary of Impacts on the Qualifying Interests of the Lower River Shannon SAC**

Qualifying Interest/ Habitat of Conservation Value	Conservation objective	Brief Explanation of Potential Impact	Mitigation Required
Estuaries [1130]	Maintain	Direct impact as this habitat is located within the boundary of the proposed works. Potential for temporary direct impacts from sedimentation and/or water quality deterioration to this habitat. Introduction and Spread of IAPS.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the Construction Environmental Management Plan (CEMP).  Measures relate to surface water management during the proposed GI works and prevention of IAPS introduction and spread.
Mudflats and sandflats not covered by seawater at low tide [1140]	Maintain	Direct impact as this habitat is located within the boundary of the proposed works. Potential for temporary direct impacts from sedimentation and/or water quality deterioration to this habitat. Introduction and Spread of IAPS.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP.  Measures relate to surface water management during the proposed GI works and prevention of IAPS introduction and spread.
Reefs [1170]	Maintain (Considered under estuaries in conservation objectives)	No direct impact as this habitat is not found within the proposed works boundary. There are pockets of reef [1170] development approximately 170m south of the study area at Carrigkeal. Although there is potential for indirect water quality impacts considering the distance and structure of this habitat.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP.  Measures relate to surface water management during construction and prevention of IAPS introduction and spread.
Salicornia and other annuals colonising mud and sand [1310]	Maintain	No direct impact as this habitat is not found within the proposed works boundary.	No
Atlantic salt meadows ( <i>Glaucopuccinellietalia maritimae</i> ) [1330]	Restore	Direct impact as this habitat is located within the boundary of the proposed works. Potential for temporary direct impacts from sedimentation and/or water quality deterioration to this habitat. Introduction and Spread of IAPS.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP.  Measures relate to surface water management during the proposed GI works and prevention of IAPS introduction and spread.
Mediterranean salt meadows ( <i>Juncetalia maritimi</i> ) [1410]	Restore	No direct impact as this habitat is not found within the proposed project boundary.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP.

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Qualifying Interest/ Habitat of Conservation Value	Conservation objective	Brief Explanation of Potential Impact	Mitigation Required
		Potential for temporary indirect impacts from sedimentation and/or water quality deterioration to this habitat due to location of habitat approximately 1km upstream of the proposed works. Introduction and Spread of IAPS	Measures relate to surface water management during the proposed GI works and prevention of IAPS introduction and spread.
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> ) [91E0].	Restore	No direct impact as this habitat is not found within the proposed works boundary. Potential for temporary indirect impacts from sedimentation and/or water quality deterioration to this habitat are limited due location 19km upstream of the proposed works.	No
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation [3260].	Maintain	No direct impact as this habitat is not found within the proposed GI works boundary. Potential for temporary indirect impacts from sedimentation and/or water quality deterioration to this habitat are limited, this habitat type is present approximately 16km upstream of the study area.	No
<i>Margaritifera</i> (Freshwater Pearl Mussel) [1029].	Restore	No direct impact as this species or habitat for the species is not found within the proposed GI works boundary Potential indirect impact via sedimentation and/or water quality deterioration	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP. Measures relate to surface water management during construction
<i>Lampetra planeri</i> (Brook Lamprey) [1096].	Restore	No direct impact as this species or habitat for the species is not found within the proposed GI works boundary Potential indirect impact via sedimentation and/or water quality deterioration	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP. Measures relate to surface water management during construction
<i>Lampetra fluviatilis</i> (River Lamprey) [1099].	Restore	No direct impact as this species or habitat for the species is not found within the proposed GI works boundary Potential indirect impact via sedimentation and/or water quality deterioration.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP. Measures relate to surface water management during construction
<i>Petromyzon marinus</i> (Sea Lamprey) [1095].	Restore	No direct impact as this species or habitat for the species is not found within the proposed GI works boundary Potential indirect impact via sedimentation and/or water quality deterioration.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP.



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Qualifying Interest/ Habitat of Conservation Value	Conservation objective	Brief Explanation of Potential Impact	Mitigation Required
			Measures relate to surface water management during construction.
<i>Salmo salar</i> (Salmon) [1106]	Restore	No direct impact as this species or habitat for the species is not found within the proposed GI works boundary Potential indirect impact via sedimentation and/or water quality deterioration.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP. Measures relate to surface water management during construction.
<i>Lutra</i> (Otter) [1355].	Restore	No direct impact as this species or habitat for the species is not found within the proposed GI works boundary. Potential indirect impact via sedimentation and/or water quality deterioration altering food resources	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP. Measures relate to surface water management during construction

**Table 6-2: Summary of Impacts on the Qualifying Interests of the River Shannon and River Fergus Estuaries SPA**

Qualifying Species of Conservation Value	Conservation objective	Brief Explanation of Potential Impact	Mitigation Required
Cormorant ( <i>Phalacrocorax carbo</i> ) [A017]	Maintain	Direct impact as this SPA is located within the boundary of the proposed works.	Yes- Mitigation measures stipulated as part of the NIS and shall be incorporated into the CEMP.  Measures relate to surface water management during the proposed GI works.
Whooper Swan ( <i>Cygnus cygnus</i> ) [A038]			
Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> ) [A046]			
Shelduck ( <i>Tadorna tadorna</i> ) [A048]		Potential direct impact via sedimentation and/or water quality deterioration altering food resources,	GI works comprising the Rotary Cores, Cone Penetration Tests and installation of the Groundwater Standpipes may be undertaken during the wintering months on the main embankments. However, Borehole Cable Percussion (shell and auger) will be restricted to being undertaken <b>outside</b> the wintering bird season (October to March inclusive).
Wigeon ( <i>Anas penelope</i> ) [A050]			
Teal ( <i>Anas crecca</i> ) [A052]		Potential indirect impacts via disturbance through noise, vibration, lighting and human presence.	
Pintail ( <i>Anas acuta</i> ) [A054]			
Shoveler ( <i>Anas clypeata</i> ) [A056]			
Scaup ( <i>Aythya marila</i> ) [A062]			
Ringed Plover ( <i>Charadrius hiaticula</i> ) [A137]			
Golden Plover ( <i>Pluvialis apricaria</i> ) [A140]			

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Qualifying Species of Conservation Value	Conservation objective	Brief Explanation of Potential Impact	Mitigation Required
Grey Plover ( <i>Pluvialis squatarola</i> ) [A141]			
Lapwing ( <i>Vanellus vanellus</i> ) [A142]			
Knot ( <i>Calidris canutus</i> ) [A143]			
Dunlin ( <i>Calidris alpina</i> ) [A149]			
Black-tailed Godwit ( <i>Limosa limosa</i> ) [A156]			
Bar-tailed Godwit ( <i>Limosa lapponica</i> ) [A157]			
Curlew ( <i>Numenius arquata</i> ) [A160]			
Redshank ( <i>Tringa totanus</i> ) [A162]			
Greenshank ( <i>Tringa nebularia</i> ) [A164]			
Black-headed Gull ( <i>Chroicocephalus ridibundus</i> ) [A179]			

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

As part of the NIS, 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 6-3** below.

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

Provided adherence to the overarching policies and objectives of the national, regional, county and local land use plans and programmes and adherence to planning conditions for individual projects, there is no potential for the mentioned plans and projects to have a cumulative impact to European sites, in combination with the proposed GI works, in the event mitigation measures are adhered to.

**Table 6-3: Cumulative Impacts Associated with Shannon Town and Environs Flood Relief Scheme GI Works**

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION IMPACT ASSESSMENT OF THE NATURA 2000 NETWORK	
<b>LAND USE AND SPATIAL PLANS</b>		
<b>Clare County Development Plan 2017-2023</b>	<p><b>Goal X</b> 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.</p> <p><b>Goal XI</b> 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</p> <p><b>CDP2.1 Development Plan Objective: Appropriate Assessment, Strategic Environmental Assessment and Strategic Flood Risk Assessment.</b> It is an objective of the Development Plan:</p> <ol style="list-style-type: none"> <li>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;</li> <li>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;</li> <li>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.</li> </ol> <p><b>CDP8.21 Development Plan Objective: Water Framework Directive.</b> It is an objective of Clare County Council:</p> <ol style="list-style-type: none"> <li>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;</li> <li>To protect groundwater resources in accordance with the statutory requirements and specific measures as set out in the relevant River Basin Management Plan;</li> <li>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.</li> </ol> <p><b>CDP8.22 Development Plan Objective: Protection of Water Resources.</b> 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;</p> <ol style="list-style-type: none"> <li>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;</li> </ol>	<p>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.</p> <p>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;</p> <ul style="list-style-type: none"> <li>- CDP2.1 Development Plan Objective: Appropriate Assessment, Strategic Environmental Assessment and Strategic Flood Risk Assessment</li> <li>- CDP11.14 Development Plan Objective: Building on the Shannon Estuary as an Environmental Asset It is an objective of Development Plan:</li> <li>- CDP12.1 Development Plan Objective: Environmental Designations in Coastal Areas.</li> <li>- CDP12.12 Development Plan Objective: Coastal Erosion and Flooding.</li> <li>- CDP14.2 Development Plan Objective: European sites.</li> <li>- CDP14.3 Development Plan Objective: Requirement for Appropriate Assessment under the Habitats Directive.</li> </ul>



- 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.**



## REPORT

### PLANS AND PROJECTS

### KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION IMPACT ASSESSMENT OF THE NATURA 2000 NETWORK

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:

- 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;
- 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;
- 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.

## REPORT

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION IMPACT ASSESSMENT OF THE NATURA 2000 NETWORK	
<b>Major Accident Emergency Plans</b>	manner.	
<b>Seveso II Sites</b>	<p><b>CDP8.36 Development Plan Objective: SEVESO III Directive.</b></p> <p>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)</p> <ul style="list-style-type: none"> <li>- The siting of Major Accident Hazard sites;</li> <li>- The modification of an existing Major Accident Hazard site; or</li> <li>- Specified development in the vicinity of a Major Accident Hazard site.</li> </ul> <p>There are three Seveso II Sites in Shannon;</p> <p>Upper Tier</p> <ul style="list-style-type: none"> <li>- Shannon Aviation Fuels, Shannon International Airport</li> </ul> <p>Lower Tier</p> <ul style="list-style-type: none"> <li>- Enva Ireland Ltd, Shannon</li> <li>- UCB Manufacturing Ireland Ltd., Shannon</li> </ul>	No Impact
<b>EPC IPC/IE Licensed Facilities</b>	<p>There are three EPA-licensed sites within 1km of the proposed works within Shannon Free Zone, namely:</p> <ul style="list-style-type: none"> <li>- International Aerospace Coatings Ltd (Coatings) (IPC Licence No.P0497-02)</li> <li>- Element Six Limited (Synthetic materials) (IPC Licence No. P0533-01)</li> <li>- Heraeus Metal Processing Limited (Metals) (IPC Licence No. P0145-01)</li> </ul>	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.
<b>Other Plans and Projects</b>		
<b>Local Planning Applications</b>	<p>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.</p>	<p>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.</p> <p>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.</p>

## REPORT

### PLANS AND PROJECTS

### KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION IMPACT ASSESSMENT OF THE NATURA 2000 NETWORK

#### Planning Reference 191006: Shannon Airport Authority

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. An Environmental Impact Assessment screening report has been prepared and is included in the application. It concluded that an Environmental Impact Assessment is not required.

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.

#### Shannon Airport Authority — Shannon Airport Embankment Scheme Ground Investigation Works

Shannon Airport Authority propose to lodge a planning application to Clare County Council to carry out Ground Investigation (GI) works, 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. 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. The proposed preliminary GI works will consist of the following:

- 54 No. Borehole Cable Percussion (BHCP) (Shell And Auger);
- 65 No. Rotary Cores;
- 62 No. Cone Penetration Tests (CPTS); and
- 25 No. Groundwater Standpipes.

The application will be accompanied by an Natura Impact Statement, which concludes the following: *“Through the implementation of best practice and the recommended mitigation measures there will be no potential for direct, indirect or cumulative impacts arising from the proposed project in combination with any other plans or projects. Therefore, it is concluded that the proposed Shannon Town and Environs Flood Relief Scheme Shannon Airport Authority Ground Investigation works and associated works will not adversely affect the integrity of the Lower River Shannon SAC River Shannon and River Fergus Estuaries SPA, or the overall European site network. No reasonable scientific doubt remains as to the absence of such adverse effects”.*

Provided the **Shannon Airport Embankment Scheme Ground Investigation Works** works take place in compliance with the conditions of planning there should be no in-combination effects with European sites.

## 7 MITIGATION MEASURES

The term “mitigation measures” are considered to be ‘*those measures which aim to minimise, or even cancel, the negative impacts on a site that are likely to arise as a result of the implementation of a plan or project. These measures are an integral part of the specifications of a plan or project*’

A number of mitigation measures are required to avoid the potential for any direct and indirect impacts to Annex I habitat or Annex II species designated within the Lower River Shannon SAC and River Shannon and River Fergus SPA.

The proposals that are detailed below are considered Best Practice measures. All of the measures are based on national and international standards and have proven to be effective in this and other jurisdictions. The proposed measures have been specifically tailored to suit this proposed GI works having regard to the particular environmental constraints.

The appointed Contractor shall be required to comply with and implement the requirements and mitigation measures as set out here and incorporated in the Outline CEMP which has been prepared to inform this application. The Outline CEMP will be updated by the OPW or Contractor working on behalf of the OPW following receipt of consent to include the requirements of any conditions relating to construction methods or environmental management measures.

### 7.1 Environmental Clerk of Works (EnCoW)

1. A suitably qualified person(s), shall be appointed to the role of Environmental Clerk of Works (EnCoW) for the project. The role of the EnCoW will be to monitor the proposed GI works and to ensure compliance with relevant legislation, planning conditions, to ensure the implementation of the mitigation measures in the planning approval as may be granted.
2. The EnCoW shall liaise with the Employers Representative (ER) who has the authority to advise the Contractors and all site staff on the contract/project requirements, on elements that require direct supervision and instruct action, as appropriate, including the temporary cessation of works, where necessary and to ensure the implementation of the mitigation measures in the planning approval as may be granted.
3. The EnCoW shall also liaise with the Employers Representative (ER) to ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, and the Contractor is required to prepare a contingency plan for before and after such events.

### 7.2 Water Pollution Control Measures

During the proposed GI works there is the potential for pollutants to enter the Lower River Shannon. This would either be via overland flow or via drainage ditches which run parallel to the embankments in places, which may in turn discharge to the Lower river Shannon. Pollutants include chemicals used during the proposed GI works such as hydrocarbons, fuels, lubricants, cement-based products or sediment laden run-off. The following mitigation measures are set out to address potential sedimentation and other water quality impacts upon QIs of the Lower River Shannon SAC and River Shannon And River Fergus SPA.

1. Before works commence silt fencing must be installed at the rotary core locations.
2. The Contractor shall ensure that no harmful materials shall be deposited into nearby water bodies, including drainage pipes, on or adjacent to the site.
3. The Contractor shall comply with the requirements of the Water Pollution Act of 1977 as amended, Public Health Acts and Fisheries Acts.

#### 7.2.1 Sediment

1. Silt fencing shall be installed around the perimeter of each rotary core GI site location works to ensure capture of any run-off material.



2. There shall be no direct discharge of water from surface runoff, washdown or any other works directly to any surface water body or surface water drainage network at any time.
3. Tool Box talks shall be given by the Environmental Manager nominated under the CEMP to all contractor's site personnel to inform them of the mitigation measures required to ensure protection and conservation the aquatic environment.
4. Establish vegetation as soon as practical on all areas where soil has been exposed i.e. exposed soil due to rutting on embankments.
5. Regular monitoring of surface waters during the construction period will be required to ensure no deterioration in water quality.

### 7.2.2 Hydrocarbons

1. All fuels, lubricants, hydraulic oils, solvents, hazardous materials and paints shall be stored a bund volume of 110% of the capacity of the storage tank. They shall be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism with the compound and provided with spill containment according to codes of practice.
2. Drip trays and a supply of spill kits and hydrocarbon adsorbent packs shall be stored on site. Personnel shall be trained in the use of this equipment. Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained, and the contaminated soil removed from the site and properly disposed of.
3. Machinery used on site, hoses and connections shall be regularly maintained and inspected to ensure there is no leakage of fuel, oils or fluids.
4. Vehicles/machinery shall never be left unattended when fueling. Fueling will only be conducted with the compound which shall be at least 50m from any water course or storm water drainage network. Design and installation of fuel tanks to be in accordance with best practice guidelines BPGCS005, oil storage guidelines. Drip trays and spill kits shall be kept available on site.

### 7.2.3 Concrete

Small amounts of concrete and bentonite grout may be used in the GI works to backfill some of the boreholes and additionally for standpipes. Concrete is usually used to secure the standpipe covers.

1. Placement of concrete shall not be permitted during periods of heavy rainfall.
2. Raw or uncured waste concrete shall be removed from the site and disposed of in an appropriate licenced facility.
3. Concrete mixed on site will be retained within and/or on a specific surface i.e. wooden sheeting or a robust tarpaulin.
4. Concrete mixing areas shall not be washed out on-site and shall be washed in an appropriate designated facility where treatment is provided and there are no direct surface water connections.

## 7.3 Invasive Species Control Measures

The RPS ecology survey conducted on 28<sup>th</sup> September 2020 identified IAPS within the study area boundary. 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. Findings of the NBDC desk study and the site survey are detailed in **Table 4-2** and **Table 4-3** in **Section 4.1.2**.

The mitigation measures below are set to address potential impacts from the introduction and subsequent spread of IAPS upon QIs of the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA.

1. Should there be a long period of time between the Ecological Survey and the proposed GI works there is potential for invasive species to be inadvertently introduced into the area or spread within the area. The following CIEEM guidance on the lifespan of ecological reports and surveys<sup>26</sup> the following is stipulated:

- Should a period of 12 months elapse in the intervening period between the Ecological Survey and the proposed GI works then a pre-construction IAPS survey shall be required;
- A suitably qualified ecologist shall be required to undertake a preconstruction invasive species survey, within the appropriate botanical survey season (April to September), prior to the proposed GI works commencing. Particular attention shall be given to identifying those invasive plant species listed on Schedule Three of the Birds and Natural Habitats Regulations 2011 (as amended); and
- If any Invasive Alien Plant Species are identified, then an Invasive Species Management Plan shall be written which shall include the appropriate course of action regarding treatment or prevention of spread.

2. In order to prevent non-native invasive species from entering the site the following is stipulated:

- The contractor shall be required to inspect vehicles before using them on site and will pay attention to wheels/tracks and where trucks and dumpers may be stowed; AND
- All plant and equipment employed on the proposed GI works (e.g. diggers, tracked machines, footwear etc.) shall be thoroughly cleaned down using a power washer unit, and washed into a dedicated and contained area prior to arrival on site and on leaving site to prevent the spread of non-native invasive species. A sign off sheet shall be maintained by the contractor to confirm cleaning in advance of entering/leaving the site.

## 7.4 Seasonal Constraints

**Table 7-1** below outlines the number of roosting locations and species in count subsite boundaries within the works area as per the site's conservation objectives. See **Figure 7-1** which illustrates the locations of roosting locations within the proposed works area which may be impacted by the proposed percussion borehole works during the wintering bird season, as a result of the type of noise disturbance created by these works.

**Table 7-1: River Shannon and River Fergus Estuaries - Roost Summary Table**

Count Subsite Boundaries	Subsite Name	Count	No. Locations	No. Species	Species
OH508	Tullyglass Pt. to Tullyvarruga Pt.	276	4	3	Black-headed Gull, XU, Shelduck
OH509	Golf Tee-Shannon	24	4	3	Mute Swan, Teal, Mallard
OH510	Brackinish Rock to Crarigkeal	93	3	1	Black-headed Gull
OH511	Rinnanna South	413	7	6	Black-headed Gull, Oyster catcher, Grey Plover, Dunlin, Redshank, Wigeon
OH512	Connor's Rock	326	8	6	Black-headed Gull, Teal, Curlew, Wigeon, Shelduck, Great Black backed Gull
OH514	Saint's Island	781	5	7	Curlew, Black-headed Gull, Shelduck, Black-tailed Godwit, Dunlin, Redshank, Teal

<sup>26</sup> <https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf>

Count	Subsite Boundaries	Subsite Name	Count	No. Locations	No. Species	Species
OH515		Tullyvarraga Pt. - Inishcullin Pt.	123	5	4	Teal, Wigeon, Curlew, Black-headed Gull

As discussed in **Section 5.3.3**, due to the limited adaptability of wintering SCI species such as Shelduck, Teal, Ringed Plover, Grey Plover, Knot, Dunlin, Greenshank and Shoveler to utilise other or alternative habitats, they are totally reliant on wetland habitats due to unsuitable surrounding habitats and/or species limited habitat requirements. Therefore, these species may be particularly susceptible to noise and visual impacts during high tide during the wintering season.

Therefore, the following will be adhered to regarding seasonal constraints:

- Borehole cable percussion GI works will be restricted to being undertaken outside the wintering bird season (October to March inclusive), with potential to take place in mid-late March subject to monitoring and supervision by a suitably qualified project ecologist.
- The following works are not seasonally restricted within the works area; borehole rotary cores and cone penetration test, due to the nature of the works and machinery used.

**Table 7-2** below outlines the calendar for GI Works taking into account the wintering bird season.

**Table 7-2: GI Works Calendar and Mitigation**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wintering Bird Season	No Borehole cable percussion GI works			All types of GI works						No Borehole cable percussion GI works		

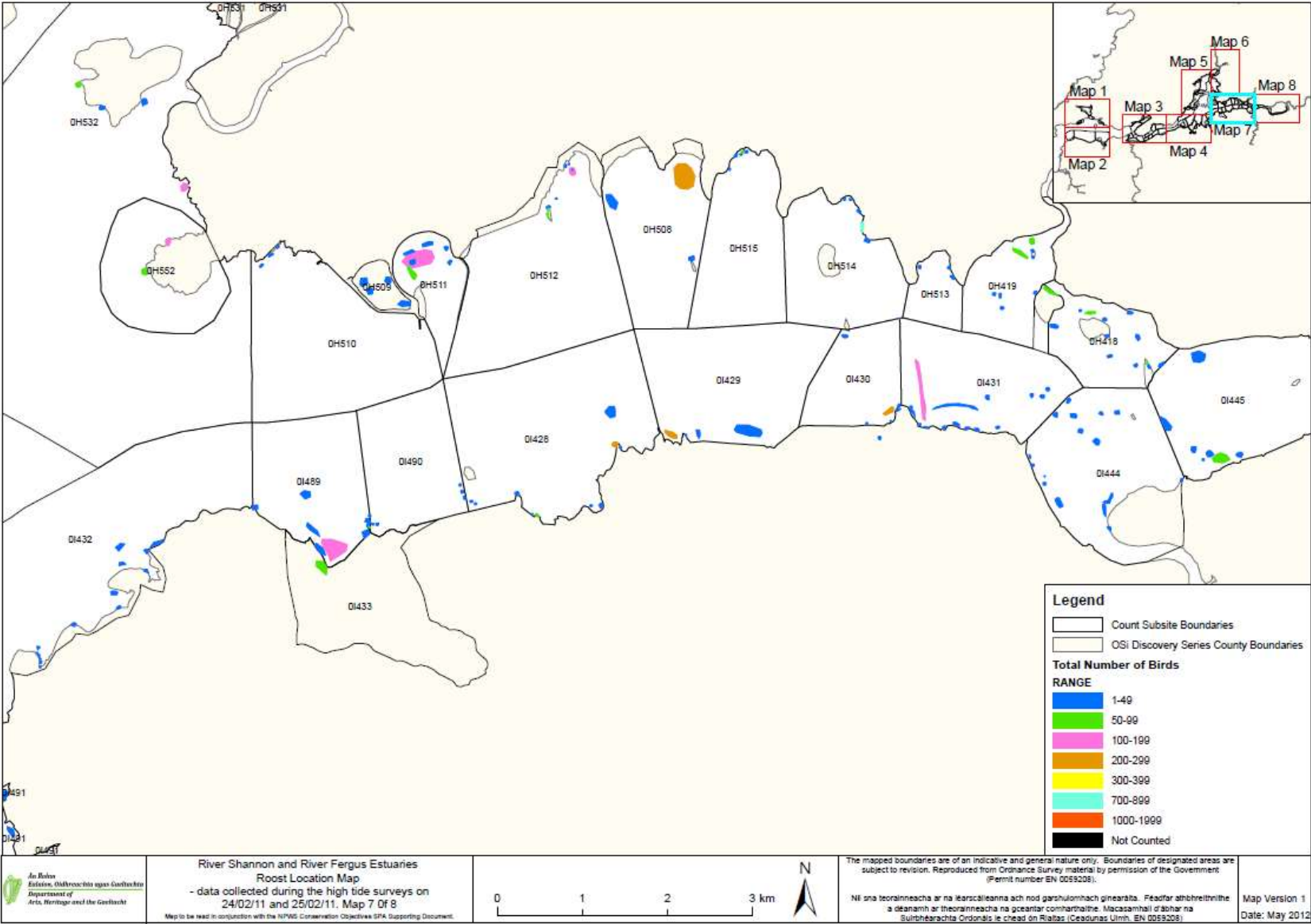


Figure 7-1: Roosting Location Map of the Proposed Works Area



## 7.5 Access and Egress

All access and egress to the GI locations will be via existing infrastructure and there will be no access required across the QI habitats of the proximal European sites. Access using bog mats may be required on areas of soft or boggy ground, to minimise rutting and subsequent run off of silts and sediments to sensitive watercourses and habitats.

## 7.6 Residual Impacts

This assessment has highlighted the fact that local and temporary impact of surface water quality are predicted during the proposed GI works. The proposed GI works could therefore, in the absence of mitigation, have an adverse effect on the protected species and habitats of the the Lower River Shannon SAC and River Shannon and River Fergus SPA.

Furthermore, the potential reduction in water quality has potential to degrade QI habitats which may be located downstream of the works and therefore be at odds with the conservation objectives set out the Lower River Shannon SAC and River Shannon and River Fergus SPA. In consideration of the outlined mitigation measures which shall be implemented to prevent any potential impact on the Annex species and habitats, no residual impact is anticipated as part of this proposal.

## 8 INTEGRITY OF THE SITE ASSESSMENT AND CONCLUSION

### 8.1 Integrity of the Lower River Shannon SAC

The overall conservation objective of the Lower River Shannon SAC is as follows:

**Objective:** To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.

Site specific Conservation Objectives have been published for the features of Qualifying Interests of the Lower River Shannon SAC are available on the NPWS website, as follows;

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO002165.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf) and

summarised in **Table 5-1** for the QI habitats and **Table 5-2** for the QI species.

In addition, numerous Conservation Objectives supporting documents for Lower River Shannon SAC are also available on the NPWS website<sup>27</sup>.

Potential exists for impacts to the aquatic QI of the SAC during the proposed GI works however these can be readily mitigated through the implementation of mitigation as outlined in **Section 7**.

From the information gathered and the predictions made about the changes that are likely to result from the proposed GI works, the integrity of site checklist is completed for the Lower River Shannon SAC in **Table 8-1** below.

**Table 8-1: Integrity of Site Checklist for the Lower River Shannon SAC**

Conservation Objectives		
Does the project have the potential to:	Yes or No	Comment
Cause delays in progress towards achieving the conservation objectives of the site?	No	All potential impacts to the Lower River Shannon SAC and its special conservation interests will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not cause delays in progress towards achieving the conservation objectives of the site.
Interrupt progress towards achieving the conservation objectives of the site?	No	All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not interrupt progress towards achieving the conservation objectives of the site.
Disrupt those factors that help to maintain the favourable conditions of the site?	No	The conservation objective for the Lower River Shannon SAC have water quality targets stipulated for designated QI species including otter, salmon, brook, river and sea lamprey. Impacts to water quality during the proposed GI works may result in the release of sediment as a result of the proposed GI works, which could potentially smother downstream spawning beds, degrading the habitat available for spawning. There is also the potential to reduce fish stocks and prey availability for otter. All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not disrupt those factors that help to maintain the favourable conditions of the site.
Interfere with the balance, distribution and density of key species that are the indicators of the	No	Impacts to water quality during the proposed GI works may impact the spawning habitat for QI species. There is also the potential to reduce fish stocks and prey availability for otter. All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works

<sup>27</sup><https://www.npws.ie/protected-sites/sac/002165>

### Conservation Objectives

favourable condition of the site?		will not interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site.
Other Objectives: Does the project have the potential to:	Yes or No	Comment
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	No	Impacts to water quality during the proposed GI works stage may impact the spawning habitat and prey availability for QI species. All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 5</b> . Therefore, the proposed GI works will not cause changes to the vital defining aspects that determine how the site functions as a habitat or ecosystem.
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No	Impacts to water quality during the proposed GI works may impact the spawning habitat and prey availability for QI species. The effects of invasive species spread on QI habitats and species, during the proposed GI works, have also been assessed. A number of the QI habitats within the SAC have a conservation objective target relating to invasive species including Alluvial forests [91EO] and <i>Molinia</i> meadows [6410]. All potential impacts to the Lower River Shannon SAC and its QIs will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not change the dynamics of the relationships that define the structure and/or function of the site.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No	Impacts to water quality during the proposed GI works may impact the spawning habitat for QI species including salmon, brook, river and sea lamprey. There is also the potential to reduce fish stocks and prey availability for otter. All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not interfere with predicted or expected natural changes to the site.
Reduce the area of key habitats?	No	There will be no reduction in the area of key habitats as a result of the proposed GI works. A total of 21 No. standpipes are proposed, each standpipe and associated works (casing and fixing material) will consist of a total area 0.1256m <sup>2</sup> surface area remaining in situ. 19 No. standpipes are within the immediate boundary of the SAC. The remaining occur outside the SAC boundary. The 19 No. standpipes will be located on existing made ground, man-made embankments and grassy verges, none of the standpipes will be located within QI Annex I habitats or supporting the QI species of the SAC. The cumulative area of the standpipes is approximately 2.4m <sup>2</sup> (0.00024 ha). The standpipes will be a temporary monitoring measure, with a projected in-situ timeline estimated at 2-5 years. The total area of the SAC is 68,300ha, therefore the loss of made ground habitat is considered <i>de minimus</i> and there is no risk of adverse effect in the over context of the SPA.
Reduce the population of key species?	No	Impacts to water quality during the proposed GI works may impact the spawning habitat for QI species including salmon, brook, river and sea lamprey. There is also the potential to reduce fish stocks and prey availability for otter. All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not interfere with predicted or expected natural changes to the site.
Change the balance between key species?	No	All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not change the balance between key species.
Reduce diversity of the site?	No	All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not reduce diversity of the site.

### Conservation Objectives

Result in disturbance that could affect population size or density or the balance between key species?	No	Otter are a QI of this site and are a highly mobile species. The surrounding environment is urbanised and otter are known to establish holts/couches in urbanised areas. Should otter be present it is considered they would be habituated to anthropogenic noise and any noise as a result of construction/operation is not considered to result in significant disturbance impact to otter. All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not result in disturbance that could affect population size or density or the balance between key species.
Result in fragmentation?	No	All potential impacts to the Lower River Shannon SAC and its QI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not result in habitat or species fragmentation.
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.)?	No	There will be no loss or reduction in key features of the site.

## 8.2 Integrity of the River Shannon and River Fergus Estuaries SPA

The overall conservation objective of the River Shannon and River Fergus Estuaries SPA is as follows:

**Objective:** To maintain the favourable conservation condition of SCI species for which the River Shannon and River Fergus Estuaries SPA has been selected.

Site specific Conservation Objectives have been published for the features of SCI of the River Shannon and River Fergus Estuaries SPA are available on the NPWS website, as follows;

[https://www.npws.ie/sites/default/files/protected-sites/conservation\\_objectives/CO004077.pdf](https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004077.pdf) and summarised in section 5.2.2 for the SCI species.

In addition, numerous Conservation Objectives supporting documents River Shannon and River Fergus Estuaries SPA are also available on the NPWS website<sup>28</sup>.

Potential exists for impacts to the SCI of the SPA during the proposed GI works however these can be readily mitigated through the implementation of mitigation as outlined in **Section 7**.

From the information gathered and the predictions made about the changes that are likely to result from the proposed GI works, the integrity of site checklist is completed for the River Shannon and River Fergus Estuaries SPA in **Table 8-2** below.

**Table 8-2: Integrity of Site Checklist for the River Shannon and River Fergus Estuaries SPA**

Conservation Objectives		
Does the project have the potential to:	Yes or No	Comment
Cause delays in progress towards achieving the conservation objectives of the site?	No	All potential impacts to the River Shannon and River Fergus Estuaries SPA and its special conservation interests will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not cause delays in progress towards achieving the conservation objectives of the site.
Interrupt progress towards achieving the	No	All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works

<sup>28</sup><https://www.npws.ie/protected-sites/spa/004077>



### Conservation Objectives

conservation objectives of the site?		will not interrupt progress towards achieving the conservation objectives of the site.
Disrupt those factors that help to maintain the favourable conditions of the site?	No	There is potential for direct and indirect impacts to this SPA via sedimentation and/or water quality deterioration altering food resources, potential indirect. All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not disrupt those factors that help to maintain the favourable conditions of the site.
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No	Impacts to water quality during the proposed GI works may reduce fish stocks and prey availability for SPA SCI species. All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Works will also be restricted to being undertaken in the outside the wintering bird season (October to March inclusive). Therefore, the proposed GI works will not interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site.

### Other Objectives: Does the project have the potential to:

Other Objectives: Does the project have the potential to:	Yes or No	Comment
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	No	Impacts to water quality during the proposed GI works may impact the prey availability for SCI species. All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCI will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 5</b> . Therefore, the proposed GI works will not cause changes to the vital defining aspects that determine how the site functions as a habitat or ecosystem.
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	No	Impacts to water quality during the proposed GI works may impact the prey availability for SCI species. The effects of invasive species spread on SCI habitats and species, during the proposed GI works of the proposed GI works, have also been assessed. All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCIs will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not change the dynamics of the relationships that define the structure and/or function of the site.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No	Impacts to water quality during the proposed GI works may impact the prey availability for SCI species. All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCIs will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not interfere with predicted or expected natural changes to the site.
Reduce the area of key habitats?	No	There will be no reduction in the area of key habitats as a result of the proposed GI works. There will be no land-take from European sites as part of the proposed GI works.
Reduce the population of key species?	No	Impacts to water quality during the proposed GI works may impact the prey availability for SCI species. All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCIs will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Works will also be restricted to being undertaken outside the wintering bird season (October to March inclusive). Therefore, the proposed GI works will not interfere with predicted or expected natural changes to the site.
Change the balance between key species?	No	All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCIs will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not change the balance between key species.
Reduce diversity of the site?	No	All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCIs will be avoided through the implementation of best practice and

### Conservation Objectives

		mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not reduce diversity of the site.
Result in disturbance that could affect population size or density or the balance between key species?	No	Disturbance to key species of the River Shannon and River Fergus SPA will be short term and temporary. However, works will be restricted to being undertaken outside the wintering bird season (October to March inclusive).  All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCIs will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not result in disturbance that could affect population size or density or the balance between key species.
Result in fragmentation?	No	All potential impacts to the River Shannon and River Fergus Estuaries SPA and its SCIs will be avoided through the implementation of best practice and mitigation measures outlined in <b>Section 7</b> . Therefore, the proposed GI works will not result in habitat or species fragmentation.
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.)?	No	There will be no loss or reduction in key features of the site.

## 8.3 NIS Conclusion and Statement

This NIS has been prepared in accordance with Article 6 (3) of the 'Habitats' Directive 92/43/EEC and Regulations 2(1) and 42(5)(a) of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

This NIS includes a report of a scientific examination of the project, and the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA, to identify and characterise any possible implications of the project individually or in combination with other plans or projects in view of the conservation objectives of the European sites to enable the OPW in carrying out of an AA.

The proposed GI works supports direct connectivity with the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA. The individual GI borehole works may be considered insignificant regards potential impacts, however the cumulative impact of numerous boreholes supporting both direct and indirect connectivity to designated European sites is considered in this assessment. Therefore, Screening for AA concluded that in the absence of mitigation, the potential for likely significant effects on the European site could not be excluded, as there is potential for impacts to surface water quality and therefore potential to impact the QIs of the SAC and SCI of the SPA. Therefore, a NIS is required to inform Stage 2 Appropriate Assessment.

Within this NIS, best practice construction and mitigation measures have been proposed for the avoidance of adverse effects to the European sites within the project Zol. The implementation of best practice construction design measures and site-specific mitigation during the GI works will retain and treat all potential pollutants within the confines of the proposed GI works site.

Provided adherence to the overarching policies and objectives of the national, regional, county and local land use plans and programmes and adherence to licencing and planning conditions for individual projects, there is no potential for plans and projects to have a cumulative impact to European sites, in combination with the proposed GI works.

Through the implementation of best practice and the recommended mitigation measures there will be no potential for direct, indirect or cumulative impacts arising from the proposed project in combination with any other plans or projects. Therefore, it is concluded that the proposed Shannon Town and Environs Flood Relief Scheme Office of Public Works Ground Investigation works will not adversely affect the integrity of the River Shannon and River Fergus Estuaries SPA, or the overall European site network. No reasonable scientific doubt remains as to the absence of such adverse effects.

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## Appendix A

### Screening for Appropriate Assessment