

# Water Supply Project: Eastern and Midlands Region

Irish Water

## Ground Investigation - Appropriate Assessment Screening Report

160418WSP1\_GI Appropriate Assessment Screening | A02

19 September 2016

### Document history and status

Revision	Date	Description	By	Review	Approved
0	7 July 2016	DRAFT for Client Review	Laura Gore	Robert Fennelly	D. Sheridan
1	27 July 2016	Revisions in response to client comments	Laura Gore	Robert Fennelly	D. Sheridan
A01	11 August 2016	Revisions in response to client comments	Laura Gore	Carol Connery	D. Sheridan
A02	19 Sept 2016	Revisions in response to NPWS advice	Daireann McDonnell	Carol Connery	D. Sheridan

### Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments
0	DS	12 July 2016	P. Murphy (Irish Water)	
1	DS	28 July 2016	P. Murphy (Irish Water)	
A01	DS	15 Aug. 2016	P. Murphy (Irish Water)	
A02	DS	20 Sept. 2016	P. Murphy (Irish Water)	

## Water Supply Project: Eastern and Midlands Region

Project No: 32105801  
Document Title: Ground Investigation - Appropriate Assessment Screening Report  
Document No.: 160418WSP1\_GI Appropriate Assessment Screening  
Revision: A02  
Date: 19 September 2016  
Client Name: Irish Water  
Client No: -  
Project Manager: Donal Sheridan  
Author: Daireann McDonnell  
File Name: G:\BAPTIE\Water & Utilities\03 PROJECTS\DCC\32105800\_Water Supply  
Project\_Dublin Region\4 - Documents\4.1 - Internal\Draft\DA1\GI Documents\14\_001-  
63\_Anx7\_AA\_A02

Jacobs Engineering Ireland Limited  
Merrion House  
Merrion Road  
Dublin D04 R2C5  
Ireland  
T +353 1 269 5666  
F +353 1 269 5497  
www.jacobs.com

TOBIN Consulting Engineers  
Block 10-4  
Blanchardstown Corporate Park  
Dublin  
Ireland  
T +353 1 8030401  
F +353 1 803 0409  
www.tobin.ie

© Copyright 2016 Jacobs Engineering Ireland Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright.

Limitation: This report has been prepared on behalf of, and for the exclusive use of Jacobs' Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

## Contents

<b>1.</b>	<b>Introduction.....</b>	<b>3</b>
<b>2.</b>	<b>The Appropriate Assessment .....</b>	<b>4</b>
2.1	Introduction to Appropriate Assessment .....	4
<b>3.</b>	<b>Detailed Screening Methodology.....</b>	<b>6</b>
3.1	The Source-Pathway-Receptor Model .....	6
3.2	In-combination Effects .....	8
3.3	The Precautionary Principle .....	8
<b>4.</b>	<b>Proposed Works .....</b>	<b>9</b>
4.1	Description of Proposed Works .....	9
4.2	Programme and Timing of Works.....	10
<b>5.</b>	<b>Baseline Environment.....</b>	<b>15</b>
5.1	Sources Informing the Baseline Description .....	15
5.2	Baseline Description.....	16
<b>6.</b>	<b>Consultation.....</b>	<b>22</b>
<b>7.</b>	<b>Screening Assessment .....</b>	<b>23</b>
7.1	Proximity of European Sites and their Qualifying Interests .....	23
7.2	Source-Pathway-Receptor Links.....	23
7.3	Relevant European Sites.....	39
7.4	Assessment of Likely Significant Effects .....	39
7.5	In-Combination Effects .....	40
7.6	Screening Conclusion Statement .....	41
<b>8.</b>	<b>References .....</b>	<b>42</b>
	<b>Drawings.....</b>	<b>45</b>
	<b>Appendix A. GI Contract Ecology Overview Mapping .....</b>	<b>46</b>
	<b>Appendix B. Silt Fencing Specifications .....</b>	<b>51</b>
	<b>Appendix C. Extents of Sensitivity of QIs .....</b>	<b>52</b>

## 1. Introduction

Irish Water, via a contract procured by Dublin City Council (DCC), has engaged Jacobs-Tobin to provide consultancy services in respect of the Water Supply Project - Eastern and Midlands Region (WSP) (“the Project”), which is a strategic national project. The aim of the Water Supply Project is to deliver a sustainable and resilient potable water supply for the Eastern and Midlands Region. The existing supply sources and infrastructure for the region do not have the capacity or resilience to meet future requirements.

To date the WSP project has undertaken three phases of non-statutory public consultation. The third phase of public consultation was on the Preliminary Options Appraisal Report (POAR) which identified Parteen Basin as the emerging preferred water abstraction option and a 2km wide “Least Constrained Route Corridor” between Parteen Basin in Co Tipperary, through counties Offaly and Kildare to Peamount in South County Dublin.

The identification of a 200m wide “Preferred Pipeline Corridor” from this 2km wide “Least Constrained Route Corridor” is ongoing; however a preliminary pipeline corridor is used for the purposes of this report.

Ground investigation (GI) works (hereafter ‘the proposed GI works’), both intrusive and non-intrusive are now required to adequately characterise the ground conditions in advance of the preparation of an Environmental Impact Statement (EIS).

In accordance with the EC Habitats Directive 92/43/EEC (hereafter “The Habitats Directive”) this Screening statement for Appropriate Assessment (AA) assesses the effects of the proposed GI works on European Sites (“Natura 2000 sites”); comprising candidate Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), in-combination with other plans and projects.

## 2. The Appropriate Assessment Process

### 2.1 Introduction to Appropriate Assessment

The requirement to carry out an AA comes from Article 6(3) of the Habitats Directive. The first step of the AA process is to carry out a Screening to establish whether, in relation to a particular plan or project, an AA is required. Article 6(3) states:

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

The above requirement has been implemented in the Republic of Ireland by the European Communities (Birds and Natural Habitats) Regulations 2011-2015 and the Planning and Development Act 2000, as amended.

The methodology in this report draws on, and has evolved from European Commission Guidance (EC, 2001), Irish guidance from the Department of Environment, Heritage and Local Government (DoEHLG, 2010), and recommendations from international AA practitioners (Levett-Therivel, 2009; Chvojková *et al.*, 2013). The procedural components of the AA process are:

- **Screening (overview)** – Screening determines whether, or not, AA is required by assessing if, on the basis of objective information, in view of best scientific knowledge, and in view of the conservation objectives of the site, the project or plan, either alone or in combination with other projects/plans, is likely to have a significant effect(s) on any European Site(s).
- Reasoned application of the ‘Precautionary Principle’ is fundamental to the Screening stage (and AA). The Precautionary Principle has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as:
  - When human activities may lead to morally unacceptable harm [to the environment] that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis.
- Where there is evidence of possible effects on a European Site(s) from a project, but uncertainty remains, significant effects must be presumed without evidence to the contrary. The project will be “screened-in”, requiring an AA. Where there is no evidence of significant effects, and no reasonable scientific doubt remains regarding this judgement, the assessment is stopped, and the project is “screened-out” from further assessment.
- **Appropriate Assessment** – If the Screening has determined that an AA is required, the competent authority then considers the effect of the project or plan on the integrity of the European Site(s). The AA considers the structure and function of European Sites, and their conservation objectives, and effects from the project both alone and in combination with other projects or plans. Where there are adverse effects identified, mitigation measures are proposed as appropriate to avoid adverse effects. For projects, the AA process is documented within a Natura Impact Statement (NIS). This is provided to the competent authority by the applicant, to facilitate an informed assessment of the project.
- **Assessment of Alternative Solutions** – If following AA including proposal of mitigation, adverse effects on integrity remain, or uncertainty remains, an Assessment of Alternatives is required. The process of examining alternative ways to complete the project and avoid adverse effects to the integrity of any European Sites is likely to have been incorporated into Screening and AA. However, if adverse effects remain after mitigation, alternatives are revisited at this stage.
- **Imperative Reasons of Over-Riding Public Interest (IROPI)** - In the unlikely event where an Assessment of Alternatives was required, and only if this failed to identify any alternatives which would not adversely

affect European Sites, Imperative Reasons of Over-Riding Public Interest (IROPI) could potentially be enacted, whereby compensatory measures are implemented to maintain the coherence of the European Site network in the face of adverse effects to site integrity. If a project is to be authorised on the basis of IROPI, an application a 'statement of case' is required to serve as the basis for an IROPI decision. Referral to the relevant Minister is also required, in advance of informing or obtaining the opinion of the European Commission.

### 3. Detailed Screening Methodology

This Screening report was informed by a desk study of all relevant environmental information and also included a review of the ecological field survey data recorded from ongoing surveys. The Screening then incorporated the following steps (broadly based on EC (2000)) :

- Determine if the plan is directly connected with or necessary to the management of the site;
- Describe the project;
- Describe the baseline environment;
- List 'Relevant' European Sites which are those sites potentially connected to the proposed works by source-pathway-receptor linkages; and
- Conclude if linkages to 'Relevant' sites have the potential to give rise to Likely Significant Effects (LSE).

#### 3.1 The Source-Pathway-Receptor Model

The standard 'source-pathway-receptor' conceptual model is a standard tool in environmental assessment. In order for an effect to occur, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism means there is no likelihood for the effect to occur. An example of this model is provided below:

- Source (s); – e.g. Piling;
- Pathway (s); e.g. Vibration; and
- Receptor (s); e.g. Underground otter resting site at risk of collapse.

The model evaluates the receptors as the Qualifying Interests (QIs) for which individual European Sites are designated, with reference to the latest Conservation Objectives from the National Parks and Wildlife Service (NPWS) website, or substitute detailed objectives from other European Sites where only generic objectives are available.

Likely significant effects to European Sites are identified by applying the source-pathway-receptor model to receptor-specific 'zones of influence' (i.e. the area over which effects may occur) and 'spatial extents of sensitivity' (i.e. the area within which a QI may be present and therefore could be affected by an effect). This is explained further in Section 3.1.1).

##### 3.1.1 Zones of Influence

The proposed GI works have the potential to result in a number of direct and indirect effects on European Sites. These are set out in Table 3.1, which identifies the "zones of influence" for each effect (i.e. the area over which effects may occur).

**Table 3.1: Potential Effects and Zones of Influence from GI works**

Potential Impact and Effect	Description	Zone of Influence
Land-take resulting in habitat loss or degradation.	The permanent loss of the habitat present in the footprint of the borehole/trial pit and the degradation of habitats present within the footprint of works including temporary access routes and site compound areas.	Land within the proposed GI works footprint and access routes.
Changes in water quality and quantity/distribution resulting in habitat loss or degradation.	Reduction in the quality of retained habitat or loss of habitat from surrounding areas as a result of surface water pollution (e.g. sedimentation from drilling) and/or	Changes in surface water quality, as a result of GI works, are assessed downstream of the proposed GI works. Changes to groundwater features as a result of sampling works are assessed

Potential Impact and Effect	Description	Zone of Influence
	changes to direction of flow or volume of groundwater.	within a radius of 250 m from intrusive works. <sup>1</sup>
Direct mortality during GI works.	Death or mortal injury of individuals of QI species as a direct result of the GI works in both terrestrial and aquatic habitats.	Land within the proposed GI footprint.
Spread of invasive non-native species resulting in habitat degradation.	Reduction in quality of retained habitat by reduction in species diversity.	Land within/adjacent the proposed GI works footprint and access routes.
Noise vibration resulting in disturbance.	Direct impact on feature species reducing their ability to forage or breed.	Generally assessed within 500m of the proposed GI route (e.g. for wintering birds), but can be significantly lower (e.g. 150 m for otter underground sites, or further (e.g. hen harriers may take flight when nesting at up to 750 m from works <sup>2</sup> .
Human presence resulting in perceived disturbance to highly sensitive bird species at significant distance from works.	Indirect impact on feature populations, due to reduced breeding success (e.g. associated with interruptions to feeding of young resulting from adult birds temporarily abandoning breeding sites).	Generally assessed within 500m of the proposed GI route (e.g. for wintering birds), but can extend further as noted for hen harrier above.

### 3.1.2 Spatial Sensitivity

The zone of influence of an effect is independent of the 'spatial sensitivity' of a QI (i.e. the area within which the QI may be present and therefore could be affected by an impact). There is a potential pathway to LSE only if:

- A QI occurs within the zone of influence (Zol) (i.e. its spatial sensitivity overlaps the Zol) and
- The QI is sensitive to that impact;

The spatial extents of sensitivity of QIs are identified in Appendix B. Where possible, QIs were grouped for the purpose of stream-lining this process, for those QIs which shared ecological dependencies and sensitivities. For instance pollution may affect two different species (e.g. larvae of brook lamprey *Lampetra planeri* and river lamprey *Lampetra fluviatilis*) over a similar area because they share a similar ecological niche (i.e. muddy riverbanks into which larvae burrow), and because pollution is a threat of medium importance for both species (NPWS, 2013a).

### 3.1.3 Criteria to Identify a Preliminary List of Sites

Using the zones of influence identified in Table 3.1, and the spatial extents of sensitivity in Appendix B, the following criteria were used to identify a preliminary list of all European Sites that could be affected by the proposed development:

- Any SACs within 10km of the proposed development were listed because 10km is the maximum potential ranging distance of mobile QI species from SACs according to best scientific knowledge (specifically otter territories may extend this far; refer to Appendix B);
- Any SPAs within 20km of the proposed development were listed because 20km is the maximum ranging distance for SPA QI bird species from SPAs according to best scientific knowledge (specifically certain goose species may forage this far from core SPA wetlands; refer to Appendix B);

<sup>1</sup> A radius of 250 m is the area within which further survey of groundwater-dependent habitats is recommended, where wind turbine foundations or borrow pits are proposed, according to the Scottish Environmental Protection Agency (SEPA, 2014). This rationale is applied here given that GI earthworks are localised in a similar way to the turbine foundations/borrow pits, and because abstraction is not proposed.

<sup>2</sup> Wintering birds collectively considered at risk of disturbance at up to 500m based on compilation of data from Madsen (1985); Smit & Visser (1993) and Rees et al., (2005); hen harrier flight initiation distance of 750m from Whitfield et al. (2008). Vibration and human presence effects to otter assessed within 150 m in accordance with guidance on road construction-related disturbance of underground sites from the National Roads Authority (NRA, 2006).



### 3.2 In-combination Effects

Where source-pathway-effect linkages are identified between the proposed works and European Sites – with reference to zones of influence and spatial extents of sensitivity – the potential for in combination effects with other plans and projects is examined. If there are no identified pathways, there is no potential for the proposed works to have LSE, and also no potential for in-combination effects.

If required, the in-combination assessment would include plans and projects, whose implementation is 'reasonably foreseeable', including:

- The incomplete parts of projects that have been started but which are not yet completed;
- Projects given consent but not yet started;
- Projects that are subject to 'live' applications for consent (for which decisions remain outstanding);
- Projects that are subject to outstanding appeal procedures;
- Any known projects that are not subject to any consent;
- Ongoing projects subject to regulatory reviews, such as discharge consents or waste management licences;
- Policies and proposals that are not yet fully implemented in plans that are still in force; and
- Draft plans that are being brought forward by other public bodies.

### 3.3 The Precautionary Principle

The Precautionary Principle has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as:

"When human activities may lead to morally unacceptable harm [to the environment] that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis".

Reasoned application of the 'Precautionary Principle' is fundamental to the Screening Stage (and AA). The precautionary principle is referenced in Article 191 of the Treaty on the Functioning of the European Union (TFEU). It relates to an approach to risk management whereby if there is the possibility that a given policy or action might cause harm to the public or the environment and if there is still no scientific consensus on the issue, the policy or action in question should not be pursued.

The precautionary principle prevails where 'reasonable scientific doubt' cannot be ruled out. Known threats to QIs of relevant sites are analysed to avoid overlooking subtle or far-field effect pathways. The duration of potential effects is a key consideration, in particular because the European Court of Justice has recently ruled—albeit in specific reference to priority habitats—that effects to site integrity must be "lasting"<sup>3</sup>.

<sup>3</sup> Judgment Of The European Court (Third Chamber) on 11 April 2013 in Case C 258/11 (REQUEST for a preliminary ruling under Article 267 TFEU from the Supreme Court (Ireland)) in relation to Peter Sweetman, Ireland, Attorney General, Minister for the Environment, Heritage and Local Government v An Bord Pleanála, paragraph 46 (and others).

## 4. Proposed Works

### 4.1 Description of Proposed Works

The proposed GI works are not connected with or necessary to the management of any European Sites.

The proposed GI works include both non-intrusive and ground investigations (intrusive and non-intrusive) and are required to determine the condition and engineering properties of the ground at particular areas along the preliminary pipeline corridor. The initial non-intrusive GI works are required to inform both geotechnical and archaeological baseline evaluations and impact assessment. The locations of the required surveys are presented in the Ground Investigation Contract "Annex 7\_Contract Drawings".

The scope of the non-intrusive surveys comprises the following:

- 6 ha of seismic refraction and 2D Resistivity to a depth of 15 m at major crossing points along the corridor;
- 17 ha of magnetometer survey to identify the extent of archaeological features subject to statutory protection within the corridor;
- 28.5 ha of magnetometer survey to identify the extent of archaeological features at non-linear infrastructure sites (see Section 2.4.1)
- Factual reporting;
- Any ancillary works associated with the above.

Exploratory holes and geophysical techniques are required to assess the nature of the underlying soils and depths and conditions of the bedrock. Cable Percussion Boreholes ranging in depth from 5 m to 20 m will be used with additional Rotary Core Holes to be advanced from the ground surface adjacent to boreholes. The approximate area of GI works at each location will be to the order of 10 m x 10 m (100m<sup>2</sup>) (allows for borehole/rotary core rig and surround matting for vehicles). The site will also include the access track (approximately 3-4m wide along access distance). Boreholes and coreholes will require minimal material excavation and removal (in the order of 0.04 – 0.12 m<sup>3</sup> rock and 0.11 – 0.18 m<sup>3</sup> soil). Material volumes for reinstatement are in the order of 0.09 – 0.14 m<sup>3</sup> soil and potentially 0.04 – 0.12 m<sup>3</sup> of bentonite. The scale and extent of the proposed works is thus extremely limited and spatially contained within the minimum area required to complete the standard GI works. The location of these boreholes and trial pits are shown in Drawing Numbers 32105801-GE-001 to 32105801-GE-004 inclusive (as BHn and TPn), where BH represents a borehole and TP a trial pit; the subscript is the unique identifier. Appendix A presents a suite of maps showing the indicative locations of the proposed GI works. The following ground (intrusive and non-intrusive) investigation works will be undertaken:

- Cable percussion boreholes. 145 No. to depths of up to 20m with follow-on rotary coring;
- Dynamic probing. 41 No. to depths of up to 10m;
- Trial pits; 9 No. (4.5m) trial pits excavated to:
  - Investigate soil types along the indicative pipeline corridor;
  - Investigate depth of shallow bedrock;
  - Undertake groundwater monitoring.
- Slit trenches;
- On-site sampling and testing works,
- Geotechnical laboratory testing;
- Factual reporting in digital format;
- Any ancillary works associated with the above.

## 4.2 Programme and Timing of Works

The proposed GI works are expected to be carried out over a continuous period starting in March 2017, and being completed in Q3/4 2017. GI works are unlikely to take longer than four days at each borehole or trail pit location; and would in many cases be completed in three, or less, days.

Works shall be carried out in daylight hours only.

### 4.2.1 Overlap with other Related Projects

A program of water sampling and hydrographic (bathymetric) survey is required to aid in the determination of potential water abstraction locations in the Lough Derg/Parteen Basin area for the Project. The bathymetric survey is complete; while water quality surveys are ongoing and estimated to be complete in Q3/Q4 2017. An Environmental Impact Statement supporting a planning application for the overall WSP is anticipated in autumn 2017; with subsequent construction of the Project estimated to commence in 2019.

### 4.2.2 Implementation of Environmental Requirements during GI Works

The Work Order Requirements included in the Invitation to Tender Document specify measures to be implemented during the completion of works, with the express aim of avoiding environmental impacts within and outside of the proposed works areas. These measures have been extracted from Section 6.34 of that document and are presented here for direct reference. This AA Screening takes account of the project proposal as a whole, acknowledging the contractual compliance requirements (binding on the appointed Contractor) and the fact that design and avoidance measures have been incorporated into the proposal. This reflects recent legal decisions relevant to AA Screening in several jurisdictions<sup>4</sup>. The measures set out in the Work Order Requirements satisfy the following criteria:

- Best practice measures will be an “intrinsic part of the work carried out”<sup>5</sup>, by virtue of their inclusion first in contract documents, and secondly in site-specific Method Statements to be prepared by the Contractor and approved by the Proponent. There is therefore no doubt that these measures will be implemented;
- Best practice measures will be proven to be efficient, and non-contentious, with reference to technical standards and best scientific knowledge;
- Best practice measures will be monitored by a qualified and experienced Site Ecologist during implementation to assess whether any amendments are needed to address unforeseen weather or ground conditions; and
- Best practice measures themselves have been evaluated as comprising a component of the proposal, with reference to their potential for adverse effects.

#### 4.2.2.1 GI Contract Work Order Requirements: Consultation with Environmental Stakeholders

The Contractor shall consult with the following Authorities, and shall comply with licence requirements where applicable, with regard to the execution and completion of the GI works.

- Inland Fisheries Ireland (IFI);
- The National Parks and Wildlife Service within the Department of Arts, Heritage, Regional, Rural & Gaeltacht Affairs.

#### 4.2.2.2 GI Contract Work Order Requirements: Principals of Environmental Best Practice Measures

The Contractor will adhere to the following key principles of environmental best practice measures:

<sup>4</sup> E.g. R (Hart District Council) v Secretary of State for Communities and Local Government [2008]; R(On the application of Champion) v North Norfolk District Council [2013]; Rossmore Properties Ltd. and Killross Properties Ltd. v ABP and Others [2014]; Ratheniska Timahoe and Spink (RTS) Substation Action Group & Anor. v An Bord Pleanála & Anor [2015]. Rulings in the UK are reviewed by Simpson in 2014.

<sup>5</sup> Rossmore Properties Ltd. and Killross Properties Ltd. v ABP and Others [2014]; (Para 6, p. 8).

- No entry into SAC or SPA sites is permitted, with the exception of access requirements at Parteen, where existing vehicle access lies within the Lower River Shannon SAC boundary.
- Access into the Lower River Shannon SAC must be minimised and works confined to habitats of low conservation value outside of the SAC. No access to the waterbody is necessary. No access into the QI habitats is required.
- Ensure no significant adverse effects to European Sites. Have particular regard for preventing silt from entering watercourses to protect the habitats of sensitive water-dependant and aquatic species listed as Qualifying Interests; including salmonids and otter.
- During the period of execution of the proposed GI works, the Contractor shall take all necessary precautions to prevent the pollution or silting of rivers, streams, watercourses, reservoir catchment areas or surface water drains by any matter arising from his operations, and shall provide any settling ponds or purifying equipment required. Site-specific Method Statements are required, in consultation with the Ecological Clerk of Works (EcOW) see Section 4.2.2.4.
- All proposed GI works to comply with S.I. No. 359/1996 — Regulations Entitled European Communities (Construction Plant and Equipment) (Permissible Noise Levels) (Amendment) Regulations, 1996.
- Establish the site compound, where required, on an area of existing hardstanding, outside European or nationally designated areas of nature conservation and protect any watercourses in the vicinity of the compound from potentially contaminated run-off;
- The works area, shall be kept to the minimum area required to carry out the proposed works and shall be clearly marked out in advance of the proposed works.
- Vegetation should be retained where possible, in consultation with the (EcOW) and landowner.
- Any waste arising from GI works shall be disposed of to a licensed waste facility by a licensed waste handler.

#### **4.2.2.3 GI Contract Work Order Requirements: Emergency Response and Environmental Training**

The Contractor shall produce an Emergency Response Plan (ERP) based on his own risk assessment, which will be reviewed by the Employer's Site Representative (ESR). The ERP will include:

- An effective spillage procedure with all staff properly briefed.
- Specification of contingency measures to be undertaken in the event of an accidental release of any sediment into a watercourse, serious spillage of chemical, fuel or other hazardous wastes (e.g. bentonite, or concrete washings), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks. Such contingency planning is required in addition to the appropriate avoidance of such risks, to be specified in the Site-Specific Method Statement.
- Spill kits which shall be carried with each individual drill rig. Any sediment releases, hydrocarbon leakages or spillages during the GI works will be immediately notified to the ESR and dealt with immediately. The bulk of the spill will be immediately contained by a spill kit and the contaminated absorbent material and the contaminated soil placed in a stockpile underlain and covered by plastic to prevent leachate generation, until such time as it can be removed off-site by an appropriately licensed waste management company.
- Relevant Contractor staff, including cover staff, shall be trained in the implementation of the ERP and the use of spill kits.

#### **4.2.2.4 GI Contract Work Order Requirements: Ecological Supervision**

The Contractor will appoint a suitably qualified (and where applicable licensed) Ecologist ('Ecological Clerk of Works (ECOW) to ensure compliance with European site regulations and the specific measures specified in the Contract relating to invasive and protected species. The Contractor shall implement the best practice measures specified by the ECOW. A Resident Engineer cannot undertake the Ecologist role. The ECOW shall hold a degree in Environmental Science or an equivalent professional qualification. The ECOW shall be a member of the Chartered Institute of Ecology and Environmental Management (CIEEM) or otherwise demonstrate suitable qualifications and experience. The ECOW shall demonstrate experience in monitoring activities; and in monitoring particular target species of concern, if relevant.

#### Reporting

The ECoW will be required to prepare and submit a Site Audit Report on a weekly basis to the Employer's Representative, the structure and content of the compliance and auditing tool will be subject to approval by the Employer's Representative in advance of works commencement.

The ECoW shall immediately notify the Employer's Representative, if in the opinion of the ECoW, the Contractor's works has potential to cause temporary and/or permanent detriment to an ecological feature.

The Contractor shall note the requirement to complete a CSEMP as per Section 6.13 of this document.

The cost included in the Bill of Quantities for Ecological supervision shall be deemed to be inclusive of all costs associated with such works including surveying, recording and reporting.

#### **4.2.2.5 GI Contract Work Order Requirements: Invasive Species**

Prior to commencement of the GI works, the Contractor will request survey data on invasive species locations in the vicinity of the proposed works. The EcOW will then advise the Contractor on best practice measures which may be required to avoid spreading invasive species, including but not limited to:

- Ensuring tyres and tracks of plant machinery and works vehicles will be power washed and checked for the presence of plant material e.g. leaves, roots and rhizomes from non-native invasive species prior to arrival on-site, and after works are completed.
- Moving works locations and/or fencing off invasive vegetation under the instruction of the Ecologist.

#### **4.2.2.6 GI Contract Work Order Requirements: Protected Species**

The proposed GI works have the potential to lead to disturbance or damage to the dwellings of Otter, an Annex II listed species. The EcOW will survey for otter breeding or resting sites within the potential zone of influence of such effects, which could be up to 150 m away, subject to ground conditions. If potential or confirmed breeding or resting sites are located, the EcOW will comply with all relevant environmental legislation to avoid LSEs to otter, where necessary and feasible instructing the contractor to move GI works so that drilling or trenching poses no risk of collapse, damage or disturbance to breeding or resting places of this species. Where relocation of the borehole is not feasible within the indicative works site, this borehole will be excluded from the works requirements on the basis of the EcOW's expert opinion regarding potential for significant effects. The contractor will not clear any trees or vegetation inside the period March 1st to August 31st in order to avoid impacts to breeding birds, unless the EcOW has completed breeding bird surveys indicating breeding birds are absent, or a derogation licence has been obtained from the NPWS to permit disturbance or removal of nests, or a competent Ecologist has otherwise advised the Contractor on specific measures to avoid significant disturbance of breeding birds or their nests (e.g. advance clearance, from September 2016 to February 2017 inclusive, of vegetation in working areas programmed for spring/summer 2017 and/or avoiding known nest locations).

Drilling works within 100m of salmonid-bearing watercourses should employ a to allow salmon and other fish to move away before the full intensity of drilling begins.

Access routes and drilling locations could be located within habitat suitable for Marsh fritillary. The EcOW will survey for suitable habitat (Fowles, 2006) within the footprint of the proposed works and green field accesses. If suitable habitat is found, the Contractor will comply with all relevant environmental legislation to avoid Likely Significant Effects to Marsh fritillary. As a minimum this will include moving works so they do not physically overlap any Marsh fritillary habitat.

#### **4.2.2.7 GI Contract Work Order Requirements: Site Compound – Set-up and Demobilisation**

If a site compound(s), potentially including sanitary facilities is required for the proposed GI works, the compound(s) shall be outside of European Sites, on existing hardstanding within existing office/industrial space and shall be agreed with the Employers' Representative prior to works commencing on site as stipulated in the contract documentation.



#### **4.2.2.8 GI Contract Work Order Requirements: Temporary Access Routes**

- Access routes will avoid the need to cross watercourses
- No plant, machinery or Contractors will enter watercourses.
- Where reasonably required, suitable bog/ground mats shall also be used to protect vegetated areas and minimise erosion risk in any sensitive areas as identified by the Ecologist (e.g. peatlands or other wetlands), in agreement with the ESR.

#### **4.2.2.9 GI Contract Work Order Requirements: Control of Sediments - Standard**

- Ensure no machinery enters or cross watercourse (including drainage channels), and ensures any temporary crossings are approved by Inland Fisheries Ireland (IFI).
- Install runoff containment measures before starting borehole and trial pit sampling. Monitor and maintain sediment controls throughout the proposed GI works to protect sensitive aquatic species
- There will be no direct or indirect discharge of surface or ground water generated during GI works to any surface water feature (drain, stream, river, lake, estuarine or coastal waterbody).
- In order to avoid indirect sedimentation impacts on nearby surface waters, run-off from GI works areas (either surface water or ground water generated during dewatering of drilling) will be intercepted and managed through a series of treatment stages that may include suitably designed settlement pond/filter channels along with other pollution control measures such as silt fences and silt mats. Pumping and transport of water off-site in tankers may be required if volumes prevent effective control by other means. The contractor will be obliged to maintain any water management system in satisfactory working order throughout the period of GI works.
- Ground works adjacent to water bodies shall not take place during periods of heavy precipitation.
- All working areas will be dewatered at the end of each working day, to prevent over-topping of silt control measures such as silt fences

#### **4.2.2.10 GI Contract Work Order Requirements: Control of Sediments –Salmonids**

Additional precautionary measures will apply, as a minimum for the following sampling locations which are located within the Barrow river sub-basin: BH-1; BH-26 to BH33; BH-41; BH-126; BH-127; BH132 to BH149 (excluding BH138); BH180 to BH183 and Trial Pit 4,

- A single layer of silt-fencing will be employed as standard at these works locations, between the works area (and as far as possible set back from) the nearest watercourse.
- Where drilling or trenching is required within at least 20m of watercourse, in these areas, a double layer of silt-fencing will be employed as standard at all works locations, with the Contractor having a third layer of silt fencing on standby if extreme weather poses an elevated erosion risk during works.
- Silt fencing specification and installation will comply with key techniques and materials to improve standard silt fences as detailed by Caraco (2000) (see Appendix B); such that no silt will enter watercourses causing significant effects to downstream Annex II listed salmon.

#### **4.2.2.11 GI Contract Work Order Requirements: Control of Other Pollutants**

- Refuelling within 5m of any watercourse will be from either small easily handled containers or by diesel pump from a small bowser.
- Water will not be introduced into cable-percussive boreholes unless necessary, and with the prior consent of the ER. If lubricants are required, these shall be vegetable-based.
- The Contractor will take measures to avoid potential for cross-contamination of an aquifer by drilling through an upper contaminated groundwater zone into the underlying clean, water-supply aquifer.
- All trial pits will be back-filled immediately on completion.

- Bentonite slurry must not be used in the backfilling of exploratory holes. The only permissible backfilling materials are either the arisings or Bentonite pellets. In all cases the Contractor shall prevent deleterious material (including silt) from migrating to water bodies.
- Consumables or waste will be removed from all sampling locations and returned to the site compound for disposal.
- There will be no storage of machinery (including drill rigs) fuel, samples, or chemicals (e.g. bentonite, drilling fluid) in areas prone to flooding.

#### **4.2.2.12 GI Contract Work Order Requirements: Re-instatement**

- A photographic condition survey will be undertaken by the Contractor prior to entry and on departure from all GI works areas (including the access route to the works area).
- Where boreholes or trenching is carried out, the ground shall be reinstated as close as possible to the existing condition prior to the start of the Works, including topsoiling and reseedling in grassed areas.
- Turves shall be kept within an enclosed temporary fenced area that will prevent them from being damaged, stored on bog-mats and kept moist if they are being stored for more than a few hours or if the weather is hot.
- Topsoil and subsoil shall be stored separately.
- Turves shall be watered in when they have been replaced.
- The use of persistent herbicides will be prohibited. Only herbicides approved for use adjacent to watercourses (e.g. Glyphosate products) will be utilised.
- The use of pesticides or artificial fertilisers in reseedling or non-native invasive species control (if required) will be prohibited within 5 metres of a watercourse.
- Upon completion of the work, the ER and EcOW will inspect the Works area to ensure satisfactory reinstatement and no waste or equipment left in situ.

## 5. Baseline Environment

### 5.1 Sources Informing the Baseline Description

The baseline environment within the study area of the proposed works locations has been evaluated with reference to European Sites utilising data gathered directly through field survey and also information contained in the key sources below.

Field surveys have been completed by the Project Ecology team along the length of the preliminary proposed corridor. The extent of surveys to date have included: habitat mapping; breeding and wintering birds; mammal surveys; bat activity and roost surveys; riparian corridor and river habitat surveys; otter surveys; and instream macroinvertebrate assessments. Where applicable, ground-truthed data has been referenced and utilised in the impact assessment set out in this Screening Report.

- Ordnance Survey Ireland mapping and aerial photography available from [www.osi.ie](http://www.osi.ie);
- Information on land zonings and land-use plans available from the Department of the Environment, Community and Local Government at [www.myplan.ie](http://www.myplan.ie);
- Mapping of European Site boundaries, Conservation Objectives and habitat /species distributions from NPWS online at [www.npws.ie](http://www.npws.ie);
- Protected species and habitat mapping data obtained from the NPWS Research Branch on various dates in 2015 and 2016;
- Data from NPWS Research Branch including:
  - Mapped Qualifying Interests (QI) habitats/species of European Sites;
  - Freshwater Pearl Mussel 'Habitat' and 'Population' GIS Data;
  - Freshwater Pearl Mussel catchment boundaries in GIS format;
  - Special Protection Area (SPA) Wetland bird roost locations in GIS format;
  - 'Favourable Reference Range' GIS data for Habitats Directive species/habitats; and
  - Tabulated threats and pressures for relevant QIs.
- Information on the conservation status of relevant SAC and SPA Qualifying Interests (species and habitats) from NPWS Conservation Objective and Conservation Status Reporting online; and
- Information on the conservation status of bird species of designated sites from the Birds of Conservation concern in Ireland 2014-2019 (Colhoun & Cummins, 2013).

Relevant plans from national to local scales are critical to inform a robust assessment of in-combination impacts, and these are listed below:

- National Biodiversity Plan, 2011-2016;
- Draft Clare County Development Plan 2017-2023;
- North Tipperary County Development Plan 2010-2016 (as varied);
- Nenagh Town & Environs Development Plan 2013-2019;
- Offaly County Development Plan 2014-2020;
- Laois County Development Plan 2011-2017;
- Kildare County Development Plan 2011-2017;
- Draft Kildare County Development Plan 2017-2023;
- South Dublin County Development Plan 2016-2022;
- Phase 2 Strategic Environmental Assessment (SEA) for the Water Supply Project – Dublin Region.



- Water Supply Project-Eastern and Midlands Region, Preliminary Options Appraisal Report

## 5.2 Baseline Description

The proposed GI works follows the pipeline corridor for the Project. From west to east, this runs from the proposed water treatment works/abstraction point for the Project to be located along the eastern shore of the River Shannon's Parteen Basin (Co. Tipperary), through the midland counties of Offaly, Laois, Kildare to Peamount Reservoir in south Co. Dublin; a distance of approximately 170km.

European Sites in the locality and wider area are presented in detail in the Screening Assessment (Section 7). For the purposes of providing context to the baseline discussion detailing the potential distribution of QI features in the vicinity of the works, all European Sites in the immediate environs of the proposed works are presented in Table 5.1.

**Table 5.1 : European Sites within 2.5km of Proposed GI Works to inform Baseline Description:**

European Sites	Site Code	Approx. Distance from Proposed Works	Qualifying Interests
Lower River Shannon SAC	002165	0.06 km	<b>Annex I habitats:</b> [1110] Sandbanks [1130] Estuaries [1140] Tidal Mudflats and Sandflats [1150] Coastal Lagoons* [1160] Large Shallow Inlets and Bays [1170] Reefs [1220] Perennial Vegetation of Stony Banks [1230] Vegetated Sea Cliffs [1310] Salicornia Mud [1330] Atlantic Salt Meadows [1410] Mediterranean Salt Meadows [3260] Floating River Vegetation [6410] <i>Molinia</i> Meadows [91E0] Alluvial Forests* <b>Annex II species:</b> [1029] Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> ) [1095] Sea Lamprey ( <i>Petromyzon marinus</i> ) [1096] Brook Lamprey ( <i>Lampetra planeri</i> ) [1099] River Lamprey ( <i>Lampetra fluviatilis</i> ) [1106] Atlantic Salmon ( <i>Salmo salar</i> ) [1349] Bottle-nosed Dolphin ( <i>Tursiops truncatus</i> ) [1355] Otter ( <i>Lutra lutra</i> )
Lisduff Fen SAC	002147	0.43 km North	<b>Annex I habitats:</b> [7220] Petrifying Springs* [7230] Alkaline Fens <b>Annex II species:</b> [1013] Geyer's Whorl Snail ( <i>Vertigo geyeri</i> )

European Sites	Site Code	Approx. Distance from Proposed Works	Qualifying Interests
Clonaslee Eskers and Derry Bog SAC	000859	0.89 km South	<b>Annex I habitats:</b> [7230] Alkaline Fens <b>Annex II species:</b> [1013] Geyer's Whorl Snail ( <i>Vertigo geyeri</i> )
Island Fen SAC	002236	1.22 km South	<b>Annex I habitats:</b> [5130] Juniper Scrub [7230] Alkaline Fens <b>Annex II species:</b> None
Slievefelim to Silvermines Mountains SPA	004165	1.47 km South	[A082] Hen Harrier ( <i>Circus cyaneus</i> )
Silvermines Mountains West SAC	002258	1.70 km South	<b>Annex I habitats:</b> [4010] Wet Heath [4030] Dry Heath <b>Annex II species:</b> None
Sharavogue Bog SAC;	000585	1.98 km North	<b>Annex I habitats:</b> [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation <b>Annex II species:</b> None
The Long Derries and Edenderry SAC	000925	2.10 km North	<b>Annex I habitats:</b> [6210] Orchid-rich Calcareous Grassland* <b>Annex II species:</b> None
River Barrow and River Nore SAC	002162	2.52 km South	<b>Annex I habitats:</b> [1130] Estuaries [1140] Tidal Mudflats and Sandflats [1310] Salicornia Mud [1330] Atlantic Salt Meadows [1410] Mediterranean Salt Meadows [3260] Floating River Vegetation [4030] Dry Heath [6430] Hydrophilous Tall Herb Communities [7220] Petrifying Springs* [91A0] Old Oak Woodlands [91E0] Alluvial Forests*

European Sites	Site Code	Approx. Distance from Proposed Works	Qualifying Interests
			<b>Annex II species:</b> [1016] Desmoulin's Whorl Snail ( <i>Vertigo moulinsiana</i> ) [1029] Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> ) [1092] White-clawed Crayfish ( <i>Austropotamobius pallipes</i> ) [1095] Sea Lamprey ( <i>Petromyzon marinus</i> ) [1096] Brook Lamprey ( <i>Lampetra planeri</i> ) [1099] River Lamprey ( <i>Lampetra fluviatilis</i> ) [1103] Twaite Shad ( <i>Alosa fallax</i> ) [1106] Atlantic Salmon ( <i>Salmo salar</i> ) [1355] Otter ( <i>Lutra lutra</i> ) [1421] Killarney Fern ( <i>Trichomanes speciosum</i> ) [1990] Nore Freshwater Pearl Mussel ( <i>Margaritifera durrovensis</i> )

### 5.2.1 Marine and Coastal Habitats

Marine and coastal Annex I habitats including: sandbanks, estuaries, mudflats, lagoons, inlets and bays, salt meadows, reefs, perennial vegetation of stony banks and cliffs are listed as Qualifying Interests of a number of SACs identified within the 10 km buffer zone of the proposed works. However, all works elements are located in the freshwater environment and at a significant distance (>10km) from the estuarine or coastal environment. Accounting for the best practice measures relating to pollution control, which are incorporated within and a binding component of the works proposal, there are no pathways for significant adverse effects identified with respect to any hydrological connectivity.

### 5.2.2 Terrestrial and Aquatic Habitats

There are no Annex I habitats overlapping, or within at least 0.4k of the proposed works. There are a variety of Annex I habitats listed as Qualifying Interests of designated SACs identified within the 10km buffer zone of the study area. These habitats include wet heath, dry heath, Juniper scrub, orchid-rich grasslands, *Molinia* meadows, bogs, fens, springs, and old oak woodland. The majority of these habitats are at a considerable distance from the proposed GI works locations; sites within the zone of influence of the proposed GI works are identified with reference to individual works locations.

The proposed GI works located immediately east of Parteen Basin, at the western end of the proposed corridor, are located outside of but adjacent to the Lower River Shannon SAC.

### 5.2.3 Plant Species

The Annex II listed Killarney fern is identified as a Qualifying Interest of the River Barrow and River Nore SAC. The current known Irish population comprises 177 discrete colonies within 64 populations and is currently in favourable status nationally (NPWS, 2013b). The proposed GI works locations do not overlap with any of these known locations of the Killarney fern according to the NBDC; furthermore, the works do not overlap with the River Barrow and River Nore SAC. Even if previously unknown populations of this species were present within the footprint of the proposed works (and therefore outside the SAC), there would be no connected indirect or in-combination effects to the scale, extent or conservation status of SAC populations.

#### 5.2.4 Fish and Marine Mammals

Annex II listed Sea lamprey, Brook lamprey, River lamprey, and Atlantic salmon are identified as Qualifying Interests for the Lower River Shannon SAC and the River Barrow and River Nore SAC, which are identified within the zone of influence of the proposed GI works. River and Brook lamprey are in favourable status nationally (NPWS, 2013b). Atlantic salmon and Sea lamprey are in unfavourable status (NPWS, 2013, b).

Watercourses in close proximity to and/or downstream of the proposed GI works have the potential to contain suitable spawning habitat for Atlantic salmon and Brook lamprey. Sea and River lamprey spawning habitat is restricted to the lower reaches of larger rivers and potential for this to occur within the zone of influence of the proposed works is limited to the Lower River Shannon SAC. It is emphasised that there are no invasive works required within or directly adjacent to any watercourse.

- The proposed works closest to the Parteen Basin (e.g. BH 138) are not located adjacent to the main channel of the River Shannon, and there are no watercourses adjacent to these works.
- Tributaries of the River Barrow, due south of Edenderry, Co. Offaly are located upstream and outside of the River Barrow and River Nore SAC. . The proposed GI works at BH 180 and BH181 and BH26 and BH27 are located in proximity to tributaries of the Figile. It is considered likely that Brook lamprey occur within the depositing margins within this stretch of river. Similarly Atlantic salmon is likely to occur; however, suitable spawning habitat for this species is absent;
- The Kilmastulla River, in Co. Tipperary is a tributary of the lower River Shannon. The proposed GI works at BH3 are within 50m and upslope of this watercourse. The lower reaches of the Kilmastulla are designated within the Lower River Shannon SAC and the watercourse is known to contain Atlantic salmon, Brook lamprey and may also contain Sea and River lamprey.

Non-invasive surveys (seismic refraction and 2D resistivity) will require personnel and equipment to cross a number of watercourses using a small boat. These crossings are as follows:

- Shannon Catchment: Nenagh River; unnamed 1<sup>st</sup> Order Stream (EPA Code: 25.1069); Little Brosna; Breaghmore Stream; Camcor River; Silver River; Clodiagh River.
- Barrow Catchment: Philipstown River; Esker Stream; Doden River; unnamed 1<sup>st</sup> order stream (EPA Code:14.1356); Figile River; Abbeylough River; Grand Canal; Cushaling River;
- Blackwater (Boyne) Catchment: Unnamed 2<sup>nd</sup> order stream (EPA Code: 07.1720); Clogheraun Stream; Blackwater River;
- Liffey Catchment: Lyreen Stream; River Liffey; Grand Canal.

The Twaite shad is listed as a Qualifying Interest of the River Barrow and River Nore SAC. This species spends most of its life in estuaries and coastal waters, but migrates into the lower tidal reaches of larger rivers to spawn in late spring. The proposed GI works do not overlap the Favourable Reference Range for the species in Ireland (NPWS, 2013b); where this species habitat extent is limited to the lower tidal reaches of the River Barrow. There is no potential for the species to occur in inland watercourses in the vicinity of the proposed GI works.

The bottle-nosed dolphin is listed as a Qualifying Interest QI of the Lower River Shannon SAC. As a species restricted to marine and estuarine waters, this species does not occur within the zone of influence of the proposed GI works.

#### 5.2.5 Aquatic Invertebrates

White-clawed crayfish occur in small and medium-sized lakes, as well as rivers and streams. The national conservation status for the species is unfavourable (NPWS, 2013b), primarily due to the threat of disease and non-native species competition. The species is listed as a Qualifying Interest of the River Barrow and River

Nore SAC, with populations occurring outside of the SAC within watercourses associated with the Barrow sub-catchment. Connectivity between watercourses in close proximity to the

Geyer's whorl snail *Vertigo geyeri* is a QI of two SACs in the vicinity of the proposed works (Lisduff Fen SAC and Clonaslee Eskers and Derry Bog SAC). The species is associated within specialised microhabitats located in groundwater and surface-water dependent saturated fen habitats. Nationally the species is in unfavourable conservation status (NPWS, 2013b), probably related to the unfavourable conservation status of fen habitats. The species is highly site-specific, due to its habitat requirements, and there are no SACs designated for the species within at least 0.4km of the works. Furthermore, based on the field ecology surveys undertaken by the Project ecology team, no suitable habitat for this species was identified within any of the indicative works areas of the proposed GI sites.

Freshwater Pearl Mussels (FPM) have been recorded from more than 160 rivers and a handful of associated lakes (NPWS, 2013b). The species is Critically Endangered on the Irish Red Data List (Byrne *et al.*, 2009) and is in unfavourable status nationally with poor future prospects (NPWS, 2013b). The species is highly sensitive to water pollution and sedimentation. The proposed works are located within the River Barrow catchment; however, they are not hydrologically connected to the designated populations of Freshwater Pearl Mussel occurring in separate tributary sub-catchments of the Barrow.

#### 5.2.6 Marsh Fritillary

The national conservation status of this butterfly species is unfavourable, probably due to the specific habitat requirements of the species which depends on mosaics of habitat of different vegetation structure determined by specific land-use regimes (NPWS, 2013b)

There are no SACs designated for Marsh fritillary within the zone of influence of the proposed GI works. However, the species can disperse over distances up to 10km (see Appendix B), potentially establishing important 'metapopulations' which support designated SAC populations through gene flow, and/or repopulation following local population crashes. There is one SAC which includes this species as a QI occurring within the 10km dispersal range; Ballynafagh Lake SAC approximately 5km from the works. There is potential for Marsh fritillary dispersing from Ballynafagh Lake to occur in the vicinity of the works should suitable habitat for its host plant Devil's bit scabious occur in grassland and peatland areas. Best practice measures have been proposed to survey for such sites, and avoid them if present.

#### 5.2.7 Otter

Otter is a QI of both the Lower River Shannon SAC and the River Barrow and Nore SAC. The works occur within potential commuting distance of the species from these European Sites (10km; Appendix B). The species is widespread, apparently tolerant of pollution and human disturbance (Reid *et al.*, 2013) and in favourable conservation status nationally (NPWS, 2013b). The species is highly likely to be active in watercourses in close proximity to the proposed GI works, outside of the confines of the SAC boundaries. Underground holts or above-ground 'couches' could be present in riparian areas and used for breeding or resting. Best practice measures have been proposed to ensure adequate survey and protection by way of avoidance of dwellings, breeding, or resting sites during works, if such sites are found to be present.

#### 5.2.8 Bird Populations

The proposed works do not overlap any SPAs, however the high mobility of most bird species means designated populations of a wide range of species could occur within the potential zone of influence of disturbance effects. The nearest SPA is the Slievefelim to Silvermines Mountains SPA designated for resident Hen harrier *Circus cyaneus* (Drawing Number 32105801-GE-001). Nationally, breeding populations of the Hen harrier are in 'moderate' conservation status; however the long-term trend is declining (EIONET, 2015). The 2015 *National Survey of Breeding Hen Harrier in the Republic of Ireland* (Ruddock *et al.*, 2016) recorded an overall decline nationally of 15.6% in the number of confirmed breeding pairs since 2010. However the population of the Slievefelim to Silvermines Mountains SPA doubled over the period from 2005 to 2015, which may reflect the relocation of birds from traditional nesting areas within the Slieve Aughties (Ruddock *et al.* 2016), at least partially in response to forest maturation removing nest site availability.

SPAs designated for their waterfowl and wetland birds are highly likely to be associated with aquatic and wetland habitats. . There is some potential for wetland habitats along several riverbank floodplains and at other localized or ephemeral wetland features in proximity to the proposed GI works, all of which are located outside of designated SPA sites. There is potential for 'wetland' birds who partially depend on terrestrial farmlands (e.g. land under cereals or root crop), such as goose and swan species to feed in farmland in the vicinity of the proposed works. There is also some potential for designated raptor species including Hen harrier to roost and/or feed in the vicinity of the proposed works. These species may be associated with SPA sites, utilising habitats occurring at a distance outside of the SPA site boundary.

## 6. Consultation

Consultation with NPWS will continue and be ongoing throughout the Water Supply Project.

## 7. Screening Assessment

### 7.1 Proximity of European Sites and their Qualifying Interests

As explained in Section 3.1, the zones of influence and spatial extents of sensitivity were used to identify a preliminary list of all European Sites that could be affected by the proposed development as follows:

- Any SACs within 10 km of the proposed development were listed because 10km is the maximum potential ranging distance of mobile QI species from SACs according to best scientific knowledge (specifically otter territories may extend this far; refer to Appendix C);
- Any SPAs within 20 km of the proposed development were listed because 20km is the maximum ranging distance for SPA QI bird species from SPAs according to best scientific knowledge (specifically certain goose species may forage this far from core SPA wetlands; refer to Appendix B);

Twenty-five SAC sites were identified as being located within 10 km of the GI works with an additional 14 SPAs within 20 km.

### 7.2 Source-Pathway-Receptor Links

The Contract Documents identify the requirement for river crossings by boat to complete non-invasive surveys. With the exception of these access requirements, there are no works discharge to surface waters, and no abstraction from surface or ground waters. These restrictions will be binding on the contractor (Section 4.2.2). There will be no demolition of structures and no provision of artificial lighting, as all works would be carried out during daylight hours. There is a contractual obligation to implement best practice measures, as set out in Section 6.34 of the Work Order Requirements, in addition to the provision of site-specific method statements which will be subject to review and approval by the EcOW and Client's Representative, respectively. This precludes the potential for water pollution, or introduction or spread of invasive species.

Based on the description of the proposed works and best practice measures included in the Work Order Requirements which comprise a contractual element of the Tender Documents, the following potential effects were identified as remaining:

- Vegetation removal, and physical disturbance drilling, trenching, and tracking of machinery potentially resulting in disturbance to mobile species located outside of any European Sites;
- Disturbance from human presence on site potentially resulting in disturbance to mobile species located outside of any European Sites.

Table 7.1 identifies those 'Relevant' European Sites and QIs potentially linked to the proposed works by a source-pathway receptor link. An evaluation is provided with regard to the potential for significant adverse effects on those QIs occurring within the zone of influence of the proposed GI works. Table 7.2 assesses the preliminary list of SPAs, to identify any 'Relevant' sites potentially linked to the proposed works by a source-pathway receptor link.



**Table 7.1 : Preliminary List of European Sites potentially affected (SACs) and Identification of 'Relevant Sites**

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
Lower River Shannon SAC (002165)	0.06 km	<b>Annex II species:</b> [1355] Otter ( <i>Lutra lutra</i> ) [1029] Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> ) [1095] Sea Lamprey ( <i>Petromyzon marinus</i> ) [1096] Brook Lamprey ( <i>Lampetra planeri</i> ) [1099] River Lamprey ( <i>Lampetra fluviatilis</i> ) [1106] Atlantic Salmon ( <i>Salmo salar</i> ) [1349] Bottle-nosed Dolphin ( <i>Tursiops truncatus</i> )	<p>The potential for a source-pathway-receptor link was identified for otter. However, taking account of the survey and avoidance measures prescribed for implementation in the Contract Documents it is evaluated that any pathways for likely significant effects on SAC populations are avoided.</p> <p>According to studies undertaken on the potential impacts of seismic surveys on freshwater fish, it is evaluated that the scale and intensity of the proposed works would not be of magnitude or duration to result in significant direct or indirect effects on fish species or SAC populations, outside of or within any designated European Site (Popper <i>et al.</i>, 2005; Song <i>et al.</i>, 2008).</p>	No
		<b>Annex I habitats:</b> [1110] Sandbanks [1130] Estuaries [1140] Tidal Mudflats and Sandflats [1150] Coastal Lagoons* [1160] Large Shallow Inlets and Bays [1170] Reefs [1220] Perennial Vegetation of Stony Banks [1230] Vegetated Sea Cliffs [1310] Salicornia Mud	<p>No source-pathway-receptor linkages were identified, and no risk of LSE was identified for other QIs, based on best practice measures in Section 4.2.2, either alone or in combination with other plans or projects. Regarding pollution, the highly protective approach implementing best practice measures will effectively remove the pathway for significant effects.</p> <p>This finding was informed by the nature and scale of the proposed works, the potential zones of influence in Section 3.1.2, and the potential extent of QI spatial sensitivity in Appendix B.</p>	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		[1330] Atlantic Salt Meadows [1410] Mediterranean Salt Meadows [3260] Floating River Vegetation [6410] <i>Molinia</i> Meadows [91E0] Alluvial Forests*		
Lisduff Fen SAC (002147)	0.43 km North	<b>Annex I habitats:</b> [7220] Petrifying Springs* [7230] Alkaline Fens <b>Annex II species:</b> [1013] Geyer's Whorl Snail ( <i>Vertigo geyeri</i> )	No, the QI habitats and species are located at a distance from and outside of the 250m radius within which potential impacts could occur (see Appendix B).  No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Clonaslee Eskers and Derry Bog SAC (000859)	0.89 km South	<b>Annex I habitats:</b> [7230] Alkaline Fens <b>Annex II species:</b> [1013] Geyer's Whorl Snail ( <i>Vertigo geyeri</i> )	No, the QI habitats and species are located at a distance from and outside of the 250m radius within which potential impacts could occur (see Appendix B).  No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Island Fen SAC (002236)	1.22 km South	<b>Annex I habitats:</b> [5130] Juniper Scrub [7230] Alkaline Fens <b>Annex II species:</b>	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		None	sensitivity in Appendix B.	
Silvermines Mountains West SAC (002258)	1.70 km South	<b>Annex I habitats:</b> [4010] Wet Heath [4030] Dry Heath <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Sharavogue Bog SAC (000585)	1.98 km North	<b>Annex I habitats:</b> [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
The Long Derries and Edenderry SAC (000925)	2.10 km North	<b>Annex I habitats:</b> [6210] Orchid-rich Calcareous Grassland* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
River Barrow and River Nore SAC (002162)	2.52 km South	<b>Annex II species:</b> [1355] Otter ( <i>Lutra lutra</i> ) [1016] Desmoulin's Whorl Snail ( <i>Vertigo moulinsiana</i> ) [1029] Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> ) [1092] White-clawed Crayfish ( <i>Austropotamobius pallipes</i> )	The potential for a source-pathway-receptor link was identified for otter. However, taking account of the survey and avoidance measures prescribed for implementation in the Contract Documents it is evaluated that any pathways for likely significant effects on SAC populations are avoided.  According to studies undertaken on the potential impacts of seismic surveys on freshwater fish, it is evaluated that the scale and intensity of the proposed works would not	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		[1095] Sea Lamprey ( <i>Petromyzon marinus</i> ) [1096] Brook Lamprey ( <i>Lampetra planeri</i> ) [1099] River Lamprey ( <i>Lampetra fluviatilis</i> ) [1103] Twaite Shad ( <i>Alosa fallax</i> ) [1106] Atlantic Salmon ( <i>Salmo salar</i> ) [1421] Killarney Fern ( <i>Trichomanes speciosum</i> ) [1990] Nore Freshwater Pearl Mussel ( <i>Margaritifera durrovensis</i> )	be of magnitude or duration to result in significant direct or indirect effects on fish species or SAC populations, outside of or within any designated European Site (Popper <i>et al.</i> , 2005; Song <i>et al.</i> , 2008).	
		<b>Annex I habitats:</b> [1130] Estuaries [1140] Tidal Mudflats and Sandflats [1310] Salicornia Mud [1330] Atlantic Salt Meadows [1410] Mediterranean Salt Meadows [3260] Floating River Vegetation [4030] Dry Heath [6430] Hydrophilous Tall Herb Communities [7220] Petrifying Springs* [91A0] Old Oak Woodlands [91E0] Alluvial Forests*	No source-pathway-receptor linkages were identified, and no risk of LSE was identified for other QIs, based on best practice measures in Section 4.2.2, either alone or in combination with other plans or projects. Regarding pollution, the highly protective approach implementing best practice measures will effectively remove the pathway for significant effects.  This finding was informed by the nature and scale of the proposed works, the potential zones of influence in Section 3.1.2, and the potential extent of QI spatial sensitivity in Appendix B.	No
Rye Water Valley/Cartron SAC (001398)	4.17 km North	<b>Annex I habitats:</b> [7220] Petrifying Springs* <b>Annex II species:</b> [1014] Narrow-mouthed Whorl Snail ( <i>Vertigo</i> )	No source-pathway-receptor linkages and no risk of LSE were identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		<i>angustior</i> [1016] Desmoulin's Whorl Snail ( <i>Vertigo moulinsiana</i> )	sensitivity in Appendix B.	
Lough Derg, North-East Shore SAC (002241)	4.57 km North	<b>Annex I habitats:</b> [5130] Juniper Scrub [7210] Cladium Fens* [7230] Alkaline Fens [8240] Limestone Pavement* [91E0] Alluvial Forests* [91J0] Yew Woodlands* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE were identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.Derg.	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
Ballynafagh Lake SAC (001387)	4.5km South	<b>Annex I habitats:</b> [7230] Alkaline Fens <b>Annex II species</b> (1065) Marsh Fritillary ( <i>Euphydryas aurinia</i> ) [1016] Desmoulin's Whorl Snail ( <i>Vertigo moulinsiana</i> )	No source-pathway-receptor linkages were identified, and no risk of LSE was identified for QIs of this site, either alone or in combination with other plans or projects. The best practice measures described in section 4.2.2 has specified that the EcOW will conduct habitat suitability surveys for Marsh fritillary. It is noted that field surveys completed by Project Team ecologists did not record larvae of this species from suitable habitat within the wider study area of this SAC in 2016. In the event where potential or confirmed marsh fritillary habitat is found, the EcOW will instruct the contractor to relocate the proposed works (including any accesses/egresses) to avoid LSE. This finding was informed by the discrete nature and scale of the proposed works, the potential zones of influence in section 3.1.2, and the potential extent of QI spatial sensitivity in Appendix B.	No
Charleville Wood SAC (000571)	5.03 km North	<b>Annex I habitats:</b> [91A0] Old Oak Woodlands <b>Annex II species:</b> [1016] Desmoulin's Whorl Snail ( <i>Vertigo moulinsiana</i> )	No source-pathway-receptor linkages and no risk of LSE were identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Keeper Hill SAC (001197)	5.03 km South	<b>Annex I habitats:</b> [4010] Wet Heath [6230] Species-rich <i>Nardus</i> Grassland* [7130] Blanket Bogs (Active)* <b>Annex II species:</b>	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		None		
Ballynafagh Bog SAC (000391)	5.31 km South	<b>Annex I habitats:</b> [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Slieve Bernagh Bog SAC (002312)	5.33 km West	<b>Annex I habitats:</b> [4010] Wet Heath [4030] Dry Heath [7130] Blanket Bogs (Active)* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Silvermines Mountains SAC (002258)	5.60 km North	<b>Annex I habitats:</b> [4010] Wet Heath [6230] Species-rich <i>Nardus</i> Grassland* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice construction measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Slieve Bloom Mountains SAC (000412)	5.67 km South	<b>Annex I habitats:</b> [4010] Wet Heath [7130] Blanket Bogs (Active)* [91E0] Alluvial Forests* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
Liskeenan Fen SAC (001683)	6.80 km North	<b>Annex I habitats:</b> [7210] Cladium Fens* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Raheenmore Bog SAC (000582)	7.83 km North	<b>Annex I habitats:</b> [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Bolingbrook Hill SAC (002124)	7.83 km South	<b>Annex I habitats:</b> [4010] Wet Heath [4030] Dry Heath [6230] Species-rich Nardus Grassland* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	
Ballyduff/Clonfinane Bog SAC (000641)	8.11 km North	<b>Annex I habitats:</b> [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation [91D0] Bog Woodland* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No



European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
Ridge Road, SW of Rapemills SAC (000919)	8.65 km North	<b>Annex I habitats:</b> [6210] Orchid-rich Calcareous Grassland* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Glenomra Wood SAC (001013)	8.71 km South West	<b>Annex I habitats:</b> [91A0] Old Oak Woodlands <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Kilcarren-Firville Bog SAC (000647)	9.29 km North	<b>Annex I habitats:</b> [7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Glenasmole Valley SAC (001209)	9.91 km South	<b>Annex I habitats:</b> [6210] Orchid-rich Calcareous Grassland* [6410] Molinia Meadows [7220] Petrifying Springs* <b>Annex II species:</b> None	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No

**Table 7.2 Preliminary List of European Sites potentially affected (SPAs) and Identification of 'Relevant' Sites**

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
Slievefelim to Silvermines Mountains SPA (004165)	1.47 km South	[A082] Hen Harrier ( <i>Circus cyaneus</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Slieve Bloom Mountains SPA (004160)	3.11 km South	[A082] Hen harrier ( <i>Circus cyaneus</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Lough Derg (Shannon) SPA (004058)	3.33 km North	[A017] Cormorant ( <i>Phalacrocorax carbo</i> ) [A061] Tufted duck ( <i>Aythya fuligula</i> ) [A067] Goldeneye ( <i>Bucephala clangula</i> ) [A193] Common tern ( <i>Sterna hirundo</i> ) [A999] Wetland and Waterbirds	No. The QI bird species are coastal/wetland birds which are highly unlikely to be present in the terrestrial habitats where GI works are proposed. No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Dovegrove Callows SPA (004137)	6.91 km North	[A395] Greenland white-fronted goose ( <i>Anser albifrons flavirostris</i> )	No. The proposed GI works occur within the potential foraging range of this species (8km; Appendix B), and there are potentially suitable crop and/or peatland feeding areas in the vicinity of the proposed GI works. However, this species has a high fidelity to feeding sites which are well recorded.	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
			There are no known records for the species from the NPWS, NBDC, or Bird Atlas within at least 10km of the proposed works. No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	
River Little Brosna Callows SPA (004086)	10.24 km North	[A038] Whooper swan ( <i>Cygnus cygnus</i> ) [A050] Wigeon ( <i>Anas penelope</i> ) [A052] Teal ( <i>Anas crecca</i> ) [A054] Pintail ( <i>Anas acuta</i> ) [A056] Shoveler ( <i>Anas clypeata</i> ) [A140] Golden plover ( <i>Pluvialis apricaria</i> ) [A142] Lapwing ( <i>Vanellus vanellus</i> ) [A156] Black-tailed godwit ( <i>Limosa limosa</i> ) [A179] Black-headed gull ( <i>Chroicocephalus ridibundus</i> ) [A395] Greenland white-fronted goose ( <i>Anser albifrons flavirostris</i> ) [A999] Wetland and Waterbirds	<p>No. With the exception of Whooper swan and Greenland white-fronted goose, QI bird species are coastal and wetland birds which are highly unlikely to be present in the terrestrial habitats where GI works are proposed.</p> <p>Whooper swans can use non-wetland sites inland, and there records of the species occurring in the vicinity of the proposed works in the Bird Atlas 2007-2011 and the NBDC online. However, the species has a core foraging range of 5km from designated areas (Appendix B), and the site is 10km from the works.</p> <p>Similarly, the SPA is further from the works, than the core foraging range for Greenland white-fronted goose populations (8km; Appendix B). Therefore, even if any whooper swan or goose populations were present and disturbed during the works, they would not be designated SPA populations.</p> <p>No source-pathway-receptor linkages identified, based on best practice measures in section 4.2.2, either alone or in combination with other plans or projects.</p>	No
All Saints Bog SPA (004103)	11.48 km North	[A395] Greenland white-fronted goose	No, the SPA is further from the works than the core foraging range for Greenland white-fronted goose populations from	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		( <i>Anser albifrons flavirostris</i> )	designated areas (8km; Appendix B). No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	
Slieve Aughty Mountains SPA (004168)	11.52 km North	[A082] Hen harrier ( <i>Circus cyaneus</i> ) [A098] Merlin ( <i>Falco columbarius</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice construction measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B. No source-pathway-receptor linkages identified, based on best practice measures in section 4.2.2, either alone or in combination with other plans or projects.	No
River Boyne and River Blackwater SPA (004232)	12.74 km North	[A229] Kingfisher ( <i>Alcedo atthis</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Poulaphouca Reservoir SPA (004063)	14.28 km South	[A043] Greylag goose ( <i>Anser anser</i> ) [A183] Lesser black-backed gull ( <i>Larus fuscus</i> )	No, the SPA is further from the works, than the core foraging range for greylag goose populations from designated areas (12km; Appendix B). No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2,	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
			potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	
Wicklow Mountains SPA (004040)	14.70 km South	[A098] Merlin ( <i>Falco columbarius</i> ) [A103] Peregrine ( <i>Falco peregrinus</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
Middle Shannon Callows SPA (004096)	14.71 km North	[A038] Whooper swan ( <i>Cygnus cygnus</i> ) [A050] Wigeon ( <i>Anas penelope</i> ) [A122] Corncrake ( <i>Crex crex</i> ) [A140] Golden plover ( <i>Pluvialis apricaria</i> ) [A142] Lapwing ( <i>Vanellus vanellus</i> ) [A156] Black-tailed godwit ( <i>Limosa limosa</i> ) [A179] Black-headed gull ( <i>Chroicocephalus ridibundus</i> ) [A999] Wetland and Waterbirds	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
South Dublin Bay and River Tolka SPA (004024)	17.18 km East	[A046] Light-bellied brent goose ( <i>Branta bernicla hrota</i> ) [A130] Oystercatcher ( <i>Haematopus ostralegus</i> ) [A137] Ringed plover ( <i>Charadrius hiaticula</i> ) [A141] Grey plover ( <i>Pluvialis squatarola</i> ) [A143] Knot ( <i>Calidris canutus</i> ) [A144] Sanderling ( <i>Calidris alba</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		[A149] Dunlin ( <i>Calidris alpina</i> ) [A157] Bar-tailed godwit ( <i>Limosa lapponica</i> ) [A162] Redshank ( <i>Tringa totanus</i> ) [A179] Black-headed gull ( <i>Chroicocephalus ridibundus</i> ) [A192] Roseate tern ( <i>Sterna dougallii</i> ) [A193] Common tern ( <i>Sterna hirundo</i> ) [A194] Arctic tern ( <i>Sterna paradisaea</i> ) [A999] Wetland and Waterbirds		
River Nore SPA (004233)	17.67 km East	[A229] Kingfisher ( <i>Alcedo atthis</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No
River Shannon and River Fergus Estuaries SPA (004077)	18.39 km South West	[A017] Cormorant ( <i>Phalacrocorax carbo</i> ) [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> ) [A056] Shoveler ( <i>Anas clypeata</i> )	No source-pathway-receptor linkages and no risk of LSE identified, either alone or in combination with other plans or projects, based on the nature and scale of the proposed works, best practice measures in section 4.2.2, potential zones of influence in section 3.1.2, and potential extent of QI spatial sensitivity in Appendix B.	No

European Sites	Distance from Proposed Works	Qualifying Interests	Source-Pathway-Receptor Link	Relevant Site Requiring Further Analysis of Potential for LSE?
		[A062] Scaup ( <i>Aythya marila</i> ) [A137] Ringed plover ( <i>Charadrius hiaticula</i> ) [A140] Golden plover ( <i>Pluvialis apricaria</i> ) [A141] Grey plover ( <i>Pluvialis squatarola</i> ) [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> ) [A999] Wetland and Waterbirds		

### 7.3 Relevant European Sites

From the source-receptor-pathway relationships identified for the designated European Sites within the zone of influence of the proposed GI works (Table 7.1 and Table 7.2) it has been evaluated that there are no pathways which would have the potential to give rise to likely significant effects for any of the SAC or SPA sites. This assessment takes account of the prescription of avoidance measures and compliance requirements set out in the Contract Documents.

### 7.4 Assessment of Likely Significant Effects

#### 7.4.1 Defining Significance

In accordance with EC (2000) and DoEHG guidance (2010) significance was defined by any effect to the Conservation Objectives of a site. All professional judgements regarding the potential significance of effects were assessed with reference to significance indicators such as the duration of fragmentation, disturbance, or population density.

#### 7.4.2 Conservation Objectives and Condition of Relevant Sites

To assist in the determination of whether the source-pathway-receptor could result in LSE, and evaluation of individual QI's has been undertaken, as presented in Table 7.1 and Table 7.2. It can be excluded, on the basis of objective evidence, that there will be no LSE on any European Site (SAC or SPA) from the proposed works alone, in the light of the site's Conservation Objectives. In-combination effects are assessed in Section 7.5. The evaluation takes account of the measures prescribed in the Contract Documents for the avoidance of effects on ecological conservation interests in addition to an assessment of the Conservation Objectives for the designated sites relating to their QIs, as follows:

- Attributes from site-specific Conservation Objectives, or substitute objectives from other European Site (s) where only generic objectives were available;
- National conservation status of Relevant QIs (NPWS, 2013a,b);
- Site-level conservation status of Relevant QIs from Natura standard data forms and;
- Key conditions supporting, and threats to integrity.



## 7.5 In-Combination Effects

In the context of in-combination effects, it is informative to refer to the conservation status of the QIs identified within the zone of influence of the proposed works, as this may be interpreted to reflect the sum of existing pressures.

All future developments of significant scale (i.e. requiring planning permission or other development consent), including the overall WSP Project, and any falling out of the land-use plans listed in Section 5.1, will be subject to their own screening for AA (and if necessary AA).

All land-use plans listed in Section 5.1 have either concluded there would be no LSE from the plan, in-combination with other plans or projects; or proposed best practice measures to ensure LSE, if identified, would not adversely affect the integrity of any sites.

The scale and extent of the proposed GI works will not have any perceptible effect on otter populations within designated SAC sites. There are no potential effects identified with regard to the proposed works which could interact cumulatively with other projects or plans to result in any potential effects on the conservation status of and individual QI (habitat or species) or on their Conservation Status.

In conclusion, taking account of the location, scale, extent and duration of the proposed GI works, it is evaluated that there is no potential for significant adverse effects arising from the proposal, cumulatively or in-combination with existing or proposed projects or plans, with reference to designated European Sites and their Qualifying Interests within the wider zone of influence.

## 7.6 Screening Conclusion Statement

The proposed GI works are not connected with or necessary to the management of any European Sites.

This Screening Report to inform the Appropriate Assessment process has evaluated that the proposed advance GI works will not have any likely significant adverse effects on a designated European Site, either individually or in combination with other plans or projects. This conclusion has been reached based on objective scientific information, and in light of the conservation objectives of relevant European Sites.

## 8. References

- BCI (2012) Bats and Appropriate Assessment Guidelines, Version 1, December 2012. Bat Conservation Ireland, [www.batconservationireland.org](http://www.batconservationireland.org).
- Bell, M.V. (1988) Feeding behaviour of wintering Pink-footed and Greylag Geese in north-east Scotland. *Wildfowl*, 39, pp. 43-53.
- Benson, L. (2009) Use of Inland Feeding Sites by Light-Bellied Brent Geese in Dublin 2008-2009: A new Conservation? *Irish birds*, 8, pp. 563-70.
- Bontadina, F., Schmied, S. F., Beck, A., & Arlettaz, R. (2008) Changes in prey abundance unlikely to explain the demography of a critically endangered Central European bat. *Journal of Applied Ecology*, 45(2), pp. 641-648.
- Bright, J. A., Langston, R. H. W., Bullman, R., Evans, R.J., Gardner, S., Pearce-Higgins, J. & Wilson, E. (2006) Bird Sensitivity Map to provide locational guidance for onshore wind farms in Scotland. RSPB Research Report No 20
- Byrne, A., Moorkens, E.A., Anderson, R., Killeen, I.J. & Regan, E.C. (2009) Ireland Red List No. 2 – Non-Marine Molluscs. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- Carney, K. M., & Sydeman, W.J. (1999) Waterbirds: *The International Journal of Waterbird Biology*, 22, pp. 68-79.
- Caraco, D. (2000) Strengthening Silt Fences: the Practice of Watershed Protection. *Watershed Protection Techniques* 2, pp. 434-428.
- Carney, K. M., & Sydeman, W. J. (1999) A review of human disturbance effects on nesting colonial waterbirds. *Waterbirds*, pp. 68-79.
- Chen, S.-F., Rossiter, S. J., Faulkes, C. G. & Jones, G. (2006) Population genetic structure and demographic history of the endemic Formosan lesser horseshoe bat (*Rhinolophus monoceros*). *Molecular Ecology*, 15, pp. 1643–1656.
- Chvojkova, E., Volf, O., Kopeckove, M., Hummel, J., Cizek, O., Dusek, J., Brezina, S. and Marhoul, P. (2011) Manual for assessment of significance of impacts on target features of natura 2000 sites. Ministry of the Environment of the Czech Republic.
- Colhoun, K. & Cummins, S. (2014) Birds of Conservation Concern in Ireland 2014-2019. *Irish Birds* 9, 523-544.
- Cutts, N., Phelps, A., and Burdon, D. (2009). Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance. Report to Humber INCA. Institute of Estuarine and Coastal Studies, University of Hull.
- DoEHLG (2010) Appropriate Assessment of Plans and projects in Ireland. Guidance for Planning Authorities. Department of Environment, Heritage and Local Government: Ireland
- EC (2000) Managing Natura 2000 sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC.
- EC (2001) 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 (European Commission Environment Directorate-General);
- Fowles, A.P. (2004) Guidance Notes for the definition and mapping of habitat quality for marsh fritillaries. Natural Science report No. 03/5/01.

- Gouin, N., Souty-Grosset, C., Ropiquet, A., & Grandjean, F. (2002) High dispersal ability of *Austroptamobius pallipes* revealed by microsatellite markers in a French brook. *Bulletin Français de la Pêche et de la Pisciculture*, 367, pp. 681-689.
- Hardey, J. (2013) *Raptors: a field guide to survey and monitoring*. The Stationery Office.
- Madsen, J. (1985). Relations between spring habitat selection and daily energetics of Pink-footed Geese *Anser brachyrhynchus*. *Scandinavian Journal of Ornithology*. 16, pp. 222–228.
- Motte, G., & Libois, R. (2002) Conservation of the lesser horseshoe bat (*Rhinolophus hipposideros* Bechstein, 1800) (Mammalia: Chiroptera) in Belgium. A case study of feeding habitat requirements. *Belgian Journal of Zoology*, 132 (1), pp. 47-52.
- National Roads Authority (2006). *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes*. National Roads Authority: Ireland
- NPWS (2009) *Threat Response Plan: Otter (2009-2011)*. National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.
- NPWS (2013a) *The Status of EU Protected Habitats and Species in Ireland. Habitat Assessments Volume 2. Version 1.1*. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- NPWS (2013b) *The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3, Version 1.0*, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.
- Popper A. N., Smith M. E., Cott P. A., Hanna B. W., MacGillivray A. O., Austin M. E., and Mann D. A. (2005). Effects of exposure to seismic airgun use on hearing of three fish species. *Journal of the Acoustical Society of America* 2005; vol. 117
- Rees, E. C., Bruce, J. H., & White, G. T. (2005) Factors affecting the behavioural responses of whooper swans (*Cygnus c. cygnus*) to various human activities. *Biological conservation*, 121(3), pp. 369-382.
- Ruddock, M., & Whitfield, D.P. (2007) *A Review of Disturbance Distances in Selected Bird Species*. A report from Natural Research to Scottish Natural Heritage.
- Rush, T., Billington, G. (2014) *Galway bat radio-tracking project*. Radio tracking studies of lesser horseshoe and vesper bat species, August and September 2014. Greena Ecological Consultancy. Witham Friary, 2014.
- Schofield, H.W. (1996) *The ecology and conservation biology of Rhinolophus hipposideros, the lesser horseshoe bat*. Unpubl. Ph. D. Thesis, University of Aberdeen (198pp).
- Seale, E. (2010) *The conservation biology and genetics of the marsh fritillary, Euphydryas aurinia (Rottemburg, 1775) (Lepidoptera, Nymphalidae), in Northern Ireland*. A thesis submitted to Queen's University Belfast in accordance with the requirements of the degree of Doctorate of Philosophy in the Faculty of Medicine, Health and Life Science.
- Scottish Environment Protection Agency (2014) *Land Use Planning System SEPA Guidance Note 31. Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and groundwater Dependent Terrestrial Ecosystems*.
- Smit, C.J. & Visser, G.J.M. (1993) Effects of disturbance on shorebirds: a summary of existing knowledge from the Dutch Wadden Sea and Delta area. *Wader Study Group Bull.* 68: 6-19.
- Song J, Mann DA, Cot PA, Hanna BW, Popper AN (2008). The inner ears of northern Canadian freshwater fishes following exposure to seismic air gun sounds. *Journal of the Acoustical Society of America*. 2008; vol. 124

Zimmermann, K., Fric, Z., Jiskra, P., Kopeckova, M., Vlasanek, P., Zapletal, M., & Konvicka, M. (2011). Mark-recapture on large spatial scale reveals long distance dispersal in the Marsh Fritillary, *Euphydryas aurinia*. *Ecological Entomology*, 36(4), pp. 499-510.

## Drawings

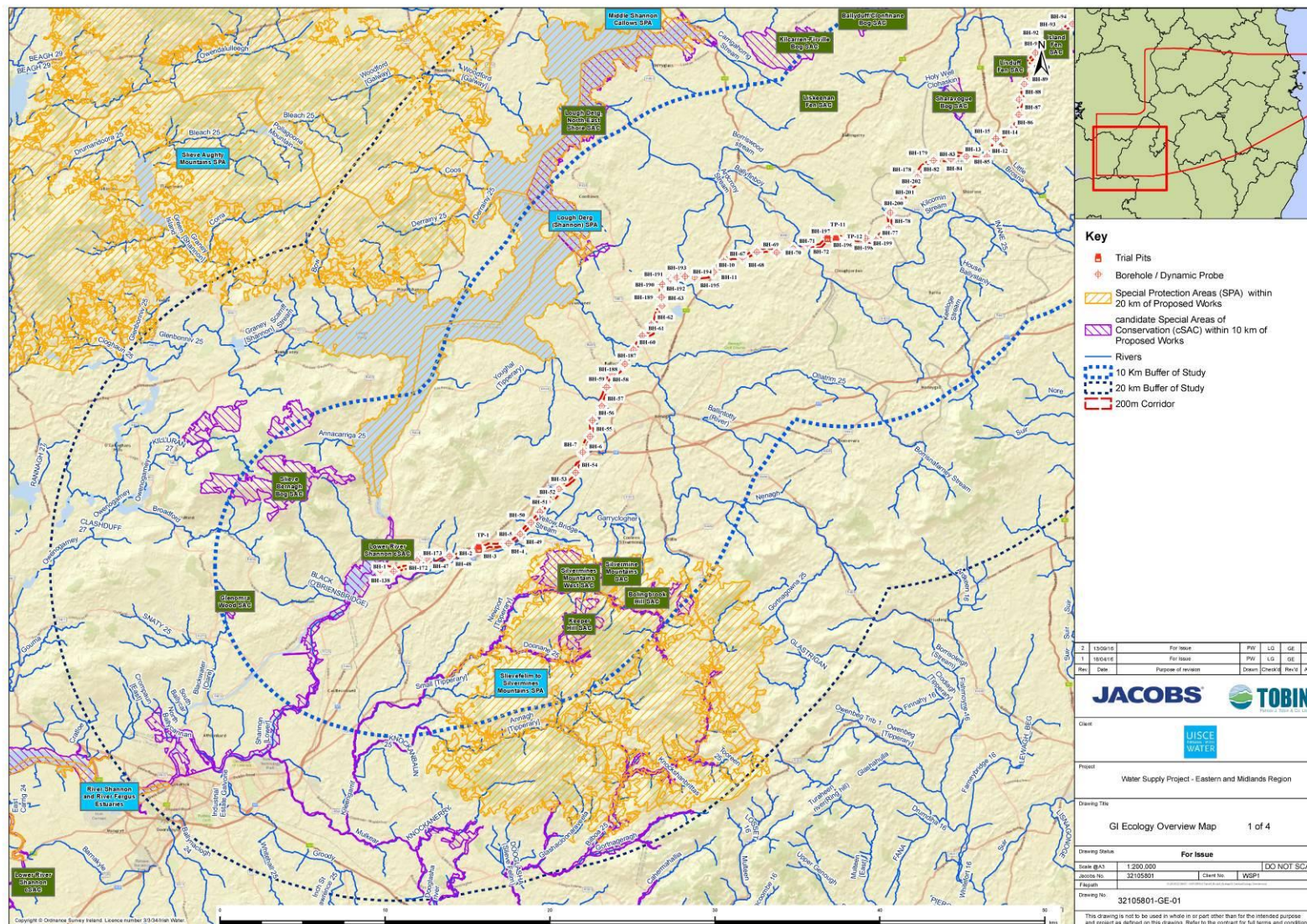
GI Ecology Overview Maps (Drawing Numbers 32105801-GE-001 to 32105801-GE-004)

## Appendix A. GI Contract Ecology Overview Mapping



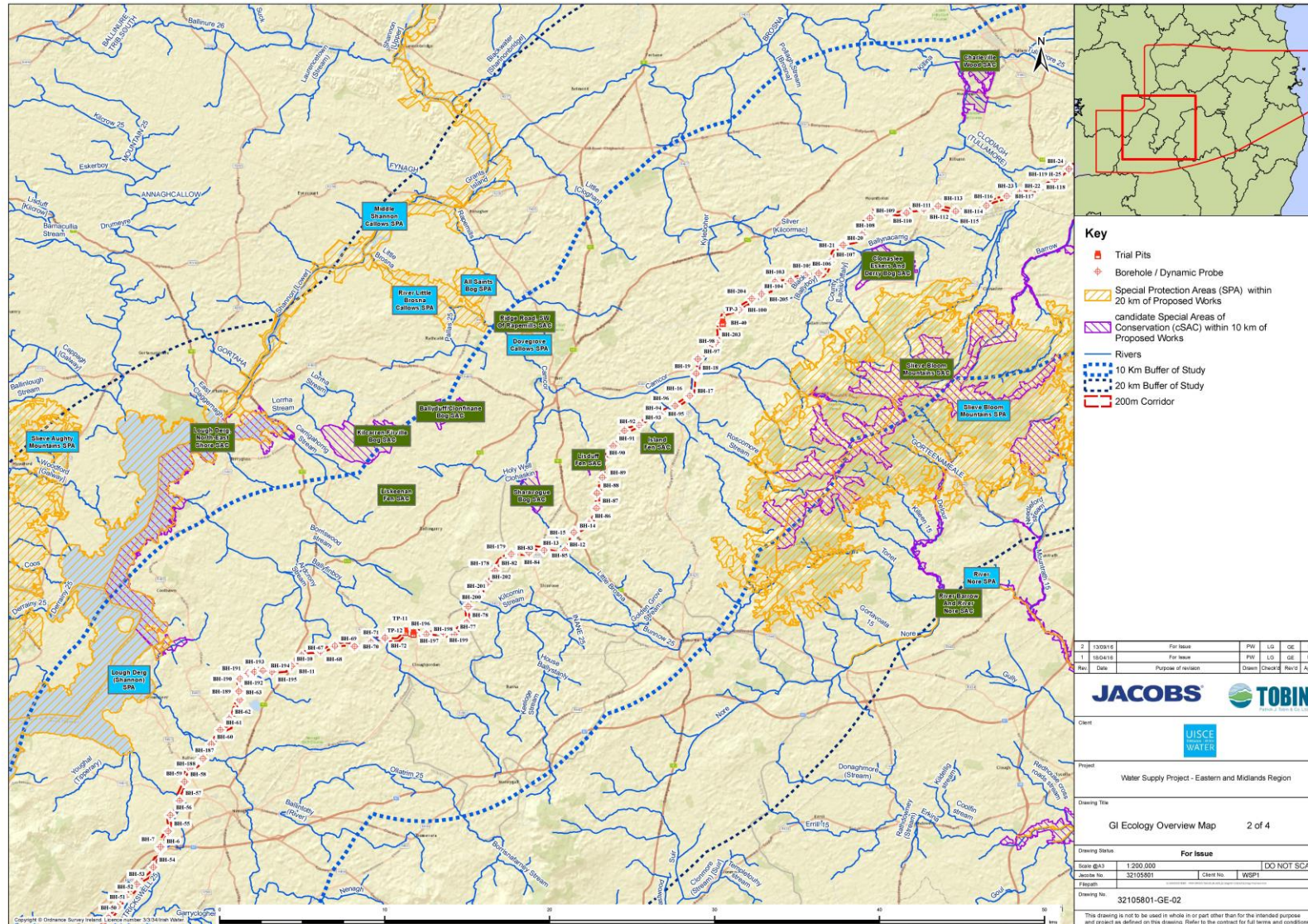
# Ground Investigation - Appropriate Assessment Screening Report

**JACOBS**



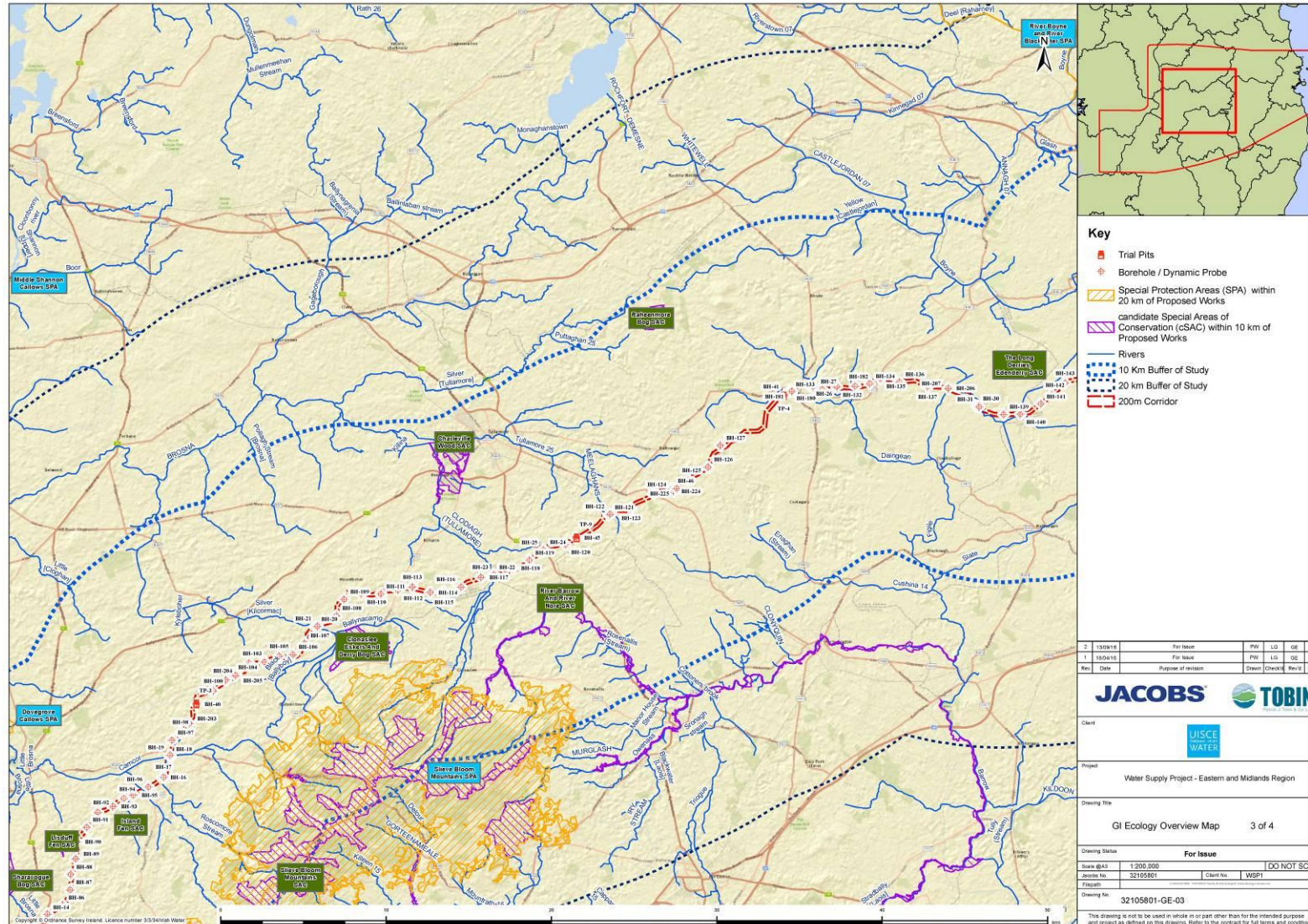


# Ground Investigation - Appropriate Assessment Screening Report





# Ground Investigation - Appropriate Assessment Screening Report

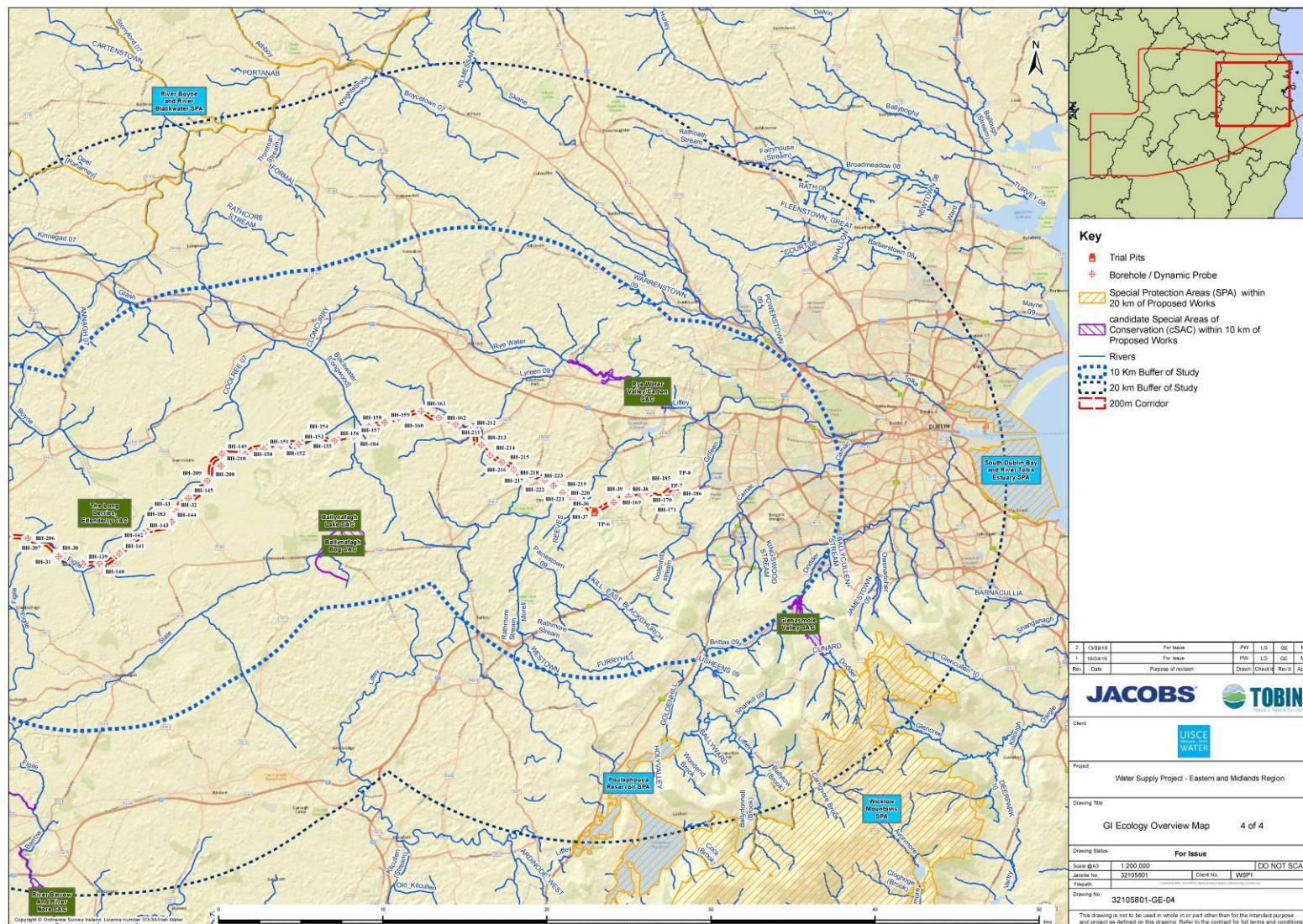




# Ground Investigation - Appropriate Assessment Screening Report


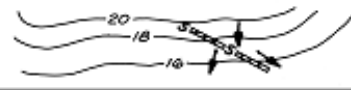

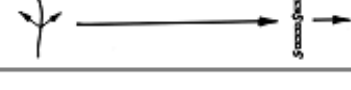







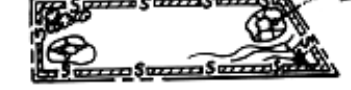
**JACOBS**

**TOBIN**  
Patrick J. Tobin & Co. Ltd.



## Appendix B. Silt Fencing Specifications

The tabulated measures below relate to correct fencing installation (from Caraco, 2000), as stipulated as a requirement in the contract documentation.

Table 2: Conditions that Limit the Effectiveness of Silt Fences		
1		<b>Slope and/or Length of Slope</b> 5% to 10%: no more than 50 feet 10% to 20%: no more than 25 feet more than 20%: no more than 15 feet
2		Silt fence is not aligned parallel to slope contours
3		Edges of the silt fence are not curved uphill, allowing flow to bypass the fence
4		Contributing length to fence is greater than 100 feet
5		Fabric is not entrenched deeply enough to prevent undercutting
6		Spacing between posts is greater than eight feet
7		Fence receives concentrated flow without reinforcement
8		Installed below an outlet pipe or weir
9		Silt fence is <i>upslope</i> of the exposed area
10		Silt fence alignment does not consider construction traffic
11		Sediment deposits behind silt fence reduce capacity and increase breach potential
12		Alignment of silt fence mirrors the property line or limits of disturbance, but does not reflect ESC needs

## Appendix C. Extents of Sensitivity of QIs

### Qualifying Interest Habitats

**Table B.1– Extents of Sensitivity for QI Habitats and Plant species informing the Screening for AA**

QI Feature (s)	Effects to which QIs Potentially Sensitive	Sensitivity Extent and Potential Mobility	Rationale
Terrestrial habitats and plant species without groundwater or surface-water dependency (e.g. oak woodlands, Killarney fern, limestone pavement)	Direct habitat loss or damage within footprint of works.	QIs have no mobility; no effects unless works overlap habitat/plant species.	No habitat loss/damage can occur unless works overlap the extent of the habitat/plant.
	Habitat loss or damage or invasive species establishment	QIs have no mobility; no effects unless works overlap or are adjacent to habitat/plant species.	No invasive species spread can occur unless works carry plant fragments or seeds into or adjacent to the habitat/plant
Ground-Water Dependent habitats and plant species. (E.g. turloughs, petrifying springs petalwort <i>Hamatocaulis verniculosus</i> ).	Habitat loss or indirect effects from changes to direction of groundwater flow or groundwater volume.	Although QIs have no mobility, they are dependent on groundwater flow which has high mobility. Any significant effects to groundwater resources within <b>250m</b> of the QIs could be significant.	The area over which intrusive excavations (e.g. foundations or borrow pits) may pose a risk to Ground Water Dependent Terrestrial Ecosystems has been estimated at 250 m by the Scottish Environmental Protection Agency (SEPA, 2014). This distance does not account for significant abstraction effects, which are not applicable in the case of the proposed works.



## Qualifying Interest Species (Other than Birds)

**Table B.2– Extents of Sensitivity for QI Non-bird fauna species informing the Screening for AA**

QI Feature (s)	Effects to which QIs Potentially Sensitive	Sensitivity Extent and Potential Mobility	Scientific Rationale
Otter breeding or resting sites	Mortality reduced breeding success resulting from loss or collapse of underground sites	QI is highly mobile and territories can extend over <b>10 km</b> from designated areas.	10km is mean territory size of Irish otters (O'Neill, 2008, cited in Reid <i>et al.</i> , 2013).
Lesser horseshoe bat <i>Rhinolophus hipposideros</i> roosts or foraging habitat	Mortality or reduced breeding success due to loss of roosts or foraging habitat within core area.	QI is highly mobile and bats can require core foraging habitat over <b>4 km</b> from designated areas.	Although maximum foraging ranges for the species have approached 6km in Ireland, which Bat Conservation Ireland have recommended as a precautionary distance over which to consider effects (BCI, 2012; e.g. 5.2km in Galway; Rush and Billington, 2014), and Wales (4.2km; Bontadina <i>et al.</i> , 2002) no studies have found core foraging ranges in excess of 4km (Schofield, 1996; Bontadina <i>et al.</i> , 2002; Rush and Billington, 2014).
Marsh fritillary individuals or their habitat	Direct injury to butterflies or their habitats	QI is highly mobile and butterflies could establish metapopulations up to <b>10 km</b> beyond designated areas, as this corresponds to their potential dispersal range.	10km is maximum dispersal range of populations of the species (Seale, 2010; Zimmerman <i>et al.</i> (2011).
Atlantic salmon, Lamprey spp. (river, brook, sea), Freshwater Pearl Mussel	Direct loss or damage to spawning grounds during instream works	QIs are highly mobile, but spawning grounds are not.; direct effects could only occur where <b>spawning habitats within footprint</b> of works	No habitat loss/damage predicted beyond this area.
	Indirect siltation effects to fish habitat, including spawning gravels.	Silt is highly mobile and large scale inputs could potentially be dispersed throughout a <b>river catchment</b> .	Once released, silt could be remobilised over time potentially reaching any downstream gravels within the same river catchment.



## Qualifying Interest Bird species

**Table B.3– Extents of Sensitivity for QI Breeding Bird species informing the Screening for AA**

Breeding Bird QI (s)	Effects to which QIs Potentially Sensitive	Sensitivity Extent and Potential Mobility	Scientific Rationale
Chough <i>Pyrhocorax pyrrhocorax</i>	Significant disturbance effect to nest site.	Nests within <b>1 km</b> of disturbance subject to professional judgement (e.g. regarding local topography that may screen disturbance).	Nests are not mobile, but birds can perceive disturbance at significant distances to post a threat. Sensitivity buffer of this distance recommended for nest sites from Bright et al., (2006).
Cormorant <i>Phalacrocorax carbo</i> nests	Significant disturbance effect to nest site.	Nests within <b>200 m</b> of disturbance subject to professional judgement (e.g. regarding local topography that may screen disturbance).	Nests are not mobile, but birds can perceive disturbance at significant distances post a threat. This distance is precautionary based on data in Carney & Sydeman (1999).
Nests of gulls, terns, fulmar <i>Fulmarus glacialis</i> storm petrel <i>Hydrobates pelagicus</i>	Significant disturbance effect to nest site.	Nests within <b>500 m</b> of disturbance subject to professional judgement (e.g. regarding local topography that may screen disturbance).	Nests are not mobile, but birds can perceive disturbance at significant distances to post a threat. This distance is precautionary based on data in Carney & Sydeman (1999).
Hen harrier nests	Significant disturbance effect to nest site.	Nests within <b>750 m</b> of disturbance subject to professional judgement (e.g. regarding local topography that may screen disturbance).	Nests are not mobile, but birds can perceive disturbance at significant distances to post a threat. 750 m is the likely critical reaction distance based on Whitfield et al.,(2008).
Merlin <i>Falco columbarius</i> nests	Significant disturbance effect to nest site.	Nests within <b>500 m</b> of effect.	Nests are not mobile, but birds can perceive disturbance at significant distances to post a threat. Distance is likely critical reaction distance based on Whitfield et al.(2008).).

**Table B.4– Zones of Influence for QI Wintering Bird species informing the Screening for AA**

Wintering Bird QI (s)	Sensitivity Extent and Potential Mobility	Scientific Rationale
Wading Birds	Up to 5km for birds feeding at inland sites	Professional judgement, expert opinion from consultation exercise, and preliminary oystercatcher resighting data from Birdwatch Ireland from Dublin Bay
Barnacle Goose	None	SNH, 2013
Greenland white-fronted goose	8km roosts/feeding sites.	SNH, 2013
Greylag goose	12km from designated roosts/feeding sites.	Bell 1988 and Hearn, personal communication cited in JNCC (2007)
Light-belled goose	15km from designated roosts/feeding sites.	Benson (2009)
Whooper Swan	5km from roosts/feeding sites.	SNH, 2013