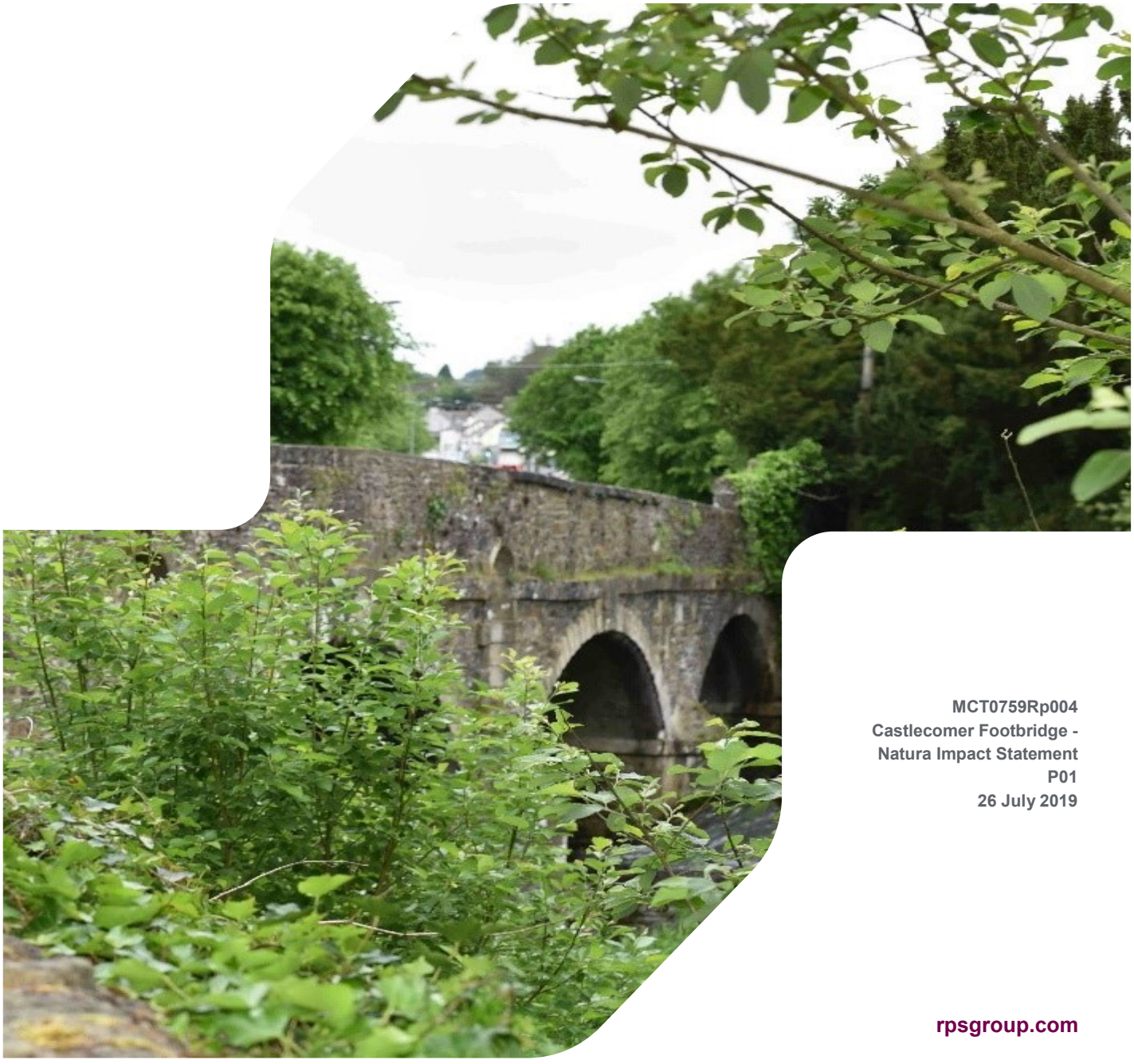
CASTLECOMER FOOTBRIDGE

Natura Impact Statement



MCT0759Rp004
Castlecomer Footbridge -
Natura Impact Statement
P01
26 July 2019

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
P01	For Planning	L. Cocchiglia	L. Cocchiglia A. Fitzgerald	A O'Brien	26.07.19

Approval for issue

A O'Brien		26 July 2019

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1 INTRODUCTION

RPS has been commissioned by Transport Infrastructure Ireland (TII) and Kildare County Council acting as lead local authority through a Section 85 Agreement (Local Government Act, 2001) on behalf of Kilkenny County Council (KCC) under Eirspan Task Order 302 to provide technical consultancy services to examine options for an improved pedestrian link across the River Dinin in Castlecomer, Co. Kilkenny.

This Natura Impact Statement (NIS) provides information in support of an Appropriate Assessment (AA) of the proposed Castlecomer Footbridge at Castlecomer, Co. Kilkenny. It assesses whether the proposed development at Castlecomer, alone or in combination with other plans and projects, is likely to have significant effects on a European Site(s) in view of best scientific knowledge and the Conservation Objectives (Cos) of the site(s). European Sites are those identified as sites of European Community importance designated as Special Areas of Conservation (SAC) under the Habitats Directive (92/43/EEC) or as Special Protection Areas (SPA) under the Birds Directive (79/409/ECC as codified by Directive 2009/147/EC).

In addition to this NIS, the Reader is advised there are other supporting documents (including stand-alone specialist reports) not included herein but available for consideration to ensure a robust review of the proposed development on the selected site:

- Appropriate Assessment Screening (AA, RPS 2019); and
- Aquatic Report (AR, RPS 2019).

1.1 Legislative Context

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, better known as “The Habitats Directive”, provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are SACs designated under the Habitats Directive and SPAs designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European Sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

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

Article 6(4) states:

> *If, in spite of a negative assessment of the implications for the [European] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*

1.2 Methodology

1.2.1 Guidance Followed

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in relation to this AA has had regard to the following guidance:

- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. Department of Environment, Heritage and Local Government, (DoEHLG, 2010);
- *Communication from the Commission on the Precautionary Principle*. Office for Official Publications of the European Communities, Luxembourg, (EC, 2000a);
- *Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (known as MN2000)*, Office for Official Publications of the European Communities, Luxembourg, (EC, 2000b);
- *Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC*. Office for Official Publications of the European Communities, Brussels (EC, 2001);
- *Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the Commission*. Office for Official Publications of the European Communities, Luxembourg, (EC, 2007);
- *Nature and biodiversity cases: Ruling of the European Court of Justice*. Office for Official Publications of the European Communities, Luxembourg (EC, 2006);
- *Article 6 of the Habitats Directive: Rulings of the European Court of Justice* (EC, 2014); and
- *Interpretation Manual of European Union Habitats*. Version EUR 28. European Commission (EC, 2013).

1.3 Stages of Appropriate Assessment

Stages 1: Screening/Test of Significance

This process identifies whether the proposed development is directly connected to or necessary for the management of a European Site(s) and identifies whether the development is likely to have significant impacts upon a European Site(s) either alone or in combination with other projects or plans.

The output from this stage is a determination for each European Site(s) of not significant, significant, potentially significant, or uncertain effects. The latter three determinations will cause that site to be brought forward to Stage 2.

Stage 2: Appropriate Assessments

This stage considers the impact of the proposed development on the integrity of a European Site(s), either alone or in combination with other projects or plans, with respect to: (i) the site's COs; and (ii) the site's structure, function and its overall integrity. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts is undertaken.

The output from this stage is a Natura Impact Statement (NIS). This document must include sufficient information for the Competent Authority to carry out the appropriate assessment. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage 3: Assessment of Alternatives

This process examines alternative ways of achieving the objectives of the project that avoid adverse impacts on the integrity of the European Site. This assessment may be carried out concurrently with Stage 2 in order to find the most appropriate solution. If no alternatives exist or all alternatives would result in negative impacts to the integrity of the European Sites, then the process either moves to Stage 4 or the project is abandoned.

Stage 4: Assessment where Adverse Impacts Remain

This stage includes the identification of compensatory measures where, in the context of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

1.3.1 Ecological Surveys and Consultation

Areas of ecological interest highlighted during the desktop and constraints assessment, particularly in relation to the presence of habitats of qualifying interest, were investigated further. Field surveys of the study area were carried out by RPS Ecologists and sub-contractors on dates listed in **Table 1-1**.

Table 1-1: Details of Surveys & Monitoring Investigations

Survey Element	Date(s) of Survey	Report Title and Summary description*
AA site visit (general ecological constraints)	24th September 2018	Castlecomer Footbridge Screening for Appropriate Assessment (AA, RPS 2019)
Aquatic Ecology Survey	24th September 2018	Castlecomer Footbridge Aquatic Ecology Survey (AR RPS, 2019)

*Surveys undertaken by RPS unless otherwise stated.

1.3.1.1 Consultation

Consultation undertaken for the proposed project is detailed in **Table 1-2.**

Table 1-2: Summary of Consultation Undertaken for the Proposed Project

Consultee	Origin of Consultation	Method of Consultation	Summary of Consultation
IFI	RPS	Email response dated 22nd November 2018	Initial feedback from IFI regarding the construction and design options for Castlecomer Footbridge. Inland Fisheries Ireland's policy on Bridge construction is that there should be no interference with the riverbed to avoid habitat loss during construction and long term. Therefore, the preferred options are clear span structures. The construction of the abutments should always take place in the dry. Where possible the abutments should be set back from the river bank sufficiently to maintain connectivity of habitat along the river bank and to avoid erosion of the bank. In some cases where the abutments cannot be set back the area should be isolated from the watercourse using bunding. The area within the bund must be electro-fished and any remaining water must be pumped to grassland or a filtration system before returning to the river. Therefore, no work should take place within the live water environment.
NPWS	RPS	Email response dated 8th July 2019	No comment

2 STAGE 1: SCREENING FOR APPROPRIATE ASSESSMENT SUMMARY

In order to comply with the requirements of Article 6(3) of the EU Habitats Directive, the process of Screening for AA was undertaken at an early stage of the Castlecomer Footbridge (AA, RPS 2019) when only the preliminary design for the proposed Castlecomer Footbridge was available. The Screening for AA assessed the potential for the project to result in likely significant effects upon European Sites within the Zone of Influence (ZoI), either alone or in combination with other plans or projects.

2.1 Potential for Likely Significant Effects

The Screening for AA was undertaken before the detailed design was completed and therefore the potential likely significant effects were undetermined. This resulted because of uncertainty regards: (i) the project design and requirements, (ii) magnitude of impact to water quality which could impact upon species and habitats of the River Barrow and River Nore SAC, the Lower River Suir SAC and the River Nore SPA.

Subsequently, it was concluded that the potential for likely significant effects could not be ruled out for the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA given the uncertainty as to what the final design requirements and layout might include as well as mitigation measures required.

2.2 Screening for Appropriate Assessment Conclusion

On completion of the Screening process, it was concluded that the potential for likely significant effects on River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA from the proposed project remained undetermined. Owing to this uncertainty with regards to the project design at that stage, and by applying the precautionary principle, which requires that the COs of European Sites should prevail, it was determined that it was not possible to rule out likely significant effects and therefore, the AA process should proceed to Appropriate Assessment including the preparation of a NIS.

The Screening for AA (AA, RPS, 2019): Castlecomer Footbridge is submitted separately as part of the Planning Application.

3 STAGE 2: APPROPRIATE ASSESSMENT – NATURA IMPACT STATEMENT

3.1 Introduction

The requirement to carry out a NIS followed on from the conclusion arrived at during the Screening process (AA, RPS 2018). At that time of the screening the design was preliminary and there were multiple design options with variant degrees of interaction with the River Barrow and River Nore SAC and the potential impact to the hydrological conditions which support particular habitats and species of the River Barrow and River Nore SAC.

3.2 Description of Project

The site of the proposed pedestrian bridge is on the eastern side of Castlecomer Town, Co. Kilkenny running parallel to the existing N78 bridge crossing of the River Dinin, see **Figure 1-1**.

The existing River Dinin Bridge was constructed in 1767 and it is approximately 6.7m wide between parapets. It caters for both vehicular and pedestrian traffic movements on the N78. As the bridge was constructed in the 18th Century, it was never intended to cater for modern vehicular traffic. Consequently, the existing bridge is too narrow to cater for a safe modern road cross section complete with footway.

There is only one footpath on the existing bridge which is sub-standard and varies 650-900mm in width. It is hazardous for both road users and pedestrians particularly on the east end of the bridge where the turning movements of HGV's encroach onto the footway due to the tight bend in the road. In order to improve safety at the location, KCC and TII intend to remove pedestrians from the existing bridge and provide a new dedicated facility for pedestrians to cross the River Dinin.

The need for improved pedestrian links over the River Dinin has been previously identified in the Castlecomer Local Area Plan (LAP) 2009 - 2018 and more recently has been identified as a key objective in the 2018-2024 LAP.

3.3 Description of Works

A Castlecomer Footbridge Options Report was prepared by RPS Design Team in conjunction with the project steering committee to assess a number of potential options for the footbridge. A copy of the report is available under a separate cover and will be submitted with the planning application.

The Options Report concluded that, a two-span steel footbridge independent of the existing bridge, was the preferred option and this option is the subject of this report. Details of the proposed bridge design are provided in **Appendix A.** The proposed footbridge will be approximately 44m in length and will be located north of the existing River Dinin Bridge. In order to facilitate the footbridge, abutments will be constructed on either bank (west and east) of the existing river with one pier to be constructed within the river bed to provide structural support.

The works will include site investigation, vegetation removal (including Japanese knotweed), excavation, piling, river diversion, pouring of concrete, input of fill for embankments and erection of the bridge superstructure. A road closure for a period of up to 48 hours may be required and an appropriate Traffic Management Plan (TMP) will be prepared. Further details are provided in **Section 2.4** of the EIA Screening report.

3.3.1 Proposed Sequence of Works and Methodology

In order to complete the detailed design of the scheme site investigation works need to be completed in advance of the construction works as a separate work activity and are detailed hereafter:

Site Investigation Works

- In order to access the river and complete the exploratory works in a safe manner, bunding shall be provided to form a low wall along the eastern river bank to protect the toe of the embankment and prevent material entering the watercourse.

- The bunding shall be typically 1m by 1m in dimensions and will be sufficient for the predicted flow in the river, it shall extend from the eastern river bank (at the confluence of the adjoining tributary) to the first pier of the existing bridge. This will continue on the southern side of the bridge back to the eastern bank to ensure water cannot travel upstream into the area of works.

- A temporary access structure will span across a small tributary (Ardra Stream) between Castlecomer Discovery Park and the existing eastern bank of the bridge as a pipe or series of pipes subject to flow. It is envisaging that the watercourse will be flumed through the pipe(s) which will be backfilled to allow access over the tributary to the bunded area.

- The proposed bunding and fluming of the watercourse shall be agreed in consultation with IFI.

- It is envisaged that during the course of any bunding works electrofishing may be required. This shall be conducted by a competent expert in accordance with an agreed methodology with IFI.

- The geotechnical borehole rig will mobilise to site and undertake the exploratory holes.

- The borehole rig will de-mobilise from site and the temporary access and bunding will be subsequently removed.

Site Preparation for Main Works

Site clearance will be undertaken on the western and eastern banks in preparation for construction of foundations and bunding of riverbanks, including removal of existing vegetation under the footprint of the proposed embankments.

Prior to commencement of works, the compound will be set up and traffic management measures will be put in place.

Vegetation removal will also take place and will include the removal of trees along both the right and left banks. During the site preparation phase Japanese knotweed located on the left bank upstream of the existing bridge and at the base of the existing bridge (left bank) will also need to be managed. Japanese knotweed will be managed in accordance with the Invasive Alien Species Management Plan (IASMP) which has been prepared by INVAS consulting services and included in **Appendix B.**

It is envisaged that the compound will be located in the Castlecomer Discovery Park on the eastern side of the river (see **Figure 3-1**), the compound will be set back a minimum of 10m from the river. All plant and equipment will be maintained, refuelled and stored at the compound location. Oil will also be stored in appropriately contained bunded facility.

Figure 3-1: Proposed Compound Location

River Diversion

- In order to complete the works the watercourse will need to be locally diverted with bunding to allow for safe construction of the works.
- The bunding shall be typically 1m by 1m in dimensions and will be sufficient for the predicted flow in the river, it shall extend from the eastern river bank (at the confluence of the adjoining tributary) to the first pier of the existing bridge. This will continue on the southern side of the bridge back to the eastern bank to ensure water cannot travel upstream into the area of works.
- A temporary access structure will span across a small tributary between Castlecomer Discovery Park and the existing eastern bank of the bridge as a pipe or series of pipes subject to flow. It is envisaging that the watercourse will be flumed through the pipe(s) which will be backfilled to allow access over the tributary to the bunded area and eastern abutment.
- The proposed bunding and fluming of the watercourse shall be agreed in consultation with IFI. It is envisaged that during the course of any bunding works electrofishing may be required. This shall be conducted by a competent expert in accordance with an agreed methodology with IFI.

Construction Works

- Excavation for the new footbridge piles, foundations and retaining walls shall be undertaken on the eastern and western banks.
- Excavators and piling rigs will be used during the works on these banks and caution must be taken with regard to utilities (buried Eir services, buried watermain, overhead electrical lines feeding the lighting columns east and west of the existing bridge in the vicinity of the bridge).
- The new pier (and associated piles) shall be shuttered, reinforcement placed, and the concrete poured.

- The shutter on the pier shall then be struck (cast in-situ).
- Once all concrete works have been completed, waterproofing shall be applied to all buried surfaces before backfilling with 6N structural fill.
- Willow spilling and rock armour will be used for grading and river bank reinstatement.
- The existing river bed will be generally be left in-situ, any river substrate material removed will be stockpiled and replaced as required within the river bed in line with IFI standards.
- A masonry wall will be constructed on either side of both embankments (on left and right bank).
- The new embankments shall be constructed by grading, levelling and compacting 6N structural fill before top soiling and grass seeding.
- Safety fencing, safety barriers and new raised concrete verges shall be completed in conjunction with top soiling and grass seeding of the verges.
- Temporary scaffolding shall be erected (on the bank and a bunded area within the river) is required to facilitate access and the bridge sections shall be lifted into place using a mobile crane.
- For site security and safety purposes, temporary lighting will be used.

Completion of Works

- Once works are completed and the areas surrounded by the bunding are no longer required during construction, the watercourse diversion shall be removed.
- Damming measures will be removed in reverse order to the way they were put in.
- Traffic management measures shall then be removed, and the pedestrian bridge shall be opened.
- The site compounds shall be removed.
- The lands within the site boundaries shall be reinstated through top soiling and grass seeding as required.
- Materials arising from excavation/demolition be segregated on site/be stored temporarily/removed from site and disposed in an approved licenced facility.
- The area shall be snagged, tidied up and handed over to Kilkenny County Council.
- The western abutment will be approximately 75m^2 in size while the approaching footpath will be 44m^2.

Materials to be Used

- Reinforcement Steel
- Structural Steel (coatings to be applied offsite)
- Concrete
- Bridge Bearings
- Stone & Mortar
- Timber

- Light fittings and ancillary products required to install pedestrian/public lighting.

Areas to be Removed/Changed

- The pier will result in the permanent removal of 1m^2 of instream habitat;
- There will be removal/disturbance to a 3m wide riparian habitat along the eastern length of the works, with reinstatement where possible; and
- There will be the removal/disturbance of river bed from the bunding measure in the immediate area of the proposed works.

3.3.2 Programme and Phasing of Works

The following is an overview of the timing on the works however is subject to receipt of planning and statutory consents:

- Construction works are envisaged to last for a period of 6 months from mobilisation to completion commencing in Q2 2020.
- In-stream works to be completed during IFI approved seasonal window July – September.

3.3.3 Management and Organisation of Works

The proposed site compound for the works is anticipated to be located the Castlecomer Discovery Park on the eastern side of the river. The size and precise location are subject to landowner agreement.

Materials and plant required for the works are anticipated to be stored in this compound at a minimum setback distance of 10m from the river bank. All storage areas shall be appropriately bunded where required. Fuelling of plant is anticipated to be in a designated fuelling area within the compound. The compound will provide for the following:

- Welfare/office facilities for site staff;
- Plant/machinery parking/storage area;
- Fuel storage/refuelling area;
- Segregated waste area; and
- Construction staff parking.

4 ECOLOGICAL DESCRIPTION OF STUDY AREA

As detailed in **Section 1.3.1**, an AA screening site visit and aquatic survey has been conducted and the findings have informed the description of the receiving environment.

The study area located close to the centre of Castlecomer town focused on the Dinin River itself and the riparian habitat. The lands immediately adjacent to the Dinin River are a composition of urban and rural lands. The wider area is characterised largely by agricultural lands.

The land within the project area is predominantly comprised of park, urban area and fields of improved pasture. There is an area of mixed woodland to the west of the project area comprised of Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*) and Alder (*Alnus glutinosa*). The eastern landing of the bridge will be positioned in an area of parkland. This parkland is comprised of mostly improved grassland and mature Ash (*Fraxinus excelsior*), Beech, Horse chestnut (*Aesculus hippocastanum*) and Sycamore (*Acer pseudoplatanus*). North of the existing bridge there is a small river marginal area close to the eastern bank. This area is comprised of mostly terrestrial plants including Alder, Willow herb, Bramble and Japanese knotweed and this area would likely flood when the river is in spate.

The site of the proposed bridge works intersects two watercourses; 'Dinin [North]' (EPA Code: 15D07) and 'Ardra' (EPA Code: 15A15). The watercourses are all part of the Dinin [North]_SC_010 sub-catchment. The [Dinin North] flows in a south westerly direction through Castlecomer Town before flowing into the Nore. The Nore then continues through Kilkenny city and eventually enters the Barrow/Suir/Nore Estuary approximately 90km downstream of Castlecomer Town. The Dinin River forms part of the River Barrow and River Nore SAC (002162) which is designated for a number of water dependant habitat and species along with terrestrial qualifying interests. The Dinin flows into the River Nore which forms the River Nore SPA (004233) designated to Kingfisher (*Alecdo atthis*).

Where the bridge will span the Dinin River the river is a 4th Order river with a wet width of approx. 22m and 20-40cm deep. At the time of the visit water levels were low. The substrate of the centre of the channel is dominated by gravels and cobbles while in the margins, boulder is most common. The aquatic habitats within the reach were primarily glides, riffles and runs. A large weir is situated across the width of the river from the first abutment on the right-hand side facing downstream north of the bridge at a 45 degree angle to the bridge.

The habitats recorded and assessed for the presence of Annex I habitats during the aquatic survey report are detailed in **Table 4-1**.

Table 4-1: Habitat Types Recorded and their Ecological Valuation

Habitat Type	Fossitt Category	Summary Description	Ecological Valuation*
Depositing/lowland Rivers	FW2	This habitat was associated with the Dinin River.	Local (higher)
Buildings and Artificial Surfaces	BL3	This habitat is of limited botanical importance given that it includes all man-made surfaces such as roads, paths and buildings along with the N78 which the Castlecomer bridge supports.	Local (lower)
Improved Agricultural Grassland	GA2	Grassland dominated by Perennial Rye-grass (*Lolium perenne*). Located immediately up and downstream of the works.	Local (lower)
Treelines	WL2	Mature broadleaved species such as alder, ash and sycamore species either side of the river.	Local (higher)

*Ecological valuation categories assigned following *Guidelines for Assessment of Ecological Impacts of National Roads Schemes* (NRA, 2009).

4.1.1 Annex I Habitats – Castlecomer

Due to the inland location of the site and a tenuous connection with coastal environments and associated marine habitats for which the River Barrow and River Nore SAC and Lower River Suir SAC are designated for, were not searched for during the site visit. These include; Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140], Reefs [1170], Salicornia and other annuals colonising mud and sand [1310], Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] and Mediterranean salt meadows (*Juncetalia maritimi*) [1410].

During a desktop survey the following Annex I habitat were identified as potentially being located within the survey area. 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion*, 3260' could be encountered as the proposed bridge project footprint is located within a 10km grid cell that intersects with known locations / positive record for the Annex I Habitat type Floating river vegetation (3260).

With respect to 'Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, 91A0', no record has been found within the project footprint but the Dinin River drains into a 10km grid square where 91A0 has been previously recorded.

During the site visit however, no habitats corresponding to Annex I designated habitats for the River Barrow and River Nore SAC or Lower River Suir SAC were found on site. Habitats within the study area comprised mostly of mixed woodland and lowland river habitat. Bankside vegetation consisted of Horse chestnut, Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*), Willow herb (*Chamerion angustifolium*), Water Mint (*Mentha Aquatica*), Butterbur (*Petasites hybridus*), Water Figwort (*Scrophularia auriculata*), Bramble (*Rubus fruticosus*), Emergent aquatic vegetation consisted of Common Reed (*Phragmites australis*), and *Carex sp.*

Within the water column Common duck weed (*Lemna minor*), Kneiff's Feather-moss (*Leptodictyum riparium*), Fool's water-cress (*Apium nodiflorum*), Water Moss (*Fontinalis antipyretica*) and Red alga (*Hildenbrandia*) were common within the river. This species did not correspond to the aquatic Annex I habitat designated for the River Barrow and River Nore SAC.

4.1.2 Invasive Alien Species

A desktop search for the Dinin River and its surrounding environs was carried out using the National Biodiversity Data Centre (NBDC) database in September 2018. A 10km square study area was analysed. The results are included in **Table 4-2**. The only invasive terrestrial plant species found onsite were;

Japanese knotweed and Cherry laurel. Japanese knotweed was found on the left bank facing downstream on a point of land between the Dinin and Ardra confluence. Canadian pondweed (*Elodea canadensis*) was also found immediately upstream of the weir within the Dinin River during the site walkover on 24th September 2018. Please see **Appendix B** for further information.

Table 4-2: Non-Native Terrestrial Plant Species Recorded within 10km Grid Square Sections throughout the Study Area and Outer Environs (NBDC Database)

Scientific Name	Common Name	Date of Last Record	Legislation (Third Schedule of the EC Birds and Natural Habitats Regs 2011)	Risk Assessment	EU Invasive Alien Species of Union Concern
Anser anser	Greylag Goose	31/12/2011	Listed	High Impact Invasive	Not listed
Elodea canadensis	Canadian Waterweed	07/07/2015	Listed	High Impact Invasive	Not listed
Prunus laurocerasus	Cherry Laurel	22/08/2003	Not Listed	High Impact Invasive Species	Not listed
Leycesteria formosa	Himalayan Honeysuckle	22/07/2013	Not Listed	Medium Impact Invasive Species	Not listed
Fallopia japonica	Japanese Knotweed	28/04/2010	Listed	High Impact Invasive	Not listed
Acer pseudoplatanus	Sycamore	31/08/2013	Not Listed	Medium Impact Invasive Species	Not listed
Tandonia budapestensis	Budapest Slug	05/04/1971	Not Listed	Medium Impact Invasive Species	Not listed
Cornu aspersum	Common Garden Snail	05/04/1971	Not Listed	Medium Impact Invasive Species	Not listed
Potamopyrgus antipodarum	Jenkins' Spire Snail	05/04/1971	Not Listed	Medium Impact Invasive Species	Not listed
Candidula intersecta	Wrinkled Snail	31/12/1903	Not Listed	Medium Impact Invasive Species	Not listed
Mustela vison	American Mink	31/03/2015	Listed	High Impact Invasive	Not listed
Myodes glareolus	Bank Vole	04/08/2012	Not Listed	Medium Impact Invasive Species	Not listed

Scientific Name	Common Name	Date of Last Record	Legislation (Third Schedule of the EC Birds and Natural Habitats Regs 2011)	Risk Assessment	EU Invasive Alien Species of Union Concern
Rattus norvegicus	Brown Rat	11/06/2017	Listed	High Impact Invasive	Not listed
Sciurus carolinensis	Eastern Grey Squirrel	31/12/2012	Listed	High Impact Invasive Species	Not listed
Oryctolagus cuniculus	European Rabbit	07/12/2013	Not Listed	Medium Impact Invasive Species	Not listed
Crocidura russula	Greater White-toothed Shrew	21/03/2014	Not Listed	Medium Impact Invasive Species	Not listed
Mus musculus	House Mouse	02/10/2012	Not Listed	High Impact Invasive Species	Not listed

4.1.3 Fauna

An AA screening and aquatic survey were undertaken to inform the design process for the overall project. Full descriptions provided in the Aquatic Survey are published under separate cover (AA, RPS, 2019).

While no Habitats Directive Annex II species were located at the time of the aquatic survey, there was potential for crayfish with Good habitat located. Poor to none lamprey and salmonid habitat was found. No evidence of otter was found at the time of the survey however given the abundance of otter in Ireland it is likely that otter are utilising the Dinin River.

Further preconstruction otter surveys would be required to confirm if any holts have been established in the interim and whether active or not.

4.1.4 Avifauna

There is limited habitat for breeding birds located within the study area within the tree lines of the western bank. The eastern bank provided little bird nesting habitat with some vegetation on the island. The eastern bank was mostly comprised of short amenity grassland and mature trees. Song birds were audially recorded onsite and are likely using the river at the time of the Aquatic Survey in 2018.

4.1.5 Aquatic Ecology

A survey was carried out on the Dinin River by RPS aquatic ecologists in September 2018 (AR, RPS, 2019).

Habitats for crayfish, lamprey and salmon within the Dinin River were assessed. The area surveyed was the Dinin River intersecting the proposed Footbridge on the 24th September 2018.

Poor to None salmonid and lamprey spawning habitat was observed downstream or upstream of the existing bridge. This is due to the thick layer of silt under the river substrate and no clean gravel. Downstream of the existing Castlecomer Bridge there were some signs of juvenile salmonid habitat with submerged boulders and over hanging vegetation providing suitable cover, shallow fast flowing water and coarse substrate. The river is heavily modified at this location with two weirs one major and one minor presenting a potential barrier to adult salmon or lamprey migration upstream for spawning. Q-value results indicated moderate quality (Q3-

4) reducing the juvenile habitat for salmon to Poor although there is potential for adult/juvenile brown trout (*Salmo trutta*) to occur which are more tolerant of moderate water quality conditions.

There was very limited lamprey nursery habitat and was assessed as Poor with a small backwatered area with silty/substrate and organic material available downstream of the bridge on the left bank.

There was Good crayfish habitat up and downstream of the bridge, crayfish have been recorded historically at this location (NBDC online mapping, 2005 record). However, no crayfish were observed on the day of survey. Given the historical recordings of Crayfish and good habitat found within the study area, it can be concluded that there is the potential for crayfish to use the habitat up and downstream of the existing bridge.

Emergent aquatic vegetation consisted of Common reed (*Phragmites australis)*, and *Carex* sp. Invasive terrestrial plant species, Japanese knotweed and Cherry laurel, were found on the left bank facing downstream on a point of land between the Dinin and Ardra confluence. The aquatic invasive Canadian pondweed (*Elodea canadensis*) was also found immediately upstream of the weir within the Dinin River. Within the water column Common duck weed (*Lemna minor*), Kneiff's Feather-moss (*Leptodictyum riparium*), Fools water-cress (*Apium nodiflorum*), Water Moss (*Fontinalis antipyretica)* and Red alga (*Hildenbrandia*) were common within the river. This habitat did not correspond to the aquatic Annex I habitat designated for the River Barrow and Rive Nore SAC.

Table 4-3 details the macrophyte species which were found within the water column, the percentage cover is also detailed for each species. The remaining percent is made up of uncolonised river habitat. This species did not correspond to the aquatic Annex I habitat designated for the River Barrow and Rive Nore SAC.

Table 4-3: Species found in Water Column at Upstream of Existing Bridge

Common Name	Scientific Name	Cover (%)
Fools water-cress	*Apium nodiflorum*	<5%;
Common duck weed	*Lemna minor*	<1 %;
Kneiff's Feather-moss	*Leptodictyum riparium*	<1%
Canadian Pond Weed	*Elodea canadensis*	<1%

4.2 Surface Water

A part of EPA's Water Framework Directive (WFD) monitoring of the Dinin River Q-value samples has been recorded circa 5km upstream at the Massford Br. (station code 15D070250) and circa 3km downstream at the Dysart Br. (station code 15D070400) with a Pre-WFD station at the works location at the 'Dinin (North) - Br in Castlecomer'. In 2016 the monitoring station at Dysart Bridge was assigned a Q3-4 (Moderate) and noted signs of enrichment at this location. The overall WFD status for the Dinin (North)_040 waterbody for 2010-2015 was 'Good' status. **Table 4-4** details the WFD status for this waterbody for the last three monitoring cycles.

The Dinin (North)_040 risk characterisation is under review, further downstream of the Dinin (Main Channel)_010 *'Not At risk'* of failing to meet the WFD environmental objectives and currently there are no measures in place to improve its water quality to Good status (Areas for Action under the second cycle of the River Basin Management Plan 2018-2021).

EPA indices, EPA water quality status and WFD status are interpreted in **Table 4-5.**

Table 4-4: River Water Quality Through Time

EPA Waterbody Name	Code	Risk	WFD Status 2007-2009	WFD Status 2010-2012	WFD Status 2010-2015
Dinin (North)_040	E_SE_15D070400	In review	Good	Good	Good

Table 4-5: EPA Q-rating and Equivalent WFD Water Quality Status Classes

Biotic Index	EQR[1]	EPA Quality Status	Water Quality	WFD[2] Status
Q5	1.0	Unpolluted	Good	High
Q4-5	0.9	Unpolluted	Fair-to-Good	High
Q4	0.8	Unpolluted	Fair	Good
Q3-4	0.7	Slightly Polluted	Doubtful-to- Fair	Moderate
Q3	0.6	Moderately Polluted	Doubtful	Poor
Q2-3	0.5	Moderately Polluted	Poor-to-Doubtful	Poor
Q2	0.4	Seriously Polluted	Poor	Bad
Q1-2	0.3	Seriously Polluted	Bad-to-Poor	Bad
Q1	0.2	Seriously Polluted	Bad	Bad

(Colour coding as employed under the WFD as specified in Schedule 3 of S.I. No. 272 of 2009: High – Blue, Good – Green, Moderate – Yellow, Poor – Orange and Bad – Red).

During the 2018 RPS Aquatic Survey a macroinvertebrate kick sample was conducted downstream of the existing bridge. Water quality results (Q-values) downstream of the bridge and proposed site indicated 'Moderate' water quality (Q3-4) within the Dinin River which coincides with the latest EPA monitoring findings.

4.3 Soils, Geology and Hydrogeology

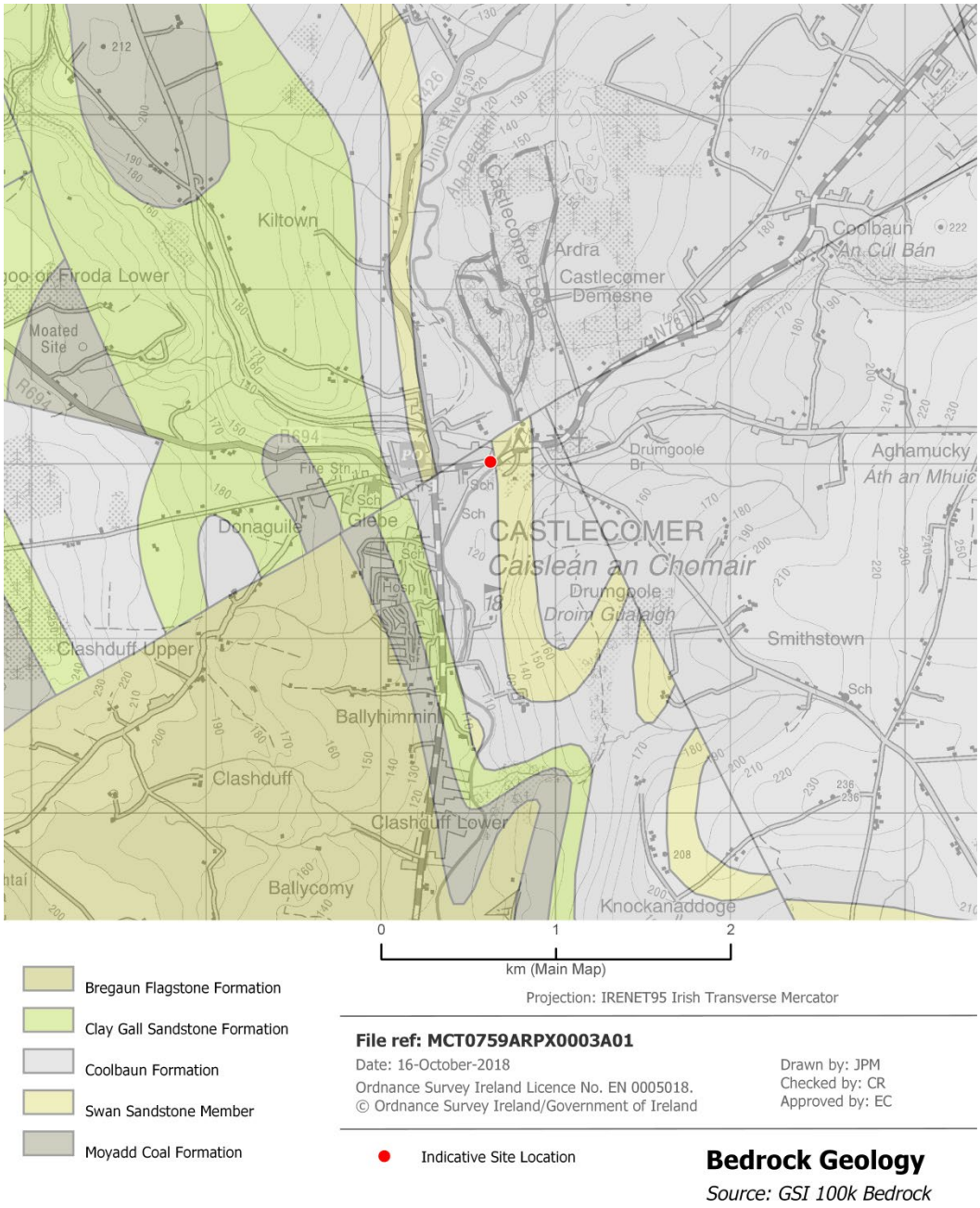
The Geological Survey of Ireland (GSI) online database (www.gsi.ie) was consulted for available edaphic, geological and hydrological information of the site and its environs.

The entire site is underlain by 'Coolbaun Formation' which is described as "Shale and sandstone with thin coals" as can be seen in **Figure 4-1.**

[1] EQR = Environmental Quality Ratio (Observed/Reference)

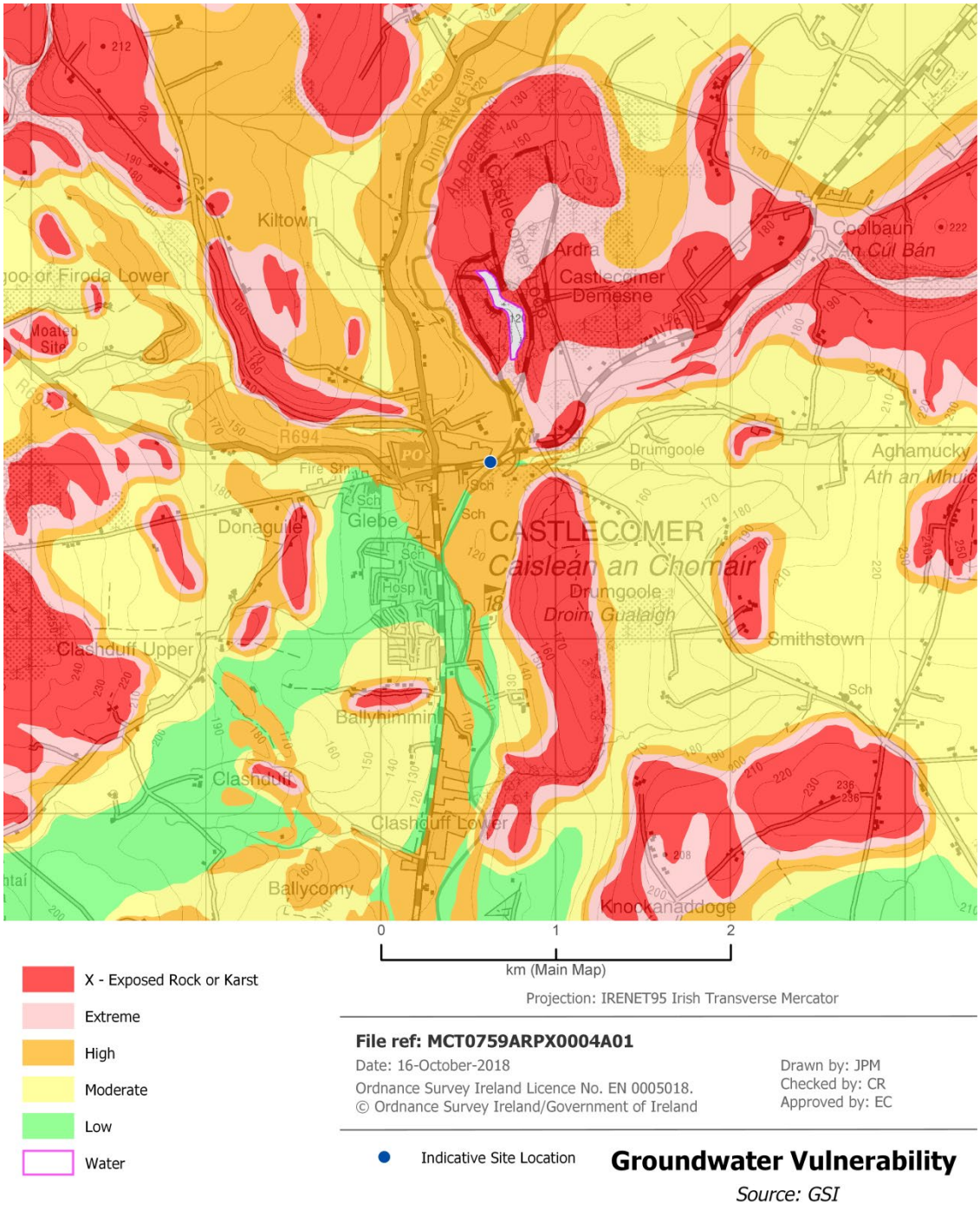
[2] WFD = Water Framework Directive (EPA, 2006)

Figure 4-1: Bedrock Formations in the Vicinity of the Proposed Works



Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities. The groundwater vulnerability within the area around the bridge is underlain by 'high' vulnerability. To the south of the site there is 'low vulnerability and 'high vulnerability' to the north with a section of 'Rock at or near Surface or Karst'. The groundwater vulnerability at the proposed works and in the vicinity, is displayed in **Figure 4-2.**

Figure 4-2: Groundwater Vulnerability in the Vicinity of the Proposed Works



4.4 European Sites

4.4.1 Zone of Influence (ZOI)

Given the project constraints with regards the location of proposed infrastructure the presence of nutrient sensitive habitats/ground water dependant habitats downstream of Castlecomer, the potential ZoI was expanded to include the entire catchment e.g. Nore_15 WFD Catchment and all European Sites contained therein during initial AA screening for this site.

In the case of the current project and in consideration of the catchment and sub-catchments in which the proposed project will occur, a 15km ZoI was considered appropriate along with any additional protected sites hydrologically connected downstream of the Dinin River (15D070400) and within the Dinin [North]_SC_010 sub catchment to ensure that all potentially affected European Sites were included during the AA screening process.

The ZoI for hydrological downstream connections was terminated at the Barrow/Suir/Nore estuary located >100km downstream of the proposed works. Given the scale and nature of the works this is considered to be a significant distance and encompasses the entire River Barrow and River Nore SAC.

The integrity of a European Site (referred to in *Article 6.3* of the EU Habitats Directive) is determined based on the conservation status of the Qualifying Interest (QIs) or Special Conservation Interest (SCIs) of the SAC or SPA. The QIs/SCIs for each site[3] have been obtained through a review of the Conservation Objectives (COs) available from the NPWS website www.npws.ie.

The European Sites located within Dinin [North]_SC_010 sub catchment and 15km of the proposed footbridge are displayed in **Figure 4-3** and listed below**;**

1. River Barrow and River Nore SAC (Site Code: 002162)
2. Lower River Suir SAC (Site Code: 002137)
3. River Nore SPA (Site Code: 004233)
4. Slieve Bloom Mountains SAC (Site Code: 000412)
5. Coolrain Bog SAC (Site Code: 002332)
6. The Loughans SAC (Site Code: 000407)
7. Knockacoller Bog SAC (Site Code: 002333)
8. Slieve Bloom Mountains SPA (Site Code: 004160)
9. Spahill And Clomantagh Hill SAC (Site Code: 000849)
10. Lisbigney Bog SAC (Site Code: 000869)
11. Galmoy Fen SAC (Site Code: 001858)
12. Thomastown Quarry SAC (Site Code: 002252)
13. Cullahill Mountain SAC (Site Code: 000831)

4.4.2 Connectivity

Connectivity from the development site to the European Sites has been reviewed. Connectivity is identified via the potential source-pathway-receptor chain, along with any hydrological connectivity which may support direct or indirect connectivity to European Sites.

The site is located within the boundary of the River Barrow and River Nore SAC forming a direct source (the works) - pathway (River Dinin) - receptor (the European Site). The River Nore SPA is connected

[3] The habitats and species for which this site is designated.

hydrologically downstream via the Dinin river and the Lower River Suir SAC is also hydrologically connected downstream via the Dinin River which discharges to the Nore and then flows to the Barrow/Nore/Suir estuary.

The River Nore SPA is located 9km (as the crow flies) from the works and shares a remote hydrological connection with the works located 17.2km downstream of the works. The SPA is designated for Kingfisher only. Kingfisher territories may extend up to 3-5km[4], the distance from the River Nore SPA is outside of the Kingfisher range and therefore the footbridge works will not have a direct impact on the species of Kingfisher in the River Nore SPA. Kingfisher require steep or vertical earthen banks to excavate a nest and this habitat is not present within the proposed development area. However, given the downstream connection with the works there may be a potential impact on Kingfisher food source in the absence of mitigation.

The Dinin River flows out into the River Nore, which then joins the River Barrow. East of Waterford City the Barrow and Suir meet in the estuary and here there is potential connectivity with Lower River Suir SAC 88km from the works site. However, as the Lower River Suir SAC is located upstream of the river Barrow only species which may migrate into the upper catchment are consider as part of this assessment.

Due to potential connectivity the River Barrow and River Nore SAC, River Nore SPA and Lower River Suir SAC these sites are further assessed below in **Table 4-6.**

From the list of sites above there are a number of SACs and SPAs located in the catchment upstream of the development. However, these sites are not designated for species which may migrate into the lower catchment or habitats which may be impacted by changes downstream **(See Table 4-6)**. These sites are the following;

4. Slieve Bloom Mountains SAC
5. Coolrain Bog SAC
6. The Loughans SAC
7. Knockacoller Bog SAC

The proposed works are not connected (hydrologically or via terrestrial pathways) to the following SAC and SPA within the catchment;

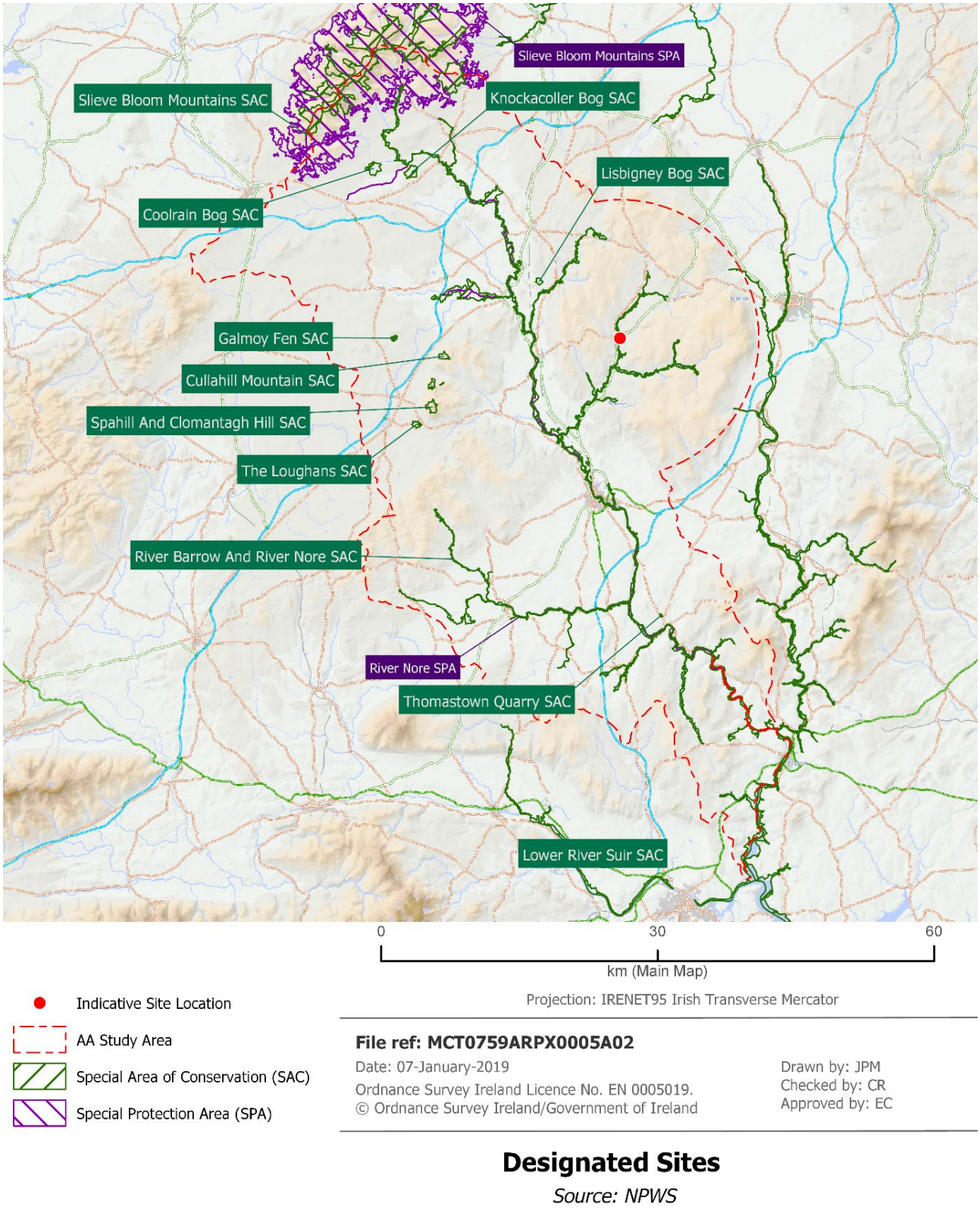
8. Slieve Bloom Mountains SAC
9. Spahill And Clomantagh Hill SAC
10. Lisbigney Bog SAC
11. Galmoy Fen SAC
12. Thomastown Quarry SAC
13. Cullahill Mountain SAC

Therefore, European **Sites 4-10** will not be considered within the ZoI and will not be brought forward for further assessment.

Table 4-6 provides details on the QIs of the European Sites which will be assessed for potential impact as a result of the proposed project and the distances and connectivity from the proposed development to the European Sites.

[4] https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kingfisher/breeding-feeding-territory/

Figure 4-3: Castlecomer – Zone of Influence Nore Catchment



Designated Sites

Source: NPWS

Table 4-6: Designated Sites within the Zone of Influence of the Study Area

Designated Area	Designation and Site Code	Qualifying Interests (*=Priority Species)	Approximate Distance from Boundary of the Proposed Development[5] and, surface water and ground water connectivity
Special Areas of Conservation (SACs)			
River Barrow and River Nore SAC	002162	**Conservation Objectives- Specific Version (19/07/2011)** **Annex I Habitats** Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] European dry heaths [4030] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Petrifying springs with tufa formation (C*ratoneurion*) [7220]* Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]* **Annex II Species** *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029]	*ca*. 0.00km **YES** - The Castlecomer Footbridge project is located within the boundary of the SAC.

[5] Closest approximate distance as measured from the boundary of the development area to the boundary of the designated site.

Designated Area	Designation and Site Code	Qualifying Interests (*=Priority Species)	Approximate Distance from Boundary of the Proposed Development[5] and, surface water and ground water connectivity
		Austropotamobius pallipes (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Margaritifera durrovensis* (Nore Pearl Mussel) [1990]	
River Nore SPA	004233	**Conservation Objectives - Generic Version 6.0 (21/02/2018)** **Annex I Habitats** Kingfisher (*Alcedo atthis*) [A229]	Remote indirect hydrological connectivity. The River Nore SPA is located 17.2km from the works.
Lower River Suir SAC	002137	*Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]* *Austropotamobius pallipes (White-clawed Crayfish) [1092)* *Petromyzon marinus (Sea Lamprey) [1095]* *(Lampetra planeri) (Brook Lamprey) [1096]* *Lampetra fluviatilis (River Lamprey) [1099]* *Alosa fallax fallax (Twaite Shad) [1103]* *Salmo salar (Salmon) [1106]* Glauco-Puccinellietalia maritimae (Atlantic salt meadows) [1330] *Lutra lutra* (Otter) 1355	*ca*. 43.8km Yes - Remote connection hydrological connection. The Dinin flows into the Nore, and in turn into the Barrow. The Lower River Suir meets the Barrow east of Waterford city. Mobile species of the Lower River Suir have the potential use this equestrian habitat downstream of the works (88km).

Table 4-7: Potential Significant Impacts on European Sites from the Proposed Works

Site Name	Direct Impacts	Indirect/ Secondary	Resource Requirements	Emissions (Disposal to Land, Water or Air)	Land Take	Transportation Requirements	Duration of Construction, Operation, Decommissioning
River Barrow and River Nore SAC	The proposed works are within the boundaries of the River Barrow and River Nore SAC site and may impact on the size or scale of that site due to direct loss of habitat. The Aquatic Survey carried out in 2018 did not find any crayfish species however good crayfish habitat was located at the site. The survey also noted (1) Poor-None salmonid and lamprey spawning habitat and (2) Poor juvenile salmon and nursery habitat for lamprey. Due to the placement of abutments and piers and associated works in the river banks and bed there is therefore the risk of direct impacts to crayfish/lamprey/salmonid habitat. Potential impacts on the QIs of the SAC.	Potential impacts: Release of sediment and pollutants to the river may cause indirect impacts to surface water dependant species and habitats of the River Barrow and River Nore SAC.	Potential impact on QI	Potential impacts: There is potential for indirect impacts as a consequence of the footbridge through the risk of sedimentation impacts to the Dinin River, and through inadequate surface water management both during the investigation works and construction phase of the proposed works. Indirect or secondary impacts on River Barrow and River Nore SAC are therefore possible as a consequence of sedimentation and distribution of hydrometric flow impacts in particular.	Potential impacts: There will be some minor landtake within and adjacent to the River Barrow and River Nore SAC in order to construct the proposed project (see **Appendix A**).	Potential impacts: The proposed footbridge works will require the importation of construction material for the Footbridge. Transportation to and from site will be minimal given the size and scale of the proposed works.	Construction works will take approximately 6 months.
Lower River Suir SAC	No impact on QI of the SAC.	Potential impacts: Release of sediment and pollutants river may cause indirect impacts to the to surface mobile species of surface water dependant species of the Lower River Suir SAC	No impact on QI	No impact on QI	No impact on QI	No impact on QI	No impact on QI
River Nore SPA	No impact on SCI of the SPA.	Potential impacts: Release of sediment and pollutants river may cause indirect impacts to the QI of the River Nore SPA. The degradation in water quality may cause a reduction in food resources (fish) of the QI and a potential impact on populations of the SCI in the SPA.	No impact on SCI	No impact on SCI	No impact on SCI	No impact on SCI	No impact on SCI

4.4.3 Brief Description of European Sites within the ZOI

The approximate distance and hydrological connectivity of these European Sites within the potential ZoI is shown in **Figure 4-3** and is assessed in **Table 4-6**. A brief description of the European Sites is also provided below, based on the Site Synopses, which have been obtained from the NPWS website (www.npws.ie). **Table 4-7** identifies the potential significant impacts on the European Sites that occur within the ZoI and clarifies those sites for which further assessment is no longer required.

4.4.3.1 River Barrow and River Nore SAC

Relevant extracts from the NPWS River Barrow and River Nore SAC site synopsis are presented below. The full site synopsis can be seen at the following link:

https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002162.pdf.

This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains, and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford.

Good examples of alluvial forest (a priority habitat on Annex I of the E.U. Habitats Directive) are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include Almond Willow (*Salix triandra*), White Willow (S. alba), Rusty Willow (*S. cinerea subsp. oleifolia*), Crack Willow (*S. fragilis*) and Osier (*S. viminalis*), along with Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Thin-spiked Wood-sedge (*Carex strigosa*), Pendulous Sedge (*C. pendula*), Meadowsweet (*Filipendula ulmaria*), Common Valerian (*Valeriana officinalis*) and the Red Data Book species Nettle-leaved Bellflower (*Campanula trachelium*).

The site is very important for the presence of a number of E.U. Habitats Directive Annex II animal species including Freshwater Pearl Mussel (both *Margaritifera margaritifera* and *M. m. durrovensis*), White-clawed Crayfish, Salmon, Twaite Shad, three lamprey species – Sea Lamprey, Brook Lamprey and River Lamprey, the tiny whorl snail (*Vertigo moulinsiana*) and otter. This is the only site in the world for the hard water form of the Freshwater Pearl Mussel, *M. m. durrovensis*, and one of only a handful of spawning grounds in the country for Twaite Shad. It should be noted that Nore Freshwater Pearl Mussel, *M. m. durrovensis* is only found in the Nore River and not the River Barrow.

4.4.3.2 River Nore SPA

Relevant extracts from the NPWS River Nore SPA site synopsis are presented below. The full site synopsis can be seen at the following link:

https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004233.pdf.

The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck (approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation.

The site is a SPA under the E.U. Birds Directive of special conservation interest for Kingfisher.

A survey in 2010 recorded 22 pairs of Kingfisher (based on 16 probable and 6 possible territories) within the SPA. The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the E.U. Birds Directive.

4.4.3.3 Lower River Suir SAC

Relevant extracts from the NPWS Lower River Suir SAC site synopsis are presented below. The full site synopsis can be seen at the following link:

https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002137.pdf.

The site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (both *Margaritifera margaritifera* and *M. margaritifera* subsp. *durrovensis* occur), White-clawed Crayfish, Salmon, Twaite Shad (*Alosa fallax fallax*), three species of lampreys - Sea lamprey, Brook lamprey and River lamprey, and otter. This is one of only three known spawning grounds in the country for Twaite Shad.

The Lower River Suir SAC contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. Parts of the site have also been identified as of ornithological importance for a number of Annex I (EU Birds Directive) bird species, including Greenland White-fronted Goose (10), Golden Plover (1,490), Whooper Swan (7) and Kingfisher. Figures given in brackets are the average maximum counts from four count areas within the site for the three winters 1994-1997. Wintering populations of migratory birds use the site.

4.5 Qualifying Interests of the European Sites

The connectivity between the proposed project and the hydrological connectivity with all European Sites within the catchment has been identified in **Table 4-6** and the potential significant impacts to the European Sites reviewed (**Table 4-7**) based on the nature of the proposed works. Connectivity is identified using the potential source-pathway-receptor model, along with any hydrological connectivity which may support direct or indirect connectivity to European Sites and / or their QIs/SCIs as a result of the proposed development.

With the exception of the River Barrow and River Nore SAC, River Nore SPA and Lower River Suir SAC for which connectivity is known, the remaining European Sites are not connected to the proposed development and potential impacts have been excluded. Therefore, they are not considered further.

The importance of a site designated under the Habitats Directive is defined by its qualifying features or interests. The QIs for any European Site are listed on pro-forma, called the Natura 2000 standard data form, which forms the basis of the rationale behind designation, and informs the Conservation Management Plan or CO (generic or specific) for targeted management and monitoring of key species and habitats. The COs for the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA are found in **Appendix C**

4.5.1 River Barrow and River Nore SAC

The following table lists the QIs of the River Barrow and River Nore SAC. Only the QI highlighted in grey have been considered for further assessment and the reasoning is discussed below.

Table 4-8: Qualifying Species and Habitats of the River Barrow and River Nore SAC

Species (Annex II) of the EU Habitats Directive	Habitats (Annex I) of the EU Habitats Directive
Vertigo moulinsiana (Desmoulin's Whorl Snail)	Estuaries [1130]
Margaritifera margaritifera (Freshwater Pearl Mussel)	Mudflats and sandflats not covered by seawater at low tide [1140]
Margaritifera durrovensis (Nore Pearl Mussel)	Reefs [1170]
Austropotamobius pallipes (White-clawed Crayfish)	Salicornia and other annuals colonising mud and sand [1310]
Petromyzon marinus (Sea Lamprey)	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
Lampetra planeri (Brook Lamprey)	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]

Species (Annex II) of the EU Habitats Directive	Habitats (Annex I) of the EU Habitats Directive
Lampetra fluviatilis (River Lamprey)	*Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]*
Alosa fallax (Twaite Shad)	European dry heaths [4030]
Salmo salar (Salmon)	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
Lutra lutra (Otter)	Petrifying springs with tufa formation (*Cratoneurion*) [7220]*
Trichomanes speciosum (Killarney Fern)	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]*

QIs highlighted in grey have been scoped for further assessment.

From **Table 4-8**: above the following habitats are not located within the proposed works area; **European dry heaths [4030]** and **Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0].**There is no connection from the proposed works area to these habitats which are terrestrial. The main pathway of contaminants from the proposed project is via hydrological connections and therefore there is no potential for impacts to these habitats and are not discussed further.

There are no records of **Petrifying springs with tufa formation (*Cratoneurion*) [7220]*** within the Dinin River. This habitat may occur as clearly defined spring heads with consolidated tufa; spring heads with associated tufaceous flush; or seepage areas with tufa formation. The Dinin River has been heavily modified with artificial banks and two weirs (one upstream of the existing bridge and a smaller weir directly downstream), areas with groundwater seepage were not observed. It is unlikely for this habitat to be present within the proposed works area. The COs have mapped one location at Dysart Wood, this is located on a steep wooded hillside close to the River Nore at Dysart, Co. Kilkenny where a substantial tufa cascade has formed (Lyons and Kelly 2016). As these springs are not located within the River Nore it is considered that there is no hydrological connection between the proposed works and the springs

The following QIs of the River Barrow and River Nore SAC are located 60-100km downstream of the proposed works in the Barrow/Nore Suir estuary. Due to the coastal/transitional location of these habitats the connection between them and the works is extremely tenuous. Any change to the Dinin River arising because of the works will not have an impact on the hydrological function and/or water quality of the marine/transitional environment and are not considered further; **Mudflats and sandflats not covered by seawater at low tide [1140], Reefs [1170], Salicornia and other annuals colonising mud and sand [1310], Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330**] and **Mediterranean salt meadows (*Juncetalia maritimi*) [1410].**

***Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016]:** There is no record of desmoulin's whorl snail on the NBDC within the Dinin River. 'Favourable' habitat has been found in the upper section of the Barrow near Borris, along with populations which were found to be 'Unfavourable/Inadequate' (Monitoring and Condition Assessment of Populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland, Moorkens, E.A. & Killeen, I.J, 2011). A dedicated whorl snail survey was not conducted; however, a brief walkover survey was conducted: no species of desmoulin's whorl snail were noted during the walkover survey and the river did not contain favourable habitat for desmoulin's whorl snail, i.e., slow flowing water and small calcareous sedges (particularly *Carex viridula* ssp. brachyrrhyncha), associated fen mosses (particularly *Drepanocladus revolvens* and *Campyllium stellatum*).

Killarney fern (*Trichomanes speciosum*) [1421] There are no known recordings of Killarney Fern within the Dinin River. Killarney fern is largely a terrestrial plant; it was not found during the September 2018 site visit and is unlikely to occur within the area of the proposed works.

The following QI habitats and species for the River Barrow and Rive Nore SAC are either found within the proposed works area or a potential source-pathway-receptor has been identified. Therefore, they have been identified as being potentially at risk from the works. These are discussed further in the document.

- Estuaries [1130];
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260];
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430];
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0];
- *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029];
- *Margaritifera durrovensis* (Nore Pearl Mussel) [1990];
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092];
- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099];
- *Petromyzon marinus* (Sea Lamprey) [1095];
- *Alosa fallax fallax* (Twaite Shad) [1103];
- *Salmo salar* (Salmon) [1106]; and
- *Lutra lutra* (Otter) [1355].

The selected QIs for the River Barrow and River Nore SAC are given in **Table 4-9**, along with the conservation status and specific sensitivities and main threats to the River Barrow and River Nore SAC in **Table 4-10**: . Information on conservation status for each habitat within the SAC was extracted from the Natura 2000 Standard Data Form (Dated September 2014) on the NPWS website http://www.npws.ie/protectedsites/. This information provides specific details on the conservation status of each habitat within the SAC. The environmental sensitivities have been derived from *The Status of EU Protected Habitats and Species in Ireland*[6].

[6] NPWS (2013): The Status of EU Protected Species and Habitats in Ireland. Habitats Assessment Volume 2. Version 1.1. Department of Arts, Heritage and Gaeltacht.

Table 4-9: Conservation Status and Population Significance for relevant QIs of River Barrow and River Nore SAC to be Assessed

Habitat/Species [code]	Conservation Status at River Barrow and River Nore SAC	Representivity (Habitats) [7]	Population Significance (Species) [8]
Estuaries [1130]	B= good conservation.	A	
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]	B= good conservation.	A	
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	B= good conservation	B	
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	A= excellent conservation.	A	
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	B= good conservation.		C
Margaritifera durrovensis (Nore Pearl Mussel) [1990]	B= good conservation.		A
Austropotamobius pallipes (White-clawed Crayfish) [1092]	A= excellent conservation.		C
Lampetra planeri (Brook Lamprey) [1096]	B= good conservation.		C
Lampetra fluviatilis (River Lamprey) [1099]	B= good conservation.		C
Petromyzon marinus (Sea Lamprey) [1095]	B= good conservation.		C
Alosa fallax fallax (Twaite Shad) [1103]	B= good conservation.		B
Salmo salar (Salmon) [1106]	B= good conservation.		C
Lutra lutra (Otter) [1355]	A= excellent conservation.		A

[7] Size and density of the population of the species present on the site in relation to the populations present within national territory. A: 100% >= p > 15% B: 15% >= p > 2% C: 2% >= p > 0% D: non-significant population.

[8] Degree of representativity of the natural habitat type on the site. A: excellent, B: good C: significant

Table 4-10: Site Specific Threats, Pressures and Activities with Impacts upon the River Barrow and River Nore SAC

Rank	Threats and pressures Code	Negative threat and pressures description	inside/outside [i|o|b]
M	A04.01.01	Non intensive cattle grazing	i
H	H01	Pollution to surface waters (limnic, terrestrial, marine & brackish)	b
M	J02.06	Water abstractions from surface waters	i
M	B05	Use of fertilizers (forestry)	b
M	B02	Forest and Plantation management & use	b
L	F02.01.02	Netting	i
M	M01	Changes in abiotic conditions	i
L	A10.01	Removal of hedges and copses or scrub	i
M	F02	Fishing and harvesting aquatic resources	o
H	J02.12.02	Dykes and flooding defense in inland water systems	i
L	F01.01	Intensive fish farming, intensification	i
L	F02.03	Leisure fishing	i
M	C01.03	Peat extraction	o
H	J02.05.02	Modifying structures of inland water courses	i
L	C01.01.01	Sand and gravel quarries	b
M	J03.02.0	Reduction in migration/ migration barriers	i
M	I01	Invasive non-native species	i
M	J02.02.01	Dredging/ removal of limnic sediments	i
H	K01.01	Erosion	i
L	E02	Industrial or commercial areas	o
M	J02	Human induced changes in hydraulic conditions	b
M	B07	Forestry activities not referred to above	b
H	A02.01	Agricultural intensification	b
L	D03.01	Port Areas	i
M	A04.01.01	Intensive cattle grazing	i

Rank: H = high, M = medium, L = low. i = inside, o = outside, b = both

4.5.2 River Nore SPA

There is only one SCI for the River Nore SPA, the kingfisher (*Alcedo atthis*) [A229]. The 2018 RPS Screening for AA reviewed the potential for direct and indirect impacts of the proposed project upon kingfisher. It found that in the absence of mitigation measures there was potential for indirect likely significant effects upon kingfisher.

The SCI for the River Nore SPA is given in **Table 4-11**: along with the conservation status and specific sensitivities and main threats to the SPA in

Table 4-12:. Information on conservation status for each habitat within the SAC was extracted from the Natura 2000 Standard Data Form (Dated September 2014) on the NPWS website http://www.npws.ie/protectedsites/. This information provides specific details on the conservation status of each habitat within the SPA.

Table 4-11: Conservation Status and Population Significance for the River Nore SPA SCI to be Assessed

Species [Code]	Conservation Status	Population Significance[9]
Alcedo atthis (Kingfisher) [A229]	B- good conservation	C

Table 4-12: Site Specific Threats, Pressures and Activities with Impacts upon the River Nore SPA

Rank	Threats and pressures code	Negative threat and pressures description	inside/outside [i|o|b]
M	D03.01	Port areas	I
M	J02.01	Landfill, land reclamation and drying out, general	o

4.5.3 River Suir SAC

The following table lists the QIs of the Lower River Suir SAC. Only the QIs highlighted in grey have been considered for further assessment and the reasoning is discussed below.

Table 4-13: Qualifying Species and Habitats of the Lower River Suir SAC

Species (Annex II) of the EU Habitats Directive	Habitats (Annex I) of the EU Habitats Directive
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
Austropotamobius pallipes (White-clawed Crayfish) [1092]	Mediterranean salt meadows (Juncetalia maritimi) [1410]
Petromyzon marinus (Sea Lamprey) [1095]	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]
Lampetra planeri (Brook Lamprey) [1096]	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
Lampetra fluviatilis (River Lamprey) [1099]	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
Alosa fallax fallax (Twaite Shad) [1103]	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]*
Salmo salar (Salmon) [1106]	Taxus baccata woods of the British Isles [91J0]*
Lutra lutra (Otter) [1355]	

The conservation status and population significance for the migratory species within the Lower River Suir SAC are set out below in **Table 4-14**:. These are the mobile QIs that may utilise the transitional water where the Barrow meets the Lower River Suir SAC. The freshwater pearl mussel is also included as it relies upon the migratory salmonid fish to complete its life cycle. These QI species may utilise these waters during migrations and therefore, may be impacted through sedimentation and/or a reduction in water quality as a

[9] Size and density of the population of the species present on the site in relation to the populations present within national territory. A: 100% >= p > 15% B: 15% >= p > 2% C: 2% >= p > 0% D: non-significant population.

result of the proposed project in the absence of mitigation. White-clawed crayfish do not use transitional or estuarian habitat and therefore would not be impacted by a reduction in water qualify linked to the works.

The QI habitats and the remaining species of the Lower River Suir SAC are either located greater than 80km downstream or not found within the Nore/Suir transitional area. Owing to this distance or lack of connectivity, they are not considered further as part of this assessment. **Table 4-15**: presents threats, pressures and negative impact activities that represent negative impacts to the Lower River Suir SAC as per the Natura 2000 Standard Data Forms (Dated September 2017) on the NPWS website http://www.npws.ie/protectedsites/. This information provides specific details on the conservation status for kingfisher within the SPA. The environmental sensitivities have been derived from *The Status of EU Protected Habitats and Species in Ireland*[10].

Table 4-14: Conservation Status and Population Significance for Relevant QIs within the Lower River Suir SAC to be Assessed

Species [Code]	Conservation Status	Population Significance[11]
Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]	B- good conservation	C
Petromyzon marinus (Sea Lamprey) [1095]	B- good conservation	C
Lampetra planeri (Brook Lamprey) [1096]	B- good conservation	C
Lampetra fluviatilis (River Lamprey) [1099]	B- good conservation	C
Alosa fallax (Twaite Shad) [1103]	B- good conservation	C
Salmo salar (Salmon) [1106]	A -excellent conservation	C
Lutra lutra (Otter) [1355]	A -excellent conservation	C

Table 4-15: Site Specific Threats, Pressures and Activities with Impacts upon the Lower River Suir SAC

Rank	Threats and pressures code	Negative Threat and pressures description	inside/outside [i|o|b]
Negative impacts			
L	J02.01.02	Reclamation of land from sea, estuary or marsh	i
L	B	Forestry	o
H	E03	Discharges	b
L	D03.01	Port areas	b
H	H01	Pollution to surface waters (limnic, terrestrial, marine and brackish)	b

[10] NPWS (2013): The Status of EU Protected Species and Habitats in Ireland. Habitats Assessment Volume 2. Version 1.1. Department of Arts, Heritage and Gaeltacht.

[11] Size and density of the population of the species present on the site in relation to the populations present within national territory. A: 100% >= p > 15% B: 15% >= p > 2% C: 2% >= p > 0% D: non-significant population.

Rank	Threats and pressures code	Negative Threat and pressures description	inside/outside [i|o|b]
H	A08	Fertilisation	o
M	J02.01	Landfill, land reclamation and drying out, general	b
H	J02.12.02	Dykes and flooding defence in inland water	i
L	A01	Cultivation	i
L	I01	Invasive non-native species	i
H	E01	Urbanised areas, human habitation	b

4.6 Conservation Objectives

Article 6.3 of the Habitats Directive requires that the impact of the project (either alone or in combination with other projects or plans) on the integrity of the European Site is considered with respect to the COs of the site and to its structure and function. The EC guidance on Natura 2000 (MN2000) states that:-

> *The integrity of a site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site's conservation objectives* (MN2000, para 4.6(3)).

The maintenance of favourable condition of QIs at the site level will contribute to the overall maintenance of favourable conservation status of those habitats and species at national level:

- **Favourable conservation status** of a **habitat** can be described as being achieved when: "its natural range, and the area it covers within that range, is stable or increasing, and the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable".

- **Favourable conservation status** of a **species** can be described as being achieved when: "population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, sufficiently large habitat to maintain its populations on a long term basis".

Where COs have not yet been set, a set of generic COs has been produced by NPWS.

Generic COs for SACs are as follows:-

- To maintain Annex I habitats and Annex II species for which the SAC has been selected at favourable conservation condition.

Generic COs for SPAs are as follows:

- To maintain or restore the favourable conservation condition of the bird species listed as SCIs for the SPA.

COs were downloaded from the NPWS website and are available in **Appendix C**. In order to fully access the ecological implications of the proposed development upon the COs and integrity of the European Sites, the attributes used to define site-specific COs for the QIs are assessed against the construction and operational phase of the proposed project.

4.6.1 River Barrow and River Nore SAC

Only the COs for the QIs brought forward for further assessment within the Screening for AA are discussed below.

4.6.1.1 Freshwater Pearl Mussel (Margaritifera margaritifera) [1029] and (*Margaritifera durrowvensis*) [1990]

The status of the freshwater pearl mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific CO is set for this species. The Nore freshwater pearl mussel (*Margaritifera durrovensis*) remains a qualifying species for this SAC and the COs below apply to the latter species.

These COs are defined by the following list of attributes and targets:

To restore the favourable conservation condition of the Freshwater Pearl Mussel in the Blackwater River (Cork/Waterford) SAC, which is defined by the following list of attributes and targets:

- Distribution; Maintain at 15.5km;
- Population size; Restore to 5,000 adult mussels;
- Population structure: recruitment. Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length;
- Population structure: adult mortality; No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution;
- Habitat extent; Restore suitable habitat in length of river corresponding to distribution target (15.5km; see map 7) and any additional stretches necessary for salmonid spawning;
- Water quality: macroinvertebrate and phytobenthos (diatoms); Restore water quality macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93;
- Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants); Restore substratum quality filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%);
- Substratum quality: sediment; Restore substratum quality stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment;
- Substratum quality: oxygen availability. Restore to no more than 20% decline from water column to 5cm depth in substrate;
- Hydrological regime: flow variability. Restore appropriate hydrological regimes; and
- Host fish; Maintain sufficient juvenile salmonids to host glochidial larvae.

4.6.1.2 Otter (*Lutra lutra*) [1355]

To restore the favourable conservation condition of otter in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Distribution; No significant decline;
- Extent of terrestrial habitat; No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136.0ha along river banks / around ponds;
- Extent of marine habitat; No significant decline. Area mapped and calculated as 859.7ha;
- Extent of freshwater (river) habitat; No significant decline. Length mapped and calculated as 616.6km;
- Extent of freshwater (lake) habitat; No significant decline. Length mapped and calculated as 2.6ha;
- Couching sites and holts; No significant decline; and

- Fish biomass available; No significant decline.

4.6.1.3 White-clawed Crayfish (*Austropotamobius pallipes)* [1092]

To maintain the favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Distribution; No reduction from baseline;
- Population structure: recruitment, Juveniles and/or females with eggs in at least 50% of positive samples;
- Negative indicator species; No alien crayfish species;
- Disease; No instances of disease;
- Water quality; At least Q3-4 at all sites sampled by EPA; and
- Habitat quality: heterogeneity. No decline in heterogeneity or habitat quality.

4.6.1.4 Sea Lamprey (*Petromyzon marinus)* [1095]

To restore the favorable conservation condition of Sea lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Distribution: extent of anadromy; Greater than 75% of main stem length of rivers accessible from estuary;
- Population structure of juveniles; At least three age/size groups present;
- Juvenile density in fine sediment; Juvenile density at least 1/m^2;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning beds; and
- Availability of juvenile habitat; More than 50% of sample site positive.

4.6.1.5 Brook Lamprey (*Lampetra planeri)* [1096]

To restore the favorable conservation condition of Brook lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Distribution; Access to all watercourses down to first order streams;
- Population structure of juveniles; At least three age/size groups of brook/river lamprey present;
- Juvenile density in fine sediment; Mean catchment juvenile density of brook/river lamprey at least 2/m²;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning beds; and
- Availability of juvenile habitat; More than 50% of sample sites positive.

4.6.1.6 River Lamprey (*Lampetra fluviatilis)* [1099]

To restore the favorable conservation condition of River lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Distribution: extent of anadromy; Greater than 75% of main stem and major tributaries down to second order accessible from estuary;
- Population structure of juveniles; At least three age/size groups of brook/river lamprey present;

- Juvenile density in fine sediment; Mean catchment juvenile density of brook/river lamprey at least 2/m²;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning beds; and
- Availability of juvenile habitat; More than 50% of sample sites positive.

4.6.1.7 Twaite Shad (*Alosa fallax)* [1103]

To restore the favorable conservation condition of Twaite shad in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Distribution: extent of anadromy; Greater than 75% of main stem length of rivers accessible from estuary;
- Population structure: age classes: More than one age class present;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning habitats
- Water quality: oxygen levels; No lower than 5mg/l; and
- Spawning habitat quality: Filamentous algae; macrophytes; sediment Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth.

4.6.1.8 Atlantic Salmon (*Salmo salar*) (only in fresh water) [1106]

To restore the favorable conservation condition of Salmon in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Distribution: extent of % of river accessible of anadromy; 100% of river channels down to second order accessible from estuary;
- 100% of river channels down to second order accessible from estuary;
- Adult spawning fish; Conservation limited (CL) for each system consistently exceed;
- Salmon fry abundance; Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling;
- Out-migrating smolt abundance; No significant decline;
- Number and distribution of redds; No decline in number and distribution of spawning redds due to anthropogenic causes; and
- Water quality; At least Q4 at all sites sampled by EPA.

4.6.1.9 Estuaries [1130]

To maintain the favorable conservation condition of Estuaries in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Habitat area; The permanent habitat area is stable or increasing, subject to natural processes;
- Community distribution; The following sediment communities should be maintained in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex; Fine sand with *Fabulina fabula* community; and
- Community extent; Maintain the natural extent of the *Sabellaria alveolata* reef, subject to natural process.

4.6.1.10 Water Courses of Plain Montane Levels with the *Ranunculion fluitantis* and *Callitrocho-Batrachion* vegetation

To maintain the favorable conservation condition Water Courses of Plain Montane Levels with the *Ranunculion fluitantis* and *Callitrocho-Batrachion* vegetationin the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Habitat distribution; No decline, subject to natural processes;
- Habitat area; Area stable or increasing, subject to natural processes;
- Hydrological regime: River flow; Maintain appropriate hydrological regimes;
- Hydrological regime: Groundwater discharge; The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation;
- Substratum composition: particle size range; The substratum should be dominated by large particles and free from fine sediments;
- Water chemistry: minerals; The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and persistence of tufa deposits;
- Water quality: suspended sediment; The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments;
- Water quality: nutrients; The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition;
- Vegetation composition: typical species; Typical species of the relevant habitat sub-type should be present and in good condition; and
- Floodplain connectivity; The area of active floodplain at and upstream of the habitat should be maintained.

4.6.1.11 Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels [6430]

To maintain the favorable conservation condition of Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Habitat distribution; No decline, subject to natural processes;
- Habitat area; Area stable or increasing, subject to natural processes;
- Hydrological regime: Flooding depth/height of water table; Maintain appropriate hydrological regimes;
- Vegetation structure: sward height; 30-70% of sward is between 40 and 150cm in height;
- Vegetation composition: broadleaf herb: grass ratio; Broadleaf herb component of vegetation between 40 and 90%;
- Vegetation composition: typical species; At least 5 positive indicator species present; and
- Vegetation composition: negative indicator species; Negative indicator species, particularly non-native invasive species, absent or under control- NB Indian balsam (*Impatiens glandulifera*), monkeyflower (*Mimulus guttatus*), Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*).

4.6.1.12 Petrifying springs with tufa formation (Cratoneurion) [7220]

To maintain the favorable conservation condition of Petrifying springs with tufa formation (Cratoneurion) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets;

- Habitat area; Area stable or increasing, subject to natural processes;
- Habitat distribution; No decline;
- Hydrological regime/height of water table/water flow: Maintain appropriate hydrological regimes;
- Water quality; Maintain oligotrophic and calcareous conditions; and
- Vegetation composition; typical species; Maintain typical species.

4.6.1.13 Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)

To restore the favorable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

- Habitat area; Area stable or increasing, subject to natural processes, at least 181.54ha for sites surveyed;
- Habitat distribution; No decline;
- Woodland size; Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size;
- Woodland structure: cover and height; Diverse structure with a relatively closed canopy containing mature trees; sub-canopy layer with semi-mature trees and shrubs; and well-developed herb layer;
- Woodland structure: community diversity and extend; Maintain diversity and extent of community types;
- Woodland structure: natural regeneration; Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy;
- Hydrological regime: Flooding depth/height of water table: Appropriate hydrological regime necessary for maintenance of alluvial vegetation;
- Woodland structure: dead wood: At least 30m³/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder);
- Woodland structure: veteran trees: No decline;
- Woodland structure: indicators of local distinctiveness; No decline;
- Vegetation composition: native tree cover; No decline. Native tree covers not less than 95%;
- Vegetation composition: typical species: A variety of typical native species present, depending on woodland type, including ash (Fraxinus excelsior) alder (Alnus glutinosa), willows (*Salix* spp) and locally, oak (*Quercus robur*); and
- Vegetation composition: negative indicator species; Negative indicator species, particularly non-native invasive species, absent or under control.

4.6.2 River Nore SPA

Only the CO for the QIs brought forward for further assessment within the Screening for Appropriate Assessment are discussed below:

4.6.2.1 Kingfisher (*Alcedo atthis*) [A229]

There is a generic CO to maintain or restore the favourable conservation condition of the bird species listed as SCIs for this SPA.

4.6.3 Lower River Suir SAC

Only the CO for the QIs brought forward for further assessment within the Screening for Appropriate Assessment are discussed below. These are the mobile QIs that may utilise the transitional water were the Barrow meets the Lower River Suir SAC.

4.6.3.1 Freshwater Pearl Mussel (*Margaritifera margaritifera*) [1029]

To restore the favourable conservation condition of the Freshwater Pearl Mussel in the Lower River Suir SAC, which is defined by the following list of attributes and targets:

- Distribution; Restore distribution to 10.4km;
- Population size; Restore population to at least 10,000 adult mussels;
- Population structure: recruitment. Restore to least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length;
- Population structure: adult mortality; No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution;
- Suitable habitat extent; Restore suitable habitat in more than 8.8km in the Clodiagh system and any additional stretches necessary for salmonid spawnings;
- Suitable habitat: condition; Restore condition of suitable habitat;
- Water quality: macroinvertebrate and phytobenthos (diatoms); Restore water quality macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93;
- Substratum quality: filamentous algae (macroalgae), macrophytes (rooted higher plants); Restore substratum quality filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%);
- Substratum quality: sediment; Restore substratum quality stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment;
- Substratum quality: oxygen availability. Restore to no more than 20% decline from water column to 5cm depth in substrate;
- Hydrological regime: flow variability. Maintain appropriate hydrological regimes; and
- Host fish; Maintain sufficient juvenile salmonids to host glochidial larvae.

4.6.3.2 Otter (*Lutra lutra*) [1355]

To maintain the favourable conservation condition of otter in the Lower River Suir, which is defined by the following list of attributes and targets:

- Distribution; No significant decline;

- Extent of terrestrial habitat; No significant decline. Area mapped and calculated as 116.17ha above high water mark (HWM) and 726.61ha along river banks;
- Extent of marine habitat; No significant decline. Area mapped and calculated as 712.27ha;
- Extent of freshwater (river) habitat; No significant decline. Length mapped and calculated as 382.31km;
- Couching sites and holts; No significant decline;
- Fish biomass available; No significant decline; and
- Barriers to connectivity; No significant increase.

4.6.3.3 Sea Lamprey (*Petromyzon marinus)* [1095]

To restore the favourable conservation condition of the sea lamprey in the Lower River Suir SAC, which is defined by the following list of attributes and targets:

- Distribution: extent of anadromy; Greater than 75% of main stem length of rivers accessible from estuary;
- Population structure of juveniles; At least three age/size groups present;
- Juvenile density in fine sediment; Juvenile density at least 1/m^2;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning beds; and
- Availability of juvenile habitat; More than 50% of sample site positive.

4.6.3.4 Brook Lamprey (*Lampetra planeri)* [1096]

To restore the favourable conservation condition of the brook lamprey in the Lower River Suir SAC, which is defined by the following list of attributes and targets:

- Distribution; Access to all watercourses down to first order streams;
- Population structure of juveniles; At least three age/size groups of brook/river lamprey present;
- Juvenile density in fine sediment; Mean catchment juvenile density of brook/river lamprey at least 2/m²;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning beds; and
- Availability of juvenile habitat; More than 50% of sample sites positive.

4.6.3.5 River Lamprey (*Lampetra fluviatilis)* [1099]

To restore the favourable conservation condition of the river lamprey in the Lower River Suir SAC, which is defined by the following list of attributes and targets:

- Distribution: extent of anadromy; Access to all water courses down to first order streams;
- Population structure of juveniles; At least three age/size groups present;
- Juvenile density in fine sediment; Mean catchment juvenile density of brook/river lamprey at least 2/m²;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning beds; and
- Availability of juvenile habitat; More than 50% of sample sites positive.

4.6.3.6 Twaite shad (*Alosa fallax)* [1103]

To restore the favourable conservation condition of the twaite shad in the Lower River Suir SAC, which is defined by the following list of attributes and targets:

- Distribution: extent of anadromy; Greater than 75% of main stem length of rivers accessible from estuary;
- Population structure: age classes: More than one age class present;
- Extent and distribution of spawning habitat; No decline in extent and distribution of spawning habitats
- Water quality: oxygen levels; No lower than 5mg/l; and
- Spawning habitat quality: Filamentous algae; macrophytes; sediment Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth.

4.6.3.7 Atlantic Salmon (*Salmo salar*) (only in fresh water) [1106]

- Distribution: extent of % of river accessible of anadromy; 100% of river channels down to second order accessible from estuary;
- 100% of river channels down to second order accessible from estuary;
- Adult spawning fish; Conservation limited (CL) for each system consistently exceed;
- Salmon fry abundance; Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling;
- Out-migrating smolt abundance; No significant decline;
- Number and distribution of redds; No decline in number and distribution of spawning redds due to anthropogenic causes; and
- Water quality; At least Q4 at all sites sampled by EPA.

4.7 Assessment of Qualifying Habitats and Species

4.7.1 Freshwater Pearl Mussel (*Margaritifera margaritifera)* [1029] and (*Margaritifera durrovensis*) [1990]

4.7.1.1 River Barrow and River Nore SAC

Freshwater pearl mussel (FWPM) (*Margaritifera margaritifera*) is a qualifying feature of the River Barrow and River Nore SAC. During a survey of the upper catchments of the Nore in 2009, a total of 167 live mussels were counted in the River Nore, (DEHLG, 2010). FWPM are not recorded in the Dinin at Castlecomer.

The COs for this SAC indicate that the status of the FWPM as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific COs is set for this species (NPWS, 2011). Under the Freshwater Pearl Mussel Regulations (SI No. 296/2009), the Dinin River is not designated for FWPMs and the desk top review revealed there are no known populations within this river[12]. FWPM populations are known within the Nore River which is listed within the Freshwater Pearl Mussel Regulations (SI No. 296/2009). The known populations are located

[12] https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17.

upstream from the Castlecomer Footbridge at the Gully-Nore confluence and upstream of the Dinin-Nore confluence.

4.7.1.2 Lower River Suir SAC

The Freshwater pearl mussel population designated in the Lower River Suir SAC are located in Clodiagh Catchment which is not hydrologically connected to the proposed project. Therefore, the Freshwater pearl mussel QI of the SAC will not be directly affected by the proposed project.

In terms of the potential for impact to Atlantic salmon, which are host to the larval stage of the Freshwater pearl mussel called glochidia, please see below.

4.7.2 Otter (*Lutra lutra*) [1355]

Otter have a widespread distribution throughout Ireland. The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater.

4.7.2.1 River Barrow and River Nore SAC

The distribution of otter throughout the SAC is not identified in COs for the site. It is assumed that otter have the potential to interact with all surface water bodies from estuarine to freshwater and are found throughout the SAC. While no signs of otter were present at the time of the aquatic survey, otter have been recorded (NBDC online mapping) in the vicinity of the proposed project.

4.7.2.2 Lower River Suir SAC

The distribution of otter throughout the SAC is not identified in COs for the site. It is assumed that otter have the potential to interact with all surface water bodies from estuarine to freshwater and are found throughout the SAC. The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater.

4.7.3 White-clawed Crayfish (*Austropotamobius pallipes)* [1092]

4.7.3.1 River Barrow and River Nore SAC

Throughout its natural range across western Europe the distribution and abundance of white-clawed crayfish has been dramatically reduced in the last 150 years due to human disturbance - overfishing, habitat destruction, pollution, the introduction of foreign crayfish species and the resultant spread of the lethal plague fungus (Holdich and Lowery, 1988). An outbreak of crayfish plague has not yet been recorded within the River Nore but it has been confirmed within the River Barrow.

NBDC records show that white-clawed crayfish has been recorded at Dinin Bridge (North) close to where the works are to take place on the 21/07/2005. White-clawed crayfish are widespread in the Nore River.

During an aquatic survey (see Appendix B of the AA Screening Report contained in **Appendix D**) undertaken at the site, no crayfish were found within the study area. Potentially good crayfish habitat was located up and downstream of the Castlecomer Footbridge, however, the presence of large amounts of sediment below the boulders and cobbles reduced the quality of the habitat in this section of the river.

4.7.4 Salmon (Salmo salar) [1106], Twaite shad (Twaite shad) [1103] and Lamprey (Lampreta spp., *Petromzon marinus*) [1095,1096,1099]

4.7.4.1 River Barrow and River Nore SAC

During 2016 WFD monitoring carried out by the IFI on the Dinin River, it was found that lamprey sp. was recorded at the Dinin Bridge monitoring station downstream of the proposed works site. Within the Nore main channel at Quakers Bridge, upstream of the Dinin confluence, Lamprey sp were identified in a 2008 IFI survey. In a survey report on the distribution of lamprey in Ireland, it is noted that "*P. marinus and L. planeri*

appear to be common in the River Nore catchment. P. marinus usually spawn in the lower reaches of the River Nore between Thomastown and Inistioge (W. Kopke), but sometimes as far as Ballyragget (P. Fitzmaurice; W. Kopke).Unspecified lampreys were observed in the upper reaches of the Nore, the Kings and the Munster and in the lower reaches of the Dinin (Lucey, in prep)"(Kurz and Costello 1999). Therefore, there is a strong potential for salmon and lamprey sp. (brook and river) to use the habitat within the Dinin River. It is unlikely that *P. marinus* is present within the Dinin, but is known to regularly spawn in Thomastown, approximately 40km downstream of the proposed works (IFI, 2014). During the 2018 aquatic survey carried out by RPS, it was found that there was 'Poor to None' Lamprey spawning areas (i.e., no clean spawning gravels) within the works area. There was very limited lamprey nursery habitat, a small backwatered area on the left-hand side of the bridge downstream, no mud/silt/sandy bed present but organic material such as deposited leaves, etc. Again, there was limited adult lamprey habitat up and downstream of the Castlecomer bridge.

Estuaries provide important feeding, migratory and nursery grounds for the shads, including young-of-year shads. Spawning runs of adult twaite shad occur during April–June, and they are known to spawn at the upper tidal limit on the River Barrow just downstream of the weir at St Mullins. The overall lengths of the estuaries of the Barrow (36 km) and Suir (43 km), combined with that of Waterford Harbour (20 km) into which both estuaries discharge, creates an elongated sheltered habitat capable of supporting juvenile and adult life stages of the shad. During the desktop survey, it was noted that Twaite shad have been captured by anglers at the top of the tide in the Nore and Suir but they are not generally found in the freshwater part of these rivers. IFI have conducted Twaite shad monitoring and found shad within the lower section of the Nore estuary and within the Barrow/Nore esturary.[13.] It is unlikely that Twaite shad occur within the Dinin River.

The Dinin River is not a designated salmonid river under SI No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988. However, it does feed into the Nore which is protected under the Salmonid River Regs (SI 293). During WFD monitoring carried out by the IFI on the Dinin River, it was found that the River was of 'Good Status' for fish at the Dinin Bridge monitoring station downstream of the works site. The assessment was carried out in July 2016 using the area delineated electro-fishing method. *'Seven fish species were recorded at Dinin Bridge. Minnow was by far the most abundant species recorded in 2016, followed by salmon'*, (Inland Fisheries Ireland, 2016). Brown trout, European eel, minnow, stone loach, 3-spined stickleback and lamprey sp. were also observe during the survey.

On foot of the Aquatic Survey conducted by RPS, salmonid spawning habitat present was rated as *'Poor to None'* salmonid habitat downstream or upstream of the bridge. This is due to the thick layer of silt under the river substrate and the lack of clean gravel areas. Downstream of the Castlecomer Road Bridge, there were some signs of juvenile salmonid habitat with submerged boulders and overhanging vegetation providing suitable cover, shallow fast flowing water and coarse substrate.

4.7.4.2 Lower River Suir SAC

With the exception of the salmonid Aherlow River (which is not hydrologically connected to the proposed works), a designated Salmonid Water under the E.U. Freshwater Fish Directive, details on the distribution of Sea lamprey; Brook lamprey; River lamprey; Twaite shad; and Atlantic salmon (only in fresh water) are not provided for the site. It is considered that migratory anadromous fish species (twaite shad, Atlantic salmon, Sea lamprey and River lamprey occur in the transitional waters of the Lower River SAC.

During the desktop survey, it was noted that Twaite shad have been captured by anglers at the top of the tide in the Nore and Suir but they are not generally found in the freshwater part of these rivers. IFI have conducted Twaite shad monitoring and found shad within the lower section of the Suir estuary and within the Barrow/Nore/Suir estuary[14].

[13] https://www.fisheriesireland.ie/Habitats-and-Red-Data-Book/juvenile-shad-monitoring.html#trawling-surveys

[14] https://www.fisheriesireland.ie/Habitats-and-Red-Data-Book/juvenile-shad-monitoring.html#trawling-surveys

4.7.5 Estuaries [1130]

4.7.5.1 River Barrow and River Nore SAC

The EU interpretation manual describes the habitat Estuary as the downstream part of a river valley, subject to the tide and extending from the limit of brackish waters. River estuaries are coastal inlets where, unlike 'large shallow inlets and bays' there is generally a significant freshwater influence. Estuaries, from the high-water mark to the subtidal, are frequently observed to be composed of a range of distinct substrates. The habitat Estuaries is located within the transitional water body Barrow Suir Nore Estuary (IE_SE_100_0100) and downstream of Lower Suir Estuary (Little Island – Cheekpoint) (IE_SE_100_0500). This habitat is not present within the River Dinin.

4.7.6 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno Pdion, Alnion incanae, Salicion albae)* [91E0]*

4.7.6.1 River Barrow and River Nore SAC

Riparian forests of ash *(Fraxinus excelsior)* and alder *(Alnus glutinosa)* occurs 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 herbaceous layer includes many tall species such as remote sedge *(Carex remota)*, gypsywort *(Lycopus europaeus),* common nettle *(Urtica dioica)* and water avens *(Geum rivale)*. In addition there are gallery forests of tall willows alongside river channels and occasionally on river islands, where the tree roots are almost continuously submerged. They are dominated by white willow *(Salix alba)*, common osier *(S. viminalis)* and almond willow *(S. triandra)*, sometimes with grey willow *(S. cinerea)* but alder is relatively rare (NPWS 2013).

This habitat type has not been mapped within the Dinin River and the vegetation observed during the site survey did not correspond to this habitat within the proposed works area. This habitat however, is mapped in multiple locates within the main channel of the Nore downstream of the Dinin confluence. The closest location is approximately 22km downstream in the Nore river near Kilkenny.

4.7.7 Water Courses of Plain Montane Levels with the *Ranunculion fluitantis and Callitrocho-Batrachion* vegetation [3260]

4.7.7.1 River Barrow and River Nore SAC

The description of this habitat is broad, covering rivers from upland bryophyte and macroalgal dominated stretches, to lowland depositing rivers with pondweeds and starworts (European Commission, 2007, Hatton-Ellis and Grieve, 2003). The full distribution of this habitat is not mapped within the COs. The basis of the selection of the SAC for the habitat is the presence of an excellent example of the vegetation community (nutrient-rich type) associated with extensive tufa deposits on the river bed in the Kings tributary of the Nore. Other examples of this or other sub-types may be present within the SAC. The COs state that a natural (relatively unmodified) flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type. For most of the sub-types of this habitat, high flows are required to maintain the substratum necessary for the characteristic species. Flow variation is particularly important, with high and flood flows being critical to the hydromorphology. Two weirs are present upstream in the immediate vicinity of the proposed works forming a modified channel unlikely to support this habitat type in the works area.

This habitat was not recorded within the proposed project study area but may be present downstream of the proposed project in unsurveyed sections.

4.7.8 Hydrophilous tall herb fringe communities of plains and the montane to Alpine levels [6430]

Two distinct communities have been considered for this habitat in Ireland. In the lowlands, the habitat occurs as a community of watercourses, particularly unmanaged edges of slow-moving rivers, and the margins of lakes. In the uplands, the habitat occurs as typically small (<1m across) communities of ungrazed or lightly grazed cliff ledges on calcareous cliffs and on wet siliceous cliffs where there is some base-enrichment from the water. In the lowlands the community is dominated by tall hydrophilous herbs, such as wild angelica *(Angelica sylvestris)*, meadowsweet *(Filipendula ulmaria)*, yellow iris *(Iris pseudacorus)*, yellow loosestrife *(Lysimachia vulgaris)*, purple-loosestrife *(Lythrum salicaria)* and common valerian *(Valeriana officinalis)*. Horsetails such as water horsetail *(Equisetum fluviatile)* and marsh horsetail *(E. palustre)* can also occur (NPWS 2013).

The COs for the River Barrow and River Nore SAC state that the distribution of this habitat is currently unknown but considered to occur in association with some riverside woodlands, unmanaged river islands and in narrow bands along the floodplain of slow-flowing stretches of river. The Dinin River is not located in a distribution 10km square identified has hosting habitats of '*Hydrophilous* tall herb fringe communities of plains and of the montane to alpine levels' [6430]. The habitat was not identified within the proposed works area at the time of the site visit. There is potential for this habitat to occur downstream of the proposed works in unsurveyed sections.

4.7.9 Kingfisher [A229]

4.7.9.1 River Nore SPA

The Site Synopsis for this SPA indicates that a survey in 2010 recorded 22 pairs of kingfisher (based on 16 probable and 6 possible territories) within the SPA. The Dinin river was not included in this survey. Kingfisher are wildly distributed around Ireland and NBDC mapping shows they have been regularly recorded along a 10km grid square. Kingfisher territories may extend up to 3-5 km[15], the distance from the proposed project to the River Nore SPA is outside of the Kingfisher range. It should be noted that there may, however, be loss of trees from the right bank facing downstream which may be used by Kingfisher for perching. However, it is considered that the removal of these trees will not represent a significant loss as to impact upon Kingfisher populations. Further suitable perching habitat is present both upstream and downstream of the proposed project with a riparian margin of mature trees overhanging the river.

[15] https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kingfisher/breeding-feeding-territory/

5 POTENTIAL IMPACTS TO KEY SPECIES AND HABITATS

The methodology for the assessment of impacts is derived from the *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites* (EC, 2002)[16]. When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented include:

- direct and indirect effects;
- short and long-term effects;
- construction, operational and decommissioning effects; and
- isolated, interactive and cumulative effects.

5.1 Potential Significant Impacts during the Construction Phase

This section comprises an evaluation of the potential significance of impacts of the construction phase of the proposed development on the COs of the QIs/SCI for the; River Barrow and River Nore SAC, River Nore SPA and Lower River Suir SAC. These QIs/SCI have been brought forward for further assessment in this section and are summarised in **Table 5.1** below. Desktop studies and field survey have been undertaken in order to inform a complete impact assessment of the proposal on the QIs of the European Site. Potential impacts include:

- Degradation of Annex I habitat;
- Disturbance of key species;
- Habitat fragmentation;
- Introduction or spread of invasive species during construction; and
- Changes in key indicators of conservation value.

Table 5-1: Summary of QIs/SCI Considered in Assessment of Potential Impacts

European Site	QI or SCI
River Barrow and River Nore SAC	Estuaries [1130]
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno Padion, Alnion incanae, Salicion albae*) [91E0]
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
	Margaritifera durrovensis (Nore Pearl Mussel) [1990]
	Austropotamobius pallipes (White-clawed Crayfish) [1092]
River Barrow and River Nore SAC	*Lampetra planeri* (Brook Lamprey) [1096]
	Lampetra fluviatilis (River Lamprey) [1099]

[16] EC (2002) *Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.* http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf

European Site	QI or SCI
&	*Petromyzon marinus* (Sea Lamprey) [1095]
Lower River Suir SAC	*Alosa fallax fallax* (Twaite Shad) [1103]
	Salmo salar (Salmon) [1106];
	Lutra lutra (Otter) [1355].
	Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]
River Nore SPA	*Alcedo atthis* (Kingfisher) [A229]

The potential impacts of these proposed works on the QIs or SCIs, in particular the following species and habitats are detailed below.

5.1.1 Degradation of Annex I Habitats

There will be no direct loss of Annex I habitats as a result of the proposed project. Although the site visit did not locate any of the following habitats within the proposed works area they are located and/or have potential to be located downstream of the proposed works. In the absence of mitigation there is the potential for indirect impacts from sedimentation and/or water quality deterioration to the following habitats during the construction phase.

- Estuaries [1130];
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno Padion, Alnion incanae, Salicion albae*) [91E0];
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]; and
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430].

Estuarine habitat is located approximately 43km downstream of the proposed project. The Dinin flows into the Nore which is estuarine in its lower reaches before meeting the Nore/Suir/Barrow estuary. In the absence of mitigation there is the potential for indirect impacts from sedimentation and/or water quality deterioration to the 'Mud to Fine Sand' community like crustaceans (*Corophium volutator, Crangon crangon*) and bristle worms (*Eteone longa, Hediste diversicolor, Pygospioelegans, Scoloplos armiger, Spio martinensis, Tubificoides benedii and Tubificoides pseudogaster*) which are characteristic of the 1130 habitat[17].

The potential for Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] and Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] to be located downstream of the proposed works cannot be ruled out. In the absence of mitigation there is the potential for indirect impacts from sedimentation and/or water quality deterioration to this habitat.

For Alluvial forests [91E0] vegetation and hydrological regime corresponding to this habitat type was not present within the proposed works area. However, the habitat is mapped in multiple locations within the main channel of the Nore downstream of the Dinin confluence. The closest location is approximately 22km downstream in the Nore River near Kilkenny. In the absence of mitigation there is the potential for indirect impacts from sedimentation and/or water quality deterioration to this habitat.

[17] https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf.

5.1.2 Disturbance to Key Species

5.1.2.1 *Austropotamobius pallipes* (White-clawed Crayfish) [1092]

Crayfish are potentially present within the Dinin River. In the absence of appropriate mitigation to protect potential populations of crayfish, the proposed footbridge works have the potential to cause disturbance of this key species within the River Barrow and River Nore SAC. This may occur directly due to works within the riverbed or indirectly via sedimentation and/or water quality deterioration to crayfish habitat.

5.1.2.2 *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029] & *Margaritifera durrovensis* (Nore Pearl Mussel) [1990]

There are no known populations of *Margaritifera margaritifera* and *Margaritifera durrovensis* in the Dinin River. *Both species have been recorded* within the Nore upstream of the Dinin/Nore confluence and therefore there will be no direct disturbance to these two pearl mussel species.

However, in the absence of mitigation measures the works have the potential to indirectly impact on these key species via sedimentation and/or water quality deterioration. This has the potential to impact upon salmonid fish which the FWPM require to complete its life cycle.

5.1.2.3 Fish

The following fish species are designated within the River Barrow and River Nore SAC and the Lower River Suir SAC and are known to occur within the Dinin River. In the absence of appropriate mitigation there is the potential for temporary direct disturbance due to works within the riverbed;

- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099]; and
- *Salmo salar* (Salmon) [1106].

In addition, there may be an indirect disturbance to the following fish species via sedimentation and/or water quality deterioration in the absence of appropriate mitigation.

- *Petromyzon marinus* (Sea Lamprey) [1095];
- *Alosa fallax fallax* (Twaite Shad) [1103];
- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099]; and
- *Salmo salar* (Salmon) [1106].

5.1.2.4 *Lutra lutra* (Otter) [1355]

While no signs of otter were present at the time of the visit, otter has been recorded (NBDC) within close proximity to the works. There is potential for direct disturbance of otter as otter may create holts in the riparian habitat set out for the abutment and pier works prior to the works commencing.

The proposed works would see the temporary indirect disturbance due to the loss of freshwater habitat as a result of the diversion of the Dinin River. The damming and diversion of the river may prevent otter migration along the river bank and upstream within the river corridor thus restricting its ability to find its food source (fish biomass) and breeding sites. The temporary crossing of the Ardra tributary may also result in a temporary disturbance/barrier to otter migrating up this channel. Additionally, impacts on fish populations downstream of the works as a result of potential reduction in water quality would lead to a further reduction in fish stocks downstream. Therefore, the proposed footbridge works in the absence of appropriate protective/mitigation measures for otter using the Dinin River would indirectly disturb otter present.

5.1.2.5 *Alcedo atthis* (Kingfisher) [A229]

Kingfisher is the only QI of the River Nore SPA. While the works will not directly impact on Kingfisher within the SPA, there is the potential for indirect impact to Kingfisher as a result of the works through a potential reduction in food resources (fish) from indirect impact on water quality. There will be some loss of trees along the right bank to facilitate the bridge construction. These may be used by kingfisher for perching, however it is considered that the removal of these trees will not represent a significant loss as to impact upon Kingfisher populations. Further suitable perching habitat is present both upstream and downstream of the proposed project with a riparian margin of mature trees overhanging the river.

5.1.3 Habitat Fragmentation

The partial damming of the river and construction along the bank site may cause temporary habitat fragmentation for the following species which have been recorded within the Dinin River. The proposed construction works may temporarily deter the following species from moving within the river corridor thus preventing them from reaching habitat up or downstream of the works:

- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099];
- *Salmo salar* (Salmon) [1106]; and
- *Lutra lutra* (Otter) [1355].

5.1.4 Introduction or spread of invasive species during construction

A number of invasive alien plant species (IAPS) were noted onsite (see **Appendix B)**. These include Japanese knotweed (*Fallopia japonica*), Cherry laurel (*Prunus laurocerasus*) and Candadian pondweed (*Elodea canadensis*). Construction to facilitate the footbridge will require works in the vicinity of a stand of Japanese knotweed. Aside from unintended or non–project related dispersal of IAPS seed or viable plant material, there remains the potential for the proposed development to spread Japanese knotweed or other high impact IAPS to downstream hydrologically connected European Sites.

5.1.5 Changes in Key Indicators of Conservation Value

Modifying structures of inland watercourses of the SAC has been identified a ‘High’ potential threat to the COs of the River Barrow and River Nore SAC, (see **Table 4-10**:). The proposed footbridge is located within the SAC and has been designed to accommodate river flow more appropriately than the bridge that is currently in place.

The input of uncontrolled additional sediment arising from the works to the Dinin and Ardra watercourses has the potential to enter the River Barrow and River Nore SAC; this would be a contradiction to the targets set out for the COs for aquatic species within the River Barrow and River Nore SAC, i.e. ‘No decline in heterogeneity or habitat quality’ in relation to the protection of crayfish habitat.

While the status of the FWPM (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is under review, currently there are no site-specific COs for this species in the River Nore and River Barrow SAC. In the case of the Nore FWPM (*Margaritifera durrovensis*), the conservation targets are to restore suitable habitat in the length of river, improve water quality, restore appropriate hydrological regimes and maintain sufficient juvenile salmonids to host glochidial larvae. In the absence of mitigation measures, the potential impacts identified as a result of the footbridge construction works would contravene with the COs outlined for the Nore population of FWPM.

High levels of sediment which may become mobile during the pier installation process can impact directly on salmon. If of sufficient severity, adult salmon could theoretically be affected by increased silt levels as gills may become damaged by exposure to elevated suspended solids levels. If of sufficient severity, aquatic invertebrates may be smothered by excessive deposits of silt from suspended solids. Aquatic invertebrates make up a large proportion of juvenile salmon food source and, therefore, this is an indirect impact on salmon populations. Where mobilised sediment, as a result of the proposed footbridge finally deposits downstream, there is the potential for salmonid and lamprey spawning habitat loss. Silt/sediment has the potential to cover the loose gravel beds which salmon and lamprey use to spawn. This contravenes the targets set out in the COs which state there shall be 'no decline in extent and distribution of spawning beds' for the three lamprey species and Twaite shad. In addition, 'maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth' for twaite shad'. For salmon there should be 'no decline in number and distribution of spawning redds due to anthropogenic cause' and 'At least Q4 at all sites sampled by EPA'.

Impacts on water quality could also impact on fish stocks which, in turn, could impact on populations of populations of otter which rely upon fish as a food resource.

5.2 Potential Significant Impacts during the Operational Phase

There will be no impacts to European Sites as a result of the operation of the proposed project.

Table 5-2: Summary of Impacts on the Qualifying Interests of River Barrow and River Nore SAC, River Nore SPA and Lower River Suir SAC

Qualifying Interest/ Habitat of Conservation Value	Brief Explanation of Potential Impact	Mitigation Required
Estuaries [1130].	No direct impact as this habitat is not found within the proposed project boundary. Habitat is located downstream of the proposed project. Potential for temporary indirect impacts from sedimentation and/or water quality deterioration to this habitat during construction.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno Padion, Alnion incanae, Salicion albae*) [91E0].	No direct impact as this habitat is not found within the proposed project boundary. Habitat is located downstream of the proposed project. Potential for temporary indirect impacts from sedimentation and/or water quality deterioration to this habitat during construction. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260].	No direct impact as this habitat is not found within the proposed project boundary. Habitat potentially located downstream of the proposed project. Potential for temporary indirect impacts from sedimentation and/or water quality deterioration to this habitat. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430].	No direct impact as this habitat is not found within the proposed project boundary Habitat potentially located downstream of the proposed project. Potential for temporary indirect impacts from sedimentation and/or water quality deterioration to this habitat. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Margaritifera durrovensis (Nore Pearl Mussel) [1990] and *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029].	No direct impact as this species is not found within the proposed project boundary and known populations are located upstream. Potential indirect impact via sedimentation and/or water quality deterioration. This has the potential to impact upon salmonid fish which the FWPM require to complete its life cycle. Any establishing FWPM could be limited in size due to degradation of water quality although is a temporary impact. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Austropotamobius pallipes (White-clawed Crayfish) [1092].	Potential temporary direct disturbance/ habitat fragmentation to this species during construction of bridge pier and dewatering activities Potential temporary indirect impact via sedimentation and/or water quality deterioration during construction Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan

Qualifying Interest/ Habitat of Conservation Value	Brief Explanation of Potential Impact	Mitigation Required
Lampetra planeri (Brook Lamprey) [1096].	Potential temporary direct disturbance/ habitat fragmentation to this species during construction of bridge pier and dewatering activities. Potential indirect impact via sedimentation and/or water quality deterioration Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Lampetra fluviatilis (River Lamprey) [1099].	Potential temporary direct disturbance/ habitat fragmentation to this species during construction of bridge pier and dewatering activities. Potential indirect impact via sedimentation and/or water quality deterioration. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Petromyzon marinus (Sea Lamprey) [1095].	No direct impact as this species is not found within the proposed project boundary. Potential indirect impact via sedimentation and/or water quality deterioration. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Alosa fallax fallax (Twaite Shad) [1103].	No direct impact as this species is not found within the proposed project boundary. Potential indirect impact via sedimentation and/or water quality deterioration. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Salmo salar (Salmon) [1106]	Potential temporary direct disturbance/ habitat fragmentation to this species during construction of bridge pier and dewatering activities. Potential indirect impact via sedimentation and/or water quality deterioration. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Lutra lutra (Otter) [1355].	Potential temporary direct disturbance/ habitat fragmentation to this species during construction of bridge pier and dewatering activities. Otter holts may have been established in the interim between the Appropriate Assessment and works. Potential indirect impact via sedimentation and/or water quality deterioration. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan
Alcedo atthis (Kingfisher) [A229]	No direct impact as this species as a result of construction works. There will be some removal of trees which may act as perching sites. No suitable nesting habitat was observed within the proposed works boundary. Potential indirect impact via sedimentation and/or water quality deterioration. Spread of IAS.	Yes- Design features and best practice measures are included in Outline CEMP and Invasive Species Management Plan

5.2.1 Cumulative and In-Combination Impacts

It is a requirement of Appropriate Assessment that the in-combination (the cumulative development with any other plans or projects) effects be assessed. The following section considers plans and projects that may contribute to in-combination impacts.

Table 5-3: List of Potential Plans and Projects which may Contribute to Cumulative Impacts

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT
Land Use and Spatial Plans		
Kilkenny County Council Planning Database	A search of the Kilkenny County Council planning database was carried out on the 6th of December 2018. This search identified permitted projects close to the works area or along the banks of the Dinin River which may in combination with the proposed project have an impact on the qualifying interests of the River Barrow and River Nore SAC. Those projects are as follows: Joseph Comerford (18231): The provision of underground gas tanks; The provision of an over-ground generator; All associated site development works. All works are to take place to the Avalon Inn Hotel, Castlecomer, Co Kilkenny. An updated search on 20th June found no additional planning applications within the study area.	There is potential for cumulative impact of emissions from both the Avalon Inn Hotel development and the Castlecomer footbridge project due to the potential release of pollutants into the Dinin River and River Barrow and River Nore SAC.
Kilkenny County Development Plan 2014-2020	To protect and, where possible, enhance the natural heritage sites designated under EU Legislation and National Legislation (Habitats Directive, Birds Directive, European Communities (Birds and Natural Habitats) Regulations 2011 and Wildlife Acts). This protection will extend to any additions or alterations to sites that may arise during the lifetime of this plan. To protect and, where possible, enhance the plant and animal species and their habitats that have been identified under European legislation (Habitats and Birds Directive) and protected under national Legislation (European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), Wildlife Acts 1976-2010 and the Flora Protection Order (SI94 of 1999).	A number of policies and objectives provide for the protection of the integrity of sites designated under European and National legislation and ecological works. The Natural Heritage and Biodiversity Objective highlights the council's objective to protect, enhance, and conserve designated sites and of ecological networks/corridors. The County Development Plan objectives outline the importance of best practice with regard to ensuring biodiversity and natural heritage are taken into account from the earliest point in the design process. Key environmental protection measures should be followed to comply with the objectives set out in the Kilkenny County Development Plan 2014-2020.
River Basin Management Plan 2018-2021	The project should comply with the environmental objectives of the Irish RBMP which are to be achieved generally by 2021. Ensure full compliance with relevant EU legislation. Prevent deterioration. Meeting the objectives for designated protected areas. Protect high status waters. Implement targeted actions and pilot schemes in focus sub-catchments aimed at:	The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination or cumulative impacts with the proposed footbridge.

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT
	Targeting water bodies close to meeting their objective and Addressing more complex issues which will build knowledge for the third cycle.	
Pollution Reduction Plans		
IPPC Programme **Local Authority Discharge**	Ormonde Brick Limited is located 0.9 km from the site. However, its IPPC licence was surrendered, and licensable activities have ceased. The current condition of the installation is not causing, or likely to cause environmental pollution. Flemings' Fireclays Manufacturing Limited is located 9.8km as the crow flies from the works area. The company manufacture stoneware bricks, chimney flue liners and chimney pots for use in the construction industry.	No IPPC licence facilities in the area, no impact. Rainwater which collects in a slump in the floor of the clay/shale pit is pumped via a settlement pond to a small waterway which drains to the River Clogh which feeds into the Dinin River. Potential cumulative impact could arise is there are elevated levels of suspended solids released from the Flemings' facility into the Dinin River while works are underway for the footbridge in the absence of appropriate mitigation methods.
Major Accident Emergency Plans		
Seveso II Sites	There are no Seveso sites within the vicinity of the proposed works.	No Impact
Fisheries Plans		
Inland Fisheries Ireland Corporate Plan 2016 -2020 **The Inland Fisheries Act 2010**	To ensure that Ireland's fish populations are managed and protected to ensure their conservation status remains favourable. That they provide a basis for a sustainable world class recreational angling product, and that pristine aquatic habitats are also enjoyed for other recreational uses. To develop and improve fish habitats and ensure that the conditions required for fish populations to thrive are sustained and protected. To grow the number of anglers and ensure the needs of IFI's other key stakeholders are being met in a sustainable conservation focused manner. EU (Quality of Salmonid Waters) Regulations 1988. All works during development and operation of the project must aim to conserve fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems and protect spawning salmon and trout.	The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive in-combination effects to European Sites. The implementation of this corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not contribute to in-combination or cumulative impacts with the proposed works.

6 MITIGATION MEASURES

For the purposes of this assessment the term "mitigation measures" are considered to be '*those measures which aim to minimise, or even cancel, the negative impacts on a site that are likely to arise as a result of the implementation of a plan or project. These measures are an integral part of the specifications of a plan or project*' (Guidance document on Article 6(4) of the Habitats Directive 92/43/EEC, January 2007).

Based on the design and nature of the project, a limited number of mitigation measures are required to avoid the potential for any indirect impacts to habitats and species. No Annex I habitat will be directly impacted.

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

The Contractor, appointed by Kilkenny County Council, will be required to comply with and implement the requirements and mitigation measures as set out here and incorporated in full in the Outline CEMP and any conditions imposed as part of the granted planning approval.

6.1 Outline Construction Environmental Management Plan (CEMP)

Given the nature of the works and sensitivity of the surface water-dependent habitats and species either within the Dinin River or downstream of the works the Contractor, appointed by Kilkenny County Council, will be required to establish a Construction Environmental Management Plan (CEMP). This will be established prior to the commencement of construction.

The CEMP will be prepared in accordance with industry Best Practice and will be effective for the duration of the construction works. The measures required to protect the River Barrow and River Nore SAC, River Nore SPA and Lower River Suir SAC that are detailed herein have been brought directly into the Outline CEMP (**Appendix E**). The Contractors CEMP will be prepared in consultation with a suitably qualified ecologist to include all of the measures contained within the Outline CEMP.

The CEMP will be a live document throughout the construction of the proposed realignment and will be subject to ongoing independent audit in consultation with the National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI). Any alterations will be for the improvement of the CEMP. The proposed protection measures described in the CEMP will be carried out, further to the requirements of the consenting authorities. This CEMP will be strictly adhered to by the contractors involved in the works and will be monitored onsite by an appointed Ecological Clerk of Works (ECoW). Additional measures may be required to be developed and incorporated into the CEMP as a result of pre-construction surveys (crayfish/otter). The final CEMP will be submitted for review and written approval by the Kilkenny County Council appointed ECoW.

The following documents have informed the measures outlined in this NIS and have contributed towards the development of the Outline CEMP:

- IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters. Inland Fisheries Ireland*, Dublin
- NRA (2008a) *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.* National Roads Authority, Dublin
- NRA (2008b) *Guidelines for the Treatment of Otters during the Construction of National Road Schemes*

- NRA (2008). *Environmental Impact Assessment of National Road Schemes, A Practical Guide National Roads Authority,* Dublin;
- E. Murnane, A. Heap and A. Swain. (2006) *Control of water pollution from linear construction projects. Technical guidance* (C648). CIRIA;
- E. Murnane et al., (2006) *Control of water pollution from linear construction projects. Site guide (C649)* CIRIA;
- Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin;
- Masters-Williams, H. et al., (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors* (C532);
- DOMNR (1998). *Fishery guidelines for Local Authority works*. Department of the Marine and Natural Resources, Dublin; and
- Enterprise Ireland (Anon) *Best Practice Guide (BPGCS005) Oil storage guidelines*.

The development of specific method statements that might arise out of the contract or the appointed contractors finalised CEMP will likewise be cognisant of the above documents. The proposed works will be carried out in accordance with the following Best Practice construction measures:

- KCC, or any Contractor appointed by Kilkenny County Council will appoint a suitably qualified person(s), to the role of Ecological Clerk of Works (ECoW). The role of the ECoW will be to monitor the construction works, appoint the relevant specialists required and to ensure compliance with relevant legislation, planning conditions and associated documents (e.g. CEMP, IASMP);
- The ECoW will have the authority to review the CEMP and method statements, advise the Contractors on the contract/project requirements, decide on elements that require direct supervision and instruct action, as appropriate, including the authority to require the temporary cessation of works, where necessary;
- All of the Contractor's site staff will be briefed regarding the biodiversity value of the surrounding landscape. This will include particular reference to the sensitive habitats and species within the River Barrow and River Nore SAC and the potential for these to be present within the works area i.e. salmon, lamprey (river and brook), otter and crayfish;
- All of the Contractor's site staff will be briefed regarding habitats; trees, treelines to ensure that there are no accidental or unintentional actions conducted during the project construction that could lead to a reduction in water quality/damage to same. Such matters often arise accidentally through lack of awareness rather than as a result of an intentional action;
- The Contractors briefing should also include emphasis on the presence of IAPS present on site. This includes the stand of Japanese knotweed to avoid the unintentional disturbance and spread of this IAPS prior to its removal;
- A surface water management plan will be prepared by the Contractor and agreed with the ECoW, KCC, IFI prior to the commencement of works. An outline of surface water management measures is detailed below and has been devised to ensure the protection of downstream European Sites and its surface water dependent Annexed species and habitats. The measures contained therein form part of the Outline CEMP requirements. Any changes in locations of any of these measures including attenuation features, silt fencing etc. are required to be shown for prior approval from KCC, the ECoW;
- Any excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows;

- Any diesel or fuel oils stored on site will be bunded to 110% of the capacity of the storage tank. Re-fuelling of plant will not occur within 50m of any watercourse or surface water feature (specifically the Dinin and Ardra watercourses). Drip trays and spill kits will be kept available on site;

- Fuels, lubricants and hydraulic fluids for equipment used on the site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice;

- Any spillage of fuels, lubricants of hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of;

- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling;

- The Contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, and the Contractor is required to prepare a contingency plan for before and after such events.

- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be readily available at strategic site locations and construction staff will be familiar with emergency procedures;

- Where dust suppression is considered to be required by the Contractor or as instructed by appointed ECoW, such requirements and methodology shall be subject to the agreement with KCC. Notwithstanding this fact water will not be abstracted from or discharged the Dinin and Ardra watercourses;

- Contaminated soil, including spoil contaminated with invasive species (defined as those species listed on the Third Schedule of the Birds and Natural Habitats Regulations), shall only be disposed of at an appropriately licenced facility. The necessary licences permit and permissions will be required for this activity and it will be the responsibility of the appointed Contractor to arrange for same. Further detail is available in the IASMP (**Appendix B**);

- All water used in the cleansing, testing or disinfection of structures shall be rendered safe prior to discharge to the environment. None shall be permitted to be returned directly to the Dinin or Ardra watercourses or to percolate to ground in the vicinity of these watercourse;

- No works will be permitted within the area of Dinin and Ardra watercourses during excessive weather events as defined by Met Eireann;

- The Contractor shall ensure that no harmful materials shall be deposited into nearby watercourses, including drainage ditches/pipes, on or adjacent to the site; and

- The Contractor shall comply with the requirements of the Public Health Acts and Fisheries Acts.

These measures including those outlined below are reproduced in the Outline CEMP (**Appendix E**).

6.1.1 Mitigation Measures for stream diversions and bridge construction

Consultation with IFI has stipulated that the following document should be adhered to IFI *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (2016). Within these guidelines clear span structures with no in-stream works is the preferred option however the site options selection process did not find this to be a viable option. A single pier is to be constructed within the Dinin River which will require in-stream works.

In-stream works should be carried out in dry conditions effectively isolated from any flowing water and instream works will only occur during the permitted summer period of July-September inclusive outside of the Annual Close Season.

Works will require the bunding and diversion of the Dinin River along the eastern bank to facilitate instream pier placement. This will be followed by reinstatement of the Dinin River once works have been completed. To facilitate works a temporary crossing will be placed within the Ardra stream consisting of pipe(s) to convey any flow.

The following as stipulated in consultation with IFI will be adhered to;

- The construction of the abutments should always take place in the dry. Where possible the abutments should be set back from the river bank sufficiently to maintain connectivity of habitat along the river bank and to avoid erosion of the bank;
- In some cases where the abutments cannot be set back the area should be isolated from the watercourse using bunding. The area within the bund must be electro-fished and any remaining water must be pumped to grassland or a filtration system before returning to the river; and
- No work should take place within the live water environment.

In addition to the above bullet points above stipulated by IFI, the following below will also be adhered to:

- The area to be dewatered must be electro-fished to translocate any fish/lamprey/crayfish present.
- The ECoW shall engage a suitability qualified and experienced ecologist to prepare a detailed translocation plan for fish/crayfish/lamprey in consultation with the ECoW and IFI;
- The ECoW will appoint a suitability qualified and experienced ecologist(s) to conduct the electro fishing and fish/lamprey/crayfish translocations;
- Fish translocation can only be conducted by qualified ecologists under licence. This is issued under Section 14 of the Fisheries (Consolidation) Act, 1959 as substituted by Section 4 of the Fisheries (Amendment) Act, 1962. Licences can take a number of weeks to obtain so the Contractor will need to be appointed well in advance of works;
- During hot weather conditions work may have to be suspended. The electrofishing team will monitor dissolved oxygen levels in the buckets and tanks and if 90% levels are difficult to maintain, or if there are mortalities, then the operation will have to be suspended;
- Once the works area is dewatered a visual inspection will be carried out by a competent and qualified ecologist for presence of lamprey, crayfish or any fish left in the works area. Any identified will be translocated. Works are only to be undertaken during the month of July – September to mitigate on impacts of potential spawning of adult brook and river lamprey in the River Dinin;
- Any spoil removed from the river bed and bank will be checked for lamprey. Any protected species found in the spoil will be released downstream away from the works; and
- Records of all captured fish must be kept.

Although no crayfish were located at the time of survey there is the possibility for this Annex II species to be present within either the Dinin or Ardra watercourses and good crayfish habitat was found during the Aquatic survey. The following measures should be adopted:

- The bunding area must also be examined for crayfish prior to dewatering. An ECoW or the appointed suitably qualified ecologist must be present on site during the dewatering activities and

can stop dewatering should any crayfish be revealed. Any crayfish found must be removed and translocated to a suitable habitat as stipulated within the translocation plan;

- The survey, handling and translocation of crayfish must be conducted by a qualified person who has relevant licence issued by NPWS for such activities; and

- All those working in-stream shall be aware of the current outbreak of crayfish plague and employ strict biosecurity measure to prevent its introduction and spread to the Dinin/ Ardra watercourses.

6.1.2 Mitigation measures for temporary stream crossing

A temporary structure will be installed to span the Ardra stream as a pipe or series of pipes subject to flow. It is envisaged that the watercourse will be flumed through the pipe(s) which will be backfilled to allow access over the tributary to the bunded area and eastern abutment.

- The ECoW will be responsible for leasing with IFI and ensuring the installation and removal of this structure adheres to IFI requirements.

IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters* will be adhered to which includes the following;

- The crossing should be in place prior to the commencement of works;

- Flow should be maintained through the structure;

- The structure must provide for the passage of fish and macroinvertebrates;

- No temporary crossing shall be installed without the approval of IFI as regards sizing, location, duration and timing;

- The crossing must be laid in such a manner as to maintain the existing stream profile;

- Ensure no significant alteration in current speed or hydraulic characteristic, in particular not result in scouring, deposition or erosion upstream or downstream the temporary crossing location;

- Have capacity to convey the full range of flows including flood flows likely to be encountered without the crossing being overtopped;

- Be covered with clean inert material such as to allow for the safe crossing of the widest items of plant and equipment without cover material being dislodged and entering waters;

- The approach and departure routes to the temporary crossing shall be designed and installed so that drainage will fall away from the watercourse being crossed. In the event that the fall of the ground does not permit sufficient control on drainage, additional earthworks settlement areas shall be provided;

- The temporary crossing structure shall be fenced terram or similar material to prevent wind blow carrying dust and other potentially polluting matter to water; and

- Side armour (or reinforced concrete traffic barriers) shall be provided to ensure machinery cannot drive over its edge or force the discharge of material from the bridge deck to waters.

6.1.3 Sediment and erosion management measures

This section describes a number of general mitigation measures which will be implemented by KCC's appointed Contractor to minimise the effects of sediment and erosion during the construction activities. Indirect impacts to downstream European Sites arise from the potential for sediment/ pollutant release from construction activities. Construction of the proposed works will be restricted to

the minimum area necessary as shown in drawing in **Appendix A**. Mitigation measures have been specified in this NIS to ensure that there will be no negative impact on the integrity of the European Sites during the construction of the proposed project. The following mitigation measures, as a minimum, will be implemented, to reduce the risk of pollution of water bodies during the construction:

- Dewatering will involve the removal and collection of water from the area, and the treatment and disposal of the collected water;
- The dewatering technique used will aim to reduce the amount of sediment extracted at source e.g. by dewatering through a filter. The water removed from the areas will be treated to remove sediment to an acceptable level (less than 25mg/l suspended solids), before being discharged;
- When damming and dewatering the maintaining dry conditions by pumping to facilitate works, any silt contaminated water from the works area must be treated prior to discharge;
- The Contractor will employ best practice settling systems to ensure maximum removal of suspended solids prior to discharge of any surface water or groundwater from excavations to receiving waterbodies. This may include treatment via settlement tanks;
- There will be no direct pumping of sediment laden water from the works to the active watercourse at any time;
- The installation and removal of temporary structures, river diversions and installation of the bridge pier will be done under the supervision of an ECoW and adhere to IFI requirements within the guidelines and also include followings from the consultation response;
- Any topsoil shall be maintained separate from general spoil in a tidy condition with side slopes not steeper than 1 in 3 and shall be maintained in good condition keeping weeds under control and preventing vermin infestation. The Contractor will take all necessary precautions to avoid run off resulting from topsoil stripping from polluting neighbouring watercourses;
- Stockpiling of construction materials, particularly in relation to the excavation for the bridge pier will be strictly limited to specific areas within the study area including low lying ground.
- Elsewhere, stockpiling of construction materials is strictly prohibited within 5m of any ditch or water-laden channel and appropriate management of excess material stockpiles to prevent siltation of watercourses;
- Temporary construction compounds will not be located close watercourses and set back as far as possible;
- Riparian vegetation will be left intact where practicable. Protection will be afforded to riparian vegetation by fencing prior to commencement of any works. Where practicable, the fencing will be set a minimum distance of 5m from the bank of the watercourse or at the edge of a woody canopy, whichever is the greatest;
- Before earthworks commence on site and before they are needed - drainage, erosion control and sediment control measures must be in place and functioning;
- Watercourse diversion will be done in a manner so as to minimise suspended solids entering the watercourse in line with IFI guidelines;
- The Contractor must specify specific sediment control measures in relation to the construction of the footbridge and river bed channel and agreed with the ECoW; and
- The downstream end of the diversion will be opened up first. Works will be carried out during low flow periods to minimise silt disturbance, and during specified times permitted by IFI for instream works i.e. 1st July to 30th September.

6.1.4 Mitigation Measures for the avoid hydrocarbon loss and other waterborne pollutants

- All oils, solvents and paints will be stored within suitably designed bunded areas with a bund volume of 110% of the capacity of the largest tank/container;
- Refuelling will only take place in designated hard standing areas. A supply of spill kits and hydrocarbon adsorbent packs will be stored along the construction areas. Personnel will be trained in the use of this equipment. Waste oils and hydraulic fluids will be collected in suitable leak-proof containers and transported from the site and off-site areas for disposal or recycling;
- Machinery used on site will be regularly inspected to ensure there is no leakage from them and to ensure the machinery will not cause contamination of watercourses;
- Where required, fuel will be transported in a mobile, double skinned tank and a spill tray will be used when refuelling (if taking place outside a compound area);
- Concrete, including, but not limited to, waste and wash-down water, will be contained and managed appropriately to prevent pollution of watercourses. Concrete pouring will be prevented during periods of heavy rainfall; quick setting mixes will be used;
- Protection measures will be put in place to ensure that all hydrocarbons used during the Construction are appropriately handled, stored and disposed of in accordance with recognised standards as detailed by the Environmental Protection Agency and/or KCC e.g. approved waste Contractor, off-site treatment/ recycling/disposal etc.;
- Guidelines for minimising impacts on water quality and fisheries in relation to construction will be implemented including, but not limited to, CIRIA C532 "*Control of water pollution from construction sites - Guidance for consultants and contractors*", IFI guidelines and TII Guidelines; and
- Runoff and wash down water from exposed aggregate surfaces, cast in place concrete and from concrete trucks will be trapped on-site to allow sediment to settle out and reach neutral pH. KCC and its Contractor will consult and comply with the requirements of the NPWS and IFI. Waste products and pollutants associated with the works will not be permitted to enter watercourses or groundwater and all precautions necessary will be taken to prevent the spillage of diesel fuel or other solvents.

6.1.5 Environmental Incidents and Accidents

In the case of environmental incidents or accidents occurring during the construction phase of the proposed project, the following measures will help to prevent/ contain the contamination of the watercourses:

- An emergency-operating plan will be established to deal with incidents or accidents during construction that may give rise to pollution in the Dinin or Ardra watercourses. This will include means of containment in the event of accidental spillage of hydrocarbons or other pollutants (e.g. oil booms, soakage pads);
- Throughout all stages of the construction phase of the proposed project the Contractor will ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the freshwater environments and the requirement to avoid pollution of all types;
- All hazardous materials on site will be stored within secondary containment designed to retain at least 110% of the storage contents;
- Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project as appropriate;

- Safe handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project and an emergency response plan shall be in place in case of accidental spillage;
- Raw or uncured waste concrete will be disposed of by removal from the site;
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of; and
- There will be no discharge of un-attenuated water to the nearby watercourses.

6.1.6 Measures to avoid the spread of invasive species

The presence of invasive alien plant species has the potential to lead to an offence under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). Regulation 49 of the 2011 Regulations prohibits (unless under licence) the breeding, release, or allowing or causing the dispersal from confinement of any animal listed in the Third Schedule of the Regulations; or the planting, allowing or causing dispersal, and spreading of any plant listed in the Third Schedule. Japanese Knotweed is a plant listed in the Third Schedule.

It is an offence to plant or encourage the spread of any third schedule invasive species by moving contaminated soil from one place to another, or incorrectly handling and transporting contaminated material or plant cuttings. Persons must therefore take all reasonable steps and exercise due diligence to avoid committing an offence under the 2011 Regulations.

The RPS survey conducted in 2018 identified IAPS within or upstream of the proposed works area. The species recorded included Japanese knotweed (*Fallopia japonica*), Cherry laurel (*Prunus laurocerasus*) and Canadian pondweed (*Elodea canadensis*). Construction to facilitate the footbridge will require works in the vicinity of a stand of Japanese knotweed and this has been mapped in **Appendix B**. Aside from unintended or non–project related dispersal of IAPS seed or viable plant material, there remains the potential for the proposed development to spread Japanese knotweed or other high impact IAPS to downstream hydrologically connected European Sites.

As a result, an Invasive Species Management Plan (IASMP) has been prepared by INVAS and is presented in **Appendix B**. This plan presents the methodology for the treatment of IAS located on site and the best practice measure to avoid the spread of invasive species. In addition to this IASMP the following presents the general mitigation and best practice methods to prevent the introduction and spread of IAS.

- KCC, its appointed Contractor and ECoW will comply with IAPS on site as per the management plan;
- It will be the responsibility of the ECoW to appoint a suitable and qualified person(s) to treat the IAPS onsite as per the management plan;
- Further stands of Japanese knotweed or other third schedule IAPS may have become established in the interim. It will be the responsibility of the ECoW to appoint a suitable qualified person to conduct a preconstruction Invasive Species Survey to assess this and to inform a finalised control programme. The person(s) appointed to treat the known IAPS on site should be informed of any further IAPS present;
- Signs will be erected at the site entrances to alert site users that the area is contaminated with Japanese knotweed, Cherry laurel and Canadian pondweed. Currently, signage confirming the presence of and ongoing treatment of Japanese knotweed is displayed at the Bridge;
- Before any site activities take place (including site compounds, facilities, machinery or vehicles being brought on site) an ‘exclusion zone’ should be clearly demarcated. In effect this will include the site entrance and other areas where works are planned to take place. It should include a visible cordon, including on all visible stands of Japanese knotweed or other third schedule

species, with a precautionary 7m buffer to take account of underground spread to prevent further spread on site or until such time that a treatment specialist can confirm that the treatment regime has been successful. This could include PVC windbreak mesh or similar material to prevent unwitting spread by damage or dislodgement. This will not be possible along public roads unless these roads are partially closed to facilitate the works. Where the road remains open, fencing along the existing wall should be provided for to prevent access to and disturbance of the Japanese knotweed;

- Dedicated exclusion zone entry and exit points should be created for operators on foot and for mobile equipment. The appointed Contractor and suitably qualified person shall agree the working area required to allow for the works to commence unhindered;

- Biosecurity facilities must be installed on-site prior to site works commencing. This must include facilities for wheel brushing, brushing down of vehicle and cleaning of footwear prior to arrival on site and on leaving site to prevent the spread of IAPS. It must also include an area where bushing can be directed into a dedicated and contained area. A sign-off sheet must be maintained by the Contractor to confirm cleaning;

- Vehicles leaving the site should be inspected for any plant material and cleaned down in the biosecurity containment area;

- Loose or dislodged material should be gathered in the dedicated and contained quarantine/clean down area will need to be appropriately treated as contaminated material. This can include plant material, contaminated soil etc;

- Any potential IAPS contaminated material being transported off-site will require licences from NPWS, separate of waste collection permit and/or licenced/permitted waste acceptance facility. It will be the responsibility of the appointed Contractor to arrange;

- For any material entering the site, particularly soils, the supplier must provide an assurance that it is free of non-native invasive species;

- All Contractors and site operatives working on-site should receive training on identification of Japanese knotweed and all potential third schedule IAPS that they might encounter; and site practices immediately on commencement on-site; and

- The appointed Contractor must ensure all site users are aware of the finalised IAPSMP and treatment methodologies. This can be achieved through “toolbox talks” before works begin on the site.

6.1.7 Mitigation for Protected Species and Habitats

The measures outlined in **Section 6.1.1** to **6.1.6** are put in place to protect water quality and also the following protected aquatic species; Salmon (Salmo salar) [1106], Twaite shad (Twaite shad) [1103] and lamprey (Lampreta spp., *Petromzon marinus*) [1095,1096,1099] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029], *Margaritifera durrovensis* (Nore Pearl Mussel) [1990], and *Austropotamobius pallipes* (White-clawed Crayfish) [1092] no further measures are required for these species.

Lutra lutra (Otter) [1355]

While no holts or signs of otter were found during either site visit in 2018, otter are widespread in Ireland and have a transitional nature. There is a possibility that otter could use the banks around the site for breeding in the period leading up to the works.

- Pre-construction otter surveys shall be undertaken prior to the commencement of any works in order to identify any changes in otter activity, holt locations, etc., since the original surveys.

- While there is no seasonal constraints around otter surveying timeframes it is preferable to carried this out during the winter month when vegetation is less dense and tracks are not noticeable.

Derogations are required for any works likely to cause disturbance to active breeding holts (when present within c.150m of a scheme). The removal of otters from affected holts, and the subsequent destruction of these holts, must be conducted under a Section 25 derogation under the 1997 Habitats Regulations. The National Parks and Wildlife Service (NPWS), of the Department of the Environment, Heritage and Local Government, is responsible for processing these licenses. An application for a Section 25 derogation should be submitted to the NPWS along with the relevant ecological information from otter surveys. Closure of holts requires a monitoring period to ensure that there is no current otter activity at the holt. Derogations may not be provided by the NPWS for the closure of holts containing a breeding female or young otters.

Annex I Habitats

There will be no direct loss of any Annex I habitat. The measures outlined in **Section 6.1.1** to **6.1.6** are put in place to protect water quality and prevent the release of contaminates into the Dinin and Ardra watercourses. This will then in turn prevent degradation of any Annex I habitats downstream of the works.

6.2 Operational Mitigation Measures

The western abutment will be set 2.5m back from the River Dinin to maintain connectivity of habitat along the river bank and to avoid erosion of the bank. It will not be possible to set the eastern abutment significantly back from the river due to the constraint of the existing road to which the footbridge will connect. A 2m corridor will be left along the river to allow for mammal navigation.

No further operational mitigation measures are required

7 RESIDUAL IMPACTS

The result of the Appropriate Assessment has highlighted the fact that local and temporary impact of surface water quality and levels are predicted during the construction of the footbridge at Castlecomer. The development could therefore, in the absence of mitigation, have a minor negative impact on the protected species and habitats of the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA. Furthermore, the potential reduction in water quality has potential to degrade protected annex habitats which may be located downstream of the works and therefore be at odds with the COs set out for the River Barrow and River Nore SAC. In consideration of the outlined mitigation measures within the CEMP and the IASMP that will be implemented to prevent any potential impact on the Annex species and habitats, no residual impact is anticipated as part of this proposal.

8 APPROPRIATE ASSESSMENT – CONCLUSION

8.1 Integration of Appropriate Assessment and the Proposal

As stated in DoEHLG Guidance Document (2010), the requirement of the AA is not to prove what the impacts and effects will be, but rather to establish beyond reasonable scientific doubt that adverse effects on site integrity will not result.

The current Appropriate Assessment of the proposed development has been incorporated into the design and has informed the proposal with changes being made as necessary to minimize potential for impact on European Sites. Initial reviews of the design indicated that there was a risk of adverse effects to the integrity of River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA in the absence of appropriate design and incorporation of protective measures. A number of Best Practice mitigation measures in the form of specific actions designed to protect the environment have been provided to ensure compliance with the Habitats Directive Article 6 requirements by integrating measures for the protection of European Sites into the proposal. Mitigating policies clearly indicate that where any physical development, water quality alteration or any other form of disturbance has the potential to significantly impact on a European Site, the works will be subject to mitigation measures to ensure full compliance with Article 6(3) and (4) of the Habitats Directive (1992).

8.2 NIS Conclusion and Statement

This Appropriate Assessment has been prepared following the DoEHLG guidance '*Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities'* (DoEHLG, 2010a). The current assessment for the proposed development investigates the potential adverse effects on the qualifying interests of the European Sites arising from the proposal. The assessment considers whether the proposal, alone or in combination with other projects or plans, will have adverse effects on the integrity of a European Site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects.

Provided the full implementation of mitigation measures is carried out, it is envisaged that there will be no significant adverse effects on the integrity of River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA. This includes consideration of the sites' COs and that the conservation status of the qualifying Annex I habitats.

The conclusion of this NIS is that there will be no potential for cumulative impacts arising in combination with any other plans or proposals, with the implementation of best practice and the recommended mitigation measures. It is considered that the proposed development will not adversely affect the integrity of River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA.

9 REFERENCE

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Appendix A

Drawings

KILKENNY COUNTY COUNCIL

KILDARE COUNTY COUNCIL

Eirspan Task Order No. 302 N78, Castlecomer Footbridge

July '19

PLANNING DRAWINGS

DRAWINGS :-

MCT0759PL0100-01	INDEX SHEET
MCT0759PL0101-01	LOCATION PLAN
MCT0759PL0102-01	PROPOSED OPTION (Sheet 1 of 3)
MCT0759PL0102-02	PROPOSED OPTION (Sheet 2 of 3)
MCT0759PL0102-03	PROPOSED OPTION (Sheet 3 of 3)

Client

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Sheets: 01 of 1

Project: **Eirspan Task Order No. 302 N78, Castlecomer Footbridge**

Title: INDEX SHEET

File Identifier: MCT0759PL0100 - 01

Status: S4

Rev: P01

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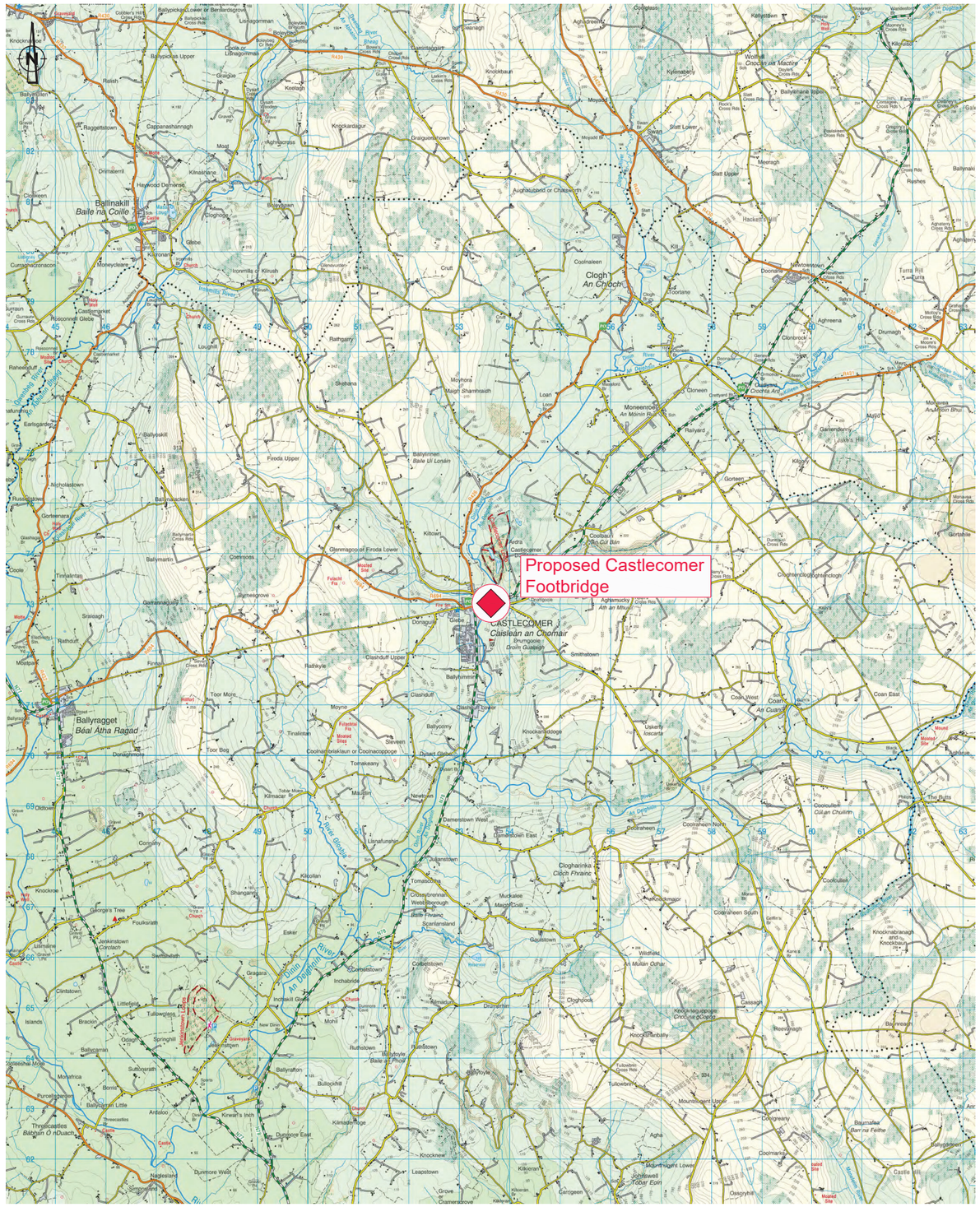

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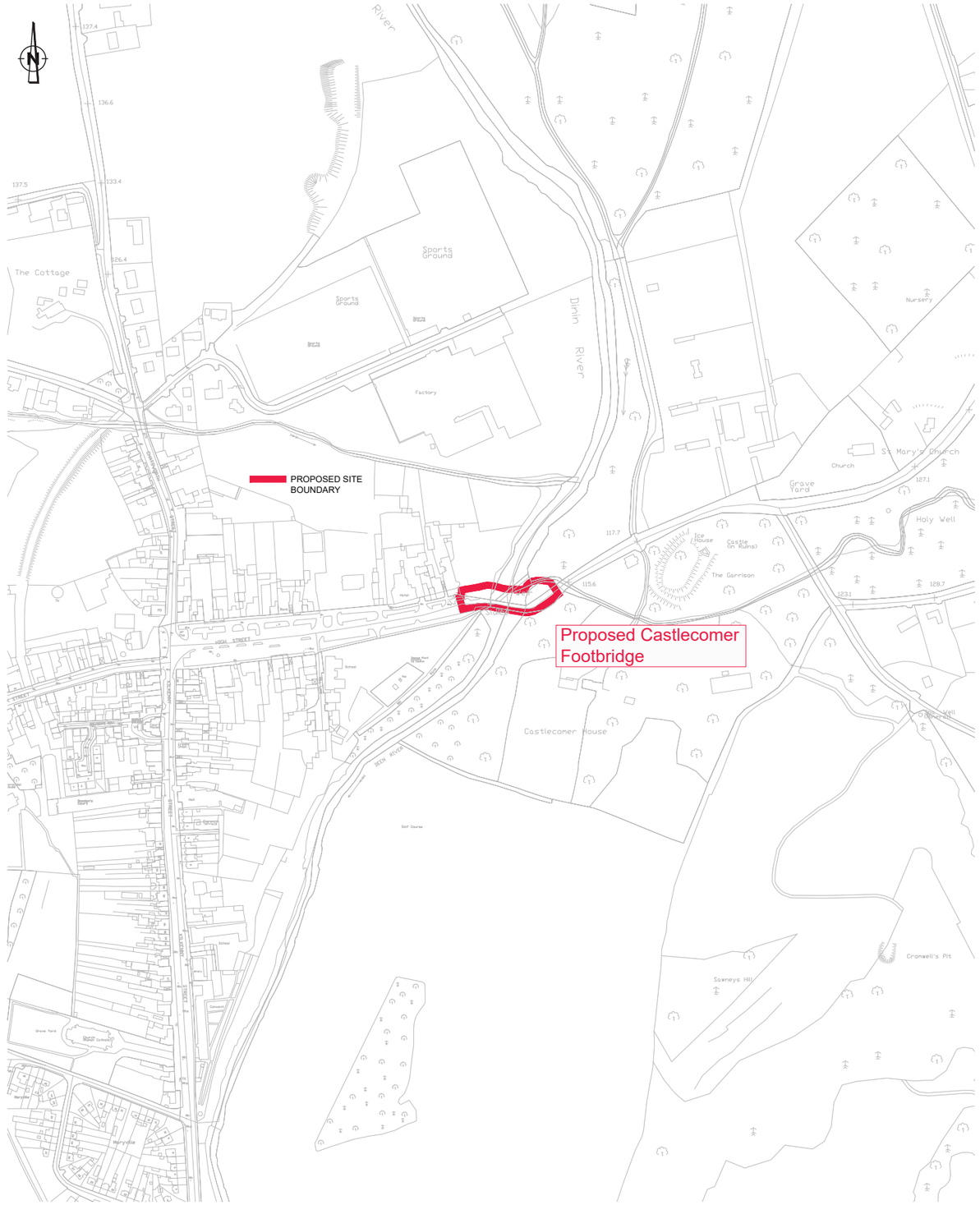

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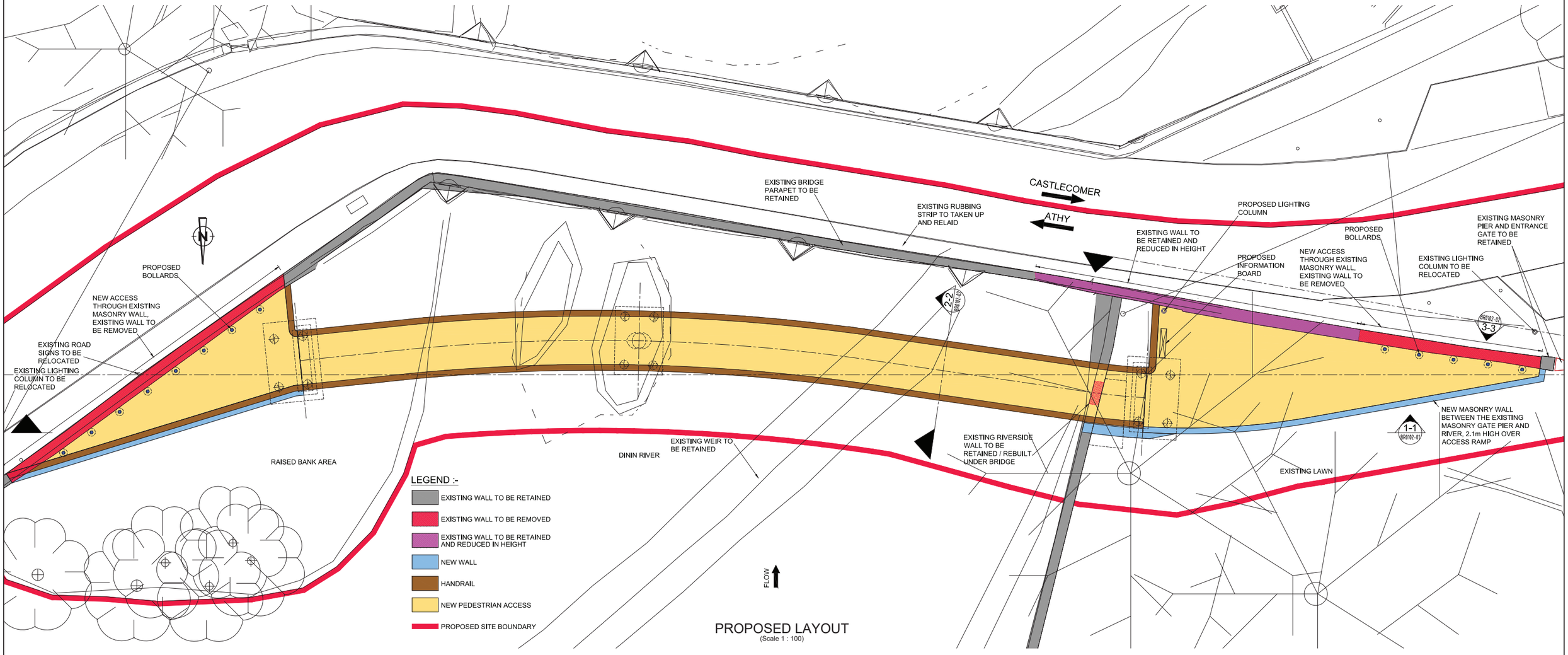
Created on: June 2019	Title: LOCATION PLAN
Sheets: 01 of 1	

File Identifier	Status	Rev
MCT0759PL0101 - 01	S4	P01



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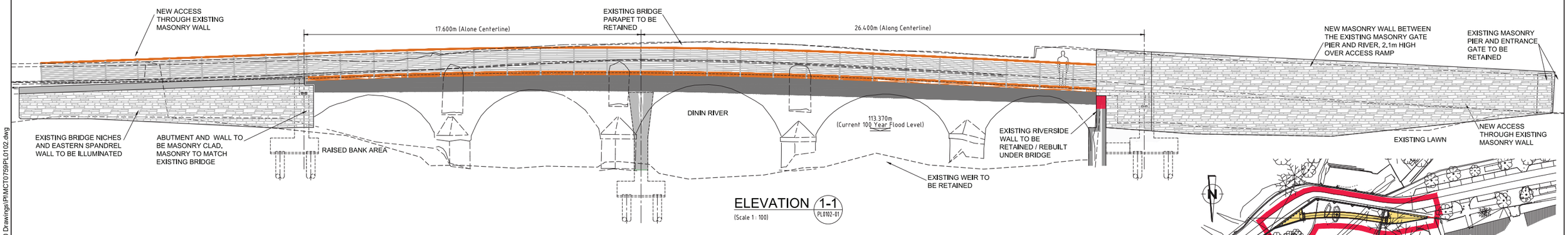

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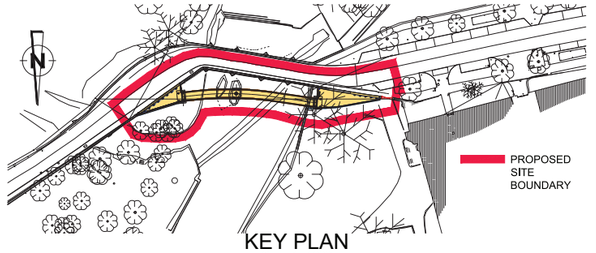

KEY PLAN
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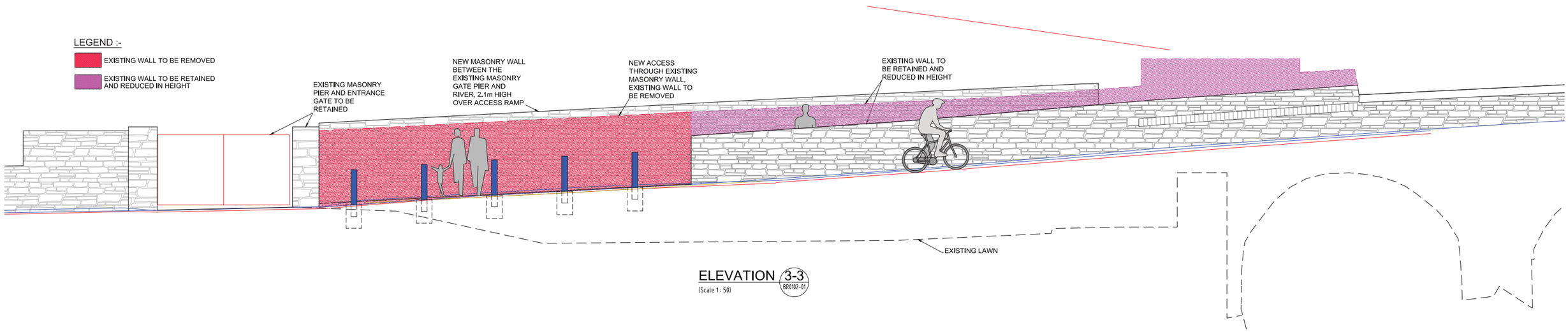
Title	PROPOSED OPTION (Sheet 1 of 3)
Model File Identifier	MCT0759PL0102
File Identifier	MCT0759PL0102 - 01
Status	S4
Rev	P01

LEGEND :-

EXISTING WALL TO BE REMOVED

EXISTING WALL TO BE RETAINED AND REDUCED IN HEIGHT



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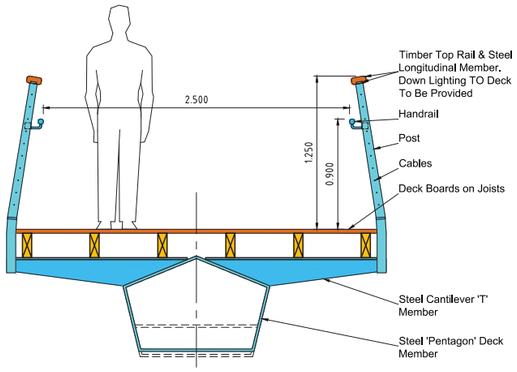

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PHOTOMONTAGE 1 PROPOSED OPTION

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Rev: P01

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Appendix B
Invasive Alien Plant Species Management Plan for Castlecomer Footbridge

Invasive Alien Species Management Plan for Castlecomer Footbridge

July 2019

Prepared by: INVAS Biosecurity
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Rev	Date	Details	Prepared by	Checked by	Approved by
1	July 2019	IAS Management Plan	Dr. William Earle (Biosecurity Manager)	Tom Donovan (Director)	Prof Joe Caffrey (Director)

Table of Contents

1. INTRODUCTION

At the request of RPS Group, INVAS Biosecurity (INVAS) was commissioned to carry out a follow up invasive alien species (IAS) survey and provide supporting information to facilitate the construction of a pedestrian bridge adjacent to the N78 near Castlecomer. An Outline Invasive Species Management Plan prepared by RPS has highlighted several infestations of IAS in the works area of the proposed pedestrian bridge.

1.1. Project Background

The project will consist of vegetation removal, excavation, piling, pouring of concrete, input of fill for embankments and installation of bridge sections. To date no groundworks have taken place at this location. The Outline IAS Management Plan (RPS, 2019) raises specific concerns in relation to infestations of Japanese knotweed (*Fallopia japonica*), Cherry laurel (*Prunus laurocerasus*) and Canadian pondweed (*Elodea canadensis*) detected in close proximity to the north side of the existing bridge and within the River Barrow and River Nore SAC.

1.2. Legal Requirements and Implications for Management

Japanese knotweed is subject to restrictions under Regulations 49 and 50 (the latter not currently commenced) of the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477), being listed in the Third Schedule (Part 1) of this legislative Act. Soil taken from a place that is infested with Japanese knotweed (vector material) is also restricted under Part 3 of this Third Schedule. The law relating to Japanese knotweed is primarily contained in Regulation 49 (2), which states that it is an offence to 'allow or cause to disperse' plants listed in the Third Schedule, of which Japanese knotweed is one. As such, any Japanese knotweed plant material or contaminated soil that is to be removed from an infested site can only be done so under a licence issued by the National Parks and Wildlife Service (NPWS).

1.3. Objectives

The aim of this Management Plan is to provide further detail on the extent of IAS and the recommendations proposed in the Outline Management Plan. It sets out a detailed methodology for the management of IAS including measures to protect the adjoining watercourse and

outlines biosecurity measures that must be implemented to prevent the spread of IAS beyond their current distributions.

2. SURVEY RESULTS

The survey was conducted on the 24th May 2018 by INVAS Biosecurity personnel. Survey points were recorded using a Garmin® GPSmap78 at a height of one meter. Points were recorded at 0.5-meter intervals around the perimeter of the infestation and where the accuracy of the survey was not impacted the interval spacing was increased. An SUAV survey was not carried out at this time due to the presence of mature trees and the proximity to a live road. Digital photographs were taken at each site to show the full extent of the IAS infestation at each location. Survey observations and photographs illustrating each IAS infestation have been provided in the following sections of this document.

2.1. Japanese Knotweed

The Japanese knotweed infestations were recorded growing in two main areas north of the N78 bridge (Figure 2.1). The first dense infestation of *circa*. 60m² is the site identified in the Outline Management Plan document, located on the bank of the river Dinin extending about 2 meters from the water's edge (Plate 1). The herbicide management carried out in October 2018 has achieved a good level of control with some small sporadic regrowth throughout the infestation (Plate 2). The Japanese knotweed infestation has resulted in the erosion of soils at this point on the riverbank and left exposed rhizomes in this area (Plate 3). These rhizomes are inherently brittle and may become detached following flow action by the river or other interference. This would increase the risk of spread of Japanese knotweed to suitable habitat further downstream. The second infestation comprises of just two small plants growing at the base of the wall circa 8 meters away from the main infestation (Plate 4). These plants were growing beneath dense vegetation and were not observed or treated with herbicide in October 2018.

Plate 1: The large infestation of Japanese knotweed at the N78 bridge near Castlecomer in May 2019.

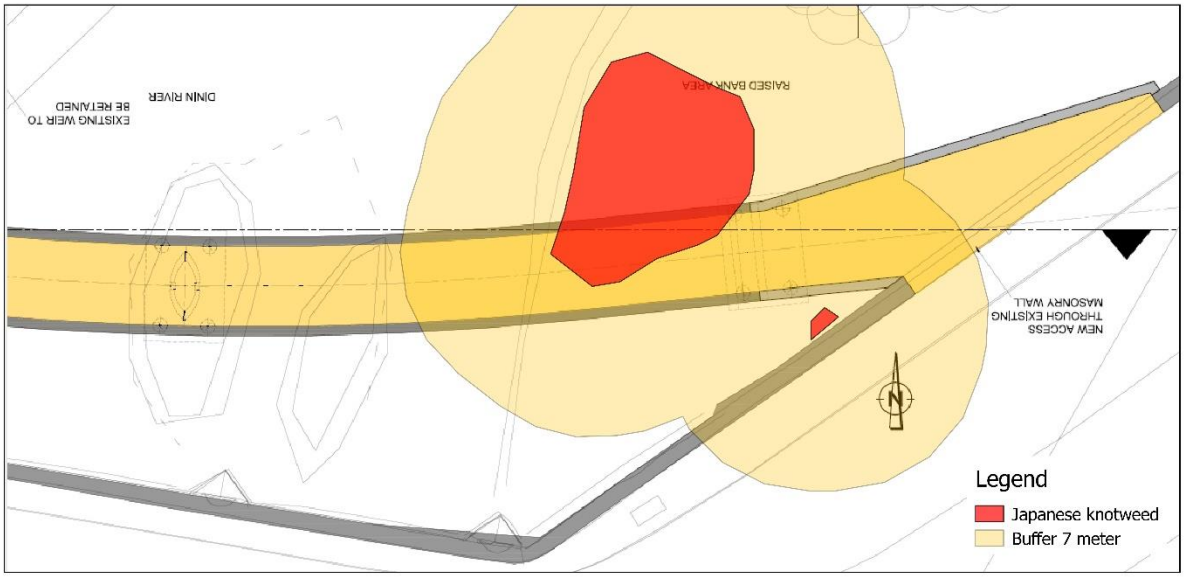

Figure 2.1: An extract from the proposed layout drawing with the location of Japanese knotweed infestations at the N78 bridge near Castlecomer in May 2019.

Plate 2: Some of the minor regrowth of Japanese knotweed among native vegetation at the N78 bridge near Castlecomer in May 2019.

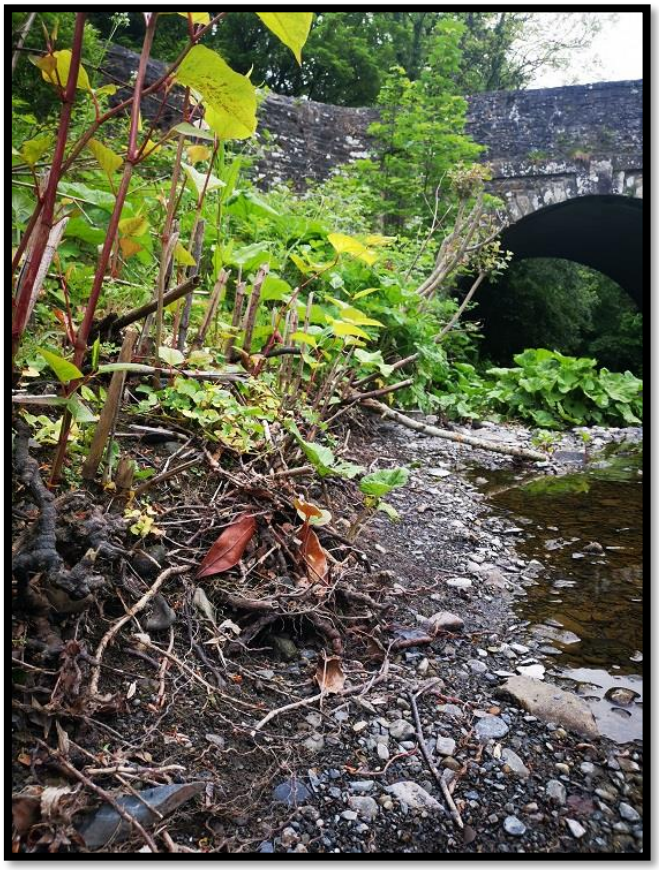

Plate 3: Exposed Japanese knotweed rhizomes on the banks of the river Dinn at the N78 bridge near Castlecomer in May 2019.

Plate 4: Two small Japanese knotweed plants close to the foundation wall of the N78 bridge near Castlecomer in May 2019.

2.1.1. Control options and recommendations

Below is a description of the combined control methods required to facilitate construction of the pedestrian bridge north of the N78.

In the Outline Management Plan, it has been suggested that instream works will take place between July and September 2019.

- It is recommended that a herbicide application to kill off surface vegetation of the Japanese knotweed and reduce the viability of root crowns/rhizomes be carried out at least 4 weeks prior to any excavation works within 7 meters of the infested areas. A targeted herbicide solution of glyphosate (Roundup Biactive which has an aquatic approval) will be applied by injection to minimise any collateral damage to surrounding vegetation, by qualified personnel. (NPTC, PA1, PA5A, PA6A, PA6AW)
- Works will be carried out when there is minimum flow in the river. (July/Sept dependent on weather conditions)
- The infested zones must be clearly demarcated.
- A silt trap, approximately 5 meters long, will be installed on the south side of the bridge.
- The excavation area will be de-watered to 2m from bank to maintain good biosecurity in the SAC. (Japanese knotweed does not grow in water).
- The infested area that encroaches at the footing of Castlecomer road (which is located to the east of the main infestation (Figure 2.1) will be excavated by a long reach excavator to a distance and depth that will not compromise the integrity of the structure. The infested area will then be excavated back from this venerable area to a minimum depth of 1.8m and a minimum 7m radius (to be determined by onsite EcOW).
- A vertical root barrier membrane will be installed against the road.
- The main infestation area will then be excavated to a depth of 1.8m and 7m radius. (This radius will extend 2m into river to edge of the dewater barrier).
- Where a 7m radius cannot be maintained from the edge of the infestation or a depth of 1.8m cannot be achieved, an approved impermeable root barrier membrane must be installed.
- All contaminated soil will be removed to licenced landfill in accordance with the provisions of the Waste Management Act and under license from the NPWS.
- Reinstate bank and backfill with approved material.

- Excavation works will be supervised by an Ecological Clerk of Works. (Ecologist)
- A monitoring program will be maintained over the following three years to ensure that any regrowth between the vertical barrier and the bridge footing is treated.

Due to the extent of underground rhizome growth and its highly invasive capacity, control of Japanese knotweed following herbicide treatment in a single season is rarely possible. It generally takes three to four seasons of herbicidal treatment to deplete the rhizome reserves and to effectively control the target vegetation. Treatment using a glyphosate-based herbicide has proved to be highly effective. Herbicide application should be carried out to the manufacturer's guidelines and by staff wearing suitable PPE and in possession of the relevant qualifications. Records of herbicide application should be kept in accordance with relevant legislation and retained after each treatment. Strict biosecurity protocols must be adhered to in all follow up surveys and treatments.

An area will be excavated to install the bridge footing on the east side of the river Dinin. This bridge footing will be located to the east of the main infestation (Figure 2.1) and will encroach on the main infestation and the 7meter buffer zone where rhizomes are likely to be present.

In order to install footings for the proposed bridge some excavation work will be carried out in the area containing Japanese knotweed plant material and associated contaminated soil. Prior to any personnel or machinery entering the infested area or buffer zone, these locations must be clearly demarcated. All staff involved in the works must have been given a toolbox talk regarding Japanese knotweed and the risks associated with the works to take place.

It is deemed prudent to remove soil in the infested areas to a depth of at least 1.8 metres and 7 metres from the last visible plant in order to be certain that no rhizomes remain in the soil following excavation operations. The material must be disposed of at a licenced landfill subject to acquiring a licence. Where a 7meter radius cannot be maintained from the edge of an infestation or a depth of 1.8 meters cannot be achieved approved impermeable root barrier membranes must be installed.

In the case of the Castlecomer footbridge it is likely that only a small area will need to be completely excavated to install the bridge footing on the east side of the river Dinin. This bridge footing will be located to the east of the main infestation (Figure 2.1) and will encroach on the main infestation and the 7meter buffer zone where rhizomes are likely to be present. If an

excavator with a long arm is available to dig out this section from the adjacent road (N78) it will greatly reduce the risk of the vehicle becoming contaminated with Japanese knotweed rhizomes. This may be possible from the area where the boundary wall of the N78 is to be removed for access to the new footbridge. It will also reduce the need for extensive decontamination of an excavator in close proximity to both rivers.

If an excavator must be brought down to the river this process may become more complicated and require further excavation of contaminated soil from the infestation. It is also likely that the bank (already destabilised by exposed Japanese knotweed rhizomes (Plate 3) will require further excavation of contaminated soil, installation of impermeable root barrier membranes on the river's edge and some form of reinforcement to stabilise the bank (gabion basket, mass concrete wall, large boulders). In any case, it would be considered good practice to provide bankside reinforcement and root barrier at the location of the exposed rhizomes to prevent spread and dispersal downstream of the infestation Silt traps must be installed at strategic locations downstream of any bankside excavation works

The contaminated soil must be carefully loaded into bio-secure trucks taking care not to spill any debris from the bucket of the excavator. These truck operators will then cover the load with a tarpaulin and transport the contaminated material to the appropriate location. Strict biosecurity protocols to be confirmed with the haulier and landfill must be adhered to at all times during this process.

The decontamination process for vehicles involved in the excavation works must consider the proximity of the adjacent stream and river Dinin. The process will generally take place at the site of the excavation works to reduce the risk of transporting Japanese knotweed rhizomes beyond the area of current infestation. If an excavator must enter the area of infestation or 7 meter buffer zone the vehicle will require a full decontamination of all tracks and undercarriage. This will result in a significant volume of water and silt entering the watercourse.

Detailed records of all operations should be maintained throughout the project. This should specifically focus on the exact areas excavated, the method of excavation, the depth of excavation, the volume of material (as numbers of truck loads) removed, an inventory of personnel and equipment entering and leaving the Japanese knotweed demarcated areas, and

the operation of cleaning and disinfection facilities provided at each area. Any problems encountered during the operation should also be recorded.

2.2. Cherry laurel

The Cherry laurel infestation was recorded growing in close proximity to the Japanese knotweed infestation (Figure 2.2) during the survey on the 24th of May. The infestation, identified in the Outline Management Plan and updated from the surveys undertaken for this Plan, is located on the bank of the river Ardra (Plate 5) in close proximity to the N78 road. The infestation is becoming established but growth has probably been limited due to shading by mature trees in the area. It is currently overhanging above the Ardra river, but no management or control appears to have taken place in recent years. This infestation may have arisen from dense stands of Cherry laurel upstream on the river Ardra bridge on the N78 (Plate 6).

Figure 2.2: The location of Cherry laurel infestations at the N78 bridge near Castlecomer in May 2019.

Plate 5: The Cherry laurel infestation close to the N78 bridge near Castlecomer in May 2019.

Cherry laurel growing in close proximity to JKO.

Plate 6: The Cherry laurel infestation on the river Ardra upstream of the N78 bridge near Castlecomer in May 2019.

2.2.1. Control options and recommendations

Manual pulling of plants that are less than 20cm high can be successful, once all of the roots are removed. It will be important to knock the soil from the roots to minimise the possibility of re-rooting. Exposure of the root system to air and sunlight will result in dehydration and death of the plant.

Large plants can be cut down, if access for machinery is available. It is possible to mechanically uproot mature Cherry laurel plants due to the relatively shallow nature of the root system (most roots are in the top 40cm of soil). Stump extraction may be necessary and will prove problematic due to the presence of mature trees and Japanese knotweed infestations, if required. This is generally only appropriate for sites where access to machinery is possible and at sites of low ecological interest where damage to existing native vegetation is not a concern. Any cut material will need to be removed from the site to avoid resprouting or suckering, which will produce new plants and potential infestations. Mulching is a good option for disposal, with mulch disposed of in an appropriate landfill.

With small infestations such as the one in Castlecomer, effective control can be achieved by cutting the plant to the stump and immediately treating the latter with herbicide (cut-stump treatment). The use of an inert dye mixed with the herbicide will ensure that no stumps are missed. This type of treatment is effective all year-round, although it is deemed to be most effective when conducted between November and April.

Monitoring should take place between November and February, looking for any new seedlings or regrowth. To achieve long-term control of this invasive plant, it will be important to factor in a number of work phases over several years. A monitoring program should focus on areas where Cherry laurel has been previously recorded and is likely to be present in the seed bank.

2.3. Canadian pondweed

As part of the surveys carried out for this Plan, Canadian pondweed was detected growing in continuous stands and some smaller clumps throughout the river section immediately above weir. The weed was growing in the photic zone between circa 0.3 and 1.5meters in depth and was most dense on the shallower east riverbank and close to the edge of the weir. Despite the prevalence of the weed in the slow-moving area above the weir it was not detected immediately downstream or immediately downstream of the bridge in relatively deep and turbulent water.

This species is considered to be naturalised in Ireland and is likely to be present throughout the river system downstream from the location presented in the Outline Plan and the surveys undertaken for this Plan.

2.3.1. Control options and recommendations

Canadian pondweed is dispersed solely by the fragmentation of existing plants. As the infestation of this species is upstream of the proposed works it is suggested to avoid encroachment on these infestations. Where infestations must be interfered with it may be prudent to manually remove vegetation in the work area. This material should be cut at the base or uprooted and disposed of in an appropriate landfill. Any machinery and equipment that comes into contact with Canadian pondweed will be subject to strict biosecurity protocols and should be thoroughly cleaned before leaving the works area.

Plate 7: Canadian pondweed infestations at the N78 bridge near Castlecomer in May 2019.

3. SPECIES DESCRIPTION

3.1. Japanese knotweed

Japanese knotweed is a non-native and highly invasive perennial plant that spreads rapidly *via* rhizome growth and fragmentation. Only female plants have been recorded in Ireland and, although the plant can produce seeds, they rarely survive. The plant overwinters as an extensive and intricate underground rhizome matrix. The rhizome system may achieve a depth of 2 metres and can extend up to 7 metres from the visible parent plant. Japanese knotweed rhizomes have extremely high regenerative potential and a fragment as small as 1 cm in length can produce a new population. Rhizomes may remain dormant for many years.

The robust and extensive woody rhizomes of Japanese knotweed are capable of penetrating asphalt, cracked foundations, walls, land drainage works and other built structures, causing significant structural damage. By eliminating native vegetation on roadsides and river banks, the plant can also cause seriously damaging subsidence. Failure to manage Japanese knotweed would result in its spread and proliferation in the infested area.

3.2. Cherry laurel

Cherry laurel (*Prunus laurocerasus*) is a fast-growing evergreen shrub that can grow to 15m tall and is tolerant of a wide range of habitat conditions and soil types. Its leaves are hairless, dark green and glossy above, with a paler underside. Leaves are arranged alternately on the stems, ending with a single leaf. Flowering occurs in spring and summer with white flowers being produced on racemes (upright spikes). Seeds are produced in black berries. Cherry laurel is well adapted to the understory of forestry and woodlands. It also thrives in areas of rocky banks and hillsides, gardens and riparian zones.

It is a non-native species (originally South-West Asia) that has become widespread in forestry and estates throughout Ireland. Cherry laurel is hardy and is tolerant of drought and shade. It has become highly invasive in Ireland. It's rapid growth rate and the toxicity of its leaves give it a competitive advantage over native species. This aids in the creation of dense thickets that can cover large areas. These thickets can reduce access and make it difficult to implement control measures. Because of the dense vegetation that the weed produces it can easily outcompete native species and becomes abundant. Cherry laurel has a significant adverse

impact on native floral (and associated faunal) biodiversity. The leaves contain toxins (cyanide) that result in herbivore avoidance and suppresses regeneration of native understorey species. Cherry laurel can spread primarily by suckers and seeds.

3.3. Canadian pondweed

Canadian pondweed (*Elodea canadensis*) is a submerged, perennial plant that can grow in deep (to 3m) water. The long stem is brittle and easily broken (aiding dispersal). Canadian pondweed will grow in lakes, rivers, streams, wetlands, reservoirs, canals and ponds. It's preferred habitat is still water between 0.5 and 2m deep. Canadian pondweed is a non-native (North America) species. Plant stands produce dense stands of vegetation and reach up to the water surface. The most common mode of spread and dispersal is by fragmentation or vegetative reproduction. The stem fragments are dispersed by the wind, by boat movement, angling equipment and, possibly, birds. Detached stems, when they sink, root from the nodes and establish new populations. Although this species is now considered to be naturalised in Ireland infestations can exclude light to indigenous macrophytes and alter native macroinvertebrate community structure. This species is not included in relevant Irish or European legislation.

4. BIOSECURITY

For the purposes of this document, biosecurity refers to all practical measures used to manage and prevent the introduction and spread of IAS.

A number of high impact aquatic and riparian IAS are currently present in Ireland and most are continuing to spread aggressively. Prominent among the terrestrial IAS are: Japanese knotweed (*Fallopia japonica*), Giant knotweed (*Fallopia sachalinensis*), Bohemian knotweed (*Fallopia* x *bohemica*), Giant hogweed (*Heracleum mantegazzianum*) and Himalayan balsam (*Impatiens glandulifera*). All of the above are listed in the Third Schedule (Parts 1 and 2) of the Habitats Directive (S.I. 477/2011) and some are included among the list of 49 EU IAS of Union Concern (http://ec.europa.eu/environment/nature/pdf/IAS_brochure_species.pd) in the EU Invasive Alien Species Regulations (1143/2014).

The ecological effects of IAS are often irreversible and, once established, they are extremely difficult and costly to control and eradicate; hence, the urgent need to prevent their introduction and spread. Prevention is clearly more cost-effective and less environmentally damaging than long-term containment, control or eradication. The most effective measure to reduce introductions and halt spread of IAS in aquatic situations is to promote and implement good biosecurity practice.

4.1. Biosecurity Standard Operating Procedure for Personnel and Equipment

This Biosecurity SOP applies to all equipment (sampling devices, hand tools, buckets, boots and PPE) that are used during the control of IAS. The purpose of this SOP is to provide standardised practical methods for cleaning and disinfecting all equipment that comes into contact with IAS while carrying out control works. This Biosecurity SOP will enhance the contractors existing biosecurity activity to deliver an improved biosecurity system that will help stop the introduction and spread of IAS during operations conducted by the contractors.

All staff that are involved in the control operations should have access to disinfection facilities that include but is not limited to:

- Detailed guide to proper cleaning and disinfection procedure and instructions for making the correct disinfection concentration

- A solution of clean water and Virkon Aquatic tablets or powder for the disinfection of equipment and PPE
- Hard-bristle brushes
- Disposable non-latex gloves for equipment and PPE
- Plastic bags and cable ties (for disposing of IAS material removed from equipment).

[* Disinfectants must be used with care and in strict accordance with the manufacturer's instructions. Disposable gloves should be worn when using the disinfectant solution.]

Before commencing operations, a 1% Virkon Aquatic disinfection solution (10g Virkon Aquatic powder in 1 litre of clean water) should be prepared for staff working in infested areas. The disinfectant solution will remain pink in colour while it is still active. Additional clean water should be readily available for further disinfectant solution as required.

It is important that all PPE and equipment used are cleaned and disinfected according to the procedures below. These biosecurity measures should be conducted before leaving each site.

- Put on disposable gloves before cleaning and disinfecting the equipment.
- Visually inspect all equipment that has come into contact with water for evidence of attached IAS material, or adherent mud or debris. Remove any such material before cleaning and disinfecting the equipment and leaving the site.
- Dispose of any IAS material taken from the equipment using the plastic bags provided.
- Spray equipment with the disinfection solution to the point of run-off. Do not rinse in clean water for at least 15 minutes.
- Use the hard-bristle brush to remove all mud and debris from boots and equipment. Then spray with the prepared disinfectant solution onto the cleaned surfaces to the point of run-off. During inspection and cleaning, pay particular attention to places where IAS could be accidentally trapped, such as the treads of boots and attachment points on equipment.
- Visually inspect all PPE that has been in contact with vector material and remove any attached IAS material, or adherent mud or debris. Wipe down this PPE with an absorbent cloth soaked in the prepared disinfectant solution.

- Where time permits and it is practical, it is good biosecurity practice to air dry equipment following cleaning and disinfection.
- Remove disposable gloves and dispose of safely.

4.2. Biosecurity Standard Operating Procedure for Vehicles

An exclusion zone will be put in place around the infestations and only those that are involved in the excavation and removal will be allowed enter this zone. Prior to the commencement of works all personnel involved in the works will be presented with a toolbox talk. Biosecurity Disinfectant Stations will be established at the exit points and all personnel must disinfect their boots and any equipment used on site at these stations. All machinery that will be used on the site must be thoroughly cleaned before entering the site (to avoid contaminating the site with invasive species from elsewhere) and again sprayed with a solution of Virkon Aquatic Disinfectant and cleaned before leaving the works area. A designated route will be marked out from which vehicles will not deviate. Trucks will enter the site and be loaded directly from the dig site. The trucks will be loaded to a maximum level of 100cms below the top sides of truck. The load will be covered over by a tarpaulin before exiting the site. The trucks wheels and undercarriage will be inspected to ensure that they are fully biosecure and will be washed down with a solution of Virkon Aquatic before exiting the site. On completion of the works the load area of the trucks will be washed out using a solution Virkon Aquatic disinfectant. All machinery used in the excavation process must be washed and disinfected before exiting the site. Following the excavation and removal of all contaminated material the area will be handed back to the contractor to progress with the upgrade. All personnel including drivers must disinfect their boots and any equipment used at the disposal site. Following the completion of the excavation and disposal works an end of contract report detailing the specifics and metrics of the operations will be drawn up.

Appendix

Appendix 1: Survey details for the infestations at Castlecomer bridge in May 2019.

Contactor name	INVAS Biosecurity
Surveyor name	William Earle
Survey date/time	07:00 – 24/05/2019
County	Kilkenny
Area	Castlecomer bridge, N78. River Dinn
Site ID	JKO_Castlecomer_RPS
Risk assessment (Potential hazards)	Live traffic, river, slips/trips/falls
Health and safety (PPE required)	Safety boots, Hi-viz
Species recorded	Japanese knotweed, Cherry laurel, Canadian pondweed
GPS details	801-814
Area located	North of existing bridge (N78) over River Dinn
Site details	One large and one small infestation of Japanese knotweed Cherry laurel growing in close proximity to JKO Canadian pondweed throughout water above weir, not detected immediately downstream of weir.
Pervious treatment/Interference	Herbicide treatment (OCT 2018 by INVAS)
Infestation beyond fence line	Yes, on riverbank of the river Dinn. Small infestation close to the wall of N78.
Notes	2 small plants growing against the edge of the wall. Main infestation being eroded by river
Photos	07:00 – 08:30
Is the site within or proximate to an ecologically sensitive area (SAC/SPA)	Yes, the River Barrow and River Nore SAC.
Other invasive species observed	JKO, CHL, ELO

Appendix 2: Decontamination record sheet for the Japanese knotweed infestation at Castlecomer during works.

Daily Biosecurity Record Sheet	
Site ID	JKO_Castlecomer_RPS
Project details	Footbridge construction
Biosecurity supervisor	
Date	

Infestation /works boundary in place (Yes/No)		Vehicle access demarcated (Yes/No)	
Staff access/egress decontamination in place (Yes/No)		Vehicle/equipment decontamination in place (Yes/No)	

Vehicle (description/reg)	Activity	Time decontaminated	Picture	Driver signature

Notes/Comments:

Signed:_____ **Date:**_____

Appendix 3: Treatment details for the Japanese knotweed infestation at Castlecomer in Oct 2018.

Site ID	KK_78_5001
Treatment Company	INVAS Biosecurity
Treated By	Bryan Ward
Treatment Date/Time	12/09/2018
Weather conditions	Dry, calm, overcast
Treatment method	Stem injection
Herbicide used	Roundup gold
PCS number	02314
Calibration rate/Ha	5:1
Total concentrated product used	10ml
Water volume used per Hectare	250L
Nozzle type	Low drift Beta nozzle
Calibration used in compliance with sustainable use directive	Yes
Qualified & registered adviser	Yes
Qualified & registered professional user	PU 025465
Notes	Stem Injected

Appendix 4: Schedule of activities for the Japanese knotweed infestation at Castlecomer.

Schedule of Activities			
Site ID	JKO_Castlecomer_RPS		
Project details	Footbridge construction		
Biosecurity supervisor			
Date			
	Phase	Date	Additional comments
Site survey and development of Management Plan	1	May 2019	
Establish and implement biosecurity protocol	2		
Toolbox talks to appropriate staff	3		
Implementation of Management Plan	4		
Decontamination of vehicles and equipment	5		
Sign off	6		

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Appendix C

Conservation Objectives for European Sites

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Lower River Suir SAC 002137

An Roinn Ealaíon, Oidhreachta,
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,
Regional, Rural and Gaeltacht Affairs

National Parks and Wildlife Service,
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs,

7 Ely Place, Dublin 2, Ireland.

Web: www.npws.ie
E-mail: nature.conservation@ahg.gov.ie

Citation:

NPWS (2017) Conservation Objectives: Lower River Suir SAC 002137. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

002137	Lower River Suir SAC
1029	Freshwater Pearl Mussel *Margaritifera margaritifera*
1092	White-clawed Crayfish *Austropotamobius pallipes*
1095	Sea Lamprey *Petromyzon marinus*
1096	Brook Lamprey *Lampetra planeri*
1099	River Lamprey *Lampetra fluviatilis*
1103	Twaite Shad *Alosa fallax fallax*
1106	Salmon *Salmo salar*
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
1355	Otter *Lutra lutra*
1410	Mediterranean salt meadows (Juncetalia maritimi)
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*
91J0	*Taxus baccata* woods of the British Isles*

Please note that this SAC is adjacent to River Barrow and River Nore SAC (002162). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent site as appropriate.

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	1998
Title :	Conservation management of the white-clawed crayfish, *Austropotamobius pallipes*
Author :	Reynolds, J.D.
Series :	Irish Wildlife Manual No. 1
Year :	2006
Title :	Otter survey of Ireland 2004/2005
Author :	Bailey, M.; Rochford, J.
Series :	Irish Wildlife Manual No. 23
Year :	2006
Title :	Initiation of a monitoring program for the freshwater pearl mussel, *Margaritifera margaritifera*, in the Clodiagh River (Suir)
Author :	Ross, E.
Series :	Unpublished report to NPWS
Year :	2007
Title :	A survey of juvenile lamprey populations in the Corrib and Suir catchments
Author :	O'Connor, W.
Series :	Irish Wildlife Manual No. 26
Year :	2007
Title :	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
Author :	NPWS
Series :	Unpublished report to NPWS
Year :	2008
Title :	National survey of native woodlands 2003-2008
Author :	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
Series :	Unpublished report to NPWS
Year :	2009
Title :	Saltmarsh monitoring project 2007-2008
Author :	McCorry, M.; Ryle, T.
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans: monitoring of the freshwater pearl mussel in the Clodiagh
Author :	Ross, E.
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans: fisheries survey. Stage 1 report
Author :	Paul Johnston Associates
Series :	Unpublished report to NPWS
Year :	2009
Title :	NS II freshwater pearl mussel sub-basin management plans: report on biological monitoring of surface water quality in Clodiagh (Waterford) catchment
Author :	Morgan, G.
Series :	Unpublished report to NPWS

Year :	2010
Title :	A provisional inventory of ancient and long-established woodland in Ireland
Author :	Perrin, P.M.; Daly, O.H.
Series :	Irish Wildlife Manual No. 46
Year :	2010
Title :	A technical manual for monitoring white-clawed crayfish (*Austropotamobius pallipes*) in Irish lakes
Author :	Reynolds, J., O'Connor, W., O'Keeffe, C.; Lynn, D.
Series :	Irish Wildlife Manual No.45
Year :	2010
Title :	Second draft Clodiagh freshwater pearl mussel sub-basin management plan (2009-2015). March 2010
Author :	NPWS
Series :	Unpublished document to the Department of Environment, Heritage and Local Government
Year :	2010
Title :	NS2 freshwater pearl mussel sub-basin management plans. Phytobenthos monitoring of the Clodiagh catchment, Co. Waterford (SERBD). June and July
Author :	Ní Chatháin, B.
Series :	Unpublished report to NPWS
Year :	2012
Title :	Lower River Shannon SAC (site code: 2165) Conservation objectives supporting document-Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation V1
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2013
Title :	National otter survey of Ireland 2010/12
Author :	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
Series :	Irish Wildlife Manual No. 76
Year :	2013
Title :	Irish semi-natural grasslands survey 2007-2012
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
Series :	Irish Wildlife Manual No. 78
Year :	2013
Title :	Results of monitoring survey of old sessile oak woods and alluvial forests
Author :	O'Neill, F.H.; Barron, S.J.
Series :	Irish Wildlife Manual No. 71
Year :	2013
Title :	Results of a monitoring survey of yew woodland
Author :	Cross, J.; Lynn, D.
Series :	Irish Wlidlife Manual No. 72
Year :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
Author :	NPWS
Series :	Conservation assessments

Year :	2016
Title :	Ireland Red List No. 10: Vascular Plants
Author :	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
Series :	Ireland Red Lists series, NPWS
Year :	2017
Title :	Lower River Suir SAC (site code: 2137) Conservation objectives supporting document- coastal habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2017
Title :	Survey and condition assessment of the freshwater pearl mussel, *Margaritifera margaritifera* (L.), in the Clodiagh River (Suir, Portlaw)
Author :	Ross, E.; Moorkens, E.; Killeen, I.
Series :	Unpublished report to NPWS

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Year :	1898
Title :	Contributions towards a Cybele Hibernica. Second Edition
Author :	Colgan, N.; Scully, R.W.
Series :	Edward Ponsonby, Dublin
Year :	1982
Title :	Otter survey of Ireland
Author :	Chapman, P.J.; Chapman, L.L.
Series :	Unpublished report to Vincent Wildlife Trust
Year :	1988
Title :	The reproductive biology of freshwater mussels in Ireland, with observations on their distribution and demography
Author :	Ross, E.D.
Series :	Unpublished Ph.D. Thesis, National University of Ireland, Galway
Year :	1991
Title :	The spatial organization of otters (*Lutra lutra*) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	Journal of Zoology, 224: 41-57
Year :	1992
Title :	Status of the freshwater pearl mussels *Margaritifera margaritifera* and *M. m. durrovensis* in the Nore, Barrow and Suir River tributaries, south-east Ireland
Author :	Moorkens, E.A.; Costello, M.J.; Speight, M.C.D.
Series :	Irish Naturalists' Journal, 24(3): 127-131
Year :	1996
Title :	Studies on the biology and ecology of *Margaritifera* in Ireland
Author :	Moorkens, E.
Series :	Unpublished Ph.D. thesis, University of Dublin, Trinity College.
Year :	1999
Title :	Diet of otters (*Lutra lutra*) on Inishmore, Aran Islands, west coast of Ireland
Author :	Kingston, S.; O'Connell, M.; Fairley, J.S.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 99B: 173-182

Year :	2001
Title :	Aquatic plants in Britain and Ireland
Author :	Preston, C.D.; Croft, J.M.
Series :	Harley Books, Colchester
Year :	2002
Title :	Reversing the habitat fragmentation of British woodlands
Author :	Peterken, G.
Series :	WWF-UK, London
Year :	2002
Title :	A survey of the white-clawed crayfish (*Austropotamobius pallipes*) Lereboullet and of water quality in two catchments of eastern Ireland
Author :	Demers, A.; Reynolds, J.D.
Series :	Bulletin Francais de la Peche et de la Pisciculture, 367: 729-740
Year :	2003
Title :	Monitoring the river, sea and brook lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*
Author :	Harvey, J.; Cowx, I.
Series :	Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
Year :	2003
Title :	Ecology of watercourses characterised by Ranunculion fluitantis and Callitricho-Batrachion Vegetation
Author :	Hatton-Ellis, T.W.; Grieve, N.
Series :	Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough
Year :	2003
Title :	Ecology of the allis and twaite shad
Author :	Maitland, P.S.; Hatton-Ellis, T.W.
Series :	Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough
Year :	2003
Title :	Pondweeds of Great Britain and Ireland
Author :	Preston, C.D.
Series :	BSBI Handbook, No. 8, London
Year :	2003
Title :	Identifying lamprey. A field key for sea, river and brook lamprey
Author :	Gardiner, R.
Series :	Conserving Natura 2000 rivers, Conservation techniques No. 4. English Nature, Peterborough
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press
Year :	2006
Title :	The status of host fish populations and fish species richness in European freshwater pearl mussel (*Margaritifera margaritifera*) streams
Author :	Geist, J.; Porkka, M.; Kuehn, R.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 16: 251-266
Year :	2007
Title :	Evolutionary history of lamprey paired species *Lampetra fluviatilis* L. and *Lampetra planeri* Bloch as inferred from mitochondrial DNA variation
Author :	Espanhol, R.; Almeida, P.R.; Alves, M.J.
Series :	Molecular Ecology, 16: 1909-1924

Year :	2008
Title :	Poor water quality constrains the distribution and movements of twaite shad (*Alosa fallax fallax*, Lacepede, 1803) in the watershed of river Scheldt
Author :	Maas, J.; Stevens, M.; Breine, J.
Series :	Hydrobiologia, 602: 129-143
Year :	2008
Title :	Flora of County Waterford
Author :	Green, P.
Series :	The National Botanic Gardens of Ireland, Dublin
Year :	2010
Title :	Otter tracking study of Roaringwater Bay
Author :	De Jongh, A.; O'Neill, L.
Series :	Unpublished draft report to NPWS
Year :	2010
Title :	Addressing the conservation and rehabilitation of *Margaritifera margaritifera* populations in the Republic of Ireland within the framework of the habitats and species directive
Author :	Moorkens, E.
Series :	Journal of Conchology, 40: 339
Year :	2011
Title :	Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland
Author :	Gargan, P.G.; Roche, W.K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.
Series :	Journal of Applied Ichthyology, 27 (Suppl. 3): 66-72
Year :	2012
Title :	Rare and threatened bryophytes of Ireland
Author :	Lockhart, N.; Hodgetts, N.; Holyoak, D.
Series :	National Museums Northern Ireland
Year :	2013
Title :	Aspects of brook lamprey (*Lampetra planeri* Bloch) spawning in Irish waters
Author :	Rooney, S.M.; O'Gorman, N.M.; Green, F.; King, J.J.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 113B(1): 13-25
Year :	2013
Title :	Management strategies for the protection of high status water bodies
Author :	Ní Chatháin, B.; Moorkens, E.; Irvine, K.
Series :	Strive Report Series No. 99. EPA, Wexford
Year :	2013
Title :	Interpretation manual of European Union habitats- Eur 28
Author :	European Commission- DG Environment
Series :	European Commission
Year :	2014
Title :	Assessing near-bed velocity in a recruiting population of the endangered freshwater pearl mussel (*Margaritifera margaritifera*) in Ireland
Author :	Moorkens, E.; Killeen, I.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 24(6): 853-862

Year :	2015
Title :	Water quality in Ireland 2010-2012
Author :	Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.
Series :	EPA, Wexford
Year :	2015
Title :	Behaviour of sea lamprey (*Petromyzon marinus* L.) at man-made obstacles during upriver spawning migration: use of telemetry to access efficacy of weir modifications for improved passage
Author :	Rooney, S.M.; Wightman, G.D.; O Conchuir, R.; King, J.J.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 115B: 1-12
Year :	2015
Title :	River engineering works and lamprey ammocoetes; impacts, recovery, mitigation
Author :	King, J.J.; Wightman, G.D.; Hanna, G.; Gilligan, N.
Series :	Water and Environment Journal, 29: 482-488
Year :	2016
Title :	A narrative for conserving freshwater and wetland habitats in England
Author :	Mainstone, C.; Hall, R.; Diack, I.
Series :	Natural England Research Reports Number 064
Year :	2016
Title :	The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016
Author :	SSCS (Standing Scientific Committee on Salmon)
Series :	Independent Scientific Report to Inland Fisheries Ireland
Year :	Undated
Title :	WFD111 (2a) Coarse resolution rapid-assessment methodology to assess obstacles to fish migration: Field manual level A assessment
Author :	SNIFFER (Scotland and Northern Ireland Forum for Environmental Research)
Series :	SNIFFER WFD111

Spatial data sources

Year :	Revision 2010
Title :	Saltmarsh Monitoring Project 2007-2008. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1330, 1410 (map 3)
Year :	Revision 2010
Title :	National Survey of Native Woodlands 2003-2008. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	91A0, 91E0 (maps 4 and 5)
Year :	Revision 2012
Title :	Margaritifera Sensitive Areas data
GIS Operations :	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
Used For :	1029 (map 6)
Year :	2016
Title :	NPWS rare and threatened species database
GIS Operations :	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
Used For :	1029, 1092 (maps 6 and 7)
Year :	2010
Title :	EPA WFD Waterbodies data
GIS Operations :	Creation of 20m buffer to river and stream centreline data. Dataset combined with derived OSi data for 1355 SSCO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1355 (no map)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	Creation of 80m buffer on the marine side of high water mark (HWM); creation of 10m buffer on terrestrial side of HWM; combination of 80m and 10m HWM buffer datasets. Datasets combined with derived EPA WFD Waterbodies data for 1355 SSCO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1355 (no map)

1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

To restore the favourable conservation condition of Atlantic salt meadows (Glauco-Puccinellietalia maritimae) in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the sub-site (Little Island) and potential areas mapped: 33.43ha. See map 3	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). The sub-site Little Island (SMP site ID: SMP0052) that supports Atlantic Salt Meadows (ASM) was mapped during the SMP (4.11ha) and additional areas of potential ASM habitat (29.32ha) were identified from an examination of aerial photographs, giving a total estimated area of 33.43ha within Lower River Suir SAC. NB further unsurveyed areas may be present within the SAC. See the Lower River Suir SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 3 for known and potential distribution	Based on data from McCorry and Ryle (2009). Saltmarsh occurs on the River Suir estuary downstream of Waterford City in old flood meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing channels below Little Island. NB further unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Little Island saltmarsh contains a well-developed topography and large, deep creeks are present. See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Based on data from McCorry and Ryle (2009). Much of the shoreline along the Lower River Suir channel has been modified by embankments, infilling and drainage. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). There are several saltmarsh communities present and zonation is moderately well-developed in the sub-site surveyed. The ASM transitions to grassland and freshwater habitats. This is typical of an estuary type saltmarsh with a significant freshwater influence. See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). As the sub-site is not grazed, the sward height is lush and rank in places. However, the overall sward structure is still quite variable. See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in McCorry and Ryle (2009)	See the coastal habitats supporting document for further details

Vegetation composition: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1% where it is known to occur	Based on data from McCorry and Ryle (2009). Common cordgrass (*Spartina anglica*) is present in the SAC, but swards are not a significant feature. See the coastal habitats supporting document for further details

1410 Mediterranean salt meadows (Juncetalia maritimi)

To restore the favourable conservation condition of Mediterranean salt meadows (Juncetalia maritimi) in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession	Mediterranean Salt Meadows (MSM) habitat was not recorded in Lower River Suir SAC during the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Thus the total area of the qualifying habitat in the SAC is unknown. An NPWS survey in the 1990s noted stands of sea rush (*Juncus maritimus*), indicative of MSM, on the saltmarsh at Grantstown (NPWS internal files), but the habitat was not recorded in the Little Island sub-site during the SMP in 2007 (McCorry and Ryle, 2009). NB unsurveyed areas may be present within the SAC. See the Lower River Suir SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes	See note on area above. NB unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Attribute and target based on data from McCorry and Ryle (2009). Mediterranean salt meadow habitat is found high up in the saltmarsh but requires occasional tidal inundation. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation in the sward	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with characteristic species listed in McCorry and Ryle (2009)	See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1% where it is already known to occur	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details

3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation

To maintain the favourable conservation condition of Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The description of habitat 3260 covers upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. The selection of Lower River Suir SAC used this broad interpretation. Conservation objectives for habitat 3260 concentrate on the high conservation value sub-types, however, little is known of the habitat's distribution or its sub-types in Lower River Suir SAC. There is a large number of lowland and tidal rivers in the SAC, as well as faster-flowing tributaries. Note: rooted macrophytes should be absent or trace (<5% cover) in freshwater pearl mussel (*Margaritifera margaritifera*) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Clodiagh River (Portlaw) within this SAC, because the mussel requires environmental conditions close to natural background levels
Habitat distribution	Occurrence	No decline, subject to natural processes	Further study is needed of Irish sub-types and their conservation value to interpret the broad description of habitat 3260 (European Commission, 2013). As noted above, little is known about the distribution of the habitat and its sub-types in Lower River Suir SAC. The uncommon, protected opposite-leaved pondweed (*Groenlandia densa*) was recorded in the SAC from floodplain ditches of the Suir near Carrick-on-Suir and Clonmel, as well as the Clodiagh near Portlaw (Colgan and Scully, 1898; NPWS internal files). See NPWS (2012) for information on the requirements of opposite-leaved pondweed. There are no known records for rare or threatened bryophytes from the rivers in the SAC (Lockhart et al., 2012). The rivers in the SAC are mainly lowland, depositing and tidal, and are likely dominated by marginal and submerged higher plants. Some fast-flowing rivers also occur that should, naturally, be dominated by macroalgae and bryophytes, with limited submerged or emergent higher plants
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	High conservation value sub-types are associated with natural hydrology. A natural flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For many sub-types, high flows are required to maintain the substratum necessary for the characteristic species. Flow variation can be particularly important, with high and flood flows being critical to the hydromorphology. Other aspects of hydrology, such as tidal regime, are important for certain sub-types of the habitat. The rivers in the SAC vary from naturally flashy, through depositing to tidal reaches
Hydrological regime: groundwater discharge	Metres per second	Maintain appropriate hydrological regime	Even small groundwater contributions can significantly alter hydrochemistry, particularly where there is basic bedrock and/or subsoils. Freshwater seepages can be very important in tidal reaches

Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	Opposite-leaved pondweed (*Groenlandia densa*) is typical of the tidal reaches of large Irish rivers, e.g. Suir, Slaney, Shannon and Blackwater (see Preston and Croft, 2001; Preston, 2003). This species is listed as Near Threatened (Wyse Jackson et al., 2016) and is protected on the Flora (Protection) Order, 2015 (Statutory Instrument No. 356 of 2015). Both the disturbance and substratum associated with the tidal regime may be important drivers
Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	Many of the high conservation value sub-types are dominated by coarse substrata, and it is likely that bedrock, boulders, cobbles and coarse gravels were naturally abundant in many tributaries in this SAC, particularly where the freshwater pearl mussel (*Margaritifera margaritifera*) occurred. Fine substrata are naturally abundant in depositing and tidal reaches. The size and distribution of particles are largely determined by the river flow. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver of rooted plant communities. Note: increased fine sediment is contributing to the unfavourable status of the freshwater pearl mussel in the Clodiagh. See the freshwater pearl mussel (1029) conservation objective
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The specific targets may vary among sub-types. Depositing and tidal stretches of rivers may, naturally, be more nutrient-rich and, therefore Water Framework Directive (WFD) good status may suffice in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos. Faster-flowing tributaries that are naturally dominated by bryophytes and macroalgae typically require WFD high status. High status targets apply to freshwater pearl mussel (*Margaritifera margaritifera*) habitat in the Clodiagh (see The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 - S.I. No. 296 of 2009). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), Environmental Protection Agency (EPA) river water quality reports (e.g. Bradley et al., 2015) and Ní Chatháin et al. (2013)
Typical species	Occurrence	Maintain typical species in good condition, including appropriate distribution and abundance	The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined. The typical species may include higher plants, bryophytes, macroalgae and microalgae, and invertebrates. As noted above, the protected vascular plant species opposite-leaved pondweed (*Groenlandia densa*) is associated with rivers and floodplains in the SAC. The banks of the Suir, particularly its tidal stretches, support a notable population of the rare *Rumex crispus* subsp. *uliginosus* (Green, 2008)
Floodplain connectivity	Hectares	Maintain floodplain connectivity necessary to support the typical species and vegetation composition of the habitat	River connectivity with the floodplain is important for the functioning of this habitat. Channels with a naturally functioning floodplain are better able to maintain habitat and water quality (Hatton-Ellis and Grieve, 2003). Floodplain connectivity is particularly important in terms of sediment sorting and nutrient deposition. High conservation value rivers are intimately connected to floodplain habitats and function as important wildlife corridors, connecting otherwise isolated or fragmented habitats in the wider countryside (Hatton-Ellis and Grieve, 2003; Mainstone et al., 2016). Alluvial woodland (91E0) is an important feature of rivers in Lower River Suir SAC (see the conservation objective for 91E0)

Fringing habitats	Hectares	Maintain marginal fringing habitats that support the typical species and vegetation composition of the habitat	Riparian habitats (including those along lake shores), particularly natural/semi-natural woodlands and wetlands, are an integral part of the structure and functioning of river systems, even where they do not form part of a natural floodplain. Fringing habitats can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates, assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling. Shade may also be important in suppressing algal growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. See Mainstone et al. (2016). Alluvial and riparian woodland is important for the rivers in Lower River Suir SAC

6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat in the SAC is unknown. The lowland type communities of the habitat are considered to occur in association with the various areas of alluvial forest (91E0) within the SAC, notably at Fiddown, below Carrick-on-Suir and at Tibberaghny Marshes. This habitat type would also be expected to occur in association with other woodland types in fringe areas along the river and with areas of open marsh or wet grassland within the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes on area above
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regime	This habitat requires winter inundation, which results in deposition of naturally nutrient-rich sediment
Vegetation composition: positive indicator species	Number of species at a representative number of monitoring stops	At least three positive indicator species present	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species is also presented
Vegetation composition: positive indicator species	Percentage cover at a representative number of monitoring stops	Cover of positive indicator species at least 40%	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species is also presented
Vegetation composition: non-native species	Percentage cover at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013). The spread of Japanese knotweed (*Fallopia japonica*) is noted as a threat at Tibberaghny (NPWS internal files)
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Cover of negative indicator species not more than 33%	Attribute and target based on O'Neill et al. (2013), where the list of negative indicator species is also presented
Vegetation composition: scrub, bracken and heath	Percentage at a representative number of monitoring stops	Cover of scrub, bracken (*Pteridium aquilinum*) and heath not more than 5%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: height	Height (centimetres) at a representative number of monitoring stops	Herb height at least 50cm	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Cover of bare soil not more than 10%	Attribute and target based on O'Neill et al. (2013)
Physical structure: grazing and disturbance	Square metres in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013)

91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

To restore the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 29.3ha for sites surveyed. See map 4	Old sessile oak woods with *Ilex* and *Blechnum* were surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Lyranearla (NSNW site code: 1834) and Inchinsqullib Wood (NSNW site code: 1898). The area of old oak woodlands in the surveyed sites within the SAC is estimated to be 29.3ha. It is important to note that further unsurveyed areas are present within the SAC, including at Portlaw Wood within the Curraghmore Estate and other small pockets within the SAC (NPWS internal files). Map 4 shows the old oak woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 4	Distribution shown based on Perrin et al. (2008). NB further unsurveyed areas are present within this SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak (*Quercus petraea*) generally regenerates poorly. In suitable sites, ash (*Fraxinus excelsior*) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-listed and other rare or localised species. The rare lichen tree lungwort (*Lobaria pulmonaria*), an indicator of ancient woodlands, is found in Portlaw Wood (NPWS internal files)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files

Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak (*Quercus petraea*) and birch (*Betula pubescens*)	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Rhododendron (*Rhododendron ponticum*) infestation at Portlaw Wood is noted as being serious, as well as the occurrence of beech (*Fagus sylvatica*), sycamore (*Acer pseudoplatanus*) and silver fir (*Abies alba*) in the woodland (NPWS internal files). Beech was reported from Lyranearla (NSNW site code: 1834) by Perrin et al. (2008)

91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 32.9ha for sites surveyed. See map 5	Alluvial forest was surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Fiddown (NSNW site code: 0022), Mountbolton (NSNW site code: 1823) and Ballycanvan Big (NSNW site code: 1839). Fiddown (0022) was also included in a national monitoring survey (O'Neill and Barron, 2013). The area of alluvial woodlands in the surveyed sites within the SAC is estimated to be 32.9ha. It is important to note that further unsurveyed areas of alluvial forest are present within the SAC, for example at islands below Carrick-on-Suir, at Shanbally (Coillte LIFE project site), Tibberaghny Marshes, along the lower stretches of the more westerly of the Suir tributaries and along both banks of the Suir as far east as the Dawn River (NPWS internal files). Map 5 shows the alluvial woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 5	Distribution shown based on Perrin et al. (2008). NB further unsurveyed areas are present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder (*Alnus glutinosa*) and oak (*Quercus* spp.) tend to regenerate poorly. Ash (*Fraxinus excelsior*) often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains, but not for woodland around springs/seepage areas
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder (*Alnus glutinosa*))	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) identify the site Ballycanvan Big (NSNW site code: 1839) as being "possible ancient woodland"
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix* spp.), oak (*Quercus* spp.), ash (*Fraxinus excelsior*) and birch (*Betula pubescens*)	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Norway spruce (*Picea abies*) and sycamore (*Acer pseudoplatanus*) occur at Shanbally (NPWS internal files). Spread of Japanese knotweed (*Fallopia japonica*) is a problem at Tibberaghny (NPWS internal files). Cherry laurel (*Prunus laurocerasus*) and rhododendron (*Rhododendron ponticum*) have been reported as occurring in part of Ballycanvan Big (NSNW site code: 1839) by Perrin et al. (2008), but not within the alluvial woodland

91J0 Taxus baccata woods of the British Isles

To restore the favourable conservation condition of *Taxus baccata* woods of the British Isles* in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	*Taxus baccata* woods of the British Isles habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat is unknown. Yew (*Taxus baccata*) woodland is known to occur at Cahir Park in an area of c.500m by 50m. Cahir Park was included in a national monitoring survey of yew woodland (Cross and Lynn, 2013). NB further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline	A narrow stand of yew woodland occurs along the steep western flank of a limestone knoll at Cahir Park within Lower River Suir SAC. See Cross and Lynn (2013) for further details. NB further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing	Yew (*Taxus baccata*) has been planted on deeper soil on top of the knoll at Cahir Park. If the transplants survive, the area of yew woodland will be considerably expanded. See Cross and Lynn (2013) for further details
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and herb and bryophyte layer	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yew (*Taxus baccata*) regenerates poorly under its own canopy but can regenerate under a canopy of other species or in the open if the competition from the field layer is not too strong
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-data and other rare or localised species
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Vegetation composition: typical species	Occurrence	A variety of typical native species present, including yew (*Taxus baccata*) and ash (*Fraxinus excelsior*)	See Perrin et al. (2008) and Cross and Lynn (2013) for further details

Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The most common invasive species in this woodland type is beech (*Fagus sylvatica*), although there is evidence to suggest that it actually facilitates regeneration of yew (*Taxus baccata*). Numerous exotic species, including cherry laurel (*Prunus laurocerasus*) in particular, have been reported from Cahir Park (Cross and Lynn, 2013)

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Restore distribution to 10.4km. See map 6	The conservation objective applies to the Clodiagh freshwater pearl mussel (*Margaritifera margaritifera*) population, which is listed on The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. (S.I. 296 of 2009). Full baseline distribution and abundance mapping was conducted in 2006 (Ross, 2006). Mussel habitat is widespread in the Clodiagh, with mussels almost continually present in low numbers from downstream of Clonea to above Portlaw (Ross, 2006). Mussels were nowhere abundant; maximum density was 3 per square metre (Ross, 2006). The habitat is significantly below carrying-capacity. The distribution in the Clodiagh has contracted since the 1990s (Ross, 2006). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Clodiagh system. See NPWS (2010) for further information
Population size	Number of adult mussels	Restore population to at least 10,000 adult mussels	Ross (2006) counted 1,206 mussels and estimated a total population of 2,412, concluding that, given the large areas of physically suitable habitat, a much larger population was previously present and a major population decline had occurred. Ross (2009) measured an 18.5% decline in mussel numbers between 2006 and 2009 at transect 1, indicating continued losses. Ross et al. (2017) recorded 'rapid and alarming' declines of 56-94% between 2006 and 2016 at five monitoring locations (67% decline overall). Moorkens (2010) estimated the population to be less than 10,000. The target of 10,000 is considered appropriate for a functional, self-sustaining population. NPWS (2013), in producing a national population estimate, assumed the Clodiagh population had declined at a rate of 3% per year. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Clodiagh system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of each population no more than 65mm in length; and at least 5% of each population no more than 30mm in length	Mussels ≤65mm are 'young mussels' and found buried in the substratum or beneath adult mussels. Mussels ≤30mm are 'juvenile mussels' and always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The Clodiagh failed both targets in 2006, 2009 and 2016 (Ross, 2006, 2009; NPWS, 2010; Ross et al., 2017). Ross (2006) found no juveniles, ≤65mm extremely uncommon, smallest individual was 45.4mm and 97% was >80mm. In 2009, the smallest mussel was 78mm and (based on Ross, 1988) 15-20 years old (Ross, 2009). The smallest of 21 mussels measured in 1986 was 48.6mm (Ross, 1988). NPWS (2010) concluded there had been no successful recruitment from 1986 to 2009. The Clodiagh population is considered to be unsustainable owing to lack of survival of juvenile and adult mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. The Clodiagh failed both targets in 2009 (Ross, 2009; NPWS, 2010) and, as noted above, a major population decline has occurred (Ross, 2006; Ross et al., 2017), and is presumed to be on-going. In 2009, 1 transect and 1 delimited count were counted: T1 numbers had fallen from 27 in 2006 to 22, representing a 18.5% decline, while numbers were the same in C2. Seven dead shells were found among 23 live mussels at one location, indicating high mortality in parts of the Clodiagh. In 2016, 67 mussels were counted at five monitoring sites that had 205 mussels in 2006 (Ross et al., 2017). The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 8.8km in the Clodiagh system and any additional stretches necessary for salmonid spawning	Mussel habitat in the Clodiagh is known to occur from Clonea to Portlaw, and is sparsely occupied from c.630m downstream of Clonea to c.1.8km above Portlaw (Ross, 2006). Mussels were recorded at Portlaw as recently as the 1990s and downstream of Portlaw in the early 20th century. It is possible that some mussel habitat occurs upstream or downstream of the mapped stretches, but few mussels are likely to be found (Ross, 2006). The mussel habitat has been severely impacted for a significant period by sedimentation, other hydromorphological changes, organic pollution and eutrophication (NPWS, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The species' habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Availability of mussel and fish habitat is determined by flow and substratum conditions. It is highly sensitive to hydromorphological changes, sedimentation and enrichment. Pressures throughout the catchment contribute to such impacts. Mussel habitat is widespread in the Clodiagh but in unfavourable condition owing to sedimentation, other hydro-morphological changes and nutrient enrichment. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality - macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	The EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). In 2009, the habitat in the Clodiagh system failed the macroinvertebrate target, but passed the phytobenthos target (Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). Q values in the mussel habitat were Q3-Q4 (Morgan, 2009). There has been a gradual decline in quality at several main-channel sites since the late 1970s (Morgan, 2009). Sewage discharge at Clonea is impacting water quality downstream of Clonea Bridge (Ross, 2006; Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality - filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The Clodiagh failed the macrophyte target, but marginally passed the macroalgal target in 2009 (NPWS, 2010). Patches of abundant *Ranunculus* were recorded by all surveyors, with up to 40% cover in places (Morgan, 2009; Ross, 2009; Ní Chatháin, 2010; NPWS, 2010). Ross (2006) also recorded widespread and, in places, abundant (up to 80%) *Ranunculus*. Algae were generally absent in 2009, however up to 10% *Cladophora* cover was recorded downstream of Clonea Bridge (Ní Chatháin, 2010; NPWS, 2010), where sewage fungus had previously been recorded (Ross, 2006). Algae were also sparse in 2006 and 2016 (Ross, 2006; Ross et al., 2017). Tree shade may be supressing plant growth over much of the mussel habitat (Ross et al., 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: sediment	Occurrence	Restore substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The Clodiagh failed the target for the Sub-basin Management Plan in 2009 and 2016, with strong silt plumes recorded in mussel habitat (Ross, 2009; NPWS, 2010; Ross et al., 2017). Ross et al. (2017) recorded extremely heavy silt plumes at every site, even in fast riffles. Ross (2006) recorded significant siltation of the mussel habitat and observed river bank erosion and collapse, and livestock entry to the river. Silt in the Clodiagh is providing a rooting medium for macrophytes. Sufficient survival of juvenile and adult mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Average redox was very poor, 23-28% at four sites monitored in 2016, only three of the 40 measurements was <20% (Ross et al., 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Hydrological regime: flow variability	Metres per second	Maintain appropriate hydrological regime	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other key factor). To restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediment or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle; see Moorkens and Killeen (2014). Groundwater inflow to the substratum contributes to water-cycling. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of Clodiagh system
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for mussels and a lack of mussel recruitment, while significantly lower host fish density and biomass were associated with high juvenile mussel numbers. Fish movements must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. No glochidia were found on young Clodiagh fish in May 2009, although six trout and 38 salmon were caught (Johnston, 2009; NPWS, 2010)
Fringing habitat: area and condition	Hectares	Restore the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, particularly natural/semi-natural woodlands and wetlands, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats aid in the settlement of fine suspended matter, protect banks from erosion, contribute to nutrient cycling and to the aquatic food web (e.g. allochthonous matter such as leaf fall) and provide habitat for life-stages of fish, birds and aquatic invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers (e.g. along parts of the Clodiagh) and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

1092 White-clawed Crayfish *Austropotamobius pallipes*

To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	No reduction from baseline. See map 7	White-clawed crayfish (*Austropotamobius pallipes*) occurs extensively on the River Suir and on many of its tributaries. On the River Suir main channel, the species has been recorded on almost the entire length of non-tidal river from the most upstream point at Cabragh, near Thurles, to downstream of Kilsheelan. It is also present on the following tributaries: Anner and Clashawley, Clodiagh and Owenbeg, Multeen, Tar, Nier, and Clodiagh Lower
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as a major direct threat to this species and as a disease vector. Ireland is currently free of non-native invasive crayfish species. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as a major threat and crayfish plague has occurred in Ireland even in the absence of alien vectors. Disease can, in some circumstances, be introduced through contaminated equipment and water in the absence of vector species. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No reduction in habitat heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus, such as leaf litter. These conditions must be available on the whole length of occupied habitat

1095 Sea Lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). Float-over surveys by Inland Fisheries Ireland (IFI) point to little success of sea lamprey adults in passing the weirs in Clonmel in Lower River Suir SAC. Modifications to these weirs would facilitate upstream passage of sea lamprey. IFI has embarked on a programme of detailed survey of major barriers in SAC catchments, in the context of sea lamprey passage, using the SNIFFER (Scotland and Northern Ireland Forum for Environmental Research) WFDIII methodology
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Lampreys spawn in clean gravels. Substantial areas of suitable spawning habitat are available from Cahir to Carrick-on-Suir, but access to areas upstream of Clonmel is problematic
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

1096 Brook Lamprey *Lampetra planeri*

To restore the favourable conservation condition of Brook Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to lampreys' migration both up- and downstream, thereby possibly limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Brook lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally (Rooney et al., 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

1099 River Lamprey *Lampetra fluviatilis*

To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block river lampreys' migration both up- and downstream, thereby limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). River lampreys spawn in clean gravels where thay excavate shallow nests and can spawn communally in numbers (Rooney et al., 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

1103 Twaite Shad *Alosa fallax fallax*

To restore the favourable conservation condition of Twaite Shad in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	In some catchments, artificial barriers block twaite shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Population structure: age classes	Number of age classes	More than one age class present	
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning habitats	
Water quality: oxygen levels	Milligrams per litre	No lower than 5mg/l	Attribute and target based on Maas et al. (2008)
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	See Maitland and Hatton-Ellis (2003) for further information

1106 Salmon *Salmo salar*

To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Suir is currently below CL, meeting 79% of CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers currently exceeding their conservation limit (CL). The average electrofishing value for the Suir in 2016 was 10.2 salmon fry, which is below the 17 fry target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are generally not currently preventing salmon from accessing suitable spawning habitat in Lower River Suir SAC
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

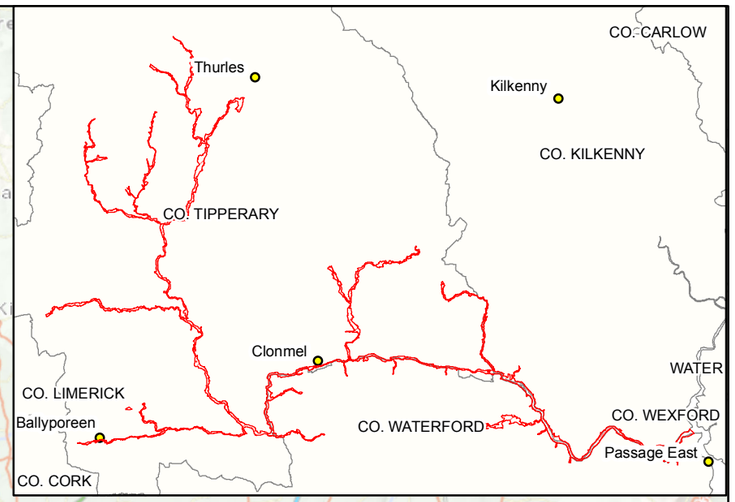
1355 Otter *Lutra lutra*

To maintain the favourable conservation condition of Otter in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al. 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 116.17ha above high water mark (HWM) and 726.61ha along river banks	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 712.27ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (Kruuk, 2006; NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 382.31km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed

Legend

Lower River Suir SAC 002137



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MAP 1:
LOWER RIVER SUIR SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

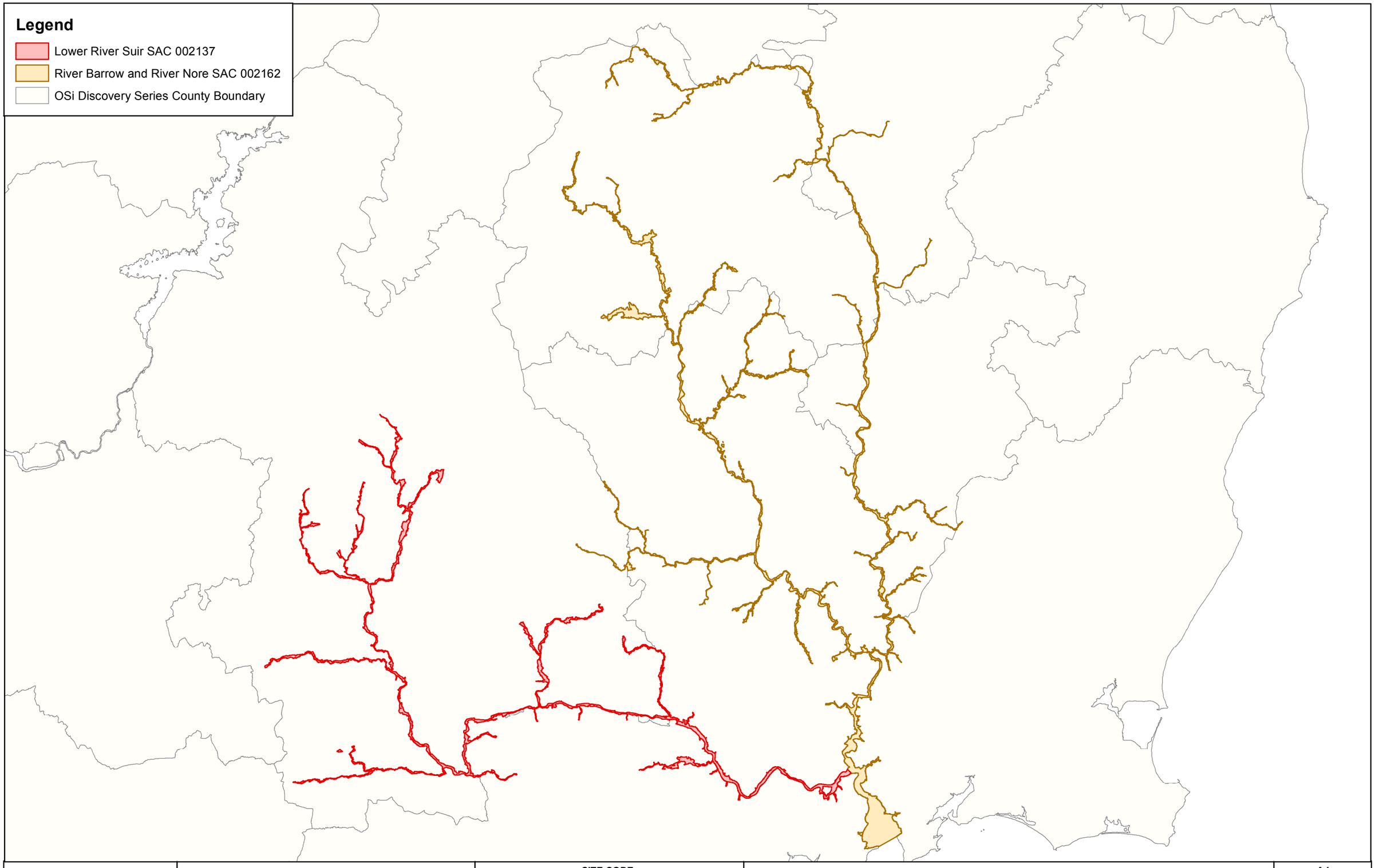
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002137; version 3.
CO. WATERFORD, CO. LIMERICK, CO.TIPPERARY, CO. KILKENNY

0 3 6 9 12 15 km

N

Map Version 1
Date: Oct 2016



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MAP 2:
LOWER RIVER SUIR SAC
CONSERVATION OBJECTIVES
ADJOINING DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002137; version 3. SAC 002162; version 3.01
CO. WATERFORD, CO. LIMERICK, CO.TIPPERARY, CO. KILKENNY

0 6 12 18 24 30 km

N

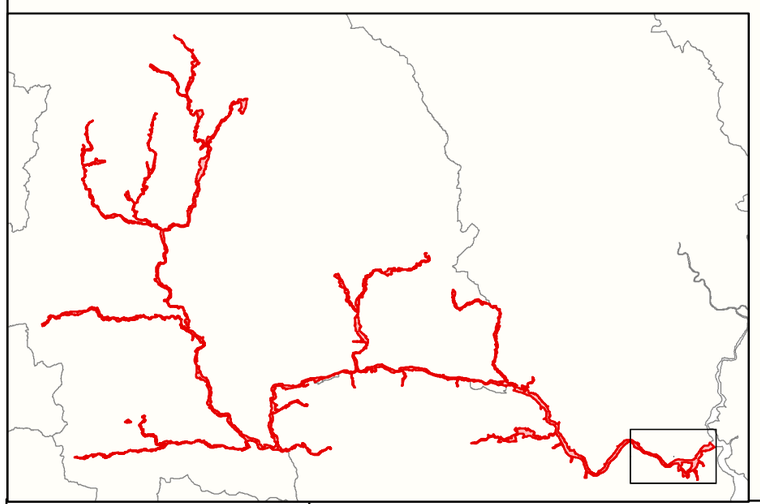
Map Version 1
Date: Oct 2016

Legend

- Lower River Suir SAC 002137
- Saltmarsh Monitoring Project Survey Area

Annex I Saltmarsh Habitats

- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- Potential 1330 Potential Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- OSi Discovery Series County Boundary



SMP Site Code: SMP0052

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MAP 3:
LOWER RIVER SUIR SAC
CONSERVATION OBJECTIVES
SALTMARSH HABITATS

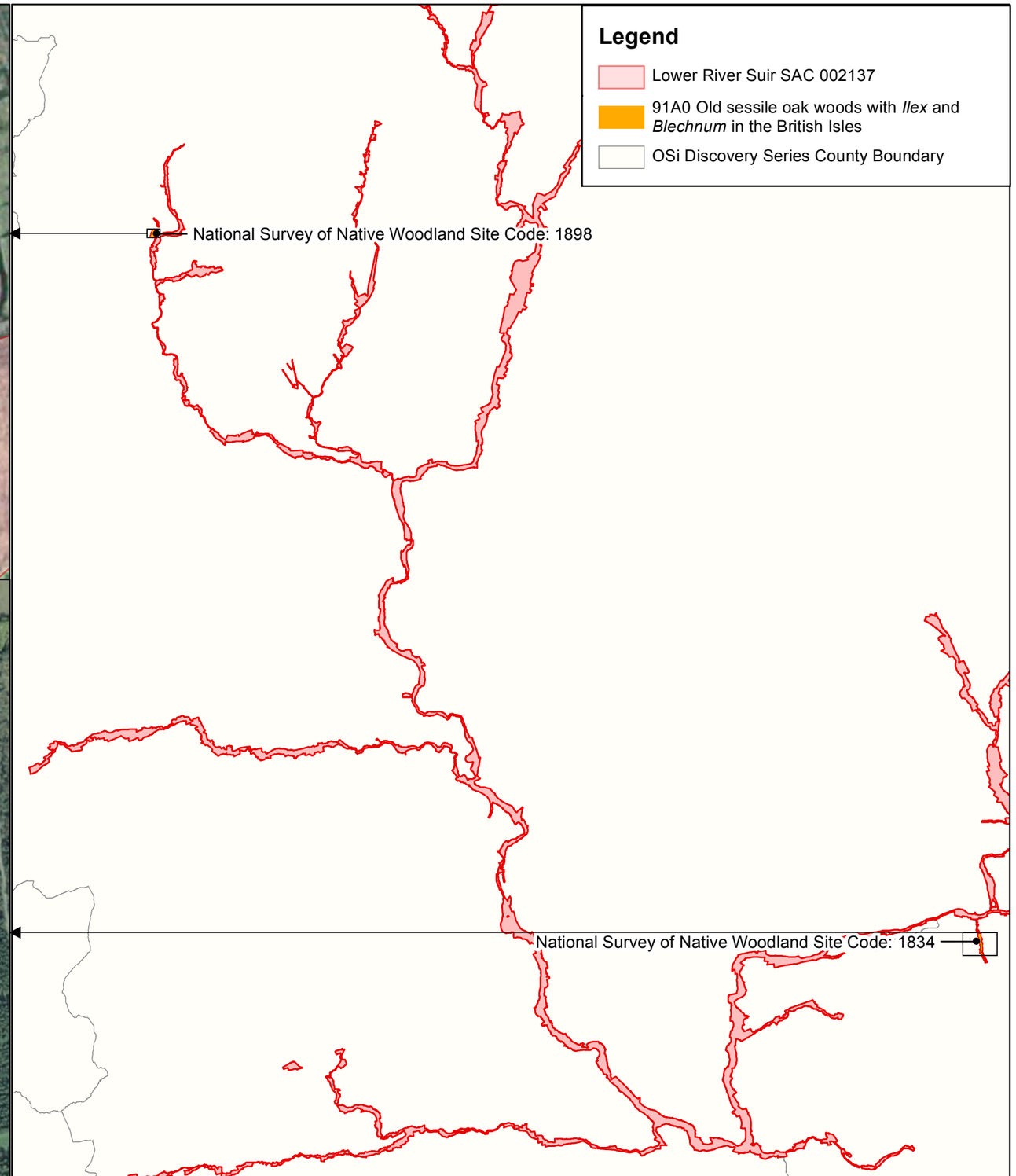
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002137; version 3.
CO. WATERFORD, CO. LIMERICK, CO.TIPPERARY, CO. KILKENNY

0 0.3 0.6 0.9 1.2 1.5 km

N

Map Version 1
Date: Oct 2016



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MAP 4:
LOWER RIVER SUIR SAC
CONSERVATION OBJECTIVES
OLD SESSILE OAK WOODLAND

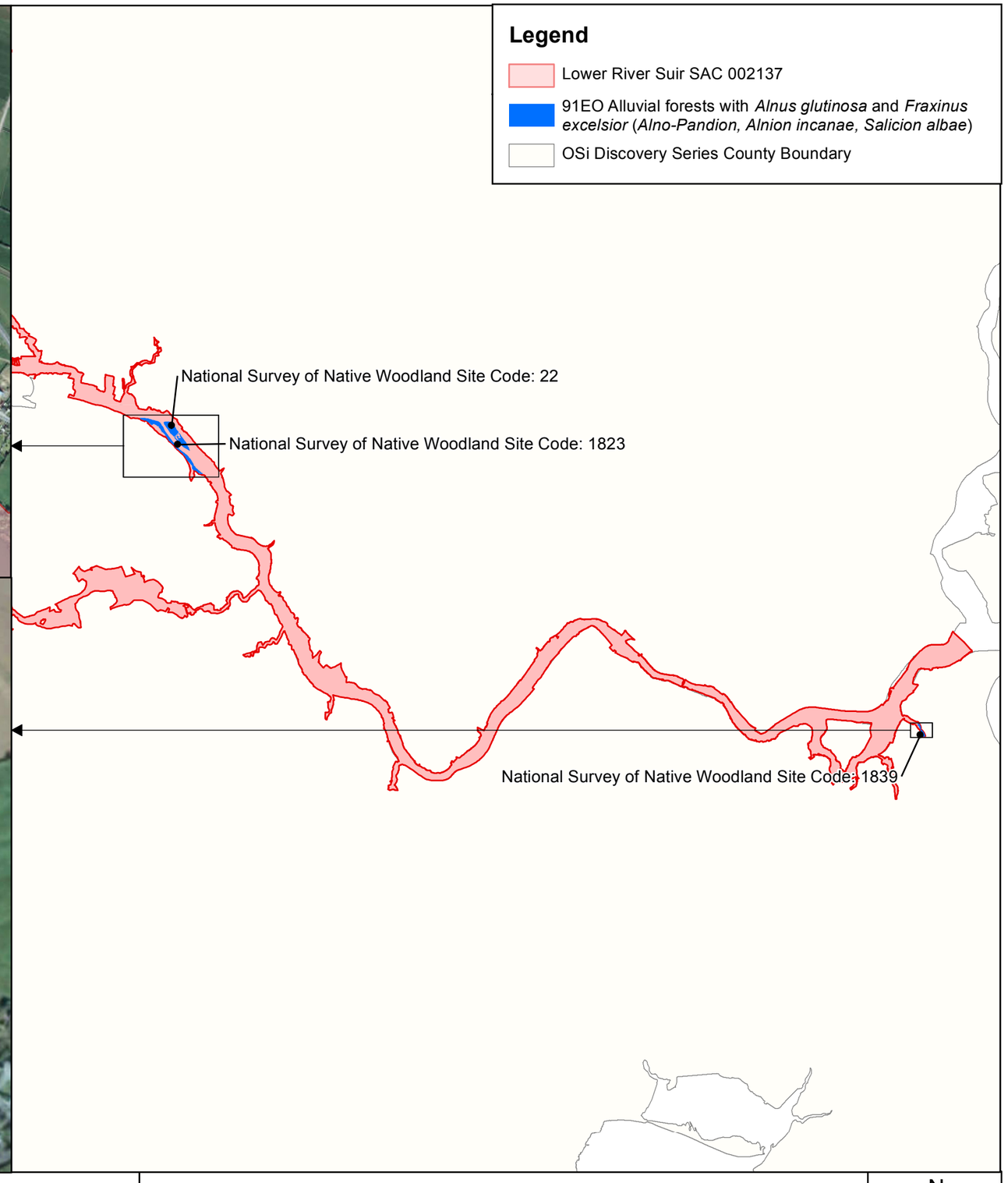
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002137; version 3.
CO. WATERFORD, CO. LIMERICK, CO.TIPPERARY, CO. KILKENNY

0 0.035 0.07 0.105 0.14 0.175 km

N

Map Version 1
Date: Oct 2016



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MAP 5:
LOWER RIVER SUIR SAC
CONSERVATION OBJECTIVES
ALLUVIAL WOODLAND

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002137; version 3.
CO. WATERFORD, CO. LIMERICK, CO.TIPPERARY, CO. KILKENNY

0 0.15 0.3 0.45 0.6 0.75 km

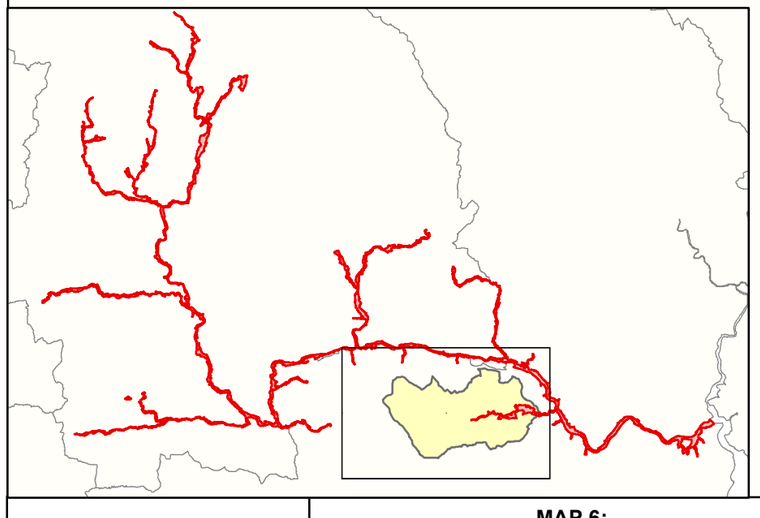
N

Map Version 1
Date: Oct 2016

Legend

- Lower River Suir SAC 002137
- 1029 Freshwater Pearl Mussel *Margaritifera margaritifera* Suitable habitat length
- 1029 Freshwater Pearl Mussel *Margaritifera margaritifera* Distribution target
- 1029 Freshwater Pearl Mussel *Margaritifera margaritifera* Catchment
- OSi Discovery Series County Boundary

Clodiagh Catchment



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MAP 6:
LOWER RIVER SUIR SAC
CONSERVATION OBJECTIVES
FRESHWATER PEARL MUSSEL -
MARGARITIFERA MARGARITIFERA

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002137; version 3.
CO. WATERFORD, CO. LIMERICK, CO.TIPPERARY, CO. KILKENNY

0 0.8 1.6 2.4 3.2 4 km

N

Map Version 1
Date: Oct 2016

Legend

- Lower River Suir SAC 002137
- 1092 White-clawed Crayfish *Austropotamobius pallipes*
- OSi Discovery Series County Boundary

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Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs

MAP 7:
LOWER RIVER SUIR SAC
CONSERVATION OBJECTIVES
WHITE-CLAWED CRAYFISH

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002137; version 3.
CO. WATERFORD, CO. LIMERICK, CO.TIPPERARY, CO. KILKENNY

0 3 6 9 12 15 km

N

Map Version 1
Date: Oct 2016

National Parks and Wildlife Service

Conservation Objectives

River Barrow and River Nore SAC 002162

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

002162 River Barrow and River Nore SAC

QI	Description
1016	Desmoulin's whorl snail *Vertigo moulinsiana*
1029	Freshwater pearl mussel *Margaritifera margaritifera*
1092	White-clawed crayfish *Austropotamobius pallipes*
1095	Sea lamprey *Petromyzon marinus*
1096	Brook lamprey *Lampetra planeri*
1099	River lamprey *Lampetra fluviatilis*
1103	Twaite shad *Alosa fallax*
1106	Atlantic salmon (*Salmo salar*) (only in fresh water)
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1310	*Salicornia* and other annuals colonizing mud and sand
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
1355	Otter *Lutra lutra*
1410	Mediterranean salt meadows (*Juncetalia maritimi*)
1421	Killarney fern *Trichomanes speciosum*
1990	Nore freshwater pearl mussel *Margaritifera durrovensis*
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation
4030	European dry heaths
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
7220	* Petrifying springs with tufa formation (*Cratoneurion*)
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
91E0	* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

Supporting documents, relevant reports & publications (listed by date)

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

Title: Desmoulin's whorl snail (*Vertigo moulinsiana* - 1016) Conservation Status Assessment Report
Year: 2011
Author: Moorkens, E. ; Killeen, I.
Series: Unpublished Report to NPWS

Title: River Barrow and River Nore SAC (002162): Conservation objectives supporting document - woodland habitats [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: River Barrow and River Nore SAC (002162): Conservation objectives supporting document - coastal habitats [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: River Barrow and River Nore SAC (002162): Conservation objectives supporting document - marine habitats [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: Second Draft Nore Freshwater Pearl Mussel Sub-basin Management Plan (2009-2015)
Year: 2010
Author: DEHLG
Series: Unpublished Report to NPWS

Title: Site investigations for *Sabellaria alveolata* (Honey-comb worm) biogenic reefs in Ireland
Year: 2010
Author: NPWS
Series: Unpublished Report to NPWS

Title: Irish Semi-natural Grasslands Survey. Annual report no. 3: Counties Donegal, Dublin, Kildare & Sligo
Year: 2010
Author: O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; McNutt, K.E.; Perrin, P.M. ; Delaney, A.
Series: Unpublished Report to NPWS

Title: A provisional inventory of ancient and long-established woodland in Ireland
Year: 2010
Author: Perrin, P.M.; Daly, O.H.
Series: Irish Wildlife Manuals No. 46

Title: Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland [Version 1.0]
Year: 2010
Author: Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
Series: Irish Wildlife Manuals No. 48

Title: A technical manual for monitoring white-clawed crayfish *Austropotamobius pallipes* in Irish lakes

Year: 2010

Author: Reynolds, J.D.; O'Connor, W.; O'Keeffe, C.; Lynn, D.

Series: Irish Wildlife Manuals No. 45

Title: Report of the standing scientific committee to the DCENR. The status of Irish salmon stocks in 2010 and precautionary catch advice for 2011

Year: 2010

Author: SSC

Series: Unpublished Report to DCENR

Title: The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. [S.I. 296 of 2009]

Year: 2009

Author: Government of Ireland

Series: Irish Statute Book

Title: The European Communities Environmental Objectives (Surface Water) Regulations 2009. [S.I. 272 of 2009]

Year: 2009

Author: Government of Ireland

Series: Irish Statute Book

Title: Saltmarsh Monitoring Report 2007-2008

Year: 2009

Author: McCorry, M.; Ryle, T.

Series: Unpublished Report to NPWS

Title: *Margaritifera durrovensis* Survey of Nore River. June – July 2009. NS 2 project

Year: 2009

Author: Moorkens, E. A.

Series: Unpublished Report to NPWS

Title: Benthic Biotope classification of subtidal sedimentary habitats in the Lower River Suir candidate Special Area of Conservation and the River Nore and River Barrow candidate Special Area of Conservation

Year: 2008

Author: ARMS

Series: Unpublished Report to NPWS

Title: A survey of mudflats and sandflats in Ireland. An intertidal soft sediment survey of Waterford Estuary

Year: 2008

Author: ASU

Series: Unpublished Report to NPWS

Title: Assessment of the Risk of Barriers to Fish Migration in the Nore Catchment, Southern Regional Fisheries Board

Year: 2008

Author: CFB; Compass Informatics

Series: Unpublished Report to CFB

Title: Poor water quality constrains the distribution and movements of Twaite shad *Alosa fallax fallax* (Lacepede, 1803) in the watershed of river Scheldt

Year: 2008

Author: Maas, J.; Stevens, M. ; Breine, J.

Series: Hydrobiologia 602, 129 - 143

Title: All Ireland Species Action Plan - Killarney fern

Year: 2008

Author: NPWS ; EHS-NI

Series: Unpublished Report to NPWS & EHS-NI

Title: National Survey of Native Woodlands 2003-2008

Year: 2008

Author: Perrin, P.; Martin, J.; Barron, S.; O'Neill, F.; McNutt, K.; Delaney, A.

Series: Unpublished Report to NPWS

Title: Saltmarsh Monitoring Report 2006

Year: 2007

Author: McCorry, M.

Series: Unpublished Report to NPWS

Title: Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents, Article 17 forms and supporting maps

Year: 2007

Author: NPWS

Series: Unpublished Report to NPWS

Title: A Survey of Juvenile Lamprey Populations in the Corrib and Suir Catchments

Year: 2007

Author: O'Connor, W.

Series: Irish Wildlife Manuals No. 26

Title: Assessment of fish passage and the ecological impact of migration barriers on the River Nore catchment

Year: 2007

Author: Sullivan, A.

Series: Nore Suir Rivers Trust & OPW

Title: Otter Survey of Ireland 2004/2005

Year: 2006

Author: Bailey, M.; Rochford, J.

Series: Irish Wildlife Manuals No. 23

Title: The status of host fish populations and fish species richness in European freshwater pearl mussel (*Margaritifera margaritifera*) streams

Year: 2006

Author: Geist, J.; Porkka, M.; Kuehn, R.

Series: Aquatic Conservation: Marine and Freshwater Ecosystems 16, 251–266

Title: The distribution of Lamprey in the River Barrow SAC

Year: 2006

Author: King, J.J.

Series: Irish Wildlife Manuals No. 21

Title: Otters - ecology, behaviour and conservation

Year: 2006

Author: Kruuk, H.

Series: Oxford University Press

Title: The ecology and conservation of the gametophyte generation of the Killarney Fern (*Trichomanes speciosum* Willd.) in Ireland

Year: 2005

Author: Kingston, N. ; Hayes, C.

Series: Biology and Environment: Proceedings of the Royal Irish Academy 105B(2): 71-79

Title: Pilot Project for Monitoring Populations of the Freshwater Pearl Mussel. Baseline survey of the Nore River SAC, Counties Laois and Kilkenny

Year: 2004

Author: Moorkens, E. A.

Series: Unpublished Report to NPWS

Title: Monitoring the river, sea and brook lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*

Year: 2003

Author: Harvey, J.; Cowx, I.

Series: Conserving Natura 2000 Rivers Monitoring Series No. 5, English Nature, Peterborough

---

Title: Ecology of Watercourses Characterised by *Ranunculion fluitantis* and *Callitricho-Batrachion* Vegetation

Year: 2003

Author: Hatton-Ellis, T.W.; Grieve, N.

Series: Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough.

Title: Ecology of the Allis and Twaite shad

Year: 2003

Author: Maitland, P.S.; Hatton-Ellis, T.W.

Series: Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough

---

Title: A survey of the white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet) and of water quality in two catchments of Eastern Ireland

Year: 2002

Author: Demers, A.; Reynolds, J. D.

Series: Bulletin Français de la Pêche et de la Pisciculture, 367: 729-740

Title: Reversing the habitat fragmentation of British woodlands

Year: 2002

Author: Peterken, G.

Series: WWF-UK, London

Title: A survey of broadleaf woodlands in 3 SACs: Barrow-Nore, River Unshin & Lough Forbes

Year: 2000

Author: Browne, A.; Dunne, F.; Roche, N.

Series: Unpublished Report to NPWS

Title: Diet of Otters *Lutra lutra* on Inishmore, Aran Islands, west coast of Ireland

Year: 1999

Author: Kingston, S.; O'Connell, M.; Fairley, J.S.

Series: Biol & Environ Proc R Ir Acad B 99B:173–182

Title:	Conservation Management of the White-clawed Crayfish, *Austropotamobius pallipes*
Year:	1998
Author:	Reynolds, J.D.
Series:	Irish Wildlife Manuals No. 1
Title:	Studies on the biology and ecology of Margaritifera in Ireland
Year:	1996
Author:	Moorkens, E.A.
Series:	Unpublished PhD thesis, University of Dublin, Trinity College.
Title:	Imminent extinction of the Nore freshwater pearl mussel *Margaritifera durrovensis* Phillips: a species unique to Ireland
Year:	1994
Author:	Moorkens, E.A. ; Costello, M.J.
Series:	Aquatic Conservation: Marine and Freshwater Ecosystems 4,363-365
Title:	The spatial organization of otters (*Lutra lutra*) in Shetland
Year:	1991
Author:	Kruuk, H.; Moorhouse, A.
Series:	J. Zool, 224: 41-57
Title:	The vegetation of Irish rivers
Year:	1987
Author:	Heuff, H.
Series:	Unpublished Report
Title:	Otter survey of Ireland
Year:	1982
Author:	Chapman, P.J.; Chapman, L.L.
Series:	Unpublished Report to Vincent Wildlife Trust

Spatial data sources

Year:	2010
Title:	EPA transitional waterbody data
GIS operations:	Clipped to SAC boundary
Used for:	1130 (map 2)

Year:	Interpolated 2011
Title:	Intertidal and subtidal surveys 2008 & 2010
GIS operations:	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data
Used for:	Marine community types, 1140 (maps 3 & 4)

Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; Saltmarsh and Sand Dune datasets erased out if applicable
Used for:	Marine community types base data (map 4)

Year:	Revision 2010
Title:	Saltmarsh Monitoring Project 2007-2008. Version 1
GIS operations:	QIs selected; clipped to SAC boundary; overlapping regions with Sand Dune data investigated and resolved with expert opinion used
Used for:	1310, 1330, 1410 (map 5)

Year:	Derived 2011
Title:	Internal NPWS files
GIS operations:	Dataset created from spatial reference contained in files
Used for:	7220 (map 6)

Year:	Revision 2010
Title:	National Survey of Native Woodlands 2003-2008. Version 1
GIS operations:	QIs selected; clipped to SAC boundary
Used for:	91A0, 91E0 (map 6)

Year:	2011
Title:	NPWS rare and threatened species database
GIS operations:	Dataset created from spatial references in database records
Used for:	1016, 1092, 1421, 1990 (map 7)

Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	Creation of an 80m buffer on the marine side of the high water mark (HWM); creation of a 10m buffer on the terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on the landward side of the river banks data; creation of a 20m buffer applied to river centerline and stream data; combination of 10m river banks and 20m river and stream centerline buffer datasets; combined river and stream buffer dataset clipped to HWM; combination of HWM buffer dataset with river and stream buffer dataset; overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary
Used for:	1355 (no map)

1016 Desmoulin's whorl snail *Vertigo moulinsiana*

To maintain the favourable conservation condition of Desmoulin's whorl snail in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. Two known sites: Borris Bridge, Co. Carlow S711503; Boston Bridge, Kilnaseer S338774, Co. Laois. See map 7	Data from NPWS rare and threatened species database
Population size: adults	Number per positive sample	At least 5 adults snails in at least 50% of samples	Attribute and target from Moorkens and Killeen (2011)
Population density	Percentage positive samples	Adult snails present in at least 60% of samples per site	Attribute and target from Moorkens and Killeen (2011)
Area of occupancy	Hectares	Minimum of 1ha of suitable habitat per site	Attribute and target from Moorkens and Killeen (2011)
Habitat quality: vegetation	Percentage of samples with suitable vegetation	90% of samples in habitat classes I and II as defined in Moorkens & Killeen (2011)	Attribute and target from Moorkens and Killeen (2011)
Habitat quality: soil moisture levels	Percentage of samples with appropriate soil moisture levels	90% of samples in moisture class 3-4 as defined in Moorkens & Killeen (2011)	Attribute and target from Moorkens and Killeen (2011)

1029 Freshwater pearl mussel *Margaritifera margaritifera*

The status of the freshwater pearl mussel (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species. Please note that the Nore freshwater pearl mussel (*Margaritifera durrovensis*) remains a qualifying species for this SAC. This document contains a conservation objective for the latter species.

1092 White-clawed crayfish *Austropotamobius pallipes*

To maintain the favourable conservation condition of White-clawed crayfish in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	No reduction from baseline. See map 7	The crayfish is present almost throughout this SAC. The records extend as far downstream as Thomastown on the Nore and Graiguenamanagh on the Barrow
Population structure: recruitment	Percentage occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as major direct threat to this species and as disease vector. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as major threat and has occurred in Ireland even in the absence of alien vectors. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No decline in heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree-roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus such as leaf litter. These conditions must be available on the whole length of occupied habitat

1095 Sea lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor, (2007). King (2007) provides survey information for the Barrow
Juvenile density in fine sediment	Juveniles/m²	Juvenile density at least 1/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003)
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information

1096 Brook lamprey *Lampetra planeri*

To restore the favourable conservation condition of Brook lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	% of river accessible	Access to all watercourses down to first order streams	Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artifical barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003). King (2007) provides survey information for the Barrow. It is impossible to distinguish between brook and river lamprey juveniles in the field, hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information

1099 River lamprey *Lampetra fluviatilis*

To restore the favourable conservation condition of River lamprey in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem and major tributaries down to second order accessible from estuary	Artificial barriers can block lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003). King (2007) provides survey information for the Barrow. It is impossible to distinguish between brook and river lamprey juveniles in the field, hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m²	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m² in optimal conditions and more than 2/m² on a catchment basis
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). Lampreys spawn in clean gravels. Artificial barriers are currently preventing lamprey from accessing suitable spawning habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Artificial barriers are currently preventing juvenile lampreys from accessing the full extent of suitable habitat. See King (2006), Sullivan (2007) and CFB and Compass Informatics (2008) for further information

1103 Twaite shad *Alosa fallax*

To restore the favourable conservation condition of Twaite shad in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	In some catchments, artificial barriers block twaite shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Population structure: age classes	Number of age classes	More than one age class present	Regular breeding has been confirmed in the River Barrow in recent years, but not in the Nore
Extent and distribution of spawning habitat	m^2 and occurrence	No decline in extent and distribution of spawning habitats	
Water quality: oxygen levels	Milligrammes per litre	No lower than 5mg/l	Attribute and target based on Maas, Stevens and Briene (2008)
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	See Maitland and Hatton-Ellis (2003) for further information

1106 Atlantic salmon (*Salmo salar*) (only in fresh water)

To restore the favourable conservation condition of Salmon in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas. See Sullivan (2007) and CFB and Compass Informatics (2008) for further information on artificial barriers
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2010). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Nore is currently exceeding its CL, while the Barrow is below its CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 min sampling	Target is threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are currently preventing salmon from accessing suitable spawning habitat
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 2	Habitat area was estimated using OSI data and the defined Transitional Water Body area under the Water Framework Directive as 3856ha. See marine supporting document for further details
Community distribution	Hectares	The following sediment communities should be maintained in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex; Fine sand with *Fabulina fabula* community. See map 4	The likely area of sediment communities was derived from a combination of intertidal and subtidal surveys undertaken in 2008 (ARMS, 2008; ASU, 2008). See marine supporting document for further details
Community extent	Hectares	Maintain the natural extent of the Sabellaria alveolata reef, subject to natural process. See map 4	The likely area of this community is derived from a survey undertaken in 2010 (NPWS, 2010). See marine supporting document for further details

1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the favourable conservation condition of the Mudflats and sandflats not covered by seawater at low tide in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSI data as 926ha. See marine supporting document for further details
Community distribution	Hectares	The following sediment communities should be maintained in a natural condition: Muddy estuarine community complex; Sand to muddy fine sand community complex. See map 4	The likely area of sediment communities was derived from a combination of intertidal and subtidal surveys undertaken in 2008 (ARMS, 2008; ASU, 2008). See marine supporting document for further details

1310 *Salicornia* and other annuals colonizing mud and sand

To maintain the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the one sub-site mapped: Ringville - 0.03ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). The Ringville sub-site was mapped and no additional areas of potential Salicornia mudflat were identified from an examination of aerial photographs, giving a total estimated area of 0.03ha. NB futher unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009).	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

To restore the favourable conservation condition of Atlantic salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 1.25ha, Killowen - 2.59ha, Rochestown - 17.50ha, Ringville - 6.70ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Four sub-sites were mapped and additional areas of potential saltmarsh were identified from an examination of aerial photographs, giving a total estimated area of Atlantic salt meadow of 35.07ha. NB futher unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

1355 Otter *Lutra lutra*

To restore the favourable conservation condition of Otter in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in south-east estimated at 73% (Bailey and Rochford, 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 122.8ha above high water mark (HWM); 1136.0ha along river banks / around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 857.7ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 616.6km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 2.6ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)

1410 Mediterranean salt meadows (*Juncetalia maritimi*)

To restore the favourable conservation condition of Mediterranean salt meadows in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Dunbrody Abbey - 0.08ha, Rochestown - 0.04ha, Ringville - 6.70ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Three sub-sites were mapped and no additional areas of potential saltmarsh were identified from an examination of aerial photoraphs, giving a total estimated area of Mediterranean salt meadow of 6.82ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species: *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on McCorry and Ryle (2009). See coastal habitats supporting document for further details

1421 Killarney fern *Trichomanes speciosum*

To maintain the favourable conservation condition of Killarney Fern in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Location	No decline. Three locations known, with three colonies of gametophyte and one sporophyte colony. See map 7	Data from NPWS rare and threatened species database
Population size	Number	Maintain at least three colonies of gametophyte, and at least one sporophyte colony of over 35 fronds	Data from NPWS rare and threatened species database
Population structure: juvenile fronds	Occurrence	At least one of the locations to have a population structure comprising sporophyte, unfurling fronds, 'juvenile' sporophyte and gametophyte generations	'Juvenile' sporophytes, which appear as small entire fronds, are known from this site. However, it is unknown whether they are due to apogamous growth or sexual reproduction. Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Habitat extent	m^2	No loss of suitable habitat, such as shaded rock crevices, caves or gullies in or near to, known colonies. No loss of woodland canopy at or near to known locations	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Hydrological conditions: visible water	Occurrence	Maintain hydrological conditions at the locations so that all colonies are in dripping or damp seeping habitats, and water is visible at all locations	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Hydrological conditions: humidity	Number of dessicated fronds	No increase. Presence of dessicated sporophyte fronds or gametophyte mats indicates conditions are unsuitable	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Light levels: shading	Percentage	No changes due to anthropogenic impacts	Based on Kingston and Hayes (2005) and Ni Dhuill (pers. Comm.)
Invasive species	Occurrence	Absent or under control	NPWS and EHS-NI (2008) provides further details

1990 Nore freshwater pearl mussel *Margaritifera durrovensis*

To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 15.5km. See map 7	The population stretches from Poorman's Bridge (S407859) to Lismaine Bridge (S442660), with most of the population found between Poorman's Bridge and the Avonmore Creamery above Ballyragget (S 440 722) (Moorkens, 1996)
Population size: adult mussels	Number	Restore to 5,000 adult mussels	The extant wild population of Nore freshwater pearl mussel is estimated as 300 adult individuals (Moorkens, 2009)
Population structure: recruitment	Percentage per size class	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. This species is known not to have reproduced successfully in the River Nore since 1970 (Moorkens and Costello, 1994; Moorkens, 2004; Government of Ireland, 2009 [S.I. 272 of 2009])
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses
Habitat extent	Kilometres	Restore suitable habitat in length of river corresponding to distribution target (15.5km; see map 7) and any additional stretches necessary for salmonid spawning	The species habitat is a stretch of large lowland river and is a combination of 1) the area of habitat adult and juvenile mussels can occupy and 2) the area of spawning and nursery habitats the host fish can occupy. Fish nursery habitat typically overlaps with mussel habitat. Fish spawning habitat is generally adjacent mussel habitat, but may lie upstream of the generalised mussel distribution. Only those salmonid spawning areas that could regularly contribute juvenile fish to the areas occupied by adult mussels should be considered. The availability of mussel habitat and fish spawning and nursery habitats are determined by flow and substratum conditions. The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles

1990 Nore freshwater pearl mussel *Margaritifera durrovensis*

To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Water quality: Macroinvertebrates and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality-macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	These EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). The habitat of the Nore pearl mussel failed both standards during 2009 sampling for the Sub-basin Management Plan (DEHLG, 2010). See also The European Communities Environmental Objectives (Surface Water Objectives) Regulations 2009
Substratum quality: Filamentous algae (macroalgae), macrophytes (rooted higher plants)	Percentage	Restore substratum quality-filamentous algae: absent or trace (<5%); macrophytes: absent or trace (<5%)	High abundance of macroalgae was recorded during 2009 sampling for the Sub-basin Management Plan (DEHLG, 2010). Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate
Substratum quality: sediment	Occurrence	Restore substratum quality-stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The habitat for the species is currently unsuitable for the survival of adult mussels or the recruitment of juveniles owing to sedimentation of the substratum. Significant sedimentation has been recorded during all recent mussel monitoring surveys. Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. The redox potential loss in 2009 was 58-64% at 5cm depth (DEHLG, 2010)
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	The availability of suitable Nore freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other important factor). In order to restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum, 2) low flows do not exacerbate the deposition of fines and 3) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle

1990 Nore freshwater pearl mussel *Margaritifera durrovensis*

To restore the favourable conservation condition of the Nore freshwater pearl mussel in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval form of freshwater pearl mussels and thus, they are essential to the completion of the life cycle. 0+ and 1+ fish are typically used, both because of the habitat overlaps and the development of immunity with age in the fish. Fish presence is considered sufficient, as higher densities and biomass of fish is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for pearl mussels and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. Fish movement patterns must be such that 0+ fish in the vicinity of the mussel habitat remain in the mussel habitat until their 1+ summer. As native brown trout appear to be favoured by the Nore freshwater pearl mussel, it is particularly important that these are not out-competed by stocked fish

3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes	The full distribution of this habitat and its sub-types in this site is currently unknown. The basis of the selection of the SAC for the habitat is the presence of an excellent example of the vegetation community (nutrient-rich type) associated with extensive tufa deposits on the river bed in the Kings tributary of the Nore (Heuff, 1987). Other examples of this or other sub-types may be present within the SAC
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The full extent of this habitat in this site is currently unknown. See above
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	Due to regular disturbance (through variations in flow), river macrophytes rarely reach a climax condition but frequently occur as transient communities. A natural (relatively unmodified) flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For most of the sub-types of this habitat, high flows are required to maintain the substratum (see below) necessary for the characteristic species. Flow variation is particularly important, with high and flood flows being critical to the hydromorphology
Hydrological regime: groundwater discharge	Metres per second	The groundwater flow to the habitat should be permanent and sufficient to maintain tufa formation	This attribute refers to sub-types with tufa formations. Groundwater discharges to this habitat throughout the year
Substratum composition: particle size range	Millimetres	The substratum should be dominated by large particles and free from fine sediments	The tufaceous sub-types develop on relatively stable substrata such as bedrock, boulders and cobbles, where tufa can deposit and accumulate. Tufa deposition is believed to be biologically mediated, by algae and bryophytes. The substratum must remain free of fine sediments such as clay, silt and fine sand, which would adversely affect the growth of algae and mosses

3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Water chemistry: minerals	Milligrammes per litre	The groundwater and surface water should have sufficient concentrations of minerals to allow deposition and persistence of tufa deposits	The tufaceous sub-types require mineral-(typically calcium-) rich groundwaters to allow deposition of tufa. Surface water must also be sufficiently base-rich to prevent chemical erosion. Alkalinity and/or total hardness data may also be relevant
Water quality: suspended sediment	Milligrammes per litre	The concentration of suspended solids in the water column should be sufficiently low to prevent excessive deposition of fine sediments	See substratum composition above. Turbidity data may also be relevant
Water quality: nutrients	Milligrammes per litre	The concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition	Phosphorus (MRP) is typically the limiting nutrient, however increased nitrogen (NO3-) negatively impacts upon the N-fixing blue-green algal communities that frequently contribute to tufa deposition. Nutrient enrichment of the habitat typically leads to increased filamentous-green-algal biomass, and consequent changes in other algae, bryophyte and macrophyte species composition and abundance. Water quality should reach a minimum of Water Framework Directive good status, in terms of nutrient standards, and macroinvertebrate and phytobenthos quality elements
Vegetation composition: typical species	Occurrence	Typical species of the relevant habitat sub-type should be present and in good condition	The sub-types of this habitat are poorly understood and their typical species have not yet been defined. Typical species and appropriate targets may emerge to be site-specific. The typical species of the tufaceous sub-type in the Kings tributary of the Nore are identified in Heuff (1987). The typical species may include higher plants, bryophytes, macroalgae and microalgae
Floodplain connectivity	Area	The area of active floodplain at and upstream of the habitat should be maintained	River connectivity with the floodplain is essential for the functioning of this habitat. The site of the tufaceous sub-type in the King's River is within an area of floodplain, with further large floodplains upstream. Floodplains regulatefine sediment deposition within the channel. See substratum composition above

4030 European dry heaths

To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline from current habitat distribution, subject to natural processes	Spatial extent currently unmapped but indicated as occurring on the steep, free-draining, river valley sides especially the Barrow and tributaries in the foothills of the Blackstairs Mountains (based on NPWS NHA Survey - 1997/98 Site Notes; Natura 2000 Form Explanatory Notes - May 2006; The above NHA survey was prior to the extensions to the SAC that included river habitat and estuary at Ballyhack which may have incorporated additional dry heath habitat)
Habitat area	Hectares	Area stable or increasing, subject to natural processes. Habitat area is not known but estimated as less than 400ha of the area of the SAC, occurring in dispersed locations	Based on NPWS NHA Survey Site Notes (1997/98); Natura 2000 Form Explanatory Notes - May 2006
Physical structure: free-draining, acid, low nutrient soil; rock outcrops	Occurrence	No significant change in soil nutrient status, subject to natural processes. No increase or decrease in area of natural rock outcrop	Based on NPWS NHA Survey Site Notes - 1997/98; Natura 2000 Form Explanatory Notes - May 2006
Vegetation structure: sub-shrub indicator species	Percentage cover	Cover of characteristic sub-shrub indicator species at least 25%: gorse (*Ulex europaeus*) and where rocky outcrops occur bilberry (*Vaccinium myrtillus)* and woodrush (*Luzula sylvatica*). Some rock outcrops support English stonecrop (*Sedum anglicum*), sheep's bit (*Jasione montana*) and wild madder (*Rubia peregrina*) as well as important moss and lichen assemblages	Dry heath in this SAC occurs on free-draining nutrient poor soils and is often characterised by gorse and open acid grassland areas. A characteristic coastal dry heath of the southeast also occurs. Several rare plants occur including two species listed in the Red Data Book (Curtis and McGough, 1988). The species occurring on the site are listed in NPWS NHA Survey Site Notes - 1997/98. A brief overview of the principal characteristics of the dry heath habitat of this SAC is given in the Natura 2000 Explanatory Notes - May 2006
Vegetation structure: senescent gorse	Percentage cover	Cover of senescent gorse less than 50%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath condition assessment methodology of Perrin et al. (2010)
Vegetation structure: browsing	Percentage cover	Long shoots of bilberry with signs of browsing collectively less than 33%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath condition assessment methodology of Perrin et al. (2010)

4030 European dry heaths

To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: native trees and shrubs	Percentage cover	Cover of scattered native trees and shrub less than 20%	Based on NPWS NHA Survey Site Notes - 1997/98; Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010). From the NHA survey notes the main threats appear to be reclamation or invasion by scrub woodland
Vegetation composition: positive indicator species	Number	Number of positive indicator species at least 2 e.g. gorse and associated dry heath/ acid grassland flora	Dry heath in this SAC occurs on free-draining nutrient poor soils and is characterised by gorse and acid grassland areas. It corresponds to Annex I sub-type "heaths rich in gorse (*Ulex*) of the Atlantic margins" (European Commission, 2007). Based on NPWS NHA Survey Site Notes -1997/98; Natura 2000 Form Explanatory Notes - May 2006 and a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation structure: positive indicator species	Percentage cover	Cover of positive indicator species at least 60%. This should include plant species characterisitic of dry heath in this SAC including gorse, bilberry and associated acid grassland flora	Dry heath in this SAC is characterised by gorse and acid grassland areas and locally bilberry and woodrush. Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: bryophyte and non-crustose lichen species	Number	Number of bryophyte or non-crustose lichen species present at least 2	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. 2010
Vegetation composition: bracken (*Pteridium aquilinum*)	Percentage cover	Cover of bracken less than 10% - however see 'Notes'	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010). Bracken appears to be quite dense in places and before any management action is considered its rate of spread needs to be established as well as its threat, if any, to other dry heath species and its potential value to important fauna (e.g. Twite)

4030 European dry heaths

To maintain the favourable conservation condition of European dry heaths in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: weedy negative indicator species	Percentage cover	Cover of agricultural weed species (negative indicator species) less than 1%	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: non-native species	Percentage cover	Cover of non-native species less than 1%.	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified version of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation composition: rare/scarce heath species	Location, area and number	No decline in distribution or population sizes of rare, threatened or scarce species, including Greater Broomrape (*Orobanche rapum-genistae)* and the legally protected clustered clover (*Trifolium glomeratum*)	Broomrape is dependent on gorse at this site as it is parasitic on gorse roots. It is recorded as occurring on steep slopes above New Ross. A small area of excellent dry coastal heath at Ballyhack is interspersed with patches rock and of dry lowland grassland and has a high species diversity. Notably there is an excellent range of Clover (*Trifolium*) species including the legally protected clustered clover, a species known only from one other site in Ireland. Also *T. ornithopodiodes*, *T. striatum* and *Torilus nodosa*. Based on Natura 2000 Form Explanatory Notes May 2006, Irish Red Data Book (Curtis and Mc Gough, 1988) and on the NPWS database of rare and threatened vascular plants. Other areas of coastal heath may also occur
Vegetation structure: disturbed bare ground	Percentage cover	Cover of disturbed bare ground less than 10% (but if peat soil less than 5%)	Based on NPWS NHA Survey Site Notes and Natura 2000 Form Explanatory Notes - May 2006 and on a modified verison of the dry heath habitat condition assessment methodology of Perrin et al. (2010)
Vegetation structure: burning	Occurrence	No signs of burning within sensitive areas	Perrin et al. (2010) defines sensitive areas

6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution of this habitat in this site is currently unknown. Considered to occur in association with some riverside woodlands, unmanaged river islands and in narrow bands along the floodplain of slow-flowing stretches of river (Natura 2000 Form Explanatory Notes)
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Extent of this habitat in this site is currently unknown. See above
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regimes	This habitat requires winter inundation, which results in deposition of naturally nutrient-rich sediment
Vegetation structure:sward height	Centimetres	30-70% of sward is between 40 and 150cm in height	Bare ground, due to natural indundation processes, may often be present. Attribute and target based on the Irish Semi-natural Grassland Survey (O'Neill et al., 2010)
Vegetation composition: broadleaf herb: grass ratio	Percentage	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2010)
Vegetation composition: typical species	Number	At least 5 positive indicator species present	List of positive indicator species identified by O'Neill et al. (2010)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control- NB Indian balsam (*Impatiens glandulifera*), monkeyflower (*Mimulus guttatus*), Japanese knotweed (*Fallopia japonica*) and giant hogweed (*Heracleum mantegazzianum*)	Species listed as being present in the site (Natura 2000 Form Explanatory Notes)

7220 * Petrifying springs with tufa formation (*Cratoneurion*)

To maintain the favourable conservation condition of Petrifying springs with tufa formation (*Cratoneurion*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Square metres	Area stable or increasing, subject to natural processes	Extent of this habitat in this site is currently unknown. An area ("Tens of square metres") has been described at one location (Natura 2000 Form Explanatory Notes; internal NPWS files), see below
Habitat distribution	Occurrence	No decline. See map 6 for recorded location	Full distribution of this habitat in this site is currently unknown. It has been described in woodlands at Dysart, between Thomastown and Inistioge (Natura 2000 Form Explanatory Notes; internal NPWS files). NB futher areas are likely to occur within the site
Hydrological regime: height of water table; water flow	Metres; metres per second	Maintain appropriate hydrological regimes	Current hydrological regimes are unknown. Petrifying springs rely on permanent irrigation, usually from upwelling groundwater sources or seepage sources
Water quality	Water chemistry measures	Maintain oligotrophic and calcareous conditions	Water chemistry is currently unknown. Water supply to petrifying springs is characteristically oligotrophic and calcareous
Vegetation composition: typical species	Occurrence	Maintain typical species	The bryophytes *Cratoneuron commutatum* and *Eucladium verticillatum* are diagnostic of this habitat. Both are found at the location described above. Natura 2000 Form Explanatory Notes and internal NPWS files also list other typical species

91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 85.08ha for sub-sites surveyed: see map 6	Minimum area, based on 13 sites surveyed by Perrin et al. (2008) - site codes 14, 20, 49, 73, 125, 508, 509, 510, 514, 515, 518, 519, 521, and other sources. NB further unsurveyed areas maybe present within the site
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	Distribution based on Perrin et al. (2008). NB further unsurveyed areas maybe present within the site
Woodland size	Hectares	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring ‘deep’ woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak regenerates poorly. In suitable sites ash can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem.
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Woodland structure: indicators of local disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) list sites 14, 20, 73, 125, 508, 509, 510, 514, 515, 518, 521 as potential ancient/long established woodlands
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak (*Quercus petraea*) and birch (*Betula pubescens*)	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: beech (*Fagus sylvatica*), rhododendron (*Rhododendron ponticum*), cherry laurel (*Prunus laurocerasus*)

91E0 * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

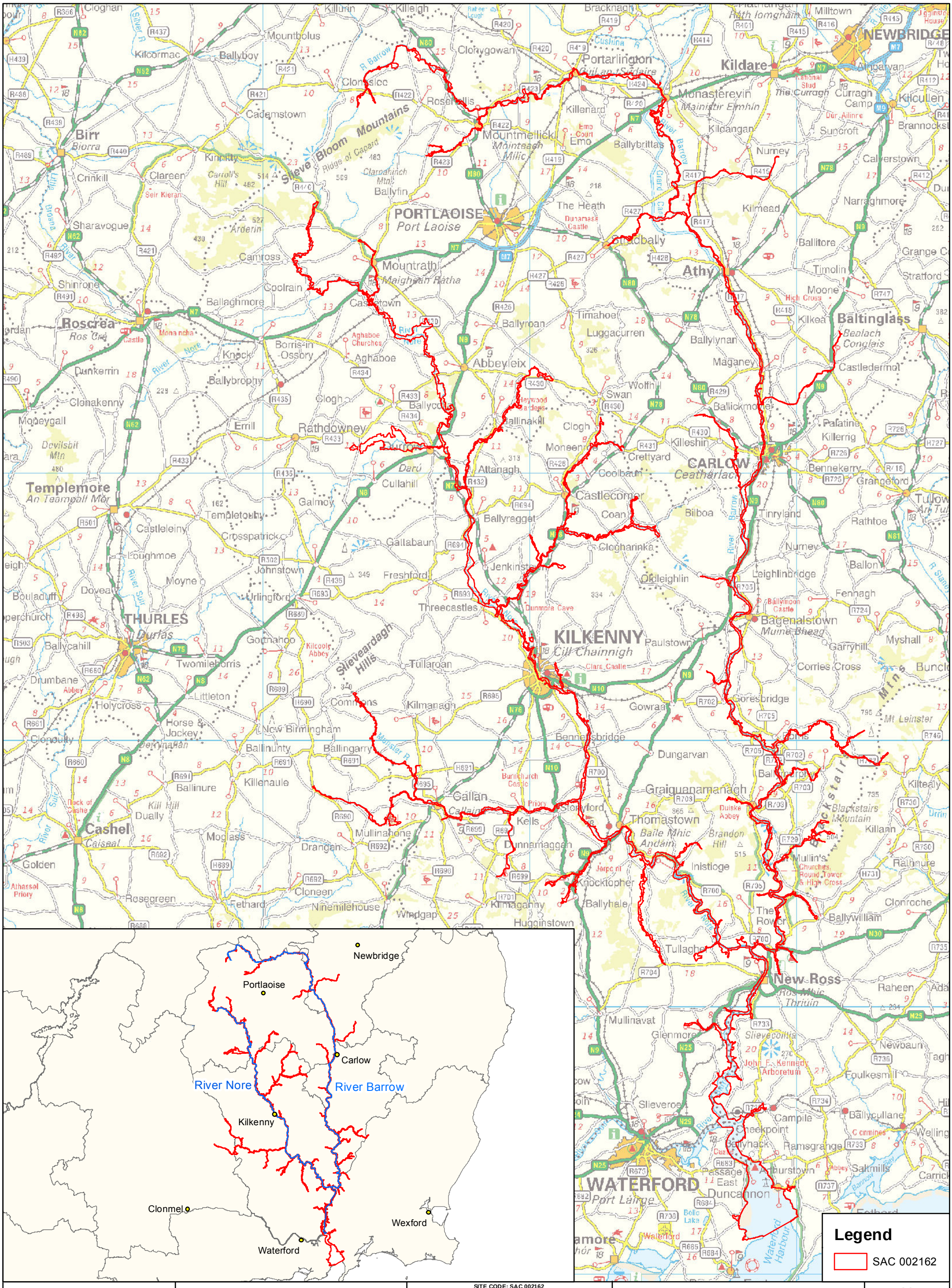
To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 181.54ha for sites surveyed: see map 6	Minimum area, based on 16 sites surveyed by Perrin et al. (2008) - site codes 10, 15, 17, 126, 127, 262, 282, 287, 511, 516, 517, 518, 520, 608, 1021; Coillte LIFE project and other sources. NB further unsurveyed areas maybe present within the SAC
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	Distribution based on Perrin et al. (2008). NB further unsurveyed areas maybe present within the site
Woodland size	Hectares	Area stable of increasing. Where topographically possible, "large" woods at least 25ha in size and “small” woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring ‘deep’ woodland conditions (Peterken, 2002). Topographical and land ownership constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008); Browne et al. (2000). See woodland habitats supporting document for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder and oak regenerate poorly. Ash often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: Flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river flood plains but not for woodland around springs/seepage areas
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least $30m^3$/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder)	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem

91E0 * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local disctinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) list sites 10, 15, 17, 127, 282, 516, 517, 518, 608 as potential ancient/long established woodlands
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including ash (*Fraxinus excelsior*) alder (*Alnus glutinosa*), willows (*Salix* spp) and locally, oak (*Quercus robur*)	Species reported in Perrin et al. (2008); Browne et al. (2000)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The following are the most common invasive species in this woodland type: sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*), rhododendron (*Rhododendron ponticum*), cherry laurel (*Prunus laurocerasus*), dogwood (*Cornus sericea*), Himalayan honeysuckle (*Leycesteria formosa*) and Himalayan balsam (*Impatiens grandiflora*)



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MAP 1: RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES SAC DESIGNATION

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

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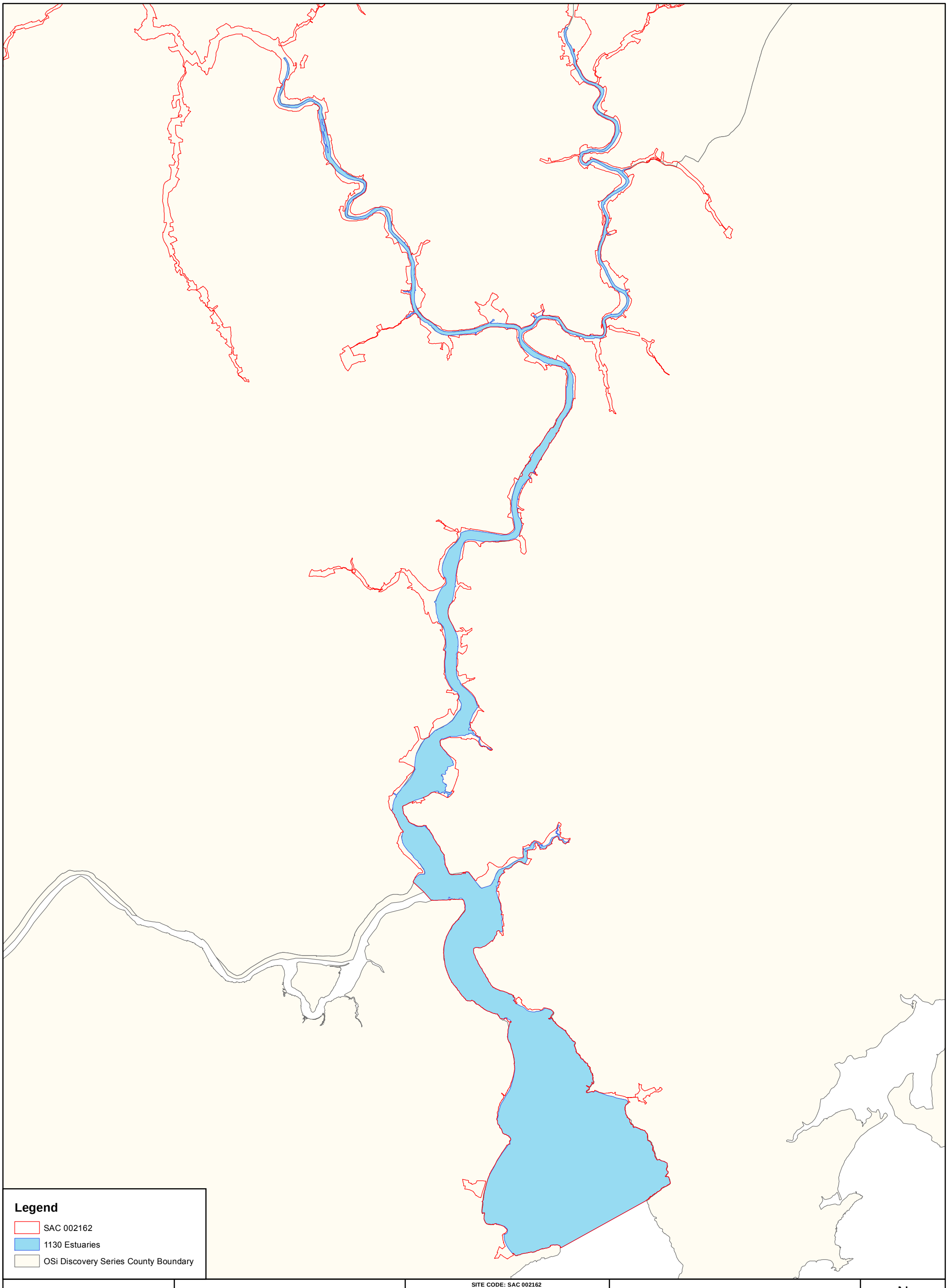
N

Map Version 1
Date: April 2011



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MAP 2:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES ESTUARIES

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04,
CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07,
CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01,
CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

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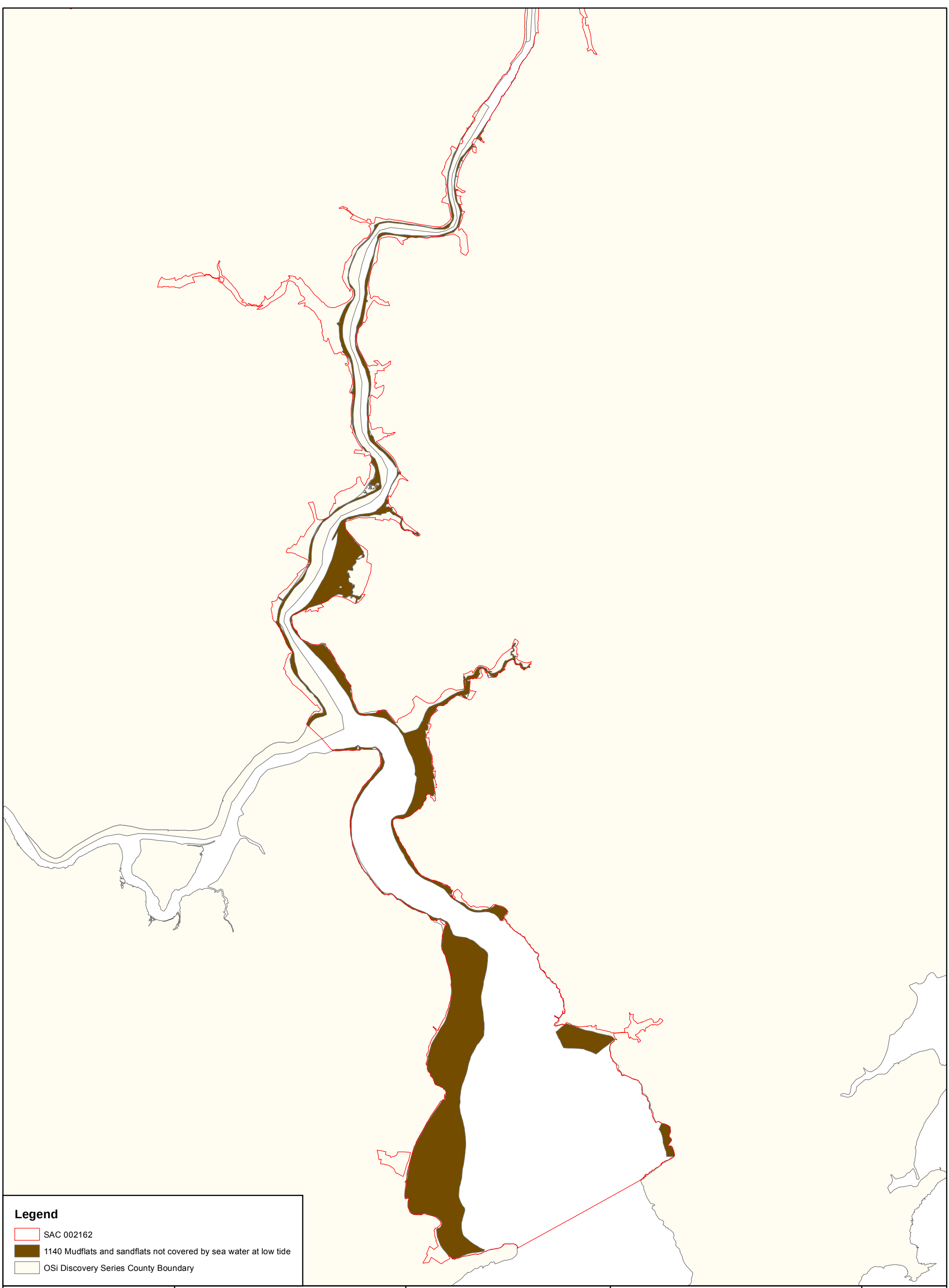
Map Version 1
Date: April 2011



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MAP 3:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES TIDAL MUDFLATS AND SANDFLATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 1 2 3 km

N

Map Version 1
Date: April 2011

Legend

- SAC 002162
- OSi Discovery Series County Boundary

Community Types

- Fine sand with *Fabulina fabula* community
- Muddy estuarine community complex
- Sand to Muddy fine sand community complex
- *Sabellaria alveolata* reef

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Department of Arts, Heritage and the Gaeltacht

MAP 4:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES MARINE COMMUNITY TYPES

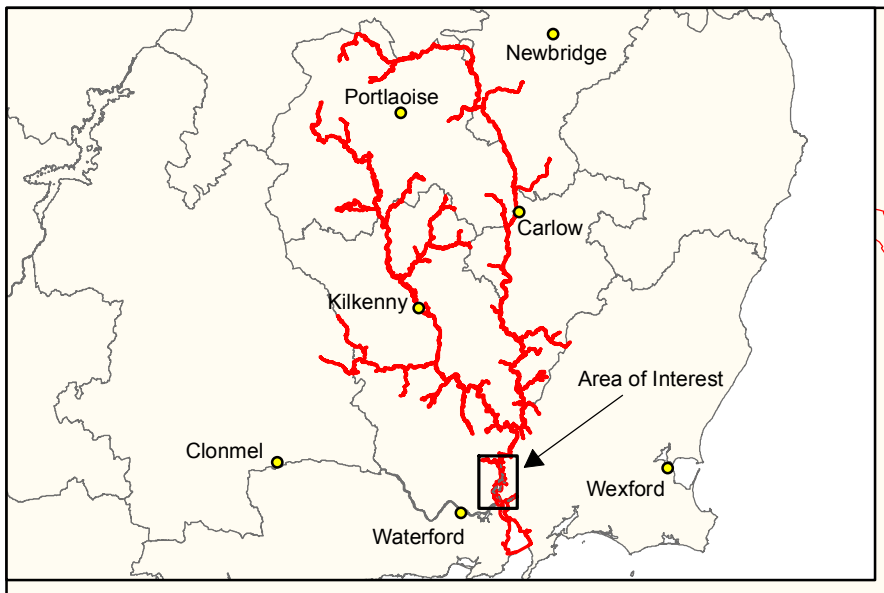
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 1 2 3 km

N

Map Version 1
Date: April 2011



SMP0049

SMP0050

SMP0051

SMP0048

Legend

- SAC 002162
- OSi Discovery Series County Boundary

Saltmarsh Habitats

- 1310 *Salicornia* and other annuals colonising mud and sand
- 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
- 1330 / 1410 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) / Mediterranean salt meadows (Juncetalia maritimi)
- 1410 Mediterranean salt meadows (Juncetalia maritimi)
- Potential 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

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MAP 5:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES SALTMARSH HABITATS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 0.25 0.5 0.75 1 km

N

Map Version 1
Date: April 2011

Newbridge

262

Portlaoise

1021

608

287

282

Carlow

10

Kilkenny

127

15

17

49

73

14

516

517

126

518

519

520

515

125

521

20

514

510

508

509

511

Legend

- SAC 002162
- OSi Discovery Series County Boundary
- 7220 *Petrifying springs with tufa formation (Cratoneurion)

Woodland Habitats

- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- 91E0 *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae)
- 91A0 / 91E0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles / *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incanae, Salicion albae)
- WD1 (Mixed) broadleaved woodland
- WN2 / WD1 Oak-ash-hazel woodland / (Mixed) broadleaved woodland
- WN2 / WN6 Oak-ash-hazel woodland / Wet willow-alder-ash woodland

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MAP 6:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES OLD OAK WOODLANDS, ALLUVIAL FORESTS & PETRIFYING SPRINGS

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 2 4 6 8 10 km

N

Map Version 1
Date: April 2011

Legend

- SAC 002162
- OSi Discovery Series County Boundary
- 1016 Desmoulin's Whorl Snail - *Vertigo moulinsiana*
- 1092 White-Clawed Crayfish - *Austropotamobius pallipes*
- 1421 Killarney Fern - *Trichomanes speciosum*
- 1990 Nore Freshwater Pearl Mussel - *Margaritifera durrovensis*

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Department of Arts, Heritage and the Gaeltacht

MAP 7:
RIVER BARROW AND RIVER NORE CONSERVATION OBJECTIVES DESMOULIN'S WHORL SNAIL, WHITE-CLAWED CRAYFISH, NORE FRESHWATER PEARL MUSSEL & KILLARNEY FERN

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE: SAC 002162
CO. CARLOW; version 1.03, CO. KILDARE; version 1.04, CO. KILKENNY; version 1.1, CO. LAOIS; version 1.07, CO. OFFALY; version 1.01, CO. TIPPERARY; version 1.01, CO. WATERFORD; version 1.01, CO. WEXFORD; version 1.01

0 2 4 6 8 10 km

N

Map Version 1
Date: April 2011

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

Produced by: National Parks and Wildlife Service,
Department of Arts, Heritage and the Gaeltacht,
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E-mail: natureconservation@environ.ie

Citation:
NPWS (2011) Conservation Objectives: River Barrow and River Nore SAC 002162. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editors: Rebecca Jeffrey & Naomi Kingston
ISSN 2009-4086

Conservation objectives for River Nore SPA [004233]

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	**Common Name**	**Scientific Name**
A229	Kingfisher	*Alcedo atthis*

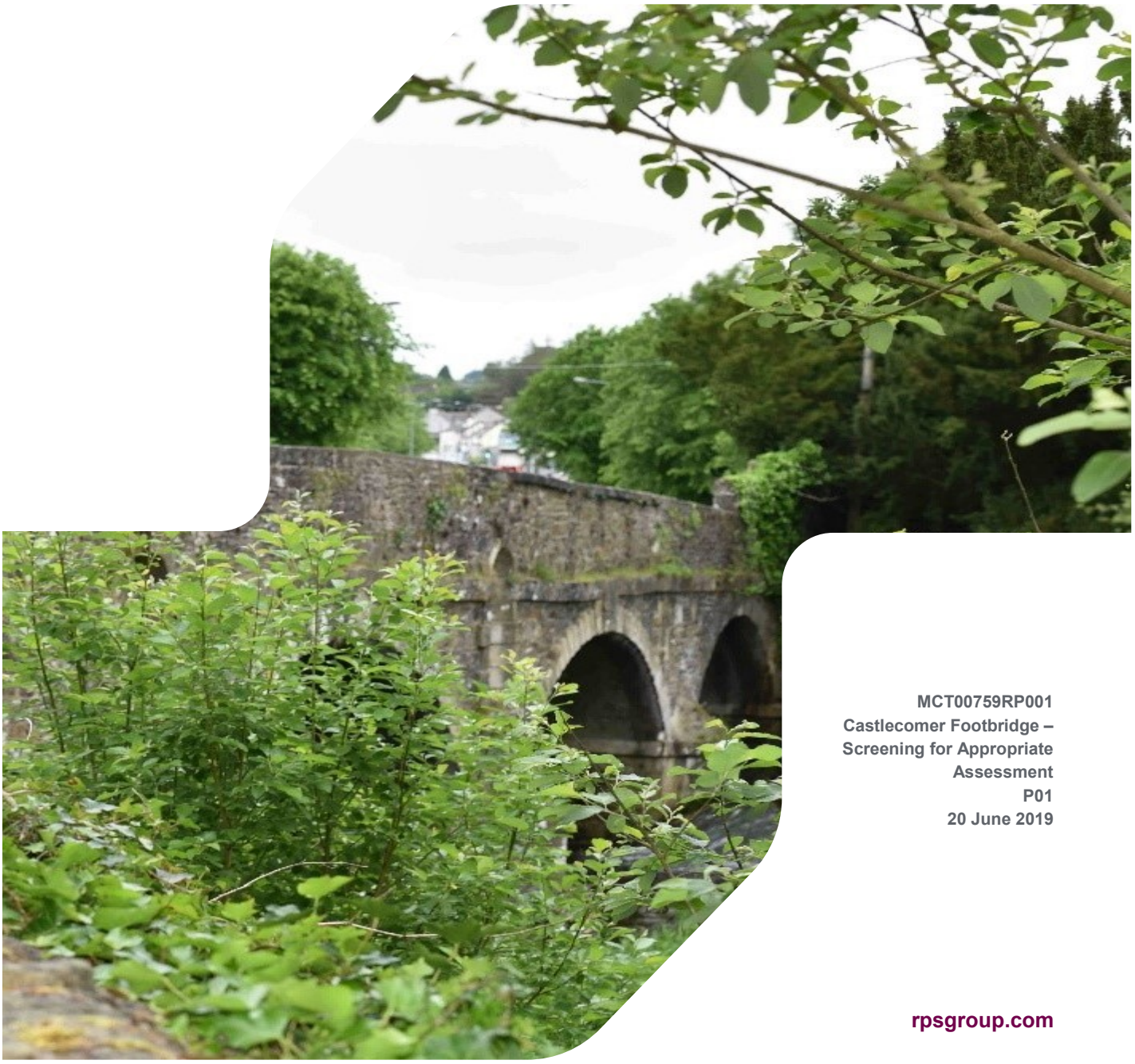
Citation: *NPWS (2018) Conservation objectives for River Nore SPA [004233]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*

Appendix D

Screening for Appropriate Assessment

CASTLECOMER FOOTBRIDGE

Screening for Appropriate Assessment



MCT00759RP001
Castlecomer Footbridge – Screening for Appropriate Assessment
P01
20 June 2019

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
A01	Client Approval	Conor Ruane	Aileen Fitzgerald Letizia Cocchiglia	Anthony O'Brien	April 2019
P01	For Planning	Aileen Fitzgerald	Aileen Fitzgerald	Anthony O'Brien	20 June 2019

Approval for issue

Anthony O'Brien		20 June 2019

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Appendix B Castlecomer Footbridge – Aquatic Ecology Survey
Appendix C European Site Within ZOI

1 INTRODUCTION

RPS has been commissioned by Transport Infrastructure Ireland (TII) and Kildare County Council acting as lead local authority through a Section 85 Agreement (Local Government Act, 2001) on behalf of Kilkenny County Council (KCC) under Eirspan Task Order 302 to provide technical consultancy services to examine options for an improved pedestrian link across the River Dinin in Castlecomer, Co. Kilkenny. RPS will also provide technical consultancy services to develop the preferred option from preliminary design through to construction and handover.

The scope of services includes the preparation of a report to inform a screening for Appropriate Assessment (AA) for a proposed footbridge spanning the Dinin River c.0.3km north-east of Castlecomer Town, Co Kilkenny, herein referred to as the proposed works. The footbridge will be located in the townlands of Ardra, Castlecomer and Drumgoole. TII intends to construct the proposed footbridge over the Dinin River immediately north of the Castlecomer Road vehicular bridge (N78).

This report comprises information in support of screening for AA for the proposed works in line with the requirements of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora, the Planning and Development Acts 2000-2018 and the European Communities (Birds and Natural Habitats) Regulations 2011 (SI No. 477/2011). This report will contain information to enable the competent authority, Kilkenny County Council, to undertake Screening for AA.

The location of the proposed works can be seen in **Figure 1.1.**

Figure 1-1: Location of Proposed Works in Castlecomer

1.1 Legislative Context for Appropriate Assessment

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

The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Acts 2000 - 2018 and the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011) as amended.

Articles 6(3) and 6(4) of the Habitats Directive establish the requirement for AA and set out the decision-making principles for the need for AA for plans and projects likely to impact on or to adversely affect the integrity of European sites.

Article 6(3) states:

> *Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public.*

Article 6(4) states:

> *If, in spite of a negative assessment of the implications for the [Natura 2000] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted.*

Natura 2000 sites are defined under the Habitats Directive (Article 3) as a coherent European ecological network of special areas of conservation, composed of sites hosting the natural habitat types listed in Annex I or habitats of the species listed in Annex II. This network shall enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range. In Ireland, these sites are designated as European sites and include Special Protection Areas (SPAs), established under the EU Birds Directive (79/409/EEC, as codified by 2009/147/EC) for birds and Special Areas of Conservation (SACs), established under the Habitats Directive 92/43/EEC for habitats and species.

Kilkenny County Council, as the competent authority, is obliged to examine the likely significant effects, individually or in combination with other plans and projects, of the proposal on European sites in light of their specific qualifying interests and conservation objectives. If screening determines that there is likely to be significant effects on a European Site, then a Stage 2 AA must be carried out for this proposal, including the compilation of a Natura Impact Statement (NIS) to inform the decision-making process.

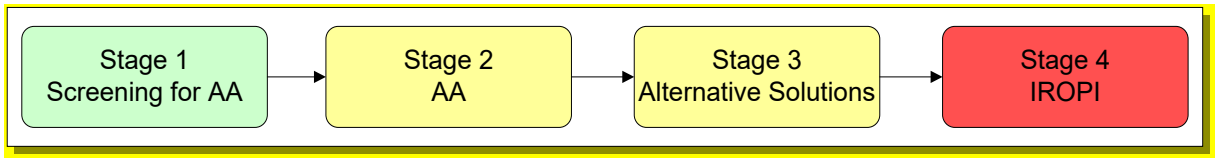
2 METHODOLOGY

2.1 Stages of Appropriate Assessment

The Department of the Environment, Heritage and Local Government guidelines 'Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities' (DEHLG, 2009, Rev. 2010) outline the European Commission's methodological guidance (EC, 2002) for AA. They promote a four-stage process to complete the AA and outline the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in **Figure 2.1**. Stages 1-2 deal with the main requirements for assessment under Article 6(3) and Regulation 42 of the European Communities (Birds and Natural Habitats) Regulations 2011 as amended. Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

Figure 2-1: Stages of Appropriate Assessment – Taken from Appropriate



The methodology followed in relation to this assessment has had regard to the following guidance and legislation:-

- 'Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities' (DOEHLG 2009, Rev 2010);
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2000);
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2002);
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission 2013;
- The European Union (Environmental Impact Assessment and Habitats) Regulations 2011;
- The European Communities (Birds and Natural Habitats) Regulations 2011;
- The Planning and Development Acts 2000-2018; and.
- Relevant case law, particularly a recent ruling from the European Court of Justice Case C‑323/17: Request for a preliminary ruling under Article 267 TFEU from the High Court (Ireland), made by decision of 10 May 2017, received at the Court on 30 May 2017, in the proceedings, People Over Wind, Peter Sweetman v Coillte Teoranta.

In light of the finding by the European Court of Justice in Case C – 323/17, it has been clarified that Stage 1 assessment needs to be based on the development proposal in the absence of site-specific mitigation. The source pathway receptor model for potential connectivity are therefore assessed carefully in consideration of the above ruling. An extract from the above ruling is provided herein:

> "*Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site*."

Stage 1 - Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3):

i. whether a plan or project (in this instance the proposed works) is directly connected to or necessary for the management of the European sites, and

ii. whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on the European sites in view of their conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). This report fulfils the information necessary to enable the competent authority (Kilkenny County Council) to screen the proposal for the requirement to prepare an AA.

This report forms Stage 1 of the AA process and sets out the following information:

- Description of the proposed works;
- Characteristics of the proximal European sites; and
- Assessment of likely significant effect of the proposed works on the European site(s) in question.

2.2 Information Consulted for this Report

The screening for AA is based on a desktop study and site visit. Sources of data reviewed as part of the screening process for this project included (but were not limited to):

- Information provided by TII and RPS design engineers on the location, design and other relevant aspects of the proposed project;
- Environmental Protection Agency – Water Quality information www.epa.ie, http://gis.epa.ie/Envision, www.catchments.ie;
- ESRI Ireland - Mapping Themes www.esri-ireland.ie;
- Geological Survey of Ireland – Geology, Soils and Hydrogeology mapping and data www.gsi.ie;
- Water Framework Directive website – www.wfdireland.ie;
- National Parks and Wildlife Service – online European site network information, including site conservation objectives www.npws.ie;
- National Parks and Wildlife Service – Information on the status of EU protected habitats in Ireland (NPWS 2013a, 2013b);
- National Biodiversity Data Centre – Information on location of EU protected habitats - www.biodiversityireland.ie, and
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie.

2.3 Screening Protocol

The sequence of events when completing the AA Screening process is provided below.

2.3.1 Screening Sequence

- Definition of the zone of influence for the proposed works;
- Identification of the European sites that are situated (in their entirety or partially) within the zone of influence of the proposed works;
- Identification of the most up-to-date Qualifying Interests (QIs) or Species of Conservation Interest (SCIs) for each European site occurring either wholly or partially within the zone of influence;
- Identification of the environmental conditions that maintain or restore the QIs or SCIs at the desired target of Favourable Conservation Status;
- Identification of the threats/impacts - actual or potential - that could negatively impact the environmental conditions of the QIs or SCIs within the European sites;
- Highlighting the activities of the proposed works that could give rise to significant negative impacts, and
- Identification of other plans or projects, for which in-combination impacts would likely have significant effects.

2.3.2 Screening Determination

In accordance with Regulation 42(7) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) as amended:-

> *"The public authority shall determine that an Appropriate Assessment of a plan or project is not required where the plan or project is not directly connected with or necessary to the management of the site as a European site and if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site."*

Further, under Regulation 42(8):

> *"Where, in relation to a plan or project for which an application for consent has been received, a public authority makes a determination that an Appropriate Assessment is required, the public authority shall give notice of the determination, including reasons for the determination of the public authority, to the following—*
>
> *the applicant,*
>
> *if appropriate, any person who made submissions or observations in relation to the application to the public authority, or*
>
> *if appropriate, any party to an appeal or referral.*
>
> *Where a public authority has determined that an Appropriate Assessment is required in respect of a proposed development it may direct in the notice issued under subparagraph (a) that a Natura Impact Statement is required."*

3 DESCRIPTION OF PROJECT

3.1 Scope and Purpose of the Project

The site of the proposed pedestrian bridge is on the eastern side of Castlecomer Town, Co. Kilkenny running parallel to the existing N78 bridge crossing of the River Dinin, see **Figure 1.1**.

The existing River Dinin Bridge was constructed in 1767 and it is approximately 6.7m wide between parapets. It caters for both vehicular and pedestrian traffic movements on the N78. As the bridge was constructed in the 18th Century, it was never intended to cater for modern vehicular traffic. Consequently, the existing bridge is too narrow to cater for a safe modern road cross section complete with footway.

There is only one footpath on the existing bridge which is sub-standard and varies 650-900mm in width. It is hazardous for both road users and pedestrians particularly on the east end of the bridge where the turning movements of HGV's encroach onto the footway due to the tight bend in the road. In order to improve safety at the location, KCC and TII intend to remove pedestrians from the existing bridge and provide a new dedicated facility for pedestrians to cross the River Dinin.

The need for improved pedestrian links over the River Dinin has been previously identified in the Castlecomer Local Area Plan (LAP) 2009 -2018 and more recently has been identified as key objective in the 2018-2024 LAP.

3.2 Description of Works

A Castlecomer Footbridge Options Report was prepared by RPS Design Team in conjunction with the project steering committee to assess a number of potential options for the footbridge. A copy of the report is available under a separate cover and will be submitted with the planning application.

The Options Report concluded that, a two-span steel footbridge independent of the existing bridge, was the preferred option and it is the subject of this screening report. Details of the proposed bridge are provided in **Appendix A** it is proposed to be located north of the existing River Dinin Bridge. In order to facilitate the footbridge, abutments will be constructed on either bank (west and east) of the existing river with a pier to be constructed within the river bed to provide structural support.

The works will include vegetation removal, excavation, piling, pouring of concrete, input of fill for embankments and erection of the bridge superstructure. A road closure for a period of up to 48 hours may be required and an appropriate Traffic Management Plan will be prepared. Further details are provided in 3.2.1.

3.2.1 Proposed Sequence of Works and Methodology

In order to complete the detailed design of the scheme site investigation works need to be completed in advance of the construction works as a separate work activity and are detailed hereafter:

Site Investigation Works

- In order to access the river and complete the exploratory works in a safe manner, bunding shall be provided to form a low wall along the eastern river bank to protect the toe of the embankment and prevent material entering the watercourse.

- The bunding shall be typically 1m by 1m in dimensions and will be sufficient for the predicted flow in the river, it shall extend from the eastern river bank (at the confluence of the adjoining tributary) to the first pier of the existing bridge. This will continue on the southern side of the bridge back to the eastern bank to ensure water cannot travel upstream into the area of works.

- A temporary access structure will span across a small tributary between Castlecomer Discovery Park and the existing eastern bank of the bridge as a pipe or series of pipes subject to flow. It is envisaging

that the watercourse will be flumed through the pipes which will be backfilled to allow access over the tributary to the bunded area.

- The proposed bunding and fluming of the watercourse shall be agreed in consultation with IFI.
- It is envisaged that during the course of any bunding works electrofishing may be required. This shall be conducted by a competent expert in accordance with an agreed methodology with IFI.
- The geotechnical borehole rig will mobilise to site and undertake the exploratory holes.
- The borehole rig will de-mobilise from site and the temporary access and bunding will be subsequently removed.

Site Preparation for Main Works

Site clearance will be undertaken on the western and eastern banks in preparation for construction of foundations and bunding of riverbanks, including removal of existing vegetation under the footprint of the proposed embankments.

Prior to commencement of works, the compound will be set up and traffic management measures will be put in place.

Vegetation removal will also take place and will include the removal of trees along both the right and left banks. During the site preparation phase a stand of Japanese Knotweed located on the left bank will also need to be managed. At this stage it is unknown as to how the knotweed will be managed but it is anticipated that it will either excavated or treated.

It is envisaged that the compound will be located in the Castlecomer Discovery Park on the eastern side of the river (see **Figure 3.1**), the compound will be set back minimum of 10m from the river. All plant and equipment will be maintained, refuelled and stored at the compound location. Oil will also be stored in appropriately contained bunded facility.

Figure 3-1: Compound Location

River Diversion

- In order to complete the works the watercourse will need to be locally diverted with bunding to allow for safe construction of the works.
- The bunding shall be typically 1m by 1m in dimensions and will be sufficient for the predicted flow in the river, it shall extend from the eastern river bank (at the confluence of the adjoining tributary) to the first pier of the existing bridge. This will continue on the southern side of the bridge back to the eastern bank to ensure water cannot travel upstream into the area of works.
- A temporary access structure will span across a small tributary between Castlecomer Discovery Park and the existing eastern bank of the bridge as a pipe or series of pipes subject to flow. It is envisaging that the watercourse will be flumed through the pipes which will be backfilled to allow access over the tributary to the bunded area and eastern abutment.
- The proposed bunding and fluming of the watercourse shall be agreed in consultation with IFI.
- It is envisaged that during the course of any bunding works electrofishing may be required. This shall be conducted by a competent expert in accordance with an agreed methodology with IFI.

Construction works

- Excavation for the new footbridge piles, foundations and retaining walls shall be undertaken on the eastern and western banks.
- Excavators and piling rigs will be used during the works on these banks and caution must be taken with regard to utilities (buried Eir services, buried watermain, overhead electrical lines feeding the lighting columns east and west of the existing bridge in the vicinity of the bridge).
- The new pier (and associated piles) shall be shuttered, reinforcement placed and the concrete poured.
- The shutters on the pier shall then be struck (cast in-situ).

- Once all concrete works have been completed, waterproofing shall be applied to all buried surfaces before backfilling with 6N structural fill.
- Willow spilling and rock armour will be used for grading and river bank reinstatement.
- The existing river bed will be generally be left in-situ, any river substrate material removed will be stockpiled and replaced as required within the river bed in line with IFI standards.
- A masonry wall will be constructed on either side of the both embankments (on left and right bank).
- The new embankments shall be constructed by grading, levelling and compacting 6N structural fill before top soiling and grass seeding.
- Safety fencing, safety barriers and new raised concrete verges shall be completed in conjunction with top soiling and grass seeding of the verges.
- Temporary scaffolding shall be erected as required to facilitate access and the bridge sections shall be lifted into place using a mobile crane.
- For site security and safety purposes, temporary lighting will be used.

Completion of Works

- Once works are completed and the areas surrounded by the bunding are no longer required during construction, the watercourse diversion shall be removed.
- Damming measures will be removed in reverse order to the way they were put in.
- Traffic management measures shall then be removed and the pedestrian bridge shall be opened.
- The site compound shall be removed.
- The lands within the site boundaries shall be reinstated through top soiling and grass seeding as required.
- Materials arising from excavation/demolition be segregated on site/be stored temporarily/ removed from site and disposed in an approved licenced facility.
- The area shall be snagged, tidied up and handed over to Kilkenny County Council.

Materials to be Used on Site will include: -

- Reinforcement Steel
- Structural Steel (coatings to be applied offsite)
- Concrete
- Bridge Bearings
- Stone & Mortar
- Timber
- Light fittings and ancillary products required to install pedestrian/public lighting.

Areas to be Removed/Changed will comprise: -

- The pier will result in the permanent removal of 1m^2 of instream habitat;
- There will be removal/disturbance to a 3m wide riparian habitat along the eastern length of the works, with reinstatement where possible; and
- There will be the removal/disturbance of river bed from the bunding measure in the immediate area of the proposed work, it will be reinstated on completion of the works.

High Level Programme

The following is an overview of the timing on the works however is subject to receipt of planning and statutory consents:

- Construction works are envisaged to last for a period of 6 months from Mobilisation to Completion commencing in Q2 2020.
- In-stream works to be complete during IFI approved seasonal window July - September;

4 EXISTING AQUATIC ENVIRONMENT

4.1 Methodology

A description of the existing environment is based on a desktop study and site survey. The site survey was carried out on 24th September 2018 by RPS Ecologists, Conor Ruane and Letizia Cocchiglia.

The site visit involved a walkover survey for sensitive receptors. An aquatic survey was carried out which covered:

- Water quality (Q-Value);
- Annex II species habitat survey (white-clawed crayfish, salmon and lamprey spp); and
- Annex I habitat survey.

The Crayfish survey comprised of a presence/absence survey and was conducted following the standard manual search approach and using a bathyscaphe (Peay, 2003[1]) and under licence from the NPWS.

Further detail on the methodology adapted for these surveys is included in the aquatic report in **Appendix B** of this report.

The proposed footbridge is located over the River Barrow and River Nore SAC and, as a result of this, the existing environment is discussed in terms of potential links to the qualifying interests of the River Barrow and River Nore SAC.

Crayfish Plague has been previously recorded in the Barrow catchment. A ban which has since been lifted was imposed on commercial and private use of the river system from September 2017 to March 2018. The necessary bio-security measures were taken before and after entering the water body during site survey work.

4.2 Site Description

The land in the project area is predominantly comprised of park, urban area and fields of improved pasture. There is an area of mixed woodland to the west of the project area comprised of ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*) and alder (*Alnus glutinosa*). To the east, the bridge will be positioned in an area of parkland. This parkland is comprised of mostly improved grassland and mature ash (*Fraxinus excelsior*), beech, horse chestnut (*Aesculus hippocastanum*) and sycamore (*Acer pseudoplatanus*). North of the existing bridge, there is a small area of land close to the eastern bank. This area is comprised of mostly terrestrial plants including alder, willow herb, bramble and Japanese knotweed *(Fallopia japonica)*. This area does not appear to be part of the river bed but would be considered to be a riparian area and would likely flood when the river is in spate.

The site of the proposed bridge works intersects two watercourses; 'Dinin [North]' (EPA Code: 15D07) and 'Ardra' (EPA Code: 15A15). The watercourses are all part of the Dinin [North]_SC_010 sub-catchment. The [Dinin North] flows in a south westerly direction through Castlecomer Town before flowing into the Nore. The Nore then continues through Kilkenny City and eventually enters the Barrow Suir Nore Estuary approximately 90km downstream of Castlecomer Town. The Dinin River is designated as a Special Area of Conservation for a number of water dependant habitat and species along with a small amount of terrestrial habitat. As detailed above, the Dinin River flows into the Nore which is a Special Protection Area and is designated for Kingfisher (*Alecdo atthis*).

[1] Peay. S. (2003). *Monitoring the White-clawed Crayfish* Austropotamobius pallipes. Conserving Natura 2000 Rivers Monitoring Series No. 1, English Nature, Peterborough.

Where the bridge will span the Dinin River, the river is a 4th Order river with a wet width of approximately 22m and 20-40cm deep. At the time of the visit, water levels were low. The substrate of the centre of the channel is dominated by gravels and cobbles while, in the margins, boulder is most common. The aquatic habitats within the reach were primarily glides, riffles and runs. A large weir is situated across the width of the river from the first abutment on the right hand side facing downstream north of the bridge at a 45° angle to the bridge.

4.2.1 Invasive Species

A desktop search for the Dinin River and its surrounding environs was carried out using the National Biodiversity Data Centre (NBDC) database in September 2018 and again in March 2019. A 10km square study area was analysed. The results are included in **Table 4.1**. The only invasive terrestrial plant species found onsite during the site walkover survey in September 2018 were; Japanese knotweed (*Fallopia japonica)*, Cherry laurel (*Prunus laurocerasus)* and Canadian pond weed (*Elodea Canadinses)*. Japanese knotweed and the Cherry laurel were found on the left bank facing downstream on a point of land between the Dinin and Ardra confluence (see **Plate 4.1**). Canadian pondweed (*Elodea Canadinses*) was found immediately upstream of the weir within the Dinin River during the site walkover on 24th September 2018.

Table 4-1: Non-Native Terrestrial Plant Species Recorded within 10km Grid Square Sections throughout the Study Area and Outer Environs (NBDC Database)

Scientific Name	Common Name	Date of Last Record	Legislation (Third Schedule of the EC Birds and Natural Habitats Regs 2011)	Risk Assessment	EU Invasive Alien Species of Union Concern
Anser anser	Greylag Goose	31/12/2011	Listed	High Impact Invasive	Not listed
Elodea canadensis	Canadian Pondweed	07/07/2015	Listed	High Impact Invasive	Not listed
Prunus laurocerasus	Cherry Laurel	22/08/2003	Not Listed	High Impact Invasive Species	Not listed
Leycesteria formosa	Himalayan Honeysuckle	22/07/2013	Not Listed	Medium Impact Invasive Species	Not listed
Fallopia japonica	Japanese Knotweed	28/04/2010	Listed	High Impact Invasive	Not listed
Acer pseudoplatanus	Sycamore	31/08/2013	Not Listed	Medium Impact Invasive Species	Not listed
Tandonia budapestensis	Budapest Slug	05/04/1971	Not Listed	Medium Impact Invasive Species	Not listed
Cornu aspersum	Common Garden Snail	05/04/1971	Not Listed	Medium Impact Invasive Species	Not listed
Potamopyrgus antipodarum	Jenkins' Spire Snail	05/04/1971	Not Listed	Medium Impact Invasive Species	Not listed
Candidula intersecta	Wrinkled Snail	31/12/1903	Not Listed	Medium Impact Invasive Species	Not listed

Scientific Name	Common Name	Date of Last Record	Legislation (Third Schedule of the EC Birds and Natural Habitats Regs 2011)	Risk Assessment	EU Invasive Alien Species of Union Concern
Mustela vison	American Mink	31/03/2015	Listed	High Impact Invasive	Not listed
Myodes glareolus	Bank Vole	04/08/2012	Not Listed	Medium Impact Invasive Species	Not listed
Rattus norvegicus	Brown Rat	11/06/2017	Listed	High Impact Invasive	Not listed
Sciurus carolinensis	Eastern Grey Squirrel	31/12/2012	Listed	High Impact Invasive Species	Not listed
Oryctolagus cuniculus	European Rabbit	07/12/2013	Not Listed	Medium Impact Invasive Species	Not listed
Crocidura russula	Greater White-toothed Shrew	21/03/2014	Not Listed	Medium Impact Invasive Species	Not listed
Mus musculus	House Mouse	02/10/2012	Not Listed	High Impact Invasive Species	Not listed

4.2.2 Surface Water

As part of the EPA's Water Framework monitoring of the Dinin River, Q-value samples have been recorded upstream at the Massford Bridge station and downstream at the Dysart Bridge station with a Pre-WFD station at the works location at the 'Dinin (North) - Br in Castlecomer' (see **Table 4.2**). The overall WFD status for the Dinin (North)_040 waterbody for 2010-2015 was 'Good' status (this includes the Ardra tributary). The WFD parameters which contribute to this status and the results for this section of the Dinin River are detailed in **Table 4.2** below**.**

The Dinin (North)_040 risk characterisation is under review, further downstream of the Dinin (Main Channel)_010 '*Not At risk'* of failing to meet the WFD environmental objectives and, currently, there are no measures in place to improve its water quality to Good status (Areas for Action under the second cycle of the River Basin Management Plan 2018-2021).

Figure 4.1 shows the proximal watercourses in relation to the proposed works. The watercourses that the proposed works have the potential to interact with and their available water quality data are identified below in **Table 4.2**.

Figure 4-1: Proximity to Watercourses

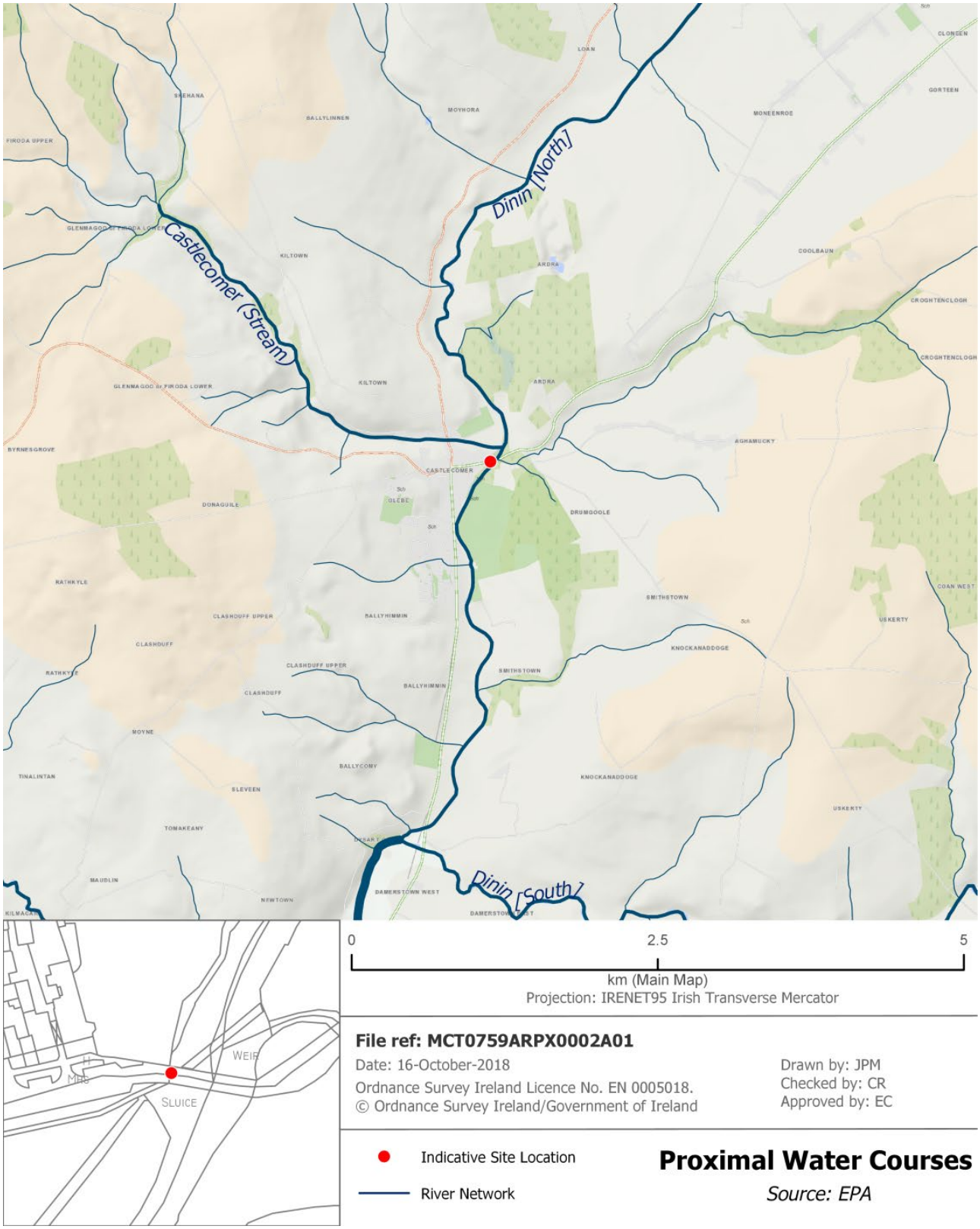


Table 4-2: River Water Quality Through Time

EPA Waterbody Name	Code	Risk	WFD Status 2007-2009	WFD Status 2010-2012	WFD Status 2010-2015
Dinin (North)_040	IE_SE_15D070400	In review	Not monitored	Poor	Good

Table 4-3: Photos of Site Visit

Plate 4.1: Japanese Knotweed (North of Castlecomer Road Bridge)

Plate 4.2: The Ardra River Upstream of Castlecomer Bridge

Plate 4.3: Crayfish Survey Site Downstream of Castlecomer Bridge

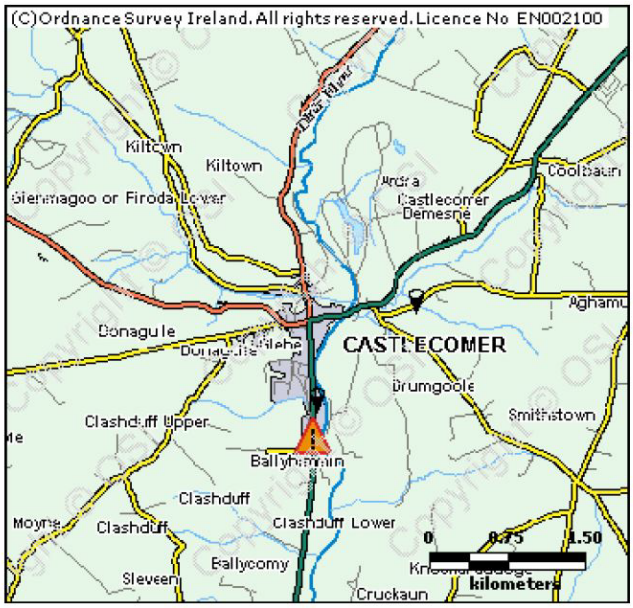
Plate 4.4: Over Hanging Trees Downstream of Castlecomer Bridge

4.2.3 Flooding

A search of the Office of Public Works National Flood Hazard Mapping website (www.floodmaps.ie) was carried out to obtain information on the flood history of the study area. One historic flood event was recorded in the vicinity of the proposed site location as can be seen in **Figure 4.2**.

The nearest recorded flood events are located in between Ballyhimmin N78 near Castlecomer on November 5th, 2000. Due to the recent flooding occurrences at this site, necessary measures should be taken into consideration during the construction of the proposed footbridge.

Figure 4-2: Flood Events in the Vicinity of the Proposed Works



Map Scale 1:62,129

Map Legend	
	Flood Points
	Multiple / Recurring Flood Points
	Areas Flooded
	Hydrometric Stations
	Rivers
	Lakes
	River Catchment Areas
	Land Commission *
	Drainage Districts *
	Benefiting Lands *

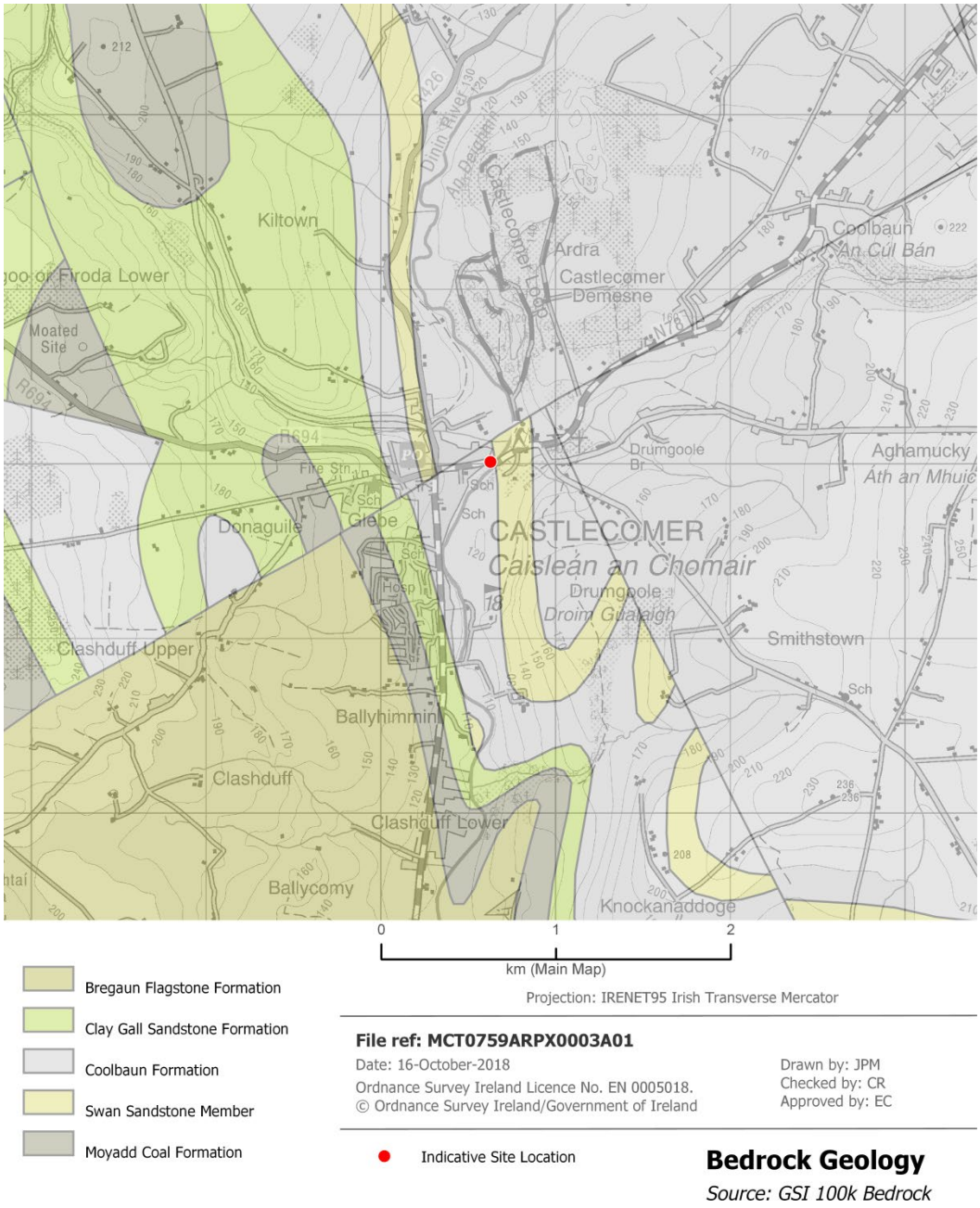
* Important: These maps do not indicate flood hazard or flood extent. Thier purpose and scope is explained in the Glossary.

4.2.4 Soils, Geology and Hydrogeology

The Geological Survey of Ireland (GSI) online database (www.gsi.ie) was consulted for available edaphic, geological and hydrological information of the site and its environs.

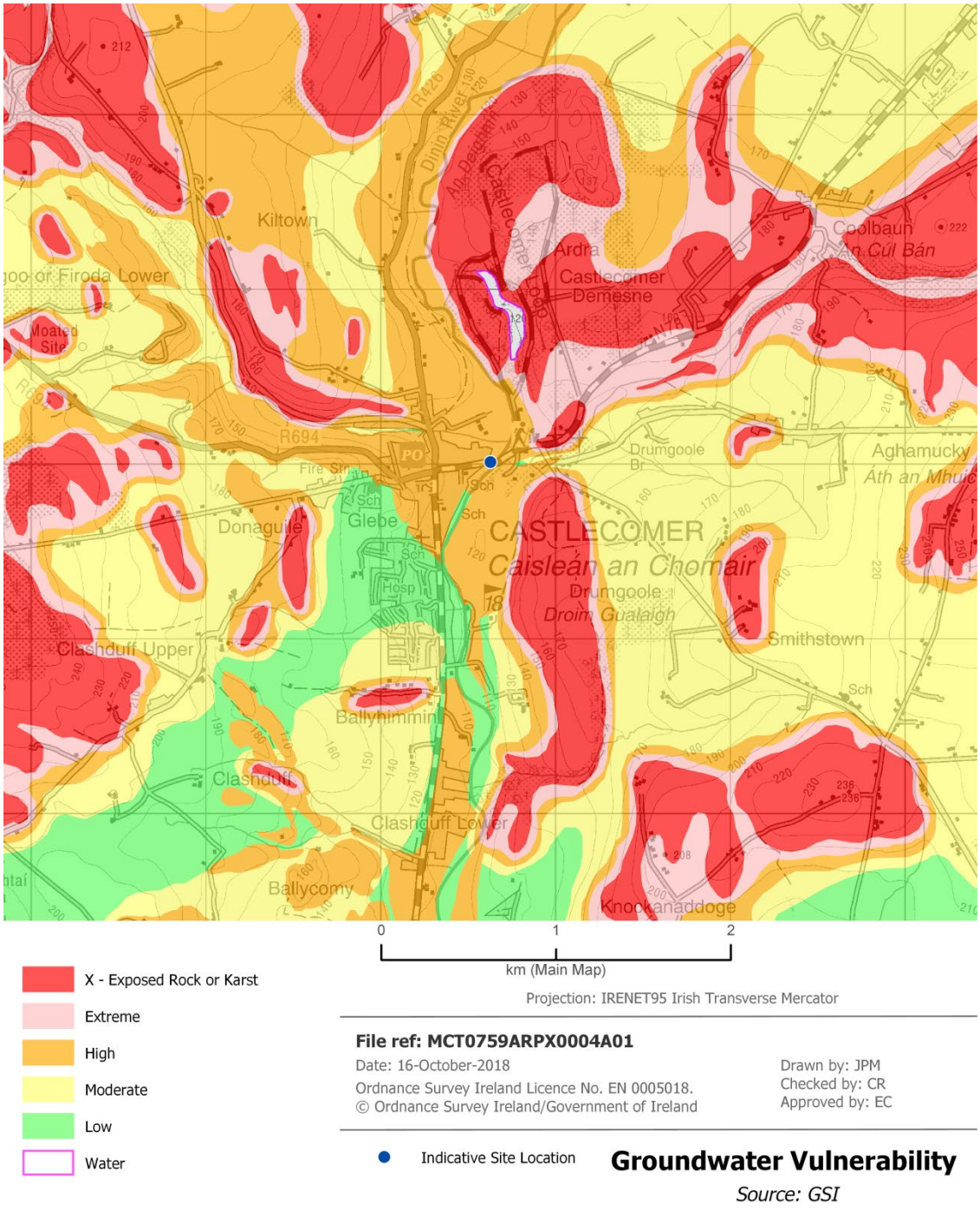
The entire site is underlain by 'Coolbaun Formation' which is described as "Shale and sandstone with thin coals" as can be seen in **Figure 4.3**.

Figure 4-3: Bedrock Formations in the Vicinity of the Proposed Works



Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease at which groundwater may be contaminated by human activities. The groundwater vulnerability within the area around the bridge is underlain by 'high' vulnerability. To the south of the site there is 'low vulnerability and 'high vulnerability' to the north with a section of 'Rock at or near Surface or Karst'. The groundwater vulnerability at the proposed works and in the vicinity is displayed in **Figure 4.4**.

Figure 4-4: Groundwater Vulnerability in the Vicinity of the Proposed Works



4.3 European Sites within the ZOI

This stage of the screening for AA outlines the proposed projects zone of influence (ZoI) and describes the European sites within this ZoI. Current guidance (DEHLG, 2010) on the ZoI to be considered during the Screening for AA states the following:

> *"A distance of 15km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson et al., 2006). For projects, the distance could be much less than 15km, 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".*

A 15km buffer zone has been chosen as a precautionary measure, to ensure that all potentially affected European sites are included in the screening process, which is in line with *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (DoEHLG, 2009, Rev. 2010) . However, given the project constraints with regards the location of proposed infrastructure, the presence of nutrient sensitive habitats/ground water dependant habitats downstream of Castlecomer, the potential zone of influence was expanded to include the entire catchment, e.g., Nore_15 WFD Catchment and all European Sites contained therein. For example, the ZoI for the freshwater pearl mussel (*Margaritifera durrovensis and Margaritifera margaritifera*) is likely to be on a catchment scale owing to their life cycle.

In the case of the current project and in consideration of the catchment and sub-catchments in which the proposed project will occur, a 15km ZoI is considered appropriate along with any additional protected sites hydrologically connected downstream of the Dinin River (15D070400) and within the Dinin [North]_SC_010 sub-catchment to ensure that all potentially affected European sites are included in the screening process. The ZoI for hydrological downstream connections was terminated at the Barrow/Suir/Nore estuary located >100km downstream of the proposed works. Given the scale and nature of the works, this is considered to be a significant distance and encompasses the entire River Barrow and River Nore SAC.

The integrity of a European site (referred to in *Article 6.3* of the EU Habitats Directive) is determined based on the conservation status of the QIs or SCIs of the SAC or SPA. The QIs/SCIs for each site[2] have been obtained through a review of the COs available from the NPWS website www.npws.ie.

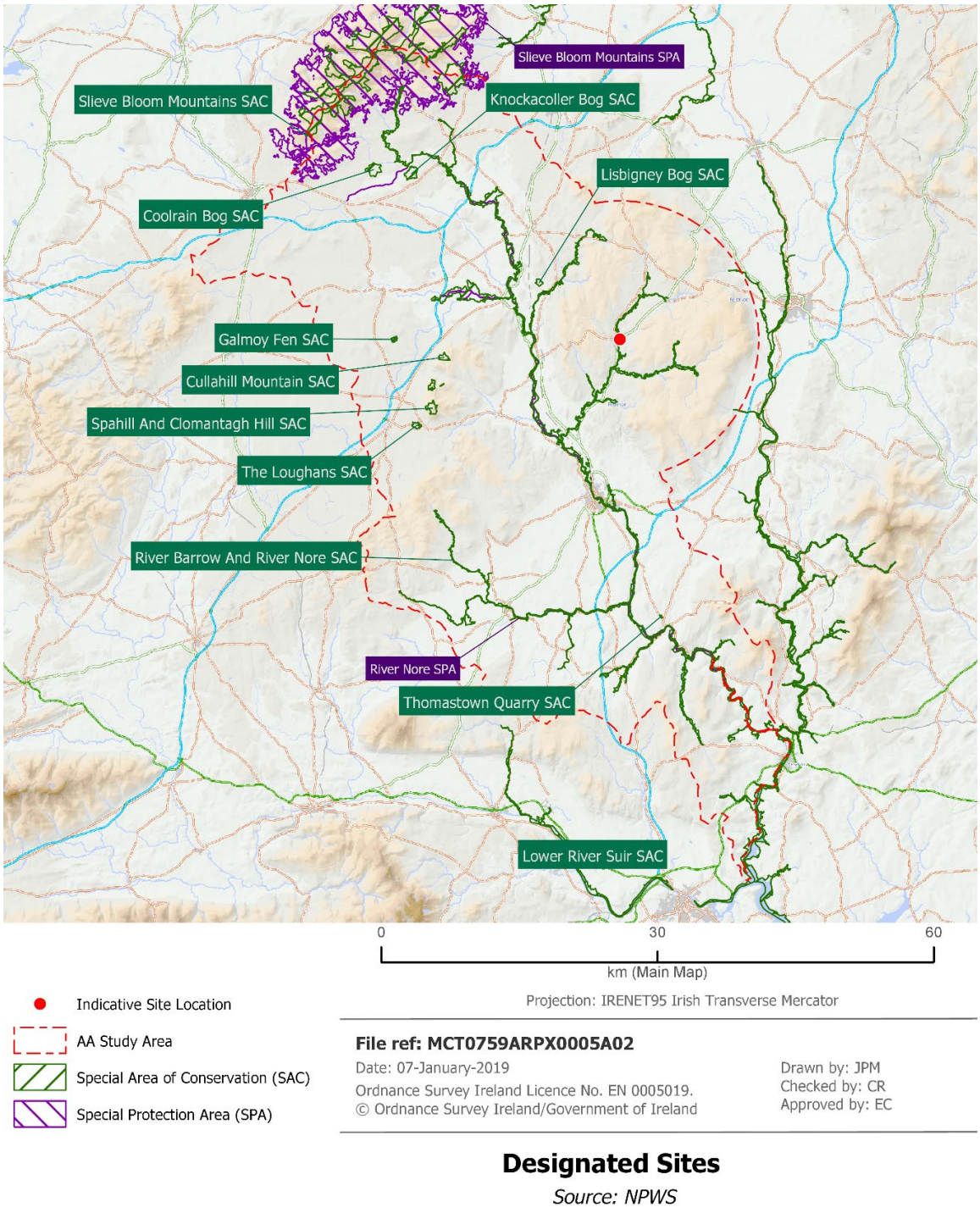
The European sites located within Dinin [North]_SC_010 sub catchment and 15km of proposed access road are shown on **Figure 4.5** and listed below**:-**

1. Lower River Suir SAC (Site Code: 002137)
2. The Loughans SAC (Site Code: 000407)
3. Slieve Bloom Mountains SAC (Site Code: 000412)
4. Cullahill Mountain SAC (Site Code: 000831)
5. Spahill And Clomantagh Hill SAC (Site Code: 000849)
6. Lisbigney Bog SAC (Site Code: 000869)
7. Galmoy Fen SAC (Site Code: 001858)
8. River Barrow and River Nore SAC (Site Code: 002162)
9. Thomastown Quarry SAC (Site Code: 002252)

[2] The habitats and species for which this site is designated.

10. Coolrain Bog SAC (Site Code: 002332)
11. Knockacoller Bog SAC (Site Code: 002333)
12. Slieve Bloom Mountains SPA (Site Code: 004160)
13. River Nore SPA (Site Code: 004233)

Figure 4-5: European Sites Located within 15km Buffer Zone Proposed Dinin Footbridge



Connectivity from the development site to the European sites has been reviewed and a complete table of European Sites within the ZoI is included in **Appendix C**. Connectivity is identified via the potential source-pathway-receptor chain, along with any hydrological connectivity which may support direct or indirect connectivity to European Sites.

The site is located within the boundary of the River Barrow and River Nore SAC. As outlined in **Table 4.4** below, the River Barrow and River Nore SAC is directly connected with the works and the River Nore SPA is connected hydrologically with the Dinin River.

The River Nore SPA is located 9km (as the crow flies) from the works and shares a remote hydrological connection with the works 17.2km downstream of the works. The SPA is designated for Kingfisher only. Kingfisher territories may extend up to 3/5 km[3], the distance from the River Nore SPA is outside of the Kingfisher range and, therefore, the footbridge works will not have a direct impact on the species of Kingfisher in the River Nore SPA. Kingfisher require steep or vertical earthen banks to excavate a nest and this habitat is not present within the proposed development area.

Given the downstream connection with the works, there may be an indirect impact on Kingfisher food source and this will be considered as part of this appropriate assessment screening process.

It should be noted that there may, however, be loss of trees from the right bank facing downstream which may be used by Kingfisher for perching. It is unlikely that these would be species from the Nore SPA given the distance of the proposed work from the Nore SPA and the range for Kingfisher.

The Dinin River flows into the River Nore 17.2km downstream of the proposed footbridge site. The Nore joins the River Barrow northeast of New Ross. East of Waterford City, the Barrow and Suir meet; there is, therefore, potential connectivity with the Lower River Suir SAC 88km from the works site via the Dinin River and River Barrow. However, as the Lower River Suir SAC is located upstream of the River Barrow, only species which may migrate into the upper catchment are considered as part of this assessment.

Due to potential connectivity with the River Barrow and River Nore SAC, River Nore SPA and Lower River Suir SAC, these sites are further assessed below in **Table 4.4**.

There are a number of SACs and SPAs located in the catchment upstream of the proposed works. However, these sites are not designated for species which may migrate into/out from the lower catchment or habitats which would be impacted by changes downstream and have, therefore, been screened out (see **Table 4.4**). These sites are the following;

1. Slieve Bloom Mountains SAC
2. Coolrain Bog SAC
3. The Loughans SAC
4. Knockacoller Bog SAC

The proposed works are not connected (hydrologically or via terrestrial pathways) to the following SAC and SPA within the catchment:

1. Slieve Bloom Mountains SAC
2. Spahill And Clomantagh Hill SAC
3. Lisbigney Bog SAC
4. Galmoy Fen SAC

[3] https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/kingfisher/breeding-feeding-territory/

5. Thomastown Quarry SAC

6. Cullahill Mountain SAC

Therefore, European sites 1-10 will not be considered within the Zone of Influence and will not be brought forward for further assessment. Please see **Table 4.4** for qualifying interest of each site listed above.

Tables 4.4 provides details on the Qualifying Interests of the European sites which will be assessed for potential impact as a result of Footbridge and the distances and connectivity from the proposed development to the European Sites.

Table 4-4: European Sites (SAC and SPA) Supporting Connectivity to the Proposed Works

Site Name	Site Code	Qualifying Habitats	Qualifying Species	Distance from Proposed Works	Connectivity
River Barrow and River Nore SAC	002162	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] European dry heaths [4030] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Petrifying springs with tufa formation (Cratoneurion) [7220] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	*Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] *Margaritifera* (Freshwater Pearl Mussel) [1029] *Austropotamobius pallipes* (White-clawed Crayfish) [1092] *Petromyzon marinus* (Sea Lamprey) [1095] *Lampetra planeri* (Brook Lamprey) [1096] *Lampetra fluviatilis* (River Lamprey) [1099] *Alosa fallax* (Twaite Shad) [1103] *Salmo salar* (Salmon) [1106] *Lutra* (Otter) [1355] *Trichomanes speciosum* (Killarney Fern) [1421] *Margaritifera durrovensis* (Nore Pearl Mussel) [1990]	*0.00 km (as the crow flies)*	*The Castlecomer Footbridge project is located within the boundary of the SAC.*
Lower River Suir SAC	0002137	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410]	*Margaritifera* (Freshwater Pear Mussel) [Site Code: *1029}* *Austropotamobius pallipes* (White-clawed Crayfish) *[1092]*		

Site Name	Site Code	Qualifying Habitats	Qualifying Species	Distance from Proposed Works	Connectivity
		Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Taxus baccata woods of the British Isles [91J0]	*Petromyzon marinus (Sea Lamprey) [1095]* *Lampetra planeri (*Brook Lamprey) *[1096]* *Lampetra fluviatilis (*River Lamprey) [*1099]* *Alosa fallax (*Twaite Shad) [*1103]* *Salmo salar (Salmon) [1106]* *Lutra (Otter) [1355]*	43.8 km (as the crow flies) 88km downstream	Indirectly hydrologically connected via the Dinin River, Nore and Barrow.
River Nore SPA	004233	N/A	Kingfisher (*Alcedo atthis*) [A229]	9.13 km (as the crow flies) 17.2km downstream	Remote indirect hydrological connectivity. The River Nore SPA is located 17.2km downstream from the works

4.4 Conservation

The integrity of a European site (referred to in Article 6.3 of the EU Habitats Directive) is determined based on the conservation status of the qualifying features of the SAC as set out above.

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

Favourable conservation status of a habitat is achieved when:

- Its natural range, and the area it covers within that range, are stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- The conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

4.4.1 River Barrow and River Nore SAC

4.4.1.1 Site Description

Relevant extracts from the NPWS River Barrow and River Nore SAC site synopsis are presented below. The full site synopsis can be seen at the following link:

https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002162.pdf.

This site consists of the freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains and it also includes the tidal elements and estuary as far downstream as Creadun Head in Waterford. The site passes through eight counties – Offaly, Kildare, Laois, Carlow, Kilkenny, Tipperary, Wexford and Waterford.

Good examples of alluvial forest (a priority habitat on Annex I of the EU Habitats Directive) are seen at Rathsnagadan, Murphy's of the River, in Abbeyleix estate and along other shorter stretches of both the tidal and freshwater elements of the site. Typical species seen include Almond Willow (*Salix triandra*), White Willow (S. alba), Rusty Willow (*S. cinerea subsp. oleifolia*), Crack Willow (*S. fragilis*) and Osier (*S. viminalis*), along with Iris (*Iris pseudacorus*), Hemlock Water-dropwort (*Oenanthe crocata*), Wild Angelica (*Angelica sylvestris*), Thin-spiked Wood-sedge (*Carex strigosa*), Pendulous Sedge (*C. pendula*), Meadowsweet (*Filipendula ulmaria*), Common Valerian (*Valeriana officinalis*) and the Red Data Book species Nettle-leaved Bellflower (*Campanula trachelium*).

The site is very important for the presence of a number of EU Habitats Directive Annex II animal species including Freshwater Pearl Mussel (both *Margaritifera* and *M. m. durrovensis*), White-clawed Crayfish, Salmon, Twaite Shad, three lamprey species – Sea Lamprey, Brook Lamprey and River Lamprey, the tiny Desmoulin's whorl snail (*Vertigo moulinsiana*) and Otter. This is the only site in the world for the hardwater form of the Freshwater Pearl Mussel, *M. m. durrovensis*, and one of only a handful of spawning grounds in

the country for Twaite Shad. It should be noted that Nore Freshwater Pearl Mussel, *M. m. durrovensis* is only found in the Nore River and not the River Barrow.

4.4.1.2 Qualifying Interests

The water dependent qualifying interest species and habitats found within the River Barrow and River Nore SAC are set out below in **Table 4.5** and **Table 4.6.** Threats and impacts for European sites are presented in the Natura 2000 data form (2014-2019) for each site. Threats and impacts to Annex I habitats and Annex II species protected under the EU Habitats Directive are also outlined in the NPWS 2013 document '*The Status of EU Protected Habitats and Species in Ireland*'[4] see **Table 4.7**.

Table 4-5: Qualifying Species of the River Barrow and River Nore SAC

Species (Annex II) of the EU Habitats Directive	Habitat/Species Code	Population Significance[5]
Vertigo moulinsiana (Desmoulin's Whorl Snail)	1016	B
Margaritifera (Freshwater Pearl Mussel)	1029	C
Austropotamobius pallipes (White-clawed Crayfish)	1092	C
Petromyzon marinus (Sea Lamprey)	1095	C
Lampetra planeri (Brook Lamprey)	1096	C
Lampetra fluviatilis (River Lamprey)	1099	C
Alosa fallax fallax (Twaite Shad)	1103	B
Salmo salar (Salmon)	1106	C
Lutra lutra (Otter)	1355	C
Trichomanes speciosum (Killarney Fern)	1421	B
Margaritifera durrovensis (Nore Pearl Mussel)	1990	A

[4] Article 17 & Article 11 Reports: http://www.npws.ie/article-17-reports-0/article-17-reports-2013

[5] Size and density of the population of the species present on the site in relation to the populations present within national territory. A: 100% >= p > 15% B: 15% >= p > 2% C: 2% >= p > 0% D: non-significant population

Table 4-6: Qualifying Habitats of the River Barrow and River Nore SAC

Habitats (Annex I) of the EU Habitats Directive	Habitat Code	% Cover (approx.) ha	Representatively[6]
Mudflats and sandflats not covered by seawater at low tide	1140	925.6891	B
Salicornia and other annuals colonizing mud and sand	1310	0.0274	C
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	1330	34.7475	A
Mediterranean salt meadows (*Juncetalia maritimi*)	1410	0.1182	A
Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	3260	123.73	A
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	6430	123.73	B
* Petrifying springs with tufa formation (*Cratoneurion*)	7220	123.73	B
* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae*)	91E0	110.0709	A

*Indicates priority habitat.

Site specific conservation objectives were published in June 2011 for River Barrow and River Nore SAC (NPWS, 2011). This document provides specific attributes and targets by which the maintenance of favourable conservation condition of qualifying interests within River Barrow and River Nore SAC is measured. Site specific Conservation Interests for River Barrow and River Nore SAC are detailed on the NPWS website at:

https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf

4.4.1.3 Potential Pressures and Threats to European Sites

Table 4.7 presents threats, pressures and negative impact activities that represent negative impacts to the River Barrow and River Nore SPA site as quoted on the Natura 2000 Data Forms for those screened in European sites.

[6] The degree of representatively of the natural habitat type on the site: A : excellent representatively, B : good representatively, C : significant representatively and D: non-significant presence.

Table 4-7: Potential Pressures and Threats to European Sites River Barrow and River Nore SAC

European Site	Threat Code[7]	Threat Type	Rank [8]	i (inside) / o (outside)/ b (both)[9]
River Barrow and River Nore SAC	A04.01.01	Intensive cattle grazing	M	i
	H01	Pollution to surface waters (limnic, terrestrial, marine & brackish)	H	b
	J02.06	Water abstractions from surface waters	H	i
	B05	Use of fertilizers (forestry)	M	b
	B02	Forest and Plantation management & use	M	i
	F02.01.02	Netting	L	i
	M01	Changes in abiotic conditions	M	i
	A10.01	Removal of hedges and copses or scrub	L	i
	F02	Fishing and harvesting aquatic resources	M	i
	J02.12.02	Dykes and flooding defence in inland water systems	H	i
	F01.01	Intensive fish farming, intensification	L	I
	F02.03	Leisure fishing	L	i
	C01.03	Peat extraction	M	o
	J02.05.02	Modifying structures of inland water courses	H	i
	C01.01.01	Sand and gravel quarries	L	i
	J03.02.01	Reduction in migration/ migration barriers	M	I
	I01	Invasive non-native species	M	i
	J02.02.01	Dredging/ removal of limnic sediments	M	i
	K01.01	Erosion	H	i
	E02	Industrial or commercial areas	L	o
	J02	Human induced changes in hydraulic conditions	M	b
	B07	Forestry activities not referred to above	M	b
	A02.01	Agricultural intensification	H	b
	D03.01	Port areas	L	i
	B02.01.01	Forest replanting (native trees)	L	b

[7] Threat code follows reference list provided on threats, pressures and activities for European sites.

[8] Threat, pressure and impact ranking H – High, M – Medium, L – Low.

[9] Inside (i),outside (o) or both (b) of European site.

4.4.2 Lower River Suir SAC

4.4.2.1 Site Description

Relevant extracts from the NPWS Lower River Suir site synopsis are presented below. The full site synopsis can be seen at the following link:

https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002137.pdf

The site is of particular conservation interest for the presence of a number of Annex II animal species, including Freshwater Pearl Mussel (both *Margaritifera margaritifera* and *M. margaritifera* subsp. *durrovensis* occur), White-clawed Crayfish, Salmon, Twaite Shad (*Alosa fallax fallax*), three species of Lampreys - Sea Lamprey, Brook. Lamprey and River Lamprey, and Otter. This is one of only three known spawning grounds in the country for Twaite Shad.

The Lower River Suir contains excellent examples of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland. Parts of the site have also been identified as of ornithological importance for a number of Annex I (EU Birds Directive) bird species, including Greenland White-fronted Goose (10), Golden Plover (1,490), Whooper Swan (7) and Kingfisher. Figures given in brackets are the average maximum counts from four count areas within the site for the three winters 1994-1997. Wintering populations of migratory birds use the site.

4.4.2.2 Qualifying Interests

The migratory species within the Lower River Suir SAC are set out below in **Table 4.8**. The qualifying interest habitats and the remaining species of the Lower River Suir SAC are either located greater than 80km downstream or not found within the Nore/Suir transitional area. Owing to this distance or lack of connectivity, they are not considered further as part of this assessment. Threats and impacts for the Lower River Suir SAC are presented in the Natura 2000 data form (2014-2019) for each site. Threats and impacts to Annex I habitats and Annex II species protected under the EU Habitats Directive are also outlined in the NPWS 2013 document '*The Status of EU Protected Habitats and Species in Ireland*'[10] see **Table 4.9**.

Table 4-8: Qualifying Species of the Lower River Suir SAC to assessed

Habitat/Species Code	Species (Annex II) of the EU Habitats Directive	Population Significance[11]
1029	*Margaritifera margaritifera* (Freshwater Pearl Mussel)	C
1092	*Austropotamobius pallipes (*White-clawed Crayfish)	C
1095	*Petromyzon marinus (Sea Lamprey)*	C
1096	*Lampetra planeri (Brook Lamprey)*	C
1099	*Lampetra fluviatilis (River Lamprey)*	C
1103	*Alosa fallax* (Twaite Shad)	C
1106	*Salmo salar (Salmon)*	C
1355	*Lutra lutra (Otter)*	C

[10] Article 17 & Article 11 Reports: http://www.npws.ie/article-17-reports-0/article-17-reports-2013.

[11] Size and density of the population of the species present on the site in relation to the populations present within national territory. A: 100% >= p > 15% B: 15% >= p > 2% C: 2% >= p > 0% D: non-significant population.

4.4.2.3 Potential Pressures and Threats to European Sites

Table 4.9 presents threats, pressures and negative impact activities that represent negative impacts to the Lower River Suir SAC as quoted on the Natura 2000 Data Forms for those screened in European sites.

Table 4-9: Threats, Pressures and Impact Activities to Lower River Suir SAC

European Site	Threat Code[12]	Threat Type	Rank [13]	i (inside) / o (outside)/ b (both)[14]
Lower River Suir SAC	J02.01.02	Reclamation of land from sea, estuary or marsh	L	i
	B	Sylviculture, forestry	L	o
	E03	Discharges	H	b
	D03.01	Port areas	L	b
	H01	Pollution to surface waters (limnic, terrestrial, marine and brackish)	H	b
	A08	Fertilisation	H	o
	J02.01	Landfill, land reclamation and drying out, general	M	b
	J02.12.02	Dykes and flooding defence in inland water systems	H	i
	A01	Cultivation	L	i
	I01	Invasive non-native species	L	i
	E01	Urbanised areas, human habitation	H	b

4.4.3 River Nore SPA

4.4.3.1 Site Description

The River Nore SPA is a long, linear site that includes the following river sections: the River Nore from the bridge at Townparks, (north-west of Borris in Ossory) to Coolnamuck (approximately 3 km south of Inistioge) in Co. Kilkenny; the Delour River from its junction with the River Nore to Derrynaseera bridge (west of Castletown) in Co. Laois; the Erkina River from its junction with the River Nore at Durrow Mills to Boston Bridge in Co. Laois; a 1.5 km stretch of the River Goul upstream of its junction with the Erkina River; the Kings River from its junction with the River Nore to a bridge at Mill Island, Co. Kilkenny. The site includes the river channel and marginal vegetation.

The site is a Special Protection Area (SPA) under the EU Birds Directive of special conservation interest for the following species: Kingfisher. A survey in 2010 recorded 22 pairs of Kingfishers (based on 16 probable and 6 possible territories) within the SPA. Other species which occur within the site include Mute Swan (35),

[12] Threat code follows reference list provided on threats, pressures and activities for European sites.

[13] Threat, pressure and impact ranking H – High, M – Medium, L – Low.

[14] Inside (i),outside (o) or both (b) of European site.

Mallard (267), Cormorant (14), Grey Heron (45), Moorhen (14), Snipe (17) and Sand Martin (1,029) – all figures are peak counts recorded during the 2010 survey.

The River Nore SPA is of high ornithological importance as it supports a nationally important population of Kingfisher, a species that is listed on Annex I of the EU Birds Directive.

4.4.3.2 Qualifying Interests

Table 4.10 shows the qualifying interest of the River Nore SPA.

Table 4-10: Qualifying Species of the River Nore SPA

Habitat/Species Code	Species (Annex II) of the EU Habitats Directive	Population Significance[15]
A229	*Alcedo atthis* (Kingfisher)	C

4.4.3.3 Potential Pressures and Threats to European Sites

Table 4.11 presents threats, pressures and negative impact activities that represent negative impacts to the River Nore SPA as quoted on the Natura 2000 Data Forms for those screened in European sites.

Table 4-11: Threats, Pressures and Impact Activities to River Nore SPA

European Site	Threat Code[16]	Threat Type	Rank [17]	i (inside) / o (outside)/ b (both)[18]
River Nore SPA	D03.01	Port areas	M	i
	J02.01	Landfill, land reclamation and drying out, general	M	o

Given that the works are situated directly within the River Barrow and River Nore SAC, the qualifying interests are explored in more detail below (see **Section 4.5**) and are assessed in **Section 5**. Whilst no direct impacts will occur to the River Suir SAC or the River Nore SPA, the potential for indirect impacts to mobile species and/or estuarine habitats within the River Suir SAC and River Nore SPA are assessed in **Section 5.**

4.5 Qualifying Interests of the River Barrow and River Nore SAC

As detailed in **Section 4.3**, the project footprint is within the River Barrow and River Nore SAC. The following is a review of existing records of the designated habitats and species of the River Barrow and River Nore SAC located within the area of the proposed works.

[15] Size and density of the population of the species present on the site in relation to the populations present within national territory. A: 100% >= p > 15% B: 15% >= p > 2% C: 2% >= p > 0% D: non-significant population.

[16] Threat code follows reference list provided on threats, pressures and activities for European sites.

[17] Threat, pressure and impact ranking H – High, M – Medium, L – Low.

[18] Inside (i),outside (o) or both (b) of European site.

4.5.1 Desmoilin's Whorl Snail (*Vertigo moulinsiana*)

The River Barrow and River Nore SAC is designated for desmoulin's whorl snail (*Vertigo moulinsiana*). There is no record of desmoulin's whorl snail on the NBDC within the Dinin River. '*Favourable*' habitat has been found in the upper section of the Barrow near Borris, along with populations which were found to be '*Unfavourable/Inadequate*' (*Monitoring and Condition Assessment of Populations of Vertigo geyeri, Vertigo angustior and Vertigo moulinsiana in Ireland, Moorkens, E.A. & Killeen, I.J, 2011).* A dedicated whorl snail survey was not conducted; however, a brief walkover survey was conducted: no species of desmoulin's whorl snail were noted during the walkover survey and the river did not contain favourable habitat for desmoulin's whorl snail, i.e., slow flowing water and small calcareous sedges (particularly *Carex viridula ssp. brachyrrhyncha*), associated fen mosses (particularly *Drepanocladus revolvens* and *Campyllium stellatum*).

4.5.2 Freshwater Pearl Mussel (*Margaritifera margaritifera*)

Freshwater pearl mussel (FWPM) (*Margaritifera margaritifera*) is a qualifying feature of the River Barrow and River Nore SAC. During a survey of the upper catchments of the Nore in 2009, a total of 167 live mussels were counted in the River Nore, (DEHLG, 2010). FWPM are not recorded in the Dinin at Castlecomer but have been recorded further downstream in the main channel near Dunmore.

The conservation objectives for this SAC indicate that the status of the FWPM as a qualifying Annex II species for the River Barrow and River Nore SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this species (NPWS, 2011). Under the Freshwater Pearl Mussel Regulations (SI No. 296/2009), the Dinin River is not designated for FWPMs and the desk top review revealed there are no known populations within this river[19]. FWPM populations are known within the Nore River which is listed within the Freshwater Pearl Mussel Regulations (SI No. 296/2009). The known populations are located upstream from the Castlecomer Footbridge at the Gully-Nore confluence and upstream of the Dinin-Nore confluence.

4.5.3 Nore Freshwater Pearl Mussel (*Margaritifera durravensis*)

Nore freshwater pearl mussel is also a QI of this SAC but is considered to only be present within the River Nore upstream of Ballyragget within the adjoining Nore_080 sub catchment. The single extant *M. durrovensis* population in the River Nore is un-viable and on the verge of extinction. The population is considered to be in unfavourable status based on the Freshwater Pearl Mussel Regulations 2009. Expert opinion has indicated that the current 300 adult mussels cannot sustain *M. durrovensis* into the future and that significant efforts are needed to increase the size of the population, (DEHLG, 2010).

4.5.4 White-clawed Crayfish (*Austropotamobius pallipes*) [1092]

NBDC records show that white clawed crayfish has been recorded at Dinin Bridge (North) close to where the works are to take place on the 21/07/2005. Also, from observation of historical sightings record by the NBDC, it appears White clawed crayfish are widespread in the Nore River catchment. NBDC records show the distribution of this species continues downstream to the confluence with the Nore River.

During an aquatic survey (see **Appendix B**) under taken at the site, no crayfish were found within the study area. Potentially good crayfish habitat was located up and downstream of the Castlecomer Footbridge Bridge (see **Plate 4.5**). However, the presence of large amounts of sediment below the boulders and cobbles reduced the quality of the habitat in this section of the river.

4.5.5 Lamprey sp.

During 2016 Water Framework Directive monitoring carried out by the IFI on the Dinin River, it was found that lamprey sp. was recorded at the Dinin Bridge monitoring station downstream of the proposed works site.

[19] https://www.npws.ie/maps-and-data/habitat-and-species-data/article-17.

Within the Nore main channel at Quakers Bridge, upstream of the Dinin confluence, Lamprey sp were identified in a 2008 IFI survey. In a survey report on the distribution of lamprey in Ireland, it is noted that "*P. marinus and L. planeri appear to be common in the River Nore catchment. P. marinus usually spawn in the lower reaches of the River Nore between Thomastown and Inistioge (W. Kopke), but sometimes as far as Ballyragget (P. Fitzmaurice; W. Kopke).Unspecified lampreys were observed in the upper reaches of the Nore, the Kings and the Munster and in the lower reaches of the Dinin (Lucey, in prep)"*(Kurz and Costello 1999). Therefore, there is a strong potential for salmon and lamprey sp. (brook and river) to use the habitat within the Dinin River. It is unlikely that *P. marinus* is present within the Dinin, but is known to regularly spawn in Thomastown, approximately 40km downstream of the proposed works (IFI, 2014). During the 2018 aquatic survey carried out by RPS, it was found that there was 'Poor to None' Lamprey spawning areas (i.e., no clean spawning gravels) within the works area. There was very limited lamprey nursery habitat, a small backwatered area on the left hand side of the bridge downstream, no mud/silt/sandy bed present but organic material such as deposited leaves, etc. Again, there was limited adult lamprey habitat up and downstream of the Castlecomer bridge.

4.5.6 Twaite Shad (*Alosa fallax*)

During a desktop survey, it was noted that Twaite shad have been captured by anglers at the top of the tide in the Nore, Suir and Munster Blackwater, but they are not generally found in the freshwater part of these rivers[20]. It is highly unlikely that Twaite shad occur within the area of the proposed works.

4.5.7 Atlantic Salmon (*Salmo salar*)

The Dinin River is not a designated salmonid river under SI No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988. However, it does feed into the Nore which is protected under the Salmonid River Regs (SI 293). During Water Framework Directive monitoring carried out by the IFI on the Dinin River, it was found that the River was of 'Good Status' for fish at the Dinin Bridge monitoring station downstream of the works site. The assessment was carried out in July 2016 using the area delineated electro-fishing method. *'Seven fish species were recorded at Dinin Bridge. Minnow was by far the most abundant species recorded in 2016, followed by salmon'*, (Inland Fisheries Ireland, 2016). Brown trout, European eel, minnow, stone loach, 3-spined stickleback and lamprey sp. were also observe during the survey.

On foot of the Aquatic Survey conducted by RPS, salmonid spawning habitat present was rated as *'Poor to None'* salmonid habitat downstream or upstream of the bridge. This is due to the thick layer of silt under the river substrate and the lack of clean gravel areas. Downstream of the Castlecomer Road Bridge, there were some signs of juvenile salmonid habitat with submerged boulders and overhanging vegetation providing suitable cover, shallow fast flowing water and coarse substrate.

4.5.8 Otter (*Lutra lutra*)

The site was assessed for signs of otter in the vicinity of the proposed footbridge works. Otters were surveyed for by looking for signs of otter activity such as spraint on ledges and rocks in the vicinity. No signs of otter activity (evidence of couches, slides, holts or spraints on either river bank upstream and downstream of the bridge) were identified during field walkover survey. During the desktop survey, it was found the works are located in a 10km square which has been identified as an area used by otter (NBDC). Otters are widespread in Ireland and, despite the lack of evidence, it is likely that otters are present in the area.

4.5.9 Killarney fern (*Trichomanes speciosum*)

There are no known recordings of Killarney Fern within the catchment. "*Widespread but sparse distribution away from the flat central plains. Greater focus in the south / south west of the country with smaller pockets*

[20] https://www.fisheriesireland.ie/fish-species/twaite-shad.html#ecology-life-history.

of records in the west, north and east" NBCD. Killarney fern is largely a terrestrial plant; it was not found during the September 2018 site visit and is unlikely to occur within the area of the proposed works.

4.5.10 Annex I Habitats

The following Annex I habitats are designated within the River Barrow and River Nore SAC:

- Estuaries [1130].
- Mudflats and sandflats not covered by seawater at low tide [1140].
- Reefs [1170].
- Salicornia and other annuals colonising mud and sand [1310].
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330].
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410].
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260].
- European dry heaths [4030].
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Petrifying springs with tufa formation (*Cratoneurion*) [7220].
- Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0].
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0].

Due to the freshwater nature and inland location of the site, the associated marine habitats for which the River Barrow and River Nore SAC is designated were not searched for during the site visit and considered not present.

During a desktop survey, the following Annex I habitat were identified as potentially being located within the survey area. 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion*, 3260' could be encountered as the proposed bridge project footprint is located within a 10km grid cell that intersects with known locations/positive record for the Annex I Habitat type '*Floating river vegetation (3260)'*.

With respect to 'Old sessile oak woods with Ilex and Blechnum in the British Isles, 91A0', no record has been found within project footprint but the Dinin River drains into a 10km grid square where 91A0 has been previously recorded.

During the site visit, no Annex I habitats designated for the River Barrow and River Nore SAC or otherwise were found on site. Habitats within the study area comprised mostly of mixed woodland and lowland river habitat. Bankside vegetation consisted of Horse chestnut, Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*), Willow herb (*Chamerion angustifolium*), Water Mint (*Mentha Aquatica*), Butterbur (*Petasites hybridus*), Water Figwort (*Scrophularia auriculata*), Bramble (*Rubus fruticosus*), Emergent aquatic vegetation consisted of Common Reed (*Phragmites australis*), and *Carex sp.*

Within the water column Common duck weed (*Lemna minor*), Kneiff's Feather-moss (*Leptodictyum riparium*), Wild Celery (*Apium*), Water Moss (*Fontinalis antipyretica*) and Red alga (*Hildenbrandia*) were common within the river. This habitat did not correspond to the aquatic Annex I habitat designated for the River Barrow and River Nore SAC.

5 SCREENING ASSESSMENT CRITERIA

5.1 Elements of the Project likely to Give Rise to Impacts on European Sites

Watercourse diversions are required to establish preparation for site investigation works and construction of foundations to be undertaken within the Dinin River. This is in order to allow for the pier to be constructed as detailed in **Section 3.2.** Access to the river bed and works will be from the eastern bank and within the main channel of the river. In the absence of specific protection measures, there is potential for contaminated water during site investigation works and construction stage to flow from the works area into the Dinin River and immediately into the River Barrow and River Nore SAC, River Nore SPA and potentially impact on waters used by qualifying species of the Lower River Suir SAC.

There is the potential during the construction phase of this project to release pollutants (sediments, hydrocarbons) which may impact the qualifying habitats and species of the River Barrow and River Nore SAC and the qualifying species and habitats of River Nore SPA River Suir SAC through deterioration in water quality.

In addition, due to the damming of the waterbody, there is the potential for a major temporary disruption to the regular flow of water into the downstream River Barrow and River Nore SAC.

5.2 Potential Direct, Indirect or Secondary Impacts of the Project on the European Sites

5.2.1 Size and Scale

The proposed works are within the boundaries of River Barrow and River Nore SAC site and may impact on the size or scale of that site. The Aquatic Survey (RPS) carried out in 2018 found poor-none salmonid and lamprey habitat; however, good crayfish habitat was located at the site. Due to the placement of abutments and piers and associated works in the river banks and bed, there is, therefore, the risk of permanently removing crayfish habitat from this section of the River Barrow and River Nore SAC.

There is potential for indirect impacts as a consequence of the footbridge through the risk of sedimentation impacts to the Dinin River, and through inadequate surface water management both during the site investigation works and construction phase of the proposed works. Indirect or secondary impacts on River Barrow and River Nore SAC, connected Lower River Suir SAC and River Nore SPA are, therefore, possible as a consequence of sedimentation and distribution of hydrometric flow impacts in particular.

5.2.2 Land Take

Approximately 120m^2 of land-take will occur within the River Barrow and River Nore SAC in order to construct the proposed pier and abutments (see **Appendix B**). This area represents approximately 0.0097% of the total area of the SAC (12367ha or 123670000m^2). No other removal of SAC or SPA habitat is linked to the works.

5.2.3 Distance from European Sites or Key Features of the Site

The nearest European site to the proposed footbridge works is the River Barrow and River Nore SAC; the proposed footbridge site is located within the boundary of this European Site.

5.2.4 Resource Requirements

The construction of the proposed footbridge will require the importation of construction material. Fuel will be consumed by construction equipment while water will be required for various construction practices.

5.2.5 Emissions

During the construction phase there is potential for emissions associated with the proposed project that may affect air quality. Emissions to air will include fine particulate matter associated with excavating and other construction practices.

There is potential for emissions to impact receiving watercourses as a result of proposed in-stream works within the Dinin River. In the absence of best practice construction measures, it highly likely that potential significant impacts will occur from the works. Potential emissions to water include sediment from site investigation works, excavation and piling for new bridge foundations.

Without robust control measures, there is the potential for cement to enter the aquatic environment through shuttering, reinforcement and concrete pours. Hydrocarbon contamination from refuelling machines could be released into the Dinin River if robust control measures are not implemented by the contractor.

These emissions could have potential negative impacts on the habitats and species of the River Barrow and River Nore SAC and on some of the mobile qualifying interests of the Lower River Suir SAC and River Nore SPA.

Given that the proposal is for a footbridge, during the operation stage there will be no additional emissions from vehicles as a consequence of the works.

5.2.6 Transport Requirements

The proposed footbridge works will require the importation of construction material for the footbridge. Transportation to and from site will be minimal given the size and scale of the proposed works.

5.2.7 Duration of Construction, Operation and Decommissioning

Construction works will take approximately 3 months while instream measures will be in place for the IFI instream works window (July – September).

The bridge will be in place permanently following construction and there are no plans to decommission.

5.2.8 Cumulative Impacts with other Plans and Projects in the Area

As part of the screening for an AA, in addition to the proposed road realignment, other relevant projects and plans in the area must also be considered at this stage. These plans and projects are considered further in this respect in **Table 5.1.**

Table 5-1: Projects or Plans which may Contribute to Cumulative or In-Combination Impacts

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT
Land Use and Spatial Plans		
Kilkenny County Council Planning Database	A search of the Kilkenny County Council planning database was carried out on the 6th of December 2018. This search identified permitted projects close to the works area or along the banks of the Dinin River which may in combination with the proposed project have an impact on the qualifying interests of the River Barrow and River Nore SAC. Those projects are as follows: Joseph Comerford (18231): The provision of underground gas tanks; The provision of an over-ground generator; All associated site development works. All works are to take place to the Avalon Inn Hotel, Castlecomer, Co Kilkenny. An updated search on 28th March 2019 found no additional planning applications within the study area.	There is potential for cumulative impact of emissions from both the Avalon Inn Hotel development and the Castlecomer footbridge project due to the potential release of pollutants into the Dinin River and River Barrow and river Nore SAC.
Kilkenny County Development Plan 2014-2020	To protect and, where possible, enhance the natural heritage sites designated under EU Legislation and National Legislation (Habitats Directive, Birds Directive, European Communities (Birds and Natural Habitats) Regulations 2011 and Wildlife Acts). This protection will extend to any additions or alterations to sites that may arise during the lifetime of this plan. To protect and, where possible, enhance the plant and animal species and their habitats that have been identified under European legislation (Habitats and Birds Directive) and protected under national Legislation (European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), Wildlife Acts 1976-2010 and the Flora Protection Order (SI94 of 1999).	A number of policies and objectives provide for the protection of the integrity of sites designated under European and National legislation and ecological works. The Natural Heritage and Biodiversity Objective highlights the council's objective to protect, enhance, and conserve designated sites and of ecological networks/corridors. The county development plan in objectives outline the importance of best practice with regard to ensuring biodiversity and natural heritage are taken into account from the earliest point in the design process. Key environmental protection measures should be followed to comply with the objectives set out in the Kilkenny County Development Plan 2014-2020.
River Basin Management Plan 2018-2021	The project should comply with the environmental objectives of the Irish RBMP which are to be achieved generally by 2021. Ensure full compliance with relevant EU legislation. Prevent deterioration. Meeting the objectives for designated protected areas. Protect high status waters. Implement targeted actions and pilot schemes in focus sub-catchments aimed at:	The implementation and compliance with key environmental policies, issues and objectives of this management plan will result in positive in-combination effects to European sites. The implementation of this plan will have a positive impact for the biodiversity. It will not contribute to in-combination or cumulative impacts with the proposed access road.

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO THE CONSERVATION OF THE NATURA 2000 NETWORK	IMPACT
	Targeting water bodies close to meeting their objective and Addressing more complex issues which will build knowledge for the third cycle.	
Pollution Reduction Plans		
IPPC Programme **Local Authority Discharge**	Ormonde Brick Limited is located 0.9 km from the site. However, its IPPC licence was surrendered and licensable activities have ceased. The current condition of the installation is not causing, or likely to cause environmental pollution. Flemings' Fireclays Manufacturing Limited is located is located 9.8km as the crow flies from the works area. The company manufacture stoneware bricks, chimney flue liners and chimney pots for use in the construction industry.	No IPPC licence facilities in the area, no impact. Rainwater which collects in a slump in the floor of the clay/shale pit is pumped via a settlement pond to a small waterway which drains to the River Clogh which feeds into the Dinin River. Potential cumulative impact could arise is there are elevated levels of suspended solids released from the Flemings' facility into the Dinin river while works are underway for the footbridge in the absence of appropriate mitigation methods.
Major Accident Emergency Plans		
Seveso II Sites	There are no Seveso sites within the vicinity of the proposed works.	No Impact
Fisheries Plans		
Inland Fisheries Ireland Corporate Plan 2016 -2020 **The Inland Fisheries Act 2010.**	To ensure that Ireland's fish populations are managed and protected to ensure their conservation status remains favourable. That they provide a basis for a sustainable world class recreational angling product, and that pristine aquatic habitats are also enjoyed for other recreational uses. To develop and improve fish habitats and ensure that the conditions required for fish populations to thrive are sustained and protected. To grow the number of anglers and ensure the needs of IFI's other key stakeholders are being met in a sustainable conservation focused manner. EU (Quality of Salmonid Waters) Regulations 1988. All works during development and operation of the project must aim to conserve fish and other species of fauna and flora habitat; biodiversity of inland fisheries and ecosystems and protect spawning salmon and trout.	The implementation and compliance with key environmental issues and objectives of this corporate plan will result in positive on-combination effects to European sites. The implementation of this corporate plan will have a positive impact for biodiversity of inland fisheries and ecosystems. It will not contribute to in-combination or cumulative impacts with the proposed works.

5.3 Changes to the European Sites Arising as a Result of the Following

5.3.1 Reduction of Habitat

There will be a reduction in the aquatic habitat of the River Barrow and River Nore SAC and terrestrial habitats along the banks of the Dinin River as a result of the proposed project. The reduction in both habitats will be approximately 0.0097% of the SAC. The area to be removed does not represent any aquatic Annex I habitat of the SAC. The SAC is not designated for terrestrial habitats. A review of the impact on habitats which are qualifying interests of the River Barrow and River Nore SAC is provided below.

Estuaries [1130]

Due to its absence from the site, there is no risk of a direct reduction in Estuaries [1130] habitat from the proposed footbridge works. However, given that the Dinin flows into the Nore and out into the Barrow River, without reliance on mitigation measures at this stage, indirect impacts from sedimentation and/or water quality deterioration cannot be ruled out to the 'Mud to Fine Sand' community like crustaceans (*Corophium volutator, Crangon crangon*) and bristle worms (*Eteone longa, Hediste diversicolor, Pygospioelegans, Scoloplos armiger, Spio martinensis, Tubificoides benedii and Tubificoides pseudogaster*) which are characteristic of the 1130 habitat[21].

Mudflats and Sandflats Not Covered by Seawater at Low Tide [1140]

NPWS Article 17 2013 report provides the location of habitats recorded with a 10km square 'Mudflats and sandflats not covered by seawater at low tide [1140]'. The nearest recorded 1140 habitat is 43km downstream and, without appropriate mitigation from the proposed works area, the works may cause a release in sediment which could cause a temporary significant impact on the structure and sediment composition of 1140 habitat. Therefore, there is a potential indirect risk to this habitat as a result of the works.

Reefs [1170]

Reefs [1170] occur in 'Large shallow inlets and bays are indentations of the coast where the influence of freshwater is generally limited' (NPWS, 2013). Due to the coastal location of this habitat, the connection between this habitat and the works is extremely tenuous. Any change to the Dinin River arising because of the works will not have an impact on the hydrological function and/or water quality of the marine environmental. Therefore, the footbridge works proposed will not have a direct reduction or indirect reduction on the Reefs [1170] habitat of the River Barrow and River Nore SAC.

Salicornia and Other Annuals Colonising Mud and Sand [1310]

Salicornia and other annuals colonising mud and sand [1310] is designated for the River Barrow and Nore SAC. This habitat is only located further down the Barrow catchment in transitional waters (100km from the works) of the Barrow Nore Estuary (NPWS, 2013). Due the transitional location in which this habitat occurs, any input of sediment and/or contaminants due to the construction works at Castlecomer will be minimal and will not have an impact on 1310 habitat within the River Barrow and River Nore SAC. There will be no direct or indirect reduction in 1310 habitat due the proposed footbridge works.

Atlantic Salt Meadows (Glauco-Puccinellietalia maritimae) [1330]

NPWS Article 17 data has records of Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] 43 km from the bridge works at Castlecomer. This habitat is not located within the works area and is found in transitional water of the Barrow Estuary. Its connection with the works is weak and, therefore, the proposed

[21] https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf.

footbridge works will not have a direct or indirect reduction on the Atlantic salt meadows habitat of the River Barrow and River Nore SAC.

Mediterranean Salt Meadows (Juncetalia maritimi) [1410]

Mediterranean salt meadows (*Juncetalia maritimi*) [1410] occupy the upper zone of saltmarshes and usually occur adjacent to the boundary with terrestrial habitats (NPWS, 2013) (53km from the proposed works). No 1410 habitat occurs within the works site or within the Dinin River. There is a very tenuous connection from the works area to 1410 habitat through the Dinin River, the River Barrow and the Barrow Estuary. The conservation objectives for 1410 habitat detail changes in hydrological flow and species composition given its location in coastal partially terrestrial environments, any additional sediment released from the Castlecomer Footbridge construction will not reach the Mediterranean salt meadows as it will be deposited within the River Barrow estuary. Therefore, the proposed footbridge works will not have an indirect or direct reduction on the Mediterranean salt meadows (*Juncetalia maritimi*) [1410] habitat.

Water Courses of Plain to Montane Levels with the Ranunculion fluitantis and Callitricho-Batrachion Vegetation [3260]

During a desktop survey, the following Annex I habitat were identified as potentially being located within the survey area. 'Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion*, 3260' could be encountered as the proposed bridge project footprint is located within a 10km grid cell that intersects with known locations/positive record for the Annex I Habitat type Floating river vegetation (3260).

As noted in **Section 4.2.11**, during the site visit no Annex I habitats designated for the River Barrow and River Nore SAC or otherwise were found onsite. Therefore, there will be no direct impact to 3260 habitats. However, in the absence of protection/mitigation measures there is the potential for indirect impacts via a reduction in 3260 Annex I habitat downstream should they occur.

European Dry Heaths [4030]

European dry heaths [4030] are not located with the works area; therefore, no direct impacts to the habitat are likely as a result of the works. Dry heath is a terrestrial habitat and although it can occur at any elevation the dominant pathway of contaminants from the proposed footbridge works would be through the Dinin River and out into the Barrow River. Therefore, considering the pathways it is logical to conclude a terrestrial habitat such as this will not be impacted indirectly by the proposed footbridge at Castlecomer.

Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels [6430]

The Dinin River is not located in a distribution 10km square identified has hosting habitats of '*Hydrophilous* tall herb fringe communities of plains and of the montane to alpine levels [6430]. No 6430 habitat was located within the works area at the time of the visit. However, from the NPWS distribution record of this habitat there is a high likelihood that it is located downstream of the works. Without mitigation measures, reduction of and impacts to this habitat downstream of the proposed footbridge development cannot be ruled out at this stage.

Petrifying Springs with Tufa Formation (Cratoneurion) [7220]

There is no recorded '*Petrifying springs with tufa formation (Cratoneurion) [7220]'* habitat within the works area. The nearest known locations of 7220 habitat to the proposed footbridge works are located in the Nore catchment and are downstream of the works (NPWS, 2013). Therefore, there will be no direct impact; however, an indirect connection is possible through the potential release of contaminants in the absence of appropriate mitigation measures into Dinin River and in turn into 7220 habitats as a result of the proposed footbridge works.

Old Sessile Oak Woods with Ilex and Blechnum in the British Isles [91A0]

'Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]' are old oak woods which generally occur on podzolised soils in upland, southern and western regions but also on localised, non-waterlogged acid soils elsewhere in Ireland (NPWS, 2013). There was no 91A0 habitat located within the works area and,

as this is a habitat type found within terrestrial environments, there is no risk to this habitat from direct or indirect impacts of the works.

Alluvial Forests with Alnus glutinosa and Fraxinus Excelsior (Alno-Pandion, Alnion incanae, Salicion albae) [91E0]

No record of 91E0 habitat was recorded within the site. No sign of 91E0 habitat were observed within the site boundary. While no reduction is likely to arise due to direct habitat removal, there is potential for indirect impacts from proposed footbridge works at the Castlecomer site. Potential changes to the habitat's hydrological regime and impact from potential contaminants cannot be ruled out without preventative measures and/or further assessment at this stage. Therefore, there is a potential for a reduction in 91E0 habitat as a result of the footbridge construction.

The qualifying interest habitats of the Lower River Suir SAC are either located greater than 80km downstream or not found within the Nore/Suir transitional area. Owing to this distance or lack of connectivity, they are not considered further as part of this assessment. There are no habitats with qualifying interests listed for the River Nore SPA.

5.3.2 Disturbance to Key Species

There is potential for the proposed footbridge works and associated works to cause disturbance to key species of the River Barrow and River Nore SAC, the River Nore SPA and mobile species of the Lower Suir SAC. Possible contaminants from the construction process may enter the Dinin which is part of the River Barrow and River Nore SAC. This, in turn, has potential to impact on the food sources, habitats and population abundance of the key species within the SAC. The following is an account of the potential disturbance to key species of the River Barrow and River Nore SAC due to the footbridge construction works.

5.3.3 River Barrow and River Nore SAC

***Vertigo moulinsiana* (Whorl Snail) [1016]**

While there are recorded populations of Whorl snail further up the Barrow catchment, no populations for Whorl snail have been recorded in the Dinin River and potential habitat was not found during the site walkover. There will be no disturbance to Whorl snail a result of the proposed footbridge works.

***Margaritifera* (Freshwater Pearl Mussel) [1029] & *Margaritifera durrovensis* (Nore Pearl Mussel) [1990]**

There are no known populations of *Margaritifera margaritifera* and *Margaritifera durrovensis* in the Dinin River; however, there are known populations of both within the Nore River which the Dinin River flows into. The only known location for *Margaritifera durrovensis* mapped within the COs is near Durrow, with population stretching from Poorman's Bridge to Lismaine Bridge with most of the population found between Poorman's Bridge and the Avonmore Creamery above Ballyragget. This population is located upstream of the Dinin/Nore confluence. The distribution of *Margaritifera margaritifera* is not mapped within the COs and is under review. Therefore, the footbridge construction works would not directly disturb current populations of *Margaritifera margaritifera* and *Margaritifera durrovensis.* However, with the absence of mitigation measures the works have the potential to indirectly impact on these key species due to the potential release of sediment and reduction in juvenile salmon habitat and good water quality which the FWPM require to complete its life cycle.

Austropotamobius pallipes (White-clawed Crayfish) [1092]

No white-clawed crayfish were noted at the time of the site walk over. Crayfish are known to be in the River Nore. Historical records exist for the Dinin River and potential crayfish habitat was encountered within the study area during the aquatic surveys their remains a potential for impacts in the absence of mitigation. Increased siltation and reduced water flow, resulting in a change in the channel flora would create unsuitable dissolved oxygen conditions for crayfish. Therefore, due to the present potential for crayfish to use the river and in the absence of appropriate mitigation to protect potential populations of crayfish, the proposed footbridge works have the potential to cause disturbance within this key species.

Fish

The following fish species designated for the River Barrow and River Nore SAC have been identified to use the Dinin River. There is the potential for direct disturbance due to works within the riverbed and, without appropriate mitigation measures, the following fish species may be impacted indirectly by sedimentation and the release of contaminants as a result of the works:

- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099];
- *Petromyzon marinus L.* (Sea Lamprey) [1095];
- *Alosa fallax fallax* (Twaite Shad) [1103]; and
- *Salmo salar* (Salmon) [1106].

Lutra lutra (Otter) [1355]

While no signs of otter were present at the time of the visit, otter has been recorded (NBDC) within close proximity to the works. There is potential for direct disturbance of otter as otter may create holts in the riparian habitat set out for the abutment and pier works prior to the works commencing.

The proposed works would see the temporary indirect disturbance due to the loss of freshwater habitat as a result of the diversion of the Dinin River. The damming and diversion of the river may prevent otter migration along the river bank and upstream within the river corridor thus restricting its ability to find its food source (fish biomass) and breeding sites. The temporary crossing of the Ardra tributary may also result in a temporary disturbance/barrier to otter migrating up this channel. Additionally, impacts on fish populations downstream of the works as a result of potential reduction in water quality would lead to a further reduction in fish stocks downstream. Therefore, the proposed footbridge works in the absence of appropriate protective/mitigation measures for otter using the Dinin River would indirectly disturb otter present.

Trichomanes speciosum (Killarney Fern) [1421]

No Killarney Fern was noted onsite during the site visit. There are no known populations of Killarney Fern in the Nore catchment; therefore, no direct disturbance to this species is likely as a result of the proposed footbridge works. Furthermore, the Killarney Fern is a terrestrial plant and, given the dominant pathway for indirect impacts as result of this project in the Dinin River, it is not likely there will be an indirect impact on this species.

Lower River Suir SAC

The following QI species may utilise the transitional water were the Barrow meets the Lower River Suir SAC and/or migrate upstream:

- *Petromyzon marinus* (Sea Lamprey) [1095]
- *Lampetra planeri* (Brook Lamprey) [1096]
- *Lampetra fluviatilis* (River Lamprey) [1099]
- *Alosa fallax fallax* (Twaite Shad) [1103]
- *Salmo salar* (Salmon) [1106]
- *Lutra lutra* (Otter) [1355]

These QI species may use these waters during migrations through the catchment and they, therefore, may be impacted upon through sedimentation and/or a reduction in water quality as a result of the works. White-clawed Crayfish) 1092 do not use transitional or estuarian habitat and, therefore, White-clawed Crayfish within the Lower River Suir SAC would not be impacted by a reduction in water qualify linked to the works.

River Nore SPA

Kingfisher is the only qualifying interest if the River Nore SPA. While the works will not directly impact on Kingfisher within the SPA, there is the potential for indirect impact to Kingfisher as a result of the works through a potential reduction in food resources (fish) from indirect impact on water quality. It should be noted that there is also the potential for impacts to the general Kingfisher population (i.e., that outside the River Nore SPA) through loss of their perching habitat during tree removal.

5.3.4 Habitat or Species Fragmentation

Possible otter, crayfish, lamprey and salmon habitat fragmentation may arise due to the proposed footbridge works. The partial damming of the river and construction along the bank site may cause temporary habitat fragmentation. The proposed construction works may deter species from moving within the river corridor thus preventing them from reaching habitat up or downstream of the works.

Although evidence of otter was not observed during the site visit, given their widespread distribution in Ireland, the presence of otter could not be ruled out and there is the potential for commuting corridors via the river to be cut off during the construction and operation phases of the works.

5.3.5 Reduction in Species Diversity

There may be potential for reduction in species diversity due to changes in hydrological function and sediment input into the Dinin River as a result of the footbridge construction. Populations of White-clawed crayfish, sea lamprey, brook lamprey, river lamprey, twaite shad, salmon and otter within the Dinin River and/or downstream may be impacted by the works. There is also the potential indirect reduction of king fisher downstream within the River Nore SPA and sea lamprey, brook lamprey, river lamprey, twaite shad, salmon and otter of the Lower River Suir SAC.

5.3.6 Changes in Key Indicators of Conversation Value

Modifying structures of inland watercourses of the SAC has been identified a ‘High’ potential threat to the conservation objective of the River Barrow and River Nore SAC, (see **Table 4.7**). The proposed footbridge is located within the SAC and has been designed to accommodate river flow more appropriately than the bridge that is currently in place.

The input of uncontrolled additional sediment arising from the works to the Dinin and Ardra Rivers has the potential to enter the River Barrow and River Nore SAC; this would be a contradiction to the targets set out for the conservation objectives for aquatic species within the River Barrow and River Nore SAC, i.e., ‘No decline in heterogeneity or habitat quality’ in relation to the protection of crayfish habitat.

While the status of the FWPM (*Margaritifera margaritifera*) as a qualifying Annex II species for the River Barrow and River Nore SAC is under review, currently there are no site-specific conservation objectives for this species in the River Nore and River Barrow SAC. In the case of the Nore (although absent in the Barrow), the conservation targets for FWPM are to restore suitable habitat in length of river, improve water quality, restore appropriate hydrological regimes and maintain sufficient juvenile salmonids to host glochidial larvae. In the absence of mitigation measures, the potential impacts identified (**Section 5.2**) as a result of the footbridge construction works would contravene with the conservations objectives outlined for the Nore population of FWPM[22].

[22] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf.

High levels of sediment which may become mobile during the pier installation process can impact directly on salmon. If of sufficient severity, adult salmon could theoretically be affected by increased silt levels as gills may become damaged by exposure to elevated suspended solids levels.

If of sufficient severity, aquatic invertebrates may be smothered by excessive deposits of silt from suspended solids. Aquatic invertebrates make up a large proportion of juvenile salmon food source and, therefore, this is an indirect impact on salmon populations.

Where mobilised sediment as a result of the proposed footbridge finally deposits downstream, there is the potential for salmonid and lamprey spawning habitat loss. Silt/sediment has the potential to cover the loose gravel beds which salmon and lamprey use to spawn. This contravenes the targets set out in the conservation objectives set out for lamprey, twaite shad and salmon which state there shall be 'no decline in extent and distribution of spawning beds' for the three lamprey species and twaite shad. No decline in number and distribution of spawning redds due to anthropogenic cause' and 'At least Q4 at all sites sampled by EPA' for salmon. 'Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth' for twaite shad[23].

Impacts on water quality could also impact on fish stocks which, in turn, could impact on populations of populations of otter.

5.3.7 Climate Change

It is not anticipated that the proposed project will have any significant effects related to climate change. There will be no change to climate change indicators such as temperature or river hydrodynamics as a consequence of the proposed project.

5.3.8 Likely Impacts on the European Sites as a Whole in Terms of Interference with Key Relationships that Define the Structure and Function of the Site

The proposed project has the potential to cause the following indirect impacts to the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA:

- Reduction in water quality due to the release of suspended solids/silt;
- Reduction in water quality due to the release of contaminants (e.g., hydrocarbons);
- Increased risk of erosion due to the loss of terrestrial habitat (including riparian zone) adjacent to a watercourse;
- Reduction in nutrient and food supply to a watercourse as a result of the loss of riparian zone vegetation; and
- Alterations to the shade conditions of a watercourse as a result of changes to the riparian zone.

[23] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf.

5.4 Indicators of Significance as a Result of the Identification of Effects Set Out Above in Terms Of

5.4.1 Loss

The proposed project will result in the loss of some terrestrial habitat along the River Barrow and River Nore SAC; this includes vegetation and tree clearance which do not correspond to any Annex I terrestrial habitats designated within the SAC. A further assessment of aquatic habitats in the area was carried out and it was found that there are no Annex I aquatic habitats within the site works.

During the assessment, it was found that there is potential for the loss of salmonid, crayfish and lamprey habitat due to the instream works.

5.4.2 Fragmentation

There will be no direct fragmentation of the River Barrow and River Nore SAC because of the proposed works. However, in the absence of mitigation measures and appropriate consideration for species migration within the design, there is a potential for fragmentation of otter, crayfish, lamprey and salmon habitat.

5.4.3 Disruption

In the absence of appropriate mitigation measures, a disruption to the key species and habitats of the River Barrow and River Nore SAC, Lower River Suir and Lower and River Nore SPA cannot be ruled out.

5.4.4 Disturbance

In the absence of robust mitigation measures, there is potential for temporary disturbance to some of the qualifying features of the River Barrow and River Nore SAC, Lower River Suir and Lower and River Nore SPA during the construction phase of the proposed project through the release of suspended solids and hydrocarbons. There is also potential for disturbance to habitat which is used by White clawed Crayfish, a QI of the River Barrow and River Nore SAC and the Lower River Shannon SAC.

5.4.5 Species Population Density

There is potential for the construction phase of the proposed project to cause a temporary impact to the Dinin River, and the habitat of Atlantic salmon, through the emissions of suspended solids and/or contaminants associated with construction works. Sedimentation can have a range of physiological (e.g., gill trauma), behavioural (e.g., avoidance) and habitat quality (e.g., damage to redds, reduced spawning habitat) impacts. These, in turn, can impact species population density. Likewise, sedimentation can also have an impact on spawning habitats of lamprey sp. and twaite shad.

Impacts to fish stocks within the river may have an indirect impact to otter population using the Dinin given that fish is a primary dietary food source for otter.

Increased siltation and reduced water flow, resulting in a change in the channel flora has the potential to create unsuitable conditions for crayfish. While crayfish are known to occur in sections of river where the banks are poached by cattle, construction activity can have an adverse effect on a population by increasing turbidity and decreasing dissolved oxygen concentrations due to sediment and excrement entering the water (Holdich 2000). The reduction in fish population within the river channel can have an indirect impact on otter populations due to a reduction in food sources.

5.4.6 Water Resource

Water will not be extracted from the River Dinin for use during the construction phase or for any other use as part of this project.

5.4.7 Water Quality

There is potential for the construction of the proposed footbridge to cause deterioration in the water quality of the River Barrow and River Nore SAC and River Nore SPA through the release of suspended solids and other contaminants (e.g., hydrocarbons) in the absence of site specific mitigation.

5.4.8 Likely Significant Impacts or Unknown Scale or Magnitude if Impacts

The proposed footbridge works have the potential to indirectly impact the River Barrow and River Nore SAC, Lower River Suir and Lower and River Nore SPA through the release of suspended solids and contaminants (e.g., hydrocarbons, lubricants) during the construction phase and the disruption the flow of water into the SAC and SPA. The indirect impacts on the River Barrow and River Nore SAC are likely to be significant in the absence of site specific mitigation measures.

The partial water diversion and damming measures during the construction phase of the project may lead to the physical obstruction of migratory protected fish (i.e., salmon, lamprey and twaite shad) and otter within the Dinin River. Without site specific mitigation measures included in the construction works, there will be a significant impact to salmon, lamprey and otter using the river to travel up-stream during construction to spawn and forage.

Works have the potential to impact on '*Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]*' which may be present downstream of the works. The release of sediment into the water column has the potential to cover the leaves of macrophytes which make up potential Annex I habitat and potentially reducing the rate of photosynthesis which may impact macrophytes populations within the habitat.

In the absence of specific methods incorporated into the construction methodology for protecting water quality, there is potential for disturbance to salmon and lamprey.

While no white-clawed crayfish were found during the survey, good habitat was present and with previous records of crayfish in the Dinin River it is likely that crayfish are using the Dinin. Should stream diversion activities expose crayfish, potential impacts can occur.

6 SUMMARY

This screening for AA identifies and assesses potential impacts which may occur as a result of the proposed works to the European site network within the zone of influence outlined in **Section 4.3**. The screening identified 13 European sites within the zone of influence of the proposed works:

1. Lower River Suir SAC (Site Code: 002137)
2. The Loughans SAC (Site Code: 000407)
3. Slieve Bloom Mountains SAC (Site Code: 000412)
4. Cullahill Mountain SAC (Site Code: 000831)
5. Spahill and Clomantagh Hill SAC (Site Code: 000849)
6. Lisbigney Bog SAC (Site Code: 000869)
7. Galmoy Fen SAC (Site Code: 001858)
8. River Barrow and River Nore SAC (Site Code: 002162)
9. Thomastown Quarry SAC (Site Code: 002252)
10. Coolrain Bog SAC (Site Code: 002332)
11. Knockacoller Bog SAC (Site Code: 002333)
12. Slieve Bloom Mountains SPA (Site Code: 004160)
13. River Nore SPA (Site Code: 004233)

Only the River Barrow and River Nore SAC (Site Code: 002162) and River Nore SPA (Site Code: 004233) has hydrological connectivity from the location of the proposed footbridge works. There is potential indirect connectivity with migratory species of the Lower River Suir SAC (Site Code: 002137).

The potential impacts of the proposed works have been assessed and have identified potential indirect impacts upon the Qualifying Interests and Special Conservation Interest of the River Barrow and River Nore SAC (Site Code: 002162), Lower River Suir SAC (Site Code: 002137) and River Nore SPA (Site Code: 004233.

This screening for AA has assessed the likely significant effect on the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA in view of best scientific knowledge and the conservation objectives of the site individually and in combination with other plans or projects.

The proposed footbridge works poses a potential effect on all three Natura 2000 sites as there is the potential for reduction of protected habitat, disturbance to key species, reduction in species diversity, the dispersal of invasive species and also a potential change to key conservation objectives of the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA.

Therefore, in the absence of mitigation measures and on the basis of objective scientific information, the proposed footbridge construction works individually or in combination with other plans or projects, will have a likely significant effect on the three European sites.

The Annex I habitats of the River Barrow and River Nore SAC and Lower River Suir SAC have been assessed against the potential direct and indirect impacts of the footbridge works. As detailed in **Section 5.3,** in the absence of mitigation measures, the following habitats have been identified as potentially at risk from the works (the omission of the remaining designated habitats from this list is justified in **Section 5.3**):

- Estuaries [1130].
- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260].
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430].
- Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0].

The designated Annex II species for the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA were also assessed against the unmitigated potential impacts of this project. The following Annex II species are potentially at risk as a result of the proposed footbridge works:

- *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029];
- *Margaritifera durrovensis* (Nore Pearl Mussel) [1990];
- *Austropotamobius pallipes* (White-clawed Crayfish) [1092];
- *Lampetra planeri* (Brook Lamprey) [1096];
- *Lampetra fluviatilis* (River Lamprey) [1099];
- Petromyzon marinus (Sea Lamprey) [1095];
- *Alosa fallax fallax* (Twaite Shad) [1103];
- *Salmo salar* (Salmon) [1106]; and
- *Lutra lutra* (Otter) [1355].
- *Alcedo atthis* (Kingfisher) [A229]

Fish

There is the potential for direct impact to adult and juvenile salmonid species due to the damming and diversion of the river. Therefore, appropriate mitigation as approved by IFI should be carried out.

Site specific conservation objectives indicate that artificial barriers can block upstream migration of salmon, lamprey sp. and twaite shad, thereby limiting species to lower stretches and restricting access to spawning areas and these species also require clean spawning gravels. These species have the potential to be present (with the exception of twaite shad) within the Dinin and it is currently not known what measures are in place to protect fish migration and water quality during construction and operation of the proposed footbridge. All necessary measures should be taken into consideration within the design and construction process to ensure there is no impact to the restoration of the favourable conservation status of these species.

Consultation with the Inland Fisheries Ireland on known spawning beds in the area and input to the design to consider fish migration up and downstream is recommended.

Margaritifera sp.

While no FWPMs (*Margaritifera margaritifera*) were observed during the site visit, it must be noted that a detailed Stage 1 FWPM survey was not conducted and was outside of the scope of the site visit. FWPM are located within the main channel of the Nore upstream of the Dinin-Nore confluence, due to the potential for impact on salmon a key component in the juvenile FWPM life cycle, without appropriate mitigation there is a potential for indirect populations on juvenile FWMP. If works are to be carried out, the NPWS should be consulted with regards to the location of FWPM and the prevention of degradation of possible habitat in any downstream locations. As a result of this consultation, necessary measures to protect potential FWPM habitat may need to be considered.

As site specific conservation objectives for Freshwater pearl mussel are not available for River Barrow and River Nore SAC to enable the full ecological implications of the proposed development on the conservation objective and integrity of River Barrow and River Nore, the attributes that are used to define site-specific conservation objectives for the same qualifying interests in other sites have been used. For Freshwater pearl mussel (*Margaritifera margaritifera*) [002162], the specific conservation objectives for the following sites have been published and adapted for consideration against the Castlecomer Footbridge works:

- Blackwater River (Cork/Waterford) SAC [002170];
- West of Ardara/Maas Road SAC [000197]; and
- Lower River Shannon SAC [002165].

To restore the favourable conservation condition of the Freshwater pearl mussel in above SACs, the restoration of suitable and any additional stretches necessary for salmonid spawning has been stated as a conservation objective. Therefore, the proposed works would contravene the conservation objectives for the Freshwater pearl mussel as adopted from specific conservation objectives for FWPM in other SACs.

Similarly, as detailed in **Section 5.3.5,** the conservation objectives of the Nore FWPM are to improve species density and habitat range. In the absence of mitigation measures due to the potential degradation of water quality and reduction in juvenile salmon, the works currently are at odds with the conservation objectives set out for the Nore FWPM. Therefore, all measures to prevent the reduction in water quality and protect salmon populations and habitats should be considered in the construction methodology of the Castlecomer Footbridge.

White-clawed crayfish

There are records of white-clawed crayfish present within the Dinin River with good quality habitat found onsite during the 2018 aquatic survey (see Aquatic Report in **Appendix B**). A management plan will need to be in place prior to commencement of works and a qualified ecologist should oversee the works and advice where necessary regarding the translocation of white-clawed crayfish at the Castlecomer Site. Owing to the likely presence of crayfish within the Dinin and presence of good crayfish habitat upstream and downstream of the existing the bridge, following the precautionary principle, likely significant effects cannot be ruled out.

Otter

As detailed in **Section 5.3**, there is potential to impact on otter within Dinin River via potential direct impacts on potential breeding grounds, restriction of movement up and downstream as a result of the damming works and potential for reduction in food supply through a reduction in water quality. Mitigation measures to prevent any impact on otter during the construction process must be carried out in order to prevent a significant effect on otter.

Conservation objectives outlined for the protection of otter populations within the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore state that there should be no significant decline in the ‘Extent of freshwater (river) habitat’ and ‘Fish biomass available’. The proposed works would see the permanent direct loss of potential breeding and foraging site due to the placement of piers within the water channel and abutments on the river bank. Partial diversion of the Dinin River will lead to the temporary loss of aquatic habitat. The damming and diversion of the river may also prevent otter migration upstream within the river corridor and thus restrict its food source (fish biomass). Additionally, impacts on fish populations

downstream of the works, as result in potential reduction in water quality, would lead to a further reduction in fish stocks downstream. The above scenarios would directly contravene with the conservation objectives listed for otter in the River Barrow and Nore SAC.

Kingfisher

Kingfisher is the only qualifying interest of the River Nore SPA. There is potential for an indirect impact to Kingfisher of the River Nore SPA due to a potential reduction in food resources as a result of impact to quality within the River Nore SPA. Conservation objectives for any site designated for Kingfisher have not been outlined in Ireland. However, given the indirect connectivity to the River Nore SPA, without the presence of mitigation measures during construction, there is a potential for significant effect on population of Kingfisher in the River Nore SPA.

7 CONCLUSION

In view of objective information, best scientific knowledge and the conservation objectives of the European Site, the potential for likely significant effects to the River Barrow and River Nore SAC, Lower River Suir SAC and River Nore SPA cannot be excluded.

Likely significant effects (in the absence of mitigation) to these European Sites arise primarily from the potential for water quality degradation as a result of the proposed works which, in turn, has the possibility to affect the conservation objectives of the European Sites alone or in combination with other plans or projects. The proposed works will also result in the direct loss of habitat used by white clawed crayfish, a qualifying interest of the River Barrow and River Nore SAC and Lower River Suir SAC.

It is acknowledged that Kilkenny County Council as the competent authority shall make the determination whether AA is required.

8 REFERENCES

Kurz, I. and Costello M.J. (1999) An outline of the Biology, Distribution and Conservation of Lampreys in Ireland. Irish Wildlife Manuals No. 5.

IFI (2014) Habitats Directive and Red Book Data Book Fish Species Summary Report 2014.

Appendix A

Drawings of the Proposed Works

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Eirspan Task Order No. 302 N78, Castlecomer Footbridge

December '18

OPTIONS DRAWINGS

DRAWINGS :-

BR0101-00	INDEX SHEET
BR0101-01	PROPOSED OPTION 1 - STEEL CANTILEVER
BR0101-02	PROPOSED OPTION 2 - SINGLE SPAN STEEL BOX
BR0101-03	PROPOSED OPTION 3 - TWO SPAN GLULAM / STEEL
BR0101-04	PROPOSED OPTION 4 - TWO SPAN STEEL
BR0101-05	PROPOSED OPTION 5 - SINGLE SPAN - GLULAM / STEEL

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Sheets: BR0101-00 of 6

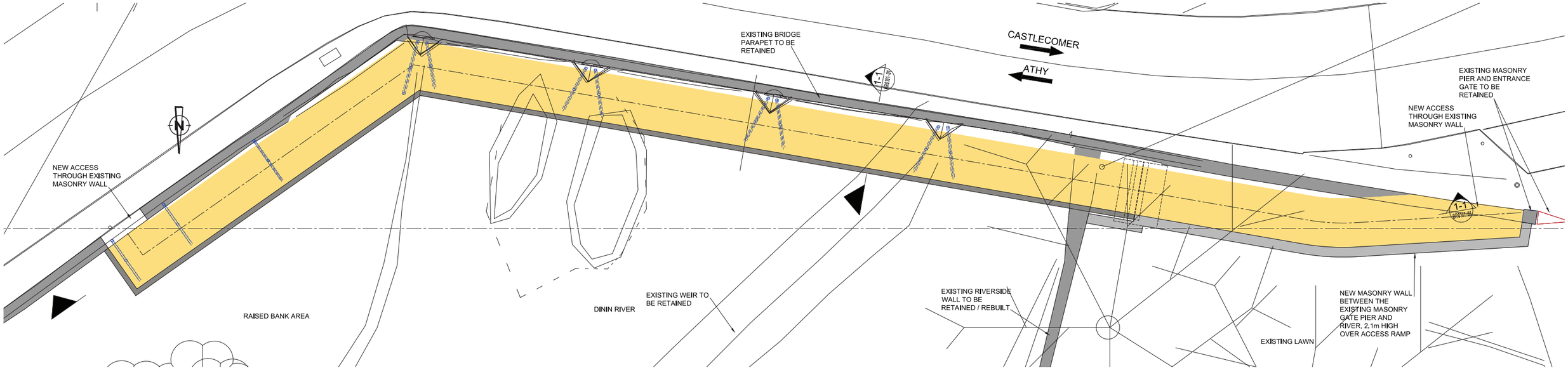
Project: **Eirspan Task Order No. 302 N78, Castlecomer Footbridge**

Title: PROPOSED OPTION 1 STEEL CANTILEVER

File Identifier: MCT0759BR0101 - BR0101-00

Status: S2

Rev: P01



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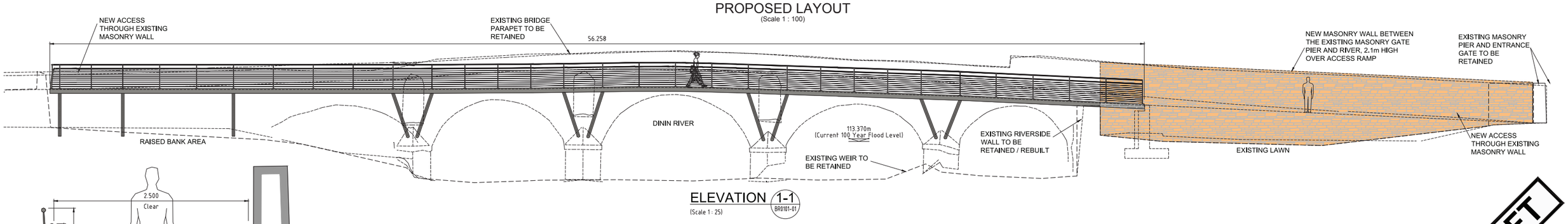

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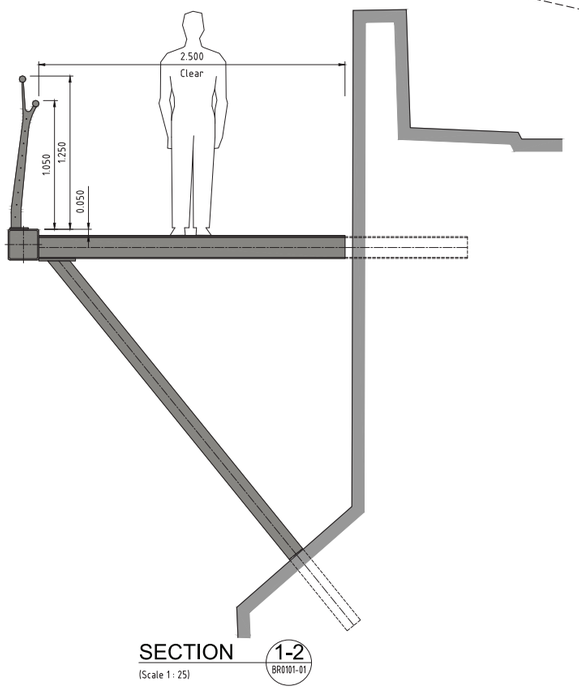

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PHOTOMONTAGE OPTION 1

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Project: **Eirspan Task Order No. 302**
N78, Castlecomer Footbridge

Title: PROPOSED OPTION 1
STEEL CANTILEVER

File Identifier: MCT0759BR0101 - BR0101-01
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Rev: D01.02

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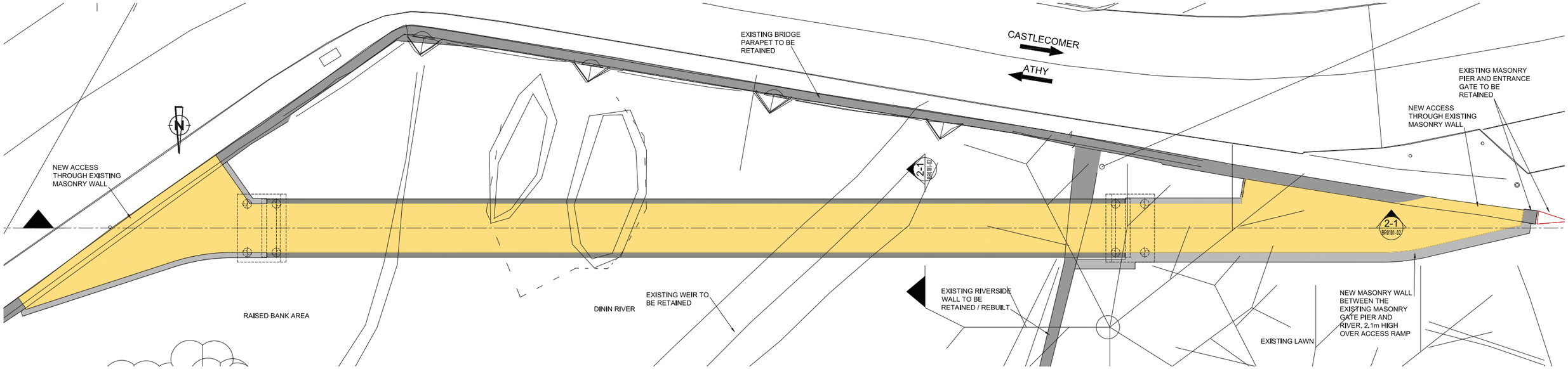

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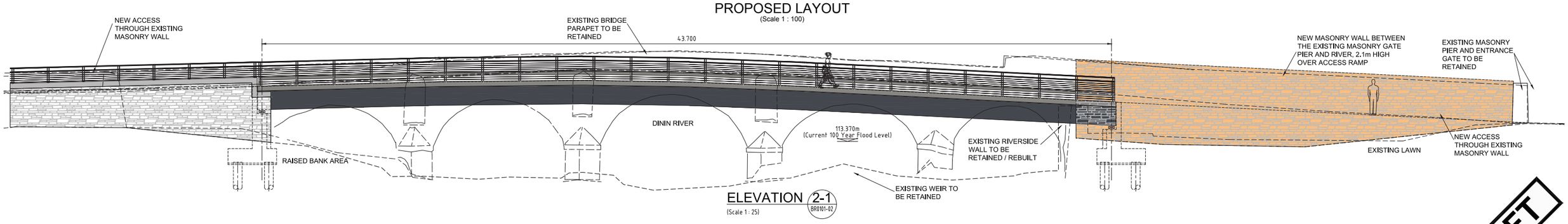

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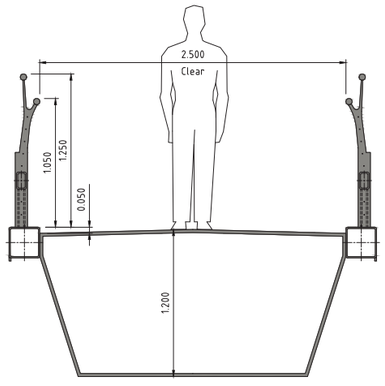

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PHOTOMONTAGE OPTION 2

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Project: **Eirspan Task Order No. 302**
N78, Castlecomer Footbridge

Title: PROPOSED OPTION 2
SINGLE SPAN STEEL BOX

File Identifier: MCT0759BR0101 - BR0101-02
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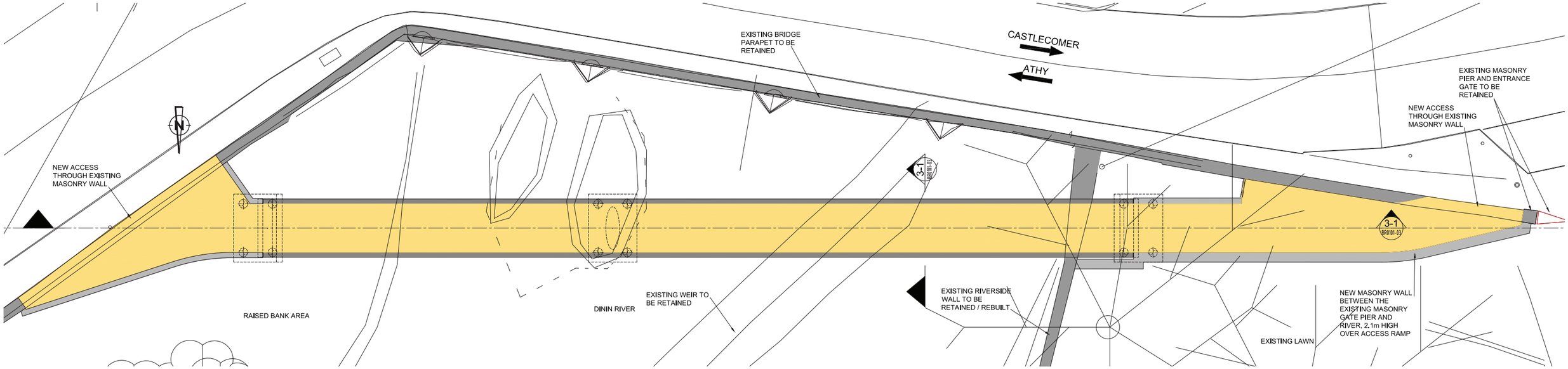

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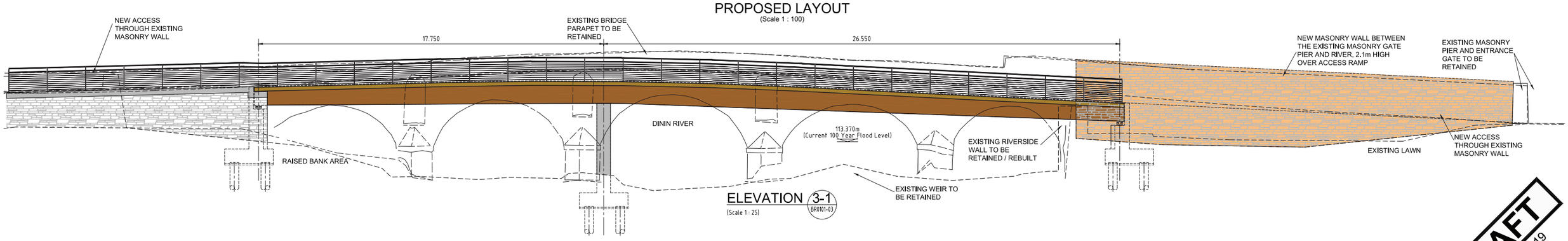

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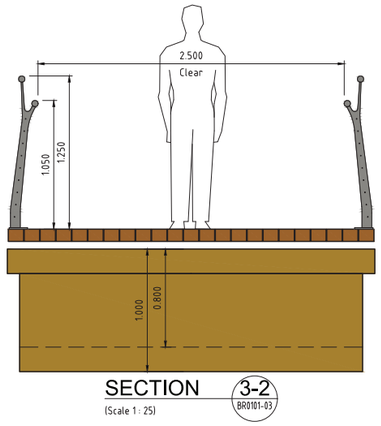

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PHOTOMONTAGE OPTION 3

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N78, Castlecomer Footbridge

Title: PROPOSED OPTION 3
TWO SPAN GLULAM / STEEL

File Identifier: MCT0759BR0101 - BR0101-03
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Rev: D01.03

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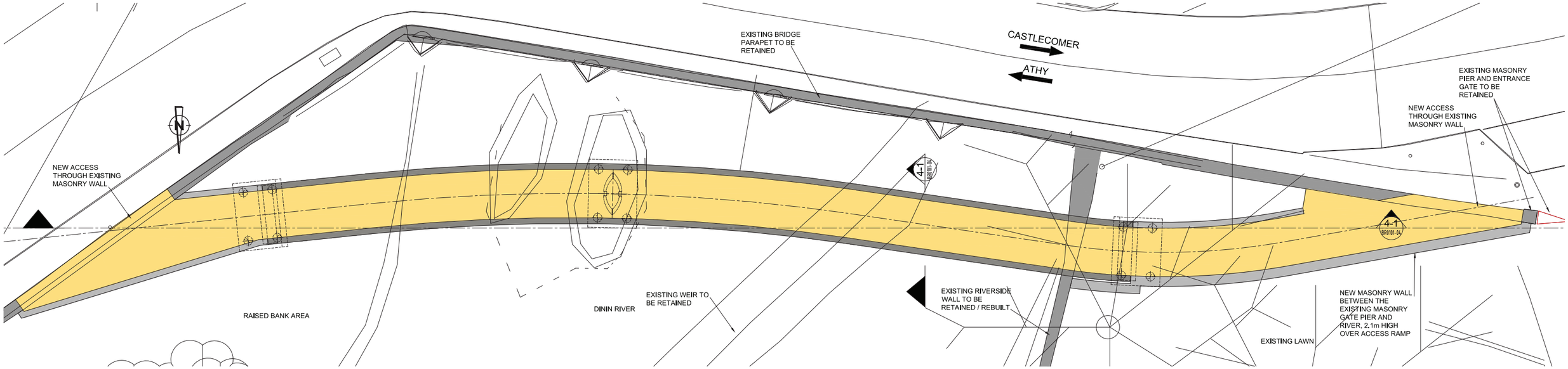

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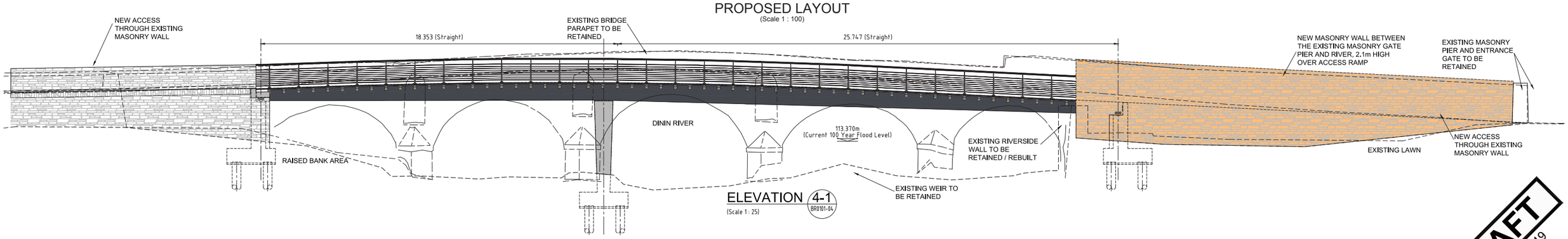

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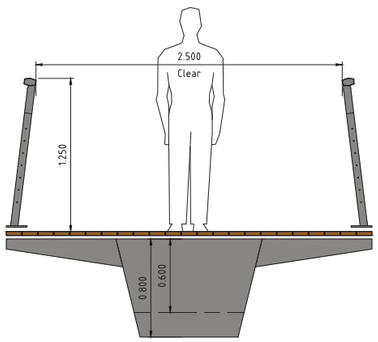

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PHOTOMONTAGE OPTION 4-1

PHOTOMONTAGE OPTION 4-2

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Project: **Eirspan Task Order No. 302**
N78, Castlecomer Footbridge

Title: PROPOSED OPTION 4
TWO SPAN STEEL

File Identifier: MCT0759BR0101 - BR0101-04
Status: S0
Rev: D01.03

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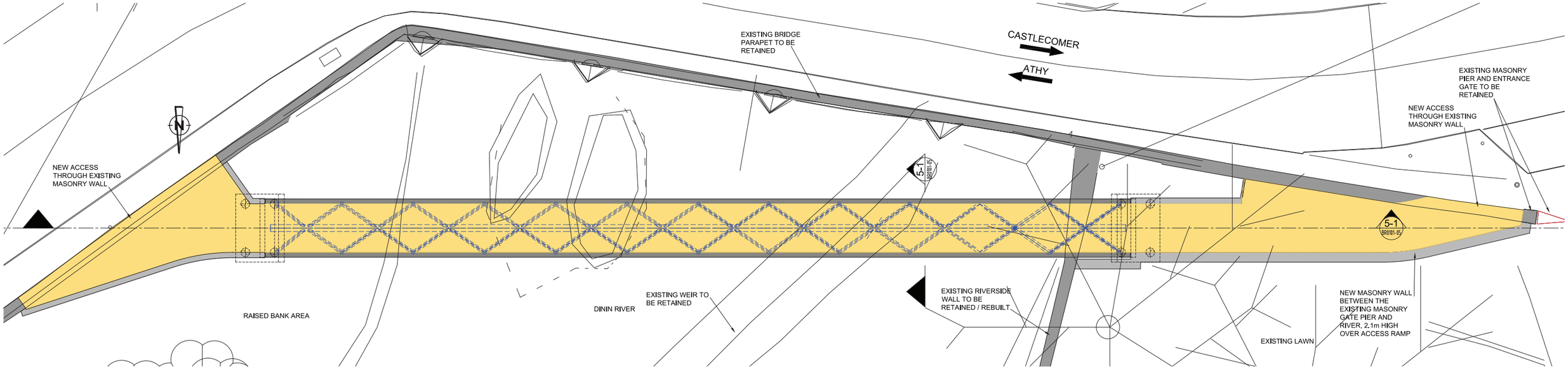

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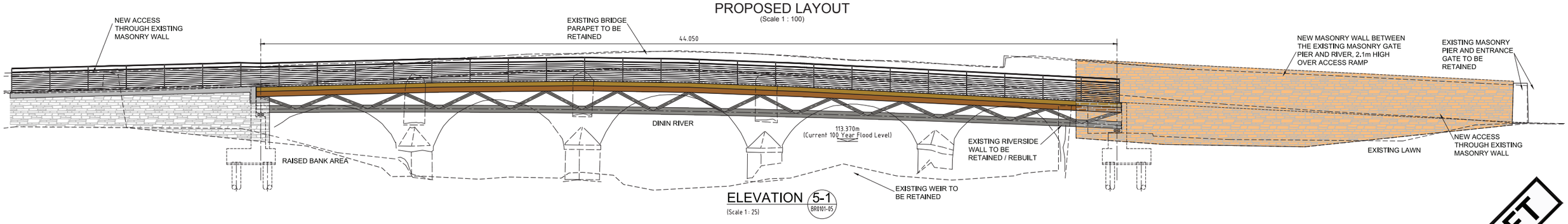

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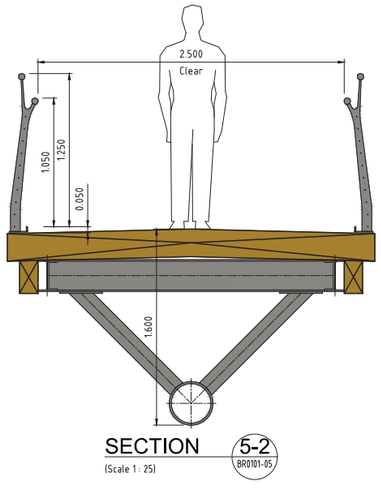

SECTION 5-2
BR0101-05
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PHOTOMONTAGE OPTION 5

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N78, Castlecomer Footbridge

Title: PROPOSED OPTION 5
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File Identifier: MCT0759BR0101 - BR0101-05
Status: S0
Rev: D01.02

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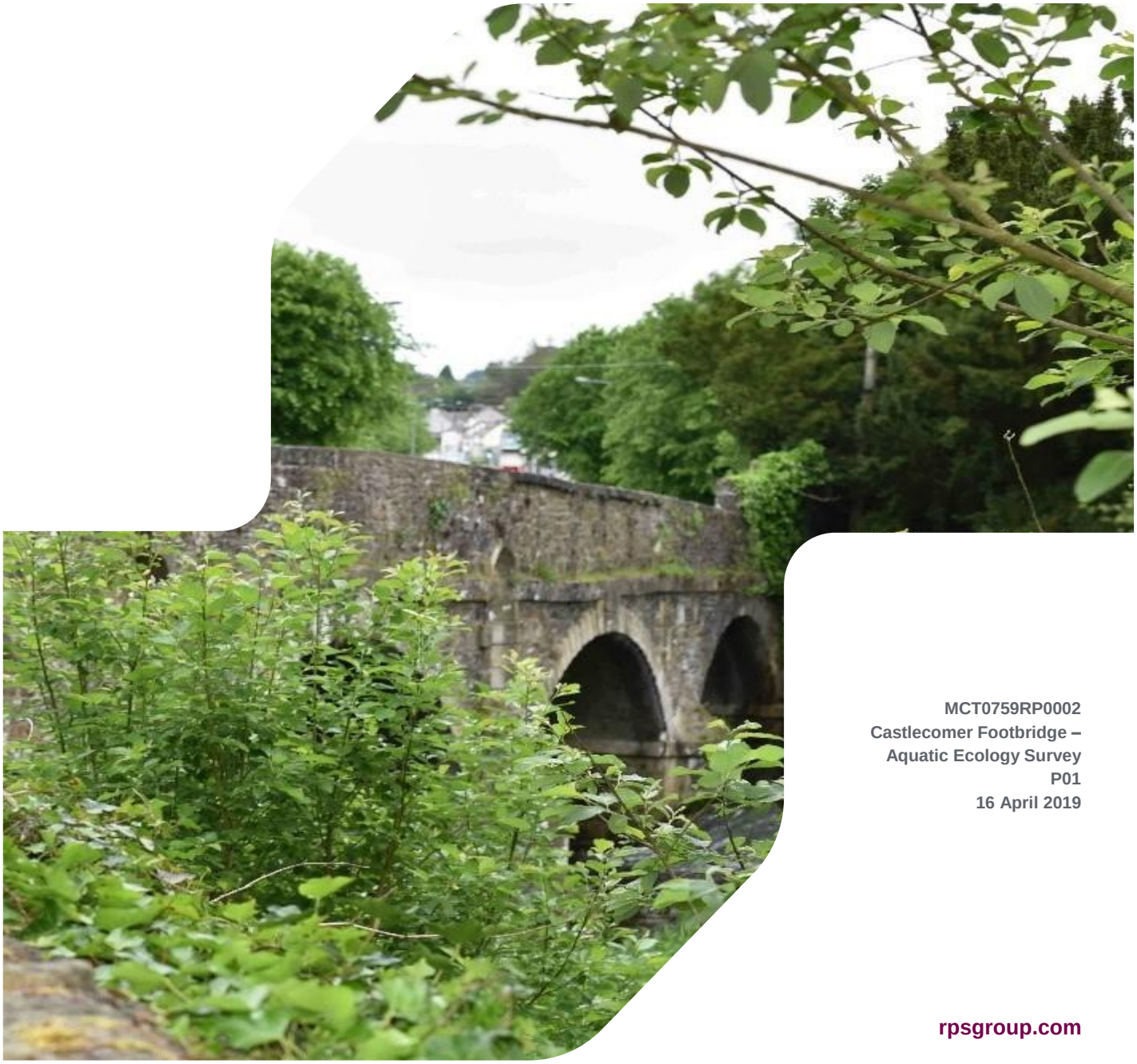
Appendix B

Castlecomer Footbridge – Aquatic Ecology Survey

CASTLECOMER FOOTBRIDGE

Aquatic Ecology Survey



MCT0759RP0002
Castlecomer Footbridge –
Aquatic Ecology Survey
P01
16 April 2019

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
P01	For Planning	Conor Ruane	Letizia Cocchiglia	Anthony O'Brien	16/04/2019

Approval for issue

Anthony O'Brien		16 April 2019

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Contents

List of Tables

1 INTRODUCTION

This report was prepared to investigate the watercourses intersecting the proposed Castlecomer Footbridge with regards to the macroinvertebrate community and habitat quality for the following protected aquatic species; salmon (*Salmo salar,* Annex II,V), lamprey (*Lampetra fluviatilis* Annex II, V, *Lampetra planeri* Annex II, *Petromyzon marinus* Annex II) and white clawed crayfish (*Austropotamobius pallipes* Annex II,V). Visual signs and/or presence of otter (an Annex II and IV species) were noted during the aquatic survey but results are not reported in this report. In addition, habitat was assessed to included further salmonid species, e.g., brown trout (*Salmo trutta*) and is referred to as salmonid habitat.

The proposed clear-span footbridge is to cross the Dinin River 0.3km east of Castlecomer Town Centre. The proposed site is immediately to the north of the existing Castlecomer Road Bridge (N78).

1.1 Existing Environment

1.1.1 Water Bodies

The site of the proposed bridge works intersects two watercourses; 'Dinin [North]' (EPA Code: 15D07) and 'Ardra' (EPA Code: 15A15). The watercourses are all part of the Dinin [North]_SC_010 sub-catchment. The Dinin North flows in a south-westerly direction through Castlecomer Town before flowing into the Nore. The Nore then continues through Kilkenny City and eventually enters the Barrow Suir Nore Estuary approximately 90km downstream of Castlecomer Town. The Dinin River is designated as a Special Area of Conservation as part of the River Barrow and River Nore SAC (site code 0022162) for a number of water dependant habitat and species along with a small about of terrestrial habitat. As detailed above, the Dinin flows into the Nore which is a Special Area of Protection and is designated to King Fisher (Alecdo atthis) (site code 004233).

The Ardra Stream is a 2nd order tributary of the Dinin; it flows under the N78 before joining the Dinin River.

1.1.2 Salmon (*Salmo salar*), Twaite shad (Twaite shad) and Lamprey (*Lampetra* spp*., Petromzon marinus*)

The Dinin River is not a designated salmonid river under SI No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988. However, it does feed into the Nore which is protected under the Salmonid River Regs (SI 293).

During Water Framework Directive monitoring carried out by the IFI on the Dinin River, it was found that the river was of 'Good Status' for fish at the Dinin Bridge monitoring station downstream of the works site. The assessment was carried out in July 2016 using the area delineated electro-fishing method. 'Seven fish species were recorded at Dinin Bridge. Minnow was by far the most abundant species recorded in 2016, followed by salmon', (Inland Fisheries Ireland, 2016). Lamprey sp. was also recorded at this station. Therefore, there is a strong potential for salmon and lamprey sp. to use the habitat within the Dinin River.

Within the River Barrow, the presence of juvenile sea lamprey in the Acore and Fusheoge tributaries indicated that adult sea lamprey can navigate or circumvent the major weirs on the main stem of the Barrow, (James J. King, 2006). The furthest Petromzon marinus has been found in the River Fusheoge in the upper catchments of the Barrow.

Data on Petromzon marinus (P. marinus) in the Dinin River is less abundant. An assessment of the distribution of lamprey in Ireland carried out by the NPWS in 1999 found that P. marinus appear to be common in the River Nore Catchment, P. marinus usually spawn in the lower reaches of the River Nore between Thomastown and Inistoge, (Kurz, 1999). While the assessment did not comment on the presence of P. marinus in the Dinin River, it does detail that they have been known to spawn as far up the catchment as Ballyragget, which is located in the neighbouring sub-catchment of Nore_SC_080. This would suggest that P. marinus can pass through Kilkenny City and has the potential to use the Dinin as a spawning river given suitable habitat and water quality conditions are present.

Twaite shad have been captured by anglers at the top of the tide in the Nore, Suir and Munster Blackwater but they are not generally found in the freshwater part of these rivers[1].

1.1.3 White-clawed crayfish (*Austropotomobius pallipes*)

National Biodiversity Data Centre (NBDC) records show that white-clawed crayfish has been recorded at Dinin Bridge (North) close to where the works are to take place on the 21/07/2005. Also from observation of historical sightings recorded by the NBDC, it appears white-clawed crayfish are widespread in the Nore River catchment. NBDC records show the distribution of this species continues downstream to the confluence with the Nore River.

1.1.4 Surface Water Quality and Risk Characterisation

As part of EPA's Water Framework Directive monitoring of the Dinin River, Q-value samples have been recorded circa 5km upstream at the Massford Bridge (station code 15D070250) and circa 3km downstream at the Dysart Bridge (station code 15D070400) with a Pre-WFD station at the works location at the 'Dinin (North) - Br in Castlecomer' (see **Table 1.1**). The overall WFD status for the Dinin (North)_040 waterbody for 2010-2015 was 'Good' status. The WFD parameters which contribute to this status and the results for this section of the Dinin are detailed in **Table 2.4**.

The Dinin (North)_040 risk characterisation is under review, further downstream of the Dinin (Main Channel)_010 'Not At risk' of failing to meet the WFD environmental objectives and, currently, there are no measures in place to improve its water quality to Good status (Areas for Action under the second cycle of the River Basin Management Plan 2018-2021).

Table 1-1: River Water Quality through Time

EPA Waterbody Name	Code	Risk	WFD Status 2007-2009	WFD Status 2010-2012	WFD Status 2010-2015
Dinin (North)_040	IE_SE_15D070400	In review	Good	Good	Good

[1] https://www.fisheriesireland.ie/fish-species/twaite-shad.html#ecology-life-history.

2 METHODOLOGY

RPS Aquatic Ecologists carried out a survey of the Dinin River intersecting the proposed footbridge on 24th September 2018. A Q-value survey (macroinvertebrates) was conducted downstream of the N78 bridge, upstream of the bridge was a large weir; past this water velocity was slow and unsuitable to conduct a Q-value survey.

The suitability of habitat for the following Annex II protected species was also assessed; white-clawed crayfish, salmon and lamprey spp. In addition, habitat was assessed to include further salmonid species, e.g., brown trout (*Salmo trutta*) and is referred to as salmonid habitat.

The Ardra_15A15 (15A15 15_1466) flows into the Dinin_North_15D07_(15D07 15_122) approximately 10m downstream. At the time of the survey, the Ardra_15A15 was dry and, therefore, an aquatic survey was not conducted in Ardra.

2.1 Macroinvertebrate Survey

Macroinvertebrates were collected using a two-minute kick sampling method with a standard hand net (0.5 mm mesh). Survey technique adhered to the ISO Standard (10870:2012) for kick sampling and utilised the Environmental Protection Agency (EPA) standard protocol and RPS recording sheets. Stone washing was also undertaken to ensure collection of species which cling to rock surfaces.

Q-values and water quality classes are assigned using a combination of habitat characteristics and the structure of the macroinvertebrate community within the waterbody. Individual macroinvertebrate taxa are ranked for their sensitivity to organic pollution and the Q-value is determined based on their relative abundance within a sample.

The Environmental Quality Ratio (EQR) represents the relationship between the values of the biological parameters observed for a body of surface water and the values for these parameters in the reference conditions applicable to that body. The ratio is expressed as a value between zero and one, with high ecological status represented by values close to one and bad ecological status by values close to zero. In Ireland, it is calculated as Observed Q-value/Reference Q-value (i.e., Q5). The EQR allows comparison of water quality status across the European Union as each Member State has an EQR value for 'High'; 'Good' etc., based on an intercalibration of boundaries between water quality categories, e.g., 'High-Good'; 'Good–Moderate'.

EPA indices, EPA water quality status and Water Framework Directive (WFD) status are interpreted in **Table 2.1.**

Table 2-1: EPA Q-Rating and equivalent WFD Water Quality Status Classes

Biotic Index	EQR[2]	EPA Quality Status	Water Quality	WFD[3] Status
Q5	1.0	Unpolluted	Good	High
Q4-5	0.9	Unpolluted	Fair-to-Good	High
Q4	0.8	Unpolluted	Fair	Good
Q3-4	0.7	Slightly Polluted	Doubtful-to- Fair	Moderate
Q3	0.6	Moderately Polluted	Doubtful	Poor
Q2-3	0.5	Moderately Polluted	Poor-to-Doubtful	Poor
Q2	0.4	Seriously Polluted	Poor	Bad
Q1-2	0.3	Seriously Polluted	Bad-to-Poor	Bad
Q1	0.2	Seriously Polluted	Bad	Bad

(Colour coding as employed under the WFD as specified in Schedule 3 of S.I. No 272 of 2009: High – blue, Good – green, Moderate – yellow, Poor – orange, and Bad – red)

[2] EQR = Environmental Quality Ratio (Observed/Reference).

[3] WFD = Water Framework Directive (EPA, 2006).

2.2 Crayfish Survey

The survey was conducted under licence following the standard manual search approach and using a bathyscope (Peay 2003[4], NRA 2009[5]) and under licence from the National Parks & Wildlife Service. A 100m stretch of the watercourse was identified, inside of which five sites were searched. The manual search consisted of searching ten potential refuges within each site and counting the numbers of crayfish spotted from which the Catch Per Unit Effort (CPUE) was calculated (the number of crayfish per refuge). Suitable refuges include boulders (>25cm) or large cobbles (15-25cm) but can also include logs, debris, margins next to favourable bankside habitat natural crevices, undercut banks and large tree roots. The survey was conducted in September which is considered to be an optimal period to conduct a crayfish survey.

Information regarding what relative abundance of crayfish is likely to occur within Irish river types is limited. The following table was developed by Peay 2003 using UK information and can be used as guidance only.

Table 2-2: Guidelin Indication of Population Abundance. Table taken from Peay 2003.

Average no. per 10 Refuges (at individual sites and average per monitoring unit i.e. CPUE)	Population Abundance
>5	Very high
>=3, <=5	High
>=1, <3	Moderate
>0, <1	Low
0	Absent

2.3 Habitat Assessments

The habitat assessment included surveys for a general river habitat survey, crayfish/lamprey/salmonid habitat potential and invasive aquatic. The general physical characteristics and hydromorphological features of each site were recorded including substrate, flow types and aquatic vegetation during surveys. All sites were assessed in terms of:

- Stream width and depth;
- Substrate type, listing substrate fractions in order of dominance;
- Flow type, listing prevalence of flow types in the area;
- Instream vegetation, listing plant species occurring and their percentage coverage of the stream bottom at the sampled area;
- Dominant bankside vegetation, listing the main species overhanging the watercourse;
- Estimated cover by bankside vegetation, and estimated shading of the sampling site, and

[4] Peay. S. (2003). *Monitoring the White-clawed Crayfish* Austropotamobius pallipes. Conserving Natura 2000 Rivers Monitoring Series No. 1, English Nature, Peterborough.

[5] NRA (2009) Ecological Surveying Techniques for Protected Flora nad Fauna during the Planning of National Road Schemes.

- The degree of siltation was recorded on a scale of clean, slight, moderate and heavy, prior to kick sampling.

The rating of habitat for salmonids, crayfish and lamprey is on a scale of *None/Poor/Fair/Good/Very Good/Excellent*. This rating assesses the physical suitability of the habitat; the presence/absence/ density of the species in question will also depend on present and historical water quality and accessibility of the section to these species. A rating of "*None*" indicates that the Ecologist carrying out the assessment regards it as impossible that the watercourse could support the species in question in the relevant life stage. A rating of "*None - Poor*" indicates that it is regarded as possible but extremely unlikely that the stream could support the species in the relevant life stage.

2.3.1 Criteria Used for Assessment of White-clawed Crayfish Habitat Quality

Assessment of the quality of crayfish habitat is based on published information on the habitat criteria for crayfish (Holdich 2003, Peay 2002 and Peay 2003) as well as the surveyor's personal experience in aquatic sampling and research. The white-clawed crayfish occurs in areas with relatively hard, mineral-rich waters on calcareous and rapidly weathering rocks. Crayfish are found in a wide variety of environments, including canals, streams, rivers, lakes, reservoirs and water-filled quarries and are typically found in watercourses 0.75 m to 1.25 m deep, but the species may occur in very shallow streams (about 5 cm of water) and in deeper, slow-flowing rivers (2.5 m). They occupy cryptic habitats under rocks and submerged logs, among tree roots, algae and macrophytes, although they usually emerge to forage. Juveniles in particular may also be found among cobbles and detritus such as leaf litter. Adults may burrow into suitable substrates, particularly in the winter months. The presence of juveniles and a varied size range of adults are indicative of a breeding population.

White-clawed crayfish may be found associated with:

- Undermined, overhanging banks;
- Sections exhibiting heterogeneous flow patterns with refuges;
- Under cobbles (juveniles) and rocks in riffles, and under larger rocks in pools;
- Among roots of woody vegetation, accumulations of fallen leaves and boulder weirs;
- Under water-saturated logs;
- Slow-flowing glides and pools (provided there are refuges), localised velocity of 0.1m/s or less;
- Loose boulders (>25cm) or other similarly sized material;
- Boulders or large cobbles in groups with crevices between them;
- Deep crevices in bedrock;
- Underlying substrate of fine gravel/sand with some pebbles;
- Submerged refuges in stable banks (e.g. natural crevices, stone block reinforcement or stable slightly undercut banks with overhanging vegetation, large tree roots, etc);
- Unmortared stone revetting which protects banks from erosion; and
- Stands of submerged and emergent aquatic plants.

2.3.2 Criteria Used for Assessment of Lamprey Habitat Quality

Each surveyed location was rated for its quality to support lamprey. Assessment of the quality of lamprey habitat is based on published information on the habitat criteria for lamprey (Maitland 2003) as well as the

surveyor's personal experience in lamprey sampling. General habitat requirements are discussed for the three-lamprey species that occur in Ireland (river, brook and sea lamprey). Lamprey habitat preferences change with the stages of their life cycle. They show a preference for gravel-dominated substratum for spawning similar to salmonids. After hatching, lamprey larvae (ammocoetes) swim or are washed downstream by the current to areas of sandy silt in still or slow flowing water where they burrow and spend the next few years in tunnels. Lampreys, therefore, require mainly silt and sand dominated substratum for nursery habitat. Other important environmental characteristics for optimal ammocoete habitat are shallow waters with low velocity and the presence of organic detritus

Suboptimal habitat supporting only a few individuals may consist of a few square centimetres of suitable silt in an open, comparatively high-velocity, boulder-strewn streambed.

The following summarises the ecological requirements of lamprey:

- Spawning habitat is broadly similar to that favoured by salmonids. Usually occurs at the tails of pools where the gravels have been deposited from upstream and the scouring of pools but the current is still reasonably fast with some water flow through the substrate;
- Larval nursery beds are at the edges of streams and rivers, well away from the main current, and that the current over them is often not only very slow, but is actually a backwater in reverse of the main current;
- Water depth in nursery areas is typically 0.1 to 0.5 m with silty/sandy substrate;
- Channelization can be damaging to lampreys, mainly through destruction of their habitat. The removal of areas of riffle and associated spawning gravels, and the dredging of essential nursery silt beds, may entirely eliminate lampreys from a river; and
- Dams/weirs can be obstacles to upstream migration of sea lamprey.

2.3.3 Criteria Used for Assessment of Salmonid Habitat Quality

Assessment of the quality of salmonid (salmon and trout) spawning, nursery and adult habitat is based on published information on the habitat criteria of salmonids (Bjorn & Reiser 1991, Hendry & Cragg-Hine 2003), water quality criteria listed in the Salmonid Regulations and the surveyor's personal experience in fish sampling and research. Habitat features important to the lifecycle of salmonids include; stream width, depth, flow type, substrate type, vegetation cover, gradient and altitude. These habitat requirements can vary during the life stages of salmonids and the proximity of juvenile habitat to spawning gravels may be significant to their utilisation. The more diverse the stream habitat in terms of substrate, flow rate, depth, riparian vegetation, light conditions, the richer the biological community is likely to be and the more suitable it is likely to be for salmonids.

The presence of overturned gravels lighter in colour compared to the rest of surrounding substrate is used to indicate the presence of salmonid redds. Excessive fine sediment can be detrimental to the survival of eggs by limiting the amount of dissolved oxygen to diffuse across the egg membrane. The presence of 10% fine sediment can reduce egg survival to hatching to 43% (Cocchiglia et al., 2012). Fine sediment content of substrate is assessed visually and high levels present indicate reduced spawning habitat quality.

Permanent stream structures such as culverts, dams, bridge abutments, perched aprons and weirs can present an obstacle to upstream migration to spawning sites. Salmon can surmount obstacles 2–3 m high, providing there is an adequate pool in front of the obstruction. The presence of obstacles is also considered during a habitat survey as well as cumulative impact of many small obstacles.

The following summarises ecological requirement of salmonids:

- Salmon spawning is likely to occur where the gradient of a river is 3% or less;
- Typical spawning sites are the transitional areas between pool and riffle where flow is accelerating and depth decreasing, where gravel of suitable coarseness is present and interstices are kept clean by up-welling flow;

- Salmon fry and parr occupy shallow, fast-flowing water with a moderately coarse substrate with cover;
- Deep or slow-moving water, particularly when associated with a sand or silt substrate, does not support resident juvenile salmonids;
- Suitable cover for juveniles includes areas of deep water, surface turbulence, loose substrate, large rocks and other submerged obstructions, undercut banks, overhanging vegetation, woody debris lodged in the channel, and aquatic vegetation;
- Adults require holding pools immediately downstream of spawning gravels in which they can congregate prior to spawning;
- Cover for adult salmon waiting to migrate or spawn can be provided by overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water and surface turbulence; and
- EPA Q-value of Q4 or higher.
- Water Quality Criteria within the Salmonid Regulations S.I. 293/1988.
- pH ≥ 6 ≤9;
- Dissolved Oxygen ≥9 mg/l (50% off the time);
- Temperature downstream of point thermal discharge not exceed (a) 21.5°C or (b) 10°C from 1st Nov to 30th Apr during reproductive season;
- Sediment ≤25 mg/l (annual average).

2.3.4 Compliance with the Water Framework Directive (200/60/EC)

The potential for the proposed development to impact upon water quality is assessed in the context of the EU WFD (Directive 2000/60/EC). The WFD established a framework for the management of water resources throughout the EU. The WFD overarching goal is to achieve at least good ecological status and good chemical status for all surface waters by 2015, or by 2021/2027 via extended deadlines. The WFD aims are specified in Article 1:

- Prevent further deterioration and protect and enhance the status of aquatic ecosystems and associated wetlands;
- Promote the sustainable consumption of water;
- Reduce pollution of waters from priority substances and phasing out of priority hazardous substances;
- Prevent the deterioration in the status and to progressively reduce pollution of groundwater; and
- Contribute to mitigating the effects of floods and droughts.

The WFD established four core environmental objectives to be achieved for surface waters which include rivers, lakes, transitional and coastal waters (out to 1 nautical mile):

- Prevent deterioration;
- Protect, enhance and restore good status by 2015;
- Protect and enhance artificial and heavily modified water bodies (aim to achieve Good Ecological Potential and good surface water chemical status); and

- Progressively reducing pollution from priority substances and ceasing or phasing out emissions, discharges and losses of priority hazardous substances.

Environmental objectives are set for each water body in the River Basin Management Plan for Ireland 2018 – 2021 and are based on scientific evidence, extensive surface water quality monitoring, and risk characterisation undertaken by the EPA. The target in most cases is for a river to be of at least good status (Q4).

3 FIELD SURVEY RESULTS

The Dinin River is a wide (20m width) lowland river which has been modified with artificial banks and a large weir spanning the width of the river directly located upstream of the N78 bridge and a smaller weir downstream of the bridge. At the sample location, the flow was low at time of survey and substrate consisted of predominately coarse gravel (50%), cobble (20%), fine gravel (15%), silt (10%) and boulders (5%). Bankside vegetation consisted of Horse chestnut (Aesculus hippocastanum)), Ash (Fraxinus excelsior), Beech (Fagus sylvatica), Willow herb (Chamerion angustifolium), Water Mint (Mentha Aquatica), Butterbur (Petasites hybridus), Water Figwort (Scrophularia auriculata), Bramble (Rubus fruticosus), Emergent aquatic vegetation consisted of Common Reed (Phragmites australis), and Carex sp. Invasive terrestrial plant species, Japanese knotweed and cherry laurel were found on the left bank facing downstream on a point of land between the Dinin and Ardra confluence. The aquatic invasive Canadian Pond Weed (Elodea canadinses) was also found immediately upstream of the weir within the Dinin River.

Within the water column, Common duck weed (Lemna minor), Kneiff's Feather-moss (Leptodictyum riparium), Fools water-cress (Apium nodiflorum), Water Moss (Fontinalis antipyretica) and Red alga (Hildenbrandia) were common within the river. This habitat did not correspond to the aquatic the Annex I habitat Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] designated for the River Barrow and Rive Nore SAC.

A macroinvertebrate kick was conducted downstream of the bridge in fast flowing riffle area. Species diversity was low with two class A species (Heptageniidae and Rhithrogena sp.) in low numbers (only 1 specimen of Rhithrogenia was recorded and, therefore, excluded from the Q-value determination). The species composition was unbalanced with numerous Hydropsyche and simuliidae. A Q-value of 3-4 (Moderate) was assigned.

There was abundant boulder habitat available for crayfish up and downstream of the existing bridge with some areas of overhanging bank available and limited areas of bank for burrowing. There was no silt on the top of the boulder substrate but there was a large amount when the substrate was disturbed. There was also a large amount of a silt/slim complex present on bryophytes. Siltation around substrate was slight; however, when the overlaying cobbles were disturbed, moderate to high silt plumes were evident indicating underlying deposits of silt below the river bed substrate. This silt reduces the habitat quality for crayfish to Poor indicating there is potential for crayfish to occur within this site although conditions are sub-optimal.

Salmonid and lamprey spawning habitat were rated as Poor to None as there was some gravel habitat and riffle glide pool sequence available but moderate siltation, Q3-4 moderate quality and the presence of weirs reduced the quality of habitat available in the area surveyed. Shallow fast flowing sections of the river and suitable boulder/tree cover was available for juvenile salmonid habitat; however, the Q-value results indicated moderate quality (Q3-4) reducing the juvenile habitat for salmon to Poor although there is potential (Fair) for adult/juvenile brown trout (Salmo trutta) to occur which are more tolerant of moderate water quality conditions. Lamprey nursery habitat was assessed as Poor with a small backwatered area with silty/ substrate and organic material available downstream of the bridge.

The results of the aquatic survey at Castlecomer Bridge are summarised in **Tables 3.1**.

Table 3-1: Aquatic Survey Results Castlecomer

Site Name	Location	Q-Value	Invasive Sp.	Land Use
Castlecomer	Footbridge Location 52.805960, -7.205143	Q3-4	Japanese Knotweed , Cherry Laurel (Left Bank U/S Of Bridge) Elodea Canadensis (Instream)	Urban, Park & Agricultural

Taxa	Group	Abundance
Hydropsychidae	Group C	Numerous
Simuliidae	Group C	Numerous
Caenis Sp.	Group C	Common
Rhyacophilidae	Group C	Common
Baetis Rhodani	Group E	Common
Sericostoma Personatum	Group B	Few
Tipula Sp.	Group C	Few
Gammarus Duebeni	Group C	Few
Asellus Aquaticus	Group D	Few
Rhithrogena Sp.	Group A	Single Specimen
Heptageniidae	Group A	Few
Polycentropodidae	Group C	Few
Hydracarina	Group C	Few
Leuctra Sp.	Group B	Few

Salmonids	**Spawning: Poor To None**, heavily modified two weirs one major and one minor presenting a potential barrier to adult migration upstream for spawning. No clean gravels for redd construction and heavy layer of silt under cobbles bolder substrate in area surveyed.
	Juveniles: Poor, suitable cover (boulders and trees) exists, shallow fast flowing water and coarse substrate. However, moderate water quality (Q3-4) reduces the quality of habitat available for salmon. Habitat is fair for juvenile trout which are more tolerate of the observed moderate water quality conditions.
Lamprey	**Spawning:** Poor to none, similar to the conditions for salmonid spawning gravel substrate was limited and were present the substrate was silted.
	Nursery Habitat: Poor, limited silt/mud habitat available for burrowing, some organic material, i.e., leaf litter. Small pool or backwatered area on left hand side downstream of weir consisting of silt. Water depth approximately 20cm
Crayfish	**Habitat:** Good habitat present. Soft bank for burrowing downstream of weir. Submerged roots and over hanging trees further downstream. Leaf litter present for juvenile crayfish. Suitable boulder/rock in abundance up and downstream. Siltation was high when substrate was disturbed limits habitat quality. 0 CPUE, no crayfish found during survey or present in kick sample. No otter spraint was found on day of survey to check for crayfish remains.
Comment	Major Weir upstream of bridge, minor weir downstream. Large plumes of silt when substrate was distributed.

4 CONCLUSIONS

Water quality results (Q-values) downstream of the Castlecomer Road Bridge site indicate Moderate water quality (Q3-4) within the Dinin (North) which is lower than the p EPA monitoring findings.

Poor to No salmonid habitat was observed downstream or upstream of the bridge. This is due to the and limited clean gravel substrate and the thick layer of silt underneath parts of the existing coarse gravel cobble substrate. Downstream of the Castlecomer Road Bridge, there was signs of juvenile salmonid habitat with submerged boulders and over hanging vegetation providing suitable cover, shallow fast flowing water and coarse substrate. A major weir presents a potential obstacle to migrating salmonids.

Lamprey spawning habitat was also Poor to None, while the dominant substrate was gravel (coarse) there was no clean spawning gravels present and no sand available for eggs to adhere to. There was very limited lamprey nursery habitat, a small backwatered area on the left-hand side of the bridge downstream, limited mud/silt/sandy bed present in the backwater area but organic material such as deposited leaves was present. Again there was limited adult lamprey habitat up and downstream of the Castlecomer Bridge. There are no recent signs of canalisation, but the river channel has been modified historically with potential barriers to migration in a minor weir and major weir upstream of the bridge.

There was Good crayfish habitat up and downstream of the bridge, crayfish have been recorded historically at this location (2005). However, no crayfish were observed on the day of survey. Given the historical recordings of Crayfish and good habitat found within the study area, it can be concluded that there is the potential for crayfish to use the habitat up and downstream of the existing bridge.

Any instream works to facilitate bridge works would need to be conducted in accordance with IFI and NPWS guidance and agreements. This may include translocating crayfish and/or fish prior to any dewatering activities and suitably qualified biologists will need to be present on-site to translocate any additional crayfish/fish during dewatering. In addition, any instream works and crayfish relocations must be cognisant of the current and ongoing outbreak of crayfish plague and biosecurity measures put in place. One instream pier is required to facilitate the footbridge and this must be done in accordance with OPW with regards to any potential flooding issues and alterations to the hydraulic regimes assessed in order to avoid changes to aquatic habitats and/or species.

5 REFERENCES

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Appendix C

European Site Within ZOI

APPENDIX D – EUROPEAN SITES WITHIN ZOI

Site Name	Site Code	Qualifying Habitats	Qualifying Species	Distance from Proposed Works	Connectivity
Lower River Suir SAC	0002137	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Taxus baccata woods of the British Isles [91J0]	*Margaritifera margaritifera* (Freshwater Pear Mussel) [Site Code: *1029}* *Austropotamobius pallipes* (White-clawed Crayfish) *[1092]* *Petromyzon marinus (Sea Lamprey) [1095]* *Lampetra planeri (*Brook Lamprey) *[1096]* *Lampetra fluviatilis (*River Lamprey) [*1099]* *Alosa fallax (*Twaite Shad) [*1103]* *Salmo salar (Salmon) [1106]* *Lutra lutra (Otter) [1355]*	43.8 km (as the crow flies) 88km downstream	Indirectly hydrologically connected via the Dinin River, Nore and Barrow.
The Loughans SAC	000407	Turloughs [3180]	N/A	23.5km as the crow flies	This SAC is located upstream works no migrating species designated for SAC therefore no connectivity with the proposed Footbridge.
Slieve Bloom Mountains SAC	000412	Northern Atlantic wet heaths with Erica tetralix [4010] Blanket bogs (* if active bog) [7130] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	N/A	32km as the crow flies	This SAC is located upstream works no migrating species designated for SAC therefore no connectivity with the proposed Footbridge.

Site Name	Site Code	Qualifying Habitats	Qualifying Species	Distance from Proposed Works	Connectivity
Cullahill Mountain SAC	000831	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210]	N/A	18.6km as the crow flies	No connectivity
Spahill And Clomantagh Hill SAC	000849	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)	N/A	19.7 km as the crow flies	This SAC is located upstream works no migrating species designated for SAC therefore no connectivity with the proposed Footbridge.
Lisbigney Bog SAC	000869	Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210]	N/A	10.3 km as the crow flies	No connectivity
Galmoy Fen SAC	001858	Alkaline fens [7230]	N/A	24.2km as the crow flies	No connectivity
River Barrow and River Nore SAC	002162	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] European dry heaths [4030] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Petrifying springs with tufa formation (Cratoneurion) [7220] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Vertigo moulinsiana (Desmoulin's Whorl Snail) [1016] Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] Austropotamobius pallipes (White-clawed Crayfish) [1092] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096] Lampetra fluviatilis (River Lamprey) [1099] Alosa fallax (Twaite Shad) [1103] Salmo salar (Salmon) [1106] Lutra lutra (Otter) [1355] Trichomanes speciosum (Killarney Fern) [1421] Margaritifera durrovensis (Nore Pearl Mussel) [1990]	0.00 km (as the crow flies)	The Castlecomer Footbridge project is located within the boundary of the SAC.

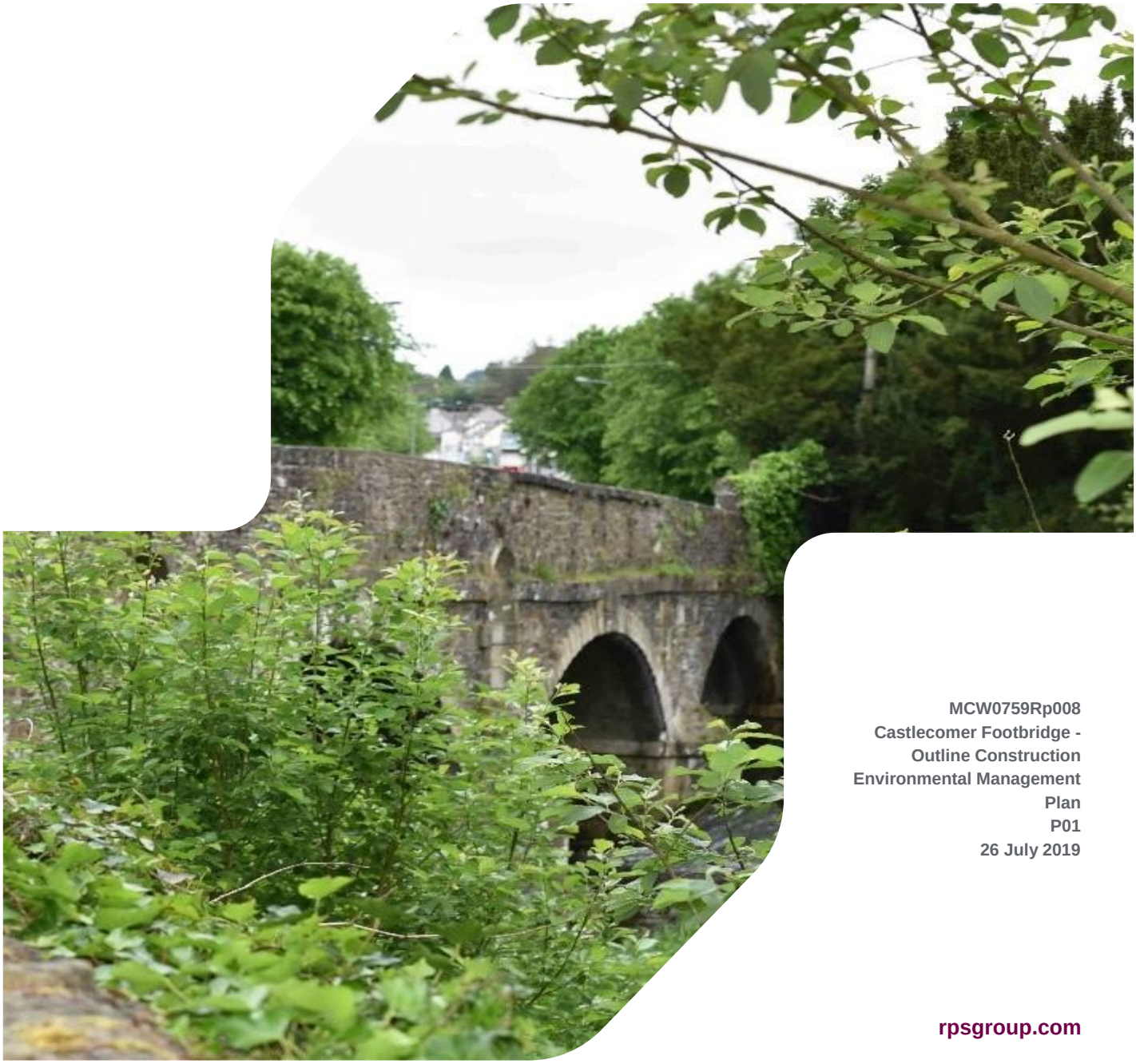
Site Name	Site Code	Qualifying Habitats	Qualifying Species	Distance from Proposed Works	Connectivity
		Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]			
Thomastown Quarry SAC	002252	Petrifying springs with tufa formation (Cratoneurion) [7220]	N/A	30.2 km as the crow flies	No connectivity
Coolrain Bog SAC	002332	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	N/A	31.6km as the crow flies	This SAC is located upstream works no migrating species designated for SAC therefore no connectivity with the proposed Footbridge.
Knockacoller Bog SAC	002333	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	N/A	28.2km as the crow flies	This SAC is located upstream works no migrating species designated for SAC therefore no connectivity with the proposed
Slieve Bloom Mountains SPA	004160	N/A	Hen Harrier (Circus cyaneus)	31km as the crow flies	This SAC is located upstream works no migrating species designated for SAC therefore no connectivity with the proposed Footbridge.
River Nore SPA	004233	N/A	Kingfisher (*Alcedo atthis*) [A229]	9.1 km as the crow flies 17.2km downstream from the proposed works	Hydrological connectivity with the SPA through the Dinin River which flows into the Nore.

Appendix E

Outline Construction Environmental Management Plan

CASTLECOMER FOOTBRIDGE

Outline Construction Environmental Management Plan



MCW0759Rp008
Castlecomer Footbridge -
Outline Construction
Environmental Management
Plan
P01
26 July 2019

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
P01	For Planning	K. Dineen	A. Fitzgerald	A O'Brien	26.07.19

Approval for issue

Anthony O'Brien		26 July 2019

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Contents

Figures

1 INTRODUCTION

RPS has been commissioned by Transport Infrastructure Ireland (TII) and Kildare County Council acting as lead local authority through a Section 85 Agreement (Local Government Act, 2001) on behalf of Kilkenny County Council (KCC) under Eirspan Task Order 302 to provide technical consultancy services to examine options for an improved pedestrian link across the River Dinin in Castlecomer, Co. Kilkenny.

The scope of services includes the preparation of an Outline Construction Environmental Management Plan (CEMP) for a proposed footbridge spanning the Dinin River c.0.3km north-east of Castlecomer Town, Co Kilkenny, herein referred to as the proposed works. TII intends to construct the proposed footbridge over the River Dinin immediately north of the Castlecomer Road vehicular bridge (N78).

1.1 Site Location

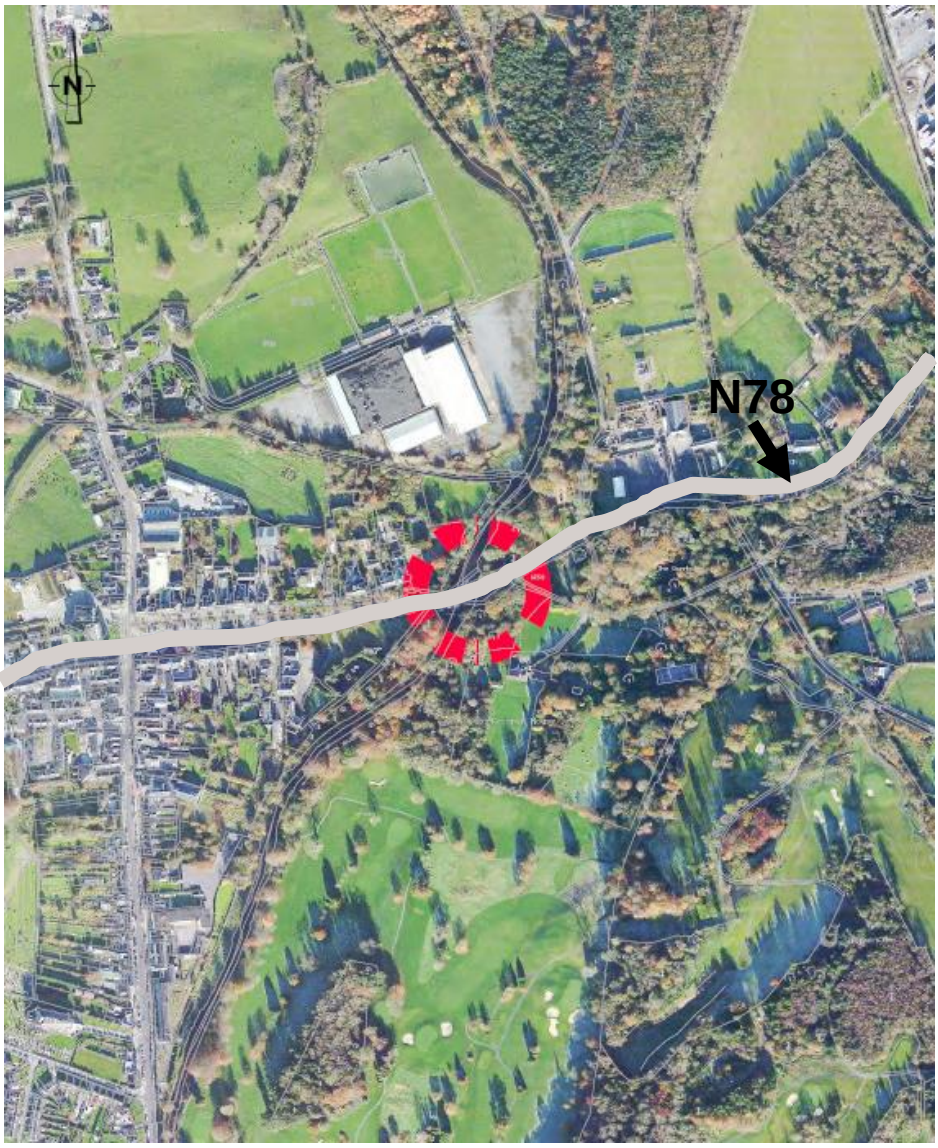
The footbridge will be located in the townlands of Ardra, Castlecomer and Drumgoole over the River Dinin immediately north of the existing River Dinin road bridge. The location of the proposed footbridge can be seen in **Figure 1-1**.

Figure 1-1: Site Location of Footbridge

1.2 Environmental Receptors

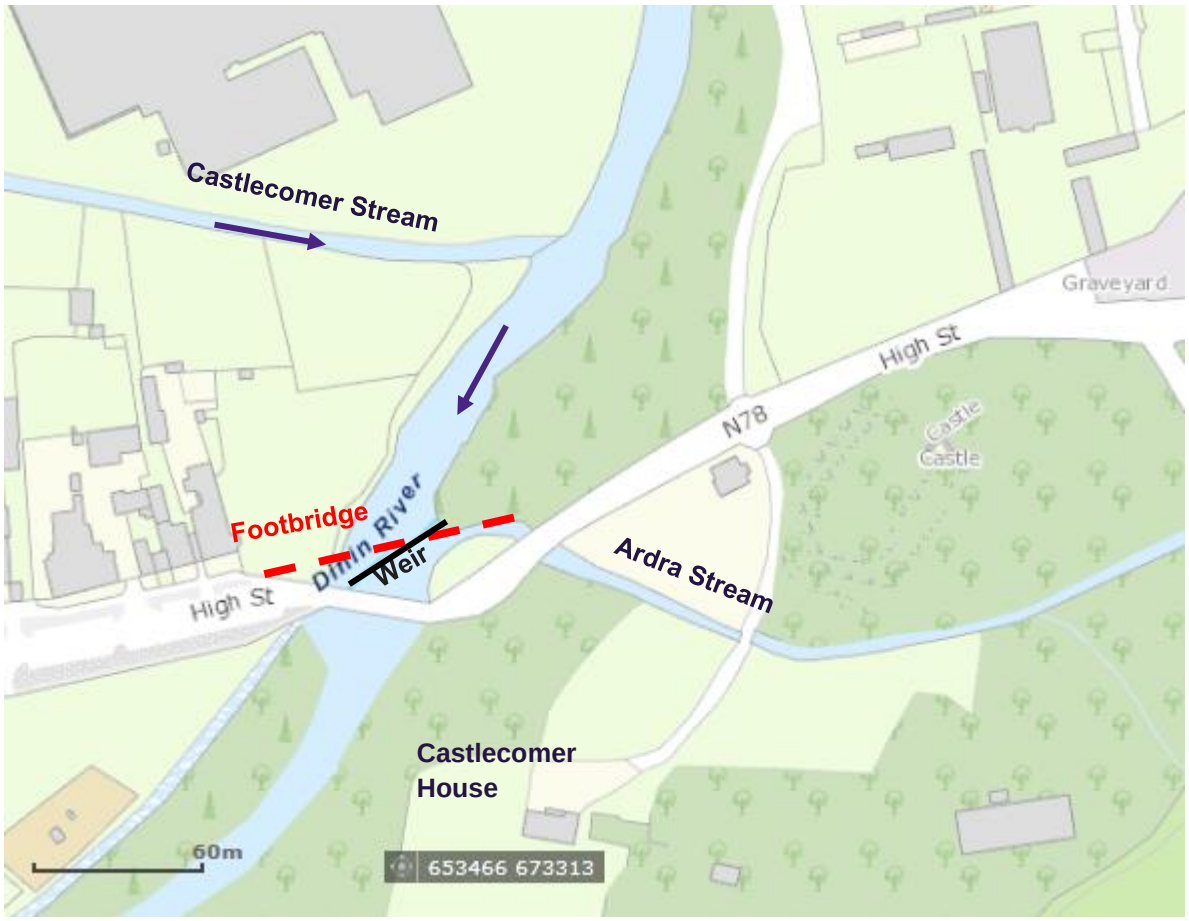
The proposed works location is within the settlement of Castlecomer, where residential, commercial and community facilities are located. There is an existing River Dinin road bridge which forms part of the N78 national road and allows vehicles to cross the River Dinin in an east west direction as seen in **Figure 1-2** also. The lands immediately adjacent to the River Dinin primarily comprise woodland with some recreational riverine amenity area. Beyond the woodland there are urban and recreational lands on the edge of the town. The wider area is characterised largely by open recreational lands including a golf course, Castlecomer Discovery Park, wooded areas and agricultural lands.

Figure 1-2: Aerial Photograph of Site Location Castlecomer Bridge



The existing River Dinin road bridge intersects two watercourses as seen in **Figure 1-3.**

Figure 1-3: **Existing Infrastructure**



The River Dinin, which the proposed footbridge is to traverse forms part of the River Barrow and River Nore Special Area of Conservation (SAC). The Natura Impact Statement (NIS) for the project sets out details on the sensitive ecological receptors associated the River Barrow and River Nore SAC. Mitigation measures as set out in the NIS to protect the Qualifying Interests of the River Barrow and River Nore SAC and the Lower River Suir SAC are described in **Section 4.4** of this CEMP.

2 BASIS OF OUTLINE CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

2.1 Scope of the Outline CEMP

This Outline CEMP has been designed to set out environmental measures and construction approaches which will minimise the potential for impact of the development on various aspects of the environment. It incorporates the standard work methodologies that are to be applied to ensure that the work is carried out in an appropriate manner to protect the environment. The Contractor will be required to comply with the requirements and constraints set forth in the Outline CEMP and its supporting documentation and to prepare a Final CEMP prior to construction taking account of the content herein.

This document will be updated following the receipt of planning approval or other relevant consents if necessary, to incorporate any additional or revised construction approaches required by condition.

This document will also be subject to ongoing independent audit in consultation with the National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI). Any alterations will be for the improvement of the CEMP.

It will be the appointed Contractor's responsibility to implement an effective construction management system to ensure that planning and environmental requirements for the construction of this project are met. The project team, including the supervisory team of KCC, as well as Contractors and Sub-Contractors staff, must comply with the requirements and constraints included within the CEMP and its supporting documentation.

All site personnel will be required to be familiar with the CEMP requirements as related to their role on site. The CEMP shall describe the project organisation and list those procedures that will be developed and adopted on site. The CEMP shall also define the roles and responsibilities of the various parties to the construction contract.

The detailed CEMP shall be supported by Contractor's Method Statements demonstrating how works are to be executed in accordance with the environmental management requirements set out within same.

Upon appointment, the Contractor will take ownership of the CEMP and will be responsible for the update of same. In addition, the detailed CEMP will be supported by the Contractor's detailed sub-plans (refer to Section 4.2), including a Surface Water Management Plan (SWMP), detailed Waste Management Plan (WMP) and detailed Construction Traffic Management Plan (CTMP).

2.2 Objectives and Targets of Outline CEMP

The objective of this Outline CEMP is to ensure that the development works take place with no likely significant impact on the environment or the surrounding areas and that all environmental conditions that may be outlined as part of a future planning consent and any other consents are adhered to. It will provide the structure with which all site stakeholders must adhere to.

Work methodologies and approaches to minimise environmental impact have been established which are consistent with relevant Irish and European environmental guidelines and policies. It is intended that these environmental controls and works methodologies will be the focal point of the environmental management of the project and will ensure the successful environmental performance activities during the proposed works.

Environmental controls for the development and the suitable best practice control measures to be adopted by the Contractor have been identified under the following categories, for which preliminary sub-plans have been prepared:

- General Environmental Management.

- People and the Community.
- Noise and Vibration.
- Air and Climate.
- Landscape and Site Reinstatement.
- Biodiversity, particularly in the form of a Surface Water Management Plan for the protection of Aquatic Ecology of the River Barrow and River Nore SAC.
- Traffic.
- Waste.

2.3 Best Practice Guidance Notes to Be Followed

All works carried out on the project will comply with all applicable Irish and European Environmental legislation and all other applicable policies, standards, documents and procedures whether from the Planning Authority or other recognised authorities or bodies such as IFI or the NPWS.

2.4 Management Structure, Roles and Responsibilities

This section shall set out the roles and responsibilities of the principal parties involved in the construction of the proposed project. In addition, it shall outline the lines of communication between the various parties. The roles and responsibilities outlined below are indicative and will be updated upon appointment of Employer's Representatives, Designers and the Contractor.

2.4.1 Project Owner

KCC shall be the project owner. A Client Project Manager shall be nominated and contact details will be confirmed within the detailed CEMP.

2.4.2 Supervising Engineer

A Supervising Engineer and team shall be appointed to act as agent for the Project Owner on site.

2.4.3 Contractor

The Contractor has yet to be appointed. Contact details will be confirmed within the detailed CEMP.

2.4.3.1 Contractor's Site Staff

The responsibilities of the Contractor's site staff shall be outlined in the detailed CEMP to be developed by the Contractor; it is possible that some roles may overlap or be carried out by the same person. The staff shall generally entail a Contract Project Manager, a Health and Safety Officer, an Environmental Officer / Engineer and an Environmental Clerk of Works. The latter may also be appointed independently by the project owner.

2.4.3.2 Responsibilities to be Assigned

Key responsibilities to be assigned include:

a) Liaison with Client's Project Manager and Supervising Engineer;

b) The implementation of the CEMP;

c) Management of the overall Project Programme;

d) Co-ordinating the construction teams/contractors;

e) Implementing the Contractor's Safety and Health Plan;

f) Liaison with the client representative staff;

g) Production of construction programmes;

h) Liaison with local stakeholders and dealing with any complaints or queries from the public;

i) Maintaining a project diary; and

j) Carrying out duty of Health & Safety Coordinator Construction Stage, implementing the Contractor's Safety and Health Plan and auditing and updating same as necessary.

Particularly with respect to the implementation of environmental protection measures, the following responsibilities are to be assigned:-

a. Implementing the Environmental Requirements of the CEMP and updating it as necessary;

b. Management of all environmental aspects of the construction works;

c. Ensuring all relevant mitigation measures are implemented as required, particularly those set out within the NIS (subject to any modifications by statutory consent) and the measure set out in **Section 4** of this Outline CEMP;

d. Ensuring any monitoring requirements are implemented as required;

e. Reviewing monitoring results if required;

f. Training of staff in all environmental issues;

g. Provision of Tool Box talks to contractors / construction workers as required;

h. Ad hoc environmental inspections;

i. Liaison with the client representative staff;

j. Auditing the construction works from an environmental viewpoint;

k. Maintaining regular contact and liaison with environmental specialists as appropriate;

l. Producing update reports on environmental compliance, if required;

m. Reporting on any non-compliances; and

n. Implementing measures for ensuring close out of non-compliances.

2.5 Non-Conformance, Corrective and Prevention Action Plan

Non-conformances are generally issued where there is a situation where legal or contractual limits associated with activities on the project are exceeded, or there is an internal/external complaint associated with environmental performance.

Non-Conformance within the CEMP system is the situation where essential components of the CEMP are absent or dysfunctional, or where there is insufficient control of the activities and processes to the extent that the functionality of the CEMP in terms of the policy, objectives and management programmes, is compromised. Correction is the act of developing or improving where non-conformances have been identified. Prevention is the act of ensuring that non-conformance does not occur.

The CEMP and all its components must conform to the environmental policy, objectives and targets and the requirements of the ISO 14001 management standard. In the event of non-conformance with any of the above, the following must be investigated:

- Cause of the non-compliance;
- Develop a plan for correction of the non-compliance;
- Determine preventive measures and ensure they are effective;
- Verify the effectiveness of the correction of the non-compliance; and
- Ensure that any procedures affected by the corrective action taken are revised accordingly.

Responsibility must be designated for the investigation, correction, mitigation and prevention of non-conformance. The Supervising Engineer will monitor and investigate non-conformances relating to environmental issues.

2.6 Accident Prevention and Emergency Response Plan

The development of an accident prevention and emergency response plan (including environmental emergencies) shall be the responsibility of the appointed Contractor and PSCS. This plan shall be appended to the detailed CEMP as an Appendix and shall include all relevant contact details.

2.7 Records Procedure

The Contractor shall establish, implement and maintain procedure(s) for the identification, storage, protection, retrieval, retention and disposal of records.

2.8 Audit and Review Procedure

Audit programmes shall be planned, established, implemented and maintained taking into consideration the environmental importance of the operation(s) concerned and the results of previous audits. At a minimum there will be a requirement for daily checks and inspections and for weekly audits. The scope of these audits will be set out in the final detailed CEMP.

The selection of auditors and conduct of audits shall ensure objectivity and the impartiality of the audit process. The purpose of an audit includes:

- Ensuring that Environment Control Plans are adhered to and that control forms are completed;
- Ensuring that Environmental Objectives and Targets are met;

- Ensuring that legislation is complied with; and
- Audit report documents and records will be kept in the relevant site office.

3 DESCRIPTION OF PROJECT

3.1 Scope and Purpose of the Project

The site of the proposed pedestrian bridge is on the eastern side of Castlecomer Town, Co. Kilkenny running parallel to the existing N78 bridge crossing of the River Dinin, see **Figure 1-1**.

The bridge was constructed in the 18th Century and it was never intended to cater for modern vehicular traffic. Consequently, the existing bridge is too narrow to cater for a safe modern road cross section complete with footway.

There is only one footpath and is located on the northern side of the existing bridge which is sub-standard and varies 650-900mm in width. It is hazardous for both road users and pedestrians particularly on the east end of the bridge where the turning movements of HGV's encroach onto the footway due to the tight bend in the road. In order to improve safety at the location, KCC and TII intend to remove pedestrians from the existing bridge and provide a new dedicated facility for pedestrians to cross the River Dinin.

The need for improved pedestrian links over the River Dinin has been previously identified in the Castlecomer Local Area Plan (LAP) 2009-2018 and more recently has been identified as a key objective in the Castlecomer 2018-2024 LAP.

3.2 Description of Works

A Castlecomer Footbridge Options Report was prepared by RPS Design Team in conjunction with the project steering committee to assess a number of potential options for the footbridge. A copy of the report is available under a separate cover and will be submitted with the planning application.

The Options Report concluded that, a two-span steel footbridge independent of the existing bridge was the preferred option and it is the subject of this Outline CEMP. Details of the proposed bridge are provided in **Appendix A** of the EIA Screening and seen in **Figure 3-1**. The proposed footbridge will be approximately 44m in length and will be located north of the existing River Dinin Bridge. In order to facilitate the footbridge, abutments will be constructed on either bank (west and east) of the existing river with one pier to be constructed within the river bed to provide structural support.

The bridge lighting has been designed to illuminate the deck of the pedestrian bridge and to softly light the niches/spandrel of the adjacent road bridge to avoid illuminating important foraging and commuting areas for bats, i.e. the river and river banks. The lighting design has taken into consideration the *Bat Conservation Trust & Institute of Lighting Professional Guidelines* (2018).

The works will include site investigation, vegetation removal (including Japanese knotweed), excavation, piling, river diversion, pouring of concrete, input of fill for embankments and erection of the bridge superstructure. A road closure for a period of up to 48 hours may be required and an appropriate Traffic Management Plan (TMP) will be prepared. Further details are provided in **Section 3.2.1**.

Figure 3-1: Two Span Steel Footbridge Elevation (North)

3.2.1 Proposed Sequence of Works and Methodology

In order to complete the detailed design of the scheme site investigation works need to be completed in advance of the construction works as a separate work activity and are detailed hereafter:

Site Investigation Works

- In order to access the river and complete the exploratory works in a safe manner, bunding shall be provided to form a low wall along the eastern river bank to protect the toe of the embankment and prevent material entering the watercourse.
- The bunding shall be typically 1m by 1m in dimensions and will be sufficient for the predicted flow in the river, it shall extend from the eastern river bank (at the confluence of the adjoining tributary) to the first pier of the existing bridge. This will continue on the southern side of the bridge back to the eastern bank to ensure water cannot travel upstream into the area of works.
- A temporary access structure will span across a small tributary between Castlecomer Discovery Park and the existing eastern bank of the bridge as a pipe or series of pipes subject to flow. It is envisaging that the watercourse will be flumed through the pipe(s) which will be backfilled to allow access over the tributary to the bunded area.
- The proposed bunding and fluming of the watercourse shall be agreed in consultation with IFI in advance of the commencement of works.
- It is envisaged that during the course of any bunding works electrofishing may be required. This shall be conducted by a competent expert in accordance with an agreed methodology with IFI.
- The geotechnical borehole rig will mobilise to site and undertake the exploratory holes.
- The borehole rig will de-mobilise from site and the temporary access and bunding will be subsequently removed.

Site Preparation for Main Works

Site clearance will be undertaken on the western and eastern banks in preparation for construction of foundations and bunding of riverbanks, including removal of existing vegetation under the footprint of the proposed embankments.

Prior to commencement of works, the compound will be set up and traffic management measures will be put in place.

Vegetation removal will also take place and will include the removal of trees along both the right and left banks. During the site preparation phase Japanese knotweed located on the left bank upstream of the existing bridge and at the base of the existing bridge (left bank) will also need to be managed. Japanese knotweed will be managed in accordance with the Invasive Alien Species Management Plan (IASMP) included under a separate cover.

It is envisaged that the compound will be located in the Castlecomer Discovery Park on the eastern side of the river (see **Figure 3-2**). The compound will be set back a minimum of 10m from the river. All plant and equipment will be maintained, refuelled and stored at the compound location. Oil will also be stored in appropriately contained bunded facilities.

Figure 3-2: Proposed Compound

River Diversion

- In order to complete the works the watercourse will need to be locally diverted with bunding to allow for safe construction of the works.
- The bunding shall be typically 1m by 1m in dimensions and will be sufficient for the predicted flow in the river, it shall extend from the eastern river bank (at the confluence of the adjoining tributary) to the first pier of the existing bridge. This will continue on the southern side of the bridge back to the eastern bank to ensure water cannot travel upstream into the area of works.
- A temporary access structure will span across a small tributary between Castlecomer Discovery Park and the existing eastern bank of the bridge as a pipe or series of pipes subject to flow. It is envisaging that the watercourse will be flumed through the pipe(s) which will be backfilled to allow access over the tributary to the bunded area and eastern abutment.
- The proposed bunding and fluming of the watercourse shall be agreed in consultation with IFI in advance of the commencement of works. It is envisaged that during the course of any bunding works electrofishing may be required. This shall be conducted by a competent expert in accordance with an agreed methodology with IFI.

Construction Works

- Excavation for the new footbridge piles, foundations and retaining walls shall be undertaken on the eastern and western banks.
- Excavators and piling rigs will be used during the works on these banks and caution must be taken with regard to utilities (buried Eir services, buried watermain, overhead electrical lines feeding the lighting columns east and west of the existing bridge in the vicinity of the bridge).
- The new pier (and associated piles) shall be shuttered, reinforcement placed and the concrete poured.
- The shutters on the pier shall then be struck (cast in-situ).
- Once all concrete works have been completed, waterproofing shall be applied to all buried surfaces before backfilling with 6N structural fill.
- Willow spilling and rock armour will be used for grading and river bank reinstatement.
- The existing river bed will generally be left in-situ, any river substrate material removed will be stockpiled and replaced as required within the river bed in line with IFI standards.
- A masonry wall will be constructed on either side of both embankments (on left and right bank).
- The new embankments shall be constructed by grading, levelling and compacting 6N structural fill before top soiling and grass seeding.
- Safety fencing, safety barriers and new raised concrete verges shall be completed in conjunction with top soiling and grass seeding of the verges.
- Temporary scaffolding shall be erected as required to facilitate access and the bridge sections shall be lifted into place using a mobile crane.
- For site security and safety purposes, temporary lighting will be used.

Completion of Works

- Once works are completed and the areas surrounded by the bunding are no longer required during construction, the watercourse diversion shall be removed.

- Damming measures will be removed in reverse order to the way they were put in.
- Traffic management measures shall then be removed and the pedestrian bridge shall be opened.
- The site compound shall be removed.
- The lands within the site boundaries shall be reinstated through top soiling and grass seeding as required.
- Materials arising from excavation/demolition to be segregated on site/be stored temporarily/ removed from site and disposed in an approved licenced facility.
- The area shall be snagged, tidied up and handed over to KCC.
- The western abutment will be approximately 75m^2 in size while the approaching footpath will be 44m^2.

Materials to be Used on Site will include: -

- Reinforcement Steel
- Structural Steel (coatings to be applied offsite)
- Concrete
- Bridge Bearings
- Stone & Mortar
- Timber
- Light fittings and ancillary products required to install pedestrian/public lighting.

Areas to be Removed/Changed will comprise: -

- The pier will result in the permanent removal of 1m^2 of instream habitat;
- There will be removal/disturbance to a 3m wide riparian habitat along the eastern length of the works, with reinstatement where possible; and
- There will be the removal/disturbance of river bed from the bunding measure in the immediate area of the proposed works.

High Level Programme

The following is an overview of the timing on the works, however this is subject to receipt of planning and statutory consents:

- Construction works are envisaged to last for a period of 6 months from mobilisation to completion commencing in Q2 2020.
- In-stream works to be completed during IFI approved seasonal window July – September.

This programme is indicative only at this time. The exact order and programme of works can only be determined by the Contractor following appointment. It will however be an objective and a requirement of the Contractor to minimise disruption to traffic, businesses and properties within the town.

3.2.2 Proposed Working Hours

Normal construction working hours for the development will be:

- Monday to Friday: 08.00 - 18.00
- Saturday: 09.00 - 13.00

Most of the works can be undertaken while the road is in operation. However some items, such as the installation of the sections of bridge with crane shall be undertaken during the 48 hour road closure.

3.2.3 Best Practice and Construction Methodology

This Outline CEMP proposes best practice design and construction methodology.

3.3 General Construction Site Organisation

The Contractor will visit the site prior to mobilisation to become familiar with the layout and ground conditions on site.

Upon mobilisation to site the Contractor will firstly demarcate a lay-down area for materials deliveries and site compound area. This will be agreed with the Environmental Manager / Ecological Clerk of Works.

The compound will provide for the following:

- Welfare / office facilities for site staff;
- Plant / machinery parking / storage area;
- Fuel storage / refuelling area;
- Segregated waste area; and
- Construction staff parking.

This compound will be located as shown in **Figure 3-2**.

In the event that toilet facilities are required, temporary self-contained units will be utilised.

The proposed development will require some spoil and materials storage. The volumes of any such storage will be low and will be temporary only. It is a requirement of the NIS that spoil from the river is checked for lamprey.

Freshly excavated spoil / topsoil will be retained in an area over 10m away from any water / drainage channels. Spoil storage will be for short term duration, will be reused in reinstatement works where possible and appropriate. Excess material will be removed from site to an authorised facility.

The works will be carried out on and adjacent to public paved roads. These existing routes are suitable for use by construction traffic. No other temporary haul routes or local work areas / staging areas around the proposed construction areas are considered necessary.

4 ENVIRONMENTAL CONTROLS AND MANAGEMENT MEASURES

4.1 Guidance Documents

The following guidelines and documents have been consulted to draw up general and specific construction management measures:

- H. Masters-Williams et al (2001) *Control of water pollution from construction sites. Guidance for Consultants and Contractors* (C532). CIRIA;
- Construction Industry Guidelines (such as CIRIA C502 Environmental Good Practice on site);
- BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise and BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part2: Vibration (together referred to as B.S. 5228);
- *Control of Dust from Construction and Demolition Activities* (BRE 2003);
- *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Water* (IFI, 2016);
- Environment Agency (2013) *The Knotweed Code of Practice. Managing Japanese knotweed on Development Sites* (Version 3);
- E. Murnane, A. Heap and A. Swain. (2006) *Control of Water Pollution from Linear Construction Projects.* Technical Guidance (C648). CIRIA;
- E. Murnane et al., (2006) *Control of Water Pollution from Linear Construction Projects. Site Guide* (C649). CIRIA;
- Murnane et al (2002) *Control of Water Pollution from Construction Sites - Guide to Good Practice.* SP156;
- Murphy, D. (2004) Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin;
- DOMNR (1998). Fishery guidelines for Local Authority works. Department of the Marine and Natural Resources, Dublin;
- Site Procedure 6 (Above-Ground Oil Storage Tanks) from CIRIA C532 *Control of Water Pollution from Construction Sites;*
- *Pollution Prevention Guidelines No.2 (Above Ground Oil Storage Tanks)* from the UK Environment Agency.
- Enterprise Ireland (Anon) Best Practice Guide (BPGCS005) Oil storage guidelines.
- *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes* (NRA, 2008a);
- *Guidelines for the Treatment of Otters during the Construction of National Road Schemes* (NRA, 2008b); and
- *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (NRA, 2010, rev. 1.).

4.2 General Environmental Procedures

The following (minimum) project specific procedures will be developed and employed by the Contractor and their subcontractors for each environmental aspect while working on the project.

Outline of Potential Environmental Procedures

- ENV-01 Awareness & Training
- ENV-02 Environmental Emergency Response
- ENV-03 Record Keeping, Auditing and Monitoring
- ENV-04 Environmental Complaints Procedure
- ENV-05 Protection of Biodiversity
- ENV-06 Surface Water Management Plan
- ENV-07 Construction Traffic Management Plan
- ENV-08 Waste Management Plan
- ENV-09 Landscape and Site Reinstatement Plan
- ENV-10 Accident Prevention and Emergency Response Plan
- ENV-11 Invasive Alien Species Management Plan

These procedures are listed in this document for illustrative purposes. The Contractor, when appointed, will be responsible for formulating these procedures, and may wish to amend these procedures when appointed. These procedures will form part of the detailed CEMP and will be continually updated where necessary. These procedures can only be amended by improvement with regards to environmental protection and must take cognisance of all relevant conditions of planning permission.

The proposed project will be carried out in accordance with the following best practice construction measures:

- The works will be undertaken under the regular supervision of an Environmental Clerk of Works.
- Site office and staff welfare facilities will be installed and will be clearly signed. Visitors to the site will report to the site office on arrival and will undergo an induction process.
- The Contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required and the Contractor is required to prepare a contingency plan for before and after such events.
- All construction materials and plant shall be stored at the designated contractor compound and transported to the works zone immediately prior to construction.

4.2.1 Method Statements

As advised above, the Contractor is required to supply detailed method statements for proposed activities on site which demonstrate how the management requirements set out in the CEMP and all requirements as detailed in contract documents are to be achieved on site.

4.3 People and The Community

The proposed works will be undertaken within the town of Castlecomer along public roads, including a national road N78. Furthermore, the works will require the mobilisation of construction machinery along these public roads, delivery of construction materials to the site and the removal of wastes. There is a requirement for a road closure. There is clear potential for impact or interaction with neighbouring properties and the wider community.

The following measures should be provided for:

- All works shall be carried out in accordance with the relevant Health and Safety legislation, and in accordance with the site specific Safety and Health Plan;
- Works will be managed appropriately to keep members of the public away from work areas;
- Strategy for timely notification of works to landowners adjacent to the works locations and in wider area that may be affected by the works adjacent to the public road or occasional large deliveries; and
- Traffic Management Planning and Control, liaison with KCC, to warn people of presence of construction site and traffic and particularly of pending road closure.

4.4 Biodiversity

4.4.1 General

The proposed works will be carried out in accordance with the following Best Practice general construction measures:

- KCC, or any Contractor appointed by KCC will appoint a suitably qualified person(s), to the role of Ecological Clerk of Works (ECoW). The role of the ECoW will be to monitor the construction works, appoint the relevant specialists required and to ensure compliance with relevant legislation, planning conditions and associated documents (e.g. IASMP);
- The ECoW will have the authority to review the CEMP and method statements, advise the Contractors on the contract/project requirements, decide on elements that require direct supervision and instruct action, as appropriate, including the authority to require the temporary cessation of works, where necessary;
- All of the Contractor's site staff will be briefed regarding the biodiversity value of the surrounding landscape. This will include particular reference to the sensitive habitats and species within the River Barrow and River Nore SAC and the potential for these to be present within the works area i.e. salmon, lamprey (river and brook), otter and crayfish;
- All of the Contractor's site staff will be briefed regarding habitats; trees, treelines to ensure that there are no accidental or unintentional actions conducted during the project construction that could lead to a reduction in water quality/damage to same. Such matters often arise accidentally through lack of awareness rather than as a result of an intentional action;
- The contractors briefing should also include emphasis on the presence of IAPS present on site. This includes the stand of Japanese knotweed to avoid the unintentional disturbance and spread of this IAPS prior to its removal;
- A surface water management plan will be prepared by the Contractor and agreed with the ECoW, KCC, IFI prior to the commencement of works. An outline of surface water management measures is detailed below and has been devised to ensure the protection of downstream European Sites and its surface water dependent Annexed species and habitats. Any changes in locations of any of these measures

including attenuation features, silt fencing etc. are required to be shown for prior approval from KCC and the ECoW;

- Any excavations will be left open for minimal periods to avoid acting as a conduit for surface water flows;
- Any diesel or fuel oils stored on site will be bunded to 110% of the capacity of the storage tank. Re-fuelling of plant will not occur within 50m of any watercourse or surface water feature (specifically the Dinin and Ardra watercourses). Drip trays and spill kits will be kept available on site;
- Fuels, lubricants and hydraulic fluids for equipment used on the site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice;
- Any spillage of fuels, lubricants of hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of;
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling;
- The Contractor shall ensure that all personnel working on site are trained in pollution incident control response. A regular review of weather forecasts of heavy rainfall is required, and the Contractor is required to prepare a contingency plan for before and after such events.
- Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be readily available at strategic site locations and construction staff will be familiar with emergency procedures;
- Where dust suppression is considered to be required by the Contractor or as instructed by appointed ECoW, such requirements and methodology shall be subject to the agreement with the KCC. Notwithstanding this fact, water will not be abstracted from or discharged the Dinin and Ardra watercourses;
- Contaminated soil, including spoil contaminated with invasive species (defined as those species listed on the Third Schedule of the Birds and Natural Habitats Regulations), shall only be disposed of at an appropriately licenced facility. The necessary licences permit and permissions will be required for this activity and it will be the responsibility of the appointed Contractor to arrange for same;
- All water used in the cleansing, testing or disinfection of structures shall be rendered safe prior to discharge to the environment. None shall be permitted to be returned directly to the Dinin or Ardra watercourses or to percolate to ground in the vicinity of these watercourse;
- No works will be permitted within the area of the Dinin and Ardra watercourses during excessive weather events as defined by Met Eireann;
- The Contractor shall ensure that no harmful materials shall be deposited into nearby watercourses, including drainage ditches/pipes, on or adjacent to the site; and
- The Contractor shall comply with the requirements of the Public Health Acts and Fisheries Acts.

4.4.2 Mitigation Measures for stream diversions and bridge construction

Consultation with IFI has stipulated that the following document should be adhered to IFI *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters* (2016). Within these guidelines clear span structures with no in-stream works is the preferred option however the site options selection process did not find this to be a viable option. A single pier is to be constructed within the Dinin River which will require in-stream works.

In-stream works should be carried out in dry conditions effectively isolated from any flowing water and instream works will only occur during the permitted summer period of July-September inclusive outside of the Annual Close Season.

Works will require the bunding and diversion of the River Dinin along the eastern bank to facilitate instream pier placement. This will be followed by reinstatement of the River Dinin once works have been completed. To facilitate works a temporary crossing will be placed within the Ardra stream consisting of pipe(s) to convey any flow.

The following as stipulated in consultation with IFI will be adhered to;

- The construction of the abutments should always take place in the dry. Where possible the abutments should be set back from the river bank sufficiently to maintain connectivity of habitat along the river bank and to avoid erosion of the bank;
- In some cases where the abutments cannot be set back the area should be isolated from the watercourse using bunding. The area within the bund must be electro-fished and any remaining water must be pumped to grassland or a filtration system before returning to the river; and
- No work should take place within the live water environment.

In addition to the above bullet points stipulated by IFI the following will also be adhered to;

- The area to be dewatered must be electro-fished to translocate any fish/lamprey/crayfish present.
- The ECoW shall engage a suitability qualified and experienced ecologist to prepare a detailed translocation plan for fish/crayfish/lamprey in consultation with the ECoW and IFI;
- The ECoW will appoint a suitability qualified and experienced ecologist(s) to conduct the electro fishing and fish/lamprey/crayfish translocations;
- Fish translocation can only be conducted by qualified ecologists under licence. This is issued under Section 14 of the Fisheries (Consolidation) Act, 1959 as substituted by Section 4 of the Fisheries (Amendment) Act, 1962. Licences can take a number of weeks to obtain so the Contractor will need to be appointed well in advance of works;
- During hot weather conditions work may have to be suspended. The electrofishing team will monitor dissolved oxygen levels in the buckets and tanks and if 90% levels are difficult to maintain, or if there are mortalities, then the operation will have to be suspended;
- Once the works area is dewatered a visual inspection will be carried out by a competent and qualified ecologist for presence of lamprey, crayfish or any fish left in the works area. Any identified will be translocated. Works are only to be undertaken during the month of July – September to mitigate on impacts of potential spawning of adult brook and river lamprey in the River Dinin;
- Any spoil removed from the river bed and bank will be checked for lamprey. Any protected species found in the spoil will be released downstream away from the works; and
- Records of all captured fish must be kept.

Although no crayfish were located at the time of survey there is the possibility for this Annex II species to be present within either the Dinin or Ardra watercourse. Good crayfish habitat was found during the Aquatic survey. The following measures should be adopted;

- The bunding area must also be examined for crayfish prior to dewatering. An ECoW or the appointed suitably qualified ecologist must be present on site during the dewatering activities and can stop dewatering should any crayfish be revealed. Any crayfish found must be removed and translocated to a suitable habitat as stipulated within the translocation plan;

- The survey, handling and translocation of crayfish must be conducted by a qualified person who has relevant licence issued by NPWS for such activities; and

- All those working in-stream shall be aware of the current outbreak of crayfish plague and employ strict biosecurity measure to prevent its introduction and spread to the Dinin/ Ardra watercourses.

4.4.3 Mitigation measures for temporary stream crossing

A temporary structure will be installed to span the Ardra stream as a pipe or series of pipes subject to flow. It is envisaged that the watercourse will be flumed through the pipe(s) which will be backfilled to allow access over the tributary to the bunded area and eastern abutment.

- The ECoW will be responsible for liaising with IFI and ensuring the installation and removal of this structure adheres to IFI requirements.

IFI (2016) *Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters* will be adhered to which includes the following;

- The crossing should be in place prior to the commencement of works;

- Flow should be maintained through the structure;

- The structure must provide for the passage of fish and macroinvertebrates;

- No temporary crossing shall be installed without the approval of IFI as regards sizing, location, duration and timing;

- The crossing must be laid in such a manner as to maintain the existing stream profile;

- Ensure no significant alteration in current speed or hydraulic characteristic, in particular not to result in scouring, deposition or erosion upstream or downstream of the temporary crossing location;

- Have capacity to convey the full range of flows including flood flows likely to be encountered without the crossing being overtopped;

- Be covered with clean inert material such as to allow for the safe crossing of the widest items of plant and equipment without cover material being dislodged and entering waters;

- The approach and departure routes to the temporary crossing shall be designed and installed so that drainage will fall away from the watercourse being crossed. In the event that the fall of the ground does not permit sufficient control on drainage, additional earthworks settlement areas shall be provided;

- The temporary crossing structure shall be fenced terram or similar material to prevent wind blow carrying dust and other potentially polluting matter to water; and

- Side armour (or reinforced concrete traffic barriers) shall be provided to ensure machinery cannot drive over its edge or force the discharge of material from the bridge deck to waters.

4.4.4 Sediment and erosion management measures

This section describes a number of general mitigation measures which will be implemented by KCC's appointed Contractor to minimise the effects of sediment and erosion during the construction activities. Indirect impacts to downstream European Sites arise from the potential for sediment/ pollutant release from construction activities. Construction of the proposed works will be restricted to the minimum area necessary as shown in drawing in **Appendix A** of the EIA Screening. Mitigation measures have been specified in the NIS to ensure that there will be no negative impact on the integrity of the European Sites during the

construction of the proposed project. The following mitigation measures, as a minimum, will be implemented, to reduce the risk of pollution of water bodies during construction:

- Dewatering will involve the removal and collection of water from the area, and the treatment and disposal of the collected water;
- The dewatering technique used will aim to reduce the amount of sediment extracted at source e.g. by dewatering through a filter. The water removed from the areas will be treated to remove sediment to an acceptable level (less than 25mg/l suspended solids), before being discharged;
- When damming and dewatering to maintain dry conditions by pumping, any silt contaminated water from the works area must be treated prior to discharge;
- The Contractor will employ best practice settling systems to ensure maximum removal of suspended solids prior to discharge of any surface water or groundwater from excavations to receiving waterbodies. This may include treatment via settlement tanks;
- There will be no direct pumping of sediment laden water from the works to the active watercourse at any time;
- The installation and removal of temporary structures, river diversions and installation of the bridge pier will be done under the supervision of an ECoW and adhere to IFI requirements within the guidelines and also include followings from the consultation response;
- Any topsoil shall be maintained separate from general spoil in a tidy condition with side slopes not steeper than 1 in 3 and shall be maintained in good condition keeping weeds under control and preventing vermin infestation. The Contractor will take all necessary precautions to avoid run off resulting from topsoil stripping from polluting neighbouring watercourses;
- Stockpiling of construction materials, particularly in relation to the excavation for the bridge pier will be strictly limited to specific areas within the study area including low lying ground.
- Elsewhere, stockpiling of construction materials is strictly prohibited within 5m of any ditch or water-laden channel and appropriate management of excess material stockpiles to prevent siltation of watercourses;
- Temporary construction compounds will not be located close to watercourses and set back as far as possible;
- Riparian vegetation will be left intact where practicable. Protection will be afforded to riparian vegetation by fencing prior to commencement of any works. Where practicable, the fencing will be set a minimum distance of 5m from the bank of the watercourse or at the edge of a woody canopy, whichever is the greatest;
- Before earthworks commence on site and before they are needed - drainage, erosion control and sediment control measures must be in place and functioning;
- Watercourse diversion will be done in a manner so as to minimise suspended solids entering the watercourse in line with IFI guidelines;
- The Contractor must specify specific sediment control measures in relation to the construction of the footbridge and river bed channel and agreed with the ECoW; and
- The downstream end of the diversion will be opened up first. Works will be carried out during low flow periods to minimise silt disturbance, and during specified times permitted by IFI for instream works i.e. 1st July to 30th September.

4.4.5 Mitigation Measures for the avoid hydrocarbon loss and other waterborne pollutants

- All oils, solvents and paints will be stored within suitably designed bunded areas with a bund volume of 110% of the capacity of the largest tank/container;
- Refuelling will only take place in designated hard standing areas. A supply of spill kits and hydrocarbon adsorbent packs will be stored along the construction areas. Personnel will be trained in the use of this equipment. Waste oils and hydraulic fluids will be collected in suitable leak-proof containers and transported from the site and off-site areas for disposal or recycling;
- Machinery used on site will be regularly inspected to ensure there is no leakage from them and to ensure the machinery will not cause contamination of watercourses;
- Where required, fuel will be transported in a mobile, double skinned tank and a spill tray will be used when refuelling (if taking place outside a compound area);
- Concrete, including, but not limited to, waste and wash-down water, will be contained and managed appropriately to prevent pollution of watercourses. Concrete pouring will be prevented during periods of heavy rainfall; quick setting mixes will be used;
- Protection measures will be put in place to ensure that all hydrocarbons used during the construction are appropriately handled, stored and disposed of in accordance with recognised standards as detailed by the EPA and/or KCC e.g. approved waste Contractor, off-site treatment/recycling/disposal etc.;
- Guidelines for minimising impacts on water quality and fisheries in relation to construction will be implemented including, but not limited to, CIRIA C532 "*Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors*", IFI guidelines and TII Guidelines; and
- Runoff and wash down water from exposed aggregate surfaces, cast in place concrete and from concrete trucks will be trapped on-site to allow sediment to settle out and reach neutral pH. KCC and its Contractor will consult and comply with the requirements of the NPWS and the IFI. Waste products and pollutants associated with the works will not be permitted to enter watercourses or groundwater and all precautions necessary will be taken to prevent the spillage of diesel fuel or other solvents.

4.4.6 Environmental Incidents and Accidents

In the case of environmental incidents or accidents occurring during the construction phase of the proposed project, the following measures will help to prevent/ contain the contamination of the watercourses:

- An emergency-operating plan will be established to deal with incidents or accidents during construction that may give rise to pollution in the Dinin or Ardra watercourses. This will include means of containment in the event of accidental spillage of hydrocarbons or other pollutants (e.g. oil booms, soakage pads);
- Throughout all stages of the construction phase of the proposed project the Contractor will ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the freshwater environments and the requirement to avoid pollution of all types;
- All hazardous materials on site will be stored within secondary containment designed to retain at least 110% of the storage contents;
- Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project as appropriate;
- Safe handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project and an emergency response plan shall be in place in case of accidental spillage;

- Raw or uncured waste concrete will be disposed of by removal from the site;
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the site and properly disposed of; and,
- There will be no discharge of un-attenuated water to the nearby watercourses.

4.4.7 Measures to Avoid the Spread of Invasive Species

The presence of Invasive Alien Plant Species (IAPS) has the potential to lead to an offence under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011). Regulation 49 of the 2011 Regulations prohibits (unless under licence) the breeding, release, or allowing or causing the dispersal from confinement of any animal listed in the Third Schedule of the Regulations; or the planting, allowing or causing dispersal, and spreading of any plant listed in the Third Schedule. Japanese knotweed is a plant listed in the Third Schedule.

It is an offence to plant or encourage the spread of any third schedule invasive species by moving contaminated soil from one place to another, or incorrectly handling and transporting contaminated material or plant cuttings. Persons must therefore take all reasonable steps and exercise due diligence to avoid committing an offence under the 2011 Regulations.

The RPS survey conducted in 2018 identified IAPS within or upstream of the proposed works area. The species recorded included Japanese knotweed (*Fallopia japonica*), Cherry laurel (*Prunus laurocerasus*) and Canadian pondweed (*Elodea canadensis*). Construction to facilitate the footbridge will require works in the vicinity of a stand of Japanese knotweed. Aside from unintended or non–project related dispersal of IAPS seed or viable plant material, there remains the potential for the proposed development to spread Japanese knotweed or other high impact IAPS to downstream hydrologically connected European Sites.

As a result, an Invasive Alien Species Management Plan (IASMP) has been prepared by INVAS and is presented as an appendix to the EIA Screening. This IASMP presents the methodology for the treatment of IAS located on site and the best practice measure to avoid the spread of invasive species. In addition to this plan the following presents the general mitigation and best practice methods to prevent the introduction and spread of IAS.

- KCC, its appointed Contractor and ECoW will comply with IASMP;
- It will be the responsibility of the ECoW to appoint a suitable and qualified person(s) to treat the IAPS onsite as per the management plan;
- Further stands of Japanese knotweed or other third schedule IAPS may have become established in the interim. It will be the responsibility of the ECoW to appoint a suitable qualified person to conduct a preconstruction Invasive Species Survey to assess this and to inform a finalised control programme. The person(s) appointed to treat the known IAPS on site should be informed of any further IAPS present;
- Signs will be erected at the site entrances to alert site users that the area is contaminated with Japanese knotweed, Cherry laurel and Canadian pondweed. Currently, signage confirming the presence of and ongoing treatment of Japanese knotweed is displayed at the Bridge;
- Before any site activities take place (including site compounds, facilities, machinery or vehicles being brought on site) an ‘exclusion zone’ should be clearly demarcated. In effect this will include the site entrance and other areas where works are planned to take place. It should include a visible cordon, including on all visible stands of Japanese knotweed or other third schedule species, with a precautionary 7m buffer to take account of underground spread to prevent further spread on site or until such time that a treatment specialist can confirm that the treatment regime has been successful. This could include PVC windbreak mesh or similar material to prevent unwitting spread by damage or dislodgement. This will not be possible along public roads unless these roads are partially closed to

facilitate the works. Where the road remains open, fencing along the existing wall should be provided for to prevent access to and disturbance of the Japanese knotweed;

- Dedicated exclusion zone entry and exit points should be created for operators on foot and for mobile equipment. The appointed Contractor and suitably qualified person shall agree the working area required to allow for the works to commence unhindered;

- Biosecurity facilities must be installed on-site prior to site works commencing. This must include facilities for wheel brushing, brushing down of vehicle and cleaning of footwear prior to arrival on site and on leaving site to prevent the spread of IAPS. It must also include an area where bushing can be directed into a dedicated and contained area. A sign-off sheet must be maintained by the Contractor to confirm cleaning;

- Vehicles leaving the site should be inspected for any plant material and cleaned down in the biosecurity containment area;

- Loose or dislodged material should be gathered in the dedicated and contained quarantine/clean down area will need to be appropriately treated as contaminated material. This can include plant material, contaminated soil etc;

- Any potential IAPS contaminated material being transported off-site will require licences from NPWS, separate of waste collection permit and/or licenced/permitted waste acceptance facility. It will be the responsibility of the appointed Contractor to arrange;

- For any material entering the site, particularly soils, the supplier must provide an assurance that it is free of non-native invasive species;

- All Contractors and site operatives working on-site should receive training on identification of Japanese knotweed and all potential third schedule IAPS that they might encounter; and site practices immediately on commencement on-site; and

- The appointed Contractor must ensure all site users are aware of the finalised IASMP and treatment methodologies. This can be achieved through “toolbox talks” before works begin on the site.

4.4.8 Mitigation for Protected Species and Habitats

The measures outlined in **Section 4.4.2** to **4.4.7** are put in place to protect water quality and also the following protected aquatic species; Salmon (Salmo salar) [1106], Twaite shad (Twaite shad) [1103] and lamprey (Lampreta spp., *Petromzon marinus*) [1095,1096,1099] *Margaritifera margaritifera* (Freshwater Pearl Mussel) [1029], *Margaritifera durrovensis* (Nore Pearl Mussel) [1990], and *Austropotamobius pallipes* (White-clawed Crayfish) [1092] no further measures are required for these species.

Lutra lutra (Otter) [1355]

While no holts or signs of otter were found during either site visit in 2018, otter are widespread in Ireland and have a transitional nature. There is a possibility that otter could use the banks around the site for breeding in the period leading up to the works.

- Pre-construction otter surveys shall be undertaken prior to the commencement of any works in order to identify any changes in otter activity, holt locations, etc., since the original surveys.

- While there are no seasonal constraints around otter surveying timeframes it is preferable to carried this out during the winter month when vegetation is less dense and tracks are not noticeable.

Derogations are required for any works likely to cause disturbance to active breeding holts (when present within c.150m of a scheme). The removal of otters from affected holts, and the subsequent destruction of these holts, must be conducted under a Section 25 derogation under the 1997 Habitats Regulations. The NPWS, of the Department of the Environment, Heritage and Local Government, is responsible for

processing these licenses. An application for a Section 25 derogation should be submitted to the NPWS along with the relevant ecological information from otter surveys. Closure of holts requires a monitoring period to ensure that there is no current otter activity at the holt. Derogations may not be provided by the NPWS for the closure of holts containing a breeding female or young otters.

Annex I Habitats

There will be no direct loss of any Annex I habitat. The measures outlined in **Section 4.4.2** to **4.4.7** are put in place to protect water quality and prevent the release of contaminates into the Dinin and Ardra watercourses. This will then in turn prevent degradation of any Annex I habitats downstream of the works.

4.4.9 Bats Construction Phase Mitigation

A walkover survey of the site was conducted on 3rd May 2019 by Karen Banks of Greenleaf Ecology and subsequently a Bat Survey Report was produced and notes that there is a Horse Chestnut identified for removal. The Horse Chestnut is identified as supporting bat roost potential and shall be examined by an experienced bat ecologist prior to work commencing by any appointed contractor or subcontractor on any part of the construction phase of the proposed project. Following this examination, should the tree be identified as a bat roost then a derogation licence application will be made to the NPWS to exclude the bats and fell the tree. The roost must not be altered or affected in any way prior to works being undertaken as stipulated within the derogation licence. Felling must be carried out under the supervision of a bat specialist named on the licence.

All works should be restricted to daylight hours so as to minimise impacts to these nocturnal species. Should this not be feasible, the emanation of artificial lighting onto the River Dinin and the riparian treeline shall be kept to the minimum area feasible.

4.5 Noise and Vibration

4.5.1 Noise

The Contractor shall ensure that noise levels emanating during site operations when measured at noise sensitive receptors shall not exceed 55dBA (30 minute Leq) between 08.00 hours and 18.00 hours, and shall not exceed 45 dBA (15 mm Leq) at any other time.

During construction works, the Contractor shall utilise the following noise abatement measures and comply with the recommendations of *BS 5228:2009*+A1:2014 - *Noise Control on Construction and Open Sites*. These measures will ensure that:

- No plant used on site will cause a public nuisance due to fumes, noise, leakages or by causing an obstruction;
- The best means practical, including proper maintenance of plant, will be employed to minimise the noise produced by on-site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machines, which are used intermittently, will be shut down or throttled back to a minimum during those periods when they are not in use;
- Any plant, such as generators or pumps, which are required to work outside of normal working hours, will be surrounded by an acoustic enclosure; and

- Throughout the contract, the supervision of the works will include ensuring compliance with the limits using the methods set out in BS:5228.

4.5.2 Vibration

The vibration thresholds in the following guidelines shall be followed and adhered to with regard to any potential vibration impacts during construction:

- *BS6472: 2008. Guide to Evaluation of Human Exposure to Vibration in Buildings. Part 1: Vibration Sources other than Blasting*; and

- *BS7385: Part 2 1993: Evaluation and Measurement for Vibration in Buildings-Guide to Damage Levels from Ground-borne Vibration*.

In general, the Contractor shall limit the hours of site activities which are likely to create high levels of noise or vibration. This will be of particular relevance if out of hours/night time work is required.

4.6 Air and Dust Management

Good practice site procedures will be adopted to limit dust at the construction site itself and to minimise potential for secondary impacts due to dust and dirt being transported onto the surrounding road network. The degree of active control measures necessary to be adopted at the subject site will depend on the time of year and the weather conditions prevalent at that time. The following 'good practice' measures will be adopted:

- Where dust suppression is considered to be required by the contractor or as instructed by the Environmental Clerk of Works (EnCoW), such requirements and methodology shall be subject to the agreement with the KCC. Notwithstanding this fact, water will not be abstracted from or discharged to the River Dinin.

- Adjacent road surfaces and construction areas will be regularly cleaned and maintained as appropriate. Hard surface roads will be swept to remove mud and aggregate materials from their surface. Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential);

- Wheel cleaning facilities will be provided at the site if the need arises;

- A mechanised road sweeper will be used on the public roads if and as mud transfer is identified as an issue;

- Dust suppression by water spray to be employed on surrounding roads and other areas, in particular spoil storage areas, if dust becomes an issue;

- Vehicles on site accessing the compound and bridge locations will have their speed restricted and this speed restriction must be enforced rigidly;

- Material handling systems and stockpiling of materials shall be designed and laid out to minimise exposure to wind and proximity to nearby residents. Water misting shall be applied as required if particularly dusty activities are required during dry or windy periods; and

- All complaints to be reported to the Site Manager and also logged within an on-site register.

4.7 Traffic Management

A Traffic Management Plan (TMP) shall be prepared by the Contractor prior to the commencement of construction works and shall be agreed in advance with KCC. The main purpose of this TMP is to ensure works adjacent to the public road are undertaken safely and to provide suitable notice to road users that they are approaching a construction site/construction site entrance.

The TMP shall seek to minimise disruption to road users, local residents, businesses and all relevant stakeholders in the area. Local peak traffic times shall be confirmed and avoided as necessary. In particular, provision shall be made and agreed with respect to the management of the proposed road closure.

It shall seek to ensure public safety and eliminate potential for hazard.

Access points to the works areas shall be clearly identified on a map of suitable scale and background detail. Any areas that are identified as exclusion zones shall be clearly marked on this map.

All relevant construction traffic routes (including in particular routes between the site compound and the works areas) shall be identified. Any relevant haul routes, including routes related to the import of materials to the site and the export of materials off site shall be identified and agreed with the local authority Area Engineer.

It shall ensure that damage does not occur to the public road network and that adequate measures are taken by the Contractor to reinstate road surfaces following completion of the works to the satisfaction of the local authority.

In the event of damage occurring to the public road network or associated infrastructure as a result of the works, such damage shall be made good in accordance with the requirements of and to the satisfaction of the planning authority.

Temporary staff parking will be provided for within the site compound or other proximate designated area in the vicinity of the works but away from watercourses as specified elsewhere in this Outline CEMP.

4.8 Waste

The following waste management measures will be adopted at the site:-

- All waste arising during the construction phase will be managed and disposed of in a way that ensures compliance with the requirements of the Waste Management Act 1996 and associated amendments and regulations and the Contractor's Final WMP;
- A segregated waste area will be set up at the compound to ensure waste is segregated at source and to maximise the potential for reuse or recovery (by licensed operators off site as appropriate);
- All construction related wastes e.g. plastics, cable ties, geotextiles etc. will be removed and recycled and/or disposed of in an appropriate segregated manner. This is to prevent any accidental inputs into the existing landscape and/or watercourses nearby;
- Any waste material generated during the construction period that is not required for/is unsuitable for reinstatement shall be removed off-site and disposed of in a licensed facility in accordance with current legislation; and
- Japanese knotweed will be taken off site under license from the NPWS and in accordance with the Waste Management Act as amended.

4.9 Cultural Heritage

John Cronin and Associates carried out an assessment entitled *Architectural Heritage Assessment* and notes that the bridge **is not a recorded archaeological monument**, but it is located within the Zone of Notification (ZON), as designated by the National Monuments Service (NMS), surrounding the historic town of Castlecomer (KK005-082----). The proposed project can therefore be considered to be located in an area of moderate to high archaeological potential. While the proposed project will have no predicted impacts on any recorded archaeological sites. There is potential to result in direct negative impacts on any such archaeological features should they be present.

The bridge is listed as a protected structure in the Record of Protected Structures (RPS Ref. no. D13) published in the current Kilkenny County Development Plan (2014). The bridge is rated as being of **national importance** in the National Inventory of Architectural Heritage (NIAH no. 12301001) survey of bridges and other historic structures in County Kilkenny. The proposed bridge will not have any significant effects on the designated architectural heritage resource other than the Castlecomer Bridge. The predicted impact relates to the alteration to the setting of the bridge.

In order to mitigate the above potential impacts the following mitigation is proposed:

Archaeological Heritage

The following mitigation measures will be implemented in full:

- An Underwater Archaeological Impact Assessment (UAIA) of the in-channel areas (including riverbanks) to be impacted by the proposed bridge structure shall be carried out prior to the construction phase. This will include a dive/wading survey of the river channel licenced by the NMS which will incorporate an inspection of the bridge structure, weir and adjacent millrace.

- Any greenfield areas on either side of the river bank that will be impacted by ground works associated with the project such areas (if accessible) should be subject to pre-construction archaeological test trenching.

- Given the archaeological potential of the area, archaeological monitoring of all ground and in-channel excavation works shall be carried out during the construction phase. This is particularly important on the eastern side of the riverbank within the raised bank area as this bank is effectively an island formed by the main river channel and a tributary channel. Archaeological monitoring of the demolition of the embanking wall to the west will also be undertaken.

- All phases of archaeological investigations shall be augmented by the use of a metal-detector (under licence by the NMS) to assist in the recovery of archaeological artefacts.

- In the event that any archaeological features and/or artefacts are uncovered during any phase of site investigations, the NMS and the TII Project Archaeologist must be notified and consulted to determine appropriate further mitigation measures.

Architectural Heritage

The following mitigation measures will be implemented in full:

- Prior to commencement of works and following removal of vegetation at the areas where the new pedestrian bridge is to connect with existing pavements, a full record of the sections of walling to be removed will be undertaken by a suitably qualified built heritage specialist. The record will include full description (i.e. construction, composition and style, etc.) and interpretation of any distinctive phases evident in the walling. This record shall include annotated drawings to be produced from photogrammetry or laser scanner survey.

- Prior to commencement of works, a conservation method statement shall be prepared by a suitably qualified conservation consultant/architect to specify (a) works for the planned interventions so that the interface between historic masonry to be removed and retained will be effectively repaired and made good and (b) the form/design of the new wall that present to the garden of La Rive (formerly No. 16 High

Street). This is to ensure that the new wall is built in a manner consistent in form and materials with adjoining masonry walls.

- Any proposed conservation or repair works will be (a) undertaken by a contractor with proven experience of the conservation and repair of historic masonry structures and (b) under supervision of a suitably qualified conservation consultant/architect. The appointed conservation consultant/architect shall carry out periodic inspections and will approve workmanship. At the discretion of the conservation consultant/architect, the contractor may be directed to prepare sample work for approval (such as repointing and sample masonry panels).

- All masonry removed during the course of works shall be retained by the contractor for the duration of works. The retained material will be reused, where practicable, for the planned programme of repairs and in a new walling. Samples of an additional masonry/stone required for the completion of the planned works shall be reviewed and approved by the appointed conservation consultant/architect

The Final CEMP will take account of any requirements of the Development Applications Unit of the Department of Culture, Heritage and the Gaeltacht such as may be conditioned by a planning consent with respect to the protection of archaeological, architectural or cultural heritage.

4.10 Landscape and Visual Management and Site Reinstatement Plan

RPS carried out an Landscape and Visual Impact Assessment (LVIA) in June 2019. The purpose of the LVIA was to identify, describe and evaluate potential impacts and effects arising from the proposed bridge on the landscape and visual receptors in the study area. Based on the LVIA and general best practice construction, the following mitigation measures are proposed:

- Construction plant and machinery shall be parked within designated areas (site compound) on site when not in use.

- When works are completed on site, the Contractor shall clean-up all areas affected by construction operations. That will include removal of all plant, equipment and materials no longer required on site.

- The appointed Contactor shall be responsible for the implementation of measures outlined within this Plan to ensure that the site is left in a visually acceptable manner. This will particularly relate to the river bank and its revegetation.

- Any necessary restoration of fences, walls, services or land will be completed as soon as practicable after main remediation works have concluded.

- Measures outlined in BS 5837 Trees in relation to construction will be implemented by the Contractor to protect vegetation to be retained during construction.

4.11 Monitoring

4.11.1 Objective

The objective of monitoring during the construction phase is to ensure that relevant environmental controls are in place and being implemented and adhered to in order to prevent environmental impact.

4.11.2 Monitoring Requirements

The following monitoring be undertaken during the construction process:

The Contractor will appoint a suitably qualified person, or persons, to the role of EnCoW to monitor the construction works. Any non-compliance issues shall be identified to the developer's site supervisory team as soon as it is identified to ensure timely corrective actions.

Furthermore, an ECoW will be appointed by KCC to oversee the project from an ecological perspective. The ECoW will work closely with the contractor's EnCoW to monitor activities and ensure compliance with all relevant environmental legislation and that the requirements of the finalised CEMP are implemented. The ECoW will have the authority to review the CEMP and method statements, advise the EnCoW and the Contractors on the contract/project requirements, decide on elements that require direct supervision and instruct action, as appropriate, including the authority to require the temporary cessation of works, where necessary.

4.12 Conclusion

Any other monitoring requirements such as may be required by the conditions of a planning consent are to be included within the Final CEMP.