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# Local Distributor Road 4 Abbeyland Navan: Ground Investigation

## Natura Impact Statement

Prepared for: Meath County Council

Project Number: 60546769

April 2019

## Quality information

| Prepared by | Checked by | Approved by |
|---|---|---|
| Dr Miles Newman | Robert Fennelly | Eleanor Ballard |
| Consultant Ecologist | Principal Ecologist | Associate Director (of Ecology) |

## Revision History

| Revision | Revision date | Details | Authorized | Name | Position |
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| Rev A | 29/03/ 2019 | For issue to NPWS/DAU | YES | Eoin Greene | Project Manager |
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## Prepared for:

Meath County Council

## Prepared by:

AECOM Ireland Limited
4th Floor
Adelphi Plaza
Georges Street Upper
Dun Laoghaire
Co. Dublin A96 T927
Ireland

T: +353 1 238 3100
aecom.com

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# 1. Introduction

AECOM Ireland Limited (hereafter referred to as AECOM) was commissioned by Meath County Council (MCC) to produce this Natura Impact Statement (NIS) to inform the Appropriate Assessment (AA) of ground investigations for the proposed Local Distributor Road 4 (hereafter 'the **proposed works**'), in accordance with the legal requirements set out in Section 1.1.

The proposed works is located approximately 1 km northwest of the town centre of Navan, Co. Meath. Existing access to the proposed works is from the Ratholdren Road to the north, and the N51 and R147 intersection (round-a-bout), to the south.

## 1.1 Legal and Planning Context

The European Communities Habitats Directive 92/43/EEC ("the Habitats Directive") provides, in Article 6 (3), the legal basis for Appropriate Assessment (AA) at European level. Where Irish land-use projects do not fall under the remit of the Irish planning legislation, the Habitats Directive is transposed by the European Communities (Bird and Natural Habitats) Regulations 2011 S.I 477 of 2011, as amended (hereafter 'the Regulations').

### 1.1.1 Screening for AA

Part 42(1) of the Regulations transposes the requirement to screen for AA:

42. (1) A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority [in this case MCC] to assess, in view of best scientific knowledge and in view of the Conservation Objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site.

Following National Parks & Wildlife Service (NPWS) technical advice that AA Screening should 'screen-in' a project or plan, and not 'screen-in' particular European sites, this NIS considers potential effect pathways to all European sites in Ireland as relevant.

### 1.1.2 Appropriate Assessment

Parts 42(9) and 42(11) of the Regulations transpose the primary obligations for AA of plans or projects which a public authority wishes to undertake:

*42 (9): Where a public authority is required to conduct an Appropriate Assessment…in relation to a plan or project that it proposes to undertake or adopt, it shall—*

*(a) prepare a Natura Impact Statement,*

*(b) compile any other evidence including, but not limited to, scientific evidence that is required for the purposes of the Appropriate Assessment, and*

*(c) submit a Natura Impact Statement together with evidence compiled under subparagraph (b) to the Minister not later than six weeks before it proposes to adopt or undertake the plan or project to which the Natura Impact Statement and evidence relates.*

*42 (11) An Appropriate Assessment...shall include a determination by the public authority…pursuant to Article 6(3) of the Habitats Directive as to whether or not a plan or project would adversely affect the integrity of a European site and the assessment shall be carried out by the public authority before a decision is taken to approve, undertake or adopt a plan or project, as the case may be.*

MCC have made a determination (AO 7604/2019 Transportation) that an AA is required; this was based on the AECOM recommendation that that AA of the proposed works is required. MCC have requested this NIS because (in the formal wording of the 'Waddenzee' ruling) it could not be excluded that the Project, individually or in combination with other plans or projects was likely to have a significant effect on European sites.

### 1.1.3 Consultation and Publication Requirements

#### 1.1.3.1 Public Access to Environmental Information

The European Communities (Access to Information on the Environment) Regulations 2007 to 2014 (AEI Regulations) transpose Directive 2003/4/EC on public access to environmental information, which was adopted to give effect to the 'Access to Information' pillar of the Aarhus Convention.

The AEI Regulations give the public the right to access environmental information. The Regulations also oblige public authorities to be proactive in disseminating environmental information to the public and to make reasonable efforts to maintain environmental information and have it in a form that is accessible and can be reproduced.

#### 1.1.3.2 Appropriate Assessment

MCC are making available for inspection by members of the public their AA determination and the reasons for that determination. MCC are making these documents available to members of the public, during office hours, at the offices of the authority and shall also make the determination or notice available in electronic form by placing the documents on the MCC website.

MCC will have regard if appropriate, for any written submissions or observations made to the public authority.

MCC will submit the NIS to the Minister for Culture, Heritage and the Gaeltacht not later than six weeks before it proposes to adopt or undertake the Project.

## 1.2 European Sites

In the Republic of Ireland, European sites[1] comprise:

- Special Areas of Conservation (SACs) designated for habitats, plants, and non-bird species;
- Special Protection Areas (SPAs) designated for bird species and their habitats; and,
- 'Candidate' sites including 'cSACs'.

The process of designating cSACs as SACs is ongoing in Ireland. The term SAC is used throughout this report for both SACs and cSACs, given they are subject to equal protection.

[1] "European site" replaced the term "Natura 2000 site" under the EU (Environmental Impact Assessment and Habitats) Regulations 2011 S.I. No. 473 of 2011.

# 2. Description of the Proposed works

The proposed works consist of trial pits and boreholes (both percussive and rotary core). A total of 22 trial pits and 9 boreholes are proposed (Figure 1).

Four proposed trial pits and five proposed boreholes are located on saturated ground inside the floodplain of two European sites: the River Boyne and River Blackwater Special Area of Conservation (SAC; site code 2299) and the River Boyne and River Blackwater Special Protection Area (SPA; site code 004232).

## 2.1 Trial Pits and Boreholes

Each trial pit is estimated to be approximately:

- 3 - 4.5 m deep; and,
- 1 m wide X 3 m long

Each trial pit will require an approximate working area of 25 $m^2$

Each borehole is estimated to be approximately:

- 5 m to 15 m deep subject to ground conditions; and,
- 100 to 200 mm wide.

Each borehole will require an approximate working area of 56 $m^2$

## 2.2 Plant and Machinery

Contractors will access sampling locations using a four wheel drive jeep and a wheeled trailer. Rotary core drill rigs will typically be tracked, while cable percussive rigs will be wheeled. Trial pits will be excavated using a excavator. A wheeled water tanker ('bowser') will also be required to flush borehole sampling locations.

Low ground pressure tracked machinery will be utilised for investigation locations within the floodplain.

## 2.3 Programme

The proposed works are predicted to last 4-8 wks depending on crew availability. Subject to contractual arrangements, Contractors are expected to mobilise in Q1 2019. The works will be phased to suit site access restrictions and seasonality restrictions as outlined in this report.

## 2.4 Compound Location

No compound will be required for the proposed works. Contractors will make use of the existing parking area in Blackwater Park for vehicles and storage.

## 2.5 Lighting

Lighting will be required to ensure safe working conditions. Borehole rigs will make use of mobile floodlights given the potential to require drilling over extended periods. Trial pits will be excavated during daylight hours.

## 2.6 Access Routes

A single track access route will be used to access sampling locations along the alignment of the proposed road development. Existing paths within the Blackwater Park will be used where practical. Existing hedge breaks will be used to minimise removal new areas of vegetation.

Where the GI contractor accessed the flood plain they will utilise ground protection mats where necessary and as agreed with the client supervision team, and client ecological supervisor, and if necessary the hole locations moved to suitable adjacent ground. As noted above low ground pressure tracked machinery will be utilised for investigation locations within the floodplain.

## 2.7 Re-instatement

Trial pits will be backfilled & compacted in layers, and left slightly ‘proud ‘to allow for localised settlement. Borehole cores will be backfilled with bentonite granules, following bagging and removal off site of cores for analysis.

## 2.8 Drainage

The Information Pack provided with the contract documentation for the proposed works includes the following requirements:

- Lubricants used on equipment are to be vegetable based.
- Equipment shall be degreased as necessary before use on site.
- The Contractor will not be permitted to discharge water directly into any adjacent watercourses.
- During the period of execution of the 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.

# 3. Methodology

## 3.1 Overview

AA is the process provided for under Article 6(3) of the Habitats Directive to determine whether a project or plan could 'adversely affect the integrity' of any European sites, either alone or in-combination with other plans or projects, in the light of the Conservation Objectives of the European sites in question.

In the event where a plan or project would, following implementation of appropriate mitigation, result in adverse effects to site integrity (or there was reasonable scientific doubt regarding the finding), the assessment would move from AA to an assessment of whether Imperative Reasons of Over-Riding Public Interest (IROPI) may apply.

IROPI, which is provided for under Article 6(4) of the Habitats Directive, is rarely pursued in Ireland and there is the potential for significant cost, delay, and/or uncertainty in the outcome of the process, which may require consultation with the European Commission. In lieu of pursuing IROPI, it is preferable that the design of a project or plan is amended in the course of the AA, and/or additional mitigation is implemented, such that the AA concludes that no adverse effects to European site integrity are predicted.

The methodology used to produce this NIS broadly follows that for AA in European Commission guidance (EC, 2001) and guidance published by the Irish Department of Environment, Heritage and Local Government (DoEHLG, 2010).

The following steps for AA broadly follow those adopted by the EC and DoEHLG and are used as the basis for this NIS:

- Step 1 – Collate Information Required;
- Step 2 – Present Conservation Objectives;
- Step 3 – Predict Effects (including Article 10 considerations);
- Step 4 – Describe Mitigation Measures; and,
- Conclusion.

## 3.2 Sources of Guidance

### 3.2.1 European Guidance

The European Commission (EC) has recently published updated guidance on the provisions of Article 6 of the Habitats Directive, including AA Screening and AA (EC, 2018). This replaces the previous EC guidance in 2000. As stated in EC (2018), the updated guidance "incorporates the large body of rulings that have been issued by the Court of Justice of the EU (CJEU) over the years on Article 6". One recent and significant CJEU ruling not expressly accounted for in EC (2018), dates from November 2018, and relates to the Kilkenny Northern Ring Road in Ireland ('Holohan; C-461/17[2]). In 'Holohan', the CJEU found, that among other points:

- "*AA must examine the implications of the proposed project [for species and habitats for which] the European site has not been listed..provided that those implications are liable to affect the conservation objectives of the [European] site*"; and,
- "*the competent authority is permitted to grant to a plan or project consent which leaves the developer free to determine subsequently certain parameters relating to the construction phase (e.g. location of the construction compound and haul routes etc..), only if that authority is certain that the development consent granted establishes conditions that are strict enough to guarantee that those parameters will not adversely affect the integrity of the European site*".

### 3.2.2 National Guidance

There have been significant changes to AA practice since the last formal Irish governmental guidance on AA (DoEHLG, 2010) arising from rulings in European, and Irish courts, and associated changes in statute. The updated EC (2018) guidance is therefore followed in lieu of DoEHLG guidance in this NIS. Unpublished' (online)

[2] Case C 461/17, Judgment of The Court (Second Chamber) 7 November 2018, Brian Holohan and Others v An Bord Pleanála.

guidance from the NPWS[3] Amounting to circa ten A4 pages when copied and pasted, this guidance (updated to August 2018, at the time of writing) covers regulatory scenarios related to AA including:

### 3.2.3 Other Guidance

The methodology informing this NIS also draws on, and has evolved from guidance and Recommendations from international AA practitioners (Levett-Therivel, 2009; Chvojková et al., 2013). For instance, following Levett-Therivel (2009): "the precautionary principle should be used with reasonableness, and should be commensurate with the level of risk and the level of uncertainty concerned. Time-consuming and costly ecological research should be required only in rare circumstances".

## 3.3 Field and Desktop Study Methods

### 3.3.1 Field Study

The assessment has been informed by ecological surveys of the proposed works designed and led by Robert Fennelly MCIEEM CEcol on dates in July, August, and November 2017, and April, May, June, and August 2018.

The field surveys assessed the potential distribution of QIs and SCI of European sites, and (if present) invasive species within the Zone of Influence (ZoI; defined in Section 3.6.2) of the proposed works. Field surveys also had as an objective to determine if invasive species posing a potential threat to European sites downstream[4] were present within the proposed works.

#### 3.3.1.1 Specific Surveys of Qualifying Interests within River Boyne and River Blackwater SAC

In July 2017, Priority QI Alluvial woodlands of the River Boyne and River Blackwater SAC (EU code 91E0; this code is not repeated hereafter) were identified within the ZoI of the proposed works. Fit of each woodland parcel to a specific woodland 'type' in the Irish Semi-Natural Woodland Survey was determined (SNWS; Perrin et al., 2008), as the SNWS provides a percentage fit to different Annex 1 woodlands for each woodland type. Species lists were collected for canopy, field, and ground layers within the Priority Annex 1 habitat. Given the highly fragmented nature of the Priority QI Alluvial woodland in the vicinity of the Proposed works (comprising a single canopy specimen in the only two instances within c. 50 m); a single monitoring stop was carried out at each following O'Neill and Baron (2013).

Watercourses, drainage ditches and wetland habitats within the ZoI of the proposed works were assessed for otter *Lutra lutra* on 22 and 23 November 2017. The survey methodology had regard for guidance of the NRA (2006b), and included searches for breeding or resting sites within up to 150 m, to account for the potential effect of piling. Other evidence of otter, including spraints, footprints, 'slides' along riverbanks or feeding remains, was also recorded where present.

#### 3.3.1.2 Surveys of Qualifying Interests within River Boyne and River Blackwater SPA

The proposed works are located within the River Boyne and River Blackwater SPA, which is designated for Special Conservation Interest (SCI) kingfisher *Alcedo atthis*. The ZoI of the proposed works was searched for potential nest sites during otter surveys in November 2017 (i.e. following vegetation die-back).

Vantage point surveys were also conducted for kingfisher on 13 April, 1 May, 18 May, and 12 June 2018 following the NRA guidelines (NRA, 2009a). An inconspicuous viewing point of the Blackwater River in the vicinity of proposed works was chosen, and any kingfisher activity was recorded for a period of two hours after dawn (e.g. including if applicable, tunnelling of nest sites, feeding, use of perching posts, or territorial behaviour). Surveyors did not wear High-Visibility clothing during surveys to minimise undue risk of disturbance to any kingfisher present.

### 3.3.2 Desktop Study

Key sources for the desktop study included:

- Design information provided by AECOM's transportation team and MCC in 2017 and 2018;

[3] Available online at https://www.npws.ie/development%20consultations. Accessed November 2018.
[4] Including all species scheduled to the EC (Birds and Natural Habitats) Regulations 2011-2015 ('the Regulations')

- Information on "favourable reference ranges"[5] of mobile QI populations in Volume 1 and Volume 2 of NPWS' *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2013a and b) and associated digital shapefiles obtained from the NPWS Research branch;
- Distribution of mobile QI and SCI populations of distant European sites held online by the National Biodiversity Data Centre[6];
- Data including surface and ground water quality status, available from the online database[7] of the Environmental Protection Agency (EPA);
- Boundaries for catchments with confirmed or potential freshwater pearl mussel (FWPM) *Margaritifera margaritifera* populations in a Geographic Information System (GIS) format available online from the NPWS[8];
- Data from Natura Standard Data Forms on the conservation status of, and threats to the River Boyne and River Blackwater SAC (site code 2299; NPWS, 2017a), and Boyne and Blackwater SPA (site code: 4232; NPWS 2017b);
- Data on the distribution and status of, and threats to breeding kingfisher of the River Boyne and River Blackwater SPA, as reported in Cummins *et al*. (2010), and Birdlife International (2018);
- Draft Environmental Impact Assessment Report for Local Distributor Road 4, Abbeyland, Navan (AECOM, 2018);
- 'National survey of native woodlands 2003-2008' report (Perrin *et al*., 2008), and the 'Results of a monitoring survey of old sessile oak woods and Alluvial woodlands'(O'Neill and Baron, 2013);
- 'Survey of rare/threatened and scarce vascular plants in County Meath' report (BEC, 2006); and,
- 'County Meath wetland and Coastal Habitats Survey' report (MCC, 2010); and,
- 'County Meath Tree, Woodland and Hedgerow Survey' report (Smith et al, 2011).

## 3.4 Consultation Methods and Results

MCC's Heritage Officer was consulted by email in October 2017 and again on 8 August 2018, to request any additional data to that already obtained in the desk study. The Heritage Officer advised that the assessment have regard for the reports of the 'County Meath Wetland and Coastal Habitats Survey' (MCC, 2010), and the 'County Meath Tree, Woodland and Hedgerow Survey' (Smith et al., 2011).

The NPWS Research Branch was consulted on 13 August 2018 to request records of rare or protected flora or fauna within 5 km of the proposed works. On 21 August 2018, the NPWS Research Branch responded with ecological records in Excel format, as well as a survey report (Cummins et al, 2010) for the NPWS kingfisher survey of Irish SAC rivers (including the Boyne and Blackwater SAC, which was not designated an SPA in 2010). The NPWS also provided links to online GIS resources for the site-specific Conservation Objectives of European sites, and advised that other consultees could be contacted for additional records; namely Inland Fisheries Ireland, Birdwatch Ireland, and Bat Conservation Ireland.

Inland Fisheries Ireland (IFI) was contacted on 8 August 2018 to request records of fish in the waters of the Blackwater River adjacent and downstream of the proposed works. On 19 September 2018, IFI responded, stating that Atlantic salmon *Salmo salar* and lamprey species *Lampetra* spp. occur in the 'Kells Blackwater' River (i.e. the Blackwater River in the ZoI of the proposed works; this name refers to the WFD sub-catchment). IFI stated that no recent electrofishing surveys have been undertaken on the Kells Blackwater River. IFI also provided a report (Gallagher et al., 2016) on relevant species to this NIS which includes data on larval lamprey in the overall Boyne catchment.

Birdwatch Ireland was contacted on 4 September 2018. Data regarding kingfisher within the area were requested. No response had been received at the time of writing this report.

[5] The favourable reference range is the total geographical area within which all significant ecological variations of the habitat or species are included and which is sufficiently large to allow the long-term survival of the habitat or species (NPWS, 2013a). This is assumed to equate to the known range of the species, unless other evidence (e.g. desktop records) indicates the contrary

[6] https://maps.biodiversityireland.ie/ Accessed September 2018.

[7] EPA MAPS (2017) Available online at: https://gis.epa.ie/EPAMaps/. Accessed 20/12/2017.

[8]Available from https://www.npws.ie/maps-and-data Accessed February 2018.

Bat Conservation Ireland was not consulted because the proposed works do not overlap the "favourable reference range" of lesser horseshoe bat *Rhinolophus hipposideros* (NPWS, 2013a; the only Irish bat for which SACs are designated).

## 3.5 The Precautionary Principle

The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, 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 judgment of plausibility should be grounded in scientific analysis".*

Reasoned application of the 'Precautionary Principle' is fundamental to AA. In this report, adverse effects to European site integrity would be presumed without evidence to the contrary, in the event where there was evidence of possible effects on a European site(s) from the proposed works, but uncertainty remained.

## 3.6 Criteria to Identify Relevant European Sites to the NIS

The 'source-pathway-receptor' model is used to identify a list of Preliminary European sites and their QIs potentially at risk of likely significant effects.

'Relevant' European sites/QIs are those within the ZoI of likely significant effects.

### 3.6.1 The Source-Pathway-Receptor Model

The '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 disturbance and/or collapse.

The model is focused solely on relevant QIs/SCIs for which European sites are designated. Any Conservation Objectives referred to in this report are referenced to identify the date of publication and version number.

### 3.6.2 Zones of Influence of Potential Effect Pathways

The proposed works have the potential to result in a number of environmental effects. The analysis of these effects, using scientific knowledge and professional judgement, leads to the identification of a ZoI, defined here as the effect area (measured in m) over which an impact can have potential effects.

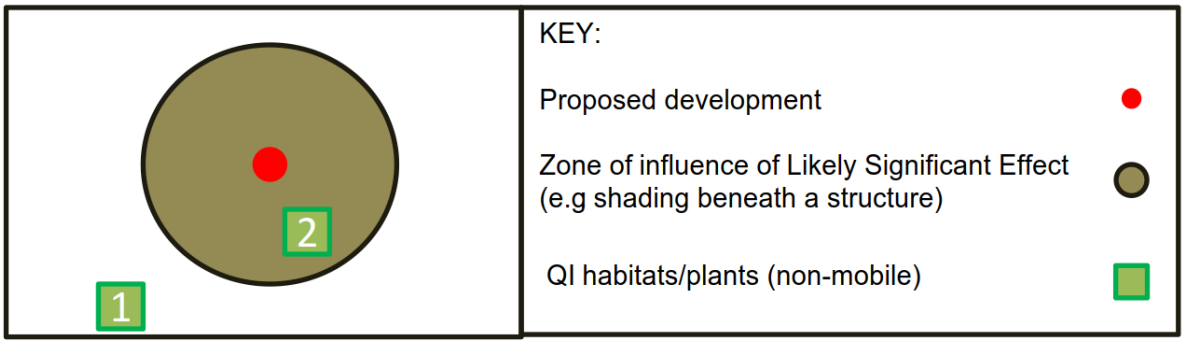
The proximity of the proposed works to European sites, and more importantly their QI/SCI, can be critical in identifying source-pathway-receptor models which could result in significant effects. Irish departmental guidance on AA states:

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

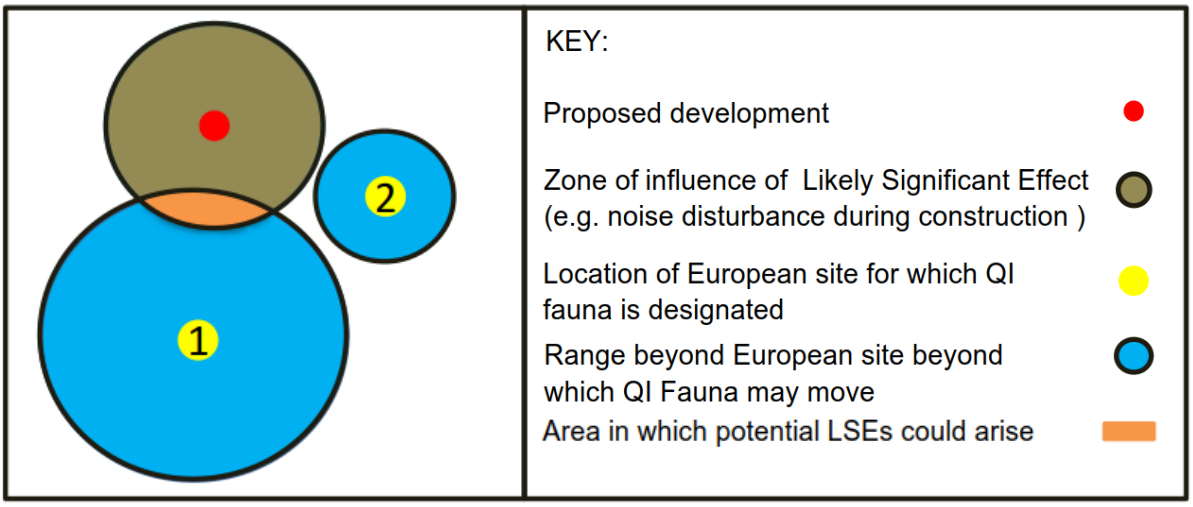
Habitats and plants are not mobile, however fauna species are, and their predicted mobility outside European sites (i.e. range) will affect whether they occur within the ZoI. The mobility of fauna species outside European sites varies considerably, from a maximum of several metres (e.g. in the case of whorl snails *Vertigo* spp.), to thousands of kilometres (in the case of migratory wetland birds). Whilst habitats and plants are not mobile, these features can still be significantly affected at considerable distances from an effect source; for instance where an instream habitat is located many kilometres downstream from a pollution source.

This difference in determining the ZoI for (mobile) fauna versus (non-mobile) habitats has been illustrated in Graphic 1 and Graphic 2.

In response to the above guidance, ZoIs were estimated for potentially relevant effects from the proposed works based on the "the nature size and location of the project" as per DoEHLG guidance. These ZoIs are summarized in Table 1.




**Graphic 1. Relationship between ZoI and QI/SCI features which are not mobile**




**Graphic 2. Relationship between ZoI and QI/SCI features which are not mobile**

In this report a conservative approach has been used which minimises the risk of overlooking distant or obscure effect pathways, whilst also avoiding non-scientific and arbitrary buffer zones (e.g. 15 km) within which all European sites should be considered. The starting point for this approach is to assess the complete list of all QI/SCI of European sites in Ireland (i.e. potential receptors), obtained in digital format from the NPWS, instead of listing European sites within arbitrary buffer zones. ZoIs are then determined having regard for the sensitivity of the features concerned, the ranging behaviour of fauna species, and the favourable reference range.

The favourable reference range is the total geographical area within which all significant ecological variations of the habitat or species are included and which is sufficiently large to allow the long-term survival of the habitat or species (NPWS, 2013a).

The presence or potential presence of relevant QI/SCI species and habitats within the ZoIs referenced in Table 1 will be detailed in Section 4. This distribution information will then be used in conjunction with scientifically-supported ZoIs constituting 'best available scientific knowledge' to identify a preliminary list of European sites whose integrity could be adversely affected by the proposed works. The evidence base for the ZoIs informing this NIS are included in Appendix C, which includes evidence supporting estimates of potential effect areas and known ranging behaviours of mobile species.

**Table 1. Zones of Influence Estimated for Potential Effects from the Proposed works**

| Potential Effect | Description of Effect | Potential ZoI of Effect |
|---|---|---|
| Noise, vibration, lighting and human presence during movements of vehicles and staff associated with ground investigation activities. | Reduction in ability of populations of QI species to forage, roost or breed (if present). Physical disturbance to QI habitats (if present). | Generally assessed within 500 m of the proposed works footprint for wintering birds[9]. However, distance can be significantly lower (e.g. 150 m for otter underground sites[10]), or higher (e.g. hen harriers may take flight when nesting at up to 750 m from disturbance[11]). |
| Noise and vibration during ground investigation activities (trial pits and boreholes). | Reduction in ability of populations of QI species to forage, roost or breed (if present). Physical disturbance to QI habitats (if present). | Generally assessed within 500 m of the proposed works footprint for wintering birds[9]. However, distance can be significantly lower (e.g. 150 m for otter underground sites[10]), or higher (e.g. hen harriers may take flight when nesting at up to 750 m from disturbance[11]). |
| Surface water run-off into local watercourses. | Silt and hydrocarbons could be washed overland into local watercourses, or migrate laterally through shallow soils, and be carried downstream potentially affecting the viability or distribution of aquatic QI species (if present). | The ZoI of effects from contaminated surface water is difficult to accurately estimate as it will depend on numerous factors including the type and concentration of pollutants, assimilative capacity of receiving waters, and time of year (related to water levels). As a precautionary measure, a reasonable worst-case spatial ZoI is considered to be the surface water catchment[12] in which the proposed works are located. |
| Changes or yield of groundwater associated with ground investigation activities. | Ground investigation activities could interfere with groundwater flow paths, potentially affecting the quality or distribution of habitats dependent on groundwater supply, if such habitats are present. | The potential ZoI of effects from earthworks to groundwater flow or yield is difficult to accurately estimate as it will depend on factors including the depth and intrusion of excavations, and time of year (related to water levels). As a precautionary measure, a reasonable worst-case spatial ZoI is considered to be 500 m from the point of excavation; which is a precautionary doubling of the 250 m stated as the potential ZoI from intrusive excavations to sensitive upland peatland sites (SEPA, 2014). |
| Disturbance of invasive species (if any are present) during the proposed works. | If invasive species are present, the proposed works could lead to the dispersal of invasive species and/or material within and beyond the proposed works; either via machinery, clothing or wild animals including birds, depending on the species concerned. | The ZoI of effects for spread of terrestrial invasive species is also difficult to accurately estimate, as plant fragments may be spread on tyre treads to distant unrelated sites. In relation to water-borne spread of vegetation, the ZoI generally is restricted to the surface water catchment[12] in which the proposed works are located. |

[9] Wintering birds collectively considered at risk of disturbance at up to 500 m based on compilation of data from Madsen (1985); Smit & Visser (1993) and Rees et al., (2005).
[10] In accordance with guidance on road construction-related disturbance of underground sites from the National Roads Authority (NRA, 2006).
[11] Hen harrier flight initiation distance of 750 m from Whitfield et al., (2008).
[12] Specifically, the spatial unit corresponding to the surface water catchment is the Catchment Management Unit defined under the (second-cycle) River Basin Management Plan (RBMP) 2018-2021.

# 4. Baseline Description

This Section describes the desktop and field survey results, in order to describe the relevant baseline environment to the proposed works. The relevant baseline environment relates to anything that may be directly or indirectly related to the QI/SCI of European sites.

## 4.1 European Sites Within/Adjacent the Proposed works

There are two European sites within the footprint of the proposed works (Figure 1 and Figure 3).These are the River Boyne and River Blackwater SAC (site code 2299) and the River Boyne and River Blackwater SPA (site code 4232). These two European sites are therefore considered in detail in this NIS, as a minimum.

## 4.2 More Distant European Sites

The next nearest European site to the proposed works is the Girley (Drewes Town) Bog SAC (site code 2203), located c. 13 km west of the proposed works, and unconnected hydrologically to it. There are no other European sites downstream of the proposed works, and within the Boyne Catchment Management Unit (Figure 2). Significant concentrations of contaminants would not cross the Boyne CMU boundary, into estuarine European sites. Other more distant European sites are discussed from Section 4.4 to Section 4.6 if relevant, for instance in relation to the potential for mobile species from distant sites to occur within the ZoI of the proposed works.

## 4.3 Overview of Proposed works

The proposed works are located to the north west of Navan, Co. Meath in a mix of pasture farmland, amenity grassland, and limited commercial development. The environs are characterised by the rough amenity grassland and hedgerows associated with the Blackwater Park and adjacent pasture farmland (see photographs in Appendix B). The proposed works span from the existing Ratholdren Road to the north, to the N51/R147 roundabout to the south. The proposed works are bisected by the Windtown ‘Stream’ and the Blackwater River.

## 4.4 Terrestrial Habitats

None of the terrestrial habitats overlapping or within the ZoI of the proposed works are QIs of European sites. One ‘scheduled’ invasive species was recorded near the Blackwater Park carpark of the proposed works, where a patch of Japanese knotweed *Fallopia japonica* (c. 5 m diameter) was identified most recently in July 2018 within 50 m of the proposed works.

## 4.5 Wetland Habitats

None of the wetland habitats overlapping the proposed works are QIs of European sites.

### 4.5.1 Watercourses

The Blackwater River in the vicinity of the proposed works is referred to as the ‘Kells Blackwater’ by the IFI (Gallagher et al., 2016), in reference to the WFD sub-catchment. The River lies c.5 m from the proposed works (Boreholes 04 and 05) where it is a ‘glide’ of deep water on gently sloping ground with an approximate wetted width of 20 m at its point nearest the proposed works. The QI aquatic species within the River are described in Section 4.6.1 (SCI Kingfisher) and Section 4.6.5 (QI Atlantic salmon and river lamprey).

A single drainage ditch is located within the ZoI of the proposed works (adjacent Borehole 01). This ditch was dry and overgrown at the time of survey in July 2018. The drainage ditch is located adjacent to a former woodland plantation south of Ratholdren Road. EPA mapping incorrectly shows this drainage ditch apparently rising west of a (disused) railway bridge c. 200 m downstream of the Proposed works, where it is referred to as the ‘Windtown Stream’. Field surveys found the dry drainage ditch adjacent to the proposed works, and topographical surveys show the drainage ditch extends downstream and is contiguous with the Windtown Stream as mapped by the EPA. The drainage ditch is presumably piped across, and fed by the cutting created by the existing railway line, before it outfalls to the Blackwater River c. 1.1 km downstream from the proposed works.

There are no other watercourses within the ZoI of the proposed works.

### 4.5.2 QI Priority Alluvial Woodland

Priority Annex 1 Alluvial woodland is a QI of the River Boyne and River Blackwater SAC. There is no QI Priority Alluvial woodland overlapping the proposed works. The nearest habitat parcel to the proposed works is a cluster (c. 50 m long by c. 30 m wide) of several (mature) crack willows *Salix fragilis*, located c. 35 m to the west, on the northern bank of the Blackwater River (Figure 3).

Crack willow dominates the canopy, which, despite being a non-native species is an accepted dominant of Annex 1 Alluvial woodland in Ireland, due to the important structural role it plays in canopy layering in Irish woodlands (Perrin et al., 2008; O'Neill and Barron, 2013).

The understorey is dominated by regenerating crack willow, and the field layer comprises a characteristically 'tangled' growth of hedge bindweed *Calystegia silvatica*, common nettle *Urtica dioica*, and brambles *Rubus fruticosus* agg. Other species present in the field layer include wild angelica *Angelica sylvestris*, Atlantic ivy *Hedera hibernica,* creeping buttercup *Ranunculus repens* and common nettle. The plot of woodland described here lacks conspicuous bryophytes in the ground layer. This community corresponds well to the community 2h '*Salix triandra – Urtica dioica'* described by Perrin et al (2008). Almond willow *Salix triandra,* which the author has observed as common elsewhere in the Boyne catchment, need not be present to qualify for this community. Perrin et al. (2008) assign this community an 89% fit to Priority QI Alluvial woodland. The absence of grey willow *Salix cinerea*[13] is a distinctive feature of this community type.

One other wet woodland type with potential fit to QI Priority Alluvial woodland occurs locally along the River Boyne floodplain, albeit outside the estimated ZoI of the proposed works. Community type 3b '*Alnus glutinosa – Rubus fruticosus'* occurs as a remnant strip of alder *Alnus glutinosa* c. 60 m west of the proposed works . This community has 56% fit to QI Priority Alluvial woodland according to Perrin et al 2008.

### 4.5.3 Non-QI Wetland Habitats of Secondary Importance to European Sites

Non-QI wet grassland and a mosaic of non-QI reed swamp/marsh habitats overlap and surround the proposed works within the River Boyne and River Blackwater SAC/SPA. These habitats occur between the proposed works and the QI Priority Alluvial woodland parcel c. 35 m from the works.

Wet grassland and reed swamp mosaic offer 'secondary' supporting value[14] to the River Boyne and River Blackwater SAC/SPA due to their role in buffering QI/SCI aquatic features from pollution.

The wet grasslands which overlap the proposed works are readily distinguished from the reed swamp/marsh habitats by the dominance of (relatively tall) reeds and sedges in the reed swamp/marsh, compared to (conspicuously) shorter grasses in the wet grasslands. The wet grasslands are variously dominated by creeping bent *Agrostis stolonifera*, Yorkshire fog *Holcus lanatus*, velvet bent *Agrostis canina*, and hairy sedge *Carex hirta*. Other species include marsh-woundwort *Stachys palustris,* willowherbs *Eplilobium* spp., and meadowsweet *Filipendula ulmaria*.

#### 4.5.3.1 Non-QI Reed swamp and Marsh Habitats

##### 4.5.3.1.1 Non-Annex 1 and Non-QI Reed swamp

Species-poor reed swamp habitat overlaps the proposed works and is scattered in narrow strips at the water's edge along the Blackwater River. It also extends 'inland' into the unmanaged floodplain on the northern bank of the Blackwater River, where the water table is above ground throughout the year.

This habitat grades into:

- Fragmented patches of species poor non-QI, Annex 1 Hydrophilous tall herb and fern habitat (see Section 4.5.3.1.2) ; and
- Remnant Priority Annex 1 Alluvial woodland habitat

[13] *Salix cinerea* is referred to hereafter as 'grey willow' for convenience, albeit according to the BSBI's nomenclature adopted in this Chapter, grey willow in fact refers to *S.cinerea* subsp cinerea subspecies. The subspecies
[14] Secondary habitats are those which are not QIs/SCIs, but which buffer QI habitats from pollution and disturbance effects.

In the field, (non-Annex 1) reed swamp is distinguished from (Annex 1) FS2/GM1 mosaic by the dominance of broad-leaved herbs in the latter. FS1 is conspicuously dominated by common reed *Phragmites australis* and creeping bent alongside abundant yellow iris *Iris pseudacorus*. Other frequent species include hedge bindweed *Calystegia sepium*, water horsetail *Equisetum fluviatile*, common nettle *Urtica dioica*, marsh-bedstraw *Galium palustre*, and blue water-speedwell *Veronica anagallis-aquatica*. Meadowsweet occurs rarely in drier areas. Conspicuous tussocks of (c. 1.5 m high) greater tussock-sedge *Carex paniculata* are occasional branched bur-reed *Sparganium erectum*, hemlock water-dropwort *Oenanthe crocata* and lesser pond sedge *Carex acutiformis* occur along the water's edge. There is no bryophyte layer present.

#### 4.5.3.1.2 Non-QI Annex 1 Hydrophilous Tall Herb and Fern Habitat

This species-rich reed swamp/marsh habitat lies adjacent to the proposed works, and corresponds to Annex 1 Hydrophilous tall herb and fern habitat. It occurs in two patches on the floodplain on the northern bank of the River Blackwater within c. 50 m of the proposed works.

Although this Annex 1 habitat occurs within the River Boyne and River Blackwater SAC, it is not a QI of this SAC.

This Annex 1 habitat is distinguished from non-Annex 1 reed swamp with which it forms a mosaic, by the greater diversity and abundance of broad-leaved herbs in the former[15]. Common reed is, whilst present in both habitats, significantly less abundant in the Annex 1 habitat, compared to the non-Annex reed swamp. Similarly to the non-Annex reed swamp, there is no bryophyte layer present in FS2/GM1.

#### 4.5.3.1.3 Other QI Wetland Habitats

No hydrological or other potential connectivity has been identified between the proposed works and any other QI wetland habitats.

### 4.5.4 Water Quality

There is potential for surface water drainage, to enter the Blackwater River:

- Via (passive) overland flow or temporary drainage works; and/or,
- Via the Windtown Stream which crosses the footprint of the proposed works as a vegetated ditch.

The EPA does not monitor surface water quality in the Windtown Stream, however, the water quality status in the River Blackwater is Moderate (Q3-4) at the nearest EPA monitoring station to the proposed works. ('Blackwater Kells'; located c. 900 m downstream; most recent results from 2012)

### 4.5.5 Groundwater

The proposed works are located within the "Wilkinson" and "Trim" Ground Water Bodies. The status of both these groundwater bodies is described as "Good"[16]. The River Boyne and River Blackwater SAC (site code 2299) and the River Boyne and River Blackwater SPA (site code 4232) are both located within this waterbody.

Alkaline fen is the only QI of the River Boyne and River Blackwater SAC which is highly groundwater-dependent. Whilst the locations of this habitat within the SAC are not known, no alkaline fen was identified within the precautionary 500 m ZoI within which potential effects to groundwater yield could occur, as per the rationale presented in Section 3.6.2.

[15] Six broad-leaved species occur in the Annex 1 habitat which are absent from the non-Annex reed swamp (water mint Mentha aquatica, water forget-me-not Myosotis scorpioides, great willowherb Epilobium hirsutum, bittersweet Solanum dulcamara, water dock Rumex hydropalanthum, and marsh-woundwort Stachys palustris). These six species are all positive indicator species for Annex 1 Hydrophilous tall herb and fern habitat (O'Neill et al 2013). Five additional indicator species (hedge bindweed, iris, water horsetail, common nettle, and marsh-bedstraw) occur in both FS1 and FS2/GM. As such, in total, eleven positive indicator species for Annex 1 Hydrophilous tall herb and fern habitat were recorded in FS2/GM1, compared to only five species in FS1.

[16] http://gis.epa.ie/EPAMaps accessed September 2018

## 4.6 Mobile Species

### 4.6.1 Birds

#### 4.6.1.1 SCI kingfisher of the River Boyne and River Blackwater SPA

There was no optimal vertical soft-substrate nesting habitat for kingfisher within the ZoI of the proposed works. From April to June 2018, over the course of a total of eight survey hours, kingfishers were recorded on a total of four occasions. Three sightings fell on a single survey date (12 June 2018; during the latter part of the kingfisher incubation period, and the peak chick-rearing period (BTO, 2005)). No feeding, perching, or food carrying was recorded. On three occasions, birds commuted along the river corridor without stopping. On one occasion, a bird was heard but not seen.

Kingfisher was only recorded perching within the ZoI of the proposed works once (in July 2017, during habitat surveys). This perching post (Figure 3) is located on the southern bank of the Blackwater River within the SPA, on a dead riparian shrub, within c.25 m of the proposed works (boreholes for bridge piers).

Cummins et al. (2010) estimated there were 15-19 kingfisher territories in the River Boyne and River Blackwater SAC[17] . This provides a density of 0.09-0.12 territories/linear km, which can be extrapolated to provide a mean territory length ranging from 8.3-11.11 km. Given a linear territory length of approximately 10 km, it is likely that the ZoI of the proposed works overlaps only a fraction of a single kingfisher territory, or potentially two territories, if the ZoI overlaps the junction of two territories.

There is no credible evidence that kingfisher nest, or regularly feed within the ZoI of the Proposed works site. The evidence suggests kingfisher use the ZoI of the works occasionally to feed.

#### 4.6.1.2 Wintering Birds of Distant SPAs

The SCI kingfisher populations of the River Boyne and River Blackwater SPA are likely to be resident within the ZoI of the Proposed works during the non-breeding season. At this time adult male kingfishers remain on their freshwater territories, while female and young kingfisher may commute downstream to coastal areas for enhanced feeding opportunities.

The River Boyne and River Blackwater SPA is designated for wintering birds. The next nearest SPA designated for wintering birds is the Boyne Estuary SPA (site code 4080), located c.26 km east of the proposed works, outside the core range of wader and duck species from their designated areas.

There was no optimal habitat for SCI wintering bird wader, goose, duck, or swan populations. These species favour open grassland and wetland areas for feeding, where human or other predators can be readily seen. The human disturbance in the Blackwater Park and the screening of the river corridor makes the ZoI of the Proposed works unsuitable to these species.

Furthermore, the proposed works are outside the core foraging range of other wintering bird populations for which European sites are designated such as greylag goose *Anser anser*, and pale-bellied Brent goose *Anser albifrons flavirostra.*

### 4.6.2 Bats

The proposed works are outside the range of the lesser horseshoe bat (NPWS, 2013b), which is the only bat species designated as a QI in Ireland. The species is restricted to the western Atlantic seaboard, and has never been recorded in Co. Meath.

### 4.6.3 Otter

The footprint of the proposed works is within the River Boyne and River Blackwater SAC which is designated for QI otter. No evidence of otter feeding, breeding or resting sites was found during the field surveys, despite surveys being carried out in November 2017 at the optimal time of year (i.e. following vegetation die-back). This

[17] The River Boyne and River Blackwater SPA was not designated in 2010cat the time of the Cummins et al study.

widespread species, which is a QI of the River Boyne and River Blackwater SAC is nevertheless presumed to forage and/or commute along the River Blackwater corridor, which contains favoured European eel, common frog and salmonid prey items

### 4.6.4 Invertebrates

The proposed works are c. 18 km outside the favourable reference range of QI marsh fritillary *Euphydryas aurinia* and there are no SACs designated for the species within the species' potential foraging range from its designated sites (i.e. 10 km; Zimmerman et al. 2011). The favourable reference ranges of all QI whorl snails are outside the ZoI of the proposed works. The nearest favourable reference range for Geyer's whorl snail *Vertigo geyeri*, narrow-mouthed whorl snail *Vertigo angustior*, and Desmoulin's whorl snail *Vertigo moulinsiana* are c.13 km, c. 25 km, and c. 18 km from the proposed works, respectively (data from NPWS, 2013b). The proposed works are outside the favourable reference range of both freshwater pearl mussel and Irish freshwater pearl mussel *Margaritifera durrovensis*, by c. 40 km and c.80 km (NPWS, 2013b), respectively. The proposed works are not within known (extant or historical) catchments of freshwater pearl mussel, which does not occur in Co. Meath.

The proposed works are within the favourable reference range of white-clawed crayfish *Austropotamobius pallipes* (NPWS, 2013b), however, the nearest SAC designated for this species is c. 30 km upstream of the proposed works (Mount Hevey Bog SAC; site code 2342).

### 4.6.5 Fish

#### 4.6.5.1 QI Atlantic Salmon

The footprint of the proposed works is within the River Boyne and River Blackwater SAC which is designated for Atlantic salmon. The IFI (Gallagher et al., 2016) have stated that several "low-head barriers to fish migration present along lower sections of the Boyne Catchment River, the most substantial of these being located at Slane, and downstream of Navan at Blackcastle…with a number of potential barriers are also present on the Kells Blackwater". However IFI have advised that Atlantic salmon do successfully migrate upstream past these obstacles, to reach spawning and nursery habitats in the Kells Blackwater.

#### 4.6.5.2 QI Lamprey Species

The River Boyne and River Blackwater SAC is also designated for QI river. There are presumed to be suitable spawning habitats present for adults, and suitable muds present for river lamprey larvae (or 'ammocoetes') in in the Blackwater River adjacent to the proposed works.

The proposed works are within the favourable reference range for brook lamprey *Lampetra planeri* (NPWS, 2013b).

While the River Boyne and River Blackwater SAC is designated for QI river lamprey, the nearest SAC designated for brook lamprey is c. 60 km outside the proposed works(River Barrow and River Nore SAC; site code 1262), and this SAC has no hydrological connectivity with the proposed works.

The proposed works are not within the favourable reference range for sea lamprey *Petromyzon marinus* (NPWS, 2013b), the nearest SAC designated for this species is c. 60 km distant in the River Barrow and River Nore SAC; (site code 1262), which has no hydrological connectivity with the Boyne CMU.

Regarding (brook and river) lamprey, O'Connor (2006) summarises that the Kells Blackwater sub-catchment (in which the proposed works are located):

- Has a good abundance of physically ideal juvenile lamprey habitats; and,
- Contains lamprey habitat under threat from pollution and drainage maintenance from urban pollution in Navan and further upstream.

More recently, IFI (Gallagher et al., 2016) reported the results of electrofishing from September 2014 at a total of six main channel sites on the Kells Blackwater, between Lough Ramor (near the Boyne headwater) , and Navan. This electrofishing confirmed significant populations of lamprey *Lampetra* spp. larvae in the Kells Blackwater. During this study, IFI staff also observed spawning brook lamprey, however this species in not a QI of any SACs within the Boyne CMU. The lamprey larvae recorded in the Kells Blackwater are presumed to include QI river lamprey of the Boyne and Blackwater SAC on a precautionary basis.

#### 4.6.5.3 Summary of Relevant Fish Populations

In summary:

- QI river lamprey of the River Boyne and River Blackwater River SAC are known to be present in the Kells Blackwater River within the ZoI of the proposed works. Given field observations of instream habitats potentially present, river lamprey populations present could include spawning and larval populations.
- QI Atlantic salmon of the River Boyne and River Blackwater River SAC are presumed present in the Kells Blackwater River within the ZoI of the proposed works. Given field observations of instream habitats potentially present, populations could include both spawning and nursery populations.
- Whilst known to be present, brook lamprey populations in the Kells Blackwater River within the ZoI of the proposed works are not the QIs of any SACs.
- Sea lamprey are not currently known to occur in the Blackwater Kells River, which lies outside the favourable reference range of this species.

#### 4.6.5.4 Non-Native/Invasive Fish Species

Ten non-native fish species have also been recorded in the Boyne Catchment (O'Connor, 2006; O'Grady, 1995). Of these, roach *Rutilus rutilus* is the only 'scheduled' species under the Regulations. There are no online records in the NBDC of roach in the Catchment Management Unit within which the proposed works are located. Whilst it may occur, it is not discussed further in this report, given there will be no instream works which could spread this species.

### 4.6.6 Other QI Species

There is no potential for other mobile QIs (e.g. such as Kerry slug *Geomalacus maculosus,* or estuarine / marine species*)* to occur within the ZoI of potentially significant effects from the proposed works.

# 5. Appropriate Assessment

In order to determine if the identified source-pathway-receptor linkages could give rise to likely significant effects, the following steps are taken:

I. Identify the conservation status of habitats and species in question (i.e. features of the River Boyne and River Blackwater SAC/SPA) to determine their potential resilience to effects;

II. Assess in detail the nature of the effect, including in-combination effects; and,

III. Conclude whether likely significant effects can be excluded.

## 5.1 Step 1: Information Required

### 5.1.1 Information on the Proposed works

The proposed works have been described in Section 2.

### 5.1.2 Information on European Sites

#### 5.1.2.1 Distribution of Relevant European Sites

There are two European sites within the footprint of the proposed works: the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. Several potential effect pathways were identified between the proposed works and these two European sites.

No effect pathways have been identified between the proposed works and any more-distant European sites, based on the ZoIs identified in Section 3.6.2, and the known or potential distribution of mobile QI/SCI features identified in Section 4.

#### 5.1.2.2 Source-Pathway-Receptor Linkages

The specific QIs of the River Boyne and River Blackwater SAC for which source-pathway-receptor links were identified as a result of the the proposed works are tabulated in Table 2 below.

**Table 2. Identification of Links (Grey Rows) with QIs of River Boyne and River Blackwater SAC (**

| QI (s) (* = priority habitats) | Distance to Proposed works | Source-Pathway-Receptor Linkage (s) |
|---|---|---|
| River lamprey and Atlantic salmon *Salmo salar* | No mapping has been completed by the NPWS or IFI of spawning or nursery habitats for either species; but both are presumed present in the Blackwater River where the proposed works are within c. 20 m of the SAC. | 1. Pollution has been identified as an existing pressure and potential future threat to both species (NPWS, 2013a). There is potential for spawning beds and nursery habitats for Atlantic salmon and/or river lamprey in the Blackwater River adjacent and downstream of the proposed works to be affected by silt, oils, grit, or other potential contaminants generated during the proposed works.<br>2. There is potential for Atlantic salmon and/or river lamprey to be affected by noise and vibration resulting from drilling activities, |
| Alkaline fens | The NPWS have not mapped the extent of this habitat within the SAC; however, the main areas of alkaline fen within the SAC are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough (NPWS, 2014).<br>Field surveys have not identified alkaline fen within at least 150 m of the proposed works, i.e. within the ZoI (as per Section 3.6.2). | None – QI alkaline fen does not occur within the ZoI of any Likely Significant Effects. |
| Alluvial woodlands* | Alluvial woodland habitat has been identified and mapped within c.35 m of the proposed works and therefore within the ZoI of potentially significant effects (as per Section 3.6.2). | 1. Although the proposed works do not overlap this habitat, there remains potential for accidental damage from drill rigs and support vehicles (e.g. during access , egress, or temporary storage)<br>2. Silt, oils, grit, or other potential contaminants generated during the proposed works could flow |

| | | |
|---|---|---|
| | | overland into this habitat. Nutrient rich surface water could promote growth of nettles. Abundant nettle growth is a threat to species diversity identified by the NPWS (2013a).<br>3. Solid garbage is a threat identified by the NPWS in latest national conservation status assessment NPWS (2013a).This habitat is at risk from indirect (deterioration) from littering/dumping during the proposed works.<br>4. Although wetland invasive species such as Himalayan balsam *Impatiens glandulifera* are not currently present within the ZoI of the proposed works, this species is abundant in the Boyne catchment. Tyre treads on drill rigs or support vehicles could, in the absence of mitigation, introduce seed from invasive Himalayan balsam into the river floodplain and Alluvial woodland habitats |
| Otter | No breeding or resting sites have been identified within the ZoI of the proposed works (i.e. 150 m of works as per Section 3.6.2). However foraging and commuting otter are presumed to at least occasionally occur within the ZoI of the proposed works. | 1. Whilst no otter breeding or resting sites are likely to be directly affected, silt, oils, grit, or other contaminants generated during the proposed works could enter the River Blackwater and affect fish or invertebrate prey supplies downstream in otter habitats.<br>2. Whilst no otter breeding, or resting sites have been identified which could be affected, it is likely that otter (at least occasionally forages or commute within the ZoI of noise, lighting, and vibration from the proposed works. |

The specific (and single) SCI of the River Boyne and River Blackwater SPA with which a source-pathway-receptor linkage was identified with the proposed works are shown in Table 3 below.

**Table 3. Identification of Linkages (Grey Rows) with SCIs of the River Boyne and River Blackwater SPA (**

| SCI (s) | Distance to Proposed works | Source-Pathway-Receptor Linkage? |
|---|---|---|
| Kingfisher *Alcedo atthis* | Kingfisher feeding and commuting habitat is located within the ZoI of the proposed works. | 1. There is potential for contaminants generated during the proposed works to be carried into local surface waters, and enter the River Boyne thereby reducing the populations of fish of invertebrate prey items which are important prey items for kingfisher.<br>2. Whilst no kingfisher nesting sites have been identified which could be affected, kingfisher is known to forage and commute within the ZoI of noise, lighting, and vibration from the proposed works. A perching post has also been identified within c. 25 m of the proposed works (and closest to Borehole 07) . |

#### 5.1.2.3 Summary Descriptions of Relevant European Sites

The NPWS site synopsis for the River Boyne and River Blackwater SAC (NPWS, 2014) summarizes the importance of the SAC as follows:

*"This site comprises the freshwater element of the River Boyne as far as the Boyne Aqueduct, the River Blackwater as far as Lough Ramor and the Boyne tributaries including the Deel, Stoneyford and Tremblestown Rivers. These riverine stretches drain a considerable area of Meath and Westmeath, and smaller areas of Cavan and Louth."*

*"The Boyne and its tributaries form one of Ireland's premier game fisheries and the area offers a wide range of angling, from fishing for spring salmon and grilse to seatrout fishing and extensive brown trout fishing. Atlantic Salmon (Salmo salar) use the tributaries and headwaters as spawning grounds."*

*"River Lamprey (Lampetra fluviatilis)…is present in the lower reaches of the Boyne River, and Otter (Lutra lutra), which can be found throughout the site".*

*"Although the wet woodland areas appear small there are few similar examples of this type of alluvial wet woodland remaining in the country, particularly in the north-east. The semi-natural habitats, particularly the strips*

*of woodland which extend along the river banks, and the marsh and wet grasslands, increase the overall habitat diversity and add to the ecological value of the site".*

The NPWS site synopsis for the River Boyne and River Blackwater SPA (NPWS, 2010) summarizes the importance of the SPA as follows:

*"The River Boyne and River Blackwater SPA is a long linear site that comprises stretches of the River Boyne and several of its tributaries: most of the site is in Co Meath but it extends also into Counties Cavan, Louth and Westmeath. A survey in 2010 recorded 19 pairs of Kingfisher (based on 15 probable and 4 possible territories) in the River Boyne and River Blackwater SPA. A survey conducted in 2008 recorded 20-22 Kingfisher territories within the SPA. The River Boyne and River Blackwater Special Protection Area is of high ornithological importance as it supports a nationally important population of Kingfisher".*

#### 5.1.2.4 Conservation Status of Relevant Features of European sites

The conservation status of QIs (at both national level, and within the SAC), and potential threats to relevant QIs of the River Boyne and River Blackwater SAC are presented in Table 4. QI Alkaline fens are not included in Table 4, nor discussed further in this NIS, since no source-pathway-receptor links were identified between the proposed works and this QI.

**Table 4. River Boyne and River Blackwater SAC: Conservation Status and Threats to Relevant QI**

| Relevant QI (s) (*=Priority habitat) | Site-Level Status (NPWS, 2017a) | National Status (NPWS, 2013a and b) | Primary Site-level Threats from Proposed works (Professional Judgement applied to NPWS, 2017a) | Other National Threats from NPWS, 2013a |
|---|---|---|---|---|
| Atlantic salmon | Moderate | Unfavourable (inadequate) | Surface water pollution, siltation rate changes | Cultivation (pesticides, fertilisation, grazing), grazing, trampling/overuse, erosion, afforestation, aquaculture, fishing, sand & gravel abstraction, quarries, peat extraction, mining, urbanisation, canalisation, barriers, invasive species, and introduction of diseases |
| Otter | Excellent | Favourable | Surface water pollution | Mortalities/Illegal killings, recreation/disturbances, hydroelectric schemes, aquaculture/fisheries, and American mink. |
| River lamprey | Moderate | Favourable | Surface water pollution, siltation rate changes | River channel maintenance, dredging, dumping, and depositing of dredged deposits |
| Alluvial woodland* | Moderate | Unfavourable (bad) | Surface water pollution, Storage of materials. | Removal of hedges and copses or scrub, invasive species, problematic native species, and dumping. |

The conservation status of, potential threats to SCI kingfisher of the River Boyne and River Blackwater SPA are presented in Table 5. Population trends are also provided in Table 5 as there is no national conservation status assessment available for birds in Ireland, equivalent to the Favourable/Unfavourable data available from the NPWS for habitats and non-bird species.

**Table 5. River Boyne and River Blackwater SPA: Conservation Status, Population Trends and Threats of (Single) Relevant SCI**

| SCI | Site-Level Status (NPWS, 2017b) | 'Short-Term' National Population trend* | 'Long-Term' National Population trend** | Primary Site-level Threats from Proposed works *** | Other Threats from Birdlife International (2018) |
|---|---|---|---|---|---|
| Kingfisher | Moderate | Decrease | Decrease | Pollution | Hard winters, canalization of streams and clearance of emergent vegetation to improve drainage, persecution to protect fish stocks |

*Table Footnotes*
**1980-2010 (European Topic Centre for Biodiversity, 2015)*
***1991-2010 (European Topic Centre for Biodiversity, 2015)*
**** Identified using professional judgment from the complete list of international threats in BirdLife International (2018)*

## 5.2 Step 2: Conservation Objectives

### 5.2.1 River Boyne and River Blackwater SAC

In consultation and agreement with the Meath County Council project team, the following section identifies the Conservation Objectives and likely attributes that could be adversely affected by the proposed works, for the 'relevant' QIs scoped into the assessment.

**Conservation Objectives**

Only generic Conservation Objectives were available for the River Boyne and River Blackwater SAC (NPWS, 2018) for QI Priority Alluvial woodland, Atlantic salmon, river lamprey, and otter.

The generic conservation objective for this SAC is to maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the SAC has been selected.

As no attributes, targets, or detail is provided, the following likely attributes are outlined below and have been provided in the absence of attributes identified by NPWS for the River Boyne and River Blackwater SAC.

**Likely Attributes Potentially Affected by Proposed Works for relevant QIs**

- The likely attributes potentially affected by the proposed works for **River lamprey** are as follows: population structure of juveniles, juvenile density in fine sediment, extent and distribution of spawning habitat, and availability of juvenile habitat.
- The likely attributes potentially affected by the proposed works for **Atlantic salmon** are as follows: number of spawning adult fish, Atlantic salmon fry abundance, out-migrating smolt abundance, number and distribution of redds and water quality.
- The likely attributes potentially affected by the proposed works for **Otter** are as follows: distribution (% positive survey sites) and fish biomass available.
- The likely attributes potentially affected by the proposed works for **Alluvial woodland** are as follows: habitat area, woodland size, woodland structure and vegetation composition.

**Likely Attributes Not Potentially Affected by Proposed works for relevant QIs**

- The likely attributes not potentially affected by the proposed works for **River lamprey** are as follows: distribution (% river accessible due to barriers), and it is noted the proposed works will not include instream works in River lamprey habitats.
- The likely attributes not potentially affected by the proposed works for **Atlantic salmon** are as follows: distribution (extent of anadromy), and it is noted the proposed works will not include instream works in Atlantic salmon habitats and will not introduce any potential barriers to migration.
- The likely attributes not potentially affected by the proposed works for **Otter** are as follows: extent of terrestrial, marine and freshwater habitat, couching sites and holts, barriers to connectivity. It is noted there

are no breeding or resting sites within the ZoI off the proposed works and the proposed works will not remove or introduce potential barriers to movement within any habitat known to be used by otter.

- The likely attributes not potentially affected by the proposed works for **Alluvial woodland** are as follows: none.

### 5.2.2 River Boyne and River Blackwater SPA

Only generic Conservation Objectives were available for the River Boyne and River Blackwater SAC (NPWS, 2018).

In the absence of alternate (detailed) Conservation Objectives for kingfisher in Ireland, professional experience of kingfisher ecology was reviewed in light of the literature on known threats to the species to develop appropriate attributes in Table 6. Table 6 identifies which of these attributes could be adversely affected by the proposed works.

**Table 6. River Boyne and River Blackwater SPA: Conservation Objective Attributes for SCI Kingfisher**

| Population (Kingfisher) | Conservation Objective | Attributes Potentially Affected by Proposed* Works* | Attributes Not Potentially Affected by Proposed works* |
|---|---|---|---|
| Breeding | Maintain or restore; no attributes or targets provided (no detail in generic objectives) | -Availability of sufficient fish prey resources<br>-Availability of suitable (and undisturbed) perching posts near favoured riparian feeding sites | -Availability of suitable nesting habitat protected from human disturbance, and predation by mink<br>-Unhindered passage along watercourses for commuting, feeding, and seasonal migration to coastal wintering areas |

** Identified using professional judgment applied to known threats to kingfisher internationally (BirdLife International, 2018) nationally (European Topic Centre for Biodiversity, 2015), and within the River Boyne and River Blackwater SPA (Cummins, 2010)*

## 5.3 Step 3: Prediction of Effects

The prediction of potential effects from the proposed works (alone) to the integrity of European sites is presented in this Section. In-combination effects from the proposed works in-combination with other plans or projects are presented in Section 5.3.3.

### 5.3.1 River Boyne and River Blackwater SAC

The prediction of effects from the proposed works to the integrity of the River Boyne and River Blackwater SAC is set out in Table 7.

## Table 7. River Boyne and River Blackwater SAC: Prediction of Effects on Site Integrity

| Relevant Qualifying Interest (*=Priority) | Pathway and Effects Prediction (Grey Rows Indicate Pathways Triggering Adverse Effects) | |
|---|---|---|
| Alluvial woodland* | Surface water pollution | -Silt, grit, fuels, oils or other contaminants could enter Alluvial woodland habitats, adjacent to, and downstream during the proposed works.<br><br>-Nutrient-rich silt could promote growth of common nettle within Alluvial woodlands and reduce the diversity or structure of the field and ground layers.<br><br>-Conservation Objectives affected are Woodland structure and Vegetation composition.<br><br>-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').<br><br>**-Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| | Damage from storage of materials, and /or access or egress routes | -Although there are no proposed works within c. 35 m of this habitat, access or egress of drill rigs and support vehicles, or material storage activities could encroach into Alluvial woodland vegetation if no mitigation is in place.<br><br>-All Conservation Objectives could be affected (Habitat area, Woodland size, Woodland structure, Vegetation composition).<br><br>-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').<br><br>**-Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| | Littering/Dumping | -Dumping of solid waste is a known threat to this habitat (NPWS, 2013a).<br><br>-If Contractors do not leave the site as found, habitat deterioration could result from discarded materials or rubbish leading to shading out of the field or ground layer.<br><br>-Conservation Objectives potentially affected are: Woodland structure and Vegetation composition.<br><br>-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').<br><br>**-Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| | Invasive species | -Whilst no Himalayan balsam is present within the ZoI of the proposed works, Himalayan balsam is a common invasive species nationally and elsewhere within the Boyne Catchment. This species spreads rapidly by seed, whose production and dispersal is prolific and aided by explosive seed pods.<br><br>-Himalayan balsam seed could be present on drill rigs, support vehicles, boots or clothing of Contractors prior to entering the SAC, if Contractors recently worked in an area containing this species.<br><br>-Japanese knotweed is present in Blackwater Park within the potential ZoI of the proposed works, and is abundant in the Boyne catchment and elsewhere. This species primarily spreads by fragments of 'rhizome' (below-ground shoots), and less frequently by above-ground shoots. In the absence of mitigation, Japanese knotweed in Blackwater Park could be disturbed during access or egress. Alternately, contractors and their machines could be working in other areas infested by Japanese knotweed on other sites, and introduce invasive material to the proposed works site. In either scenario support vehicles, drill rigs, or boots of Contractors could carry soil containing invasive Japanese knotweed material into Alluvial woodland habitats.<br><br>-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').<br><br>-Conservation Objectives potentially affected are: Woodland structure and Vegetation composition<br><br>**-Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| Atlantic salmon and River lamprey | Surface water pollution, siltation rate changes | -Silt, grit, fuels, oils or other contaminants could enter Atlantic salmon and river lamprey habitats downstream as a result of the proposed works.<br><br>- Conservation Objectives potentially affected are: Water quality, Quality and availability of spawning habitats, Juvenile production, and Out-migrating smolt abundance. |

| | | |
|---|---|---|
| | | - In the case of Atlantic salmon, effects potentially amplified by the 'Moderate' site-level status (deemed 'Unfavourable – inadequate') of Atlantic salmon.<br><br>-**Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| | Vibration/Noise from drilling | -Noise or vibration resulting from drilling could injure and/or displace Atlantic salmon and/or river lamprey.<br><br>-Potential effects would be greatest during the combined spawning season for these species (November to June inclusive)<br><br>-Conservation Objectives potentially affected for river lamprey are: Population structure of juveniles and Juvenile density in fine sediment.<br><br>-Conservation Objectives potentially affected for Atlantic salmon are: Number of spawning adult fish, Atlantic salmon fry abundance, Out-migrating smolt abundance, and Number and distribution of redds.<br><br>-**Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| Otter | Surface water pollution | -As above for surface water pollution affecting Atlantic salmon and river lamprey, but Conservation Objective attributes affected are: distribution of otter and available fish biomass.<br><br>-**Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| | Disturbance to feeding or commuting otter | -Noise or vibration resulting from drilling, or human presence during the proposed works could displace otter, which is presumed to at least occasionally forage or commute through the area. No breeding or resting sites are present within the ZoI of the proposed works.<br><br>-The only Conservation Objective potentially affected for otter is: Distribution of otter.<br><br>-Otter is primarily a nocturnal species which is unlikely be regularly present during the proposed works which will be primarily completed during daylight hours. Whilst some temporary localized displacement to otter could occur during the duration of the proposed works, no permanent reduction in otter distribution will arise. Adverse effects to site integrity are not predicted from the proposed works alone in the absence of mitigation measures. As will be shown in Section 5.3.3, this prediction of no adverse effects remains, having regard for in-combination effects. |

### 5.3.2 River Boyne and River Blackwater SPA

The prediction of effects from the proposed works to the integrity of the River Boyne and River Blackwater SPA is set out in Table 8.

**Table 8.River Boyne and River Blackwater SPA: Prediction of Effects on Site Integrity (SCI Kingfisher)**

| | Pathway and Effects Prediction |
|---|---|
| Pollution including siltation affecting SCI kingfisher | -Silt, grit, fuels, oils or other contaminants could enter kingfisher habitats downstream as a result of the proposed works.<br>-This could impact water quality leading to interference with the Conservation Objective attribute to have sufficient fish and invertebrate prey resources available.<br>-**Adverse effects to site integrity are predicted** from the proposed works alone in the absence of mitigation measures. |
| Disturbance to foraging and commuting kingfisher | -No kingfisher nesting sites have been identified within the ZoI of the proposed works. However kingfishers are known to forage and commute within the ZoI of noise, lighting, and vibration from the proposed works. A perching post has also been identified c. 25 m from the proposed works.<br>-The Conservation Objective potentially affected is: Availability of suitable (and undisturbed) perching posts near favoured riparian feeding sites.<br>-The proposed works will be completed outside the kingfisher breeding season (which runs from March to August inclusive), during which time disturbance will not affect feeding and commuting activities of mating pairs, or the young they are rearing.<br>-Some temporary localized displacement to non-breeding kingfisher could occur during the duration of the proposed works adjacent to the River Blackwater, however there will be no permanent reduction in availability of suitable (and undisturbed) perching posts near favoured riparian feeding sites. |

-Adverse effects to site integrity are not predicted from the proposed works alone in the absence of mitigation measures. As will be shown in Section 5.3.3, this prediction of no adverse effects remains, having regard for in-combination effects

### 5.3.3 In-Combination Effects

This assessment has particular regard for developments potentially affecting the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA, as the proposed works interact with both European sites.

#### 5.3.3.1 Development Types Relevant to European Site Threats

The Natura Standard Data Form for the River Boyne and River Blackwater SAC (NPWS, 2017a) ranks five activities as posing a threat of high importance to the SAC. These are:

- Industrial or commercial areas;
- Other human changes to hydraulic conditions;
- Invasive non-native species;
- Other discharges; and,
- Pollution to surface waters.

In addition, fifteen activities posing a threat of 'Medium' importance to the SAC have been identified. These are:

- Siltation, rate changes, dumping, depositing of dredged materials;
- Sand and gravel extraction;
- Removal of hedges and copses or scrub;
- Stock feeding;
- Storage of materials;
- Roads and motorways;
- Other sports and leisure activities;
- Cultivation;
- Human induced changes in hydraulic conditions;
- Artificial planting on open ground (non-native trees);
- Disposal of industrial waste;
- Use of biocides, hormones and chemicals;
- Other patterns of habitation;
- Management of aquatic and bank vegetation for drainage purposes; and,
- Fertilisation.

In contrast to the above threats, 'Modifying structures of inland water courses', and 'Mowing of grassland' are identified as positive impacts of 'Medium' importance to the SAC.

The Natura Standard Data Form for the River Boyne and River Blackwater SPA (NPWS, 2017b) ranks three activities as posing a threat of 'High' importance to the SPA. These are:

- Urbanised areas, human habitation;
- Roads, motorways; and,
- Dispersed habitation.

In addition to the above threats, 'Human-induced changes in hydraulic conditions' have been identified as posing a threat of 'Medium' importance to the SPA. There are no activities identified as having a significant positive impact to the SPA.

#### 5.3.3.2 Planning Application Search

A search was conducted of planning applications within the ZoI of the proposed works to identify applications which could act in-combination with the proposed works to impact European sites, namely:

- The National Planning Application Map Viewer[18] for private applications. The search was limited to the 5 year period preceding the date of issue of this report (due to the typical five-year lifetime of permission). Retention applications (i.e. typically local-scale residential or commercial developments where an impact has already occurred), and withdrawn and refused applications (including refusals on appeal), were excluded.
- The list of 'Part 8' local authority-led developments currently being progressed by MCC[19]

The projects bulleted below were identified within the potential ZoI of the proposed works, focused in the existing light industrial and suburban fringe of Navan Town, on the southern bank of the Blackwater River. These projects are within the same CMU as the proposed works, and therefore offer a potential source of in-combination pollution effects (during construction and/or operation):

- The Navan Greater Dublin Area (GDA) Cycle Network, subject to a live Part 8 application at the time of writing (P8/18014), comprising c. 3 km of cycle way and footpath improvements in Navan Town. The majority of the project is within the curtilage of existing roadways and footpaths. Approximately 10% of the project will require removal of vegetated areas, and the project will not include any earthworks, vegetation removal, or temporary storage within the River Boyne and River Blackwater SAC/SPA
- The proposed Cantilevered pedestrian bridge across the River Boyne (P8/17006; under construction at the time of writing); immediately to the south of, and contiguous with, the existing "New Bridge" (a 'Protected Structure') which will not include any earthworks, vegetation removal, or temporary storage 'within'[20] the River Boyne and River Blackwater SAC/SPA
- Numerous permissions granted to extend or refurbish existing properties in the urban fabric of Navan Town surrounding the proposed works;
- Planning reference NA150427 – The (consented) construction of a coffee shop and restaurant granted permission in August 2015 (0.2 km from the proposed works);
- Planning reference NA151301 – The (consented) construction of 99 new residential units and associated works, granted June 2016 (0.4 km from the proposed works);
- Planning Reference NA171138 – The (consented) upgrade to the existing Water Treatment Plant (WTP) at Liscarton, Navan (wholly contained within the boundary of the existing WTP): consented January 2018 (c. 2.5 km from the proposed works);
- Planning Reference NA171476 – Construction of warehouses, offices and a food store with parking, subject to determination by An Bord Pleanála following appeal, as of October 2018 (2.5 km from the proposed works);
- Planning Reference NA160607 – The (consented) development comprising 218 new residential units and associated works, granted permission in June 2016 (1.7 km from the proposed works); and,
- Numerous (consented) light industrial and commercial developments on the southern bank of the Proposed works (focused in the existing Blackwater Retail Park and Balmoral Industrial Estate) in close proximity to the proposed works.

Importantly:

- No 'live' (i.e. submitted but yet not determined) or consented applications were identified within the River Boyne and River Blackwater SAC/SPA within the ZoI of the proposed works ; and,

[18] Available online at www.myplan.ie. Accessed August 2018.

[19] Available online at http://www.meath.ie/CountyCouncil/Planning/Part8s/ Accessed September 2018.

[20] Albeit the proposal is suspended over the River Boyne and River Blackwater SPA/SAC.

- With the exception of the proposed public lighting scheme (P8/18012), no live or consented applications were identified within Blackwater Park adjacent to the proposed works and upslope of the Blackwater River.

5.3.3.3 Plans

#### 5.3.3.3.1 Project Ireland 2040

The Project Ireland 2040 National Planning Framework (NPF[21]) does not list specific plans for the ZoI of the proposed works site, and no in-combination effects are predicted.

#### 5.3.3.3.2 Meath County Development Plan

The Meath County Development Plan 2013 -2019 (CDP)[22] identifies Navan as the primary growth centre in Meath. Several policies and objectives of the CDP are directly related to the protection of European sites, and have been drafted to include protective policy wording, which negates the potential for in-combination effects:

- ”NH POL 5; To permit development on or adjacent to designated Special Areas of Conservation, Special Protection Areas, or those proposed to be designated over the period of the plan, only where an assessment carried out to the satisfaction of the Meath County Council, in consultation with National Parks and Wildlife Service, indicates that it will have no significant adverse effect on the integrity of the site.”
- ”NH POL 6: To have regard to the views and guidance of the National Parks and Wildlife Service in respect of Proposed works where there is a possibility that such development may have an impact on a designated European or National site or a site proposed for such designation.”
- ”NH POL 7: To undertake appropriate surveys and collect data to provide an evidence-base to assist Meath County Council in meeting its obligations under Article 6 of the Habitats Directives, subject to available resources.”
- “TRAN POL 32: To ensure that all road plans and project proposals in the County which could, either individually or in combination with other plans and projects have a significant effect on a [European] site, undergo an Appropriate Assessment in accordance with Article 6 (3) of the EC Habitats Directive.”
- ”WS OBJ 13: To design flood relief measures to protect the conservation objectives of [European] sites and to avoid indirect impacts of conflict with other qualifying interests or [European] sites.”
- ”WS OBJ 14: To promote positive flood relief measures that can enhance habitats in the Boyne floodplain such as swales, constructed wetland basins etc.”
- ”WS OBJ 15: To seek to ensure that construction works are designed so as not to result in surface water runoff into SACs or SPAs either directly or indirectly via a watercourse.”
- ”NH OBJ 2: To ensure an Appropriate Assessment in accordance with Article 6(3) and Article 6(4) of the Habitats Directive, and in accordance with the Department of Environment, Heritage and Local Government Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, 2009 and relevant EPA and European Commission guidance documents, is carried out in respect of any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect on a Natura 2000 site(s), either individually or in-combination with other plans or projects, in view of the site’s conservation objectives.”
- ”NH OBJ 3: To protect and conserve the conservation value of Special Areas of Conservation, Special Protection Areas, National Heritage Areas and proposed Natural Heritage Areas as identified by the Minister for the Department of Arts, Heritage and the Gaeltacht and any other sites that may be proposed for designation during the lifetime of this Plan.”

[21] Available online at http://npf.ie/. Accessed October 2018.
[22] Available online at http://www.meath.ie/CountyCouncil/Publications/PlanningPublications/MeathCountyDevelopmentPlan2013-2019/

#### 5.3.3.3.3 Economic Development Strategy for County Meath

The Economic Development Strategy for County Meath 2014 – 2022[23] identifies Navan as an 'area of high importance' for County Meath. However as this plan does not identify any specific objectives for the area, no significant in-combination effects are predicted.

#### 5.3.3.3.4 Navan Development Plan

The proposed works site is zoned under the Navan Development Plan 2009-2015 (which has been extended until 2019, despite the name of the plan). The plan was most recently varied in 2017.

There is no potential for in-combination 'secondary' habitat loss[14] in the River Boyne and River Blackwater SAC/SPA from other development within the ZoI of the proposed works, because the SAC/SPA is zoned 'To protect the setting, character and environmental quality of areas of high natural beauty'.

There is some potential for significant in-combination pollution effects to arise from development under the Plan because:

- The fields to the west of the Blackwater Park are zoned to provide new residential housing; and,
- Although the Blackwater Park is zoned as open space for recreational amenities, local authority–led recreational improvements could generate silt or other contaminations during construction (including the proposed lighting plan to be progressed under Part 8 detailed in Section 5.3.3.2).

#### 5.3.3.3.5 Navan 2030

The approved Navan Town Centre Integrated Public Realm and Movement Plan (hereafter 'Navan 2030 Plan' (MCC, 2017), relates only to the urban core of Navan Town, and includes upgrades to various squares, streets, roads and laneways, enhanced pedestrian and cycle facilities, and other transport improvements.

The Chief Executives Report for the draft Navan 2030 Plan concludes that there are will be no direct or indirect impact on habitats identified as qualifying interest of the River Boyne and River Blackwater SAC, and also notes that no works are proposed to any habitats or features which support kingfisher.

#### 5.3.3.3.6 Transport Strategy for the Greater Dublin Area

Both the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA are within the study area of the draft Transport Strategy for the Greater Dublin Area (2016-2035)[24] The N2/M2 national route inclusive of a bypass of Slane intersects the River Boyne and River Blackwater SAC and SPA. An AA screening (and if necessary an AA, informed by a NIS) will, as required by law, be completed for this project, to identify and mitigate any significant effects (including those arising in combination with the Proposed works).

#### 5.3.3.3.7 Flood Risk Assessment and Arterial Drainage Plans/Projects

In the OPW's Eastern Catchment Flood Risk Assessment and Management Study[25] (Eastern CFRAM) the proposed works is located within Hydrometric Area '07 (Boyne)'. Under CFRAM projects, Areas for Further Assessment (AFAs) are areas where, based on the Preliminary Flood Risk Assessment, the risks associated with flooding are considered to be potentially significant. Relative to the 'catchment-scale' flood risk measures, more detailed assessment is required to determine the degree of flood risk to AFAs, and develop measures to manage and reduce the flood risk. The Eastern CFRAM identified Navan as an AFA, due to historical fluvial flooding in the town.

Following publications of potential flood relief options for the Navan AFA in the Eastern CFRAM, the Flood Risk Management Plan (FRMP) for the Boyne Catchment [26] ('the Boyne FRMP') included the proposed installation of hard defences requiring modifications to the banks of the Blackwater River within the SAC and SPA to prevent flooding in the Navan AFA. The indicative locations for the hard defences proposed in the Boyne FRMP are located on the southern bank of the Blackwater River (either side of the alignment of the proposed LDR4 road

[23] Available online at http://www.meath.ie/Business/MeathEconomicDevelopmentStrategy/LargerthanFourMBDownload,63735,en.pdf. Accessed July 2018.
[24] Available online at- https://www.nationaltransport.ie/ wp-content/uploads/2016/08/Transport_Strategy_for_the_Greater_Dublin_Area_2016-2035.pdf. Accessed September 2018.
[25] Available online at http://eastcfram.irish-surge-forecast.ie. Accessed September 2018.
[26] Available online at - https://www.floodinfo.ie/publications/ Accessed September 2018.

development which the proposed works are informing). Whilst the Indicative locations indicated in the NIS[27] for the Boyne FRMP are inside the River Boyne and River Blackwater SAC/SPA, they do not overlap known locations for QI Priority Alluvial woodland habitat.

The NIS[28] for the Boyne FRMP identified potential for the proposed hard defences to result in disturbance of QIs/SCIs, increases in sedimentation, and changes in channel morphology. The NIS concluded that the impacts could be suitably mitigated (to include seasonal works, pollution control, and surveys to inform licensed derogation works for QI fish, kingfisher and otter) to avoid adverse effects to site integrity, taking account of in-combination effects at that time. More importantly, the NIS for the Boyne FRMP also stated that the proposed hard defences "presented …are not the final and definitive works. Potential flood relief works set out ..will need to be further developed at a local, project level before Exhibition or submission for planning approval"

The Eastern CFRAM identified the OPW's Boyne Arterial Drainage Scheme ('the Scheme')[29] as historically having a negative impact on the River Boyne and River Blackwater SAC/SPA. This Scheme, implemented between 1969 and 1986 aimed to increase drainage of agricultural land through the creation of drainage ditches and dredging of rivers which has led to an increase in water levels and flow in the Boyne and Blackwater Rivers. The modifications made to the natural environment as part of the Scheme require regular maintenance, detailed within Arterial Drainage Maintenance (ADM) projects. ADMs primarily consist of removing the build-up of foreign or natural material that impedes the free flow of water including through the removal of vegetation. In some cases, re-grading of river banks following landslides or erosion is required. The ADMs are subjected to AA every five years; most recently in 2016, at which time an NIS was produced (JBA Consulting, 2016). Following implementation of mitigation measures to protect European sites during ADM activities, the NIS concluded the ADM would not adversely affect the integrity of any European sites, taking account of in-combination effects at that time.

#### 5.3.3.3.8 Environmental River Enhancement Programme

The Environmental River Enhancement Programme[30] (EREP), operated by IFI aims to reduce negative impacts caused by past OPW drainage projects. The EREP is likely to positively influence the condition and quality of aquatic habitats and species in the River Boyne and River Blackwater SAC/SPA. Indeed, such modification has been identified as having a potential positive impact on the River Boyne and River Blackwater SAC (NPWS, 2017a).

### 5.3.4 Ground Water

As no ecological features with significant groundwater dependence were identified within the ZoI of the proposed works in this NIS (QI Alkaline fen of the River Boyne and River Blackwater SAC does not occur there), in-combination effects considering groundwater quality, flow or yield are not assessed.

### 5.3.5 Pollution (Surface Waters)

Surface water pollution and flood plain development interacting with river hydromorphology are respectively pressures of 'Medium' and 'High' importance, as identified in the NPWS Standard Data Form for the River Boyne and River Blackwater SAC (NPWS, 2017a). The potential for several specific projects and plans to have in-combination pollution effects has already been described (Sections 5.3.3.2 and 5.3.3.3).

The existing water quality of watercourses upstream, adjacent and downstream of the proposed works site within the Boyne CMU offers a useful proxy metric for the pressure of existing projects and plans on the aquatic features within the Boyne and River Blackwater SAC/SPA. As was detailed in Section 4.5.4, the EPA does not monitor surface water quality in the Windtown Stream. The water quality status in the River Blackwater is Moderate (Q3-4) at the nearest EPA monitoring station (Blackwater Kells; located c. 900 m downstream; most recent results from 2012) to the proposed works. This indicates the Blackwater River may have a somewhat reduced assimilative capacity to absorb further silt loading and/or contaminants, relative to other watercourses of Q4, Q4-5 or Q5.

[27] Available online at - https://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/Eastern_CFRAM/_UOM07/07_NaturalmpactStatement/NIS_Final2018_RiverBasin_07.pdf Accessed September 2018.
[28] Available online at - https://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/Eastern_CFRAM/_UOM07/07_NaturalmpactStatement/NIS_Final2018_RiverBasin_07.pdf Accessed September 2018.
[29] Available online a:t https://www.opw.ie/en/floodriskmanagement/operations/environmentalactivities. Accessed August 2018
[30] Annual reports available online at https://www.fisheriesireland.ie/Projects/erep.html. Accessed on various dates in 2018.

There is potential for consented and future development to act in-combination with the proposed works to additively or synergistically affect QI Atlantic salmon and/or river lamprey via changes in water quality in the River Boyne and River Blackwater SAC. This would also indirectly affect SCI kingfisher of the River Boyne and River Blackwater SPA through prey reduction.

However, there are binding obligations on all Irish local authorities including MCC to achieve good status of surface waters, under the terms of the EU Water Framework Directive 2000/60/EC, and in related policies in applicable county development plans. Furthermore, Irish Water, who has national statutory remit for wastewater and drinking water services, has committed to a 25 year programme of improvements to wastewater impacts on surface waters in their Water Services Strategic Plan (WSSP)[31].

The second cycle River Basin Management Plan for Ireland (2018-2021) (RBMP)[32] prioritises targeted measures to improve water quality in areas for action during the lifetime of the current RBMP. The targeted approach will continue in the third cycle (2021 – 2027).

### 5.3.6 Concluding Statements: In-Combination Effects

No significant in-combination effects are predicted to affect the River Boyne and River Blackwater SAC/SPA, having regard for:

- The legal protection for the Blackwater River as a European site (through legislation at national level, and policy initiatives at national, county and local levels);
- The absence of known developments within the River Boyne and River Blackwater SAC/SPA (other than flood relief measures whose construction and operation has been subjected to AA and appropriately mitigated); and,
- Recent and ongoing River enhancement works under the EREP.

[31] Available online at https://www.water.ie/projects-plans/our-plans/water-services-strategic-plan/ Accessed on various dates in 2018.
[32] Available online at – http://www.housing.gov.ie/water/water-quality/river-basin-management-plans/river-basin-management-plan-2018-2021. Accessed on various dates in 2018.

# 6. Mitigation Measures (Step 4)

## 6.1 Priority Measures

The following measures (detailed in the Section indicated in parentheses) must be carried out prior to the commencement of drilling or trenching activities:

- Appointment of the 'suitably experienced' Ecologist who will supervise setting out of works, and provide toolbox talks (Section 6.2.1) ;
- Agreement of Contractor Method Statements with the Ecologist, and the Employer (MCC);
- Fencing around, and signage at Japanese knotweed plants (Section 6.3.3);
- Setting out of works, including those in the River Boyne and River Blackwater SAC/SPA (Section 6.2.1);
- Installation of silt fencing (to include a silt fence within the River Boyne and River Blackwater SAC/SPA) and other sediment control measures (Section 6.2.2);
- Contractor to provide evidence of staff training in Emergency Response Procedures (Section 6.2.2).

## 6.2 Measures Applicable to All Features

### 6.2.1 Role of the Ecologist

The Employer (i.e. MCC) shall engage a suitably experienced and qualified Ecologist (the Ecologist), as part of the Employer's Representative (ER) Team, who meets the criteria set out in this Section. The Ecologist should be a full member of a relevant institution such as the Chartered Institute of Ecology and Environmental Management (CIEEM), have relevant experience in the management of ecological constraints on Ground Investigations, and hold or have held a protected species licence (s) in the Republic of Ireland. The Ecologist shall be appointed sufficiently in advance of the proposed works to arrange for any mitigation requirements to be incorporated into the Contractor's site-specific Method Statements and programme.

The Contractor will accommodate the Ecologist, whose role will be to:

- Review Contractor Method Statements for compliance with the mitigation in this NIS to avoid damage or disturbance to European sites;
- Attend site meetings and input to Contractor toolbox talks prior to commencement of the proposed works; and,
- Supervise and direct the proposed works as part of the Employer's Site Representative (ESR) Team[33], including setting out.

#### 6.2.1.1 Licensing

At the time of writing this NIS, there were no protected species licences required in relation to QI otter, SCI kingfisher, or invasive species.

The Ecologist will determine the potential requirement for licences outside the scope of this NIS (e.g. for nationally protected species such as badger), as per the contractual requirements which will be instructed to the appointed GI Contractor.

### 6.2.2 Pollution Control

The Contractor shall take all necessary precautions to prevent the pollution or silting of all wetlands and watercourses from the proposed works, including the Blackwater River, the Windtown 'Stream' (which occurs as a dry drainage ditch in the vicinity of the proposed works) and the reedswamp-dominated floodplain of the Blackwater River. The Contractor shall provide any settling ponds or purifying equipment required to prevent pollution of these watercourses.

[33] The ESR Team is the site-based part of the ER team.

The Contractor shall produce site-specific Method Statements for review and agreement with the Ecologist, to demonstrate adherence to specific, tried-and-tested pollution control measures whose performance, following correct installation leaves no reasonable scientific doubt as to the protection of European Sites from adverse effects.

The Contractor will take the following precautions as a minimum:

- Avoid any instream works within the Blackwater River or other watercourses;
- Avoid carrying out any sampling works on ground which is so saturated that sinking of machinery (resulting in localized alterations to flood regime) is a possibility;
- Utilisation of low ground pressure tracked machinery within the floodplain;
- Install runoff containment measures before starting Borehole and Trial Pit sampling;
- Use ground protection mats (approved by the client supervision team) in areas of soft ground within the boundary of the River Boyne and River Blackwater SAC/SPA;
- Silt fencing shall be installed and maintained following the requirements in Section 6.2.2.1;
- Monitor and maintain sediment controls throughout the proposed works to inform repairs and enhancements to silt fencing and other control measures;
- Cover all temporary stockpiles generated during trial pitting to minimise run-off;
- Avoid direct or indirect discharges of untreated surface or ground water generated during the proposed works to any surface water;
- Dewater all working areas at the end of each working day, if necessary using pumping and transport of water off-site in tankers if volumes prevent effective attenuation and treatment prior to discharge; and,
- Maintain any water management system in satisfactory working order throughout the period of construction activities.

#### 6.2.2.1 Silt Fencing

The Contractor will, having regard to silt fence installation:

- Ensure all silt fencing is to the specification of 'Hytex Terrastop premium standard'[34], which has been scientifically tested and shown to be consistently more efficient than Terram or Hessian fabrics in filtering silt across a range of soil types (Liddon, 2013), or similar as agreed with the Ecologist;
- Install a single layer of silt fencing for all works with 10 m of watercourses;
- Within 10 m of the boundary of the River Boyne and River Blackwater SAC/SPA: Install a double layer of silt fencing around all sampling locations ensuring a) the outer fence is installed without excavation by driving in fence posts by hand and using sandbags to weigh down geotextiles above ground and b) using only double-bagged sandbags containing clean washed sand;
- Install silt fencing having regard for the following criteria from the peer-reviewed literature on silt fencing (Caraco, 2002):
  - The slope and contributing length of slope/works area will be:

    For 5% to 10% slopes: No more than 15 m;

    For 10% to 20% slopes: No more than 7.5 m; and,

    For > 20% slopes: No more than 6 m.
  - Silt fencing must be aligned parallel to the slope contours;
  - Silt fencing edges must be curved uphill, preventing flow from bypassing the fence;
  - The contributing length of the works areas must not be greater than 30 m;
  - Spacing between posts must not be greater than 2.5 m;

[34] Refer to specification available online at https://www.hy-tex.co.uk/products/geotextiles/terrastop-premium-silt-fence . Accessed October 2018.

  - Silt fencing must not receive concentrated flow without reinforcement;
  - Silt fencing must not be installed below an outlet pipe or weir;
  - Silt fencing must not be installed upslope of the works area; and,
  - Silt fencing installation must consider construction traffic requirements.

During works, the Contractor will:

- Respond to recommendations of the Ecologist, regarding repairs or improvements to silt fencing;
- Inspect silt fences immediately after each rainfall event and at least daily during prolonged rainfall;
- Correct any deficiencies immediately, if necessary replacing ineffective silt fencing; and,
- Remove sediment deposits when the accumulation reaches one third of the height of the exposed fence (in a manner compliant with waste legislation, and without causing a siltation risk);

The Contractor will, having regard to silt fencing removal:

- Leave the outer layer of silt fencing within the River Boyne and River Blackwater SAC/SPA in-situ until after reinstated areas have revegetated to the satisfaction of the Ecologist; and,
- Prior to removal of fencing, dispose of any excess sediment in accordance with relevant waste legislation and ensuring no siltation risk to watercourses;

### 6.2.3 Emergency Response and Environmental Training

The Contractor shall produce an Emergency Response Plan (ERP) based on the Contractor's own Risk Assessment, which will be reviewed by the Employer's Representative Team, Including the Ecologist. The ERP will include:

- The Contractor's proposed training of relevant staff, including cover staff, in the implementation of the ERP and the use of spill kits;
- Details of procedures to be undertaken by the Contractor in the event of the release of any sediment into a watercourse, or any spillage of chemicals, fuel or other hazardous wastes (e.g. bentonite), non-compliance incidents with any permit or licence, or other such risks that could lead to a pollution incident, including flood risks;
- Confirmation of the number and specification of spill kits which shall be carried by the Contractor, as a minimum, with each individual drill rig;
- Information on clean-up procedures to include the following:
  - The Contractor will immediately initiate appropriate clean-up operations and notify any sediment releases, hydrocarbon leakages or spillages during the GI works to the wider ESR Team;
  - The Contractor will contain the bulk of the spill immediately using a spill kit before placing the contaminated absorbent material and the contaminated soil in a stockpile outside the 1% AEP floodplain (and at least 10 m from, and downslope of any watercourses);
  - All contaminated material will be 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; and,
  - In the event where contaminants such as fuel or oils are mobilized into saturated ground in the Blackwater River floodplain despite the above, following unforeseen events (e.g. storm conditions), the Contractor will use floating 'booms' will to contain contaminants, prior to dewatering to a bowser using a pump.

## 6.3 Measures for QI Habitats

### 6.3.1 QI Priority Alluvial Woodland

The Contractor will avoid disturbance or damage to SAC QI habitats (Alluvial woodland; Figure 3), which would constitute an offence.

The Contractor will agree locations of all access routes, egress routes, temporary storage areas, and (where required) site compound (s) with the Ecologist and ESR.

The Ecologist will supervise setting out of all works within European sites and instruct the Contractor on areas of QI Priority Alluvial woodland and other sensitive habitats to avoid.

The Ecologist will verify that the Contractor has left the site of the proposed works as found, and where relevant direct the Contractor to remove any litter, or materials off-site (e.g. silt fencing posts or geotextiles, jerry cans, sacks containing bentonite granules etc...).

### 6.3.2 'Secondary' Habitats

The Contractor will minimise disturbance or damage to habitats providing 'secondary' support to QI Priority Alluvial woodland, and instream QI fisheries habitats in the form of serving as filters to potential pollutants.

To achieve this, the Contractor will agree locations of all access routes, egress routes, temporary storage areas, and (where required) site compound (s) with the Ecologist and ESR.

The Ecologist will supervise setting out of all works within European sites and instruct the Contractor on areas of QI and other sensitive habitats to avoid (including all habitats within the 1% AEP (1:100 year) floodplain of the Blackwater River.

All site compounds will be located outside of European sites, on existing hard-standing and shall be agreed with the ER prior to works commencing on site as stipulated in the Works Requirements.

### 6.3.3 Invasive Species

Under the European Communities (Birds and Habitats Regulations 2011 as amended ('the Regulations'), it is an offence to allow or cause to spread or grow in any place, certain invasive species. The invasive species Japanese knotweed, which is scheduled under the Regulations, has been recorded in Blackwater Park adjacent to a hedge, c. 70 m from Trial Pit 10 (Figure 1).

Access and/or egress for the proposed works have the potential to disturb Japanese knotweed plants, resulting in spread of invasive species which could damage QI Priority Alluvial woodlands, and constitute an offence under the Regulations. Prior to commencement of works, the Contractor will fence off an area of 10 m from the known area of Japanese knotweed (and any other areas identified by the Ecologist) under the direction of the Ecologist.

The Contractor will provide and ensure the use of, a wheel washing station for all vehicles entering and exiting the proposed works.

## 6.4 Measures for SCI Kingfisher

Prior to the commencement of the proposed works, and throughout their duration, temporary visual screening will be installed close to the water's edge (i.e. parallel with the River Blackwater (within the floodplain)). The type of screening, to be agreed with the Ecologist, may comprise use of a screen mounted on Heras fencing, but will regardless of the materials used, achieve complete visual screening of human presence associated with the proposed works, from kingfisher populations potentially present in the Blackwater River. All screening will be removed following completion of the works.

## 6.5 Measures for QI Otter

No mitigation measures are proposed for QI otter, in addition to the pollution control measures in Section 6.2.2

## 6.6 Measures for QI Salmon and River Lamprey (Excluding Pollution Control Measures)

Drilling works within 100 m of the Blackwater River will employ a 'soft-start' to allow QI Atlantic salmon and adult river lamprey to move away from the potential zone of injury before the full intensity of drilling begins. The soft start will involve a gradual ramping up of drill head rotation speed, incrementally over a set time period to be agreed with the ESR Team, until full operational power is achieved.

# 7. Concluding Statement

Following implementation of mitigation measures, It is the view of AECOM that the proposed works would have no adverse effects on the integrity of any European sites, either alone or in-combination with other plans or projects.

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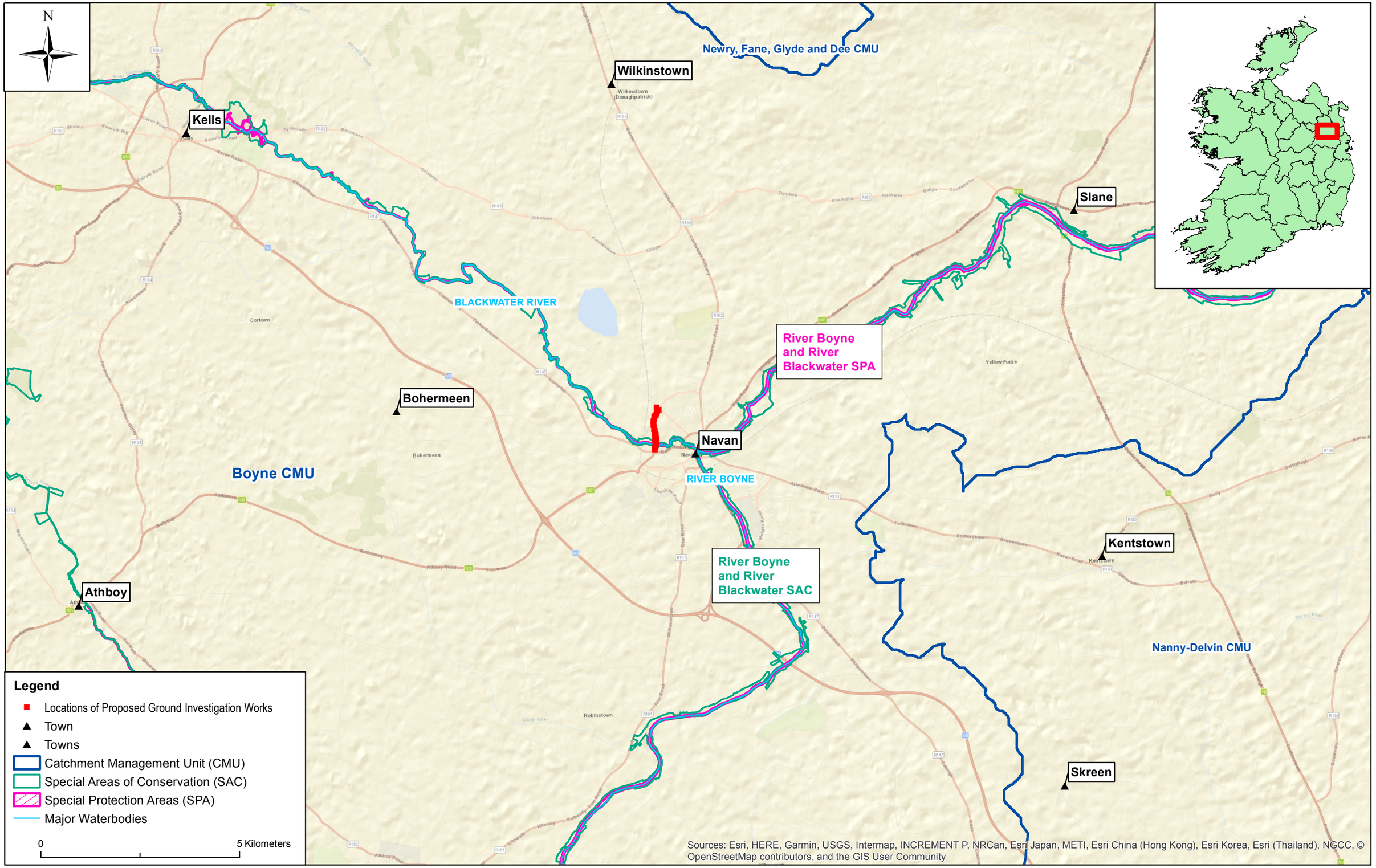
# Appendix A Figures




| | | | |
|---|---|---|---|
| Client: Meath County Council | Title: Fig. 1. European Sites Discussed in GI NIS | AECOM Adelphi Plaza George's Street Upper Dun Laoghaire Co. Dublin A96 T927 Tel +353 (1) 238 3100 Fax +353 (1) 238 3199 www.aecom.com | Drawn: Emmi Virkki / Checked: Steven Walker |
| Project: Meath Abbeyland LDR4 | | | Verified: Robert Fennelly / Approved: Robert Fennelly |
| | | | Date: 06/11/2018 / Scale at A3: 1:88,000 |
| | | | Drawing Reference: 20181106_Fig1_European sites_GI_NIS |



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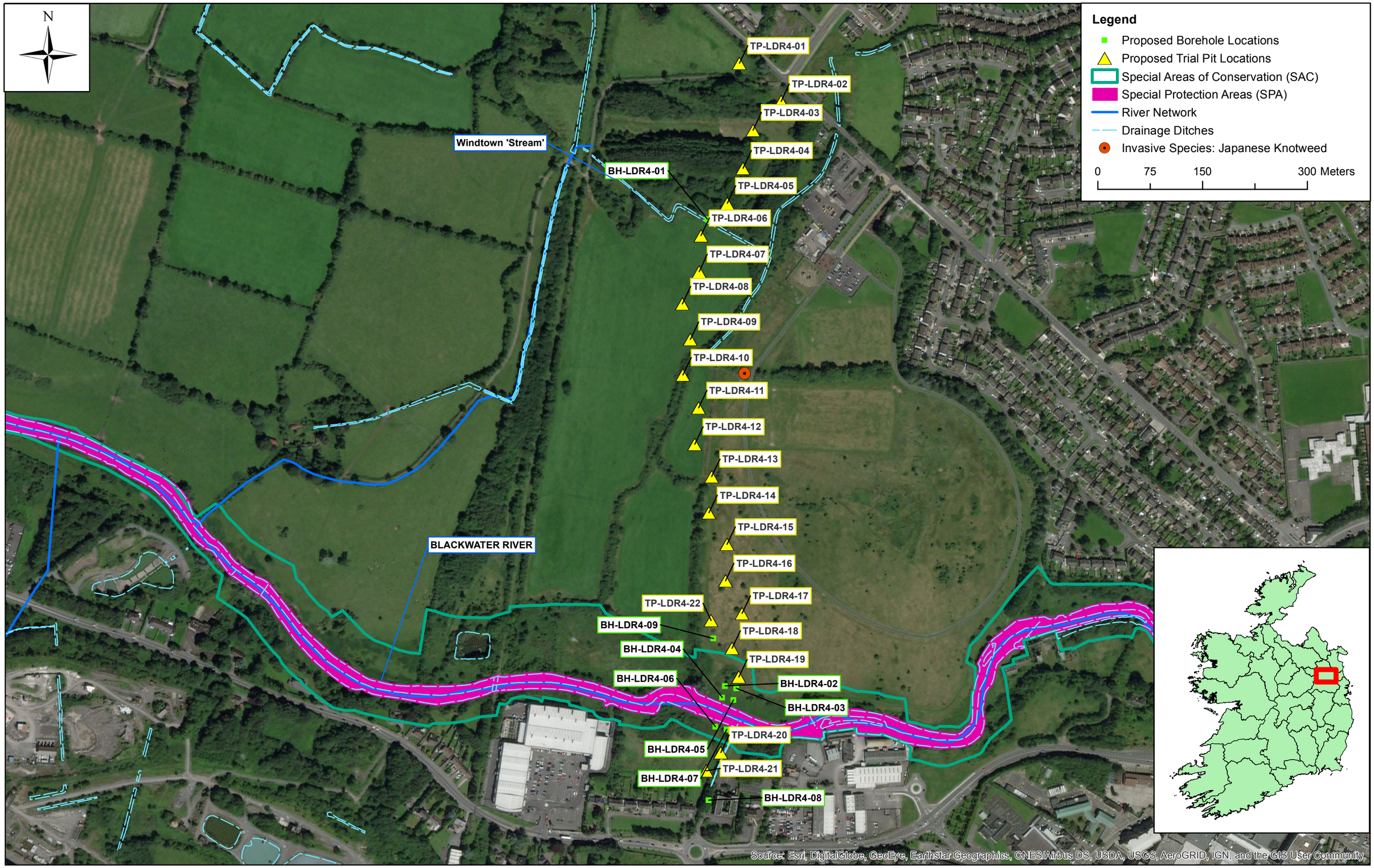


| | | | | |
|---|---|---|---|---|
| Client: Meath County Council | Title: Fig. 2. Eurpoean sites in vicinity of proposed works | AECOM<br>Adelphi Plaza<br>George's Street Upper<br>Dun Laoghaire<br>Co. Dublin<br>A96 T927<br>Tel +353 (1) 238 3100<br>Fax +353 (1) 238 3199<br>www.aecom.com | Drawn: Emmi Virkki | Checked: Steven Walker |
| Project: Meath Abbeyland LDR4 | | | Verified: Robert Fennelly | Approved: Robert Fennelly |
| | | | Date: 06/11/2018 | Scale at A3: 1:5,000 |
| | | | Drawing Reference: 20181106_Fig2_European sites_NIS_GI_all sampling locations | |



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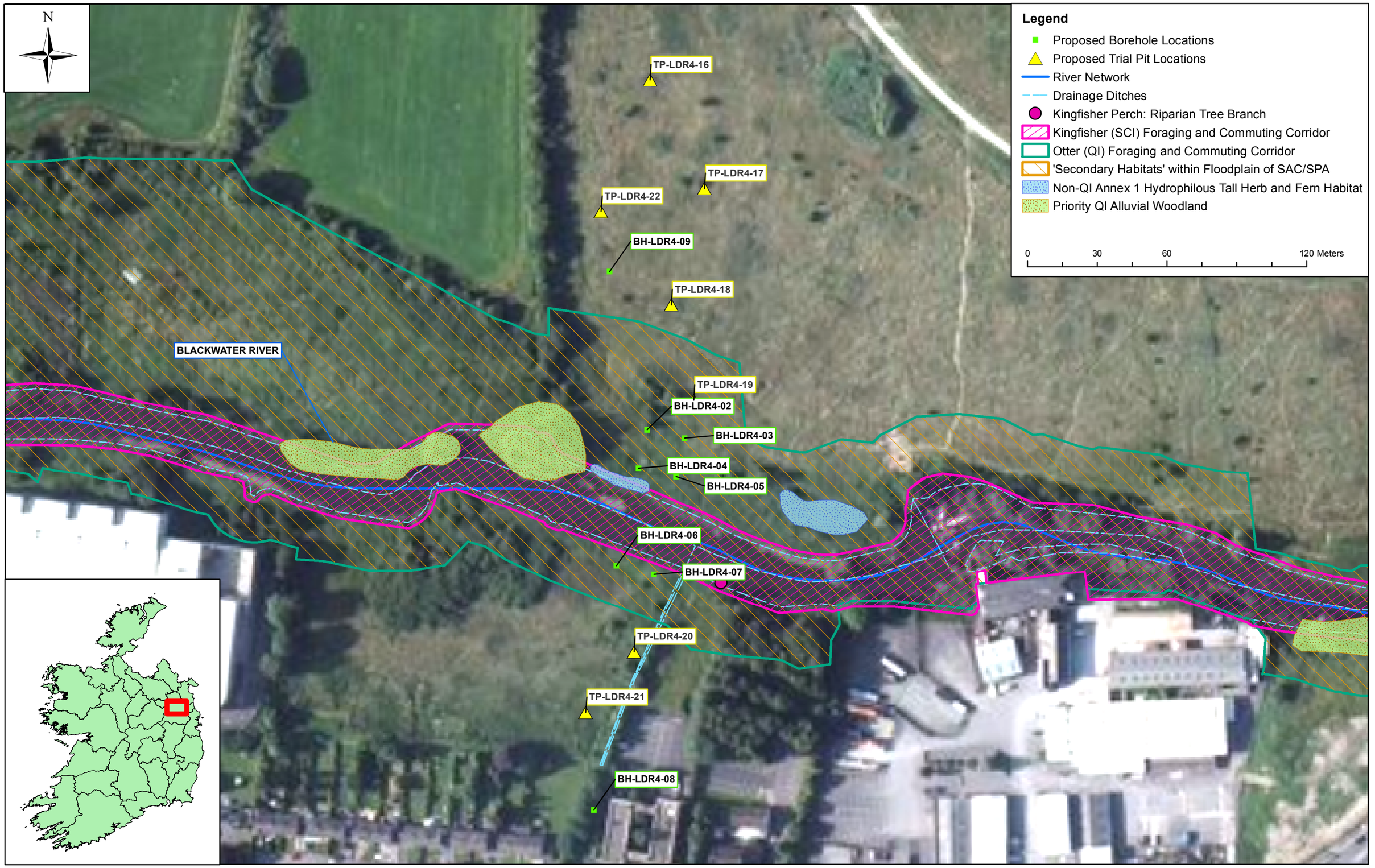


| | | | | |
|---|---|---|---|---|
| Client: Meath County Council | Title: Fig. 3. Distribution of known QI and SCI features within River Boyne and River Blackwater SAC/SPA | AECOM Adelphi Plaza George's Street Upper Dun Laoghaire Co. Dublin A96 T927 Tel +353 (1) 238 3100 Fax +353 (1) 238 3199 www.aecom.com | Drawn: Emmi Virkki | Checked: Steven Walker |
| Project: Meath Abbeyland LDR4 | | | Verified: Robert Fennelly | Approved: Robert Fennelly |
| | | | Date: 06/11/2018 | Scale at A3: 1:1,500 |
| | | | Drawing Reference: 20181106_Fig3_EcoI features_NIS_GI_Zoom at river | |



Path: \\du-man-002\Dublin-Jobs\Ecology Projects\Navan\GIS\02_Maps\GI NIS\20181106_Fig3_EcoI features_NIS_GI_Zoom at river.mxd

# Appendix B Site Photos

**Photograph B.1 Annex 1 Hydrophilous tall herb and fern vegetation near the proposed works footprint (foreground), and Priority Annex 1 Qualifying Interest Alluvial woodland west of the proposed works footprint (background)**

**Photograph B.2 Photograph taken near Photograph B.1 but at edge of River Boyne and River Blackwater SAC**

**Photograph B.3 Annex 1 Priority Annex 1 Qualifying Interest Alluvial woodland west of the proposed works footprint; photographs show the crack willow *Salix fragilis* canopy (Left of view), and dense tangle in the field layer (right of view) which is characteristic of community 2h *Salix triandra-Urtica dioica***

**Photograph B.4 Japanese knotweed outside of proposed works footprint in Blackwater Park**

**Photograph B.5 View south from Blackwater Park towards the Blackwater River showing the mosaic of scrub and species-poor lowland meadows within the proposed works footprint there**

# Appendix C Zones of Influence Informing the Assessment

### Table A.1: Zones of Influence informing the NIS – habitats and flora

| Habitats | Type of potential impact | ZoI (m) for potentially significant effects | Rationale |
|---|---|---|---|
| 'Terrestrial' habitats and plant species without significant groundwater or surface-water dependency (i.e. relative to examples in the next two rows of this table) | Direct habitat loss. | Footprint of proposed works including access and egress | No habitat loss / damage predicted beyond this area.<br>Assumes no indirect and / or far-field effects, e.g. from flooding or shading arising as a result of the Proposed works. |
| | Indirect effects resulting from spread of weedy species into terrestrial habitats during construction work (note: invasive species are present within the working area) | Footprint of proposed works including access and egress, plus a precautionary buffer of at least 100 m | Significant passive spread of weedy species (e.g. by wind-borne seed or plant fragments, or 'creep' of stoloniferous or rhizomatous perennials) is not predicted beyond 100 m from the working area. |
| Habitats and plant species with relatively high ground-water dependency relative to 'terrestrial' habitats (e.g. turloughs, petrifying springs, petalwort) | Direct habitat loss or indirect impacts to groundwater supply or yield. | Groundwater body in which proposed works including accesses and egresses are located. | Assumes no significant impacts predicted on flow or yield of groundwater to groundwater-dependent habitats beyond this area. |
| Habitats and plant species with relatively high surface-water dependency relative to 'terrestrial' habitats above (e.g. rivers, mudflats, saltmarsh, reefs) | Direct habitat loss. | Footprint of proposed works including access and egress | No habitat loss / damage predicted beyond this area. |
| | Indirect pollution impacts. | Entire catchment downstream of proposed works (i.e. Catchment Management Unit as defined in RBMP) | Assumes pollutants will settle and/or be adsorbed such that significant volumes/concentrations of pollutants do not cross CMU boundaries. |

## Table A.2: Zones of Influence (ZoI) informing the NIS – Fauna

| Fauna species and their habitat features | Type of potential impact | ZoI (m) for potentially significant effects | Rationale |
|---|---|---|---|
| Lesser horseshoe bats and their roosts ( | 'Direct' disturbance of roost sites including noise, vibration, or light spill. | Typically estimated as a minimum of 50 m from potential or confirmed roost sites, but informed by on a case-by-case basis by relevant data (e.g. isoline drawings of lux levels in the case of light spill).<br><br>**Note: No potential for effects if ZoI does not overlap the Favourable Reference Range for lesser horseshoe bat which is restricted to the western Atlantic seaboard (NPWS, 2013a)** | Professional judgement, having regard for description of the proposed works, and guidance including Collins (2016), BCT and ILP, 2018). |
| Breeding or resting sites of otter | Physical disturbance to breeding or resting sites including 'entombment 'in the case of otter (i.e. following collapse of hole / nest due to vibration). | Breeding/resting sites within up to 150 m of disturbance in the case of blasting/rock-breaking/piling.<br><br>Breeding/resting sites within 50 m of other works. | 150 m is the potential limit of disturbance from blasting and piling from NRA (2006).<br><br>Distances are subject to case-by-case assessment of local ground conditions (e.g. holes in unstable clay substrates are more sensitive than those protected from vibration from sheet rock). |
| Birds: Kingfisher | Disturbance to nesting sites if present | Nest sites within c.100 m from proposed works which could contain a single territory. | Professional judgement applied to nest site disturbance based on published Flight Initiation Distances from approaches by a single pedestrian (Moller, 2009; Diaz et al, 2013) Estimated kingfisher territory size of 10 km populations of the Boyne and Blackwater SAC (Cummins et al., 2010) |
| Birds: Non-breeding (wetland) birds | Feeding or roosting birds disturbed by noise or visual presence of humans. | **Note: No potential for effects for range-restricted species unless ZoI overlaps the Favourable Reference Range (e.g.** | Professional judgement applied to data from Madsen (1985); Smit and Visser (1993) and Rees *et al*. (2005). |

| Fauna species and their habitat features | Type of potential impact | ZoI (m) for potentially significant effects | Rationale |
|---|---|---|---|
| | | **Brent goose *Branta bernicla hrota*, barnacle goose *Branta leucopsis* , greylag goose *Anser anser* )**<br><br>Generally assessed within 500 m of proposed works and access/egresses for wintering birds, subject to presence of screening and topography. | |
| Invertebrates: white-clawed crayfish | Direct loss of habitat or injury | Breeding or resting sites if present within footprint of proposed works. | Professional judgement. |
| | Siltation or other pollution effects on spawning, feeding, or nursery areas. | Entire CMU downstream of Proposed works | Professional judgement. |
| Invertebrates: marsh fritillary | Direct loss of habitat or injury. | Marsh fritillary habitat if present within footprint of proposed works. SACs designated for the species within the species' core foraging range could be affected. | Similarly to habitats; no habitat loss / direct injury predicted beyond this area. Radio-tracking studies have shown core foraging range to be 10 km (Zimmerman et al. 2011). |
| Invertebrates: whorl snails (*Vertigo moulinsiana, V. geyeri, and V*. angustior) | Direct loss of habitat or injury | Footprint of proposed works and access/egresses | Professional judgement. |
| | Indirect affects arising from changes to water levels | Footprint of potential changes to habitat from water levels | Determined on a case by case- basis |
| Fish: Atlantic salmon, river lamprey, brook lamprey | Noise or vibration from piling or other intrusive earth works causing displacement of fish from spawning/nursery habitats if present. | At least 100 m from drilling activities, subject to a case-by-case assessment | Professional judgement applied to type, location, and duration of earthworks, and having regard for literature including Colotelo et al. (2012) |
| | Physical obstacle to migratory fish populations. | Any fish populations upstream and/or downstream of instream obstacle subject to assessment of fish lifecycle and known migratory corridors etc. | Professional judgement. |

| Fauna species and their habitat features | Type of potential impact | ZoI (m) for potentially significant effects | Rationale |
|---|---|---|---|
| | Siltation or other pollution effects on spawning, feeding, or nursery areas. | Entire CMU downstream of Proposed works | Professional judgement. |

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