

Local Distributor Road 4 Abbeyland Navan

Appropriate Assessment Screening and Natura Impact Statement

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1. Introduction

AECOM Ireland Limited (hereafter referred to as AECOM) was commissioned by Meath County Council (MCC) to produce this Appropriate Assessment (AA) Screening Report and Natura Impact Statement (NIS) to inform a proposed new link road, the Local Distributor Road (LDR) 4, in west Navan, Co. Meath (hereafter referred to as 'the **proposed works**' or '**Proposed Development**').

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 Overview of Proposed Development Site

The applicant is proposing to develop a circa 1.15 km local distributor road referenced in the Navan Development Plan 2009-2015 and in Appendix IV of the Navan Transport Plan on approximately 8.63 ha of predominantly greenfield site in the north-west of Navan, Co. Meath (refer to Figure 1; Appendix A). The Proposed Development comprises an urban Arterial Street, incorporating both footpath and cycle path provisions, connecting the N51/R147 Kells Road to the L3409 Ratholdron Road through Abbeyland. The scheme is located in the townlands of Abbeyland, Abbeyland South, Moathill, Townparks, and Windtown in Navan, Co. Meath.

1.2 Statement of Authority

This AA Screening Report and NIS was prepared by Mr Barry O'Loughlin, BSc, MSc, MCIEEM. Barry is a Principal Ecologist at AECOM and holds over 9 years professional experience in the preparation of Appropriate Assessments and the provision of ecological services. Barry has prepared AA documentation for a range of commercial development projects including overhead powerlines and underground grid connections, national road schemes, renewables (wind farm and solar farm developments), road schemes, residential developments, quarry and ancillary developments, wastewater supply schemes, etc.

The AA Screening Report and NIS was checked by Dr Eleanor Ballard BSc. (Hons), DPhil. PgDip, CEnv, MCIEEM with over 10 years' experience of AA and 20 years' providing biodiversity inputs to planning. All other suitably experienced AECOM ecologists who assisted with field surveys have third level qualifications in a discipline relevant to biodiversity.

The AA Screening Report and NIS was approved by Dr James Riley BSc MSc PhD CEnv MCIEEM. Dr Riley has 16 years' experience of AA and 20 years experience as an ecologist and is the Technical Director leading AECOM's Appropriate Assessment workstream.

2. Screening for AA

Under Section 177U (1) of the Planning Acts, a Screening for AA of the Proposed Development shall be carried out by the competent authority (in this case, MCC) to assess in view of best scientific knowledge, if the Proposed Development, individually or in combination with other plans or projects, is likely to have a significant effect(s) on any European sites. The term 'European site' is defined in Section 4.

Having regard for relevant European and national guidance on AA Screening (detailed in Section 6.1), AECOM concluded that the Proposed Development should be 'Screened in' to the requirement for AA. This conclusion was reached on the basis that, in the absence of mitigation measures, significant effects on 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 4232), during construction and operation of the Proposed Development, could not be excluded on the basis of objective information, individually or in combination with other plans or projects.

Potential pollution risks to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA during construction and operation of the Proposed Development identified that the Proposed Development should be 'Screened in' and the Proposed Development should be subject to the requirement for AA.

3. Appropriate Assessment

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 light of the conservation objectives of the European sites in question.

Under Section 177U (4) of the Planning Acts, the competent authority (Meath County Council (MCC)) determined that an AA of the Proposed Development is required because it cannot be excluded on the basis of objective information, that the Proposed Development, individually or in combination with other plans or projects, will have a significant effect on a European site(s).

The MCC determination that a Stage 2 Appropriate Assessment of the Proposed Development is required and a Natura Impact Statement should be prepared in respect of the proposed road development is included in Appendix C.

The statutory definition of NIS is provided in Section 4.2. The methodology for completing the NIS is provided in Section 6.

4. Key Definitions

4.1 European Sites

In the Republic of Ireland, European sites comprise:

- SACs designated for habitats, plants, and non-bird species;
- SPAs designated for bird species and their habitats; and,
- 'Candidate' sites including 'cSAC'.

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.

The designation features of SACs are referred to as Qualifying Interests (QIs), and these comprise both species (excluding birds), and habitats.

The designation features of SPAs are referred to as Special Conservation Interests (SCIs), and these comprise bird species, as well as wetland bird habitats.

The designation features of European sites are identified in the Statutory Instruments for European sites where such sites have completed the designation process. In all cases, designation features are also identified in Conservation Objectives published by the NPWS. Any Conservation Objectives referred to in this NIS are referenced to identify the date of publication and version number.

4.2 Natura Impact Statement

Under Section 177T of the Planning Acts (177T), a NIS is defined as:

"A statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a Proposed Development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites".

The NIS must *"include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one European site in view of the conservation objectives of the site or sites"*.

4.3 Zone of Influence

Irish departmental guidance on AA Screening and AA (DoEHLG, 2010) requires European sites within the "zone of impact" of a plan or project to be identified (p. 32). In relation to the zone of impact, the guidance states:

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

In this AA Screening Report and NIS, the term Zone of Influence (Zoi) is used in lieu of “zone of impact”. The detailed method used to identify the Zoi is outlined in Section 6.5.

5. Proposed Development

5.1 General Description

The Applicant is proposing to develop a circa 1.15 km local distributor road referenced in the Navan Development Plan 2009-2015 and in Appendix IV of the Navan Transport Plan on approximately 8.63 ha of predominantly greenfield site in the north-west of Navan, Co. Meath. The Proposed Development comprises an urban Arterial Street, incorporating both footpath and cycle path provisions, connecting the N51/R147 Kells Road to the L3409 Ratholdron Road through Abbeyland. The scheme is located in the townlands of Abbeyland, Abbeyland South, Moathill, Townparks, Windtown in Navan, Co. Meath.

The Proposed Development runs in a north-south direction across the River Blackwater between the L3409 Ratholdron Road and the N51/R147 Kells Road. The location is characterized by presence of open greenfield area with some wooded areas in the section north of the River Blackwater, which runs to the west of the recently developed Blackwater Park. The southern section of the study area contains the River Blackwater and continuing to the south the scheme meets the N51/R147 Kells Road, which is lined by both residential and commercial properties.

A new bridge crossing over the River Blackwater is proposed, which will improve access to lands to the north of Navan town between the L3409 Ratholdron Road and the R162 Proudstown Road and also the Clonmagaddan Strategic Development Zone. The proposed bridge is located within the River Boyne and River Blackwater SAC (site code: 2299) and River Boyne and River Blackwater SPA (site code 4232).

The Proposed Development comprises the following major elements:

- Approximately 1.15 km of urban Arterial Street (DMURS - 3.25 m lanes - single carriageway), incorporating pedestrian and cycle facilities (2.0m wide raised one-way cycle track on both sides, 2.5m wide footpaths on both side, 1.0m road verges);
- Two new signalised junctions at the scheme termination points, L3409 Ratholdron Road and R147 / N51 Kells Road, both incorporating right turn lane and pedestrian/cycle crossings;
- One new single span river bridge over the River Blackwater (overall length 45m);
- One new piped culvert over an existing field ditch;
- New Pedestrian and cycle facilities, including 2 accesses to the Blackwater Park;
- Associated earthworks including excavation of unacceptable material, excavation and processing of rock and other material, provision of material deposition areas and deposition and recovery of unacceptable material for reuse in the works;
- Accommodation Works, including the provision of access roads and accesses;
- Drainage works, including the construction of an attenuation pond and storage tanks;
- Demolition of an existing commercial building in the southern section of the Proposed Road Development;
- Landscaping works, including the construction of earth bunds between the proposed scheme and the Town Park;
- Utilities and services diversion works, including the diversion of a high voltage electricity line crossing the Proposed Road Development, including the provision of associated support poles;
- Safety Barrier, Public Lighting, Fencing; and,
- Environmental measures and other ancillary works, including but not limited to the provision of 1 mammal underpass and mammal fencing.

A detailed description of the Proposed Development and associated site works is presented in the following paragraphs. The project location and extent of the Proposed Development is shown in Figures 4.1 to 4.4 contained in Appendix A of this Report.

5.1.1 Key Provisions of the LDR4 Scheme

The implementation of the Proposed Development will provide the following:

- Reduce the reliance of the road network on the existing crossings of the River Blackwater located near Navan town centre (namely N51 and Flower Hill);
- Reduce the high traffic volumes and congestion experienced in Navan town centre;
- Provide a road that is fit for purpose and which is designed and constructed in accordance with current design standards;
- Provide a consistent cross-section which will allow for the efficient movement of persons and goods through Navan;
- Provide high quality pedestrian and cycle facilities by providing safe routes to and from Blackwater Park and the town centre for the surrounding communities;
- Provide safe crossing points throughout the road corridor for non-motorised users;
- Provide appropriate junctions and accesses in accordance with current design standards; and,
- Provide road surface water runoff collection and treatment facilities to ensure that rainfall is effectively removed from the road surface and treated before discharge to the existing water environment. This includes the provision for cut-off and storage in the event of a road accident causing spillage of deleterious materials.

5.2 Main Alignment

The alignment is composed of one single section (Chainage from 0+000 to 1+150), running north to south for a total length of 1.15 km, between the existing L3409 Ratholdron Road / L34094-1 Clonmagadden Road Junction (Junction 1) and the existing N51 / R147 Roundabout (Junction 2) and it is illustrated in Figures 4.1 to 4.4 contained in Appendix A of this Report.

The LDR4 mainline alignment commences with a proposed 4 way signalised junction on the L3409 Ratholdron Road in place of the existing T-junction with L34094-1 Clonmagadden Road. The alignment then runs south across a small area of woodland and agricultural land. The alignment then turns south east with a left hand 255 m radii curve and follows broadly the existing hedgerows that indicate the western boundary of Town Park.

The alignment starts with a short section at grade and then slowly moves to an embankment section with minimum longitudinal gradients (+0.5%) and one culvert located at Ch. 0+225. After a crest point located at Ch. 0+320 the vertical alignment starts to descend with a constant -1.7% gradient until Ch. 0+800.

The horizontal alignment then turns south with a right hand 255 m radii curve and across the River Blackwater almost perpendicularly (Ch. 0+920 to Ch. 0+975). The vertical alignment presents a reduced gradient to -0.5% along the entire crossing of the river.

The alignment continues southbound to the east of the existing residential properties at Blackwater Park, requiring the acquisition and demolition of an existing commercial building. The vertical alignment presents a low point at Ch. 1+035 and then rises in level with a +2.5% gradient. The alignment ties into the existing R147/N51 roundabout which will be upgraded to a 4-arm signalised junction.

5.3 Pedestrian and Cycle Provision

Along the length of the LDR4 mainline, a 2.0 m wide raised one-way cycle track and 2.5 m wide footpaths have been incorporated on both sides. Two new dedicated pedestrian / cycle links between the LDR4 and the walking route within the Blackwater Park have also been incorporated into the design.

Where existing facilities are intersected by the LDR4 scheme (see junctions at the north and south end of the scheme, these have been connected to the proposed facilities, and pedestrian and cycle crossings have been incorporated into the design.

5.4 Junctions

Two alterations of existing junctions have been incorporated into the design of the LDR4 Abbeyland Navan scheme. Two four-arm signalised junctions are proposed in place of the existing T-junction between L3409 Ratholdron Road and L34094-1 Clonmagadden Road, and in place of the existing roundabout between N51 and R147 Kells Road.

5.5 River Blackwater Bridge

The River Blackwater bridge has a single span of 45.0 m, with the bridge abutments located outside the river channel to avoid instream works for the construction of the bridge over the River Blackwater SAC. The finished bridge abutments on the north and south side will be located 10 m and 7.5 m respectively away from the river channel. This bridge will be a key programme item for the construction, particularly in conjunction with seasonal constraints during the construction of drainage outfalls and earthworks in proximity to the river. The proposed bridge is illustrated in Figure 4.17 contained in Volume 3 of Chapter 4 (Description of the Proposed Road Development) of the EIAR.

The structure will be located west of Navan town at coordinates 686093.790, 768174.037 (ITM). The bridge will cross the River Blackwater and its flood plain in a north-south direction. At the crossing point, the river bank topography shows relatively steep embankments of 6 m to 7 m in height.

The bridge will consist of a 45 m single span ensuring a clear span over the river channel. The proposed underbridge alignment will cross the River Blackwater at a skew of approximately 12° to the perpendicular. The structural depth of the underbridge will be 2.5 m with minimum vertical clearance of 2.4 m provided.

The construction methodology with regard to the River Blackwater and proposed bridge is described in Section 5.9.

5.6 Proposed Road Drainage Networks

It is proposed that as the road will cross the River Blackwater and due to the use of kerbs on the road section, a sealed system will be employed. Road runoff will be collected through gullies located at regular intervals or kerb drains where necessary. Sealed pipes will convey the flows to the downstream attenuation systems.

The proposed road drainage system has been divided into three separate networks, A, B and C respectively. The road drainage outfalls at three locations into the River Blackwater via vegetated interceptor ditches at two locations and via an existing pipe system at a third location. The temporary and permanent land acquisition required to undertake these works and associated attenuation systems has been incorporated into the Compulsory Purchase Order. The outfalls and drainage requirements are shown in Figures 4.18 to 4.21 inclusive contained in Volume 3 of Chapter 4 (Description of the Proposed Road Development) of the EIAR.

5.6.1 Flow Attenuation Systems

It is proposed that flows from the proposed road will be attenuated prior to discharge to the receiving watercourse so that the post development peak flow rate is not greater than the original greenfield runoff rate. This will be achieved using pond and tank attenuation systems with a flow restricting device such as a vortex flow control device upstream of the outlet to a receiving waterbody.

The scheme proposes to use a pond upstream of the discharge point to the River Blackwater for the greenfield section of the scheme. The remaining sections at the northern and southern tie-in points will be attenuated using tank systems.

The attenuation systems have been designed to accommodate a 1 in 100 year event plus 20% for climate change without increasing the discharge rate to the receiving watercourse. This design will ensure that there is no increase in the risk of flooding in the receiving watercourse due to construction of the road up to the 100 year return period. A shut-down valve will be provided at the outlet to each outfall to allow any potential spillage to be accommodated within the attenuation system.

5.6.1.1 Flow Attenuation Pond

The pond has been designed to accommodate the first flush surface water runoff within a forebay. First flush flows are those that arrive at the outfall first after a rainfall event. The first flush is defined as 10% of the five year storm peak flow and contains the heaviest contaminant load. The plan area of the sediment forebay will be at least 10% of the total basin area. The connection from the forebay area to the main body of the pond is via a permeable bund.

Due to the environmentally sensitive nature of the area and because the pond will be used for spillage containment, the pond will be lined. The pond shape and orientation is designed based on the local topography and environment and is designed to appear natural and aesthetically unobtrusive. The pond uses soft geometries with curved

boundaries and undulating margins, rather than straight lines and hard edges. The pond will incorporate suitable planting mix to aid filtration and pollution control.

The attenuation pond will be in land adjacent to the proposed road – see Figures 4.18 to 4.21 inclusive contained in Volume 3 of Chapter 4 of the EIAR for locations of attenuation systems. Access for future maintenance will be accommodated by provision on a gated access track running around the proposed attenuation pond and connected to the road mainline.

5.6.1.2 Flow Attenuation Tank

The storage tanks proposed at two locations will be in the form of a high strength plastic modular system which will be provided upstream of the flow restriction. These high strength units typically provide a void ratio in excess of 94%. The tank system will be surrounded with an impermeable geomembrane to create a sealed unit. The outlet from this sealed “tank” is then controlled to facilitate a slow release of the stored water back into the receiving watercourse at the permitted runoff rate.

The tank systems will be in land adjacent to the proposed road and will be landscaped after installation. Access for future maintenance will be accommodated by incorporating inspection crates within the system at appropriate intervals.

5.6.2 Culverts

Streams and interceptor ditches crossed by the scheme will be culverted. At chainage 0+225 (refer to Figures provided in Appendix A) the scheme crosses an existing waterbody. The existing waterbody has a very flat longitudinal gradient. It has been observed that during periods of dry weather that this waterbody does not have a flow. It is assumed that from the available information that this waterbody only collects local overland runoff during normal rainfall events.

Office of Public Works (OPW) flood mapping suggests however that the waterbody accommodates flood waters which back up from the existing culvert under the railway which acts as a throttle. The mapping indicates flooding downstream of the proposed culvert at a level of 47.72 mOD for a 1 in 100 year flow rate of 0.78m³/sec. The new culvert will be sized to accommodate this flow with 300 mm additional free-board clearance above the 100 year water level.

5.7 Major Accidents and Disasters

The Proposed Development has been assessed to determine the risks to the LDR4 scheme from either a major accident or in the event of a natural disaster.

With regards natural disasters, severe weather conditions pose one of the most common risks to Ireland and to the Proposed Development site. The most likely natural disaster for a project located in Navan is the impact from a major flood event. The Proposed Development has been designed to have a negligible impact on the River Blackwater during the 1 in 100 year storm event.

In the event of a major accident, the greatest risk to the Proposed Development, would be from a spillage that could pollute a receiving watercourse. A preliminary risk assessment to quantify the likelihood of a serious accidental spillage has been carried out in accordance with the TII (NRA). The spillage assessment carried out on the Proposed Development demonstrates a very low magnitude of risk for individual or grouped catchment outfalls and shows the overall spillage risk for the entire scheme to be 1 in 8,128 years. Shut-down facilities at outfalls are included in the project.

5.8 Lighting

The full extent of the LDR4 scheme and side roads will be illuminated. The lighting will comprise full cut-off type lanterns with shielding where adjacent to residential properties to minimise light spillage as far as practicable. The lighting shall be of an energy efficient design, incorporating LED and dimmable technologies.

Public lighting has been provided within the design in accordance with TII Standard DN-LHT-03038 - Design of Road Lighting for National Roads, BS5489-1:2013, and the Institution of Lighting Professionals (ILP) Professional Lighting Guide PLG02 – The Application of Conflict Areas on the Highway. The lighting design will comply with the requirements of MCC's Public Lighting Technical Specification & Requirements. Four distinct lighting zones have

been identified of which one zone, 'Natural Zone' encompasses the area of the proposed bridge at the River Blackwater crossing.

5.9 Construction Sequence and Approach

The proposed River Blackwater Bridge has a single span of 45.0 m, with bridge abutments located outside the river channel and avoids the requirement for instream works for the construction of the bridge. The construction will be undertaken taking into account seasonal constraints during the construction of drainage outfalls and earthworks in proximity to the River Blackwater.

Due to the semi-urban nature of the scheme, there are services impacted by the scheme. Among these, the most relevant is one high voltage (110 kV) overhead power line, which will require diversion. These services will require particular attention with regard to implementation of the diversion measures prior to construction activities commencing at these locations and will be delivered either through advance works contract or as a priority in the construction programme for the project.

It is also noted that a Construction Environmental Management Plan (CEMP) will be developed prior to any construction phase.

It is likely that the construction of the Proposed Development will be progressed as a single construction contract with the construction phase potentially lasting between 15 - 18 months.

5.9.1 Preliminary Construction Works

The establishment of the works compounds and connection of services for their operation will likely be carried out at the start of the works. This will then be followed by site clearance and topsoil stripping of the site in stages. It is likely that this will be phased to keep just ahead of the major earthworks movements. Initial works on permanent and temporary boundary fences may also be carried out as a preliminary operation, with further boundary works required on completion of the main construction works. Accommodation works where required for access, as well as temporary access routes and haul routes through the site will be key early activities.

5.9.2 Main Construction Works

The main construction works consist predominantly of the construction of the River Blackwater Bridge, in conjunction with earthworks and road pavement construction.

The earthworks will involve the excavation and placement of materials for the construction of embankments as well as the hauling of materials and importation of materials to complete road formation and sub-formation. Materials for the road construction will include those brought to site including gravels and bituminous pavement and surfacing materials. The construction of the structures will involve the delivery of beams, reinforcement, concrete and granular fill materials. In addition to the structures, earthworks and pavement construction, the main activities will involve the following:

- Drainage: the installation of pipes, culverts, surface water channels, filter drains, ditches and attenuation systems;
- The diversion and construction of utilities and services;
- Construction of noise barriers, landscaping and habitat creation;
- Ancillary roadworks including the installation of safety barriers, public lighting, signage and road markings; and
- Accommodation works for affected landowners such as access roads, entrances, fences, gates, walls, ducting and reconnection of severed services.

5.9.3 Drainage

The Contractor will construct elements of the permanent drainage system as early as practicable, such as the interceptor drains, to facilitate earthworks haul routes and control drainage from the works, to avoid flows onto adjacent land and/or untreated discharges to watercourses. The piped culvert, including the headwalls, is proposed to be constructed during the summer months, when the drainage ditch is dry or there is standing water only. This culvert will be constructed in accordance with the Inland Fisheries Ireland (IFI) guidelines, Construction Erosion and Sediment Control Plan (CESCP) and to the EIAR requirements in relation to works on or near watercourses.

Details of the proposed drainage identified outfalls and treatment as well as the proposed measures proposed for the prevention of pollution to watercourses is provided in Chapter 9 (Hydrology Chapter) of the EIAR.

5.9.4 River Blackwater Bridge

There is one river crossing proposed as part of this road development, involving a single span (45.0m) crossing of the River Blackwater. The abutment will be located within the 1 in 100 year flood event extents. Detailed hydraulic modelling carried out as part of the preliminary design has demonstrated that abutment locations will not result in changes to the flood regime.

The proposed bridge will be founded on bored piles, rock socketed to bedrock with two in situ reinforced concrete abutment walls and cantilever wingwalls completing the substructure arrangement. The superstructure will be formed of large, 2.3 m deep, W19 precast beams spanning 45m with a 250mm thick reinforced in situ concrete deck. An in situ or precast parapet edge beam will also be provided.

In order to construct the bridge, a temporary cut off wall will be required to create a safe and dry works area for the duration of construction. The proposed wall will be 5 m deep, 1 m wide and approximately 33 m long constructed of in situ concrete using an excavator and a trench box. The cut off wall may also be constructed using precast concrete elements avoiding concrete works within the flood plain. Using precast would also provide an option to recover the cut off wall from the flood plain following construction.

The 45m span beams are expected to weigh in the region of 140 tn and will be transported through Navan town. A route analysis will be carried out to ensure the beam can be delivered to site without the need for advance works. It is noted that the beams will likely be delivered at night to minimise disruption to road traffic and this may require temporary road diversion and/or closures. It is also noted that the required permit for transport and delivery will be agreed in advance with MCC and any other relevant authority. It is proposed that the beams will be installed using a 400 tn crawler crane with the lift occurring from the area to the north of the bridge location. The crane will be supported on a temporary crane platform formed of rock infill within the extent of the cut off wall, bog mats will also be required to disperse the crane loading evenly to the infill material.

The contract documents will include details on the proposed measures and will require the contractor to submit detailed method statements.

The assumed construction sequence for the bridge is as follows:

- Construct temporary cut off wall.
- Install piling platform and any required ground improvements within the footprint of the temporary cut off wall.
- Excavate bridge support zone to required formation level.
- Install piles to abutment foundations.
- Cast in situ abutment foundations, abutment wall and wingwalls.
- Construct approach embankments.
- Backfill to abutments (required for stability during installation of beams).
- Erect all precast beams.
- Cast deck slab.
- Cast abutment diaphragm beams.
- Cast in situ/erect precast parapet edge beam.
- Apply waterproofing to deck slab.
- Complete backfill to abutments.
- Construct verges with required service ducts and drainage.
- Erect parapet system.
- Road Surfacing.

5.9.5 Side Roads

All side roads intersected by the Proposed Development are at-grade crossings. During the construction period, all side roads will be required to be maintained. Alternative access to agricultural land will be required during the construction phases.

5.9.6 Landscaping

Landscaping will include the construction of bunds, berms, noise barriers and the placing of topsoil and other materials to complete the landscape shaping of the site. Grassing, reinstatement of vegetated turves and appropriate specified planting of side slopes and other specific landscaped areas will also be carried out in accordance with landscape design strategy as detailed in Chapter 12 of the EIAR.

5.10 Construction Materials

The main materials that will be imported to/from the site or hauled within the site in bulk are:

- Earthworks, including topsoil, general fill material, soft soils, rock and capping materials;
- Pavement materials, including granular sub-base material and bituminous pavement materials;
- Concrete, both in-situ and precast units such as concrete bridge beams, concrete deck sections, pipes, culverts and headwalls;
- Steel, reinforcement for concrete works; and,
- Other materials required including fencing materials, plants, ducting, etc.

5.10.1 Earthworks

During construction and excavation, additional details regarding the condition of the materials may be established which may lead to further development of the earthworks design to improve the import requirement for the LDR4 scheme.

The development involves the excavation, transportation and importation of material. The earthworks have been designed to minimise the amount of material requiring importation from external quarries as far as practicable. The exact strategy for the earthworks will depend, to a certain extent, on the strategy adopted by the successful contractor.

5.10.2 Sourcing of Materials

It is anticipated that a significant volume of acceptable material, sub-base material and structural backfill material will be imported from local quarries to the site. Prior to construction, suppliers shall be reviewed and only those quarries that conform to all necessary statutory consents will be used in the construction phase.

5.10.3 Concrete Material

The LDR4 scheme includes the construction of one river bridge, a culvert and footpaths. These structures contain both pre-cast concrete units and in situ concrete. Precast concrete elements will be sourced from specialist producers. Any requirement for works associated with In situ concrete will be sourced from producers.

5.11 Construction Compound

A construction compound will be required along, or in the vicinity of the Proposed Development.

It was proposed that the primary construction compound would be located on the land located to the south-west of the existing T-junction between L3409 Ratholdron Road and L34094-1 Clonmagadden Road. An alternative and secondary compound is proposed to the north of the existing N51/R147 roundabout on the land currently occupied by a commercial building to be demolished.

Following completion of construction these areas will be cleared and re-instated, temporary buildings and containers, parking areas and material such as rubble, aggregates and unused construction materials will be removed as appropriate.

6. Methodology

6.1 Sources of Guidance

6.1.1 European Guidance and Case Law

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 original EC guidance on Article 6 of the Habitats Directive (EC, 2000), but should be read with other EC guidance available online¹.

As stated in EC (2018), the updated guidance “*incorporates the large body of rulings that have been issued by the CJEU over the years on Article 6*”². This NIS also has regard for relevant updated case law since the publication of the EC guidance in November 2018.

6.1.2 National Guidance

There have been significant changes to AA practice since the last formally published 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 the 2010 DoEHLG guidance in this NIS, as supplemented by relevant unpublished (online) guidance from the NPWS³ (updated to August 2018, at the time of writing).

6.1.3 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*”.

6.1.4 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.

6.2 Steps in Producing the NIS

The following steps for the NIS are compliant with the EC and DoEHLG guidance detailed in Section 6.1.2 and are applied as the basis for this NIS:

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 – Information Required (Section 8.1)
 - Informed by field and desktop studies (Section 6.3) and consultation responses (Section 6.4), to identify the relevant baseline environment relating to European sites (Section 7);

¹Available from http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm. Accessed September 2019.

² Including, but not limited to Case C-323/17 ‘People Over Wind’, C-258/11 ‘Galway City Outer Bypass’; Peter Sweetman v Coillte Teoranta

³ Available online at <https://www.npws.ie/development%20consultations>. Accessed September 2019.

- Step 2 – Present Conservation Objectives (Section 8.2);
- Step 3 – Predict Effects (including Article 10 considerations; Section 8.3);
- Step 4 – Describe Mitigation Measures (Section 9); and,
- Conclusion (Section 10).

6.3 Field and Desktop Study Methods

6.3.1 Field Study

The assessment has been informed by ecological surveys of the proposed works designed and led by Robert Fennelly MCIEEM CEcol on the following dates: on 20 July and 10 August 2017, 13 April, 1 May, 18 May, and 12 June and August 2018; 10 July 2019 and 25 May 2020.

The field surveys assessed the potential distribution of QIs and SCIs of European sites within the Zone of Influence (Zoi; defined in Section 4.3) of the proposed works. Field surveys also had as an objective to determine if invasive species posing a potential threat to European sites downstream⁴ were present within the proposed works.

6.3.1.1 Targeted Surveys of Qualifying Interests within the River Boyne and River Blackwater SAC

Alluvial forests [91E0]

In July 2017, Priority QI Alluvial forest (EU Annex I Habitat Code: 91E0) of the River Boyne and River Blackwater SAC, was identified within the Zoi of the proposed works. Alluvial forest in the vicinity of the Proposed Development, comprised two parcels of single species canopy within c. 25-50 m). 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 Annex 1 habitat. Given the highly fragmented nature of the QI habitat within the Zoi, a single monitoring stop was carried out at each following methodology by O'Neill and Baron (2013).

Lutra lutra (Otter) [1355]

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 up to 150 m from suitable habitat, 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.

There will be no requirement for any instream works within any watercourse as part of the Proposed Development. Specialised aquatic ecology surveys with an emphasis on fisheries of the SAC were therefore not deemed necessary.

6.3.1.2 Surveys of SCIs within River Boyne and River Blackwater SPA

Kingfisher (*Alcedo atthis*) [A229]

Elements of the Proposed Development are located within the River Boyne and River Blackwater SPA, which is designated for the Special Conservation Interest (SCI) kingfisher *Alcedo atthis*. The Zoi of the Proposed Development was searched for potential nest sites during surveys carried out 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, 2008). This was followed up by a walkover survey on 25 May 2020. A suitable viewing point that offered optimal views of the river was selected at the proposed bridge location. Kingfisher activity was recorded for a period of two hours after dawn (e.g. including evidence or signs in relation to tunnelling of nest sites, feeding, use of perching posts, or territorial behaviour).

⁴ Including all species scheduled to the EC (Birds and Natural Habitats) Regulations 2011-2015 ('the Regulations')

6.3.2 Desktop Study

Key sources for the desktop study include:

- Design information provided by AECOM's transportation team and MCC;
- Information on "favourable reference ranges"⁵ of mobile QI populations in Volume 2 and Volume 3 of NPWS' *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2019a; NPWS 2019b) 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 Centre⁶ and Irish Bird Atlas (Balmer et al. 2013);
- Information on threats to, conservation condition, and habitat characteristics of Annex 1 habitats in Volume 2 of NPWS' *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2019a and 2019b);
- Data on kingfisher ecology in the Boyne catchment, including territory sizes, from Cummins et al. (2010);
- Data including surface and ground water quality status, available from the online database⁷ of the Environmental Protection Agency (EPA);
- Boundaries for catchments with confirmed or potential freshwater pearl mussel (FWPM) *Margaritifera margaritifera* populations available online from the NPWS⁸;
- Data from Natura Standard Data Forms on the conservation status of, and threats to the River Boyne and River Blackwater SAC (NPWS, 2017a), and Boyne and Blackwater SPA (NPWS 2017b);
- Data on the extent and vulnerability of local groundwater bodies⁹;
- 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 (Chapter 7 (Biodiversity Chapter) of the EIAR);
- 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 Forests (O'Neill and Baron, 2013);
- Survey of rare/threatened and scarce vascular plants in County Meath report (BEC, 2006);
- County Meath wetland and Coastal Habitats Survey report (MCC, 2010);
- County Meath Tree, Woodland and Hedgerow Survey report (Smith et al, 2011);
- Habitats and species identified in the Draft County Meath Biodiversity Action Plan 2015-2020 (Meath County Council, 2015); and,
- Data from Map of Irish Wetlands held by Wetland Surveys Ireland, www.WetlandSurveysIreland.com (Accessed: October 2019).

6.4 Consultation

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 Development. The NPWS Research Branch responded on 21 August 2018 with ecological records in Excel format, as well as the 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). Relevant records provided by the NPWS are included in the tables in Section 7.3.3 of the EIAR Biodiversity Chapter prepared to accompany the planning application. The NPWS also provided links to online resources for the site-

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, 2019a). 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 2019.

⁷ EPA MAPS (2017) Available online at: <https://gis.epa.ie/EPAMaps/>. Accessed 10/09/2019.

⁸ Available from <https://www.npws.ie/maps-and-data> Accessed September 2019.

⁹ Available online at: <https://gis.epa.ie/EPAMaps/> Accessed September 2019.

specific Conservation Objectives of European sites and advised that other consultees could be contacted for additional records; namely IFI, Birdwatch Ireland, and Bat Conservation Ireland.

IFI was contacted on 8 August 2018 to request records of aquatic species (i.e. fish etc.) in 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 Zol of the proposed works; this name refers to the WFD sub-catchment). IFI stated that no recent electrofishing surveys have been carried out on the Kells Blackwater River. IFI also provided a report (Gallagher et al., 2015) 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 with reference to kingfisher populations within the general area was requested. No response had been received at the time of writing this report.

Bat Conservation Ireland was consulted in July 2017. On 20 July 2017, Bat Conservation Ireland responded with records from their database for Car-based Bat Monitoring Scheme 2003-2015, All Ireland Daubenton's Bat Waterways Scheme 2006-2015, Brown Long-eared Bat Roost Monitoring Scheme 2007-2015, BATLAS 2010, Landscape conservation for Irish bats and species-specific roosting characteristics (Lundy et al., 2011), and ad-hoc bat records. However; it should be noted that the proposed works do not overlap the "favourable reference range" of lesser horseshoe bat *Rhinolophus hipposideros* (NPWS, 2019b); the only Irish bat for which SACs are designated).

6.5 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/SCIs potentially at risk of likely significant effects.

'Relevant' QIs/SCIs are those within the Zol of likely significant effects.

6.5.1 The Source-Pathway-Receptor Model

The assessment of impacts on European sites is carried out using a standard 'Source-Pathway-Receptor' model, where, in order for an impact to be established, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is enough to conclude that a potential effect is not of any relevance or significance. This assessment determines if direct, indirect and cumulative adverse effects will arise from the Proposed Development. The model focuses on the QIs/SCIs for which European sites have been designated and identified within the Zone of Influence. An example of this model is provided below:

- Source (s): e.g. piling works; artificial lighting, earthworks, etc.;
- Pathway (s): e.g. vibration and noise; pollution (i.e. run-off), etc.; and,
- Receptor (s): e.g. disturbance to commuting otter, barrier to connectivity on QI salmon, QI lamprey, SCI kingfisher, etc.

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.

6.5.2 Zones of Influence of Potential Effect Pathways

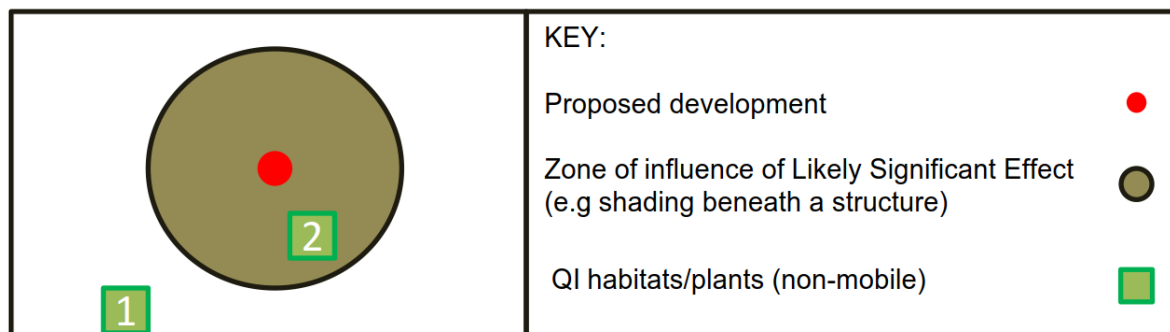
The proposed works have the potential to result in a range of environmental effects. The analysis of these effects, using scientific knowledge and professional judgement, leads to the identification of a Zol, defined here as the effect area (measured in m) over which an impact can have potential effects.

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.

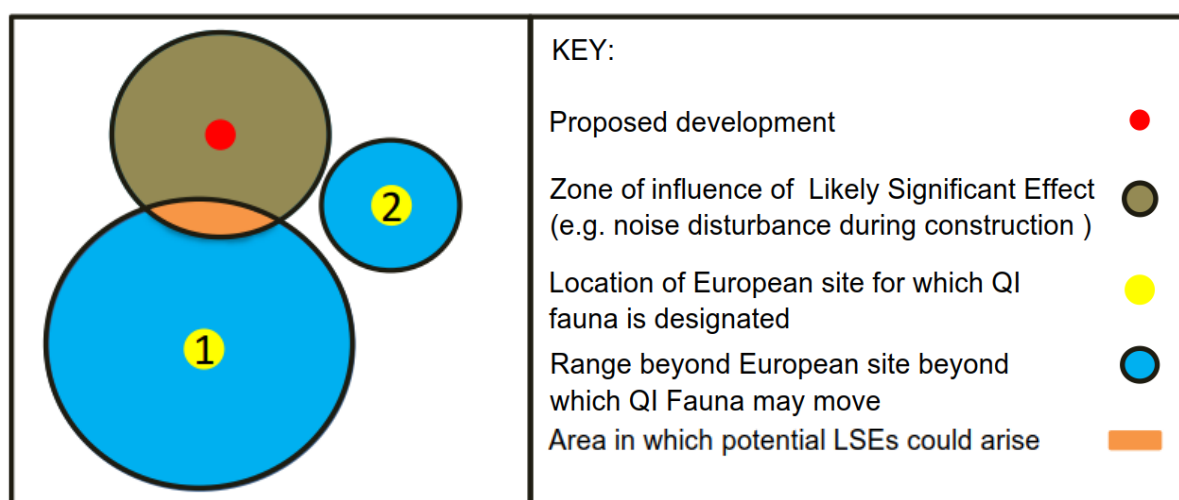
Habitats and plants are not mobile, however fauna species are, and their predicted mobility outside European sites (i.e. range) will affect whether they occur within the Zol. The mobility of fauna species outside European sites varies considerably, from a maximum of several metres (e.g. in the case of 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 Zol for (mobile) fauna versus (non-mobile) habitats has been illustrated in Graphic 1 and Graphic 2.

In response to the above guidance, Zols 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 (DoEHLG, 2010). These Zols are summarised in Table 1.



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



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

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, 2019a).

The most up to date spatial datasets for European sites were downloaded from the NPWS website (www.npws.ie). and potential pathways within the Zone of Influence were identified. This assessment takes into account the ecological characteristics and requirements of the QIs/SCIs of European sites that have been identified within the Zol.

The potential effects from the proposed works within the zone of influence for the construction and operational phase of the proposed works are detailed in Table 1. The presence or potential presence of relevant QI/SCI species and habitats within the Zols are referenced in Table 1. This assessment takes into consideration the core foraging, breeding and roosting areas of mobile species in the wider surroundings.

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

| Development Phase | Source of Potential Effect | Description of Effect Pathway | Potential Zone of Influence of Effect (Reference Footnoted for Brevity) | Potential Relevance of Effect to AA Screening |
|--------------------|--|--|---|---|
| Construction Phase | Noise, vibration, lighting and human presence during movements of vehicles and construction personnel associated with construction phase. | During construction, noise or other construction-related disturbance could reduce the ability of populations of Qualifying Interests (QI)/Special Conservation Interest (SCI) species to forage, roost or breed (if QI/SCI species are present within estimated Zone of Influence). | Varies by species and is difficult to define due to the variation in tolerances of different populations within the same species (e.g. rural vs urban), and the influence of local topography and ground conditions. Potentially assessed within 500 m of the Proposed Development footprint for wintering birds ¹⁰ , subject to the location and duration of the human disturbance (e.g. noise associated with human presence), and potential for local topography or other factors to mitigate the disturbance. However, distance could potentially be significantly lower (e.g. 150 m for potential disturbance impacts to 150 m for otter underground sites ¹¹) or higher (e.g. hen harriers may take flight when nesting at up to 750 m from disturbance ¹²). | Potential relevance to Special Conservation Interest fauna and Qualifying Interest habitats/species of European sites (if present). |
| Construction Phase | Surface water run-off (i.e. potential release of suspended silt/sediment and contaminants to the River Blackwater and local watercourses (including following flooding)) | Silt, hydrocarbons, sediments, suspended solids and other contaminants could be washed (i.e. run-off) to 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 Zol 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). There will be no requirement for instream works | Potential relevance to Special Conservation Interest fauna and Qualifying Interest habitats/species of European sites (if present). |

¹⁰ 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).

¹¹ In accordance with guidance on road construction-related disturbance of underground sites from the National Roads Authority (NRA, 2006).

¹² Hen harrier flight initiation distance of 750 m from Whitfield et al., (2008).

| Development Phase | Source of Potential Effect | Description of Effect Pathway | Potential Zone of Influence of Effect (Reference Footnoted for Brevity) | Potential Relevance of Effect to AA Screening |
|--------------------|--|---|---|---|
| | | | associated with the Proposed Development. | |
| Construction Phase | Potential introduction and spread of invasive species during the construction of the Proposed Development. | The potential presence of invasive species within the site could lead to the dispersal of invasive species and associated earthen material within and beyond the Proposed Development site during construction works. This could potentially occur via movement of vehicular machinery, construction personnel and/or wildlife. | The Zone of Influence of effects for the spread of terrestrial invasive species is difficult to accurately estimate, as plant fragments may potentially be dispersed on tyre treads via machinery to distant unrelated sites. In relation to water-borne spread of vegetation, the Zone of Influence generally is restricted to the surface water Catchment Management Unit. | Potential relevance to Special Conservation Interest fauna and Qualifying Interest habitats/species of European sites (if present). |
| Construction Phase | Changes in groundwater quality, flow or yield associated with earthworks during construction activities. | Earthworks could interfere with groundwater potentially affecting the quality or distribution of habitats dependent on groundwater supply, if such habitats are present. | The Zone of Influence of potential effects to ground water quality, flow or yield are difficult to accurately estimate as it will depend on factors including the type and volumes of contaminations concerned, the depth and intrusion of excavations, and time of year (related to water levels). As a precautionary measure, a reasonable worst-case spatial Zone of Influence is considered to be the extent of the bedrock aquifer, as shown on the Geological Survey of Ireland (GSI) digital mapper, having regard for GSI Groundwater vulnerability mapping (reflecting type and thickness of soils, and presence of karst features), and potential interactions with surface water features. | Potential relevance to Qualifying Interest groundwater dependent habitats of European sites (if present). |

| Development Phase | Source of Potential Effect | Description of Effect Pathway | Potential Zone of Influence of Effect (Reference Footnoted for Brevity) | Potential Relevance of Effect to AA Screening |
|-------------------|--|--|--|---|
| Operation Phase | Noise, lighting and human presence during movements of vehicles and staff associated with operational activities. | During operation, noise or other disturbance from traffic, cyclists and pedestrians could reduce the ability of populations of Qualifying Interest/ Special Conservation species to forage, roost or breed (if Qualifying Interest/ Special Conservation species are present within the estimated Zone of Influence). | Varies by species and is difficult to define due to the variation in tolerances of different populations within the same species (e.g. rural vs urban), and the influence of local topography and ground conditions. Potentially assessed within 500 m of the Proposed Development footprint for wintering birds, subject to the location and duration of the human disturbance (e.g. noise associated with human presence) and potential for local topography or other factors to buffer potential disturbance. However, distance could potentially be significantly lower (e.g. 150 m for potential disturbance impacts to 150 m for otter underground sites) or higher (e.g. hen harriers may take flight when nesting at up to 750 m from disturbance). | Potential relevance to SCI fauna and QI habitats / species of European sites (if present). |
| Operation Phase | Surface water run-off associated with siltation of the storm water drainage system and attenuation pond; and infiltration of contaminated groundwater into the surface water network (i.e. potential release of hydrocarbons and contaminants to local watercourses (including events following flooding)) | In the absence of appropriate mitigation, silt, hydrocarbons, sediments, suspended solids and other contaminants could be washed (i.e. run-off) to 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 Zol 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). There will be no requirement for instream works associated with the Proposed Development | Potential relevance to Special Conservation Interest fauna and Qualifying Interest habitats/species of European sites (if present). |

| Development Phase | Source of Potential Effect | Description of Effect Pathway | Potential Zone of Influence of Effect (Reference Footnoted for Brevity) | Potential Relevance of Effect to AA Screening |
|-------------------|---|---|---|--|
| Operation Phase | Proposed Bridge Crossing (Blackwater River) posing a collision risk to birds. | There is potential for the proposed bridge crossing at the Blackwater River, to pose a collision risk to birds in flight. | The bird populations potentially affected are most likely attributed to the SCIs of the River Boyne and River Blackwater SPA (i.e. kingfisher). In general, waterbirds will utilise natural features in the landscape such as natural watercourses when commuting between feeding and roost sites as opposed to mountainous and hilly terrain (Robinson et al., 2004). Birds will utilise the Blackwater River as natural corridors along which to commute between feeding and roosting sites, which could potentially strike the proposed bridge crossing and associated traffic, particularly at night and/or in conditions of poor visibility. | Potential relevance to SCI fauna of European sites (if present). |

7. Baseline Description

This Section describes the desktop and field survey results, in order to describe the relevant baseline environment to the Proposed Development. The relevant baseline environment relates to anything that may be directly or indirectly related to the reasons for designation for, or protection of European sites.

7.1 Identification of European Sites Within/Adjacent to the Proposed Development Site

There are two European sites within the footprint of the Proposed Development (where the Proposed Development crosses the River Blackwater), namely the River Boyne and River Blackwater SAC (Site Code: 002299) and the River Boyne and River Blackwater SPA (Site Code: 004232) and presented in Figure 2; Appendix A. Both European sites are identified within the Zol and are therefore subject to further assessment in the NIS.

7.2 Identification of European Sites in the Wider Surroundings

Other European sites located in the wider surroundings (deemed to be outside of the Zol) were considered during the preparation of this assessment. The next nearest European sites to the Proposed Development include:

- Girley (Drewes Town) Bog SAC (site code 2203) designated for the QI habitat 'Degraded raised bogs still capable of natural regeneration [7120]', located 13 km west of the proposed works. The European site is not hydrologically connected to the Proposed Development.
- The Boyne Coast Estuary SPA (NPWS Side Code: 004080) occurs approximately 25km East and 34km downstream of the Proposed Development site and designated for the SCIs; shelduck *Tadorna tadorna* [A048], oystercatcher *Haematopus ostralegus* [A130], golden plover *Pluvialis apricaria* [A140], grey plover *Pluvialis squatarola* [A141], lapwing *Vanellus vanellus* [A142], knot *Calidris canutus* [A143], sanderling *Calidris alba* [A144], black-tailed godwit *Limosa limosa* [A156], redshank *Tringa totanus* [A162], turnstone *Arenaria interpres* [A169], little tern *Sterna albifrons* [A195] and Wetland and Waterbirds [A999].
- The Boyne Coast and Estuary SAC (NPWS Site Code: 001957) occurs approximately 25 km east and 34 km downstream of the Proposed Development and is designated for the QI habitats; Estuaries [1130], Mudflats and sandflats not covered by seawater at low tide [1140], Annual vegetation of drift lines [1210], Salicornia and other annuals colonising mud and sand [1310], Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) [1330], Embryonic shifting dunes [2110], Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] and Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130].

The Boyne Coast Estuary SPA (NPWS Side Code: 004080) and The Boyne Coast and Estuary SAC (NPWS Site Code: 001957) are hydrologically connected to the Proposed Development site and occur 25 km east and 34 km downstream. Both sites have been screened out on the basis that there will be no requirement for instream works associated with the Proposed Development. This review also takes into consideration the core foraging ranges for mobile species associated with the SCIs of the Boyne Coast Estuary SPA (with reference to core ranges of winter birds in line with the SNH Guidance Document, *Assessing Connectivity with Special Protection Areas (SPAs)* (SNH, 2016)) and the QIs of the Boyne Coast Estuary SAC (habitats restricted to coastline), the separation distance and dilution factors.

This judgement has been informed by review of best available scientific knowledge on the known and potential distribution of European site designation features.

7.3 Terrestrial Habitats

With the exception of the QI habitat, Alluvial forest, none of the other terrestrial habitats (i.e. Dry meadows and grassy verges (GS2), Scrub (WS1), Wet grassland (GS4), Broadleaved woodland plantation (WD1), etc.) overlapping or that occur within the Zol of the proposed works are QIs of European sites subject to this assessment.

7.3.1 QI Priority Alluvial forest

Priority Annex 1 Alluvial forest is a QI of the River Boyne and River Blackwater SAC. In July 2017, the QI Alluvial forest (91E0) of the River Boyne and Blackwater SAC was identified within the Zol of the proposed works (refer to

Figure 3; Appendix A). All instances of this habitat within the ZOI of the Proposed Development correspond to Priority Annex 1 Alluvial forest. The original coverage of this habitat in the local area has been significantly reduced due to historical drainage of the Blackwater River. The nearest example of this habitat to the Proposed Development comprises a cluster (c. 50 m long by c. 30 m wide) of several (mature) crack willows *Salix fragilis*, located c. 25 m to the west (at its nearest point to the Proposed Development), on the northern bank of the Blackwater River. Crack willow dominates the canopy, which, despite being a non-native species is an accepted dominant of Annex 1 Alluvial Forest 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).

7.4 Wetland Habitats

None of the wetland habitats (i.e. Reed and Large Sedge Swamp (FS1), Tall-herb swamp (FS2), Marsh (GM1), etc.) that occur within the footprint and surrounding environs of the proposed works are QIs of the identified European site, River Blackwater and River Boyne SAC.

7.4.1 Freshwater/Drainage Features

7.4.1.1 Depositing/Lowland Rivers (FW2)

The Proposed Development crosses the Blackwater River at Chainage 0+950 (Figure 5; Appendix A). The Blackwater River in the vicinity of the proposed crossing is a 'glide' of deep water on gently sloping ground. The wetted width is approximately 20 m at the proposed crossing point. Macrophyte presence instream indicates reduced flow rates relative to other areas where instream vegetation is absent. Instream vegetation is dominated by yellow water-lily *Nuphar lutea*, reed sweet-grass *Glyceria maxima*, and floating sweet-grass *Glyceria fluitans*. Common duckweed *Lemna minor* is found in the shelter of marginal reed cover. Flowering rush *Butomus umbellatus* occurs occasionally. The Blackwater River in the vicinity of the proposed works is referred to as the 'Kells Blackwater' by the IFI (Gallagher et al., 2015), in reference to the WFD sub-catchment.

7.4.1.2 Drainage Ditches (FW4)

A single drainage ditch is crossed by the Proposed Development footprint. This ditch (referred to as the 'Windtown Stream' by the EPA) 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 Development). However topographical surveys show the drainage ditch extends further upstream from the railway line and across the Proposed Development. The drainage ditch is presumably piped across and fed by the cutting created by the existing railway line. It outfalls to the Blackwater River c. 1.1 km upstream from the Proposed Development.

7.4.2 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 (refer to Figure 3; Appendix A). These habitats occur between the proposed works and the QI Priority Alluvial Forest parcel c. 25 m from the works. Wet grassland and reed swamp mosaic offer 'secondary' supporting value¹³ to the River Boyne and River Blackwater SAC/SPA due to their role in buffering QI/SCI aquatic features from pollution.

7.4.2.1 Reed and Large Sedge Swamp (FS1)

This habitat is scattered in narrow strips at the water's edge along the Blackwater River. It also extends 'inland' into the unmanaged flood plain on the northern bank of the Blackwater River, where the water table is above ground throughout the year. FS1 habitat grades into a) fragmented patches of Annex 1 Hydrophilous tall herb and fern habitat (FS2 Tall-herb swamp/GM1 marsh) and b) remnant Priority Annex 1 Alluvial Forest (WN6 Willow-alder ash woodland). In the field, (non-Annex 1) FS1 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 *Agrostis stolonifera* alongside abundant yellow iris *Iris pseudacorus*. Other frequent species include hedge bindweed *Calystegia sepium*, water horsetail *Equisetum fluvatile*, common nettle *Urtica dioica*, marsh-bedstraw *Galium palustre*, and blue water-speedwell *Veronica anagallis-aquatica*. Meadowsweet *Filipendula ulmaria* occurs rarely in drier areas. Conspicuous tussocks of (c. 1.5 m high) greater tussock-sedge *Carex*

¹³ Secondary habitats are those which are not QIs/SCIs, but which buffer QI habitats from pollution and disturbance effects.

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.

7.4.2.2 Tall-herb swamp/GM1 Marsh (FS2)

This habitat corresponds to EU Annex 1 listed habitat, *Hydrophilous* tall herb and fern habitat (refer to Figure 3; Appendix A). It occurs in two patches on the flood plain on the northern bank of the River Blackwater. Although this Annex 1 habitat occurs within the River Boyne and Blackwater SAC, it is not a QI of this SAC. FS2/GM1 habitat is intermediate between characteristics of FS2 and GM1, because some areas (closer to FS2) have standing water throughout the year, while in others (closer to GM1), the water table is at or below ground level.

The FS2/GM1 mosaic is distinguished from the FS1 habitat with which it forms a mosaic, by the greater abundance of broad-leaved herbs. Common reed is, whilst present in both habitats, significantly less abundant in FS2/GM1 compared to FS1. FS2/GM1 also has several broad-leaved species not present in FS1 and this is visually striking in mid-summer when species are in flower. Similarly, for FS1, there is no bryophyte layer present in FS2/GM1.

Six broad-leaved species occur in FS2/GM1 but not in FS1 (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.

Monitoring 'stops' at eight random locations in FS2/GM1 habitat inside or within c. 50 m of the Proposed Development footprint recorded:

- Three of eight stops failing one of the eight criteria (i.e. cover of common reed was not $\leq 33\%$); and,
- All stops passing all other criteria.

Following O'Neill and Barron (2013), the habitat was considered in unfavourable condition because at least one monitoring stop failed at least one criterion.

None of the *Hydrophilous* tall herb and fern habitats monitored by the NPWS (O'Neill et al., 2013) occur within the potential Zol of the Proposed Development.

7.5 Grassland

7.5.1 Improved Agricultural Grassland (GA1)

There is one field of species-poor grassland, currently cut for silage, immediately west of the Proposed Development. This habitat is dominated by perennial rye-grass *Lolium perenne*, and other artificially seeded species of limited ecological value.

7.5.2 Dry Meadows and Grassy Verges (GS2)

This habitat dominates managed 'meadow' areas of Blackwater Park, and also occurs on elevated (but relatively damper) ground on the margins of the River Blackwater flood plain. Whilst the GS2 habitat in Blackwater Park benefits from being subject to infrequent cutting, it also suffers from lack of management, in that the 'arisings' (i.e. grass cuttings) appear to be left in-situ by park managers. This results in the shading out of forbs and sedges in the sward, and nutrient enrichment which benefits 'weedy' species. Scrub encroachment from eared willow *Salix aurita*, grey willow *Salix cinerea*¹⁴, and the hybrid of these two species (*S. x multinervis*) is also contributing to a rank, species-poor sward.

Within Blackwater Park, the sward is typically dominated by the grasses common bent *Agrostis capillaris*, and Yorkshire fog *Holcus lanatus*.

¹⁴ *Salix cinerea* is referred to hereafter as 'grey willow' for convenience.

7.5.3 Wet Grassland (GS4)

Species-poor wet grassland dominates an intensely grazed field at the northern end of the Proposed Development. The habitat is dominated by soft rush *Juncus effusus*, broad-leaved dock, and other common species of poorly drained intensely managed grassland.

Relatively species-rich wet grassland is limited to the banks of the Blackwater River, above the flood plain. These areas are readily distinguished from FS1 and FS2/GM1 by the dominance of (relatively tall) reeds and sedges in the two latter habitats, compared to (conspicuously) shorter wet grasses in GS4. The habitat is variously dominated by creeping bent, yorkshire fog, velvet bent *Agrostis canina*, and hairy sedge *Carex hirta*. Other species include marsh-woundwort, willowherbs *Epilobium* spp., and meadowsweet *Filipendula ulmaria*.

7.6 Woodland and Scrub

7.6.1 Wet Willow-Alder-Ash Woodland (WN6)

None of the Priority Annex 1 Alluvial Forests monitored and published by the NPWS (O'Neill and Barron, 2013) occur within the Zol of the Proposed Development.

All instances of this habitat within the Zol of the Proposed Development correspond to Priority Annex 1 Alluvial forest. The original coverage of this habitat in the local area has been significantly reduced due to historical drainage of the Blackwater River. The nearest example of this habitat to the Proposed Development comprises a cluster (c. 50 m long by c. 30 m wide) of several (mature) crack willows *Salix fragilis*, located c. 25 m to the west (at its nearest point), on the northern bank of the Blackwater River. Crack willow dominates the canopy, which, despite being a non-native species is an accepted dominant of Annex 1 Alluvial Forest 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 stands of crack willow and the field layer comprises hedge bindweed, nettle, and bramble *Rubus fruticosus* agg. Other species present in the field layer include wild angelica *Angelica sylvestris*, Atlantic ivy *Hedera hibernica*, creeping buttercup and common nettle. The parcel 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 does not require to be present to qualify for this community. Perrin et al (2008) assign this community an 89% fit to Priority Annex 1 Alluvial Forest (refer to Section 7.4). The absence of grey willow is a distinctive feature of this community type.

One other WN6 woodland type with potential fit to Priority Annex 1 Alluvial Forest occurs locally along the River Boyne flood plain, albeit outside the estimated Zol of significant effects. Community type 3b '*Alnus glutinosa* – *Rubus fruticosus*' occurs as a remnant strip of alder *Alnus glutinosa* trees c. 60 m west of the Proposed Development. This community has 56% fit to Priority Annex 1 Alluvial forest according to Perrin et al 2008.

7.6.2 Broadleaved Woodland (WD1)

This habitat occurs within the footprint of the Proposed Development near the 'tie-in' with Ratholdren Road, to the north of Blackwater Park. The majority of the canopy is dominated by (non-native) beech *Fagus sylvatica*, with occasional ash *Fraxinus excelsior*, birch *Betula* sp., and white poplar *Populus alba*. Understorey regeneration, consisting of hazel *Corylus avellana* and hawthorn *Crataegus monogyna* is present in at least some locations. A separate woodland strip nearby, adjoining the boundary of the Electricity Supply Board networks lands is dominated by planted sycamore *Acer pseudoplatanus*. The field layer and ground layers appear to be poorly developed in these plantations due to shading resulting from the dense canopy.

A different belt of plantation woodland runs west to east across Blackwater Park, passing within c. 10 m of the Proposed Development. This area is dominated by early mature ash, alongside wych elm *Ulmus glabra*, and rowan *Sorbus acuparia*. The understorey is dominated by hawthorn and brambles. The densely shaded field layer includes abundant wood dock *Rumex sanguineum*, shield ferns *Polystichum* spp., common nettle, Atlantic ivy, herb-Robert *Geranium robertianum*, and occasional hedge-woundwort *Stachys sylvatica*. Roses were frequent in plantations throughout and identified as dog-rose *Rosa canina*.

7.6.3 Conifer Plantation (WD2)

This habitat occurs at a single location at the northern end of the Proposed Development. It is species-poor and dominated by non-natives; namely a cypress *Chamaecyparis* sp. and lodgepole pine *Pinus contorta*.

7.6.4 Parkland (WD5)

This habitat occurs in amenity areas around the existing Blackwater Park carpark. A number of young ornamental trees occur here and deemed to be of limited ecological value. Species include Japanese larch *Larix kaempferi*, small-leaved elm *Ulmus minor* and (copper) beech *Fagus sylvatica*.

7.6.5 Scrub (WS1)

This habitat occurs as scattered bushes across the Blackwater Park meadow grasslands (GS2), where eared willow, grey willow, and their hybrid dominate. Elsewhere, hawthorn, bramble and/or gorse *Ulex europaeus* scrub is encroaching from hedgerows into unmanaged areas of grassland. There is one area of dense blackthorn *Prunus spinosa*-dominated scrub on the southern bank of the Blackwater River in an area of drier ground elevated above the surrounding flood plain.

7.7 Other Habitats

7.7.1 Hedgerows (WL1)

The hedgerows within and adjacent to the Proposed Development comprise a dense belt of mature hawthorn, punctuated by occasional semi-mature to mature ash. There is a poorly developed ground flora beneath the shade of the dense hawthorn understorey, although some hedges have lush shield ferns, in addition to Atlantic ivy, herb-Robert and several other common hedgerow species such as hogweed *Heracleum sphondylium*. All roses are dog-rose *Rosa canina*. Wild privet *Ligustrum vulgare* was scattered throughout hedges within and adjacent to the Proposed Development.

7.7.2 Recolonising Bare Ground (ED3)

A localized area of sandy disturbed ground occurs near the centre of Blackwater Park in the vicinity of a c. 4 m high vegetated mound originating from historical archaeological excavations. This area is disturbed by recreational mountain-bike users. Searches of this area revealed presence of a number of weedy and dry grassland species typical of dry habitats including wall speedwell *Veronica agrestis*, red bartsia, and red fescue *Festuca rubra* agg..

7.8 Invasive Species

One 'scheduled' invasive species occurs near the Blackwater Park carpark on the Proposed Development; a stand of Japanese knotweed *Fallopia japonica* (c. 5 m diameter stand) occurs next to a public footpath. No other 'scheduled' species were recorded during field surveys.

7.9 Water Quality

The River Blackwater is identified on the EPA map viewer as a drinking water river in accordance with European Communities (Drinking Water) (No. 2) Regulations 207 (SI no. 278/2007); however, it is considered unlikely that there are abstractions downstream of the Proposed Development Site as the river enters the urban area of Navan.

The river has a Water Framework Directive (WFD) Status of 'moderate' (Q3-4), with the general conditions having a 'pass' status. However, the river is deemed 'at risk' (IE_EA_07B011800) by the EPA. The site is underlain by two groundwater bodies (Wilinstown and Trim). Both groundwater bodies are classed as 'at risk' according to the EPA online map viewer, however classed as 'good' under WFD Status 2010 – 2015.

According to the EPA online map viewer, a national water monitoring station (RS07B011700 - BLACKWATER (KELLS) - Railway Br Nevinstown) is located c. 300 m west of the Proposed Development. A second monitoring station is located downstream, (RS07B011790 - 100m d/s New Bypass Br) approximately 740 m east from the Proposed Development.

Records consulted as part of this assessment do not indicate any discharge licences issued under Section 4 of the Local Government (Water Pollution) Act 1977, as amended, in respect of the discharge of trade effluent and / or sewage effluent to surface water or groundwater in the vicinity of the Proposed Development.

Whilst the River Blackwater is not listed as being protected under European Salmonid Waters, c. 1 km east of the Proposed Development, the River Blackwater flows into the River Boyne which is a protected river under European Salmonid Waters.

7.10 Groundwater

According to the GSI spatial resources viewer¹⁵, the Proposed Development is located across three bedrock aquifer units (refer to Chapter 8 (Land and Soil) of the EIAR). The main unit is classed as a poor aquifer, with the bedrock being generally unproductive except for local zones. This relates to the Britstown Formation, Navan Syenite and White Island Bridge Formation. To the east and west of these units, the Meath Formation is regarded as a locally important aquifer with the bedrock being moderately productive in local zones, as is the Lucan formation, which underlies the southern portion of the Proposed Development. Groundwater vulnerability varies in accordance with the variation in superficial and solid geology. Groundwater vulnerability is referred to as 'extreme' (E) surrounding the River Blackwater, with isolated areas of rock at or near surface (X). Further from the river, groundwater vulnerability is 'high' (H), decreasing to 'moderate' (M) with increasing distance. According to the GSI website, there are no groundwater wells on the Proposed Development. The Proposed Development is not located within a groundwater Source Protection Area. In addition, there are no gravel aquifers in the vicinity of the Proposed Development.

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 corresponding habitat alkaline fen was identified within the Zol. This has been informed by best scientific knowledge (i.e. desktop records, published literature sources, online datasets, field surveys, etc.).

7.11 Mobile Species

7.11.1 Birds

7.11.1.1 SCI Kingfisher of the River Boyne and River Blackwater SPA

Kingfisher, an Annex 1 listed bird species of the EU Birds Directive and an SCI of the River Boyne and Blackwater SPA occurs within the Zol of the Proposed Development. There was no optimal vertical soft-substrate nesting habitat for kingfisher within the Zol of the Proposed Development. Kingfisher was recorded on a total of four occasions during vantage point surveys out of a total duration of eight hours of vantage point watch effort from April to June 2018. There were three sightings recorded on 12 June 2018 (overlapped with the latter part of the kingfisher incubation period, and the peak chick-rearing period (BTO, 2005)). Observations consisted of birds commuting along the river corridor. No other behavioral observations such as feeding, perching, or food carrying was recorded on this date. Birds were observed commuting along the river corridor. Aural registrations were also recorded. There was no evidence to suggest an established breeding territory based on observations recorded in the field. No observations were recorded during 2020 field surveys.

A lone individual was recorded perching within the Zol of the Proposed Development on a single occasion during habitat surveys carried out in July 2017 (refer to figure 3; Appendix A). The perching post is located on the southern bank of the Blackwater River within the SPA, on a dead riparian shrub. This perching post is within the footprint of the proposed bridge abutment. Cummins et al. (2010) estimated there were 15-19 kingfisher territories in the River Boyne and Blackwater SAC. 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 Zol of the Proposed Development overlaps only a fraction of a single kingfisher territory, or potentially two territories, if the Zol overlaps the junction of two territories.

There is no credible evidence that kingfisher nest, or regularly feed within the Zol of the Proposed Development. The evidence suggests kingfisher use the Zol occasionally for commuting and foraging purposes.

7.11.1.2 Wintering Birds of Surrounding SPAs

The SCI kingfisher population of the River Boyne and Blackwater SPA are likely to be present within the Zol of the Proposed Development during the non-breeding season. At this time, adult males remain at their summer territories, while females and juveniles commute downstream to coastal areas for enhanced feeding opportunities. There was no optimal habitat for SCIs of surrounding SPAs (i.e. golden plover *Pluvialis apricaria*, Whooper swan *Cygnus cygnus*, etc.). The bird species tend to favour major wetlands (lakes, coastal mudflats, marshes, cutaway bogs, etc.) and open grassland for feeding and roosting. The high level of human activity associated with Blackwater Park, together with the screening of the river corridor, renders the Proposed Development unsuitable for these species. The habitats of the Proposed Development site are deemed to be sub-optimal for the foraging

¹⁵ <http://gis.epa.ie/EPAMaps> accessed September 2019

and roosting preferences of the SCIs of SPAs in the wider surroundings. The Proposed Development is located outside the core foraging range of other wintering bird populations that constitute SCIs of other European sites in the wider surroundings such as Greylag goose *Anser anser*, and pale-bellied brent goose *Branta bernicla* (SNH, 2016).

7.11.2 Bats

The proposed works are outside the range of the lesser horseshoe bat (NPWS, 2019b), which is the only bat species designated as a QI in Ireland. The species is restricted to the western Atlantic seaboard and Co. Meath does not support populations of the species.

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

7.11.4 Invertebrates

No suitable habitat was identified for Ireland's only European protected butterfly species (Annex II; EU Habitats Directive): marsh fritillary, *Euphydryas aurinia*. There was an absence of optimal habitat in the form of the species main food plant, devil's-bit scabious *Succisa pratensis* to support populations of the species. 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 Zol 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 Development site, respectively (data from NPWS, 2019b). The Proposed Development is 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, 2019b), respectively. The proposed works are not within known (extant or historical) catchments of freshwater pearl mussel, which does not occur in the regional area of Co. Meath.

The proposed works are within the favourable reference range of white-clawed crayfish *Austropotamobius pallipes* (NPWS, 2019b), however, the nearest SAC designated for this species is c. 30 km upstream of the proposed works (Mount Hevey Bog SAC; site code 2342).

7.11.5 Fish

7.11.5.1 QI Atlantic Salmon *Salmo salar* (1106)

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., 2015) state 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 advise that Atlantic salmon do successfully migrate upstream past these obstacles, to reach spawning and nursery habitats in the Kells Blackwater. There is suitable nursery and spawning habitat for the species within the Zol of the Proposed Development given the diversity of spawning gravels, deeper pools, and muds present. The EPA has compiled a map of WFD Designated Salmonid Waters under the S.I. No. 293/1988 – European Communities (Quality of Salmonid Waters) Regulations 1988, as amended. The Boyne and Blackwater Rivers are designated WFD Designated Salmonid Waters. Inland Fisheries confirmed that River Blackwater currently has populations of Atlantic salmon. There will be no requirement for any instream works associated with the Proposed Development.

7.11.5.2 QI River Lamprey *Lampetra fluviatilis* (1099)

The footprint of the proposed works is within the River Boyne and River Blackwater SAC which is designated for the QI, river lamprey. There is suitable nursery and spawning habitat for the species within the Zol of the Proposed Development given the diversity of spawning gravels, deeper pools, and muds present. There is presumed to be suitable spawning habitat present for adults, and suitable muds present for river lamprey larvae (or ammocoetes)

in the Blackwater River adjacent to the proposed works. There will be no requirement for any instream works associated with the Proposed Development.

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.

IFI (Gallagher et al., 2015) 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 is not a QI of any SACs within the Boyne Catchment Management Unit (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.

7.11.5.3 Summary of Relevant Fish Populations

In summary:

- River lamprey, a QI of the River Boyne and River Blackwater River SAC is known to be present in the Kells Blackwater River within the Zol of the proposed works. Taking into account field observations of instream habitats present, river lamprey populations could potentially include spawning and larval populations.
- Atlantic salmon, QI of the River Boyne and River Blackwater SAC are presumed present in the Kells Blackwater River within the Zol of the Proposed Development. Taking into account field observations of instream habitats present, Atlantic salmon populations could include both spawning and nursery populations.

7.11.6 Other QI Species

There is no potential for other mobile QIs (i.e. estuarine / marine species, etc.) to occur within the Zol of potentially significant effects from the proposed works.

8. Appropriate Assessment

8.1 Step 1: Information Required

8.1.1 Information on the Proposed works

The proposed works have been described in Section 5.

8.1.2 Information on European Sites

Having regard to the Zols in Table 1, which were developed from the Project Description in Section 5, there are two European sites within the Zol of the Proposed Development: River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. The Proposed Development comprises the construction of a new bridge at the River Blackwater and overlaps both the River Boyne and River Blackwater SAC and SPA at this crossing point.

The Boyne Coast Estuary SPA (NPWS Side Code: 004080) and The Boyne Coast and Estuary SAC (NPWS Site Code: 001957) are hydrologically connected to the Proposed Development site and occur c. 34 km and 35 km downstream respectively. Both sites have been screened out on the basis that there will be no requirement for instream works associated with the Proposed Development. This review also takes into consideration the core foraging ranges for mobile species associated with the SCIs of the Boyne Coast Estuary SPA (with reference to core ranges of winter birds in line with the SNH Guidance Document, *Assessing Connectivity with Special Protection Areas (SPAs)* (SNH, 2016)) and the QIs of the Boyne Coast Estuary SAC, the separation distance and dilution factor.

This judgement has been informed by review of best available scientific knowledge on the known and potential distribution of European site designation features.

8.1.3 Source-Pathway-Receptor Links Identified

8.1.3.1 Construction-Phase (Pathways Identified)

In the absence of mitigation, the Proposed Development could have a range of potential impacts on the QIs /SCIs of European sites within the Zol during the construction phase. Significant potential impacts during construction include habitat loss, habitat deterioration, disturbance (i.e. visual, vibration and noise, temporary barriers to connectivity, etc.) and the potential for the release of pollutants and contaminants (i.e. suspended solids, oils, fuels, paints, concrete, lime, etc.) to receiving watercourses. A number of factors influence the potential significance of impacts including vulnerability of individual receptors concerned (e.g. condition of vegetation; or 'fitness' of fauna populations), time of year and lifecycle stage of a species impacted, and the potential for unforeseen events such as extreme weather (including flooding of working areas), or introduction of invasive species to exacerbate predicted impacts.

In the absence of mitigation measures, construction phase impacts have the potential to disturb a range of habitats and protected species throughout duration of construction.

The overall construction duration of the Proposed Development will be approximately 15 – 18 months. The earthworks construction will involve the excavation and placement of materials for the construction of embankments as well as the hauling and importation of materials to complete the sub-formation and road formation. The construction of the structures will involve the delivery of fill materials. The civil works of relevance to the ecological environment include the following activities:

- Preliminary works, including clearance, levelling, site roads/pedestrian access and establishment of lay-down and fabrication area;
- Construction of bridge and abutment structures;
- Drainage works - the installation of pipes, culverts, surface water channels, filter drains, ditches and attenuation systems; and,
- Landscaping and reinstatement.

The main materials that will be imported to/from the site or hauled within the site in bulk include:

- Earthwork materials, including topsoil, general fill material, soft soils, rock and capping materials;
- Pavement materials, including granular sub-base material and bituminous pavement materials;
- Concrete precast units such as concrete bridge beams, concrete deck sections, pipes, culverts and headwalls;
- Steel reinforcement for concrete works; and,
- Other materials required including fencing materials, plants, ducting etc.

Significant short-term impacts are predicted on a number of QIs of the River Boyne and River Blackwater SAC and the SCIs of the River Boyne and River Blackwater SPA during the construction phase. Impacts and effected pathways are discussed further in this section.

8.1.3.1.1 Pollution

QI River Lamprey, Atlantic Salmon, Otter, Alluvial Forest (River Boyne and River Blackwater SAC); and SCI Kingfisher (River Boyne and River Blackwater SPA)

Surface Water

Potential pollution effect pathways (arising during construction works) have been identified with the Proposed Development and both the River Blackwater SAC and the River Boyne and River Blackwater SPA.

In the absence of appropriate mitigation, any construction activities carried out close to surface waters (i.e. River Blackwater) involve a risk of pollution due to accidental spillage and leaks. Whilst liquids such as oils, lubricants, paints, bituminous coatings, preservatives and weed killers present the greatest risk, fuel spillages from machinery operating close to watercourses also present a risk. Other risks associated with the Proposed Development include the use of lime and concrete and the release of sediments and suspended solids to surface waters during construction works (i.e. runoff associated with material stockpiles, excavations, site stripping and bulk earthworks, etc.). The refueling of general construction plant also poses a significant risk of pollution, depending on how and where it is carried out. Pollution as a result of accidental spillage could potentially affect the QIs and SCI species of the River Boyne and River Blackwater SAC and SPA that could have a dramatic effect on prey availability such as invertebrate communities. The potential risk associated with the transport and mobilization of sediment due to excavation of soil could also potentially impact on freshwater ecology of watercourses downstream. A reduction in water quality due to sedimentation could affect hydrochemistry, impair plant growth and impact on salmonid and lamprey spawning habitat downstream (if present). This could have knock on negative impacts on the QI species (river lamprey, Atlantic salmon, otter of the River Blackwater and River Boyne SAC and SCI kingfisher of the SPA).

Accidental spillage may potentially result in a direct and/or indirect impact to surface water should contaminants enter surface waters directly. Potential pollutants such as silt and/or contaminants including oils, fuels, paints, lubricants, and/or concrete washings can originate from the construction phase. These pollutants have the potential to enter the flood plain and the River Blackwater during the construction phase, pollutants may be carried to the flood plain and the QI habitats within, as well as the River Blackwater, with surface water run-off aided by the downward nature of the river bank. It should be noted that the Proposed Development adopts a clear span bridge structure and eliminates the requirement for instream works.

There is separately, a risk of pollutants entering the 'Windtown Stream' (drainage ditch) and being carried downstream into the River Blackwater. Silt and/or contaminants including oils, fuels, paints, lubricants, and/or concrete washings could have potentially significant pollution impacts on water quality or the physical structure of the river bed. These potential impacts could significantly affect spawning habitats for QI Atlantic salmon and river lamprey of the River Boyne and Blackwater SAC, reduce available invertebrate prey for QI Atlantic salmon, and/or reduce available fish prey of river lamprey. Any significant impacts on fish or water quality in the Blackwater River could also significantly affect QI otter and SCI kingfisher. Taken together and subject to the types and volumes of contaminants concerned, potential impacts to the River Boyne and Blackwater SAC/SPA, from the pollution pathway via this drainage feature and could be significant in the short to medium term.

Groundwater

In the absence of appropriate mitigation, the "Land and Soil" Chapter (Chapter 8) of the EIAR prepared for the Proposed Development has identified potential pollution effects to groundwater and soils. Specifically, potential risks were identified in the event of an accidental spillage associated with fuels, chemicals, lime and concrete (i.e. concreting during road and bridge construction and concreting for culverts). This may result in impacts on soils and groundwater underlying the Proposed Development if inappropriately handled or stored during the construction

phase. Potential contaminants could migrate through the subsoils and impact underlying groundwater. Applying the Precautionary Principle, such pollution could occur during the early stages of construction in each phase resulting in soil and/or groundwater contamination migrating into nearby receiving waters within the River Blackwater SAC and/or River Boyne and Blackwater SPA.

As such, whether by surface and/or groundwater pathways, contaminants could enter, and affect the distribution of features of the River Blackwater SAC (QI river lamprey, otter and Atlantic salmon) and SCI species, kingfisher of the River Boyne and Blackwater SPA. This potential impact is further assessed against the conservation objectives of the River Boyne and River Blackwater SAC and SPA (refer to Section 8.2).

8.1.3.1.2 Disturbance

QI River Lamprey and Atlantic Salmon (River Boyne and River Blackwater SAC)

Piling of bridge abutments may be required within c. 20 m of spawning and/or nursery habitats for QI Atlantic salmon and river lamprey of the River Boyne and Blackwater SAC. Sound from drilling will be emitted both through the water column as a sound pressure wave and through the ground as vibration. There will be no requirement for instream works associated with the Proposed Development (the Proposed Development adopts a clear span bridge structure and there are no instream works in the River Blackwater).

Atlantic salmon possess a swim bladder which enhances hearing sensitivity, as the bladder acts to convert sound pressure to vibrations (Baxter, 1981). Strong avoidance behaviour to noise has been shown by some salmonid species (Nedwell et al., 2003). Lamprey species lack a swim bladder and some species have been shown to be tolerating relatively low pressures without ill affect (Colotelo et al., 2012). However, there is lack of evidence regarding the potential sensitivity of lamprey to noise disturbance. Applying the Precautionary Principle, the potential for significant short-term disturbance impacts to Atlantic salmon and river lamprey from construction is assumed to be significant within the locality of proposed construction works. This potential impact on QI Lamprey and QI Salmon is further assessed against the conservation objectives of the River Boyne and River Blackwater SAC (refer to Section 8.2).

QI Otter (River Boyne and River Blackwater SAC)

Piling of bridge abutments, and noise and visible presence from construction staff and machinery could displace foraging or commuting QI otter of the River Boyne and Blackwater SAC if the species was present during construction. Potential displacement impacts to foraging otter would be limited to local level for the duration of construction (i.e. short-term).

NRA (2006) guidelines advocate minimum setback distances of 150 m from otter breeding sites during construction works. No otter breeding or resting sites were identified within the Zol during surveys informing the EIAR and this NIS. However, the species could establish new above-ground 'couches' or below-ground holts in the interim (between the completion of mammal surveys informing the EIAR and NIS on 23 November 2017, 18 May 2018 and 25 May 2020 and the start date of construction). Should new holts become established within the Zol prior to construction, piling and associated disturbance (i.e. noise, vibration and artificial lighting generated during construction) could result in disturbance to otter, potentially resulting in population-level impacts. There will be no requirement for instream works associated with the Proposed Development and will therefore not serve as a temporary barrier to connectivity to the species using the River Blackwater. In the absence of mitigation and applying the Precautionary Principle, there is potential for significant short-term disturbance related impacts during the construction phase. This potential impact on QI otter is further assessed against the conservation objectives of the River Boyne and River Blackwater SAC (refer to Section 8.2).

SCI Kingfisher (River Boyne and River Blackwater SPA)

Piling of bridge abutments, and noise and visible presence from construction staff and machinery activity could displace foraging or commuting SCI kingfisher of the River Boyne and River Blackwater SPA, if present during construction. Potential displacement impacts to foraging kingfisher would be limited to local level for the duration of construction (i.e. short-term). There will be no requirement for instream works associated with the Proposed Development.

No kingfisher nest sites were identified within the Zol during surveys informing the EIAR and this NIS. However, SCI kingfisher could establish new nesting holes in the interim (between the period of completion of bird surveys informing the EIAR and NIS in May 2020 and the start date of construction). Should nests become established within the Zol prior to construction, piling and associated disturbance (i.e. noise, vibration and visual generated during construction) could result in injury to kingfisher and/or young, potentially resulting in population-level impacts of the SPA. The Proposed Development may also serve as a temporary barrier to connectivity should the species

utilise the terrestrial habitats of the Proposed Development site for foraging and commuting. In the absence of mitigation and applying the Precautionary Principle, there is potential for significant short-term disturbance related impacts during the construction phase. This potential impact on SCI kingfisher is further assessed against the conservation objectives of the River Boyne and River Blackwater SPA in Section 8.2.

8.1.3.1.3 *Habitat Loss*

QI Alluvial Forest (River Boyne and River Blackwater SAC)

Land-take with respect of the River Boyne and River Blackwater SAC and SPA boundaries during the construction phase will be restricted to non-QI habitats of local importance (i.e. Dry meadows and grassy verges (GS2), Wet grassland (GS2), Broadleaved Woodland (WD1), Mixed broadleaved/conifer woodland (WD2), Scrub (WS1), Reed and large sedge swamp (FS1), Hedgerows (WL1) and Treelines (WL2)). The habitats onsite are common and widespread. There will be no loss of any QI habitat of the River Boyne and River Blackwater SAC. The Proposed Development has been designed to avoid QI Priority Alluvial Forest habitats of the River Boyne and Blackwater SAC. The Priority Annex 1 Alluvial Forest in the vicinity of the Proposed Development is highly fragmented (comprising a single species canopy layer in the only two instances c. 25 m removed from the Proposed Development). In addition, the Proposed Development adopts a clear span bridge structure and eliminates the requirement for instream works to result in direct impacts on secondary habitats that support QI Atlantic salmon, river lamprey and Otter of the SAC and SCI kingfisher of the SPA.

SCI Kingfisher (River Boyne and River Blackwater SPA)

The River Boyne and River Blackwater SPA is not formally designated for any bird habitat SCIs, however; a riparian (dead shrub) perching post used by kingfisher for feeding in July 2017 will be permanently removed. It appears reasonable to state that abundant alternative suitable habitat (i.e. riparian features offering perching opportunities) currently exist within the affected kingfisher foraging area and is likely to cover an area of ten linear kilometers. It is assumed that storm damage and fast flows result in the creation and destruction of perching post features on a regular basis. The loss of this perching post is likely to be significant at a local scale in the short-term.

8.1.3.1.4 *Habitat deterioration*

QI Alluvial Forest (River Boyne and Blackwater SAC)

The main negative impacts recorded in QI Priority Alluvial Forest habitat nationally are the spread of invasive species and "over-vigorous native species" (O'Neill and Barron, 2013).

In the absence of mitigation, there is potential for the introduction and dispersal of scheduled invasive species into the river corridor of the River Boyne and Blackwater SAC and SPA. Japanese knotweed, which is present within 30 m of the Proposed Development at Blackwater Park, could if spread within the SAC (e.g. via vehicle tyre treads, machinery, construction personnel, etc.), lead to erosion of bankside habitats (via shading out of the field and ground layers), and/or shading out of positive indicator species of QI Priority Alluvial Forest habitat, with potential impacts to the River Boyne and Blackwater SAC. Potential also exists for habitat deterioration in the form of littering/dumping of waste generated onsite and site access.

There is also the risk of the introduction and dispersal of problematic native species in the course of carrying out earthworks in the vicinity of the River Boyne and Blackwater SAC. For instance, the field layer of QI Priority Alluvial Forest habitat could become dominated by common nettle (which is a positive indicator species of this habitat at lower frequency) due to localized nutrient enrichment associated with run-off during construction.

In the absence of mitigation and appropriate control measures, potential impacts could result in significant long-term impacts. This potential impact on QI Alluvial Forest is further assessed against the conservation objectives of the River Boyne and River Blackwater SAC in Section 8.2.

8.1.3.2 *Operational Phase Impacts*

In the absence of mitigation and appropriate control measures, the Proposed Development could have a range of potential impacts on the QIs/SCIs of European sites within the ZOI during the operational phase. Significant potential impacts during the operational phase include pollution, habitat loss, habitat deterioration (altered flood regime), barriers to connectivity, disturbance, bird strike risk, mortalities due to collisions (road casualties) and artificial lighting. Potential impacts during the operational phase, in the absence of adequate management and mitigation measures are as follows:

8.1.3.2.1 Pollution

QI River Lamprey, QI Otter and QI Atlantic Salmon (River Boyne and River Blackwater SAC); and SCI Kingfisher (River Boyne and River Blackwater SPA)

No permanent drainage infrastructure for the Proposed Development will be at risk of flooding, even considering the 1:1000 year Annual Exceedance Probability (AEP) flood level (i.e. the 0.1% AEP; alternatively described as the “low probability” flood extent in the CFRAM dataset), in the ‘high-end’ future scenario (i.e. accounting for a 30% increase in rainfall associated with climate change). As such there is no risk of the operational drainage system being flooded.

The support abutment of bridge is located within the flood plain. Hydraulic modelling demonstrated there is limited potential to impact on the flood regime of the River Blackwater thus flood storage and the morphology of the river channel will not be impacted.

There is potential for adverse impacts on water quality during the operational phase associated with siltation of storm water drainage system and attenuation pond; and infiltration of contaminated groundwater into the surface water network. Routine road runoff from the operation of the Proposed Development has the potential to impact on water quality in receiving watercourses including the River Blackwater that could potentially impact on QI River Lamprey, QI Otter and QI Atlantic Salmon and SCI Kingfisher due to the presence of a range of contaminants, typically including hydrocarbons, suspended solids and de-icing agents. In the absence of mitigation, there is the potential for significant impacts associated with accidental spills and leaks to occur from vehicles using the Proposed Development during its operation. This potential impact is further assessed against the conservation objectives of the River Boyne and River Blackwater SAC and SPA in Section 8.2.

The impacts and effects as a result of changes in air pollutant concentrations has been assessed for the Proposed Road Development in Chapter 10. The assessment has concluded that there would be no instance under any of the scenarios considered where a receptor is predicted to be exposed to annual mean concentrations higher than the National Air Quality Standard value for Nitrogen Dioxide (NO₂) and Particulate Matter (PM₁₀ and PM_{2.5}). No impacts are foreseen with regard to air pollutants on ecological receptors.

8.1.3.2.2 Habitat Loss

QI Alluvial Forest (River Boyne and River Blackwater SAC)

The Proposed Development will not pose any risk of (indirect) shading of QI Priority Annex 1 Alluvial Forest habitat in the River Boyne and River Blackwater SAC, due to the separation distance between the nearest proposed infrastructure (i.e. proposed cut-off wall) and the nearest area of this habitat type (which is c. 25 m west of the Proposed Development on the northern bank of the Blackwater River).

QI River Lamprey and QI Atlantic Salmon (River Boyne and River Blackwater SAC)

The proposed bridge structure is 16 m in width and will cast a permanent shadow on the underlying river bed. Bridges can cause shading of the river bank and bed thereby potentially altering the aquatic flora present in the river bed (Environment Agency, 2002). Cocchiglia et al., (2012) reports that tree and shrub canopies provide shade and regulate watercourse temperatures that benefit fish populations. The shading effect of bridges can benefit fish by providing optimal cover and feeding opportunities (United States Federal Highway Administration, 1985). Shading associated with the proposed bridge crossing at the River Blackwater will not result in habitat loss or displacement of QI Atlantic salmon and QI lamprey species during the operational phase.

8.1.3.2.3 Habitat Deterioration (Altered Flood Regime)

River Boyne and River Blackwater SAC & SPA

The results of the bespoke hydraulic modelling (which takes account of local topography and is more accurate than CFRAM mapping) displayed a maximum increase of 0.008 m in the water level immediately upstream for all bridge options and no change was indicated in the water level immediately downstream of the proposed bridge for a 1%AEP event (accounting for climate change). It was concluded from the results of the hydraulic modelling that the development of the bridge would have limited impact on the flow and water levels.

Under the bespoke hydraulic modelling developed for the project (accounting for climate change), the following abutment areas will be within the 1% AEP extent

- C. 250 m² of the abutment on the northern bank of the Blackwater River; and,
- C. 20 m² of the abutment on the southern bank of the Blackwater River.

The project design team has verified that potential flood regime changes will not result in significant changes to the frequency or intensity of flooding at Priority QI Alluvial Forest habitat locations (the nearest of which is approximately 22 m from the Proposed Development at its nearest point).

8.1.3.2.4 Disturbance

8.1.3.2.5 SCI Kingfisher and QI Otter, Salmon and River Lamprey (River Boyne and Blackwater SAC / SPA)

The presence of cyclists and pedestrians (both of which are unpredictable forms of disturbance), artificial lighting and to a lesser extent the presence of cars (a predictable disturbance) associated with the proposed bridge crossing poses a potential risk of displacing foraging and commuting QI otter, commuting QI river lamprey and QI salmon; and/or foraging SCI kingfisher. The effects of disturbance displacement are expected to decrease over time as birds, fish and mammals adjust to the new habitat configuration. This habituation may lead to some alterations in bird foraging behaviour (Welty, 1987). Artificial light can increase luminance levels in natural areas which could affect ecological functions. The location of inappropriate lighting could result in displacement disturbance impacts. In the absence of mitigation and appropriate control measures, potential impacts could result in significant long-term impacts. This potential impact is further assessed against the conservation objectives of the River Boyne and River Blackwater SAC and SPA in Section 8.2.

8.1.3.2.6 Barrier to Connectivity

SCI Kingfisher (River Boyne and River Blackwater SPA)

There is adequate 'free-board' (ca. 2.4 m) above the 1% AEP flood level (1:100 year) for passage of SCI kingfisher beneath the proposed bridge crossing. No SCI kingfisher nest sites were identified within or in the immediate surroundings of the Proposed Development.

There is potential for artificial light to spill onto the River Blackwater associated with the Proposed Development during hours of darkness. The location of inappropriate lighting during the operational phase could cause disturbance or a barrier to connectivity on foraging and commuting SCI kingfisher. In the absence of mitigation and appropriate control measures, potential impacts could result in significant long-term impacts. This potential impact on SCI kingfisher is further assessed against the conservation objectives of the River Boyne and River Blackwater SPA in Section 8.2.

QI River Lamprey, Salmon and Otter (River Boyne and River Blackwater SAC)

The proposed bridge abutments are located at setback distances of 10 m and 7.5 m respectively from the river corridor. This area will be maintained in a natural state (except for the requirement of a temporary cut off wall during the construction phase). A mammal ledge above the 1% AEP (1:100 year) has been incorporated into the design of the proposed bridge crossing, to avoid any potential for severance impacts to commuting Otter to cater for flood events at the 1% AEP (1:100 year). No otter breeding sites or resting places were identified within or in the immediate surroundings of the Proposed Development. No potential significant impacts associated with barrier to connectivity or severance risks are predicted on QI otter.

There is potential for artificial light to spill onto the River Blackwater associated with the Proposed Development during hours of darkness. The location of inappropriate lighting during the operational phase could cause disturbance or a barrier to connectivity on QI Atlantic salmon, QI river lamprey and QI otter. Mitigation is therefore required to ensure that lighting associated with the operational phase of the project does not affect movements or spawning migrations of Atlantic salmon, river lamprey and otter.

In the absence of mitigation and appropriate control measures, potential impacts could result in significant long-term impacts. This potential impact on QI salmon, river lamprey and Otter of the SAC is further assessed against the conservation objectives of the River Boyne and River Blackwater SAC in Section 8.2.

8.1.3.2.7 Bridge Strike Risk

SCI Kingfisher (River Boyne and River Blackwater SPA)

Kingfisher foraging behaviour (involving visual identification of fish prey in water) is largely restricted to daylight hours. Collision with man-made objects including bridges has not been identified as a known threat to Irish kingfisher populations (Cummins et al., 2010; NPWS, undated). The BTO's Ringing Scheme for historical ringing recoveries of dead or injured birds (containing over 3,000 records) does not contain any records for kingfisher assigned 'circumstance codes' relating to strikes with man-made objects. Kingfisher typically establish vertical nest banks at 1-2m in height above the water level (Cummins et al., 2010). It is assumed that the species typical flight heights fall within this range when foraging and commuting along river corridors. The proposed bridge will be 2.4

m above the water level and will provide sufficient free board for the passage of SCI Kingfisher. The evidence base indicates there is unlikely to be significant risk of collision impacts to SCI kingfisher from the proposed bridge crossing and operating traffic of the River Boyne and Blackwater SPA.

8.1.3.2.8 Mortalities due to collisions (road casualties)

QI Otter (River Boyne and River Blackwater SAC)

There is the potential for accidental otter fatalities with vehicles as individuals attempt to cross the new road development from watercourses and adjoining terrestrial habitats. New autoroutes and bridges are not a significant threat (due in part to modern construction requirements), however existing roads will continue to threaten otter populations (NPWS, 2007a). Furthermore, the project avoids any requirement for instream works and interference of the River Blackwater and will not impede commuting and foraging otter using this river corridor during both the construction and operational phase of the Proposed Development.

8.1.4 Identification of Relevant QIs and SCIs

8.1.4.1 River Boyne and River Blackwater SAC

The relevant QIs of the River Boyne and Blackwater SAC for which source-pathway-receptor links were identified with the Proposed Development are presented in Table 2. Table 2 should be read in conjunction with identified pathways in Section 8.1.3.

Table 2. Identification of links with QIs of River Boyne and River Blackwater SAC

| QI (s) (* = priority habitats) | Within Zone of Influence with Potential for Adverse Effects | Source-Pathway-Receptor Link |
|--|--|--|
| River lamprey (<i>Lampetra fluviatilis</i>) and Atlantic salmon (<i>Salmo salar</i>) | No comprehensive mapping has been completed by the NPWS or Inland Fisheries Ireland of spawning or nursery habitats for any of these species; but all are presumed present in the River Blackwater within the Zone of Influence of adverse effects from the Proposed Development. Both species spawn in freshwater habitats. | <ul style="list-style-type: none"> Yes - Pollution has been identified as an existing pressure and threat to both species (NPWS, 2019b). There is potential for adverse impacts to receiving watercourses (i.e. River Blackwater) impacting on both species arising from activities linked to the potential release of silt, sediment, oils, grit, lime, concrete or other potential contaminants generated during the proposed works. There is potential for disturbance related impacts on Atlantic salmon and river lamprey associated with noise, vibration and construction personnel (within proximity to the River Blackwater) during construction works (i.e. piling of bridge abutments). |
| Otter (<i>Lutra lutra</i>) | No breeding or resting sites have been identified within the Zol of the proposed works (including distances extending to 150 m). However, foraging and commuting individuals are presumed to at least occasionally utilise and occur within the Zol of the proposed works. Suitable habitat exists in the form of the River Blackwater and associated riparian bankside vegetation. | <ul style="list-style-type: none"> Yes – Pollution has been identified as an existing pressure and threat to otter (NPWS, 2019b). There is potential for adverse impacts to receiving watercourses (i.e. River Blackwater) impacting on the species arising from activities linked to the potential release of silt, sediment, oils, grit, lime, concrete or other potential contaminants generated during the proposed works. There is potential for disturbance related impacts on otter associated with noise, vibration and construction personnel (within proximity to the River Blackwater) during construction works (i.e. piling of bridge abutments) |
| 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). Field surveys have not identified alkaline fen within at least 150 m of the proposed works, i.e. within the Zol. This review has been informed through desktop studies (i.e. online datasets, published reports, etc.). | None – QI Alkaline Fen does not occur within the Zol of potential significant adverse effects. |
| Alluvial Forest* | Alluvial Forest habitat has been identified and mapped and occurs c.25 m from the | <ul style="list-style-type: none"> Yes – Although the proposed works avoid QI Alluvial Forest, there remains potential for accidental damage from construction personnel |

proposed works and therefore within the
Zol of potential significant adverse effects.

and equipment (e.g. during access, egress, or
temporary storage).

- 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 (2019a).
- Solid garbage is a threat identified by the NPWS in latest national conservation status assessment NPWS (2019a). This habitat is at risk from indirect (deterioration) from littering/dumping during the proposed works.
- Japanese knotweed is present within the Zol of the proposed works. Tyre treads associated with machinery accessing and exiting the construction site could, in the absence of mitigation and appropriate biosecurity measures, result in the introduction and dispersal of seed from invasive species into the river flood plain and Alluvial Forest habitats

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 and presented in Table 3.

Table 3. Identification of Linkages with SCIs of the River Boyne and River Blackwater SPA (Site Code 004232)

| SCI (s) | Distance to Proposed works | Source-Pathway-Receptor Linkage? |
|---------------------------------|--|---|
| Kingfisher <i>Alcedo atthis</i> | Kingfisher feeding and commuting habitat is located within the Zol of the proposed works. No established nest sites were identified. | <ul style="list-style-type: none"> ▪ There is potential for contaminants generated during the proposed works to be transported and mobilised to the River Blackwater, thereby reducing prey availability for kingfisher. ▪ Whilst no kingfisher nest sites have been identified, the species is known to forage and commute within the Zol. There is potential for disturbance related impacts (i.e. noise, vibration, lighting, construction personnel, etc.) during construction phase. ▪ A perching post has also been identified within c. 25 m of the proposed works. There is potential for habitat loss of this perching post associated with the proposed works. |

8.1.4.2 Summary Descriptions of Relevant European Sites

The NPWS site synopsis for the River Boyne and River Blackwater SAC (NPWS, 2014) summarises 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”.

8.1.4.3 Conservation Status of Relevant Features of European sites

8.1.4.3.1 River Boyne and River Blackwater SAC

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. QIs which have already been scoped out (i.e. Alkaline fens) are not included.

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

| Qualifying Interest (s) (*denotes Priority habitat) | Site-Level Status (NPWS, 2017a) | National Status (NPWS, 2019a and b) | Primary Site-level Threats from Proposed works (Professional Judgement applied to NPWS, 2017a) | Other National Threats from NPWS, (2019a & 2019b) and Natura Standard Data Form (NPWS 2017a) (H (High), M (Medium), L (Low)). |
|---|---------------------------------|-------------------------------------|--|--|
| Atlantic salmon | Moderate | Unfavourable (inadequate) | Discharges & Disturbance | <p>NPWS (2019b) - A26 Agricultural activities generating diffuse pollution to surface or ground waters (H), G19 Other impacts from marine aquaculture, including infrastructure (H), K05 Physical alteration of water bodies (H), N01 Temperature changes (e.g. rise of temperature & extremes) due to climate change (H), A25 Agricultural activities generating point source pollution to surface or ground waters (M), B23 Forestry activities generating pollution to surface or ground waters (M), F12 Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water (M), F28 Modification of flooding regimes, flood protection for residential or recreational development (M), G11 Illegal harvesting, collecting and taking (M), I02 Other invasive species (other than species of Union concern) (M).</p> <p>The Natura 2000 Standard Data Form identifies the following threats and pressures within the SAC: (NPWS 2017a) - J02.11.01 Sea defences (M), C01.01 Gravel extraction (M), A10.01 removal of hedges and copses or scrub (M), E02 Industrial or commercial areas (H), G05.06 closures of caves or galleries (L), A05.02 stock feeding (M), E05 Storage of materials (M), J02.15 human induced changes in hydraulic conditions (H), I01 invasive non-native species (H), D01.02 roads, motorways (M), G02.10. Management aquatic/ bank vegetation for drainage (M), B01.02 artificial planting on open ground (non-native trees) (M), E03.02 disposal of industrial waste (M), H01 Pollution to surface waters (limnic & terrestrial) (H), G01 Outdoor sports and leisure activities, recreational activities (L), E01.04 other patterns of habitation (M), D01.05 bridge, viaduct (L), G05 Other human intrusions and disturbances (L), J02.10 management of aquatic and bank vegetation for drainage purposes (M) and A08 Fertilisation (M).</p> |
| Otter | Excellent | Favourable | Discharges & Disturbance | <p>The NPWS species assessment report (NPWS 2019b) does not list any threats or pressures in relation to otter.</p> <p>The Natura 2000 Standard Data Form identifies the following threats and pressures within the SAC: (NPWS 2017a) - J02.11.01 Sea defences (M), C01.01 Gravel extraction (M), A10.01 removal of hedges and copses or scrub (M), E02 Industrial or commercial areas (H), G05.06 closures of caves or galleries (L), A05.02 stock feeding (M), E05 Storage of materials (M), J02.15 human induced changes in hydraulic conditions (H), I01 invasive non-native species (H), D01.02 roads, motorways (M), G02.10. Management aquatic/ bank vegetation for drainage (M), B01.02 artificial planting on open ground (non-native trees) (M), E03.02 disposal of</p> |

| Qualifying Interest (s) (*denotes Priority habitat) | Site-Level Status (NPWS, 2017a) | National (NPWS, and b) | Status 2019a | Primary Site-level Threats from Proposed works (Professional Judgement applied to NPWS, 2017a) | Other National Threats from NPWS, (2019a & 2019b) and Natura Standard Data Form (NPWS 2017a) (H (High), M (Medium), L (Low)). |
|---|---------------------------------|------------------------|--------------|--|--|
| | | | | | industrial waste (M), H01 Pollution to surface waters (limnic & terrestrial) (H), G01 Outdoor sports and leisure activities, recreational activities (L), E01.04 other patterns of habitation (M), D01.05 bridge, viaduct (L), G05 Other human intrusions and disturbances (L), J02.10 management of aquatic and bank vegetation for drainage purposes (M) and A08 Fertilisation (M). |
| River lamprey | Moderate | Unknown | | Discharges & Disturbance | <p>NPWS (2019b) - D02 Hydropower (dams, weirs, run-off-the-river), including infrastructure (H), N03 Increases or changes in precipitation due to climate change (H), A19 Application of natural fertilisers on Agricultural land (M), A20 Application of synthetic (mineral) fertilisers on agricultural land (M), A31 Drainage for use as agricultural land (M), E03 Shipping lanes, ferry lanes and anchorage infrastructure (e.g. canalisation, dredging) (M), N01 Temperature changes (e.g. rise of temperature & extremes) due to climate change (M), N02 Droughts and decreases in precipitation due to climate Change (M).</p> <p>The Natura 2000 Standard Data Form identifies the following threats and pressures within the SAC: (NPWS 2017a) - J02.11.01 Sea defences (M), C01.01 Gravel extraction (M), A10.01 removal of hedges and copses or scrub (M), E02 Industrial or commercial areas (H), G05.06 closures of caves or galleries (L), A05.02 stock feeding (M), E05 Storage of materials (M), J02.15 human induced changes in hydraulic conditions (H), I01 invasive non-native species (H), D01.02 roads, motorways (M), G02.10. Management aquatic/ bank vegetation for drainage (M), B01.02 artificial planting on open ground (non-native trees) (M), E03.02 disposal of industrial waste (M), H01 Pollution to surface waters (limnic & terrestrial) (H), G01 Outdoor sports and leisure activities, recreational activities (L), E01.04 other patterns of habitation (M), D01.05 bridge, viaduct (L), G05 Other human intrusions and disturbances (L), J02.10 management of aquatic and bank vegetation for drainage purposes (M) and A08 Fertilisation (M).</p> |
| Alluvial Forest* | Moderate | Unfavourable (bad) | | Discharges & Disturbance. | <p>NPWS (2019a) - I02 Other invasive alien species (other than species of Union concern) (H), I04 Problematic native species (M), B09 Clear-cutting, removal of all trees (M), I05 Plant and animal diseases, pathogens and pests (M).</p> <p>The Natura 2000 Standard Data Form identifies the following threats and pressures within the SAC: (NPWS 2017a) - J02.11.01 Sea defences (M), C01.01 Gravel extraction (M), A10.01 removal of hedges and copses or scrub (M), E02 Industrial or commercial areas (H), G05.06 closures of caves or galleries (L), A05.02 stock feeding (M), E05 Storage of materials (M), J02.15 human induced changes in hydraulic conditions (H), I01 invasive non-native species (H), D01.02 roads, motorways (M), G02.10. Management aquatic/ bank vegetation for drainage (M), B01.02 artificial planting on open ground (non-native trees) (M), E03.02 disposal of industrial waste (M), H01 Pollution to surface waters (limnic & terrestrial) (H), G01 Outdoor sports and leisure activities, recreational activities (L), E01.04 other patterns of habitation (M), D01.05 bridge, viaduct (L), G05 Other human intrusions and disturbances (L), J02.10 management of aquatic and bank vegetation for drainage purposes (M) and A08 Fertilisation (M).</p> |

8.1.4.3.2 River Boyne and River Blackwater SPA

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 source: Birdlife International (2018) |
|------------|---------------------------------|---|---|--|--|
| Kingfisher | Moderate | Decrease | Decrease | Discharges & Disturbance | Hard winters, canalization of streams and clearance of emergent vegetation to 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)

8.2 Step 2: Conservation Objectives

8.2.1 River Boyne and River Blackwater SAC

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 and also assesses the potential significant adverse impacts.

Conservation Objectives

Only generic Conservation Objectives have been prepared for the River Boyne and River Blackwater SAC (NPWS, 2018) for QI Priority Alluvial Forest, 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"*.

Site specific attributes and targets to provide for favourable conservation condition of the relevant QI for the River Boyne and River Blackwater SAC are not available (www.npws.ie). Generic attributes that have been prepared for other similar SACs (applicable to the QIs subject to this assessment) were considered and applied to the assessment of potential adverse impacts on QIs associated with the Proposed Development and are assessed in Table 6.

Table 6. Potential Impacts on Attributes of the River Boyne and River Blackwater SAC

| Relevant Qualifying Interest (QI Code) | Conservation Objective | Attributes Potentially Affected by Proposed Development* | Assessment of Potential Significant Adverse Impacts |
|--|---|--|---|
| Atlantic salmon (1106) | Restore the favourable conservation condition of the Annex II species | <ul style="list-style-type: none"> ▪ Distribution: extent of andromedy/barriers to migration ▪ Adult spawning fish ▪ Salmon fry abundance ▪ Out-migrating smolt abundance ▪ Number and distribution of redds ▪ Water quality | <p><u>Extent of Andromedy</u></p> <p>Atlantic salmon is an anadromous species, with mature fish returning to their natal freshwater streams to spawn usually in Spring. Movement of spawning salmon to upstream watercourses is predominantly nocturnal. The eggs hatch in Spring and the young (i.e. alevins) remain within the river gravel substrate for a number of weeks until the young or 'fry' rise to the surface (NPWS, 2013). The migration of Atlantic salmon is predominantly nocturnal and the majority of individuals will migrate through the project location during hours of darkness when the proposed works will be suspended at night. There will be no physical barrier or obstruction associated with the Proposed Development as the project design adopts a clear span bridge structure and avoids any requirement for instream works or piling of structures within the river bed. For these reasons and taking into account of the damping effect of the intervening substrates and soils, noise and vibration associated with piling of bridge abutments, earthworks, surfacing, etc. is not likely to cause a significant barrier during spawning migration. Adult Atlantic salmon species comprise a large body mass and are deemed to be hearing generalists. Any effects associated with piling of the bridge abutments on the species are considered to be an unlikely occurrence. This is due to the proposed working hours (restricted to daylight hours), migration patterns and habits of Atlantic salmon and damping effect of the intervening substrates and soils. Mitigation will be prescribed to ensure construction works are carried out in line with best practice having regard to the ecological sensitivities associated with the SAC. The operational phase of the project does not provide for any significant increase in noise emissions or vibrations on the receiving aquatic environment. No potential impacts associated with noise/vibration to cause barriers on migratory behaviours during the operational phase are foreseen.</p> <p>There is potential for artificial light to spill onto the River Blackwater associated with the Proposed Development during hours of darkness. The location of inappropriate lighting during the construction and operation phase could cause disturbance or a barrier to connectivity on Atlantic salmon. Mitigation is therefore required to ensure that lighting associated with the construction and operation of the project does not affect movements or spawning migrations of Atlantic salmon.</p> <p><u>Adult spawning fish; salmon fry abundance; Out-migrating smolt abundance; Number and distribution of redds; and Water Quality</u></p> <p>Adopting the Precautionary Principle, there is presumed to be suitable spawning habitat present within the Zone of Influence of the project. The Proposed Development avoids the requirement for instream works and adopts a clear span bridge structure. However, taking into account the proximal distance of the project (i.e. piling of bridge abutments) to the SAC and River Blackwater, construction activities associated with the proposed works has the potential to affect the riverine habitat for spawning fish, fry, smolt and redds through water quality impacts. In the absence of appropriate mitigation, there is also potential for adverse impacts on water quality during the operational phase associated with siltation of storm water drainage system and attenuation pond; and infiltration of contaminated groundwater into the surface water network. Therefore, mitigation will be required to prevent impacts on water quality and a reduction in habitat quality to fish, fry, smolts and redds.</p> |

| Relevant Qualifying Interest (QI Code) | Conservation Objective | Attributes Potentially Affected by Proposed Development* | Assessment of Potential Significant Adverse Impacts |
|--|---|---|---|
| River Lamprey (1099) | Restore the favourable conservation condition of the Annex II species | <ul style="list-style-type: none"> ▪ Distribution ▪ Population structure of juveniles ▪ Juvenile density in fine sediment ▪ Extent and distribution of spawning habitat ▪ Availability of juvenile habitat | <p><u>Distribution</u></p> <p>Important requirements for the successful spawning of anadromous lamprey are unimpeded access from the sea through the estuarine and tidal areas and to the upper reaches of rivers to spawning grounds where suitable gravel substrate exists for redd construction (NPWS, 2007b). River lamprey is assumed present within the Zone of Influence of the project. The upstream migration period for river lamprey is not well known; however, Maitland (2003) proposes that peak migration periods occur from October to December or August to November. This is followed by a second peak in March and April as reported by ROD (2018). The migration of river lamprey is almost exclusively nocturnal (Maitland, 2003). The majority of individuals will migrate through the project location during hours of darkness when the proposed works will be suspended at night. There will be no physical barrier or obstruction associated with the Proposed Development as the project design adopts a clear span bridge structure and avoids any requirement for instream works or piling of structures within the river bed. For these reasons and taking account of the damping effect of the intervening substrates and soils, noise and vibration associated with piling of bridge abutments is not likely to cause a significant barrier during migration periods to spawning grounds. This is due to the proposed work schedule, migration patterns and habits of river lamprey and damping effect of the intervening substrates and soils. Mitigation will be prescribed to ensure construction works are carried out in line with best practice having regard to the ecological sensitivities associated with the SAC. The operational phase of the project does not provide for any significant increase in noise emissions or vibrations on the receiving aquatic environment. No potential impacts associated with noise and vibrations to cause barriers on migratory behaviours during the operational phase are foreseen.</p> <p>There is potential for artificial light to spill onto the River Blackwater associated with the Proposed Development during hours of darkness. The location of inappropriate lighting during the construction and operation phase could result in disturbance or a barrier to connectivity on river lamprey to the upper and lower reaches of the bridge crossing. Mitigation is therefore required to ensure that lighting associated with the construction and operation of the project does not affect movements or spawning migrations of river lamprey.</p> <p><u>Population structure of juveniles; Juvenile density in fine sediment; Extent and distribution of spawning habitat; and Availability of juvenile habitat</u></p> <p>The river lamprey has two periods of migration (autumn and spring) with spawning taking place usually in April (NPWS, 2007b). Adults excavate nests in the gravel substrate where eggs are washed once they have been fertilised. Following hatching, juvenile larvae are washed downstream by the current to areas of fine sediment in still water in which they use to burrow. The species live as filter feeders and can remain in fine sediment habitat for several years before transforming into young adult fish (NPWS, 2007b).</p> <p>Juveniles (ammocoetes) of river lamprey are restricted to fresh waters. Adopting the Precautionary Principle, there is presumed to be suitable habitat present within the Zone of Influence of the project. The Proposed Development avoids the requirement for instream works and adopts a clear span bridge structure and will not affect the quantity of habitat available for river lamprey. However, taking into account the proximal distance of the project (i.e. piling of bridge abutments) to the SAC and River Blackwater, construction activities associated with the proposed works has the potential to affect the attributes subject to this assessment through water quality impacts. In the absence of appropriate mitigation, there is also potential for adverse impacts on water quality during the operational phase associated with siltation of storm water drainage system and attenuation pond; and infiltration of contaminated groundwater into the surface water network.</p> |

| Relevant Qualifying Interest (QI Code) | Conservation Objective | Attributes Potentially Affected by Proposed Development* | Assessment of Potential Significant Adverse Impacts |
|--|---|---|---|
| | | | Water quality impacts associated with the project may have potential impacts on food availability and spawning habitat and this may lower survival rates of river lamprey. Therefore, mitigation will be required to prevent impacts on water quality and a reduction in habitat quality. |
| Otter (1355) | Restore the favourable conservation condition of the Annex II species | <ul style="list-style-type: none"> Fish biomass availability Barriers to connectivity Distribution Extent of terrestrial habitat Extent of marine habitat Extent of freshwater (river) habitat Extent of freshwater (lake) habitat Couching sites and holts | <p><u>Fish biomass availability</u></p> <p>Otter is an opportunistic feeder with a broad and varied diet (NPWS, 2019b). Within freshwater environments, the species diet comprises a variety of fish ranging from sticklebacks to salmon and eels (Bailey & Rochford, 2006). The species will also predate on crustaceans (i.e. White-clawed Crayfish) and Common Frog (NPWS, 2019a). The effects of the project are not considered likely to directly reduce the total fish biomass available to otter (no requirement for instream works as project design adopts clear span bridge structure). However, taking into consideration the proximal distance of the project (i.e. piling of bridge abutments) to the SAC, construction activities associated with the proposed works has the potential to affect prey availability through water quality impacts. In the absence of appropriate mitigation, there is also potential for adverse impacts on water quality during the operational phase associated with siltation of storm water drainage system and attenuation pond; and infiltration of contaminated groundwater into the surface water network. Water quality impacts associated with the Proposed Development (i.e. potential release of suspended solids, contaminants, etc.) may impact on food availability and this in turn may lower survival rates of QI otter. Adopting the Precautionary Principle and in the absence of appropriate mitigation, such impacts are considered to be significant. Therefore, mitigation will be required to prevent impacts on water quality and consequently fish biomass available to otter.</p> <p><u>Barriers to connectivity</u></p> <p>The Proposed Development could result in the displacement of QI otter from using the project area through disturbance. The Proposed Development has the potential to form a barrier to connectivity for foraging and commuting otter via noise emissions arising during construction works and the requirement for artificial lighting (construction and operation phase). The Proposed Development will not result in the obstruction of otter movements through physical barriers within the river corridor as the project avoids in-stream works (project design adopts a clear span bridge structure). Otters will continue to be able to commute past the project area via the River Blackwater unimpeded. However, there is potential for disturbance associated with noise/vibration (i.e. piling of bridge abutments) and artificial lighting arising from construction related activities leading to reduced connectivity between the upstream and downstream stretches of the River Blackwater at the proposed bridge crossing. Therefore, mitigation is required to ensure emissions associated with noise/vibrations and artificial lighting will not lead to barriers to connectivity on QI otter during the construction phase.</p> <p>Potential for barriers to connectivity on this species during the operation phase is restricted to impacts associated with artificial lighting and increased noise levels associated with traffic, pedestrians, etc. Given the presence of human activity associated with the nearby Blackwater Park, local otter populations of the SAC are considered to have already habituated to the presence of human activity and other anthropogenic factors. The effects of disturbance displacement from increased noise levels (i.e. traffic) during the operation phase is expected to decrease over time as commuting and foraging otter adjust and habituate to the presence of the Proposed Development. In relation to artificial lighting, inappropriate lighting design has the potential to cause light to spill onto the adjoining River Blackwater and potentially deter otter from using the river corridor of the SAC. Mitigation is required to ensure that the lighting design during the operation phase does not provide a barrier to QI otter.</p> |

| Relevant Qualifying Interest (QI Code) | Conservation Objective | Attributes Potentially Affected by Proposed Development* | Assessment of Potential Significant Adverse Impacts |
|--|--|--|---|
| | | | <p><u>Distribution; Extent of terrestrial habitat; Extent of marine habitat; Extent of freshwater (river) habitat; Extent of freshwater (lake) habitat and Couching sites and holts.</u></p> <p>Taking into consideration the nature and scale of the Proposed Development, there is no potential for a significant reduction or decline in the distribution and extent of terrestrial, marine and freshwater habitats for QI otter of the SAC. There were no confirmed breeding sites, couching sites or resting places recorded within the ZOI during surveys carried out to inform the NIS and EIAR Biodiversity Chapter. The Proposed Development will not significantly affect QI otter in the River Boyne and River Blackwater with respect to the following attributes: Distribution; Extent of terrestrial habitat; Extent of marine habitat; Extent of freshwater (river) habitat; Extent of freshwater (lake) habitat and Couching sites and holts. A pre-construction survey for otter will be carried out to identify any new established breeding sites or couching sites should any new territories become established within the ZOI of the project in the interim.</p> |
| Alluvial Forest (91E0) | Restore the favourable conservation condition of the Annex I habitat | <ul style="list-style-type: none"> Hydrological regime: flooding depth/height of water table; and Vegetation composition: negative indicator species Habitat area Habitat distribution Woodland size Woodland structure: cover and height Woodland structure: community diversity and extent Woodland structure: natural regeneration Woodland structure: dead wood Woodland structure: veteran trees Woodland structure: indicators of local distinctiveness Vegetation composition: native tree cover Vegetation composition: typical species | <p><u>Hydrological regime: flooding depth/height of water table</u></p> <p>The Interpretation Manual of EU habitats 2013 (EC, 2013) states that all Alluvial Forest types occur on heavy soils which are periodically inundated by the annual rise of river levels, but which are otherwise well-drained and aerated during low water. The Proposed Development avoids any loss of QI Alluvial Forest and is located ca. 25 m east of the habitat identified within the ZOI the project. Alluvial Forest is a habitat potentially susceptible to indirect hydrological impacts and localised hydrological changes may potentially have significant impacts on this habitat type. Any alterations to hydrological sensitivities through drainage operations and flood regimes could result in the loss of this habitat over time. The potential for the Proposed Development to give rise to hydrological impacts is discussed in detail in Chapter 9 (Hydrology Chapter) of the EIAR. Detailed hydraulic modelling carried out as part of the preliminary design has demonstrated that abutment locations will not adversely impact the flood regime. The flood risk model outlined in Chapter 9 of the EIAR has surmised:</p> <p>The results of the bespoke hydraulic modelling (which takes account of local topography and is more accurate than CFRAM mapping) displayed a maximum increase of 0.008 m in the water level immediately upstream for all bridge options and no change was indicated in the water level immediately downstream of the proposed bridge for a 1%AEP event (accounting for climate change). It was concluded from the results of the hydraulic modelling that the development of the bridge would have limited impact on the flow and water levels.</p> <p>Under the bespoke hydraulic modelling developed for the project (accounting for climate change), the following abutment areas will be within the 1% AEP extent:</p> <ul style="list-style-type: none"> C. 250 m2 of the abutment on the northern bank of the Blackwater River; and, C. 20 m2 of the abutment on the southern bank of the Blackwater River. <p>The potential flood regime changes outlined above will not result in significant changes to the frequency or intensity of flooding at Priority QI Alluvial Forest habitat locations (the nearest of which is c. 25 m from the Proposed Development at it's nearest point). Therefore, no significant impacts in relation to alterations of flood regime associated with the Proposed Development is predicted on QI Alluvial Forest.</p> |

| Relevant Qualifying Interest (QI Code) | Conservation Objective | Attributes Potentially Affected by Proposed Development* | Assessment of Potential Significant Adverse Impacts |
|--|------------------------|--|--|
| | | | <p>With respect to indirect drainage effects on QI Alluvial Forest and the Proposed Development, the project has been designed to minimise indirect drainage impacts on QI Alluvial Forest. Culverts to facilitate drainage of the Proposed Development will be diverted beneath the distributor road from the western boundary (ca. 25 m from QI Alluvial Forest) to the eastern road boundary of the proposed distributor road to avoid any alterations of the hydrological regime to QI Alluvial Forest (refer to Figure 3: Distribution Of Known QI/SCI Features At Blackwater River Crossing). Therefore, no significant impacts in relation to alterations of the hydrological regime associated with the Proposed Development is predicted on QI Alluvial Forest.</p> <p><u>Woodland Structure and Vegetation composition: negative indicator species/Invasive Species</u></p> <p>There is potential for the introduction and dispersal of scheduled invasive species to areas occupying QI Alluvial Forest during construction works. Japanese knotweed, which is present at Blackwater Park, could if spread within the SAC (e.g. via vehicle tyre treads, machinery, construction personnel, etc.) lead to erosion of bankside habitats (via shading out of the field and ground layers), and/or shading out of positive indicator species of QI Priority Alluvial Forest habitat, with potential impacts to the River Boyne and Blackwater SAC. The species primarily spreads by fragments of 'rhizome' (below-ground shoots), and less frequently by above-ground shoots. The introduction and/or dispersal of invasive species poses a threat to the integrity and habitat quality of QI Alluvial Forest. Therefore, mitigation is required to prevent the import and/or spread of invasive species.</p> <p><u>Habitat area; Habitat distribution; Woodland size; Woodland structure: cover and height; Woodland structure: community diversity and extent; Woodland structure: natural regeneration; Woodland structure: dead wood; Woodland structure: veteran trees; Woodland structure: indicators of local distinctiveness; Vegetation composition: native tree cover; and Vegetation composition: typical species</u></p> <p>In the absence of appropriate control measures and mitigation, there is potential for habitat deterioration of QI Alluvial Forest during the construction phase of the project. Impacts could arise due to trampling and damage to woodland structure (associated with construction personnel and machinery access), littering/dumping of waste generated onsite, potential for release of sediment, contaminants arising during construction works, etc. Therefore, mitigation is required to ensure that any potential for adverse impacts on QI Alluvial Forest during the construction phase remain insignificant.</p> |

8.2.2 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 detailed Conservation Objectives for kingfisher in Ireland, a combination of professional judgement and scientific literature sources of kingfisher ecology was reviewed in light of the literature on known threats to the species to develop appropriate attributes in Table 7. Table 7 identifies attributes that could be adversely affected by the proposed works.

Table 7. River Boyne and River Blackwater SPA: Conservation Objective Attributes for SCI Kingfisher

| Population (Kingfisher) | Conservation Objective | Attributes Potentially Affected by Proposed Development* | Assessment of Potential Significant Adverse Impacts |
|-------------------------|--|---|---|
| Breeding | To maintain or restore the favourable conservation condition of the bird species | <ul style="list-style-type: none"> ▪ Availability of prey biomass ▪ Breeding population abundance: Apparently Occupied Nests (AONs) ▪ Productivity rate ▪ Distribution: breeding colonies ▪ Barriers to connectivity ▪ Population trend | <p><u>Availability of prey biomass</u></p> <p>Kingfisher is a widespread species largely confined to lowland rivers, streams and other waterbodies with shallow slow-moving water (Morgan and Glue, 1977). The main diet of kingfisher comprises populations of small fish in stagnant waters. Kingfisher tends to avoid rivers with either scarce or very dense riparian vegetation but will utilise trees and shrubs to perch for plunge diving of prey (Crowe, 2010). The effects of the project are not considered likely to directly reduce the total fish biomass available to kingfisher (no requirement for instream works as project design adopts clear span bridge structure). However, taking into consideration the proximal distance of the project (i.e. piling of bridge abutments located 10 m and 7.5 m from the river corridor) to the SAC, construction activities associated with the proposed works has the potential to affect prey availability through water quality impacts. In the absence of appropriate mitigation, there is also potential for adverse impacts on water quality during the operational phase associated with siltation of storm water drainage system and attenuation pond; and infiltration of contaminated groundwater into the surface water network. Water quality impacts associated with the Proposed Development (i.e. potential release of suspended solids, contaminants, etc.) may impact on food availability and this in turn may lower survival rates of kingfisher. In addition, the proposed works will result in the loss of a perching post (comprises deadwood associated with a riparian shrub) likely used for foraging and plunge diving of prey species. Adopting the Precautionary Principle and in the absence of appropriate mitigation, such impacts are considered to be significant. Therefore, mitigation will be required to prevent impacts on water quality and consequently fish biomass available to kingfisher.</p> <p><u>Breeding population abundance: Apparently Occupied Nests (AONs); Productivity rate and Distribution: breeding colonies and Population Trend</u></p> <p>Taking into consideration the nature and scale of the Proposed Development, there is no potential for a significant reduction or decline in breeding population abundance, productivity rates and distribution of breeding colonies. There were no confirmed nest sites or breeding territories identified within the Zol of the project during field surveys carried out at the Proposed Development site to inform the NIS and EIAR Biodiversity Chapter. The habitats along the river bank of the project area are deemed to be sub-optimal for the species breeding requirements. Based on observations of the species during field surveys, kingfisher only utilise the River Blackwater within the Zol of the Proposed Development for foraging and commuting purposes. The Proposed Development will not significantly affect SCI kingfisher in the River Boyne and River Blackwater SPA with respect to the following attributes: Breeding population abundance: Apparently Occupied Nests (AONs); Productivity rate and Distribution: breeding colonies and Population trend. As a precautionary measure, a pre-construction survey for breeding kingfisher will be carried out to identify any new established nest sites should any new territories become established within the Zol of the Proposed Development site in the interim.</p> <p><u>Barrier to Connectivity</u></p> <p>The Proposed Development could result in the displacement to SCI kingfisher from using the project area through disturbance. The Proposed Development has the potential to form a barrier to connectivity to foraging and commuting kingfisher via noise emissions arising during construction works and the requirement for artificial lighting (construction and operation phase). The Proposed Development will not result in the obstruction of kingfisher movements through physical barriers within the river corridor as the project avoids in-stream works (project design adopts a clear span bridge structure). However, there is potential for disturbance associated with noise/vibration (i.e. piling of bridge abutments) and artificial lighting arising from construction related activities that could lead to reduced connectivity between the upstream and downstream stretches of the River Blackwater at the proposed bridge crossing. Therefore, mitigation is</p> |

| Population (Kingfisher) | Conservation Objective | Attributes Potentially Affected by Proposed Development* | Assessment of Potential Significant Adverse Impacts |
|----------------------------|---------------------------|---|---|
| | | | <p>required to ensure emissions associated with noise/vibrations and artificial lighting will not lead to barriers to connectivity on SCI kingfisher during the construction phase.</p> <p>The proposed bridge crossing will not result in barriers to commuting and foraging kingfisher during the operational phase. There is adequate 'free-board' (ca. 2.4 m) above the 1% AEP flood level (1:100 year) for passage of SCI kingfisher beneath the proposed bridge crossing. No SCI kingfisher nest sites were identified within the Zol of the Proposed Development. No potential significant impacts associated with barrier to connectivity or severance risks associated with the bridge crossing are predicted on SCI kingfisher.</p> <p>Potential for barriers to connectivity on this species during the operation phase is restricted to disturbance impacts associated with artificial lighting and increased noise levels associated with traffic, pedestrians, etc. Given the presence of human activity associated with the nearby Blackwater Park, kingfisher populations of the SPA are considered to have already habituated to the presence of human activity and other anthropogenic factors. The effects of disturbance displacement is expected to decrease over time as the species adjusts to the new habitat configuration and presence of the Proposed Development. In relation to artificial lighting, inappropriate lighting design has the potential to cause light to spill onto the adjoining River Blackwater and potentially deter kingfisher from using the river corridor of the SPA. Artificial lighting has the potential to impact on the body mass regulation of birds causing sleep deprivation and upsetting the onset of the breeding season (Pollard 2009). Mitigation is required to ensure that the lighting design during the operation phase does not provide a barrier or disturbance to commuting and foraging kingfisher.</p> |

8.3 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 8.3.3.

8.3.1 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 8. This section takes into consideration the assessment for potential adverse impacts identified on the conservation objectives of the SAC outlined in Section 8.2.

Table 8. River Boyne and River Blackwater SAC: Summary of Prediction of Effects on Site Integrity

| Relevant QI (* denotes Priority Habitat) | Pathway and Effects Prediction |
|---|--|
| Alluvial Forest* | <p>Surface water pollution</p> <p>-In the absence of appropriate mitigation and control measures, silt, grit, fuels, oils, suspended solids, sediment release or other contaminants generated during construction could potentially enter areas of QI Alluvial Forest.</p> <p>-Nutrient-rich silt could promote growth of common nettle within Alluvial Forests and reduce the diversity or structure of the field and ground layers.</p> <p>-Conservation Objectives with potential to affect attributes include: Woodland structure and Vegetation composition.</p> <p>-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| Damage from storage of materials, and /or access or egress routes | <p>-Although QI Alluvial Forest is buffered (ca. 25 m) from the proposed works, in the absence of mitigation and appropriate control measures, there is potential for access routes, construction personnel, machinery crossings, support vehicles, or material storage activities to encroach onto areas supporting QI Alluvial Forest vegetation.</p> <p>-Conservation Objectives with potential to affect the following attributes include: Habitat area; Habitat distribution; Woodland size; Woodland structure: cover and height; Woodland structure: community diversity and extent; Woodland structure: natural regeneration; Woodland structure: dead wood; Woodland structure: veteran trees; Woodland structure: indicators of local distinctiveness; Vegetation composition: native tree cover; and Vegetation composition: typical species.</p> <p>-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| Littering/Dumping | <p>-Dumping of solid waste is a known threat to this habitat (NPWS, 2019a). In the absence of mitigation and appropriate control measures, habitat deterioration could result arising from discarded materials or waste generated onsite.</p> <p>-Conservation Objectives with potential to affect the following attributes include: Woodland structure: cover and height; Woodland structure: community diversity and extent; Woodland structure: natural regeneration; Woodland structure: dead wood; Woodland structure: veteran trees and Woodland structure: indicators of local distinctiveness</p> <p>-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| Invasive species | <p>-In the absence of mitigation and appropriate control measures, potential exists for the introduction and dispersal of scheduled invasive species including Japanese knotweed (recorded at Blackwater Park) within the ZOI during construction works. Invasive species could be transported via support vehicles, machinery, boots or clothing of construction personnel having previously worked in infested areas.</p> |

-Effects would be amplified by the 'Moderate' site-level status (deemed 'Unfavourable – bad').

-Conservation Objectives with potential to affect attributes include: Woodland structure and Vegetation composition: negative indicator species.

-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 and groundwater pathways (Water Quality) | <p>-In the absence of mitigation and appropriate control measures, silt, grit, fuels, oils, sediment or other contaminants generated during construction could enter the freshwater habitats of Atlantic salmon and river lamprey at the River Blackwater as a result of the proposed works.</p> <p>- Conservation Objectives of Atlantic salmon with potential to affect attributes include: Adult spawning fish, salmon fry abundance, Out-migrating smolt abundance, Number and distribution of redds and Water quality.</p> <p>- Conservation Objectives of river lamprey with potential to affect attributes include: Population structure of juvenile, Juvenile density in fine sediment, Extent and distribution of spawning habitat; and Availability of juvenile habitat</p> <p>- In the case of Atlantic salmon, effects potentially amplified by the 'Moderate' site-level status (deemed 'Unfavourable – inadequate') of Atlantic salmon.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| | Vibration/Noise (i.e. piling of bridge abutments, earthworks, surfacing, etc.) | <p>-In the absence of mitigation and appropriate control measures, noise or vibration resulting from piling of bridge abutments during the construction phase could disturb/displace Atlantic salmon and/or River lamprey from the project area. Potential effects would be greatest during the combined spawning season for these species (November to June inclusive)</p> <p>-Conservation Objectives potentially affected for river lamprey include: Distribution</p> <p>- Conservation Objectives of Atlantic salmon with potential to affect attributes include: Distribution: extent of andromedy/barriers to migration.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| | Artificial lighting | <p>-Artificial lighting during the construction and operation phase could displace Atlantic salmon and/or River lamprey from the project area. Potential effects would be greatest during the combined spawning season for these species (November to June inclusive)</p> <p>-Conservation Objectives with potential to affect attributes include: Distribution</p> <p>- Conservation Objectives of Atlantic salmon with potential to affect attributes include: Distribution: extent of andromedy/barriers to migration.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| Otter | Surface water pollution and groundwater pathways (Water Quality) | <p>- In the absence of mitigation and control measures, silt, grit, fuels, oils, sediment or other contaminants generated during construction could enter the freshwater habitats of otter at the River Blackwater as a result of the proposed works.</p> <p>- Conservation Objectives of otter with potential to affect attributes include: Fish biomass availability.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| | Vibration/Noise (i.e. piling of bridge abutments, earthworks, surfacing, etc.) | <p>- In the absence of mitigation and control measures, noise or vibration resulting from piling of bridge abutments during the construction phase could disturb/displace commuting and foraging otter from the project area. No breeding or resting sites are present within the Zol of the proposed works.</p> <p>- Conservation Objectives of otter with potential to affect attributes include: Barriers to connectivity and Distribution.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| | Artificial lighting | <p>- In the absence of mitigation and control measures, artificial lighting during the construction and operation phase could displace commuting and foraging otter from the project area. No breeding or resting sites are present within the Zol of the proposed works.</p> |

-Conservation Objectives of otter with potential to affect attributes include: Barriers to connectivity and Distribution.

-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.

8.3.2 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 9. This takes into consideration the assessment for potential adverse impacts indented on the conservation objectives of the SAC outlined in Section 8.2.

Table 9. River Boyne and River Blackwater SPA: Summary Prediction of Effects on Site Integrity (SCI Kingfisher)

| Pathway and Effects Prediction | |
|--|---|
| Surface Water Pollution (Water Quality) | <p>-In the absence of mitigation and appropriate control measures, silt, grit, fuels, oils, sediment release or other contaminants could enter freshwater habitats downstream and impact on fish biomass and prey availability for foraging kingfisher of the SPA. In addition, the proposed works will result in the loss of a perching post (comprises deadwood associated with a riparian shrub) likely used for foraging and plunge diving of prey species. This could impact on the conservation objective in terms of the availability of fish biomass for the species foraging requirements.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| Vibration/Noise (i.e. piling of bridge abutments, earthworks, surfacing, etc.) | <p>-Noise or vibration resulting from piling of bridge abutments during the construction phase could disturb/displace commuting and foraging kingfisher from the project area. No breeding territories or nest sites are present within the Zol of the proposed works.</p> <p>- Conservation Objectives with potential to affect attributes include: Barriers to connectivity.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |
| Artificial lighting | <p>-The location of inappropriate artificial lighting during the construction and operation phase could displace commuting and foraging kingfisher from the project area and the upper and lower reaches of the River Blackwater at the proposed bridge crossing. No breeding or nest sites are present within the Zol of the proposed works.</p> <p>-Conservation Objectives of otter with potential to affect attributes include: Barriers to connectivity.</p> <p>-Adverse effects to site integrity are predicted from the proposed works alone in the absence of mitigation measures.</p> |

8.3.3 In-Combination Effects

8.3.3.1 Introduction

This assessment has regard for the Proposed Development to potentially affect the QIs of the River Boyne and River Blackwater SAC and SCIs of the River Boyne and River Blackwater SPA. Given the Proposed Development overlaps both European sites; and in the absence of appropriate mitigation, adverse effects from the Proposed Development were predicted to affect the European sites from the Proposed Development in isolation.

8.3.3.2 Threats and Pressures to European Sites

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

- 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 include:

- 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.

8.3.3.3 Planning Application Search

A search was conducted of planning applications within the Zol 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 Viewer¹⁶ 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 MCC¹⁷

The projects outlined in the paragraphs below were identified within the potential Zol of the proposed works and 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):

- Blackwater Park, Windtown Road, Navan, Co. Meath (P8/19005) (approx. 120 m east of proposed development site). The development will consist of the construction of single storey changing room

¹⁶Available online at www.myplan.ie. Accessed October 2019.

¹⁷ Available online at <http://www.meath.ie/CountyCouncil/Planning/Part8s/> Accessed September 2019.

facilities comprising of office area, 2 no. changing rooms, separate male, female & disabled toilets and 2 no. store rooms. One part of the building is plastered externally while the other part has facing brick finish. Roof is finish in tapered zip-lock aluminium standing seam roofing sheets.

- The Navan Greater Dublin Area (GDA) Cycle Network (P8/18014) (approx. 0.9km west): Construction works along various routes in Navan which will involve the following elements; - Construction of new kerb lines for new footpath and/or cycle tracks; - Earthworks - excavations of portions of existing verges, of existing roadway/footpaths, for service ducts and road crossings; - Removal of trees, setting back of boundaries, landscaping; - Construction of footpaths and cycle tracks, road markings and drainage works.
- Shared pedestrian and cycle greenway facility along the disused Navan to Kingscourt rail line (P8/13007 and P8/13008) (approx. 188 m north-east). The proposed greenway facility commences at Blackwater Park, Rathaldron Road, Navan and terminates at Kingscourt, Co. Cavan. The existing rail line commences in the administrative area of Meath County Council at Simonstown, Navan and continues as far as the townland of Boynagh, south of Kingscourt. The rail line then meanders across the county boundary into Co. Cavan before re-entering Co. Meath at 2 further locations in the townlands of Boynaghbought and finally at Derumgill, adjacent to the former Kingscourt railway station.
- Planning reference NA1711232 – The (conditional) development of the resumption of underground mining in the Nevinstown orebody. Previously planning permission was granted by An Bord Pleanála, ref PL17.204034. Mining will follow a cyclic pattern resulting in the removal of ore from underground, hoisting to surface for processing followed by the filling of the extraction voids using cemented backfill. The surface characteristics and features of the Nevinstown townland will not be altered by mining activity. There will be no additional above ground structure/infrastructure associated with the development. Grant date October 2018
- Planning reference NA181137 (circa 510 m) – To remove temporary accommodation blocks to rear of site, provide internal alterations to existing educational and administrative building, alterations to elevations and new entrance porch, additional carpark spaces to rear of site, new site access and entrance arrangement, landscaping and all associated site works. Grant date 14/01/2019.
- Planning reference NA180732 – decommission and remove existing below ground District Regulating Installation (DRI) adjacent to Watergate St. and install a new above ground 0.87m x 0.50m x 1.36m (LxWxH) DRI enclosure including a 3m high 'lamp post' style relief vent stack with all ancillary services and associated site works. Grant date 04/10/2018.
- Planning reference NA180163 – The upgrading, reconfiguration and change of use of existing car showroom and retail units to provide for 2 no. car showrooms (781 sq.m), workshop (563 sq.m.), parts store (150 sq.m.) and ancillary staff facilities and public toilet (109 sq.m.) The proposed development will also include: 2 no. free-standing double-sided signs, upgrades to the existing signage and shopfronts including new glazing and cladding, reconfiguration of the existing car park and yard to provide for 92 no. car parking spaces, concrete paved forecourt area and reconfiguration of internal road. The proposed development includes all engineering works, landscaping works, boundary treatments and site development work on the approx. 0.70-hectare site. Significant further information/revised plans submitted on this application. 27/07/2018.
- Planning reference NA181543 – The proposed development will consist of the demolition of an existing vacant single storey dwelling and associated shed (total c.165.7sqm) and the construction of 74 no. apartment units in 2 no. 5 storey blocks over partial basement with combined gross floor area of c.7308.3 sqm (excluding c. 405sqm basement) and a maximum overall height of c. 17m OD. The proposed apartments will include 13 no. 1 bed units, 60 no. 2 bed units, and 1 no. 3 bed unit; associated plant; landscaped public open space; 95 no. car parking spaces; 86 no. bicycle spaces; 2 no. bin stores; ESB Substation; drainage arrangements; 3 no pedestrian access/egress onto footpaths along the N51 and R147; and associated boundary treatments and site development works, vehicular access to the proposed development will be through the residential scheme permitted on lands to the south of the subject site (Reg Ref: NA151301). Granted 09/07/2019.
- Planning reference NA150427 – Development located at Blackwater Retail Park, Navan, Co. Meath. The (consented) construction of a coffee shop and restaurant granted August 2015 (0.2 km from the proposed development). The proposed development will consist of the construction of a single storey Coffee Shop and a single storey Drive Thru Restaurant including associated Drive Thru Lane, external yard and bin store. The proposed development also includes signage on the elevations of the building, external seating

areas, minor alterations to the existing carpark, alterations to the eastern boundary and all ancillary site development site services and hard and soft landscaping works. Grant Date 11/08/2015.

- Planning reference NA151301 – Development located at Moathill, Navan, Co. Meath. The proposed development will consist of 99 no. residential units comprising 32 no. duplex/apartments and 67 no. 2 storey detached and semi-detached houses. The development will also include, a 2 storey crèche with play area, bin shelters, bicycle parking and car parking spaces, 2 no. landscaped public open spaces, a footpath and cycleway along the N51 National Road, a new vehicular access from the N51 National Road and associated revised junction layout, and all associated site and drainage works (ca. 150m from the proposed development). Grant date 03/06/2016.
- 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 development will consist of: 1. Upgrades to the existing site access roads, security (fencing upgrades) and replacement of the site entrance gates. 2. Landscaping and reinstatement. 3. Intake works modifications. 4. Provision of 2 no. aluminium sulphate storage tanks. 5. Provision of 1 no. flocculation tank. 6. Provision of 1 no. backwash water storage tank. 7. Provision of 4 No. UWWEST's (used wash water equalisation and settling tanks. 8. Provision of 1 no. sludge balancing tank. 9. Provision of 2 no. sludge thickening tanks. 10. Provision of 1 no. sludge holding tank. 11. Provision of sludge dewatering building (7.5m x 17m). 12. Demolition of the 2 no. existing aluminium sulphate storage tanks. 13. Demolition of the raw water pumping station super structure. 14. Building repair and refurbishment. The (consented) upgrade to the existing Water Treatment Plant at Liscarton, Navan (wholly contained within the boundary of the existing WTP): consented 11/01/2018 (approximately 2.5 km from the proposed development); also part of the Navan and Mid Meath Water Supply Scheme (Scheme code 2300PUB1016)¹⁸;
- Planning Reference NA180163 – Located at Balmoral Estate, Kells Road, Navan, Co. Meath. The upgrading, reconfiguration and change of use of existing car showroom and retail units to provide for 2 no. car showrooms (781 sq.m), workshop (563 sq.m.), parts store (150 sq.m.) and ancillary staff facilities and public toilet (109 sq.m.) The proposed development will also include: 2 no. free standing double sided signs, upgrades to the existing signage and shopfronts including new glazing and cladding, reconfiguration of the existing car park and yard to provide for 92 no. car parking spaces, concrete paved forecourt area and reconfiguration of internal road. The proposed development includes all engineering works, landscaping works, boundary treatments and site development works on the approx. 0.70 hectare site. Significant further information/revised plans submitted on this application. Decision date 27/07/2018
- Planning Reference NA171476 – Construction of warehouses, offices and a food store with parking, currently subject to determination by ABP following appeal (circa. 255 m from the proposed development site) at Balmoral Estate, Kells Road, Navan, Co. Meath. The proposed development will consist of: Demolition of existing single and two storey warehouse buildings within the western portion of the site; Construction of a 6 no. storey mixed use building over basement (with rooftop plant at fifth floor level) to include setbacks and accessible terraces (eastern elevation) at first and fifth floor levels: Provision of a discount food store (to include off-licence use) with a gross floor area of c. 1,695 sq.m (net retail area 1,140 sq. m) at ground floor level to include all ancillary areas; provision of a 135 sq.m retail unit at first floor level (south) and circa 5,412 sq.m of office/medical floor space from first to fifth floors; provision of external plant enclosures (western elevation) at ground floor level; landscaped surface car park (90 no. car parking spaces) to serve the proposed discount food store (including 1 no. set down space), 70 no. bicycle parking spaces, goods delivery/reception area; provision of a basement car park to serve the medical/office uses (including plant room/ancillary areas and 120 no. car parking spaces); reconfiguration of internal road and provision of ramp to basement of proposed development; Upgrades to the existing footpath along Kells Road and provision of a landscape plaza area at the junction of the Kells Road and the existing access road to Balmoral Industrial Estate; provision of 7 sq. m of illuminated signage located on the northern and eastern elevation including a 42 sq.m totem sign located at the main entrance of the site; all associated and ancillary site development and landscaping works. Significant further information/revised plans submitted on application. Decision date 27/07/2018.

¹⁸ www.epa.ie [accessed 6 September 2019].

- Planning Reference NA160607 – Development located at Blackcastle Demesne, Navan, Co. Meath. The (consented) construction of 218 new residential units and associated works, granted June 2016 (1.7 km from the proposed development); Construction of a total 218 no. units comprising of 135 no. single (6 no. houses designed for the elderly) and two storey (129 no.) houses and 83 no. apartments, including 13 no. apartments within the restored Blackcastle House and Stables. The breakdown of houses consists of 32 no. four bedroom houses, 61 no. three bedroom houses, 36 no. two bedroom houses and 6 no. one bedroom houses. The breakdown of apartments contained within 5 no. two (Block E) and three storey (Blocks A, B, C & D) buildings (not including Blackcastle House and Stables) are 14 no. three bedroom apartments, 42 no. two bedroom apartments and 14 no. one bedroom apartments. The 13 no. apartments within the restored Black House and Stables consists of 2 no. three bedroom apartments, 4 no. two bedroom apartments and 7 no. one bedroom apartments. The development includes the demolition of a number of existing outbuildings (Blackcastle House, a protected structure and associated stables and walled garden will be retained). The development includes all associated and ancillary works, including site infrastructure works; the provision of a 403 sq.m creche to facilitate circa 74 children; refurbishment and amendments including, two new openings to the walled garden; amendments to the entrance to Blackcastle House from the N51 including widening of the protected entrance pillars to allow limited vehicular access to the proposed development; provision of ESB substation; car parking; public open spaces; landscaping; boundary treatment; new internal roads; and footpaths. An Environmental Impact Statement and Natura Impact Statement have been prepared in respect of this planning application, the site includes Blackcastle House, entrance pillars (Both Protected Structures) and associated walled garden and outbuildings. Further Information/Revised plans submitted on this application. Decision Date 20/12/2016.
- Planning Reference NA160363 – Development located at Windtown, Navan, Co. Meath. The development will consist of a new single storey support services building with car parking, connect to existing entrance to public road and connect to existing mains water, mains sewerage and surface water with ancillary site works (circa. 70 m from the Proposed Development site). Grant date 14/07/2016.
- Planning Reference NA140993 – Development located at St. Patrick's Classical School, Moatlands (Kells Road), Navan, Co. Meath. The development will consist of the demolition of part of existing structure and construction of a fully serviced 2 storey extension to the existing school containing 1 no. music/drama room and 1 no. science laboratory and preparation room together with ancillary stairs, stores, circulation spaces and associated works (circa 210 m from the Proposed Development site). Grant date 12/02/2015.
- Planning Reference NA140992 – Development located at St. Patrick's Classical School, Moatlands (Kells Road), Navan, Co. Meath. The development will consist of the demolition of part of existing structure and construction of a fully serviced single storey extension to the existing school containing 1 no. woodwork room together with ancillary stores, plant, circulation space and associated works. (circa 210 m from the Proposed Development site). Grant date 12/02/2015.
- Planning Reference NA161020 – Development at Ratholdron Old, Abbeyland, Navan Co. Meath. Construction of 6 no. dwelling houses consisting of 3 no. semi-detached blocks, connection to public water main, public sewer and associated site development and ancillary works including development of a vehicular entrance and service road, open space provision, all landscaping works, site boundary treatment and associated drainage works. Significant further information/revised plans submitted on this application (circa. 178 m from the proposed development site). Grant Date 05/04/2017.

8.3.3.4 Plans

8.3.3.4.1 Project Ireland 2040

The Project Ireland 2040 National Planning Framework (NPF¹⁹) does not list specific plans for the ZOI of the proposed works site, and no in-combination effects are predicted.

8.3.3.4.2 Meath County Development Plan

The Meath County Development Plan 2013 -2019 (CDP)²⁰ 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:

¹⁹ Available online at <http://npl.ie/>. Accessed October 2019.

²⁰ Available online at <http://www.meath.ie/CountyCouncil/Publications/PlanningPublications/MeathCountyDevelopmentPlan2013-2019/>

- "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 adverse 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 flood plain 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 adverse 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."

8.3.3.4.3 *Economic Development Strategy for County Meath*

The Economic Development Strategy for County Meath 2014 – 2022²¹ 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.

8.3.3.4.4 *Navan Development Plan 2009-2015*

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 varied in 2017.

There is no potential for in-combination 'secondary' habitat loss¹³ 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.

²¹ Available online at <http://www.meath.ie/Business/MeathEconomicDevelopmentStrategy/LargerthanFourMBDownload.63735,en.pdf>. Accessed October 2019.

8.3.3.4.5 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 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.

The draft Navan 2030 Plan (MCC, 2017) under consultation at the time of writing, relates only to the urban core of Navan Town and a new Park and Ride facility located on the R147. The NIS for the draft Navan 2030 Plan (Brady Shipman Martin, 2017) stated that the lands within the Navan 2030 Plan provided no habitats of significance to European site features, the NIS concluded that earthworks during removal of agricultural lands and operational drainage posed a potential risk to the River Boyne and Blackwater SAC/SPA. Following pollution mitigation, the NIS concluded there was no potential for the plan to significantly affect any European sites.

8.3.3.4.6 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 Transport Strategy for the Greater Dublin Area (2016-2035)²² 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 adverse effects (including those arising in combination with the Proposed works).

8.3.3.4.7 Flood Risk Assessment and Arterial Drainage Plans/Projects

In the OPW's Eastern Catchment Flood Risk Assessment and Management Study²³ (Eastern CFRAM) the proposed works are 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 AFA 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 Catchment²⁴ ('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 development which the proposed works are informing). Whilst the Indicative locations indicated in the NIS²⁵ for the Boyne FRMP are inside the River Boyne and River Blackwater SAC/SPA, they do not overlap known locations for QI Priority Alluvial Forest habitat.

The NIS²⁶ 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')²⁷ 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

²² Available online at- https://www.nationaltransport.ie/wp-content/uploads/2016/08/Transport_Strategy_for_the_Greater_Dublin_Area_2016-2035.pdf. Accessed September 2019.

²³ Available online at <http://eastcfam.irish-surge-forecast.ie>. Accessed September 2019.

²⁴ Available online at - <https://www.floodinfo.ie/publications/> Accessed September 2019.

²⁵ Available online at - https://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/Eastern_CFRAM/UOM07/07_NaturalImpactStatement/NIS_Final2018_RiverBasin_07.pdf Accessed September 2019.

²⁶ Available online at - https://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/Eastern_CFRAM/UOM07/07_NaturalImpactStatement/NIS_Final2018_RiverBasin_07.pdf Accessed September 2019.

²⁷ Available online at: <https://www.opw.ie/en/floodriskmanagement/operations/environmentalactivities>. Accessed September 2019

ivers 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.

8.3.3.4.8 *Environmental River Enhancement Programme*

The Environmental River Enhancement Programme²⁸ (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. Such modification has been identified as having a potential positive impact on the River Boyne and River Blackwater SAC (NPWS, 2017a).

8.3.4 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 is not present in ZoI), in-combination effects considering groundwater quality, flow or yield are not assessed.

8.3.5 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 8.3.3.3 and 8.3.3.44).

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. 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.

There is potential for consented and future development to act in-combination with the proposed works to additively or synergistically affect QI Atlantic salmon, river lamprey and otter 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)²⁹.

The second cycle River Basin Management Plan for Ireland (2018-2021) (RBMP)³⁰ prioritises targeted measures to improve water quality in areas for action during the lifetime of the current RBMP. The measures encompass four River Basin Districts (RBDs) within the Republic of Ireland, and a further three international RBDs (which cut across Northern Ireland and the Republic of Ireland). The Proposed Development is located within the Eastern River Basin District and subject to the measures outlined in the RBMP. The targeted approach will continue in the third cycle (2021 – 2027).

²⁸ Annual reports available online at <https://www.fisheriesireland.ie/Projects/erep.html>. Accessed on various dates in 2019.

²⁹ Available online at <https://www.water.ie/projects-plans/our-plans/water-services-strategic-plan/>. Accessed on various dates in 2019.

³⁰ 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 2019.

8.3.6 Concluding Statements: In-Combination Effects

Following review of projects and plans, no significant in-combination effects are predicted to interact with the Proposed Development to adversely affect the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA (River Blackwater Corridor). This assessment has regard to the legal protection of the River Blackwater designated for European sites (through legislation at national level, and policy initiatives at national, county (i.e. policies and objectives outlined in the Meath County Development Plan) and local levels (i.e. Local Area Plan (LAP)) and a review of consented developments identified within the ZOI of the Proposed Development (i.e. River Boyne and River Blackwater SAC and SPA).

9. Step 4: Mitigation Measures

In the absence of mitigation, Section 8.2 and Section 8.3 of this NIS identified adverse effects likely to arise from the Proposed Development on the attributes associated with the QIs of the River Boyne and River Blackwater SAC and the SCIs of the River Boyne and River Blackwater SPA. This section prescribes the mitigation measures and appropriate control measures to block pathways with the potential to result in adverse effects thereby protecting the integrity of European sites during the construction and operational phases of the Proposed Development.

The project adopts a number of measures that avoid the potential for any adverse impacts on the QIs of the River Boyne and River Blackwater SAC and SCIs of the River Boyne and River Blackwater SPA. The following measures have been incorporated into the project design and include:

- Adoption of a clear span bridge structure that eliminates the requirement for instream works and direct impacts on the River Blackwater.
- Installation of a Sustainable Urban Drainage System (SUDS), including treatment and attenuation of all surface water to appropriate standards prior to discharge to the River Blackwater and Windtown Stream.
- Alignment of the Proposed Development which has avoided direct impacts on QI Alluvial Forest (priority Annex I habitat) of the River Boyne and Blackwater SAC.
- Installation of a temporary cut off wall (i.e. proposed construction sequence for the bridge is to construct a large 1 m wide and up to 5 m deep (to bedrock) cut off wall) and silt fence which will minimise seepage and overtopping from the construction zone adjacent to the River Boyne and River Blackwater SAC and SPA. This will create a safe works area and will be constructed using an excavator on bog mats and a trench box. The cut off wall will be detailed to ensure it caters for the flood level to avoid the risk of flood to the construction zone. The proposed cut-off wall serves as a coffer dam to protect the working area from potential ingress of flood waters. As such, no significant pollution impacts will occur from the construction works within the flood plain of the River Blackwater. Following construction, the cut off wall will be dismantled (if precast) and allow for the natural colonisation of vegetation within this footprint. Mitigation measures such as silt fencing will also be used to reduce the risk to the River Blackwater and the River Boyne and River Blackwater SAC and SPA. The elevated section of the cut-off wall (i.e. above ground elements) will be dismantled and removed offsite and reinstated with soil and grass seed/vegetated turves in keeping with the natural landscape.
- Adequate free-board above the River Blackwater (2.4 m) allowing for safe passage of QI otter of the River Boyne and Blackwater SAC and SCI kingfisher of the River Boyne and Blackwater SPA.
- Inclusion of a mammal ledge within the 1% AEP flood event (1:100 year) in the design of the proposed bridge crossing; to NRA standard (NRA, 2006b), to allow for continued passage of otter and other mammals in the event of a 1% AEP flood event (1:100 year).
- Mammal fencing will be installed along the proposed road alignment and a dry mammal underpass has been designed into the proposed alignment (in a proposed road embankment in Blackwater Park with no risk of flooding (Chainage 450; Figure 4.3; Appendix A)). Mammal fencing and the proposed underpass will be designed (e.g. including 'lead-in planting'), installed and maintained in accordance with the NRA specification (NRA, 2006). Appropriate setback distances from the River Blackwater corridor will be maintained to avoid any restrictions on the movement of Otter from utilising riparian zones along the river margins.
- Interceptor Ditches - Interceptor ditches will be provided to collect overland flows where the adjoining land slopes towards the road cutting or embankment. These interceptor ditches will discharge to existing watercourses where the topography permits and to the road drainage system in areas with no suitable outfall location. With particular regard to the discharge on the north side of the River Blackwater, it is noted that the interceptor ditch on the west side will be piped under the proposed embankment (at approx. Chainage 0+875; Figure 5; Appendix A) to join the interceptor ditch on the east side. This solution will provide one single outfall location into the River Blackwater to the east of the proposed bridge which will be located to a greater distance from the QI Alluvial forest (QI of River Boyne and River Blackwater SAC) and Annex I *hydrophilous* tall herb fringe communities (non-QI), thereby minimising the potential for indirect effects associated with drainage on QI Alluvial forest.
- Adoption of a solid bridge parapet (1.4 m height) and low-rise lighting system (e.g. lighting integrated within the bridge parapet or alternative systems where the level of light source is not higher than the bridge

parapet) in order to avoid light spill onto the River Boyne and River Blackwater SAC and SPA (natural zone). The solid bridge parapet will also serve to minimise the visible presence of pedestrians, cyclists and light spill associated with traffic during the operational phase.

- Control measures such as silt fencing will be utilised throughout the construction phase to reduce the risk to the River Boyne and River Blackwater and the SAC and SPA. Regular monitoring and recording of the effectiveness of the control measures will be utilised with additional control measures employed if and when required.
- The proposed bridge abutments comprise a setback distance of 10 m and 7.5 m respectively from the River Blackwater, thereby maintaining a natural corridor on either side of the river bank.
- The location and layout of the construction compounds³¹ will incorporate the protection and control measures and conform to the requirements outlined in the Construction Erosion and Sediment Control Plan (CESCP).
- Various construction methods that safeguard the water quality of the River Boyne and River Blackwater SAC and SPA (i.e. River Blackwater).
- Adoption of a sealed system where the proposed road crosses the River Blackwater SAC. Road runoff associated with the project will be collected through gullies located at regular intervals or kerb drains where necessary. Sealed pipes will convey the flows to the downstream attenuation systems.
- A vegetated interceptor ditch will be constructed at the tank outlet. This will be located upstream of the River Boyne and River Blackwater SAC and SPA and will provide additional treatment. The headwall will be constructed using precast concrete or Stone Gabions to minimise the potential for pollution to enter the River Blackwater during construction.
- The project design caters for shut-down facilities at outfalls (as a precautionary measure) due to the presence of the River Boyne and River Blackwater SAC and SPA.

Additional mitigation has been proposed to further offset, remedy or reduce potential impacts to acceptable levels: These additional measures include the following key themes:

- Precedence of mitigation protecting European sites over mitigation protecting other features where conflict arises (e.g. seasonal avoidance of the proposed cut-off wall taking into account QI river lamprey and atlantic salmon);
- Commission a suitably experienced Ecologist during construction and handover phases to oversee and advise the appointed Contractor(s) on implementation of mitigation;
- Checks for invasive species, badger, otter, and kingfisher to ensure mitigation addresses any changes in site conditions since completion of original surveys to inform the EIAR in 2017, 2018 and 2020;
- Timing of works: Limit earthworks within the flood plain of the River Boyne and River Blackwater SAC/SPA to the driest months of the year when rainfall poses the least risk of siltation to fish including Atlantic salmon and lamprey species.
- Use of monitoring by a suitably experienced ecologist to determine the effectiveness of mitigation in agreement with NPWS

³¹ . It was proposed that the primary construction compound would be located on the land located to the south-west of the existing T-junction between L3409 Ratholdron Road and L34094-1 Clonmagadden Road. An alternative and secondary compound is proposed to the north of the existing N51/R147 roundabout on the land currently occupied by the commercial building to be demolished.

9.1 Construction Stage Mitigation

9.1.1 Protection of QI River Lamprey, QI Otter and QI Atlantic Salmon (River Boyne and River Blackwater SAC)

9.1.1.1 Phasing of Earthworks

Earthworks for the proposed cut-off wall within the 1% AEP flood level (1:100 year) will be carried out from July to September inclusive (following published guidelines by IFI (2016)). This period is deemed to have the least ecological impact on aquatic fisheries and QIs of the River Boyne and River Blackwater SAC. The proposed bridge abutments and associated piling operations are located at a setback distance of 7.5 m and 10 m respectively from the River Blackwater and avoids any requirement for instream works. Therefore, construction of the bridge abutments and associated operations will not be subject to the same timeframe restrictions that will apply for the proposed cut-off wall. It is envisaged that such works will be scheduled to coincide with periods of dry weather. As a further precaution, to minimise the risk of an unforeseen flood event during construction of the proposed bridge abutments and allow for protective measures to be installed prior to flooding management, the Contractor will monitor weather conditions in advance throughout the construction phase. There will be some requirement for vegetation clearance during the bird nesting season (1st of March to 31st of August inclusive). A derogation licence under Section 55 of European Communities Regs 2011 may be sought to carry out the works to comply with the requirements of the provisions of Regulation 53. However, construction works will adhere to avoid vegetation removal where possible. There will be no requirement for vegetation removal of riparian habitats associated with the River Blackwater given the setback distances associated with the bridge abutments. In the event where the Contractor identifies a potential future flood event, the Contractor will communicate the details to MCC, the Employer's Representative (ER) Team, and the Ecologist who will agree the appropriate response to protect the working area. Works giving rise to noise emissions are restricted to and permitted by Meath County Council to 07.00 – 19.00 Hrs Monday – Friday; and 07.00 - 13.00 Hrs on Saturdays. Work outside of normal hours shall only take place where written permissions have been sought and received from MCC.

Vegetation clearance and earthworks for the following elements of the Proposed Development will be phased for the months July to September inclusive:

- The locations of the proposed cut-off wall in proximity to the River Blackwater.

Elsewhere, vegetation clearance will be restricted where possible, particularly within the River Boyne and River Blackwater SAC and SPA.

9.1.1.2 Phasing of the proposed cut-off wall/Piling of Bridge Abutments

One of the most effective measures to avoid noise and vibration impacts associated with drilling/piling on the QIs (Atlantic salmon, river lamprey and otter) of the River Boyne and River Blackwater SAC is to schedule construction works at periods deemed to have the least sensitivity on the species. The timing of works takes into account seasonal factors and migration preferences (i.e. life cycle, etc.) of the species. Having regard to the preferred migration periods for Atlantic salmon and river lamprey, it is recommended that works associated with the proposed cut-off wall in proximity to the River Blackwater will be undertaken within the timeframe of 1 July to 30 September (inclusive). The IFI guidance document (Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters (2016)) advocates undertaking works in proximity to watercourses during the period July-September inclusive to minimise adverse impacts on the fisheries resource. The construction of the proposed cut-off wall within the River Boyne and Blackwater (SAC and SPA) will be programmed outside the spawning, nursery, and migration season for QI river lamprey and will be scheduled from July to September inclusive, unless otherwise agreed with IFI. The proposed bridge abutments and associated piling operations are located at a setback distance of 7.5 m and 10 m respectively from the River Blackwater and avoids any requirement for instream works. Therefore, construction of the bridge abutments and associated operations will not be subject to the same timeframe restrictions that apply for the proposed cut-off wall. It is envisaged that such works will be scheduled to coincide with periods of dry weather primarily during summer months and outside the core migration period for Atlantic salmon and river lamprey. To mitigate impacts to QI river lamprey, a 'soft-start' to drilling/piling will also be employed to allow lamprey and other fish to move away before the full intensity of drilling/piling 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 ER Team, until full operational power is achieved. Works giving rise to noise emissions are restricted to and permitted by MCC to 07.00 – 19.00 Hrs Monday – Friday; and 07.00 - 13.00 Hrs on Saturdays. Work outside of normal hours shall only take place where written permissions have been sought and received from MCC.

9.1.1.3 Artificial Lighting

Light spill onto the river channel during hours of darkness has the potential to form a barrier to the migration movement of nocturnal QI species (i.e. river lamprey, salmon and otter). Turning off lights during periods of darkness throughout the construction phase will eliminate any risk of impacts sensitive ecological receptors outside of work hours. The risk of impacts associated with artificial lighting on the River Blackwater will be minimised by restricting lighting to the footprint of the Proposed Development works and avoiding any unnecessary light spill (i.e. turning lights off outside working hours) onto the River Boyne and River Blackwater SAC. Light spill from construction onto the River Blackwater will not exceed 1 lux (equivalent to moonlight). In all cases, the Contractor will make retrospective amendments to light cowls to restrict light spillage. The appointed Ecologist will ensure that these measures are adhered to during the construction phase.

9.1.1.4 Water Quality

A range of pollution prevention control measures and best practices have been adopted for the construction phase of the project and are outlined in Section 9.1.4. The measures have due regard to the ecological sensitivities associated with the QIs of the River Boyne and River Blackwater SAC and the SCIs of the River Boyne and River Blackwater SPA.

9.1.1.5 Noise and Vibration

A range of best practice control measures in relation to noise and vibration have been proposed during the construction phase of the project and are outlined in Section 9.1.5. The measures have due regard to the ecological sensitivities associated with the QIs of the River Boyne and River Blackwater SAC and the SCIs of the River Boyne and River Blackwater SPA.

9.1.1.6 Pre-construction Surveys

At least two months in advance of commencing any construction works (including enabling or advance works), the Ecologist will oversee the design and implementation of pre-construction surveys having regard for best available scientific knowledge including the specifications in the NRA Environmental and Construction Guidelines (2005-2011).

The objective of these surveys will be to determine if any new breeding or resting sites of protected species, or new invasive species populations have become established since surveys were completed in 2017, 2018 and 2020 to inform the EIAR. The Ecologist shall ensure suitably experienced ecologists complete the surveys (as determined by the Ecologist). The Ecologist shall oversee the following surveys in suitable habitats:

- Otter breeding or resting sites (within 150 m of proposed piling works and 50 m of all other works).

The appointed Ecologist will take necessary steps to mitigate survey limitations including for instance:

- Overseeing localized clearance of dense vegetation to search for otter where the pre-construction survey window does not overlap winter/early spring (i.e. vegetation die-back).

9.1.1.7 Barrier to Connectivity

There will be inclusion of a mammal ledge within the 1% AEP flood event (1:100 year) in the design of the proposed bridge crossing, including access ramp and lead-in planting; to NRA standard (NRA, 2006b), to allow for continued passage of otter and other mammals in the event of 1% AEP flood event (1:100 year).

9.1.1.8 Mammal Underpass

Mammal fencing along the proposed road alignment and a dry mammal underpass has been designed into the proposed alignment (in a proposed road embankment in Blackwater Park with no risk of flooding (Chainage 425; Figure 4.3; Appendix A)). Mammal fencing and the proposed underpass will be designed (e.g. including 'lead-in planting'), installed and maintained in accordance with the NRA specification (NRA, 2006).

9.1.1.9 Landscaping

Excavated vegetated turves within the SAC boundary (soil from construction works i.e. site stripping in areas comprising Dry Meadows and Grassy Verges (GS2)) will be reused and reinstated where possible during landscaping works to retain native seed mix and encourage rapid colonisation of vegetation. The re-use of spoil on

development sites can include its incorporation into the infrastructure for the purpose of restoring habitats. Particular attention should be paid to the proper storage, re-use and maintenance of the upper, living layer of vegetation. This measure will serve to stabilise soil particles and reduce the potential risk of sediment release associated with exposed soil. The restoration measure will also serve as supporting secondary habitat for QI otter associated with the River Boyne and River Blackwater SAC. The reuse of soil material from construction works is broadly based on guidelines published by the Scottish Environmental Protection Agency (SEPA) 2011, *Restoration Techniques Using Peat Spoil from Construction Works*. The reinstatement of vegetated turves will be supplemented with an application of native seed mix. The Landscape design team with input from the appointed Ecologist will be responsible for overseeing the proposed works.

9.1.2 Protection of QI Alluvial Forest (River Boyne and River Blackwater SAC)

9.1.2.1 Disturbance to QI Alluvial Forest

The Ecologist shall supervise setting out of the works to avoid the potential for Priority QI Alluvial Forest of the River Boyne and Blackwater SAC (which are located c. 25 m west of the Proposed Development) to be disturbed during works. A number of measures are proposed to avoid disturbance and habitat deterioration of QI Alluvial Forest during the construction phase of the project. The following measures have been considered in respect of QI Alluvial Forest:

- An exclusion zone will be established to safeguard areas of QI Alluvial Forest within the study area to avoid any unnecessary disturbance or intrusion during site works. The Ecologist will supervise setting out of all works within European sites and instruct the Contractor on areas of QI Priority Alluvial Forest and other sensitive habitats to avoid.
- Temporary signage will be installed to highlight the location of protected QI Alluvial Forest to construction personnel accessing the site.
- Any requirement for stockpiling, re-fueling of machinery, site access, etc. during construction phase of the project will be sited away from QI Alluvial Forest.
- Machinery access will be restricted to the confines of the Proposed Development footprint and the Contractor will agree locations of all access routes, egress routes, temporary storage areas, site compound, etc. with the appointed Ecologist.
- Any waste/litter generated onsite will be removed offsite to a waste licensed facility. There will be no interference with areas of QI Alluvial Forest during site works. 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

9.1.2.2 Water Quality

A range of pollution prevention control measures and best practices have been adopted during the construction phase of the project and are outlined in Section 9.1.4. The measures have due regard to the ecological sensitivities associated with the QIs of the River Boyne and River Blackwater SAC and the SCIs of the River Boyne and River Blackwater SPA.

9.1.2.3 Invasive Species

A draft Invasive Species Management Plan (ISMP) will be produced by the appointed Contractor to determine the appropriate methods for treatment, control, and/or removal of Japanese knotweed. The Invasive Species Management Plan will be informed by a pre-construction resurvey. In addition to the preparation of an ISMP, the proposed works will adopt best practice control measures to avoid the potential for cross-contamination with infested areas particularly QI Alluvial Forest. Construction personnel will be prohibited from entering areas identified and mapped as QI Alluvial Forest. The project and ISMP will have due regard to the relevant biosecurity measures throughout all phases of the project. Further details are provided in Section 9.1.6.

9.1.3 Protection of SCI Kingfisher (River Boyne and River Blackwater SPA)

9.1.3.1 Pre-construction Surveys

In advance of commencing any construction works (including enabling or advance works), the Ecologist will oversee the design and implementation of pre-construction surveys having regard for best available scientific knowledge including the specifications in the NRA Environmental and Construction Guidelines (2005-2011).

The objective of these surveys will be to determine if any new breeding or resting sites of protected species, or new invasive species populations have become established since surveys were completed in 2017, 2018 and 2020 to inform the EIAR. The Ecologist shall ensure suitably experienced ecologists complete the surveys (as determined by the Ecologist). The Ecologist shall oversee the following surveys in suitable habitats:

- Kingfisher nesting sites (within 150 m of proposed piling/drilling works and 50 m of all other works).

The appointed Ecologist will take necessary steps to mitigate survey limitations including for instance:

- Accessing the Blackwater River by boat to search for kingfisher nest sites where the pre-construction survey window does not overlap the kingfisher nesting season, or where areas with potential to contain otter breeding or resting sites cannot be accessed from the banks (e.g. incidences of flooding).

9.1.3.2 Artificial Lighting

Light spill onto the river channel during hours of darkness has the potential to form a barrier to the migration movement of SCI kingfisher. Turning off lights during periods of darkness during the construction phase will eliminate any risk of impacts on sensitive ecological receptors outside of work hours. The risk of impacts associated with artificial lighting on the River Blackwater will be minimised by restricting lighting to the footprint of the Proposed Development works and avoiding any unnecessary light spill (i.e. turning lights off outside working hours) onto the River Boyne and River Blackwater SPA. Light spill from construction onto the River Blackwater will not exceed 1 lux (equivalent to moonlight). In all cases, the Contractor will make retrospective amendments to light cowl to restrict light spillage. The appointed Ecologist will ensure that these measures are adhered to during the construction phase.

9.1.3.3 Water Quality

A range of pollution prevention control measures and best practices have been adopted during the construction phase of the project and are outlined in Section 9.1.4. The measures have due regard to the ecological sensitivities associated with the QIs of the River Boyne and River Blackwater SAC and the SCIs of the River Boyne and River Blackwater SPA.

9.1.3.4 Noise and Vibration

A range of best practice control measures in relation to noise and vibration have been proposed during the construction phase of the project and are outlined in Section 9.1.5. The measures have due regard to the ecological sensitivities associated with the QIs of the River Boyne and River Blackwater SAC and the SCIs of the River Boyne and River Blackwater SPA.

9.1.4 Pollution Control Mitigation (River Boyne and River Blackwater SAC and SPA)

9.1.4.1 Water Quality

The measures described in this section shall be further refined and expanded by the appointed Contractor into a Construction and Environmental Management Plan (CEMP) as more information becomes available in the course of detailed road design (e.g. including but not limited to construction methods and work schedule). The detailed CEMP will be prepared prior to commencement of construction subject to the approval of MCC, and the appointed Ecologist. The CEMP will remain at all times a live document, subject to amendment of adaptive management throughout construction as required (e.g. in response to extreme weather including flooding and/or alterations to design elements due to the availability of more cost efficient or effective techniques or materials). The following measures shall be implemented as a minimum by the appointed Contractor:

- Installation of a temporary cut off wall (i.e. proposed construction sequence for the bridge is to construct a large 1 m wide and up to 5 m deep cut off wall) which will minimise seepage and overtopping from the

construction zone adjacent to the River Boyne and River Blackwater SAC and SPA. The cut off wall will be detailed to ensure it caters for the flood level to avoid the risk of flood to the construction zone.

- Construction phase earthworks will avoid periods of relatively high rainfall, in conjunction with flood forecasting.
- Phasing and other silt control measures to be refined by the Contractor into an Erosion and Sediment Control Plan, which will be agreed between MCC and the appointed Ecologist.
- The primary construction compound would be located on the land located to the south-west of the existing T-junction between L3409 Ratholdron Road and L34094-1 Clonmagadden Road. An alternative and secondary compound is proposed to the north of the existing N51/R147 roundabout on the land currently occupied by the commercial building to be demolished;
- Use of a single layer of high-performance silt fence around all other works adjacent or in close proximity to the SAC; and specifically, and exclusively following installation methods outlined in published literature (Caraco, 2000) to maximize the effectiveness of particle filtration by geotextiles.
- Use of a triple layer of high-performance silt fence, in conjunction with sandbags, within 50 m of the boundary of the River Boyne and Blackwater SAC/SPA;
- Use of high-performance silt fencing, whose efficacy has been proven by credible evidence (Liddon, 2013).
- Supervision of installation and performance throughout construction of silt fencing and other pollution control measures by the Ecologist and ER Team who will advise the Contractor on repairs required to maximize performance (including repair of sandbags).
- Use of 'Silt dewatering bags' or tubes in conjunction with filter drains and other means necessary to capture, attenuate, and treat surface water generated during construction prior to any discharge to watercourses (subject to the relevant licenses);
- Use of geo-textile or timber mats (where appropriate) within the 0.1% AEP flood zone (1:1000 year) to minimise erosion of soils during tracking of machinery over other vegetated ground.
- Fuel handling and bunding procedures during the works, in unsurfaced areas of the site and in areas near rivers, streams and watercourses.
- Contractor to adopt, and provide evidence to MCC and the Ecologist of staff training in Spill Response & Control Plan to minimize the risk of adverse impacts upon surface waters and groundwater in the unlikely event of accidental spillages, flooding or other emergencies;
- Procedures for dewatering the working area to include adequate treatment of any resulting silt-laden surface water prior to discharge.
- Establishment of contingency measures to cater for impacts to unknown services underlying the construction site (for example, old sewers, culverts); and,
- Control of mud at entry and exit points to the works area using wheel washes; and
- Material and machinery storage to be outside the 1% AEP flood zone (1:100 year).

Mitigation measures relating to safeguarding water quality during the construction phase are outlined in Chapter 9 (Hydrology Chapter) of the EIAR and some of the measures (relevant to ecology) are provided below::

Sedimentation (Suspended Solids) and surface water run-off

- As part of the implementation of the mitigation measures in any approval as may be granted a Construction Environmental Management Plan (CEMP) will be prepared and approved by the County Council and NPWS in advance of works.
- Any requirement for material stockpiling will be located at suitable setback distances away from the river bank as far as possible. Where instructed by the Ecologist, material stockpiles will be covered with polythene sheeting during periods of heavy rain-fall to minimise the potential for sediment release and run-off. Furthermore, runoff from spoil heaps will be prevented from entering watercourses by diverting

any potential run-off through on-site settlement ponds and removing material as soon as possible to designated storage areas.

- Drainage channels and streams will be clearly identified on site and shown on method statements and site plans. Construction compounds will be located at a minimum distance of 25m from watercourses and out of the 1% AEP flood plain.
- Drains carrying high sediment load will be diverted through settlement ponds, located between the construction area and the nearest surface water drain. Surface water runoff from working areas will not be allowed to discharge directly to the local watercourses. To achieve this, the drainage systems will be constructed prior to the commencement of major site works or the Contractor will provide an alternative means of silt management. Discharge from settlement / treatment ponds will be controlled and maintained at Greenfield runoff rates to avoid impacting existing surface water flow rates.
- During construction works, there will be a requirement for diverting rain water away from the construction areas, into nearby drainage channels and streams. Water will be filtered to prevent sediment from entering drainage channels and water streams. A monthly water sampling regime for the River Blackwater will be put in place by the Contractor during construction activity on site.
- Excavations will only remain open for limited time periods to reduce groundwater ingress and water containing silt will be passed through a settlement tank or adequate filtration system prior to discharge. Discharge consent will be obtained for disposal of groundwater arising from pumping (if any) or such water may be disposed of as construction site run off having first passed through a settlement tank or filtration system, where appropriate.
- Silt traps will be placed across the works boundary in any areas adjacent to watercourses to avoid siltation of watercourses. These will be maintained and cleaned regularly throughout the construction phase. Attention should also be paid to preventing the build-up of dirt on road surfaces, caused by trucks and other plant entering and exiting the Proposed Development Site.
- The contractor shall supply a Method Statement in relation to weather forecasts to remove all site machinery, equipment and construction related material from flood zones in order to minimise the risk of silt and sediment release and construction related materials to the river during flood events.
- Excavated vegetated turves within the SAC boundary (soil from construction works i.e. site stripping in largely confined to Dry Meadows and Grassy Verges (GS2)) will be reused and reinstated where possible during landscaping works to retain native seed mix and encourage rapid colonisation of vegetation. This measure will serve to stabilise soil particles and reduce the potential risk of sediment release associated with exposed soil. The restoration measure will also serve as supporting secondary habitat for QI otter associated with the River Boyne and River Blackwater SAC. The reinstatement of vegetated turves will be supplemented with an application of native seed mix. The Landscape design team with input from the appointed Ecologist will be responsible for overseeing the proposed works.

Cementitious Materials (Control of Concrete of Lime)

- Ready-mixed concrete will be brought to the Proposed Development by truck. A suitable risk assessment for wet concreting will be completed by the Contractor prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated water to onsite or nearby surface waters.
- The pouring of concrete will take place within a designated area protected to prevent concrete runoff into the soil/groundwater media or directly to watercourses. Washout of concrete transporting vehicles will take place at an appropriate facility, offsite where possible, alternatively, where wash out takes place on-site, it will be carried out in carefully managed on-site wash out areas.
- In order to minimise potential impacts to the River Blackwater during bridge construction works, any unnecessary movement of construction personnel or vehicular access in proximity to the river bank will be avoided as far as practical in order to minimise impacts to receiving watercourses. During construction works suitable drainage, settlement and silt control measures will be implemented to mitigate disturbance to the SAC and SPA. The bridge span will be constructed using precast beams.

Hydrocarbons and other chemicals

In order to prevent accidental spillages to ground of fuels, and to prevent any consequent migration through the subsurface to surface waters or direct spillages to the River Blackwater, it will be necessary to adopt mitigation measures during the construction phase, which include:

- Designating a bunded storage area at the compound for all oils, solvents and chemicals used during construction.
- Oil and fuel storage tanks will be bunded to the greater volume of either 110% of the capacity of the largest tank/container within the bunded area or to a volume of 25% of the total capacity of all the containers.
- Drainage from the bunded area will be diverted for collection and safe disposal. All containers within the storage area will be clearly labelled so that appropriate remedial action can be taken in the event of a spillage.
- When moving drums from the bunded storage area to locations along the Proposed Development a suitably sized spill pallet will be used for containing any spillages during transit.
- Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles, will take place in designated areas which will be away from the River Blackwater and drainage features.
- Spill kit facilities will be provided at the fuelling areas in order to provide for accidental releases or spillages in and around the area. Any used spill kit materials will be disposed of using a hazardous waste contractor.
- Where mobile fuel bowers are used on the Proposed Development, in the event of a machine requiring refuelling outside of the designated area, fuel will be transported in a mobile double skinned tank. A flexible pipe tap or valve will be fitted with a lock where it leaves the container and locked shut when not in use. The pump or valve will be locked shut when not in use. Each bower will carry a spill kit and each bower operator will have spill response training.

Culverting and Drainage Works

- Culverting works (where required) will be carried out during dry periods when the ditch is dry or there is standing water only. Pre-cast units will be used to minimise disturbance during construction of the culvert. The culvert will be sized to accommodate the 1% AEP flood elevation with 300 mm additional freeboard clearance above this water level.

9.1.4.2 Earthworks

The following mitigation measures relating to safeguarding water quality of natural watercourses and earthworks during the construction phase of the project shall apply (refer to Chapter 8 (Land and Soils) of the EIAR):

Soil requiring off-site disposal will be managed in accordance with relevant waste legislation (Classification, Labelling and Packaging Regulation (CLP) European Waste Catalogue and Hazardous Waste List (EPA, 2002), EU Council Decision (2003/33/EC) of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of Annex II to Directive 1999/31/EC, Council Directive 1999/31/EC on the landfill of waste, Waste Management Act 1996, the Environment (Miscellaneous Provisions) Act 2011 (No. 20 of 2011).

- In general, materials will be hauled along the route of the Proposed Development between the various sections without the need to use the public road network. The imported fill materials will be brought to the site on the public road network, prior to being distributed along the path of the Proposed Development via the haul routes. Any hard core required along this route during construction stage will be reused (most likely in the capping layer).
- Some localised construction stage access routes will be needed close to the bridge abutment to cater for beam lifting; these will represent minor elements in terms of earthworks volumes.
- Temporary drainage during construction stage will be addressed in the CEMP and will be managed so as to reduce the direct runoff to ground and water. Surface water runoff from the Proposed Development may impact the surrounding soils and groundwater introducing silts and increased chemical concentrations to the existing environment. The effect of surface water runoff from road works during the construction stage to the surrounding land and groundwater is considered 'not significant' (as any imported fill material brought to Proposed Development will be assessed to determine its suitability for use prior to use) and to be 'temporary' in duration.
- A construction compound will be required along, or in the vicinity of the Proposed Road Development. It was proposed that the primary construction compound would be located on the land located to the south-west of the existing T-junction between L3409 Ratholdron Road and L34094-1 Clonmagadden Road. An alternative and secondary compound is proposed to the north of the existing N51/R147 roundabout on the land currently occupied by the commercial building to be demolished;

- The construction compound will incorporate the protection and mitigation measures outlined in the EIAR and conform to the requirements outlined in the Construction Erosion and Sediment Control Plan (CESCP), Natura Impact Statement (NIS) and planning conditions. Following completion of construction, the compound area will be re-instated.

9.1.5 Noise and Vibration

A range of best practice control measures in relation to noise and vibration have been compiled in Chapter 11 (Noise and Vibration Chapter) of the EIAR. The proposed measures will have due regard to the QIs of the River Boyne and River Blackwater SAC/SPA during the construction phase. The proposed measures will be carried out with a view to maintaining noise emissions at reduced levels. The following mitigation measures will apply during construction site works:

- With regard to construction activities, all plant items used during the construction phase will comply with standards outlined in 'European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations,' (1998). Reference should be made to 'BS5228: Noise control on construction and open sites', which offers detailed guidance on the control of noise from construction activities.
- The following practices will be adopted during construction, including:
 - Limiting the hours during which noisy site activities are permitted by Meath County Council to 07.00 – 19.00 Monday – Friday and 07.00 - 13.00 Saturday. Work outside of normal hours shall only take place where written permissions have been sought and received from Meath County Council;
 - Appointing a site representative responsible for matters relating to noise; and
 - Establishing channels of communication between the contractor/applicant, Meath County Council and residents.
- Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These include:
 - Selection of construction plant with low inherent potential for generation of noise and/or vibration and use of quiet working methods to be implemented where practicable;
 - Mufflers or silencers should be used where practicable and in line with manufacturers guidelines, all machines and equipment should be shut down when not in use;
 - Erection of temporary barriers around items such as construction generators or high duty compressors. For maximum effectiveness, a barrier would be positioned as close as possible to either the noise source or receiver. The barrier would be constructed of material with a mass of > 7 kg/m² and should have no gaps or joints in the barrier material. As a guide, the length of a barrier would be five times greater than its height. A shorter barrier would be bent around the noise source, to ensure no part of the noise source is visible from the receiving location;
 - Siting of noisy construction plant as far away from sensitive ecological receptors (i.e. River Boyne and River Blackwater SAC / SPA) where practicable.
 - Plant and Machinery used on site should comply with the EC (Construction Plant and Equipment) Permissible, Noise Level Regulations, 1988 (S.I. No. 320 of 1988) or the most recent regulations available at the time of construction;
 - All noise producing equipment should comply with S.I. No. 632 of 2001 European Communities (Noise Emission by Equipment for use Outdoors) Regulations 2001 or the most recent regulations available at the time of construction;
 - Should construction noise levels raise above NRA guidance levels mitigation measures should be implemented to reduce noise levels.

It is not expected that there will be any significant sources of vibration due to the use of vibratory rollers in compaction of earthworks and road surfacing. The works will be undertaken during daylight hours and will not result in significant impacts on QI atlantic salmon and lamprey as the species movement patterns are primarily nocturnal when construction works will be suspended. The works associated with the proposed cut-off wall in proximity to the River Blackwater will be restricted for the most part during summer months and outside the core migration periods for QI atlantic salmon and river lamprey.

9.1.6 Invasive Species

An Invasive Species Management Plan (ISMP) will be produced by the appointed Contractor to determine the appropriate methods for treatment, control, and/or removal of Japanese knotweed. The Invasive Species Management Plan will be informed by a pre-construction resurvey. The pre-construction survey will be carried out during the growing season (i.e. from May to September) to assess if new populations of invasive species have become established since the original surveys were completed in 2017, 2018 and 2020 to inform the EIAR. The Ecologist will review the draft ISMP to ensure it has due regard for emerging best scientific knowledge, such as the likely rhizome extent of Japanese knotweed (Fennell et al., 2018).

Developing codes of practice aims to reduce the risk from, and impacts of, invasive species and safeguarding the QIs and SCIs of the River Boyne and River Blackwater SAC / SPA. Japanese knotweed was recorded at Blackwater Park during field surveys. In addition to the preparation of an ISMP, the proposed works will adopt best practice control measures to avoid the potential for cross-contamination with infested areas. The project and ISMP will have due regard to the relevant biosecurity measures throughout all phases of the project:

- Clearly identify and mark out the infested areas of Japanese knotweed to inform construction personnel and operating machinery. Infested areas of Japanese knotweed will be fenced off (where possible) and signage will be installed to highlight the location of invasive species.
- Create dedicated exclusion zone entry and exit points for operators on foot and for mobile equipment in the vicinity of infested areas comprising stands of Japanese knotweed.
- All earthworks machinery will be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere.
- Wheel washing facilities will be provided at the site entrance. All washing must be carried out in areas with no potential to result in the spread of invasive species.
- Care will be taken not to disturb or cause the movement of fragments of invasive species, either intentionally or accidentally.
- All plant machinery and construction personnel will be restricted to the footprint of the proposed works area and will avoid unnecessary crossings in adjoining areas known to support stands of Japanese knotweed.
- With the exception of Japanese knotweed recorded at Blackwater Park, there are no other existing stands of scheduled invasive species onsite. However, should any new species become established in the interim, stands will be clearly demarcated by temporary fencing and machinery tracking or otherwise within infested areas will be strictly avoided. A minimum buffer of seven metres will be applied to avoid disturbance of lateral rhizomes.
- The machinery must be thoroughly pressure-washed in a designated area at least 25 metres from any watercourse before moving on to an area that is not yet infected.
- All contractors and staff will be briefed about the presence, identification and significance of Japanese knotweed before commencement of works.
- For any material entering the site, the supplier must provide an assurance that it is free of invasive species (i.e. Japanese knotweed).
- Good construction site hygiene will be employed to prevent the spread of these species with vehicles thoroughly washed prior to leaving any site with the potential to have supported invasive species. All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) will be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species such as Japanese knotweed and
- The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority *The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads* (NRA 2010) and the Property Care Association (PCA) (2018) – *Practical Management of Invasive Non-Native Weeds in Britain and Ireland*.

9.1.7 Role of the Ecologist

Prior to commencement of construction, a suitably experienced Ecologist (the Ecologist), will be engaged as part of the Employer's Representative (ER) Team. The Ecologist will be a full member of a relevant professional institute such as the Chartered Institute of Ecology and Environmental Management (CIEEM), have relevant experience in the management of ecological constraints during construction, 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 Development 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:

- Communicate relevant matters to MCC, and other stakeholders as relevant;
- Review Contractor Method Statements for compliance with the mitigation in this NIS;
- Attend site meetings and input to Contractor toolbox talks prior to commencement of the Proposed Development; and,
- Supervise and direct construction of the Proposed Development as part of the Employer's Site Representative (ESR) Team (Ecological Clerk of Works).

9.1.7.1 Licensing

At the time of writing this NIS, there were no protected species licences required in relation to QIs/SCIs, or invasive species. The Ecologist will determine the potential requirement for licences outside the scope of this NIS.

9.1.8 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 carried out 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, 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; and
- Information on spill control procedures as specified in Section 9.2.6.

9.1.9 Construction Environmental Management Plan (CEMP)

The Contractor will be required to complete a Construction Environmental Management Plan (CEMP), also referred to as Environmental Operating Plan (EOP), in accordance with the NRA/TII Guidelines for the Creation and Maintenance of an Environmental Operating Plan. The CEMP will set out the Contractor's approach to managing environmental issues associated with the construction of the road and provide a documented account to the implementation of the environmental commitments set out in the EIAR and NIS and measures stipulated in the planning conditions. Details within the plan will include;

- All Environmental commitments and mitigation measures included as part of the planning approval process and any requirements of statutory bodies such as the National Parks and Wildlife Services as well as a method documenting compliance with the measures;
- A list of all applicable environmental legislation requirements and a method of documenting compliance with these requirements;
- Outline methods by which construction work will be managed to avoid, reduce or remedy potential adverse impacts on the environment.

To oversee the implementation of the CEMP the Contractor will be required to appoint a responsible manager to ensure that the mitigation measures included in the NIS, EIAR and the CEMP are executed in the construction of the works and to monitor that those mitigation measures employed are functioning properly.

9.1.9.1 Construction and Demolition Waste Management Plan

Included within the CEMP will be the Waste Management Plan which clearly sets out the Contractor's proposals regarding the treatment, storage and recovery or disposal of waste. The plan itself will contain (but not be limited to) the following measures;

- Details of waste storage (e.g. skips, bins, containers) to be provided for different waste and collection times;
- Details of where and how materials are to be disposed of - landfill or other appropriately licensed waste management facility;
- Details of storage areas for waste materials and containers;
- Details of how unsuitable excess materials will be disposed of where necessary;
- Details of how and where hazardous wastes such as oils, diesel and other hydrocarbon or other chemical waste are to be stored and disposed of in a suitable manner.

9.1.9.2 Construction Erosion and Sediment Control Plan (CESCP)

A CESCP will be prepared at detail design stage for the Proposed Road Development. All of the measures, mitigations, controls, requirements, procedures, etc. will be developed from industry environmental best practice to ensure that there are no significant adverse effects on the receiving environment during the construction of the proposed road scheme. These mitigation measure will be implemented in full and will ensure that sediment laden runoff from the construction site does not enter watercourses or water bodies with an emphasis on the River Boyne and River Blackwater SAC/ SPA.

The contract documents for the LDR4 scheme will place an obligation on the construction contractor to further develop this plan to include any additional requirements stipulated by the consenting authority. The exact details of the plan, particularly in relation to construction phasing, sequence or layout, may be amended by the Contractor to reflect different construction approaches but shall, as an absolute minimum, include all the measures, mitigations, controls, requirements, procedures, etc. included in the plan.

9.2 Operational Stage Mitigation

9.2.1 Protection of QI River Lamprey, QI Salmon and QI Otter (River Boyne and River Blackwater SAC) and SCI Kingfisher (River Boyne and River Blackwater SPA)

9.2.1.1 Artificial Lighting

During the operational phase, the risk of impacts associated with artificial lighting on the River Blackwater will be minimised by the adoption of the following design requirements:

- A low level lighting column (avoidance of over-hanging lanterns, etc.) will be provided along the proposed bridge crossing at the River Blackwater.
- The location of lighting along the rest of the scheme will be designed to maximise the set back distance from the proposed bridge taking into account the ecological sensitivities associated with the River Boyne and River Blackwater SAC and SPA.
- Artificial lighting along the proposed river bridge will be provided by means of low-rise lighting system (e.g. lighting integrated within the bridge parapet or alternative systems where the level of light source is not higher than the bridge parapet) in order to avoid light spill onto the River Blackwater. The proposed bridge will comprise a solid bridge parapet to avoid light spill onto the River Boyne and River Blackwater SAC and SPA.
- A suitably experienced ecologist will be present to oversee and ensure that the proposed lighting will not result in additive light spill on the adjoining river.

9.2.1.2 Pollution Prevention Control Measures

The operation of the Proposed Road Development is unlikely to have any significant adverse impacts on the local hydrological environment due to the inherent environmental design considerations that have been incorporated into the Proposed Road Development. There will be no direct discharges to surface waters during the operational phase. The following control measures having due regard to pollution prevention control during the operational phase (refer to Chapter 9 (Hydrology Chapter) of the EIAR) include:

Accidental Spillages and Leaks

Releases of fuel or chemicals from accidental spills associated with potential road traffic accidents or runoff from rainwater that has passed over impermeable surfaces will be prevented from polluting the local surface waters as all surface water runoff from the paved areas will be collected in a closed drainage network and will pass through hydrocarbon interceptors prior to discharge to a surface water siltation and attenuation pond before entering the River Boyne and River Blackwater SAC and SPA. The outlet of the attenuation pond will be fitted with a shut-down facility so that, in the event of a catastrophic spill, the spillage will be contained within the attenuation pond to be removed by tanker. The drainage system will be maintained by Meath County Council during the operational phase of the Proposed Road Development.

Surface Water/Storm Water Drainage

The attenuation pond will be lined and the surface water drainage network sealed in order to prevent infiltration of contaminated groundwater into surface water network. The attenuation pond will be designed to facilitate a 1-in-100 year flood event plus a 20% allowance for climate change.

To minimise sediment build up within the storm water drainage network, trapped inlets will be used at all points of entry and key manholes will have sumps to collect material. A regular maintenance regime, including monitoring, will be put in place to remove any excess build-up of material. Meath County Council will be responsible for the maintenance of the drainage network during the operational phase.

Flood Risk

The support abutment of Bridge is located within the flood plain. Hydraulic modelling carried out demonstrated there is limited potential to impact on the flood regime of the River Blackwater. The attenuation pond will attenuate peak discharges from storm events by allowing a controlled release of water into the adjacent watercourse, thus reducing point loading within the channel. This would also assist in the prevention of bank erosion within the channel, lowering sediment release and the subsequent potential for adverse impact on the QIs and SCIs of the River Boyne and River Blackwater SAC and SPA.

No additional mitigation is required with respect to the QIs and SCIs of the River Boyne and River Blackwater SAC and SPA during the operational phase of the project.

9.2.2 Noise

In order to minimise noise levels during the operational phase of the Proposed Development, a number of mitigation measures have been proposed:

A Low Noise Road Surface (LNRS) is proposed along all sections of the link road, including the mainline and all tie-ins to the scheme

A 1.5m high noise barrier is also proposed along the new link road, extended 39.5m along the northbound carriageway in the vicinity of Blackwater Park.

9.3 Monitoring

In relation to monitoring, the Draft Guidance from the EPA states (p. 61) [*emphasis added*];

“It may be appropriate, where relevant, to propose monitoring to take place after consent is granted in order to *demonstrate that the project in practice conforms to the predictions made.*”

“It is important to avoid excessive reliance on monitoring because this has the potential to lead to operational changes that fall outside the scope of project that was subject to scrutiny during the consent process.”

“Monitoring post-consent should similarly not be used to allow the deferral of the gathering of information that is necessary for the assessment/consent.”

“Monitoring descriptions should refer to remedial actions to be taken; as well as responsible parties.”

With this in mind, monitoring measures have been proposed in relation to the Proposed Development.

9.3.1 Construction-Phase Monitoring

9.3.1.1 Role of the Contractor

The Contractor will carry out a programme of water quality monitoring, whose parameters will be agreed with the IFI and the Ecologist (Refer to Water Quality Monitoring Program (WQMP) in Chapter 9)

9.3.1.2 Role of the Ecologist

As already described the Ecologist will be appointed to oversee, advise, and facilitate the proper implementation of all ecological mitigation measures by the Contractor, to include consultation input from the NPWS and IFI.

9.3.1.2.1 Ecological Monitoring Strategy

The Ecologist will review this NIS, planning conditions, post-consent consultations with statutory bodies, and the results of pre-construction surveys, to inform production of an ‘Ecological Monitoring Strategy’.

The function the Ecological Monitoring Strategy (EcMS) will be to:

- Inform adaptive management measures to be agreed with MCC and advised to the Contractor;
- Provide an evidence-base to be communicated to the NPWS and IFI, on the effectiveness of mitigation measures proposed, to inform improvements to industry practice.

The specific aims of the EcMS will be to monitor and oversee the correct implementation of mitigation, and instruct the Contractor on how to adapt mitigation as required, with particular regard to:

- Results of pre-construction surveys which may identify new ecological constraints within the ZOI of the Proposed Development.
- Implementation of the ISMP.
- Phasing of works including piling, earthworks, and vegetation clearance in response to potentially unforeseen weather conditions or programme changes.
- Condition and performance of silt fencing silt de-watering sacs and other aspects of the Erosion and Sediment Control Plan, as informed by site observations by the Ecologist, and the results of the Contractor’s WQMP.
- Working methods within the flood plain of the River Blackwater;
- Culling of construction lighting to protect the QIs of the River Boyne and River Blackwater SAC and SCIs of the River Boyne and River Blackwater SPA.
- Ensure directional lighting used to minimise light spillage on the River Blackwater (River Boyne and River Blackwater SAC and SPA).
- Construction and installation of the mammal ledge for otter and mammal fencing (including lead-in planting, and access ramps).
- Ensure no access or damage within areas of QI Alluvial Forest.
- Provide input to landscaping works for reinstatement of vegetated turves to provide secondary habitat within the River Boyne and River Blackwater SAC.

The Ecologist will report the actions taken under the EcMS to the NPWS and IFI in agreement with MCC.

9.3.2 Operation-Phase Monitoring

MCC will be responsible, during operation, for the commission of a suitably experienced ecologist to monitor effectiveness of and make recommendations to adapt the measures set out in relation to the design of lighting in the 'natural zone' at the River Blackwater and associated SPA and SAC.

10. Concluding Statement

The mitigation measures prescribed in Section 9.1 to 9.3 will provide for the protection of the relevant QIs (river lamprey, salmon, otter and Alluvial forest) of the River Boyne and River Blackwater SAC and SCI kingfisher of the River Boyne and River Blackwater SPA present within the ZOI of the Proposed Development. There will be no adverse effects on any European site.

The NIS has been prepared based on best scientific knowledge and in accordance with the requirements and provisions under the Habitats Directive, Habitat Regulations and Planning and Development Act, most up to date case law and published guidance. It can be determined beyond all reasonable scientific doubt that Proposed Development will not adversely affect the integrity of the River Boyne and River Blackwater SAC and the River Boyne and River Blackwater SPA. All identified pathways with potential for adverse impacts are robustly blocked through the use of best practice, avoidance and appropriate design as set out in this report.

Following implementation of mitigation measures, the Proposed Development, individually and/or in combination with other plans and projects, will not adversely affect the integrity of any European site.

11. References

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Appendix A Figures

Figure 1. Proposed Development Site Location

Figure 2. European Sites within Zol

Figure 3. Distribution of QI Habitats and SCI Features

Figure 4.1. General Arrangement – Sheet Plan

Figure 4.2. General Arrangement – Sheet 1 of 3

Figure 4.3. General Arrangement – Sheet 2 of 3

Figure 4.4. General Arrangement – Sheet 3 of 3

Figure 5. Bridge Construction Detail

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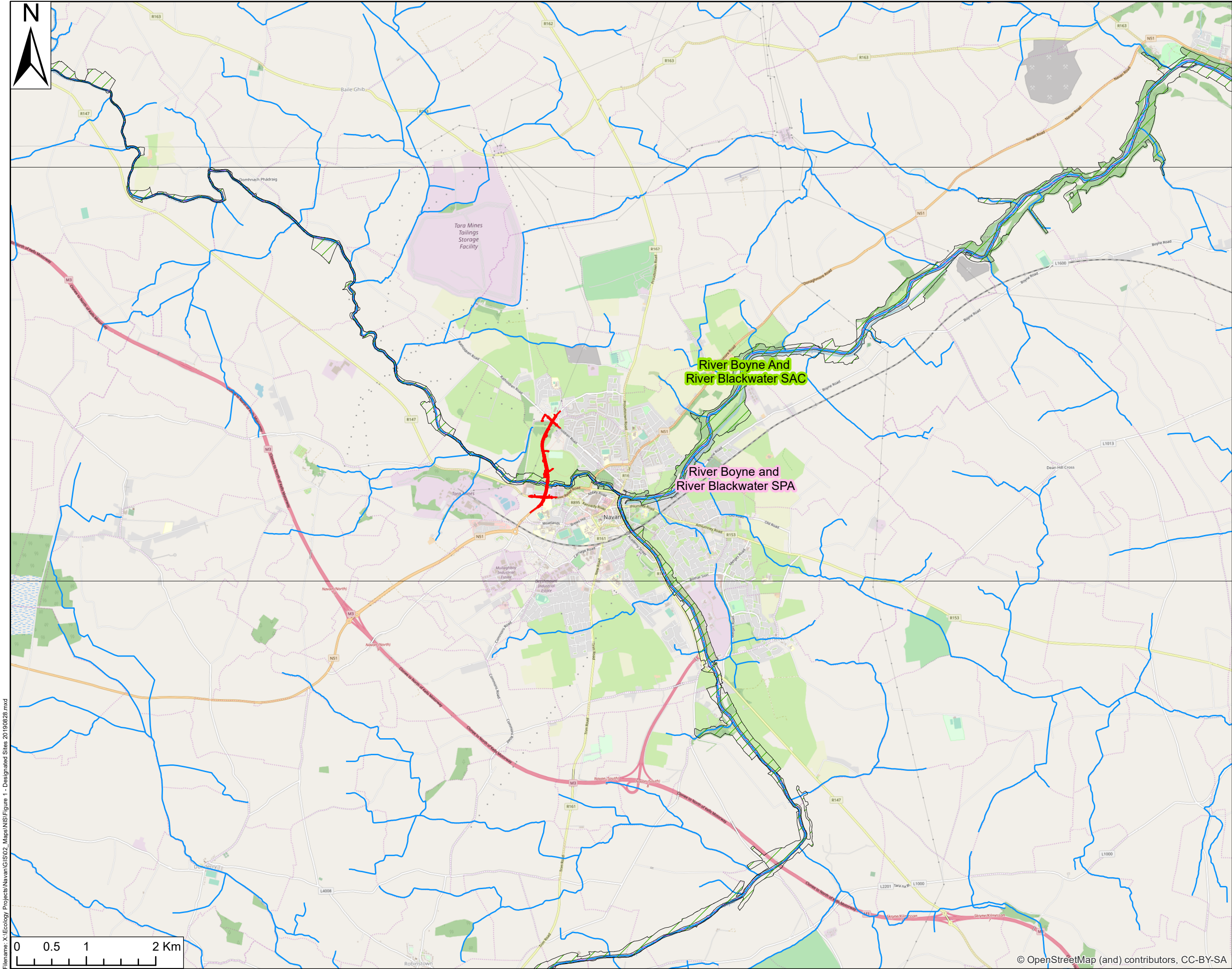
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SCHEME LOCATION PLAN

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FIGURE 1

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Project Title:

LOCAL DISTRIBUTOR
ROAD 4
NAVAN, CO. MEATH

Client:

MEATH COUNTY
COUNCIL

LEGEND

- Proposed Development
- Watercourses
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

AECOM Internal Project No:

60546769

Drawing Title:

DESIGNATED
EUROPEAN SITES IN
RELATION TO PRO-
POSED DEVELOPMENT

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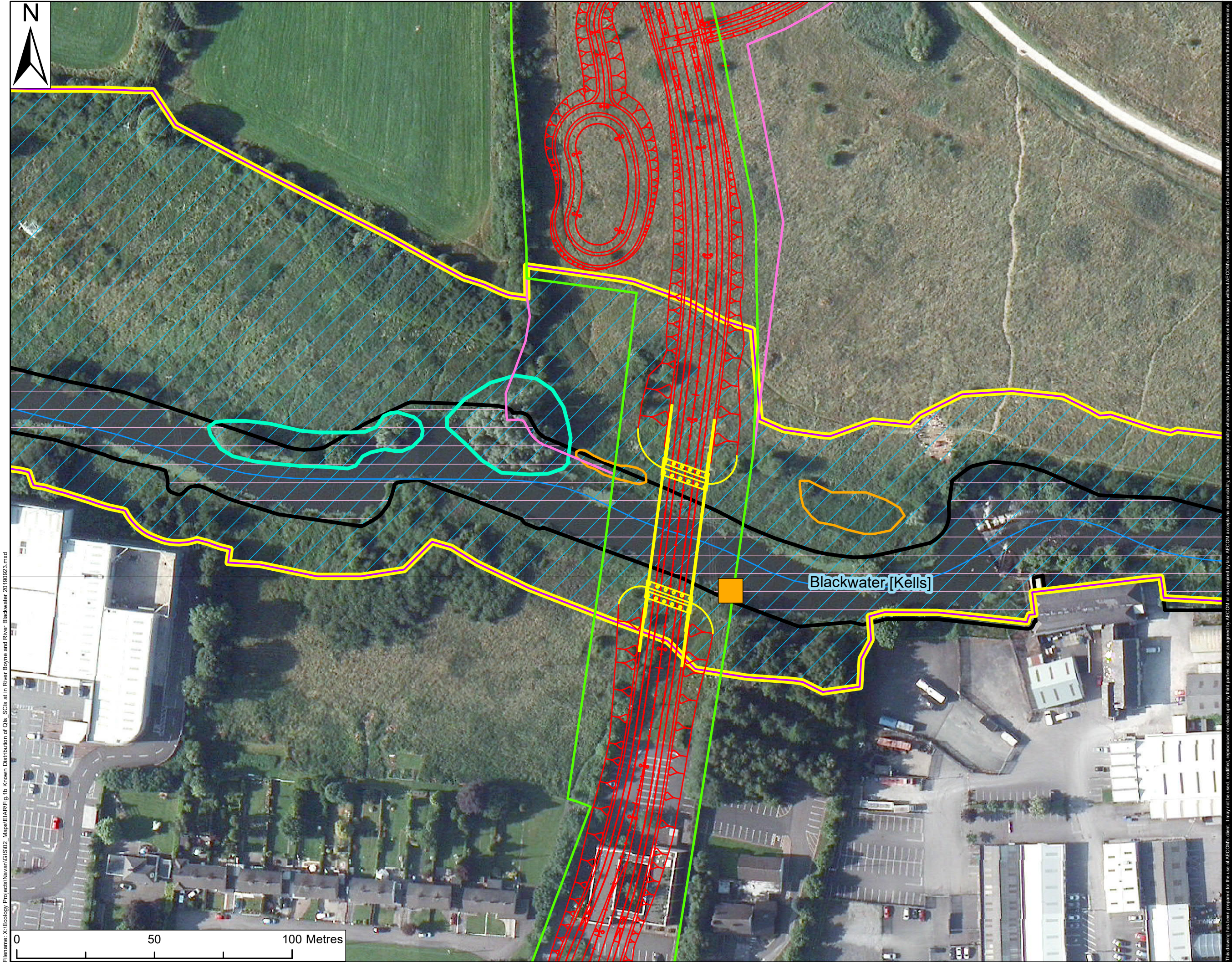
FIGURE 2

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Project Title:
LOCAL DISTRIBUTOR
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NAVAN, CO. MEATH

Client:
MEATH COUNTY
COUNCIL

- LEGEND**
- Proposed Development
 - Bridge
 - Permanent CPO Line
 - Temporary CPO Line
 - Watercourses
 - Priority QI Alluvial Woodland
 - Non-QI Annex 1 Hydrophilous Tall Herb and Fern Habitat
 - Otter (QI) Foraging and Commuting Corridor
 - Special Area of Conservation (SAC)
 - Special Protection Area (SPA)
 - Kingfisher (SCI) Foraging and Commuting Corridor
 - Secondary Habitats within Floodplain
 - Kingfisher (SCI): Perch (Riparian Tree Branch)

AECOM Internal Project No:
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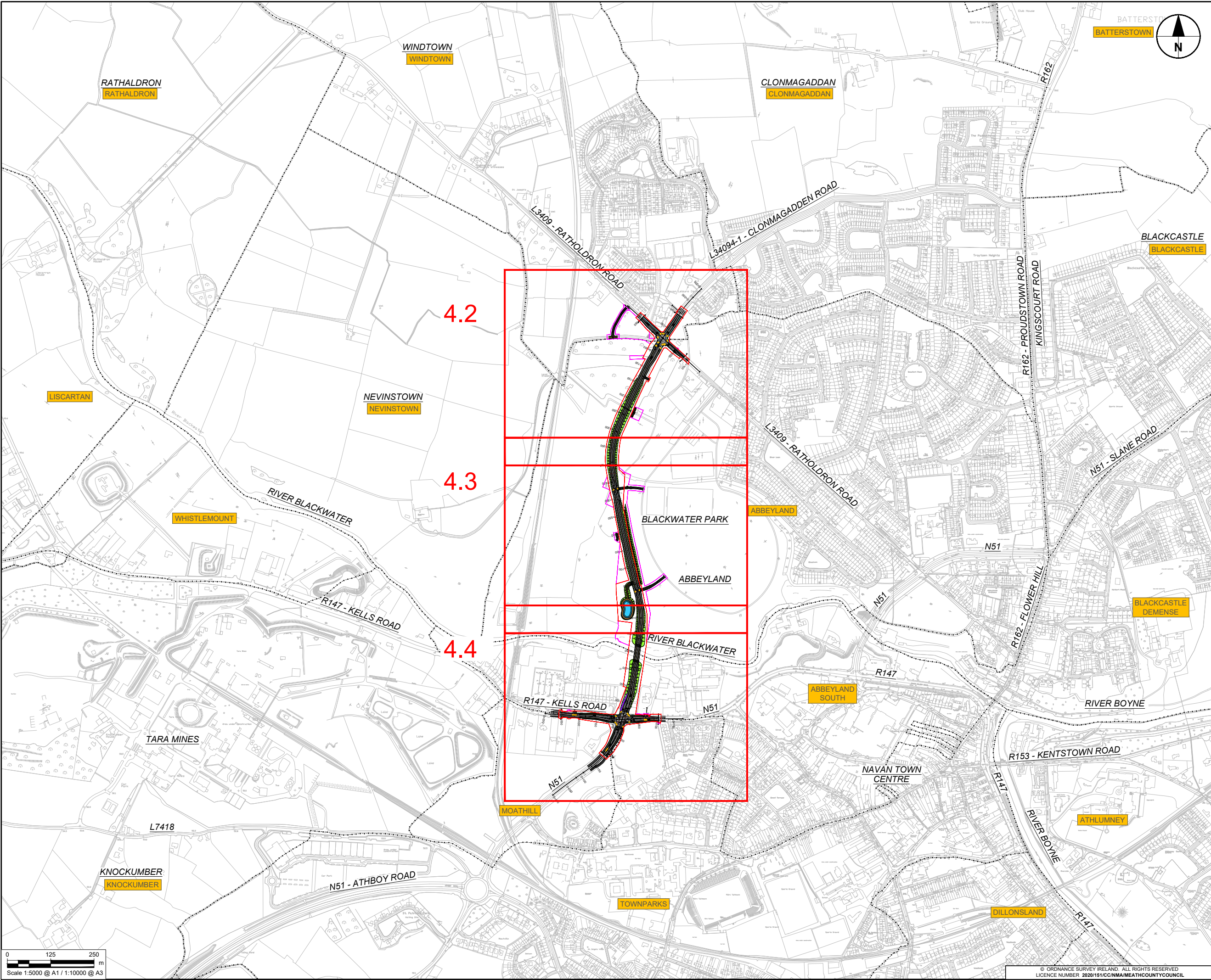
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DISTRIBUTION OF
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FIGURE 3

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 - ISLAND / FOOTWAY
 - OFF ROAD CYCLE TRACK
 - ON ROAD CYCLE LANE
 - CYCLE RAMP
 - SHARED SURFACE
 - GRASSED VERGE
 - EARTHWORKS
 - FIELD / POND ACCESS
 - INTERCEPTOR DITCH
 - CPO LINE (PERMANENT)
 - CPO LINE (TEMPORARY)
 - TOWNLAND BOUNDARY

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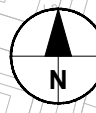
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SHEET 1 OF 3

SHEET NUMBER

FIGURE 4.2

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FIGURE 4.3

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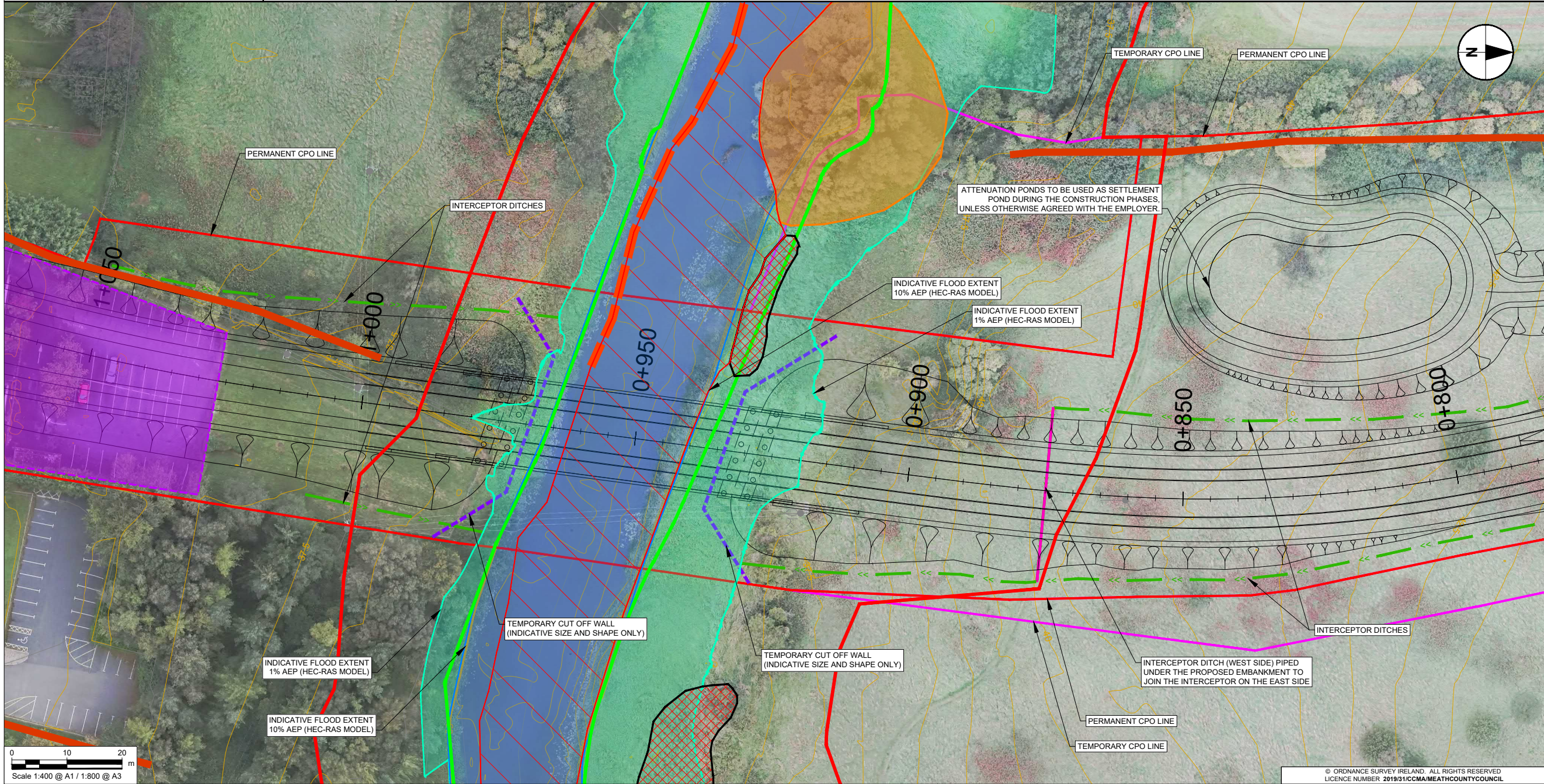
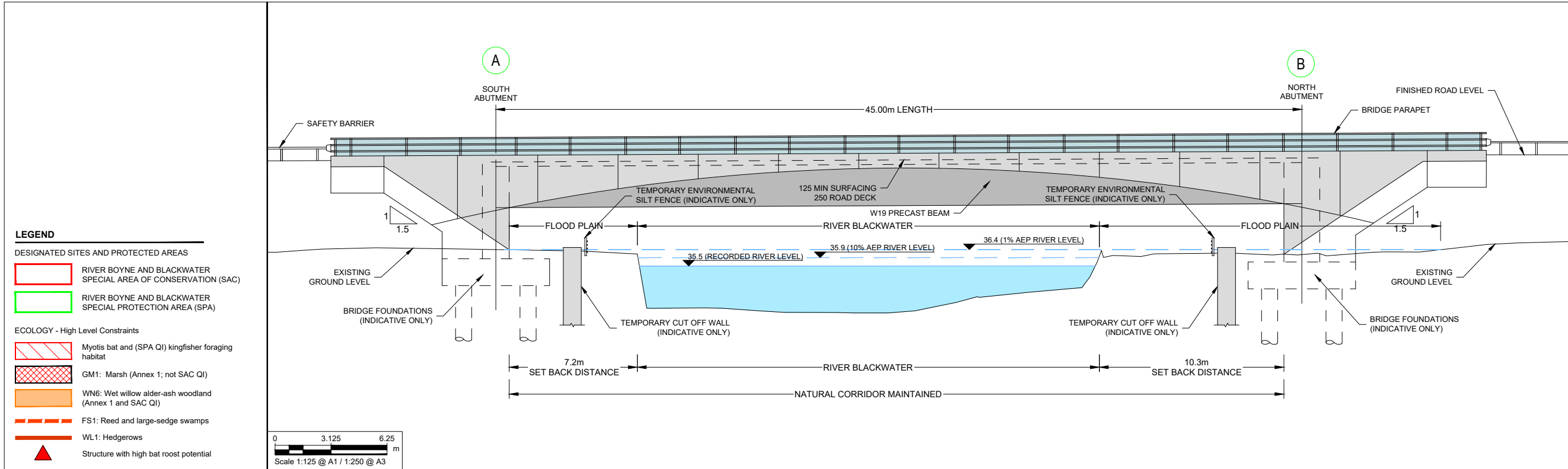
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Appendix B Site Photos



Photograph B.1 The proposed development footprint traverses habitats deemed to be of local importance dominated by Dry meadows and grassy verges (GS2) and Improved agricultural grassland (GA1). The proposed bridge crosses the River Blackwater designated as an SAC and SPA.



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



Photograph B.3 Annex 1 Priority Annex 1 Qualifying Interest Alluvial Forest west of the proposed works footprint; photographs present 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 recorded in Blackwater Park.

Appendix C Appropriate Assessment Determination

Subject: TRA 04 008 Local Distributer Road 4 Abbeyland Navan – Screening for Appropriate Assessment

Order: By virtue of the powers vested in me by the Local Government Acts 1925 – 2024

It is hereby ordered that...In accordance with Regulation 250 of the Planning and Development Regulations, 2001, as inserted, concerning 'Screening for Appropriate Assessment' and having screened the Local Distributer Road 4 Abbeyland Navan (hereinafter referred to as 'the proposed road development') to assess, in view of best scientific knowledge, if the proposed road development, individually or in combination with other plans or projects, would be likely to have a significant effect on a European site and as part of that screening, having considered the report titled *Local Distributer Road 4 Abbeyland Navan, Screening Assessment, (prepared by Aecom)* referred to hereunder as 'the said report' which concludes in relation to the proposed road development that:

1. Having regard for relevant European and national guidance on AA Screening, the Proposed Road Development should be 'Screened in' to the requirement for AA. This conclusion was reached on the basis that, in the absence of mitigation measures, significant effects on 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 4232), during construction and operation of the Proposed Development, could not be excluded on the basis of objective information, individually or in combination with other plans or projects.

Potential pollution risks during construction and operation of the Proposed Development to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA, which are located within the proposed road development works zones and downstream of the proposed development works zones, informed AECOM's conclusion that the Proposed Development should be 'Screened in' and the Proposed Development should be subject to the requirement for Stage 2 AA.

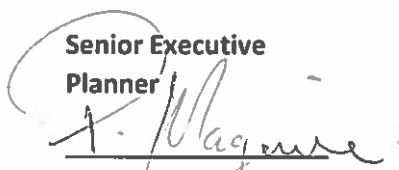
2. As a result, a Stage 2 Appropriate Assessment of the proposed road development is required, and a Natura Impact Statement should be prepared in respect of the proposed road development.

Having agreed with the findings and conclusions of the said report, I have determined that a Stage 2 Appropriate Assessment of the proposed road development shall be submitted to An Bord Pleanála for consideration and approval under Section 51(2) of the Roads Act, 1993 (as amended).

Linda O Grady
Executive Planner



Pádraig Maguire
**Senior Executive
Planner**


27-4-20

Jackie Maguire
Chief Executive

