CLONASLEE FLOOD RELIEF SCHEME

Environmental Impact Assessment Report
Chapter 9: Biodiversity

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9 BIODIVERSITY

9.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes, and presents an assessment of the likely significant effects of the Clonaslee Flood Relief Scheme (hereafter referred to as the 'Proposed Scheme') on terrestrial and aquatic ecology. Potential effects are assessed for the construction and operational/maintenance phases of the Proposed Scheme. The Proposed Scheme is described in **Chapter 5: Project Description**. The assessment presented is informed by the following EIAR chapters and technical appendices:

- **Chapter 10: Land, Soils, Geology and Hydrogeology:** Baseline descriptions and impact assessment relating to soils, groundwater and hydrogeology;
- **Chapter 11: Water:** Baseline descriptions and impact assessment relating to other aspects of the surface water environment such as Water Framework Directive considerations, hydrology and flood risk;
- **Chapter 12: Air Quality:** Baseline descriptions and impact assessment relating to air pollution;
- **Chapter 14: Noise and Vibration:** Baseline descriptions and impact assessment relating to noise and vibration activities; and
- **Appendix 9.1, 9.2, 9.3, 9.4, 9.5, 9.6:** Chapter 9: Biodiversity: Supporting Information.
  - Appendix 9.1: Valuation of IEFs
  - Appendix 9.2: Desk Study Results
  - Appendix 9.3: Photographs
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  - Appendix 9.6 Biodiversity Management and Enhancement Plan

This chapter should also be read in conjunction with the Stage 1 – Appropriate Assessment Screening Report and Stage 2 – Natura Impact Statement for the Proposed Scheme which has been prepared with reference to European Sites. These reports are available under separate cover as part of the overall planning submission application for development consent to An Bord Pleanála (ABP).

9.2 Methodology

9.2.1 Relevant Legislation, Policy and Guidance

The assessment of the likely significant effects of the Proposed Scheme on ecological features has taken account of the following legislation, policy and guidance documents, where relevant.

9.2.1.1 International Legislation

- EU Habitats Directive - Council Directive 92/43/EEC (1992), requires the conservation of a wide range of rare, threatened or endemic animal and plant species and the conservation of characteristic habitat types;
- EU Birds Directive – Council Directive 2009/147/EC (2009), requires the protection all wild bird species and the protection and restoration of their habitats;
- EU Water Framework Directive (2000/60/EC) (WFD) requires the protection and improvement of water quality in all waters so that good ecological status is achieved within specified timelines; and
- International Convention on Wetlands of International Importance especially Waterfowl Habitat, (concluded at Ramsar, Iran on 2 February 1971, also known as the Ramsar Convention) – under the convention each Contracting Party undertakes to designate at least one wetland site for inclusion in the List of Wetlands of International Importance. There are over 2,000 "Ramsar Sites" on the territories of over 160 Contracting Parties across the world.

- Nature Restoration Law - The Nature Restoration Law aims to restore ecosystems, habitats and species across the EU's land and sea areas. The law was approved in June 2024. EU Member States are expected to submit National Restoration Plans to the Commission within two years of the Regulation coming into force (by mid-2026), showing how they will deliver on the targets. They will also be required to monitor and report on their progress. Ireland's Nature Restoration Plan is being prepared and is not yet published.

9.2.1.2 National Legislation[1]

- The Wildlife Act 1976, as amended, is the principal national legislation providing for the strict protection of wildlife and the control of some activities that may adversely affect wildlife. It aims to provide for the protection and conservation of wild fauna and flora, to conserve a representative sample of important ecosystems and protect species from injury, disturbance, and damage to breeding and resting sites (EC, 2000). Such species, where relevant, are considered as sensitive ecological receptors in this chapter;
- Part XAB of the Planning and Development Act, 2000 (S.I. No. 30 of 2000) as amended and the Habitats Regulations (see above). In Ireland, these sites are designated as European Sites and include Special areas of Conservation (SAC), established under the Habitats Directive and Special Protection Areas (SPA), established under the Birds Directive 2009/147/EC as well as candidate and proposed sites (cSAC and pSPA);
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), as amended, give legal effect in Ireland to the WFD;
- European Communities Environmental Objectives (Surface Waters) Regulations (S.I. No. 272 of 2009), as amended, establishes the legally binding water quality objectives for all surface waters and outlines environmental quality standards for pollutants; and
- European Communities (Quality of Salmonid Waters) Regulations (S.I. No. 293 of 1988) designate "waters capable of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*)" as salmonid waters. They also set out the quality standards that must be achieved in these waters.
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) as amended (hereafter referred to as 'the Habitats Regulations'), transposes the EU Habitats Directive and the EU Birds Directive into Irish law; and
- Flora (Protection) Order 2022 (S.I. No. 235 of 2022) - The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 2022, which supersedes orders made in 1980, 1987, 1999 and 2015.

9.2.1.3 Policy

- Irelands 4th National Biodiversity Action Plan 2023 – 2030;
- Laois County Development Plan 2021-2027 (LCC, 2021); and
- Local Biodiversity Action Plan for Clonaslee, Co. Laois (Mac Gowan, 2015).

9.2.1.4 Relevant Guidance

- Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018; version 1.3 updated September 2024);

[1] The Department of Housing, Local Government and Heritage published a consultation on review and update of Wildlife Legislation in Ireland on the 27th June 2024. This consultation period is ongoing at the time of writing, and the actions arising from the consultation, including potential revision of legislation, are not known at this stage.

- Guidelines for Assessment of Ecological Impacts of National Road Schemes (National Roads Authority (NRA), 2009);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency (EPA), 2022);
- Best Practice Guidance for Habitat Survey and Mapping (Smith, et al., 2011);
- A Guide to Habitats in Ireland (Fossitt, 2000);
- Bat Mitigation Guidelines for Ireland – V2 (Marnell, et al., 2019);
- Bat Surveys: Good Practice Guidelines, Third Edition (Collins, 2016);
- Bat Surveys: Good Practice Guidelines, Fourth Edition (Collins, 2023) - At the time of undertaking suitability for roosting bat surveys (April and June 2021 – July 2023), the BCT Bat Surveys for Professional Ecologists: Good Practice Guidelines published in 2016 were applicable. New BCT Guidelines were issued in September 2023 (Collins, 2023), however there is no change to the current baseline as a result of this updated guidance; and
- Environmental Planning and Construction Guidelines Series (NRA, 2005-2011).

9.2.2 Study Area & Zone of Influence

The ecology study area is determined by the potential Zones of Influence (ZoI) of the Proposed Scheme (Area 1, Area 2, Area 3 and associated temporary construction compounds); which vary depending on the habitat or species considered (as detailed in **Table 9-1**). The ZoIs for a Proposed Scheme is the area over which ecological features may be subject to significant effects as a result of the Proposed Scheme and associated activities. The ZoI is likely to extend beyond the boundary of a development, for example where there are hydrological links extending beyond the site boundaries.

The ZoI will vary for different ecological features depending on their sensitivity to an environmental change. It is therefore appropriate to identify different ZoIs for different features. The features affected could include habitats, species and the processes on which they depend. Zones of influence are specified for different features and types of potential impact and effect. The ZoI for the ecological features assessed are outlined in **Table 9-1**. The study area for the initial desk study to support the ecological assessment is outlined in **Table 9-1** and **Figure 9-1**.

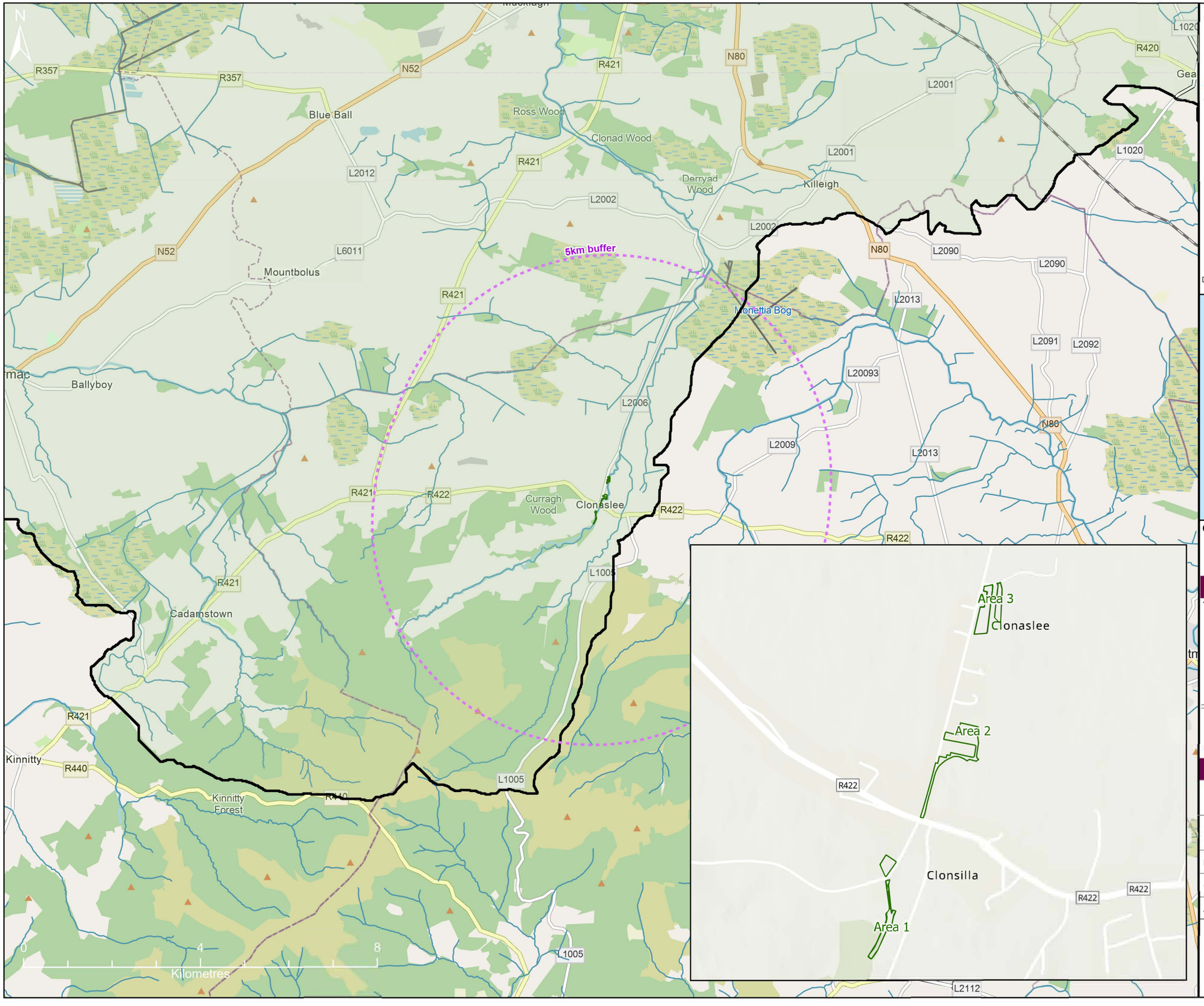
Designated Sites within the ZoI of the Proposed Scheme are identified as those with connectivity to the Proposed Scheme. Connectivity between the Proposed Scheme and these Sites is identified through the application of the source-pathway-receptor (S-P-R) model. Likely pathways are determined using existing information on the location of Designated Sites and the surrounding environment (e.g., proximity to the site, river flow networks, expected groundwater flow paths and interactions etc.). In addition, all sites (i.e. the receptors) associated with birds within 20 km of the Proposed Scheme are considered. Consideration is given to any of these sites (i.e., within 20 km of the Proposed Scheme) if they supported other mobile species such as bats.

Through the incorporation of relevant ZoIs for the Proposed Scheme, the ecology study area is determined to extend outside the footprint of the Proposed Scheme, to include the ecological features as set out in **Table 9-1**.

Table 9-1: Ecological study area and zone of influence for ecological features

Ecological Features	Study Area for Desk Study	Zone of Influence Identified
Sites designated for nature conservation (as outlined in **Section 9.3.1**)	Based on S-P-R model.	All sites with connectivity to the Proposed Scheme (see text for more detailed explanation of how connectivity was defined).
Habitats, rare, threatened, and protected flora, and invasive alien plant species	5 km	Redline boundary of the Proposed Scheme and adjoining habitats.
Otter *Lutra lutra*	5 km	Up to 150 m upstream and downstream from the redline boundary of the Proposed Scheme and adjacent riparian habitats.

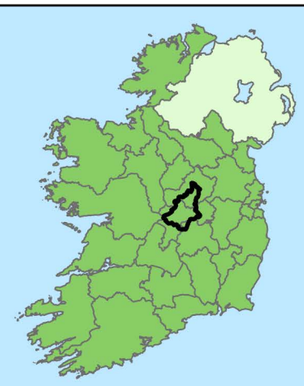
Ecological Features	Study Area for Desk Study	Zone of Influence Identified
Badger *Meles meles*	5 km	Up to 50 m buffer from the redline boundary of the Proposed Scheme.
Bats	5 km	Redline boundary of the Proposed Scheme and adjoining habitats.
Birds	5 km	Breeding birds - Redline boundary of the Proposed Scheme and relevant adjoining habitats. Kingfisher - within redline boundary along the Clodiagh River.
Other protected and notable species	5 km	Redline boundary of the Proposed Scheme and adjoining habitats.
Watercourses	Lower Shannon WFD catchment (25A)	Watercourses connected with the Proposed Scheme.



Legend

- Works Area
- 5km Buffer
- Watercourses
- Lower Shannon Catchment (25A)

Data Sources: EPA



Client

Laois County Council

Clonaslee FRS

Title

Figure 9-1
Ecological Study Area

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9.2.3 Information Used to Inform the Assessment

Information on ecological receptors within the ecological study area was collected through a combination of detailed desk review of existing, publicly available studies and datasets, site-specific surveys, and consultation with relevant bodies.

9.2.3.1 Desk Study

Information on habitats and species within the ecology study area was collected through a detailed desk review of existing, publicly available studies and datasets. These are summarised in **Table 9-2**.

The National Biodiversity Data Centre's (NBDC) online database was searched for records of protected flora (including under the Flora (Protection) Order, 2022), protected fauna under the EU Habitats Directive (92/43/EEC), Birds Directive (2009/147/EC) and Wildlife Acts (1976 as amended) and invasive species within a 5 km radius of the Proposed Scheme. Records greater than 20 years old were excluded from the assessment.

Table 9-2: Summary of Key Desktop Sources.

Title	Year[2]	Author/Source
Map of Irish Wetlands	2024	Wetland Surveys Ireland and Foss Environmental Consulting *https://wetland.maps.arcgis.com/apps/View/index.html?appid=e13b75c3bcab4932b992aa0169aa4a32&extent=-12.6266,51.3236,-3.2168,55.4102* Accessed October 2024.
Surface and ground water quality status, and river catchment boundaries	2024	Environmental Protection Agency (EPA) https://gis.epa.ie/EPAMaps/default Accessed February 2024.
NPWS designated areas spatial data	2024	National Parks and Wildlife Services (NPWS) https://www.npws.ie/maps-and-data/designated-site-data/download-boundary-data Accessed October 2024
Margaritifera Sensitive Areas Map	2020	NPWS: https://www.npws.ie/maps-and-data/habitat-and-species-data Accessed March 2024
Inland Fisheries Ireland WFD Fish Data	2015	(Kelly, et al., 2015)
Habitats Directive and Red Data Book Species Summary Report 2021.	2021	(Gallagher, et al., 2022)
Distribution records for protected species and habitats (including suitability index for bats) held online by the National Biodiversity Data Centre (NBDC), NPWS, and Heritage Council.	2004- 2024	NBDC: https://maps.biodiversityireland.ie/ (Map Assessed October 2024.) NPWS: https://www.npws.ie/maps-and-data/flora-protection-order-map-viewer-bryophytes (Accessed October 2024) NPWS: https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=a41ef4e10227499d8de17a8abe42bd1e (Accessed October 2024) Heritage Council: https://heritagemaps.ie/WebApps/HeritageMaps/index.html Accessed October 2024.
Checklists of protected and threatened species in Ireland	2019	(Nelson, et al., 2019)
Red Lists	1998, 2006, 2009, 2010, 2011, 2012, 2016, 2019, 2020	(Curtis & Mc Gough, 1988); (Fitzpatrick, et al., 2007); (Regan, et al., 2010); (King, et al., 2011); (Clarke, et al., 2016); (Wyse Jackson, et al., 2016); (Marnell, et al., 2019).

[2] Note that the year provided for website sources refers to the last time it was checked. For published sources, dates are variable.

Title	Year[2]	Author/Source
Birds of Conservation Concern	2021	(Gilbert, et al., 2021)
Status of EU Protected Habitats and Species in Ireland, Volume 1, 2, and 3	2019a 2019b 2019c	(NPWS, 2019a) (NPWS, 2019b) (NPWS, 2019c)
National Biodiversity Action Plan 2023 - 2030	2023	Department of Culture, Heritage and the Gaeltacht
Local Biodiversity Action Plan for Clonaslee 2015	2015	Laois County Council (LCC)
Laois County Development Plan 2021-2027	2024	LCC

9.2.3.2 Field Survey Methodologies – Terrestrial Ecology

9.2.3.2.1 Survey Schedule

Field surveys were undertaken using professional interpretation and reference to the guidance referred to in the text describing each survey. These multidisciplinary and taxon-specific terrestrial ecology surveys were undertaken between 2021 and 2024 during the optimum seasons for the relevant habitats and species. These ecology field surveys informed the characterisation of the baseline environment against which impacts and effects on terrestrial biodiversity were assessed. **Table 9-3** summarises the surveys carried out.

The survey extents changed as the Proposed Scheme was developed. Surveys undertaken in 2021 and 2023 focused on the assumed or confirmed project footprint at that time. Surveys undertaken in 2024 related to design modifications and additions to the Proposed Scheme and comprised additional walkovers of the River Clodiagh, the proposed site compound areas and trees directly affected by works. Ecology surveys and results relevant to the final Proposed Scheme design are present.

Table 9-3: Summary of site-specific terrestrial surveys.

Field Survey	Extent of survey	Overview of survey	Date(s)
Walkover Survey	Survey in April 2021 focused on the River Clodiagh 1.1 km downstream of Clonaslee bridge and 500 m upstream plus 50 m either side of river. Survey in June 2021 focused on a proposed flood retention Area 2.5 km south-west of Clonaslee near Scarroon. Survey in June 2024 focused on the proposed site compound in Area 2, but also included a general walkover survey of the entire scheme area to validate the habitat and IAPS survey data collected during the previous year.	Multidisciplinary walkover survey to identify mammal signs, habitats, invasive flora, rare or protected flora, high level bat roost potential, incidental bird observation.	April & June 2021 June 2024
Habitats	Surveys in 2023 focused on the footprint of the Proposed Scheme and immediate adjoining lands (where accessible).	Phase 1 Habitat classification to Fossitt (2000).	August 2023
Protected and Notable Flora	Footprint of the Proposed Scheme and immediate adjoining lands (where accessible).	Search for species listed in Flora Protection Order and Red Lists (Wyse *et al*., 2016; Lockhart *et al*., 2012) as part of habitat survey.	August 2023
Invasive alien plants (IAPS)	Surveys in 2021 and 2023 focused on footprint of the Proposed Scheme and immediate adjoining lands (where accessible).	Identification of Third Schedule species of European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).	September 2021 August 2023
Badger	Survey in 2023 focused on footprint of the Proposed Scheme including all	Assessment for evidence of sett entrances and field signs (e.g., scat, hair, trails, prints and snuffle holes)	August 2023

Field Survey	Extent of survey	Overview of survey	Date(s)
	accessible land within 50 m outside the footprint of the Proposed Scheme.		
Otter	Bankside and instream assessment of the Clodiagh River. See **Section 9.2.3.2.6** for detail.	Assessment for evidence of holts and field signs (e.g., spraint, slides, trails, prints, and couch) along the River Clodiagh	August, October 2021 August 2023 June 2024
Bat - Suitability for roosting, commuting and foraging habitats	Trees and structures within the footprint of the Proposed Scheme and environs	Suitability assessments completed with cognisance of the Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016).	July 2023
Bat – Potential Bat Roost (PBR) survey	Trees affected by the Proposed Scheme	Assessed with cognisance of Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2023).	June 2024 July 2024
Bat – Detailed inspection of Potential Roost Features (PRF) and Emergence Survey	Trees assessed to potentially support multiple bats (PRF – M)	Undertaken under licence with cognisance of Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2023).	June 2024 July 2024 August 2024
Bat - Activity (static detectors)	Site specific locations as identified during suitability for commuting and foraging assessment	Activity surveys completed with cognisance of the Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016) and the Bat Mitigation Guidelines for Ireland (Marnell, et al., 2022)	July, August & September 2021 July, August & September 2023
Breeding birds	Incidental data	Identification of calls and sightings.	October 2021, July 2023
Kingfisher	Along the banks of the Clodiagh River	Walkover survey - Kingfisher habitat appraisal	August 2023 June 2024
Amphibian and reptiles	Incidental data	During walkover surveys evidence of field signs and suitable habitats were recorded	April 2021, August 2023, June 2024
Invertebrates	Incidental data	During walkover surveys evidence of field signs and suitable habitats were recorded	April 2021, August 2023, June 2024
Other protected mammals	Incidental data	Assessment for evidence of field signs (e.g., prints, scat, hairs)	April 2021, July and August 2023, June 2024

9.2.3.2.2 Walkover Surveys

Initial site surveys were carried out on the 21st April and 1st June 2021, respectively, for the original Proposed Scheme design. The survey extents in April 2021 comprised the River Clodiagh within the scheme area, namely a section between 1.1 km downstream of Clonaslee bridge and 500 m upstream. In June 2021, an area proposed for flood retention approximately 2.5 km southwest of Clonaslee was walked along a 1 km stretch from a local bridge northwest of Scarroon in an eastward direction toward Brittas Wood. An extra 100 m was also walked either end of these start and end locations. The lands within 50 m either side of river were also walked during both the April and June 2021 surveys. Note that the area surveyed in June 2021 is no longer part of the Proposed Scheme. The surveys undertaken comprised multidisciplinary walkover surveys (i.e., identification of invasive flora, habitat classification, identification of mammal signs, high-level assessment of bat roosting potential). On the 6th June 2024, a walkover survey of the proposed site compound within Area 2 was undertaken, comprising a search for invasive flora, habitat classification and a search for mammal signs. This survey also comprised an additional walkover survey of the River Clodiagh,

and the Proposed Scheme area to validate the habitat and IAPS survey data collected during the previous year.

9.2.3.2.3 Habitats and Flora

The initial site surveys were carried out in April and June 2021 for the original Proposed Scheme design (see **Section 9.2.3.2.2**). However, the Proposed Scheme design has since been refined. To account for this, the Proposed Scheme area was revisited in August 2023, and detailed baseline habitat surveys were undertaken.

The aim of the survey was to classify habitats using the Heritage Council's habitat classification system (Fossitt, 2000) for both aquatic and terrestrial habitats occurring within the footprint and adjoining habitats of the Proposed Scheme. The mapping of habitats had cognisance of the Heritage Council's mapping methodology (Smith, et al., 2011). The information gathered from the surveys were used to describe habitat features, and to direct further habitat and species-specific survey work to inform this assessment. 'Target Notes' were recorded as necessary on maps in the field to identify the location of additional ecological features noted during the field surveys.

Habitat surveys recorded species using an ordinal abundance scale, the DAFOR scale, as detailed in (Smith, et al., 2011). The DAFOR scale records each species' abundance as Dominant, Abundant, Frequent, Occasional, or Rare based on a semi-quantitative description of each category. Indicator species for different habitat types or conditions and rare or declining species identified on relevant Red Lists (Jackson, et al., 2016) and (Lockhart, 2012), if present, were also noted.

Habitats were also assessed for their affinity to Annex I habitat in line with Fossitt (2000) and the EU habitats interpretation manual (EC, 2013).

9.2.3.2.4 Invasive Alien Plants and Animal Species

The presence and location of any invasive alien plant species (IAPS) and invasive alien animal species (IAAS) was recorded during initial walkover surveys undertaken in April and June 2021 and supplemented through the completion of a dedicated survey for invasive flora undertaken on the 29th September 2021. Subsequently, additional data was required to update baseline data collected in 2021, and this survey was carried out on the 1st August 2023. During survey in 2023, information on IAPS was recorded including the species present, the location of the species and the approximate extent of the infestation.

For the purpose of this assessment, IAPS and IAAS are those contained within the Third Schedule of the Habitats Regulations (S.I. No. 477/2011).

9.2.3.2.5 Bats

Bat Roosting – Trees & Structures

During walkover surveys undertaken in April and June of 2021, a high-level assessment of potential roost features for bats was undertaken.

On the 19th July 2023, a ground-level roost assessment was carried out during daylight hours, using close focusing binoculars, to identify features with suitability for roosting bats in trees and structures within or adjoining the footprint of the Proposed Scheme. All trees within or immediately adjoining the footprint of the Proposed Scheme were assessed for the presence of features with suitability for roosting bats including cavities, frost cracks, trunk and branch splits, rot holes, and hollow sections of trunk and branches. Structures were assessed for the presence of suitable features such as crevices and small gaps in the stonework of the bridges and walls. Both trees and structures were assessed for evidence of use by bats, e.g., staining and splashes, bat specimens, and droppings, in the vicinity of suitable structures and trees. The results of this assessment were used to grade trees as having Negligible, Low, Moderate, or High suitability for roosting bats in accordance with *the Bat Conservation Trust's (BCT) Bat Surveys for Professional Ecologists: Good Practice Guidelines* (Collins, 2016).

A second ground-level roost assessment was undertaken on the 6th June 2024. This survey focused on trees identified through arboricultural assessment as requiring or potentially requiring removal as part of the Proposed Scheme. The trees were assessed for the presence of features with suitability for roosting bats including cavities, frost cracks, trunk and branch splits, rot holes, and hollow sections of trunk and branches, and were assessed for evidence of bats. Surveys were undertaken with reference to the *Bat Conservation*

Trust's (BCT) Bat Surveys for Professional Ecologists: Good Practice Guidelines Collins (2023). The trees were classified based on the presence of potential roost features (PRFs) and their ability to support multiple bats (PRF-M), individual bats (PRF-I), no bats (none) or whether further assessment was required (FAR). The BCT guidelines for bat surveys were updated in the period between the first and second ground level roost assessments being undertaken. As such, there was a difference in terminology and approach between the two assessments.

Two trees were classified as having an overall suitability of PRF-M following the preliminary ground-level roost assessment undertaken on the 6th June 2024. These two trees were subject to additional survey as described in the following sections.

Detailed Inspection of PRF-M

One tree (sycamore - tree number 16, tag number 0616) was deemed suitable for detailed inspection with an endoscope as the PRF-M identified was located at ground level within a cavity created by rot. This feature was inspected with an endoscope on the 24th June 2024 under licence (DER/BAT 2024-19).

Emergence Survey of PRF-M

Emergence surveys of a potential PRF-M on tree number 8 (sessile oak *Quercus petraea*, tag number 0608), namely a crack within a bough, were undertaken. Unlike tree number 16, emergence surveys of this feature were required, as it could not be assessed at ground level due to its height above the ground. The emergence survey was repeated three times, on the 24th June 2024, 24th July 2024 and 20th August 2024. The emergence survey was conducted from two vantage points by two ecologists (one ecologist per vantage point). Each ecologist was equipped with a night vision aid (NVA) (Canon XA60 Pro Camcorder with infra-red capabilities, Nightfox XB5 Infrared torches) and full spectrum recording bat detector (Elekon Batlogger M2). The equipment was set up on each side of the PRF-M to ensure that any bats emerging from the feature could be seen. The emergence survey commenced 15 mins before sunset and continued for 1.5 to 2 hours. Survey conditions were acceptable on each survey occasion. On the 24th June, temperature was 21ºC, there was no precipitation and at most the wind was described as a gentle breeze. Cloud cover was 45-50% when the survey commenced. On the 24th July temperature was 12 to 16ºC, there was no precipitation and at most the wind was described as a gentle breeze. Cloud cover was 100% when the survey commenced. On the 20th August temperature was approximately 15ºC. An occasional light shower was recorded, and the wind was described as a fresh breeze. Cloud cover was 100% when the survey commenced.

Commuting and Foraging - Activity Surveys

Bat activity surveys were conducted within the footprint of the Proposed Scheme. Two 'static' (i.e., passive/stationary/automated) full-spectrum digital-recording bat detectors (Anabat Swift) were deployed to capture bat activity at two different locations, where bat activity was expected based on an initial habitat suitability assessment. The static detectors were set up during the period July – September 2021 and July - September 2023, in all weather conditions. Every three weeks data from the detectors were downloaded and batteries changed, and the detectors were redeployed at each site. A summary of the locations of each detector and the actual period where static detectors were recording is provided in **Table 9-4**. A map showing the locations of these static detectors is provided in **Figure 9-11**.

Table 9-4: Summary of static detector surveys and locations for the years 2021 and 2023.

Detector Code	Location Description	Co-ordinates (WGS84)	Data Collection Period	Total number of nights
ST1	Tree on bankside of Clodiagh River located in Brittas Wood	53.145432, -7.526942	12/07/2021 – 19/07/2021	7
			13/09/2021 – 29/09/2021*	16
ST2	Tree in hedgerow on left bank of the Clodiagh River	53.150718, -7.522694	03/08/2021 – 09/08/2021	6
ST3**	Tree on bankside of Clodiagh River located in Brittas Wood	53.145432, -7.526942	19/07/2023 – 03/08/2023	15
			18/09/2023 – 21/09/2023	3
ST4	Hedgerow on bankside of Clodiagh River in field across from Integrated Constructed Wetland	53.154597, -7.522113	19/07/2023 – 03/08/2023	15
			18/09/2023 – 21/09/2023	3

**data collect by this static detector for this period were lost. This is discussed further in the limitations section.*

***due to high levels of audible static in the bat data collected by this static detector, these data have been omitted from the data analysis. This is discussed further in the limitations section.*

Data Analysis

Bat activity recordings were downloaded and analysed within specialised software (Kaleidoscope Pro (version 5.6.3) developed by Wildlife Acoustics) by an experienced data analyst, to confirm the bat species present.

During manual analysis, calls were assigned to species according to their key parameters and where applicable their peak frequency, as shown in **Table 9-5** (Russ, 2021).

Table 9-5: Bat species and their call frequency parameters.

Species	Latin Name	Call Frequency
Soprano Pipistrelle	*Pipistrellus pygmaeus*	FM/qCF calls above 2 kHz
Common Pipistrelle	*Pipistrellus pipistrellus*	FM/qCF calls between 40 kHz and 48 kHz
Nathusius Pipistrelle	*Pipistrellus nathusii*	FM/qCF calls below 40 kHz
Pipistrellus spp.	–	FM/qCF calls between 40 and 42 kHz; and 48 and 52 kHz
Natterer's Bat	*Myotis nattereri*	FM call with wide range between 23 and 107 kHz
Daubenton's Bat	*Myotis daubentonii*	FM call with wide range between 30 and 81 kHz
Myotis spp	–	FM calls greater than 30 kHz
Brown Long-eared Bat	*Plecotus auritus*	FM calls greater than 30 kHz with two harmonics
Leisler's bat	*Nyctalus leisleri*	qCF calls between 23 and 28 kHz
Nyctalus spp	–	Low (less than 30 kHz) qCF or FM calls

Not all calls could be positively assigned to a species. Call frequencies and shapes can be shared by bat species within the same genus and can change according to the habitat they are flying in, such as open areas with no trees or structures, moorlands, cluttered environments which contain trees, areas of scrub, or linear features such as streams and conifer plantation/woodland edge. Bats adapt their call patterns within their habitats to enable prey detection and navigation and as such, the recordings may differ in parameters. For example, a bat was classified as *Myotis* species if differences in call shape and frequency between Daubenton's bats and Natterer's bats could not be discerned.

9.2.3.2.6 Otter

Otter surveys were undertaken on the 11th and 17th August 2021, 18th October 2021, 1st August 2023 and 6th June 2024. The survey on the 11th August 2021 focused on an area 500 m upstream of Clonaslee bridge and 1.1 km downstream of Clonaslee bridge. An area proposed for flood retention approximately 2.5 km southwest of Clonaslee was surveyed on 17th August 2021 and 18th October 2021. Note that this flood retention area is no longer within the Proposed Scheme area. The surveys undertaken in August 2023 and June 2024 focused on the footprint of the Proposed Scheme, the River Clodiagh within the Proposed Scheme area, and included an Area 150 m upstream and downstream of same where accessible. The focus of the survey effort was on areas where otter may spraint (e.g., on or adjacent to trails or on conspicuous features like boulders or bridge footings), where signs of commuting otter might be obvious (e.g., prints or trails left in muddy riverbanks) and where holts or couches might be likely (e.g., vegetated areas adjacent to the stream, among roots etc.). If trails leading from the river were identified, these were followed as far as possible and searched for signs of holts. In addition, otter signs, if observed during the course of other ecological surveys (e.g., general walkover surveys), were recorded. Otter surveys were undertaken to confirm the presence or likely absence of otter through the identification of field signs such as spraints, prints, slides, holts and couches.

Otter surveys were carried out with cognisance of the NRA publication 'Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes' (NRA, 2008a). The survey methodology had regard to NRA guidance (NRA, 2008b).

9.2.3.2.7 Badger

The badger survey methodology recorded any signs of badger activity, including the presence of setts, foraging evidence, trails and prints, with cognisance of Scottish-Badgers (2018), NRA publications (NRA, 2008a) and (NRA, 2008c), and Harris et al. (1989). If setts were identified, usage of potential sett entrances and direction of tunnelling was also recorded.

Guidance from the NRA (2008c) states that a survey of setts within 50 m of a Proposed Scheme should be undertaken as part of pre-construction badger surveys, but this should be extended to 150 m where activities such as blasting and piling are proposed, as these activities may cause disturbance to badger setts (triggering derogation licencing).

The footprint of the Proposed Scheme was surveyed during April and June 2021 as part of general walkover surveys (see **Section 9.2.3.2.2**), and on the 1st August 2023. Outside the footprint of the Proposed Scheme, accessible land within 50 m of the footprint was surveyed in 2023. This extent was considered appropriate as no piling or blasting is proposed.

9.2.3.2.8 Birds

Kingfisher Survey

The methodology employed involved walking the Clodiagh River from Area 1 of the Proposed Scheme, located south of Clonaslee Village to Area 3, north of Clonaslee Village (**Figure 9-1**). These sections were chosen to cover areas intersecting with the Proposed Scheme. The survey was carried out in August 2023 and all activity of target species (i.e. kingfisher) was noted as well as any observations of potential nesting sites and suitable habitat along the riverbanks. Kingfishers breed in tunnels dug in vertical banks along streams and rivers. Kingfisher nesting banks are typically tall vertical banks with soft material into which they can dig their burrows (Cummins, et al., 2010). This survey was repeated on the 6th June 2024.

Incidental Bird Activity

Incidental bird activity was recorded during all of the site visits. Observations of birds, such as number of birds, flight direction and behaviour (e.g., commuting or foraging) were recorded, where possible.

9.2.3.2.9 Other Protected and Notable Species

Incidental sightings and secondary evidence of other fauna were recorded during all visits. During all of the ecology surveys conducted within the footprint of the Proposed Scheme, the potential was also noted for habitats of other protected terrestrial mammal species to occur including hedgehog (*Erinaceus europaeus*), pygmy shrew (*Sorex minutus*), pine marten (*Martes martes*), Irish stoat (*Mustela erminea*), red squirrel (*Sciurus vulgaris*), Irish hare (*Lepus timidus hibernicus*) and red deer (*Cervus elaphus*).

9.2.3.3 Field Survey Methodologies - Aquatic Ecology

9.2.3.3.1 Survey Schedule

The aquatic ecology and physical river habitat field surveys were undertaken on the 21st April 2021, 11th August 2021, 17th August 2021, 24th August 2023, 12th March 2024 and 6th June 2024. Surveys undertaken included a general river habitat survey, an assessment of crayfish/fish habitat potential, dedicated crayfish surveys and an assessment of the freshwater macroinvertebrate community (**Table 9-6**). The aim was to fully characterise baseline conditions of instream habitats and identify key aquatic receptors and Important Ecological Features (IEFs). The surveys are described below and listed in **Table 9-6**.

Strict biosecurity protocols were employed to ensure there was no potential for spread of disease. *Check, Clean, Disinfect, Dry* was the core of the protocol. Inland Fisheries Ireland (IFI) Biosecurity Protocol for Field Survey Work was implemented for disinfection procedures.

Table 9-6: Summary of aquatic ecology surveys undertaken as part of the Proposed Scheme.

Survey	Date	Survey extent
Walkover survey, Q-value assessment, fish and crayfish habitat appraisal	21st April 2021	1.1 km downstream of Clonaslee bridge and 500 m upstream. Q-value assessment undertaken at one location upstream of Clonaslee bridge.

Survey	Date	Survey extent
Crayfish survey and habitat appraisal	11th August 2021	500 m downstream of Clonaslee bridge plus a 100m reach at the ICW, 500 m upstream of Clonaslee bridge.
Crayfish survey and habitat appraisal	17th August 2021	Resurvey of areas not visible on 11th August 2021 upstream of Clonaslee bridge (water levels were high and the river coloured on the 11th of August, which reduced visibility in deeper sections. Areas which could not be adequately surveyed on the 11th were resurveyed on the 17th August).
Q-value assessment, fish and crayfish habitat appraisal	24th August 2023	Representative reach upstream of Clonaslee bridge (approximately 50 m in length).
Crayfish survey and habitat appraisal, walkover survey	24th August 2023	800 m downstream of Clonaslee bridge and 500 m upstream.
Detailed habitat assessment	12th March 2024	Instream works area, and 100m upstream and downstream of same.
Detailed habitat assessment	6th June 2024	Instream works area, and 100m upstream and downstream of same.

9.2.3.3.2 Habitat

The general physical characteristics and hydromorphological features of the Clodiagh River were recorded at a representative reach along the river channel; upstream of Clonaslee bridge. This reach was surveyed initially on the 21st April 2021, and the survey was repeated on the 24th August 2023. This site corresponded with the EPA monitoring location of the Clodiagh River (station code: RS25C060100). On the 12th March 2024 and 6th June 2024, an additional survey was undertaken at the proposed debris trap and instream works location and included the river 100 m upstream and 100 m downstream of this area. Standard physicochemical parameters were recorded in-situ (dissolved oxygen, pH, conductivity, temperature) during each survey occasion, with the exception of the survey undertaken on the 6th June 2024. The Brittas Stream at the culvert remediation works location was also surveyed.

The following was recorded at all locations:

- 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;
- Dominant bankside vegetation, listing the main species overhanging the watercourse;
- Hydromorphological condition;
- Estimated cover by bankside vegetation, and estimated shading of the survey site; and
- The degree of siltation within the stream, recorded on a scale of clean, slight, moderate, and heavy, prior to kick sampling.

9.2.3.3.3 Fisheries and White-Clawed Crayfish Habitat

Assessment of the quality of the Clodiagh River for white-clawed crayfish (*Austropotambius pallipes*) habitat was undertaken on the 21st April 2021, 11th August 2021, 17th August 2021 and 24th August 2023. The assessment was based on published information on the habitat criteria for crayfish in Holdich (2003) and Peay (2003). The survey on the 21st April 2021 comprised a general walkover survey of the river Clodiagh upstream (500 m) and downstream (1.1 km) of the bridge in Clonaslee. The surveys on the 11th and 17th August 2021 and 24th August 2023 were undertaken as part of dedicated crayfish surveys (described below). An appraisal of crayfish habitat on the Brittas Stream at and immediately upstream of the culvert was undertaken on the 12th March and 6th June 2024. Assessment of the quality of crayfish habitat was based on published information (Holdich, 2003; Peay, 2003)

The Clodiagh River was also surveyed for it's potential to support fish species. These surveys, based on a habitat appraisal, were undertaken on the 21st April 2021, 24th August 2023, 12th March 2024 and 6th June

2024. The surveys on the 21st April 2021 and 24th August 2023 were undertaken on a representative reach within the Proposed Scheme area, upstream of Clonaslee bridge. The survey on the 12th March 2024 and 6th June 2024 was undertaken at the proposed debris trap and instream works location and included the river 100 m upstream and 100 m downstream of this area. Assessment of the quality of lamprey habitat (river lamprey (*Lampetra fluviatilis*), and brook lamprey (*Lampetra planeri*)) was based on published information on the habitat criteria for lamprey (Maitland, 2003). 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.

Assessment of the quality of salmonid (salmon (*Salmo salar*) and trout (*Salmo trutta*)) spawning, nursery and adult habitat was based on published information on the habitat criteria of salmonids (Hendry, et al., 2003) and water quality criteria listed in the Salmonid Regulations (S.I. 293/1988). 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 etc., the richer the biological community is likely to be, and the more suitable it is likely to be for salmonids.

Assessment of the quality of European eel (*Anguilla anguilla*) was based on published research regarding the occurrence and habitat use of European eel in running waters (Degerman, et al., 2019), in addition to the author's experience in fish surveys. For both small and large eel, Dergerman et al. (2019) found that the probability of occurrence increased with increasing substrate size from fine to stony substrate. For small European eel, the predicted occurrence did not differ between areas with large stones or small and large boulders, whereas the occurrence of large eel increased with increasing substrate size. The occurrence of both size classes of eel showed low and comparable probabilities of occurrence for fine and sandy substrates, indicating low use of areas dominated by finer substrate classes. Furthermore, the probability of occurrence of small and large eel increased significantly with mean water depth. For both size classes of eel, the predicted occurrence increased with mean depth up to 0.31–0.40 m (Degerman, et al., 2019). Eels have also been shown to be positively associated with the presence of aquatic plants, woody debris and undercut banks.

The rating of habitat for fish and crayfish was on a scale of None/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, current or historic presence of disease and accessibility of the section to these species. This was taken into consideration where information was available.

The rating of habitat for fish and crayfish is classified as:

- '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.
- 'None-Poor' indicates that it is regarded as possible but extremely unlikely that the stream could support the species in the relevant life stage.
- 'Fair' indicates that it is possible that the stream section could support the species in question.
- 'Good' indicates that the ecologist considers it possible and likely that the stream could support the species in question.
- 'Very Good' indicates that the stream certainly could support the species.
- 'Excellent' indicates that the ecologist regards the stream as the ideal habitat for the species in question.

9.2.3.3.4 Aquatic Macroinvertebrates

A biological water quality assessment of the Clodiagh River was undertaken using benthic macroinvertebrates as bioindicators. Surveys were undertaken on the 21st April 2021 and 24th August 2023 at a representative reach along the river channel, upstream of Clonaslee bridge. There were no flood events

or particularly high-water levels recorded within the Clodiagh in the week before the macroinvertebrate surveys were undertaken. Water level data from Bracknagh Bridge, an Office of Public Works (OPW) monitoring station located on the River Clodiagh 2.5 km downstream of the works area, indicate water levels ranged between 0.235 – 0.263 m and 0.264 – 0.372 m in the week before the surveys in April 2021 and August 2023 respectively. Tenth percentile water level in the River Clodiagh (i.e., particularly high-water level) is 0.577 m. Note that white-clawed crayfish surveys are described separately (**Section 9.2.3.3.3** and **9.2.3.3.5**).

Benthic macroinvertebrates are an excellent tool for water quality assessment as they exhibit differential responses to physical and chemical changes in their environment. Macroinvertebrate community diversity declines in the presence of pollution, and sensitive species are progressively replaced by more tolerant forms as pollution increases. As such, macroinvertebrates provide a realistic record of prevailing water quality conditions. Water quality was inferred using the EPA Q-value system.

Macroinvertebrates were collected using a two-minute kick sampling method with a standard hand net (1 mm mesh) as per (Feeley, et al., 2020). Stone washing was also undertaken to ensure collection of species which cling to rock surfaces. Macroinvertebrates were identified on the riverbank and returned to the river on completion of analysis. Faunal composition was analysed on the bank side following the EPA Q-value classification system as set out in (Toner, et al., 2005).

Q-values and water quality groups were inferred 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 the sample and reflects the average water quality at a location (see macroinvertebrate indicator groups in **Table 9-7**).

The composition of the macroinvertebrate community expected in the various Q-value and water quality classes is described in (Toner, et al., 2005).

Table 9-7: Macroinvertebrate Indicator Groups (Toner, et al., 2005).

Group	Pollution Sensitivity
Group A	Sensitive
Group B	Less Sensitive
Group C	Tolerant
Group D	Very Tolerant
Group E	Most Tolerant

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').

The Q-value is assigned on a scale of 1 to 5 with a Q5 representing high quality pristine conditions and a Q1 representing bad seriously polluted conditions. The intermediate values (Q1-2, 2-3, 3-4, etc.) denote transitional conditions. The scheme mainly reflects the effects of organic pollution (i.e., deoxygenation and eutrophication) but where a toxic effect is apparent or suspected the suffix '0' is added to the biotic index (e.g. Q1/0, 2/0 or 3/0). An asterisk after the Q value (e.g. Q3*) indicates heavy siltation of the substratum. EPA indices, EPA water quality status and WFD status are outlined in **Table 9-8**.

Table 9-8: EPA Biotic Index (Q-value) and Equivalent WFD Water Quality Status Classes.

Q-value Score	EQR	Pollution Gradient	WFD Status
Q5	1.00	Unpolluted	High
Q4-5	0.90	Unpolluted	High
Q4	0.80	Unpolluted	Good

Q-value Score	EQR	Pollution Gradient	WFD Status
Q3-4	0.70	Slightly Polluted	Moderate
Q3	0.60	Moderately Polluted	Poor
Q2-3	0.50	Moderately Polluted	Poor
Q2	0.40	Seriously Polluted	Bad
Q1-2	0.30	Seriously Polluted	Bad
Q1	0.20	Seriously Polluted	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.

9.2.3.3.5 Crayfish

Dedicated white-clawed crayfish surveys were undertaken on the 11th and 17th August 2021 and the 24th August 2023. The surveys were undertaken with reference to Peay (2003), under the following licences: C146/2021 and C36/2023.

In 2021, a section measuring approximately 500 m was surveyed from the bridge at Clonaslee upstream into Brittas Wood, and a section measuring approximately 500 m downstream of Clonaslee bridge plus a 100 m reach at the ICW was surveyed. In 2023, a 500 m section was surveyed from the bridge at Clonaslee upstream into Brittas Wood, and an 800 m section was surveyed from the bridge at Clonaslee downstream as far as the bridge over the River Clodiagh to the ICW. The surveys were undertaken by separating the river Clodiagh into discrete reaches (approximately 100 m in length). Within each reach, five habitat patches were identified. Ten suitable crayfish refuges within each habitat patch were then hand searched for crayfish with the help of a bathyscope where necessary. To supplement the bathyscope survey, kick sampling was conducted in survey areas. Refuges were also searched by sweeping or kicking with a pond net where appropriate (e.g., in muddy patches or under tree roosts). Identification of suitable habitat patches and refuges was made with reference to Table 5 “Crayfish habitat preferences – a guide to identifying habitat patches and refuges” and Section 4.4.2 in Peay (2003). An overall habitat appraisal for crayfish was undertaken at each reach. If crayfish were found, they were measured and notes on their condition taken.

9.2.3.4 Survey Scoping

On the basis of the results of the surveys carried out to inform the baseline environment, and consideration of the activities associated with the Proposed Scheme, the following surveys were not deemed necessary to inform the baseline:

- Breeding bird surveys were scoped out as the Proposed Scheme is relatively small and localised in extent, and therefore it is unlikely to support any notable assemblage of breeding birds or notable populations of one or more species of breeding birds within the area of the proposed scheme. Seasonal mitigation will apply and is in place for the proposed works (no vegetation removal within the bird nesting season from 1 March - 31 August, inclusive). Any bird species that were encountered during site-specific surveys as outlined in **Table 9-3**, were noted.
- Amphibian and reptile – dedicated amphibian and reptile surveys were not undertaken as part of the ecological walkover due to lack of suitable habitat within the redline boundary, but any incidental records of these species were noted during the ecological site walkovers. No incidental records were made.
- Terrestrial invertebrates – dedicated invertebrate surveys were not undertaken as part of the ecological walkover due to lack of suitable habitat or records for protected species (e.g., marsh fritillary *Euphydryas aurinia*) within the redline boundary, but any incidental records of notable invertebrates were noted during the ecological site walkovers. No incidental records were made.

9.2.4 Assessment Criteria and Significance

9.2.4.1 Assessment Methodologies

The assessment on biodiversity has been completed with reference to the following guidance documents, which are specific to biodiversity:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine, Version 1.3- Updated September 2024 (CIEEM, 2018); and
- Guidelines for Assessment of Ecological Impacts of National Roads Schemes, Revision 2 (NRA, 2009).

The CIEEM (2018) guidelines have been used as the primary basis of the assessment. The process also takes cognisance of the EPA (2022) guidelines and incorporates NRA (2009) guidelines for the ecological valuation and geographic context.

9.2.4.2 Important Ecological Features

The methodology used to value ecological features was undertaken with reference to the geographic frames of reference outlined by the NRA (2009).

Important Ecological Features (IEF), as termed in CIEEM (2018), are defined here as those ecological features which are valued at local importance (higher value) or greater NRA (2009). Ecological features below this value were scoped out of further ecological impact assessment as any potential impact is deemed to be of local importance (lower value) or negligible.

9.2.4.3 Ecological Impact Assessment Process

The ecological impact assessment process, as described by CIEEM (2018), involves:

- Identifying and characterising impacts and their effects;
- Incorporating measures to avoid and mitigate negative impacts and effects;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset significant residual effects; and
- Identifying opportunities for ecological enhancement.

The assessment comprises a review of the baseline data gathered and the identification of IEFs with features valued on the basis of available information/guidance and using professional judgement.

9.2.4.4 Characterising and Determining Significance

Impacts on IEFs are characterised with the following qualitative terms as defined in CIEEM (2018):

- **Positive or Negative**: Positive and negative impacts and effects were determined according to whether the change is in accordance with nature conservation objectives and policy:
  - **Positive** – a change that improves the quality of the environment (e.g. by increasing species diversity, extending habitat or improving water quality). This may also include halting or slowing an existing decline in the quality of the environment.
  - **Negative** – a change which reduces the quality of the environment (e.g. destruction of habitat, removal of foraging habitat, habitat fragmentation, pollution).
- **Extent**: The extent is the spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions (e.g. noise transmission under water).
- **Magnitude**: Magnitude refers to size, amount, intensity and volume. It was quantified if possible and expressed in absolute or relative terms (e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population).
- **Duration**: Duration was defined in relation to ecological characteristics (such as the lifecycle of a species) as well as human timeframes. For example, five years, which might seem short-term in the

human context or that of other long-lived species, would span at least five generations of some invertebrate species.

- **Frequency and Timing**: The number of times an activity occurs will influence the resulting effect. For example, a single person walking a dog will have very limited impact on nearby waders using wetland habitat, but numerous walkers will subject the waders to frequent disturbance and could affect feeding success, leading to displacement of the birds and knock-on effects on their ability to survive. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons (e.g. bird nesting season).
- **Reversibility**: An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

There may be any number of possible impacts on IEFs arising from a development. However, it is only necessary to describe in detail the impacts that are likely to be significant. Impacts that are either unlikely to occur, or if they did occur are unlikely to be significant, are scoped out. If there was any doubt, the precautionary principle was applied, and the potential impact was assessed.

When assessing the significance of an effect and for the purposes of this assessment, the significance of an effect is simply any effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a scheme. For the purposes of ecological impact assessment, a 'significant effect' is defined as an effect that either supports or undermines the biodiversity conservation for the IEF. These significant effects are qualified with reference to an appropriate geographical scale e.g., for plants this could be within metres of its location but for birds this could be considerably further.

The approach to determining significance does not utilise a matrix of degrees of impact significance (such as EPA (2022)) but instead follows the industry standard for ecological impact significance (CIEEM, 2018) where impacts/effects are determined to be 'significant' or 'not significant.'

9.2.5 Data Limitations

9.2.5.1 Desk study

Sources of desk study information are neither exhaustive nor necessarily easily available, and a reasonable effort was made to obtain ecological data in the public domain to inform the description of the baseline environment and its assessment. Additional information, not in the public domain, is likely to exist, but could not be obtained or assessed here. This limitation is acknowledged and incorporated into the assessment and is deemed to not affect the certainty or predictability of the assessment. It is important to note that desk study information provides largely contextual information to enable the need and scope of any field surveys to be better determined.

Species records data held by record centres and statutory bodies (such as the NBDC and NPWS) are often provided on an ad-hoc basis by recorders. These records can only provide an indication of what species might be found in an area; they do not constitute full and complete species lists. Absence of certain species from these sources does not confirm absence of these species from the area.

9.2.5.2 Field study

The receiving environment (i.e., baseline condition) may naturally vary through seasons and between years (NRA, 2008a). All reasonable effort has been made to address this (e.g., combined use of desk and field survey data), and the limitation is acknowledged. Once incorporated into the assessment the limitation is deemed to not affect the certainty or predictability of the assessment. In the case of the Proposed Scheme, surveys have been completed and updated over multiple years which also increases the robustness of the baseline against which the assessment has been completed.

9.2.5.2.1 Habitat Survey

Not all lands within and adjacent to the Proposed Scheme area were subject to walkover survey. Binoculars were used, where possible, to survey such areas. The only lands within the proposed works area not subject to walkover survey was the location of the Proposed Site compound in Area 1. This agricultural field was

surveyed from the roadside. Once incorporated into the assessment this limitation is deemed to not affect the outcome or certainty of the assessment.

9.2.5.2.2 Bat Data Collection

Data collected from ST1 in September 2021 were lost due to equipment failure. During the collection of static bat data between the months of July, August and September 2023, occasional equipment errors occurred. These were a result of battery, memory card, and Global Positioning System (GPS) issues which are not untypical with respect to the use and deployment of such equipment. The regular maintenance visits (c. 2–4-week intervals) to the static detector units limited loss of data. Due to high levels of audible static in the bat data collected in 2023 for ST3, these data have been omitted from the data analysis. These limitations are acknowledged and have been incorporated into the assessment and are not deemed to not affect the certainty or predictability of the assessment.

9.2.5.2.3 Ground Level Roost Assessment

The ground level roost assessment survey of tree no. 50 and 151, and hedge no. 140 was slightly limited due to dense vegetation (in the case of tree no. 50 and hedge no. 140) and due to the presence of livestock in Area 3 (tree no. 151 and hedge no. 140) which limited full access to these features. Where necessary, precautionary mitigation has been included for the Proposed Scheme. These limitations are acknowledged and have been incorporated into the assessment and are not deemed to not affect the assessment.

9.2.5.2.4 Badger Data Collection

During badger surveys in July 2023, a 50 m survey area was searched. However, owing to landowner access permissions this 50 m survey extent was reduced in certain areas. This limitation is acknowledged and is deemed to not affect the certainty or predictability of the assessment. All reasonable efforts were made to gain access for surveys and, where necessary, precautionary mitigation included for the Proposed Scheme.

9.2.6 Data Validity

Data validity depends on the sensitivity of the baseline environment and the nature and type of potential impacts that arise as a result of the Proposed Scheme. **Table 9-9** provides details on the validity of the survey data used to inform the biodiversity assessment and has been reviewed in line with the CIEEM Advice Note on the Lifespan of Ecological Reports and Surveys (CIEEM, 2019). CIEEM (2019) provides guidance on the age of survey data that can be used to inform the assessment. Bat Conservation Trust's (BCT) Bat Surveys for Professional Ecologists: Good Practice Guidelines 4th edition (Collins, 2023) also provides guidance on the age of bat survey data which can be used to inform the assessment. Where CIEEM or BCT do not provide guidance on a particular survey type, professional judgement has been provided.

Table 9-9: Summary of ecology survey validity.

Survey	Date most recent survey undertaken	Age of data (as of February 2025)	Data valid?
Habitat survey & botanical survey including IAPS	August 2023	c. 18 months	CIEEM (2019) note that surveys aged between 12 and 18 months are likely to be valid, with some exceptions. There has been limited (if any) change in the land management of the wider area of the Proposed Scheme, as confirmed via walkover survey undertaken in June 2024. Therefore, it is assumed there has been no significant change in the ecological function or condition of these habitats. The habitat and botanical data are considered valid to inform the assessment.
Badger survey	August 2023	c. 18 months	CIEEM (2019) recommend survey validity of 12 months for mobile species. However, given that no badger signs were observed during any surveys undertaken (including incidental observations during surveys in 2024) these data are considered valid to inform the assessment.

Survey	Date most recent survey undertaken	Age of data (as of February 2025)	Data valid?
Otter survey	June 2024	< 1 year	Yes. CIEEM (2019) note that surveys less than 1 year old are likely to be valid.
Bat roost assessment (structures)	July 2023	c. 19 months	CIEEM (2019) recommend survey validity of 12 months for mobile species. However, there has been limited (if any) change in the land management of the wider area of the Proposed Scheme, as confirmed via walkover survey undertaken in June 2024. Therefore, it is assumed there has been no significant change in the ecological function or condition of structures supporting bats. These data are considered valid to inform the assessment.
Bat roost assessment (trees) (including ground level assessment, emergence surveys and endoscope surveys)	June - August 2024	< 1 year	Yes. CIEEM (2019) note that surveys less than 1 year old are likely to be valid.
Bat activity	July – September 2023	c. 19 months	CIEEM (2019) recommend survey validity of 12 months for mobile species. However, there has been limited (if any) change in the land management of the wider area of the Proposed Scheme, as confirmed via walkover survey undertaken in June 2024. Bats recorded during emergence surveys in 2024 were similar to those recorded during 2023 activity surveys. The bat activity data are considered valid to inform the assessment.
Kingfisher habitat appraisal	June 2024	< 1 year	Yes. CIEEM (2019) note that surveys less than 1 year old are likely to be valid.
Q-Value assessment, fish & crayfish habitat appraisal	August 2023	c. 18 months	CIEEM (2019) note that surveys aged between 12 and 18 months are likely to be valid, with some exceptions. There has been limited (if any) change in the land management of the wider area of the Proposed Scheme. Walkover surveys of the River Clodiagh for Kingfisher in 2024 did not note any obvious change in the physical habitat of the River Clodiagh. Therefore, it is assumed there has been no significant change in the ecological function or condition of these habitats. The Q-value, fish and crayfish habitat data are considered valid to inform the assessment.
Crayfish survey and habitat appraisal, walkover survey	August 2023	c. 18 months	CIEEM (2019) note that surveys aged between 12 and 18 months are likely to be valid, with some exceptions. Crayfish are a mobile species but are likely to have been extirpated within the Proposed Scheme area as a result of crayfish plague. Walkover surveys of the River Clodiagh for Kingfisher in 2024 did not note any obvious change in the physical habitat of the River Clodiagh. Therefore, it is assumed there has been no significant change in the ecological function or condition of these habitats. The data are considered valid to inform the assessment.
Detailed habitat assessment (at debris trap)	June 2024	< 1 year	Yes. CIEEM (2019) note that surveys less than 1 year old are likely to be valid.

9.2.7 Consultation

Meetings and follow up consultations were arranged with stakeholders at all phases of the Proposed Scheme. Comments and queries from stakeholders informed the design process, and **Table 9-10** summarises the feedback relevant to this Chapter received to date, together, with how this feedback has been addressed in the preparation of this report. **Chapter 3: Consultation** also provides details on the types of consultation activities undertaken for the Proposed Scheme and the consultees that were contacted.

Table 9-10: Summary of Consultations

Consultee	Feedback	Where considered in this chapter
Inland Fisheries Ireland (IFI) Consultation Request (Response received - Date: 09/01/2024)	The aquatic habitat and physical nature of any watercourse affected by the development must be fully described in detail. This includes areas of open water, pool riffle glide sequences, density and types of aquatic vegetation, description of riparian zones to depth of at least 10 metres on either bank etc. The extent of the surveys should be sufficiently long enough so as to be representative of the habitat contained in that watercourse. There should be a particular focus on sections upstream and downstream of any point where an impact on the watercourse is likely to arise.	Aquatic ecology surveys have been undertaken. The survey methodology is described in **Section 9.2.3.3** and the data collected are presented in **Section 9.3.5**.
	Please also note that any instream works or other works which may impact directly on a watercourse should only be carried out during the open season which is from 1st July to 30th of September in each year (so as to avoid impacting on the aquatic habitat during the spawning season). It would be important that appropriate scheduling of works is allowed for.	Mitigation measures outlined for aquatic ecological receptors outlined in **Section 9.6.7.1**. Instream works are proposed to be undertake during the period 1st July to 30th September.
	In relation to the proposed debris trap, IFI would like more information on this novel structure, including more information on the efficacy of the structure referred to in the UK and the one approved as part of the Whitechurch FRS. An assessment shall also me made on the impact of loss of potential spawning habitat at this location and any changes to the flow regime and its impact on sediment deposition or erosion. The responsibility for the trap maintenance shall also be defined.	See **Chapter 5: Project Description** re. efficacy of the structure. The potential impacts of this structure are addressed in **Section 9.5.3**.
	Hydromorphology of rivers is one the key tenets for defining the ecological status of rivers under the Water Framework Directive, where a deterioration due to hydromorphology will lead to a status change in a river. River continuity is one of the quality elements in such assessment. It is the strong preference of IFI that any weir removal is not ruled out at this stage and should be scoped as part of the final project design. IFI have completed SNIFFER protocol assessments of the weirs in Clonaslee, the results available in attached email.	The feedback was noted by the assessment. The Proposed Scheme does not include any weir removal.
	The EIAR should indicate proposals to monitor the impact on watercourses within the site. In the event that environmental damage to the aquatic habitat and associated riparian zone is caused, the EIAR should indicate the steps that may be taken to rectify any damage to the aquatic habitat including liaison with the appropriate authorities.	Schedule of construction phase and operational phase monitoring provided in **Section 9.8**. The requirement and criteria for an environmental emergency response/contingency plan is outlined in **Section 9.6.4**.
National Parks and Wildlife Services (NPWS)	Careful consideration must be given to the timing of instream works and clearance of riparian vegetation, as the open season for instream works overlaps with the closed season for vegetation clearance.	A construction schedule has been prepared which details phasing of instream works and vegetation clearance. Mitigations measures are provided in **Sections 9.6.5.1.5, 9.6.6.1.1, 9.6.7.1.4** and **9.6.7.1.5**.
	Potential bat roost survey of trees proposed for felling required.	PBR surveys of trees proposed for felling have been undertaken. See **Section 9.2.3.2.5** and **9.3.4.1.2**.
	Pre-construction surveys for otter required, and if resting or breeding habitat confirmed a derogation licence will be required.	Pre-construction surveys for otter specified in **Section 9.6.3**.
	Indicative construction plan should be prepared and issued to NPWS for comment.	Indicative construction programme issued to NPWS for comment on the 14th June 2024. Comments received June 25th and programme

Consultee	Feedback	Where considered in this chapter
		updated accordingly. Programme reissued for further NPWS commentary. Response was received from NPWS on 16th July stating they had no further comments.

9.3 Description of Existing Environment

This section outlines the baseline environment of the ecological study area, based on the desk studies and field surveys completed. The baseline has been used to identify the IEFs which have subsequently been taken forward with respect to the identification of potential impacts and the assessment of significant effects.

9.3.1 Site Location and Context

The Proposed Scheme is located within Clonaslee Village, which is situated in the upstream Brosna catchment. Two rivers pass through the village; the Clodiagh River to the West and Gorragh River to the East. The Clodiagh River flows northwards through the village, from its source on Knockachorra Mountain in the Slieve Bloom Mountain range. The Gorragh River passes to the east of the village before its confluence with the Clodiagh River approximately 1.5 km north of the village. The upper catchments of both rivers comprise poorly draining mineral and peat soils. The River Clodiagh flows in a predominantly northerly direction before merging with the Tullamore River. From this point, it flows northwest and joins the River Brosna southwest of Clara. The Brosna then flows southwest and merges with the River Shannon near Shannon Harbour at the border of counties Offaly and Galway.

The soils are predominantly well-draining within the environs of Clonaslee Village. The physical landscape within the environs grades from mountain to hill physiographic units in the south, to flat to undulating physiographic units towards the north. With the exception of Brittas Wood which occurs within the southern extents of the Proposed Scheme area, the primary landuse within the Proposed Scheme environs is agricultural land and the urban areas associated with Clonaslee village itself. Mature trees occur along the banks of the Clodiagh River. Property/field boundaries comprise hedgerows, treelines and strips of linear scrub/woodland, which are subject to varying degrees of management. An Integrated Constructed Wetland (ICW) developed for the village of Clonaslee is located to the north of the village.

9.3.2 Designated Sites for Nature Conservation

European and national legislation sets out the requirements of Member States to identify and protect sites that are of importance for nature conservation. The designation, monitoring and overall protection of these sites in Ireland is one of the key responsibilities of the NPWS.

Site synopses are prepared for each designated site in Ireland, produced by the NPWS, which are a source of information used when investigating important habitats or species likely to be found within areas that have been officially designated because of their conservation importance on an international or national level. Site synopses for designated sites of conservation importance can be found on the NPWS website.

In Ireland, the main types of designation are:

- Special Area of Conservation (SAC) and cSAC[3] – European designated sites;
- Special Protection Area (SPA) and pSPA[3] – European designated sites;
- Natural Heritage Area (NHA) – nationally designated sites;
- Proposed Natural Heritage Area (pNHA) – nationally designated sites;

[3] In this report, candidate and proposed SACs and SPAs are referred to as “SACs” and “SPAs”, and there is no distinction made between candidate/proposed sites and European Sites as they have the same level of protection as a matter of domestic law. Therefore, this report does not treat them differently and they are one and the same.

- Ramsar sites – internationally designated site for wetlands of significant value;
- National parks and nature reserves - nationally designated areas for wildlife protection; and
- Wildfowl sanctuaries - nationally designated sites for the protection of game birds.

9.3.2.1 Identification of Connectivity with Designated Sites

The Proposed Scheme has been subject to Appropriate Assessment (AA). An AA Screening report and Natura Impact Statement (NIS) have been prepared and accompany this application under separate cover. European Sites (Designated Sites) identified as part of the AA are listed in **Section 9.3.2.2**. In the AA, Designated Sites within the potential ZoI of the Proposed Scheme are identified using the Source-Pathway-Receptor (S-P-R) model. The same approach has been undertaken for European and non-European Designated Sites in this Chapter. Pathways between the Proposed Scheme and Designated Sites were identified as follows:

In terms of hydrogeological pathways via groundwater flow paths, as stated in **Chapter 10: Land, Soils Geology and Hydrogeology**, flow paths within the Clonaslee West groundwater body (GWB) and the Geashill GWB (which underly the Proposed Scheme Area) are relatively short (along fractures, joints and major faults, with flow following local topography). Discharge is to rivers and springs which cross these GWBs and near the contact areas with the impure limestones at the north of the study area. Groundwater flow will generally follow a subdued version of topography. Regional topography slopes from the high ground at the south towards the north, therefore local groundwater flow direction is expected to be from south to north towards the Clodiagh River and Gorragh River. Accordingly, Designated Sites dependent on groundwater are only considered to have potential hydrogeological connectivity with the Proposed Scheme if they are located within close proximity (1 km) to the Proposed Scheme. Contaminants could enter the groundwater body via infiltration through the soil, or surface water run-off into boreholes, which are part of the Clonaslee Public Water Supply (PWS), which adjoin the western boundary of Area 1.

In terms of hydrological pathways, Designated Sites are considered to be within the potential ZoI of the Proposed Scheme if they occur downstream and within the floodplain of the River Clodiagh to a distance (by river) of 50 km, or if they occur upstream of the Proposed Scheme but support mobile fauna or species dependent on same. The flood plain is determined based on a review of CFRAM River Flood Extents maps[4]. Some of the flood extents in downstream reaches are under review by the OPW due to error identified in the flood map source data (map review code: MR075). Where the flood extents are under review, then consideration has been given to historic maps, topography and distance between Designated Sites and the River Clodiagh. In the case of uncertainty, the precautionary principle was applied.

Given the assumed presence of crayfish plague (*Aphanomyces astaci*) in the River Clodiagh (see **Section 9.3.5.2**), the potential for significant effects on Designated Sites for which white-clawed crayfish (*Austropotamobius pallipes*) is listed as a qualifying interest are also considered. Although there is a possibility that the pathogen is no longer present within the River Clodiagh (the pathogen is likely to die out once all host crayfish perish (Brady, et al., 2024), surveys in Ireland have found crayfish plague to persist in catchments both upstream and downstream of an infected site. This was observed in the River Bruskey in the Erne catchment where surveys undertaken after a mass mortality event due to crayfish plage indicated that by a year later (2016), the pathogen was still present and had spread downstream (Mirimin, et al., 2022). Furthermore, the Marine Institute, as part of the National Crayfish Plague Surveillance Programme (2020/2021) detected crayfish plague via eDNA analysis in sites within the Shannon Estuary South in both 2020 and 2021 (Swords & Griffin, 2022). Therefore, without tests confirming the absence of crayfish plague from the Clodiagh River, the possibility that it still persists must be assumed. All European sites in Ireland which have been designated for the protection of white-clawed crayfish are included in the ZoI due to uncertainty regarding whether machinery, equipment or PPE used during the construction and operational phase of the Proposed Scheme could also be used in other waterbodies across Ireland subsequently, and therefore potentially spread crayfish plague. Although the likelihood of crayfish plague spread may be relatively low, particularly for crayfish catchments very remote from the Proposed Scheme area, the potential magnitude of the effect (risk of 100% mortality in affected populations), and the uncertainty as to whether it could occur, justifies including these European Sites within the ZoI. Human-mediated transport of crayfish

[4] https://www.floodinfo.ie/map/floodmaps/#

plague via contaminated water equipment is highly likely to be the primary cause of spread within Ireland (Brady, et al., 2024).

Designated Sites within 20 km of the Proposed Scheme are considered with regard to whether they support bird species. Consideration has been given to any of these Sites (i.e., within 20 km of the Proposed Scheme) if they supported other mobile species.

9.3.2.2 European Sites

The Natura 2000 network is defined under the Habitats Directive 92/43/EEC (Article 3) and the Birds Directive 2009/147/EC (Article 4) as a coherent European ecological network of Special Areas of Conservation (SAC) and Special Protection Areas (SPA).

SACs are composed of sites hosting the Qualifying Interest (QI) habitat types listed in Annex I and/or species listed in Annex II (under Habitats Directive Article 3). SPAs are composed of sites supporting Special Conservation Interests (SCI) comprising Annex I bird species, regularly occurring migratory species and the supporting wetland habitats (under Article 4 Birds Directive). The purpose of the network is to enable the natural habitat types and the species' habitats concerned to be maintained at, or where appropriate restored to, favourable conservation status in their natural range.

9.3.2.2.1 European Sites within the potential ZoI of the Proposed Scheme

Several European Sites occur within the potential ZoI of the Proposed Scheme. These Sites include Charleville Wood SAC, River Shannon Callows SAC, Slieve Bloom Mountains SPA, Middle Shannon Callows SPA and River Nore SPA (**Table 9-11** and mapped in **Figure 9-2**). Furthermore, given the assumed presence of crayfish plague (*Aphanomyces astaci*) in the River Clodiagh (see **Section 9.3.5.2**), the potential for significant effects on European Sites for which white-clawed crayfish (*Austropotamobius pallipes*) is listed as a qualifying interest are also considered. These SACs include the River Barrow and River Nore SAC, Blackwater River (Cork/Waterford) SAC, Bricklieve Mountains and Keishcorran SAC, Glenade Lough SAC, Kilroosky Lough Cluster SAC, Lough Bane and Lough Glass SAC, Lough Corrib SAC, Lough Gill SAC, Lough Lene SAC, Lough Owel SAC, Lower River Suir SAC, River Moy SAC, White Lough Ben Loughs and Lough Doo SAC, Lough Hoe Bog SAC and Lough Nageage SAC. These SACs are considered to be within the theoretical ZoI of the Proposed Scheme as white-clawed crayfish is listed as a qualifying interest of these SACs. These Sites are not linked to the Proposed Scheme in any other way.

Of the Sites within the ZoI of the Proposed Scheme, the only Sites considered for further assessment (as significant effects on these sites are considered likely) are Charleville Wood SAC and Slieve Bloom Mountains SPA (**Table 9-11**), as well as the additional 15 Sites for which white-clawed crayfish are a QI (**Table 9-12**).

The Slieve Bloom Mountains SAC (000412) is located within the River Clodiagh catchment to the south of the Proposed Scheme. This SAC is not within the potential ZoI of the Proposed Scheme, as there are no pathways leading to this SAC from the Site. This SAC is located upgradient and more than 1 km from the Proposed Scheme area.

Table 9-11: Conservation objectives of European Sites within the potential ZoI.

European Site (Code)	Straight line distance to Proposed Scheme	Qualifying Interest Habitats & Species (*=Priority Habitat)	Conservation objective	Rationale for inclusion within potential ZoI	Is European site considered further in the assessment?
River Barrow and River Nore SAC (002162) (NPWS, 2011)	2 km (East)	Estuaries [1130]	Maintain	This SAC is included within the potential ZoI of the Proposed Scheme given its proximity to the Scheme, and that white-clawed crayfish are listed as a qualifying interest. There is no direct hydrological or hydrogeological connectivity between the Proposed Scheme and this European Site. Therefore, the only QI that may be within the ZoI of the Proposed Scheme is **white-clawed crayfish**. The remaining QIs are sufficiently remote from the Proposed Scheme (at least 2 km) and have no connectivity to the Proposed Scheme. Otters are known to forage up to 32 km from their home range (NatureScot, 2024) and have been confirmed in the Clodiagh River, within the footprint of the Proposed Scheme. However, given the distance between this SAC and the Proposed Scheme, and the extensive areas of suitable habitat for otter within the River Barrow and River Nore SAC itself, it is considered that there is no likelihood for significant effects on otter associated with this SAC as a result of the Proposed Scheme. Despite the absence of a direct hydrological link between the Proposed Scheme and the River Barrow and River Nore SAC, white-clawed crayfish are considered to be within the ZoI. There is the potential, although slight, that machinery, equipment or PPE used during the construction and operational phase of the Proposed Scheme could also be used in this catchment. Given the potential magnitude of the effect of the spread of crayfish plague into watercourses (risk of 100% mortality in	**Yes**
		Mudflats and sandflats not covered by seawater at low tide [1140]	Maintain		
		Reefs [1170]	Maintain or restore[5]		
		Salicornia and other annuals colonising mud and sand [1310]	Maintain		
		Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Restore		
		Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Restore		
		Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Maintain		
		European dry heaths [4030]	Maintain		
		Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	Maintain		
		* Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Maintain		
		Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0]	Restore		

[5] This habitat is listed as a qualifying interest of this SAC on the site synopsis but not the conservation objectives document (NPWS, 2011).

European Site (Code)	Straight line distance to Proposed Scheme	Qualifying Interest Habitats & Species (*=Priority Habitat)	Conservation objective	Rationale for inclusion within potential ZoI	Is European site considered further in the assessment?
		* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Restore	affected populations), and the uncertainty as to whether it could occur during the construction or operational phase, this species is considered to be within the potential ZoI.	
		Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	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.		
		Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	Maintain		
		Nore pearl mussel (*Margaritifera durrovensis*) [1990]	Restore		
		Killarney fern (*Trichomanes speciosum*) [1421]	Maintain		
		Sea lamprey (*Petromyzon marinus*) [1095]	Restore		
		Brook lamprey (*Lampetra planeri*) [1096]	Restore		
		River lamprey (*Lampetra fluviatilis*) [1099]	Restore		
		Atlantic salmon (*Salmo salar*) (only in fresh water) [1106]	Restore		
		Twaite shad (*Alosa fallax*) [1103]	Restore		
		White-clawed crayfish (*Austropotamobius pallipes*) [1092]	Maintain		
		Otter (*Lutra lutra*) [1355]	Restore		

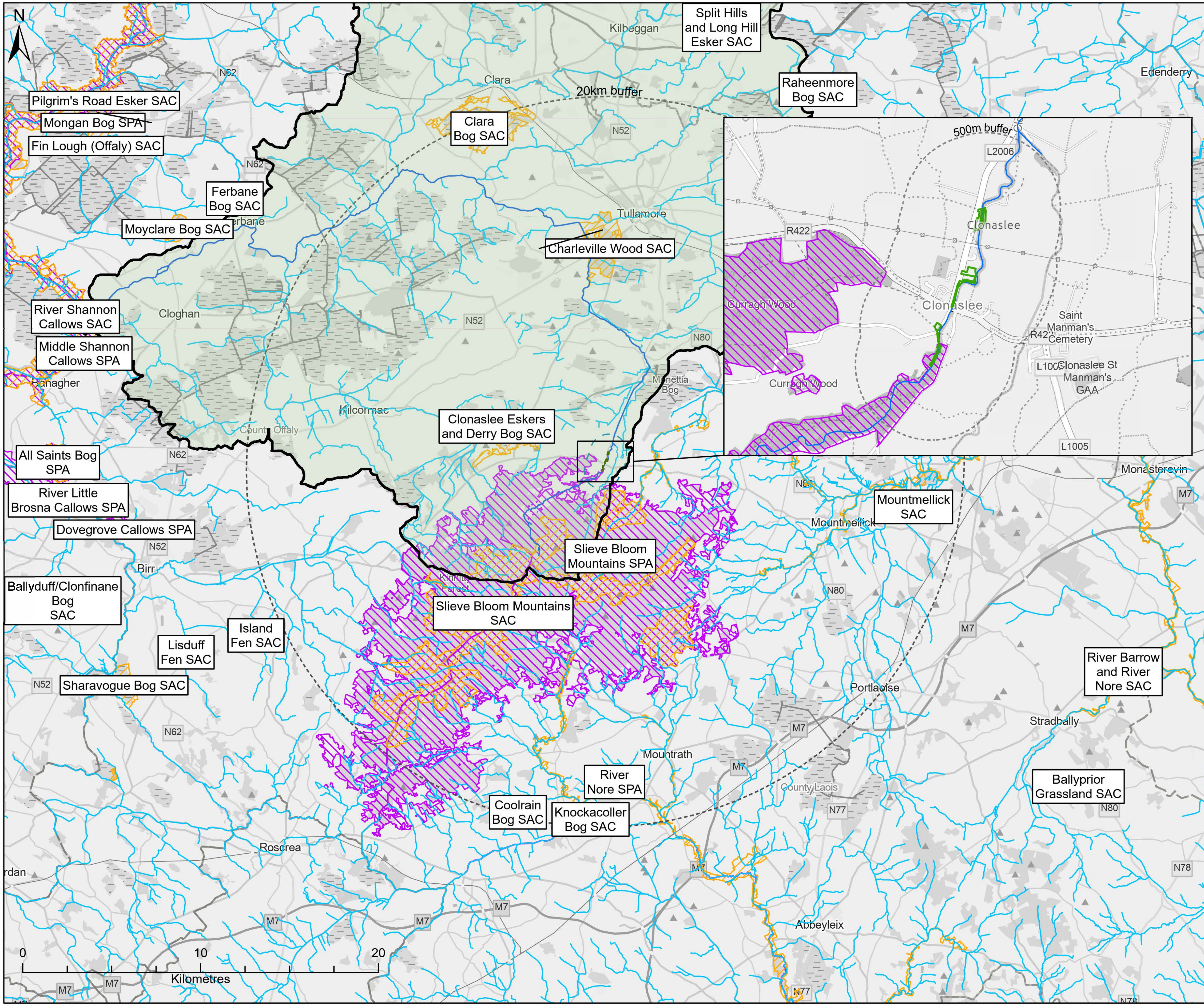
European Site (Code)	Straight line distance to Proposed Scheme	Qualifying Interest Habitats & Species (*=Priority Habitat)	Conservation objective	Rationale for inclusion within potential ZoI	Is European site considered further in the assessment?
Charleville Wood SAC (000571) (NPWS, 2021a)	9.4 km (North)	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Restore	This European Site is located downstream of the Proposed Scheme, with direct hydrological connectivity via the Clodiagh River.	**Yes**
		Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	Maintain		
River Shannon Callows SAC (000216) (NPWS, 2022a)	29.1 km (NW)	Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) [6510]	Restore	This European Site is located downstream of the Proposed Scheme, with direct hydrological connectivity via the Clodiagh River. The only QIs which may be within the ZoI are the water dependent habitats and species listed for the site, namely alkaline fens, molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae), alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) and otter. However, considering the distance to this site is approximately 40 km by river, it is unlikely that significant effects on receptors within this SAC are likely to arise. Therefore, this SAC is not screened in for further assessment.	**No**
		Limestone pavements* [8240]	Maintain		
		Alkaline fens [7230]	Maintain		
		Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]	Restore		
		Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]	Maintain		
		Otter (*Lutra lutra*) [1355]	Maintain		
Slieve Bloom Mountains SPA (00416) (NPWS, 2022b)	Intersects Proposed Scheme	Hen Harrier (*Circus cyaneus*) [A082]	Restore	This SPA intersects with the Proposed Scheme. Noise or other construction related disturbance could reduce foraging and breeding ability of the hen harrier populations, a QI species. Potential for habitat loss as works are proposed within this SPA.	**Yes**
River Nore SPA (004233) (NPWS, 2022c)	17.4 km (South)	Kingfisher (*Alcedo atthis*) [A229]	Maintain or restore	This SPA is located within 20 km of the Proposed Scheme. There is no hydrological or hydrogeological connectivity with this site. The only species listed for this SPA is kingfisher. According to Bird Watch Ireland, kingfisher are a very sedentary species, rarely moving	**No**

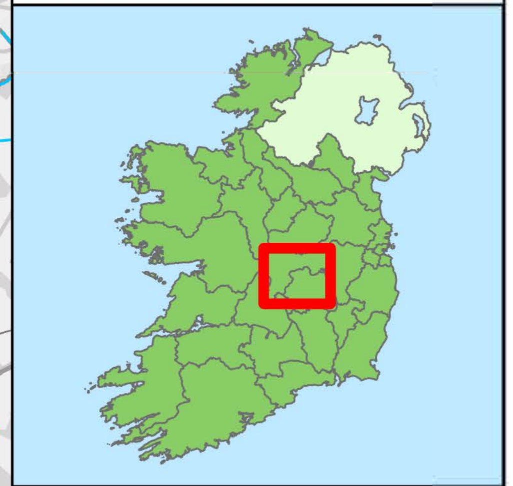
European Site (Code)	Straight line distance to Proposed Scheme	Qualifying Interest Habitats & Species (*=Priority Habitat)	Conservation objective	Rationale for inclusion within potential ZoI	Is European site considered further in the assessment?
				from their territories[6]. Therefore, this SPA is not considered further in this assessment.	
Middle Shannon Callows SPA (004096) (NPWS, 2022d)	29.1 km	Whooper Swan (*Cygnus cygnus*) [A038]	Maintain	This European Site is located downstream of the Proposed Scheme, with direct hydrological connectivity via the Clodiagh River. However, considering the distance to this site is approximately 50 km by river, it is unlikely that significant effects on receptors within this SPA are likely to arise. Therefore, this SPA is not screened in for further assessment.	**No**
		Wigeon (*Anas penelope*) [A050]	Restore		
		Lapwing (*Vanellus vanellus*) [A142]	Restore		
		Black-tailed Godwit (*Limosa limosa*) [A156]	Restore		
		Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Restore		
		Wetland and Waterbirds [A999]	Maintain		
		Corncrake (*Crex crex*) [A122]	The status of corncrake as a Species of Conservation Interest for the Middle Shannon Callows SPA is currently under review.		
		Golden Plover (*Pluvialis apricaria*) [A140]	Maintain		

[6] https://birdwatchireland.ie/birds/kingfisher/

Table 9-12: Conservation objectives for white-clawed crayfish in the SACs for which this species is listed as a QI.

European Site (Code)	Conservation Objective for white-clawed crayfish	Rationale for inclusion within potential ZoI	Scoped in for further assessment?
River Barrow and River Nore SAC (002162) (NPWS, 2011)	To maintain the favourable conservation condition of white-clawed crayfish in the River Barrow and River Nore SAC.	There is the potential, although slight, that machinery, equipment or PPE used during the construction and operational phase of the Proposed Scheme could also be used in catchments supporting these SACs. Given the potential magnitude of the effect of the spread of crayfish plague into watercourses (risk of 100% mortality in affected populations), and the uncertainty as to whether it could occur during the construction or operational phase, this species is considered to be within the potential ZoI.	Yes
Blackwater River (Cork/Waterford) SAC (002170) (NPWS, 2012)	To maintain the favourable conservation condition of White-clawed Crayfish in the Blackwater River (Cork/Waterford) SAC.		
Bricklieve Mountains and Keishcorran SAC (001656) (NPWS, 2021b)	To maintain the favourable conservation condition of white-clawed Crayfish in Bricklieve Mountains and Keishcorran SAC.		
Glenade Lough SAC (001919) (NPWS, 2021c)	To maintain the favourable conservation condition of White-clawed Crayfish in Glenade Lough SAC.		
Kilroosky Lough Cluster SAC (001786) (NPWS, 2021d)	To maintain the favourable conservation condition of White-clawed Crayfish in Kilroosky Lough Cluster SAC.		
Lough Bane and Lough Glass SAC (002120) (NPWS, 2021e)	To restore the favourable conservation condition of White-clawed Crayfish in Lough Bane and Lough Glass SAC.		
Lough Corrib SAC (000297) (NPWS, 2017a)	To maintain the favourable conservation condition of White-clawed Crayfish in Lough Corrib SAC.		
Lough Gill SAC (001976) (NPWS, 2021f)	To maintain the favourable conservation condition of White-clawed Crayfish in Lough Gill SAC.		
Lough Lene SAC (002121) (NPWS, 2021g)	To restore the favourable conservation condition of White-clawed Crayfish in Lough Lene SAC.		
Lough Owel SAC (000688) (NPWS, 2018)	To maintain the favourable conservation condition of White-clawed Crayfish in Lough Owel SAC.		
Lower River Suir SAC (002137) (NPWS, 2017b)	To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC.		
River Moy SAC (002298) (NPWS, 2016)	To maintain the favourable conservation condition of White-clawed Crayfish in River Moy SAC.		
White Lough, Ben Loughs and Lough Doo SAC (001810) (NPWS, 2021h)	To maintain the favourable conservation condition of White-clawed Crayfish in White Lough, Ben Loughs and Lough Doo SAC.		
Lough Hoe Bog SAC (000633) (NPWS, 2017c)	To maintain the favourable conservation condition of White-clawed Crayfish in Lough Hoe Bog SAC.		
Lough Nageage SAC (002135) (NPWS, 2021i)	To maintain the favourable conservation condition of White-clawed Crayfish in Lough Nageage SAC.		


N
Pilgrim's Road Esker SAC
Mongan Bog SPA
Fin Lough (Offaly) SAC
Ferbane Bog SAC
Moyclare Bog SAC
River Shannon Callows SAC
Middle Shannon Callows SPA
All Saints Bog SPA
River Little Brosna Callows SPA
Dovegrove Callows SPA
Ballyduff/Clonfinane Bog SAC
Lisduff Fen SAC
Island Fen SAC
Sharavogue Bog SAC
Split Hills and Long Hill Esker SAC
Raheenmore Bog SAC
Clara Bog SAC
Charleville Wood SAC
Clonaslee Eskers and Derry Bog SAC
Slieve Bloom Mountains SPA
Slieve Bloom Mountains SAC
Mountmellick SAC
River Barrow and River Nore SAC
River Nore SPA
Coolrain Bog SAC
Knockacoller Bog SAC
Ballyprior Grassland SAC
20km buffer
Kilbeggan
Clara
Edenderry
Tullamore
Cloghan
Kilcormac
Banagher
Birr
Mountmellick
Monasterevin
Portlaoise
Stradbally
Mountrath
Roscrea
Abbeyleix
County Offaly
County Laois
500m buffer
L2006
R422
Clonaslee
Curragh Wood
Saint Manman's Cemetery
Clonaslee St Manman's GAA
L1005
0
10
20
Kilometres
Legend
1km Buffer
20km Buffer
WFD Rivers
Special Protected Area
Special Area of Conservation
River Clodiagh
Lower Shannon Catchment (25A)
Works Area
Data Sources: NPWS, EPA



Client

Laois County Council

Clonaslee FRS

Title

Figure 9-2
European Sites relevant to the Proposed Scheme

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Issue Details

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NOTE:

9.3.2.3 National & International Sites (excluding European Sites)

The following summarises the sites within the potential ZoI of the Proposed Scheme. All designated sites with potential connectivity to the Proposed Scheme are listed in **Appendix 9.2** and illustrated in **Figure 9-3**.

9.3.2.3.1 Ramsar Sites

Ramsar sites are designated under the 'Conventions on Wetlands of International Importance' especially as waterfowl habitat.

There is one Ramsar site, the Slieve Bloom Mountains Ramsar Site (site number: 335) located approximately 4 km southwest of the Proposed Scheme. The location of this site overlaps with the Slieve Bloom Mountains SPA and Slieve Bloom Mountains SAC.

9.3.2.3.2 National Heritage Areas (NHA) and Proposed Natural Heritage Areas (pNHAs)

The Wildlife Act 1976 (as amended) is the legislative mechanism that implements and affords protection to designated Natural Heritage Areas (NHAs) which are sites that are of national importance. Under the Wildlife Act, NHAs are legally protected from negative impacts and damage from the date they are formally proposed for designated status.

Proposed NHAs (pNHAs) are sites which were published on **a non-statutory** basis in 1995 but have not since been statutorily proposed or designated. These sites are afforded limited protection in the form of various agri-environmental schemes and are required to be considered by licensing and planning authorities regarding their ecological value. These sites are of significance for wildlife and habitats.

Following a detailed assessment of nationally designated sites, the following NHAs and pNHAs are considered to be within the potential ZoI of the Proposed Scheme:

- Screggan Bog NHA (000921);
- Hawkswood Bog NHA (002355);
- Slieve Bloom Mountains pNHA (000412);
- Pallas Lough pNHA (000916);
- Raheen Lough pNHA (000917);
- Clonad Wood pNHA (000574);
- Grand Canal pNHA (002104); and
- Charleville Wood pNHA (000571).

The section below provides a site synopsis for each designated site taken from the NPWS site synopsis portfolio and outlines the rationale for their inclusion within the potential ZoI.

Screggan Bog NHA

This site is located 7.8 km northwest of the Proposed Scheme. There are areas with occasional small pools, and some poorly developed hummock/hollow systems in the largest section. Much of the bog is quite dry due to drainage and peat cutting at the margin. An unusual feature is the extensive colonisation of its southeast portion by Scots pine (*Pinus sylvestris*). There are large areas of coniferous forestry on the cutover areas of the site, along with areas of deciduous woodland and scrub. The high bog at Screggan shows features typical of a midland raised bog. The bog surface is soft and wet in places and is largely comprised of bog mosses.

This NHA is within the potential ZoI of the Proposed Scheme as it is located immediately adjacent to the River Clodiagh downstream of the Site and occurs within the flood plain of the River Clodiagh.

Hawkswood Bog NHA

This NHA is located approximately 7 km north of the Proposed Scheme. Hawkswood Bog NHA is a site of conservation significance comprising a raised bog, a rare habitat in the E.U. and one that is becoming increasingly scarce and under threat in Ireland. This site supports a good diversity of raised bog microhabitats, including hummocks, lawns and pools. Its southern location adds further interest.

This NHA is within the potential ZoI of the Proposed Scheme as there is uncertainty as to whether it occurs within the flood plain of the River Clodiagh. The CFRAM flood extents for this area are under review at time of writing.

Slieve Bloom Mountains pNHA

This pNHA overlaps with the Slieve Bloom Mountains SPA and SAC, as well as the Slieve Bloom Mountains Ramsar Site. The Slieve Bloom Mountains SPA is designated for the presence of breeding hen harrier (*Circus cyaneus*). The Slieve Bloom Mountains SAC is designated for the presence of three Annex I habitats, namely Northern Atlantic wet heaths with *Erica tetralix* [4010], blanket bogs (* if active bog) [7130] and alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]. This pNHA occurs to the south of the Proposed Scheme.

Pallas Lough pNHA

This site is located 8.6 km northwest of the Proposed Scheme, in a limestone-rich gravel drift over lower limestone, the lake is rich in calcium. The aquatic component of the lake vegetation is rich, with charophytes (*Chara spp.* and *Nitella spp*.) and pondweeds (*Potamogeton spp*.). The area to the north of Clonterlough wood contains great fen-sedge (*Cladium mariscus*), a species very much indicative of wet, calcium-rich, peaty substrates. Marshland and wet grassland on the southern side of the site is used to graze livestock. Significant numbers of wildfowl and waders use the lake. This site was identified as occurring within the potential ZoI of the Proposed Scheme due to the presence of waterbird species.

Raheen Lough pNHA

Raheen Lough lies 10 km north of Mountmellick in Co. Offaly. It is set in pasture grazed by cattle and sheep. The water appears to be clean, supporting the pollution intolerant alternate water-milfoil (*Myriophyllum alterniflorum*). However, its main interest lies in the variety and numbers of wildfowl and waders that it attracts. In this it has a particularly important role because open water bodies are infrequent in the area. The site hosts swans, diving ducks, dabbling ducks, waders and other bird species. The site is of at least local importance on ornithological grounds. This site was identified as occurring within the potential ZoI of the Proposed Scheme due to the presence of waterbird species. This Site is located approximately 15.8 km northeast of the Proposed Scheme.

Clonad Wood pNHA

Clonad Wood is an area of deciduous woodland situated on low-lying agricultural land bordering the Clodiagh River, 5km south of Tullamore in Co. Offaly. The high canopy of the wood is dominated by pedunculate oak (*Quercus robur*) which has been underplanted with beech (*Fagus sylvatica*) and conifers. The understorey also contains a rich diversity of native species including holly (*Ilex aquifolium*), ash (*Fraxinus excelsior*), wych elm (*Ulmus glab*ra), hazel (*Corylus avellana*), spindle (*Eunonymus europaeus*), guelder-rose (*Viburnum opulus*) and field-rose (*Rosa arvensis*). The rare alder buckthorn (*Frangula alnus*) and bird cherry (*Prunus padus*) are found in the woodland, while Irish whitebeam (*Sorbus hibernica*) is also abundant. This pNHA is within the potential ZoI of the Proposed Scheme as it is located immediately adjacent to the River Clodiagh downstream of the Site.

Grand Canal pNHA

The Grand Canal pNHA is located approximately 13.5 km north of the Proposed Scheme area. The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy. The Grand Canal pNHA comprises the canal channel and the banks on either side of it. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species.

The Grand Canal pNHA flows over the River Clodiagh via an aqueduct in the townland of Kilgortin. This pNHA is in the potential ZoI of the Proposed Scheme, as small sections of it (namely terrestrial habitats) occur within the flood plain of the River Clodiagh and River Brosna. Furthermore, the Grand Canal is fed by the River Shannon immediately downstream of the Brosna-Shannon confluence.

Charleville Wood pNHA

Charlesville Wood pNHA is located north and downstream of the Proposed Scheme, with direct hydrological connectivity via the Clodiagh River. This pNHA overlaps with Charleville Wood SAC. Charleville Wood SAC is designated for the Annex I habitat alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0] as well as the Annex II species Desmoulin's whorl snail (*Vertigo moulinsiana).*

9.3.2.3.3 Nature Reserves

The Slieve Bloom Mountains Nature Reserve is located approximately 5 km southwest of the Proposed Scheme (**Figure 9-3**). The location of this nature reserve overlaps with the Slieve Bloom Mountains SAC/SPA/pNHA and Ramsar site.

N

Ferbane Bog pNHA
Grand Canal pNHA
Clara Bog pNHA
Ballyduff Esker pNHA
Ballyduff Wood pNHA
Charleville Wood pNHA
Kilcormac Esker pNHA
Screggan Bog NHA
Clonad Wood pNHA
Pallas Lough pNHA
Hawkswood Bog NHA
Lough Boora pNHA
Annaghmore Lough Fen (Offaly) pNHA
Annaghmore Lough Fen (Offaly) pNHA
Clonaslee EskersAnd Derry Bog pNHA
Lough Coura pNHA
Slieve Bloom Mountains pNHA
Kinnitty (Domestic Dwelling, Occupied) pNHA
Derrykeel Meadows pNHA
Camcor Wood pNHA
Slieve Bloom Mountains pNHA
Delour River Near Lacca Manor pNHA
Clonreher Bog NHA
Ridge of Portlaoise pNHA
The Great Heath Of Portlaoise pNHA
Dunamase Woods pNHA
Rock Of Dunamase pNHA

Ferbane
Rahan
Killina
Tullamore
Moleen
Charleville Castle
Clonaslee
Saint Manman's Cemetery
L1005 Clonaslee St Manman's GAA
Mountbolus
Kilcormac
Ballyboy
Moanmore Bog
Clonygowan
Derryounce Bog
Garryinch Bog
Cush Wood
Mountmellick
Emo
Portlaoise
Cadamstown
Killyon
Coolderry
Mountrath
Coolnamona
Bog Grove

0 6.5 13 Kilometres

Legend

- Nature Reserves
- 20km Buffer
- Proposed Natural Heritage Area (pNHA)
- Natural Heritage Area (NHA)
- Slieve Bloom Mountains Nature Reserve
- Slieve Bloom Mountains Ramsar Site
- 1km Buffer
- Ramsar Sites
- WFD Rivers
- Lower Shannon Catchment (25A)
- Works Area

Data Sources: EPA, NPWS

Client

Laois County Council

Title

T

Figure 9-3 Designated sites relevant to the Proposed Scheme (excluding Natura 2000 sites)

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NOTE:

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9.3.3 Habitats and Flora

Habitats detailed during the field study within the ZoI (as defined in **Table 9-1**) of the Proposed Scheme are illustrated in **Figure 9-4** to **Figure 9-7**, which include the relevant habitat codes from Fossitt (2000).

There are a number of Annex I habitats in the wider landscape surrounding the Proposed Scheme. These are mainly located south of Clonaslee village and include habitat such as dry heath (4030) and wet heath (4010). Blanket bog habitat (7130) is also found in this area and to the east of the Gorragh River. The Annex I habitat closest to the Proposed Scheme area (dry heath habitat) is located c. 1km to the southeast. An active raised bog (7110) is located c. 4 km west of the village and alluvial forests are located c.14 km (by river) downstream of the Proposed Scheme. An Annex I habitat old oak woodlands (91A0) is present c. 1.5 km west of the Proposed Scheme.

9.3.3.1 Habitats

The following sections detail the terrestrial habitats (classified with reference to Fossitt (2000)) recorded as part of field surveys undertaken for the Proposed Scheme. Spatial locations for each habitat type within the surveyed areas are also provided. Detailed species lists are provided for habitats within the footprint of the Proposed Scheme. For ease of reference, treelines and hedgerows have been labelled, with the labels shown in **Figure 9-6** and **Figure 9-7**.

The ecological value of each habitat with reference to NRA guidance (NRA, 2009) is provided in **Table 9-21.**

Habitats identified within the areas surveyed for the Proposed Scheme determined to be of local importance (lower value) (NRA, 2009) were assigned as such due to being either common and widespread habitats or because they are habitats that support low botanical value.

The following descriptions should be read in conjunction with **Figure 9-4** to **Figure 9-7.**

9.3.3.1.1 Grassland

Grassland habitats were common throughout the study area, with some areas modified and managed for agricultural purposes.

GA1 Improved agricultural grassland

Many of the lands intersected by and adjacent to the Proposed Scheme are characterised by fields of improved agricultural grassland (GA1) bounded by hedgerows (WL1) or treelines (WL2). The GA1 habitat was mainly grazed by livestock, primarily cattle but also some sheep and horses.

Throughout the survey area, GA1 vegetation was typically species poor. Bent grass (*Agrostis sp.*), white clover (*Trifolium repens*), docks (*Rumex sp.*), creeping buttercup (*Rannunculus repens*), Yorkshire fog (*Holcus lanatus*) and nettle (*Urtica dioica*) were recorded. The field within Area 3 comprised dock, cock's foot (*Dactylus glomerata*), ragwort (*Jacobaea vulgaris*), creeping buttercup and Yorkshire fog, all of which were occasional. This field was grazed by a horse at the time of survey. The field within Area 2 comprised abundant Yorkshire fog and occasional meadow buttercup (*Ranunculus acris*), ground elder (*Aegopodium podagraria*), red fescue (*Festuca rubra* agg.), cock's foot, false oat grass (*Arrhenatherum elatius*), rye grass (*Lolium* sp.) and creeping buttercup. Hogweed (*Heracleum sphondylium*) was recorded as rare. Detailed survey of the GA1 field within Area 1 was noted undertaken, however the habitat was confirmed as GA1 based on assessment from the field boundary.

GA2 Amenity grassland (Improved)

Amenity grassland habitat was recorded within private gardens and maintained verges throughout the Proposed Scheme. These habitats were maintained and mowed, and detailed species lists were not recorded. Typical species included various grasses, creeping buttercup, dandelion (*Taraxacum vulgaria)*, red clover (*Trifolium pratense)*, white clover, ragwort and docks.

9.3.3.1.2 Woodland, Hedgerow and Scrub

Despite the expansive agricultural patchwork of fields that characterise the Proposed Scheme, areas of woodland were recorded, often as linear landscape elements, but elsewhere, such as the southern side of the village of Clonaslee, as discrete woodland namely Brittas Wood. Across the landscape, semi-mature and

mature trees, largely deciduous, were common throughout, reflecting in places the heritage of larger demesnes and estates.

WD1 (Mixed) broadleaved woodland

The largest area of WD1 recorded within the Proposed Scheme area was Brittas Wood located in Area 1 (**Figure 9-5**). This woodland is located to the south of Clonaslee village. A range of native and non-native woodland species were recorded here. Tree species included beech (*Fagus sylvatica*), downy birch (*Betula pubescens*), sycamore (*Acer pseudoplatanus*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), horse chestnut (*Aesculus hippocastanum*), grey willow (*Salix cinerea*), holly (*Ilex aquifolium*), ash (*Fraxinus excelsior*), English oak (*Quercus robur*) and hazel (*Corylus avellana*). All were recorded as occasional, apart from English oak, which was rare, and ash and hazel which were recorded as frequent.

The ground flora and scrubby understorey was species rich. Ivy (*Hedera helix*) was abundant. Frequently recorded species included bramble (*Rubus fructicosus*), enchanter's nightshade (*Circaea lutetiana*), wood sedge (*Carex sylvatica*) and false brome (*Brachypodium sylvaticum*). Species recorded as occasional included hogweed, herb-Robert (*Geranium robertianum*), hedge woundwort (*Stachys sylvatica*), germander speedwell (*Veronica chamaedrys*), great wood-rush (*Luzula sylvatica*) remote sedge (*Carex remota*), daisy (*Bellis perennis*), ragwort, cock's foot, ribwort plantain (*Plantago lanceolata*), bracken (*Pteridium aquilinum*), nipplewort (*Lapsana communis*), wood avens (*Geum urbanum*), bush vetch (*Vicia sepium*), hedge parsley (*Torilis japonica*), broad-leaved plantain (*Plantago major*), rosebay willowherb (*Chamaenerion angustifolium*), creeping buttercup, gorse (*Ulex sp.)*, red clover, meadowsweet (*Filipendula ulmaria*), selfheal (*Prunella vulgaris*), soft shield fern (*Polystichum setiferum*), lord's-and-ladies (*Arum maculatum*), knapweed (*Centaurea nigra*), violet (*Viola* sp.) creeping bent (*Agrostis stolonifera*), barren strawberry (*Potentilla sterilis*), sanicle (*Sanicula europaea*), hart's tongue fern (*Asplenium scolopendrium*), and ground ivy (*Glechoma hederacea*). Marsh thistle (*Cirsium palustre*), common figwort (*Scrophularia nodosa*), yellow pimpernel (*Lysimachia nemorum*), currant (*Ribes sp.*), common bluebell (*Hyacinthoides non-scripta*), honeysuckle (*Lonicera periclymenum*) and cotoneaster (*Cotoneaster* sp.) were recorded as rare.

A narrow strip of woodland habitat was recorded on the southern side of the access road to the ICW and along the left bank (looking downstream) of the River Clodiagh in Area 3 (**Figure 9-7**). The woodland adjacent to the access road comprised abundant hazel and bramble. Hawthorn, ground ivy, meadowsweet, bush vetch, common sorrel (*Rumex acetosa*) and violet were occasional. A single large beech tree was recorded here. Where this woodland occurred adjacent to the River Clodiagh, it comprised a large number of mature trees. Sycamore, holly and blackthorn were recorded as frequent. Ivy was abundant. Hawthorn, hazel, beech, grey willow and alder (*Alnus glutinosa*) were recorded as occasional. Within the understorey, angelica (*Angelica sylvestris*), ground elder (*Aegopodium podagraria*), dock, nettles, lord's-and-ladies, violet, dandelion, bush vetch and herb-Robert were occasional. Wood avens was rare. The woodland was approximately 5.6 m in width in places, with blackthorn noted spreading out into the field towards the south.

WD5 Scattered trees and parkland

Within Area 3, small patches of WD5 were recorded. These habitats comprised planted trees including ash, Scots pine (*Pinus sylvestris*) and Italian alder (*Alnus cordata*), with mown grass in the understorey (**Figure 9-7**). This habitat was also recorded within the garden of a property within Area 2, where native/ornamental trees (including cider gum (*Eucalyptus gunni*), yew (*Taxus baccata* 'Fastigiata'), Lawson cypress (*Chamaecyparis lawsoniana cv.*), Monterey cypress (*Cupressus macrocarpa*) plum (*Prunus domestica*) and apple (*Malus domestica*)) were planted with mown grass in the understorey.

WL1 Hedgerow

Many of the fields within the ecological study area were bounded by hedgerows. Hedgerows along the public road network showed limited management with cutback likely a few times a year, with hedgerow heights greater than 4 m in areas. Where hedgerows were established as field boundaries within agricultural lands or garden boundaries, they were more intensively managed, usually less than 4 m in height and species poor.

Scrubby vegetation, classified as a hedgerow (WL1), was recorded on the river side of Chapel Street wall in Area 2 (H1). This vegetation had been topped but was growing out. It was approximately 2.5 m in height and 1.2 m in width. Sycamore, ground elder and bramble were recorded as frequent here. Snowberry (*Symphoricarpos albus*), grey willow, bush vetch, hogweed, alder, monbretia (*Crocosmia x crocosmiiflora*), herb-Robert, meadowsweet, ivy-leaved toadflax (*Cymbalaria muralis*) and cleavers (*Galium aparine*) were all recorded as occasional. Rose (*Rosa* sp.), wood horsetail (*Equisetum sylvaticum*) and nipplewort were recorded as rare. A hedge was also recorded on the right bank of the River Clodiagh at this location (H2). Detailed species lists for this hedge were not recorded but sycamore, willow and bramble were noted within it.

Hedges forming garden boundaries were recorded in Area 2 (H3, H4, H5). Sycamore was dominant in hedge H3, with hawthorn occasional and ivy frequent. Nettles, bramble, hogweed, bush vetch and cleavers were recorded as occasional. *Rosa* sp., bindweed (*Convolvulus arvensis*) and spear thistle were recorded as rare. The hedge was managed and boxed to approximately 1.25 m high and 1 m wide. Detailed botanical surveys of hedges H4 and H5 were not undertaken. However, H4 is described in the arborist survey (labelled H137 in tree schedule) as a managed hedge with ivy and dense vegetation throughout, comprising shrubby honeysuckle (*Lonicera* sp.). The hedge is approximately 1.5 m in height with a stem diameter of 1 m. Hedge H5 is described in the arborist survey (labelled H144 in tree schedule) as a managed hedgerow with extensive ivy and dense vegetation, forming a field boundary. Hawthorn is common in this hedge, which is approximately 1.5 m in height with a stem diameter of 1 m.

A hedgerow was recorded along the left bank of the River Clodiagh and northern boundary of the proposed compound within Area 2 (H9). This hedgerow was managed and comprised abundant hawthorn and bramble and frequent rose (*Rosa* sp.). Bindweed, cleavers, bush vetch and nettle were recorded as occasional at the hedgerow field boundary and scrambling throughout the hedgerow. A small, managed privet hedge was recorded at the entrance to the proposed site compound in Area 2.

A hedgerow was also recorded on the roadside and field margins of lands within Area 3 (H7). Bramble was abundant in this hedge, with elder (*Sambucus nigra*), hazel, hawthorn, sycamore, ground ivy and *Rosa* sp. occasional. Damson (*Prunus* sp.) was recorded as rare. This hedge was approximately 4.5 m wide with no obvious management. Bramble and blackthorn were spreading into the field from this hedge.

WL2 Treelines

Treelines were recorded throughout the Proposed Scheme area, many of which comprised mature trees. The banks of the Clodiagh River were lined with mature broadleaved trees in many areas, forming an almost continuous but narrow riparian buffer. This habitat did not correspond to riparian woodland (WN5) or Annex I habitat alluvial forest.

A treeline comprising silver birch (*Betula pendula*) and Italian alder (TL1) was recorded on the left bank of the River Clodiagh, immediately downstream of Clonaslee bridge. The understory comprised colt's foot (*Tussilago farfara*) (frequent), angelica, nettle, nipplewort, meadowsweet, red clover, daisy, fuchsia (*Fuchsia* sp.), rye grass (*Lolium* sp.), ragwort, yarrow, monbretia, Yorkshire fog, dandelion, white clover and herb-Robert which were all recorded as occasional. A treeline with abundant, tall Leylandii (*Cupressocyparis x leylandii*) was recorded on the opposite bank of the River Clodiagh at this location (TL2). Norway maple (*Acer platanoides*), beech and silver birch were recorded as occasional in this treeline. Ground flora on the right bank of the Clodiagh at this location comprised frequent ground elder, occasional monbretia, snowberry, *Clematis* sp., perennial cornflower (*Centaurea montana*), ribwort plantain, bush vetch, lesser knotweed (*Persicaria campanulata*), selfheal, colt's foot, and Yorkshire fog. Marsh thistle was recorded as rare.

Sycamore, beech, elm (*Ulmus* sp.), hazel, holly, blackthorn, elder and ash were all recorded as occasional within the treeline adjacent to agricultural lands in Area 2, on the right bank (looking downstream) of the River Clodiagh (TL3). Within the understorey, ground elder was recorded as frequent and ivy as abundant. Monbretia, brambles, herb-Robert, snowberry, lord's and ladies, cock's foot, meadow buttercup (*Ranunculus acris*), Yorkshire fog, nipplewort, dock, nettles, wild privet (*Ligustrum vulgare*), ribwort plantain, smooth hawk's beard (*Crepis capillaris*), *Brachypodium* sp., hogweed, selfheal, germander speedwell, gorse and bush vetch recorded as occasional. Hedge bindweed (*Calystegia sepium*), *Rosa* sp., *Clematis* sp. and cotoneaster were recorded as rare.

A treeline was also recorded on the left bank (looking downstream) of the River Clodiagh, beginning where the Chapel Street wall ends (TL4). In the southern end of this treeline, sycamore was recorded as abundant. Blackthorn/damson (*Prunus* sp.) was recorded as occasional and elder rare. The understorey comprised Wilson's honeysuckle (*Lonicera nitida*), bush vetch, creeping buttercup, germander speedwell, bindweed, hogweed, cleavers and herb-Robert (all of which were recorded as occasional), as well as ground elder, nettles and hogweed (all frequent). Wood horsetail was recorded as rare. The northern end of this treeline comprised conifers, and Japanese knotweed (*Reynoutria japonica*) was visible on the left bank of the River Clodiagh (see **Section 9.3.3.2.2**).

A treeline was recorded on the right bank of the River Clodiagh in Area 3 (TL8). These trees were recorded growing on the river side of the fence (both palisade and wooden with chain-link recorded) located here. No obvious management was noted. Grey willow and bramble were abundant in this treeline, with occasional gorse, sycamore, goat willow (*Salix caprea*) and alder. The understorey comprised occasional cleavers, bindweed, bush vetch and herb-Robert.

WS1 Scrub

A mosaic of scrub and hedgerow (WS1/WL1) was recorded in Area 2, adjacent to Chapel Street wall and a private garden (**Figure 9-6**). This habitat comprised a mixture of native and ornamental species. Bramble was frequent in this habitat, with ivy abundant. Wilson's honeysuckle, sycamore, periwinkle (*Vinca major*), elder and hawthorn was recorded as occasional. Ash was rare.

9.3.3.1.3 Disturbed and man-made ground

BL1 Stone walls and other stonework & BL3

Stone walls, as well as areas of hardstanding associated with Clonaslee Village (roads, buildings etc.) and a gravel path within Brittas Wood were recorded within the Proposed Scheme area, as shown in **Figure 9-4** to **Figure 9-7**.

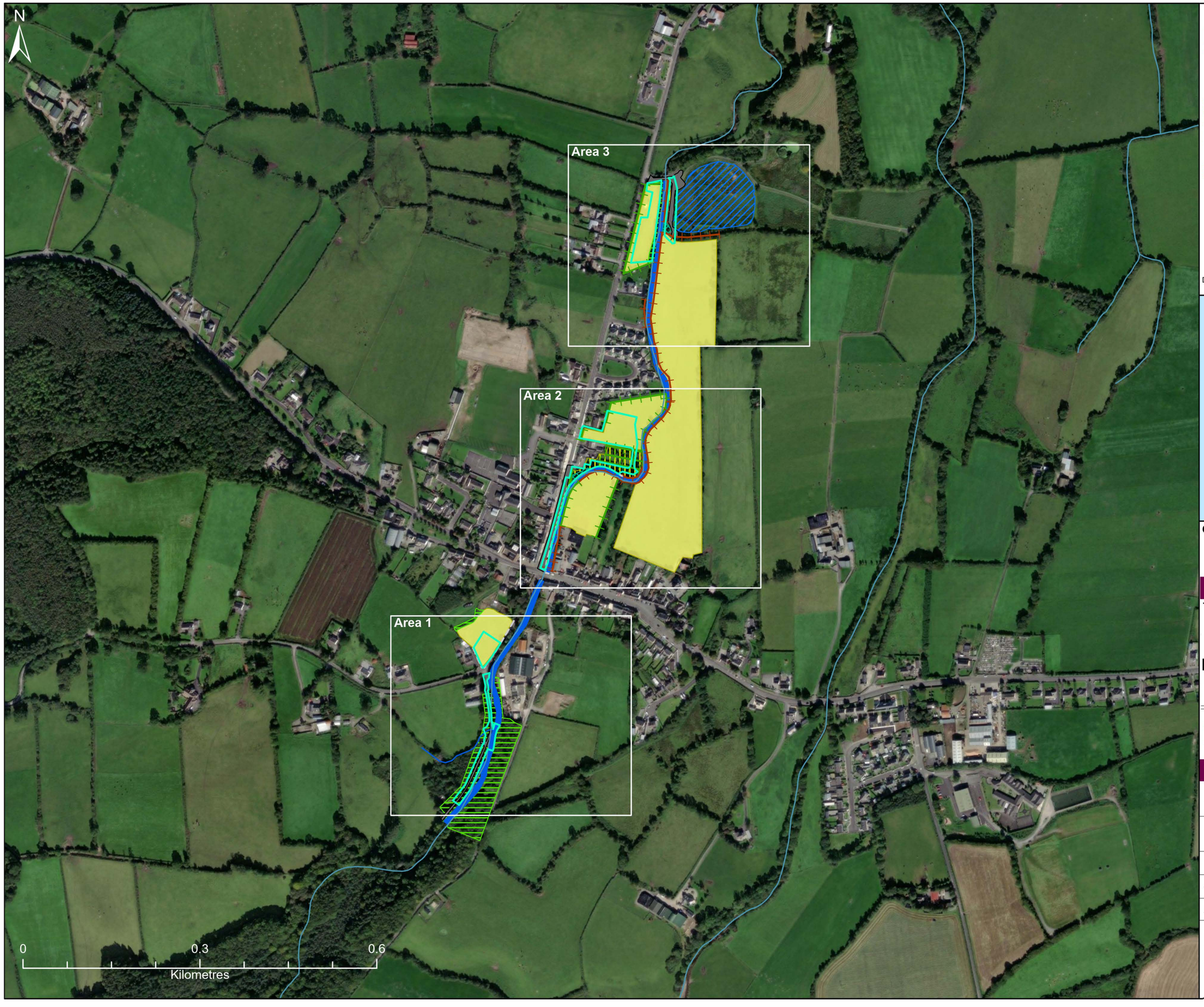
9.3.3.1.4 Aquatic Habitats

FW1 Eroding/upland rivers

The Clodiagh River and Brittas Lake Stream were classified as eroding/upland rivers (FW1). A detailed description of these waterbodies is provided in **Section 9.3.5.2**.

FS1 Reed and large sedge swamps

The constructed wetland in Area 3 was classified as reed and large sedge swamps (FS1). Reed sweet-grass (*Glyceria maxima*), grey willow, and bulrush (*Typha latifolia*) were recorded here.



Legend

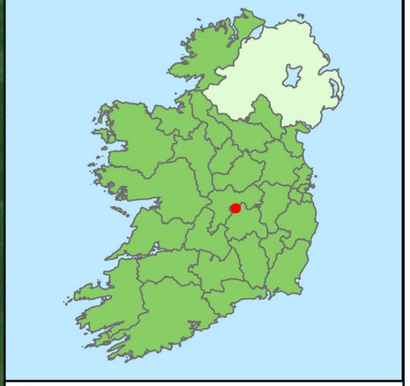
Works Area

Watercourses

Habitats

- BL3 Buildings and artificial surfaces
- FS1 Reed and large sedge swamps
- FW1 Eroding / upland rivers
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- WD1 (Mixed) broadleaved woodland
- WD5 Scattered trees and parkland
- WL1/WS1 Hedgrows / Scrub
- BL1 Stone walls and other stonework
- FW1 Eroding / upland rivers
- WL1 Hedgerows
- WL2 Treelines

Data Sources: EPA



Client

Laois County Council

Clonaslee FRS

Title

Figure 9-4
Habitats mapped within the Proposed Scheme study area Overview

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S1	P04	

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Legend

- Works Area
- Watercourses

Habitats

- BL3 Buildings and artificial surfaces
- FW1 Eroding / upland rivers
- GA1 Improved agricultural grassland
- WD1 (Mixed) broadleaved woodland
- BL1 Stone walls and other stonework
- FW1 Eroding / upland rivers

Data Sources: EPA

Client

Laois County Council

Clonaslee FRS

Title

Figure 9-5
Habitats mapped within the Proposed Scheme study area Area 1

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Issue Details

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MDW0867-RPS-AP-XX-R-EN-0905

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Legend

- Works Area
- Watercourses

Habitats

- BL3 Buildings and artificial surfaces
- FW1 Eroding / upland rivers
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- WD5 Scattered trees and parkland
- WL1/WS1 Hedgrows / Scrub
- BL1 Stone walls and other stonework
- WL1 Hedgerows
- WL2 Treelines

Data Sources: EPA

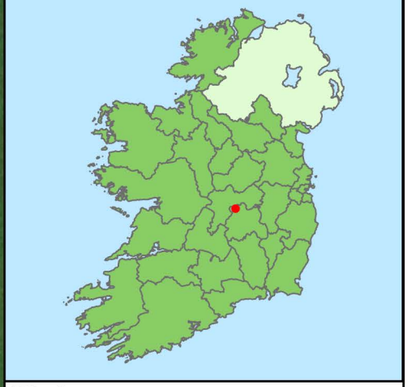

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Figure 9-6
Habitats mapped within the Proposed Scheme study area Area 2

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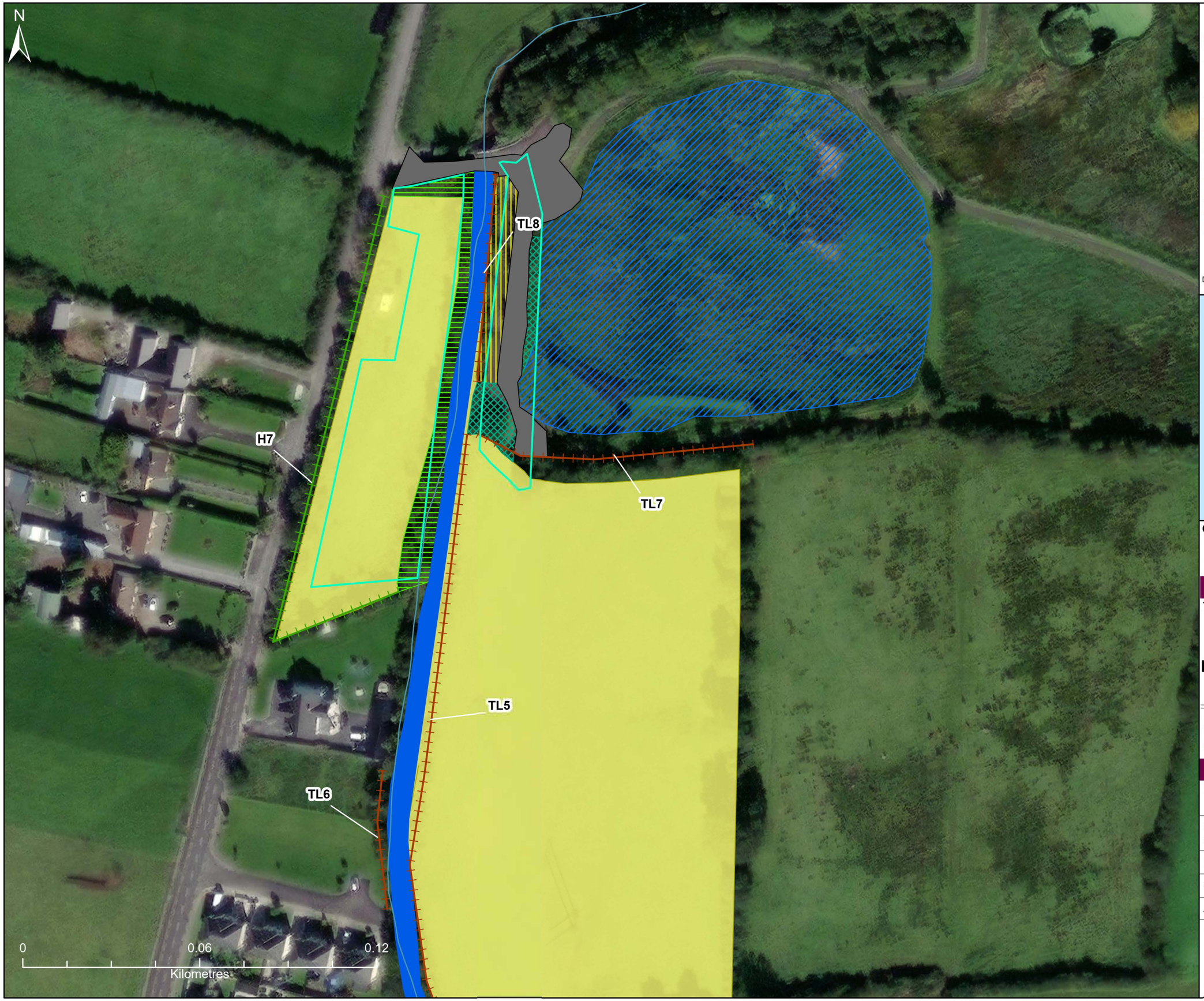

Legend

- Works Area
- Watercourses

Habitats

- BL3 Buildings and artificial surfaces
- FS1 Reed and large sedge swamps
- FW1 Eroding / upland rivers
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- WD1 (Mixed) broadleaved woodland
- WD5 Scattered trees and parkland
- WL1 Hedgerows
- WL2 Treelines

Data Sources: EPA

Client

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Clonaslee FRS

Title

Figure 9-7
Habitats mapped within the Proposed Scheme study area Area 3

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9.3.3.2 Flora

9.3.3.2.1 Protected Flora

No protected flora (i.e., Flora Protection Order and Annex II species protected under the Habitats Directive) or flora species of conservation concern (i.e. red lists for vascular plants and bryophytes), were noted during the field studies. There are NBDC records for Irish whitebeam (*Sorbus hibernica*) and large white-moss (*Leucobryum glaucum*) within the 5 km desk study area, both recorded in January 2014. Large white-moss is listed on Annex IV of the Habitat Directive. This species records are from outside the Proposed Scheme area to the west and northwest. There are no records for protected flora within Clonaslee on the Flora (Protection) Order 2022 Map Viewer[7].

9.3.3.2.2 Invasive Alien Plant Species

A search of the NBDC database returned records indicating one scheduled invasive alien plant species – Indian balsam (*Impatiens glandulifera*). However, no sightings of Indian balsam were recorded during the site visits. Refer to **Appendix 9.2** for summary on IAPS returned as part of the desk study.

During the field surveys Japanese knotweed (*Reynoutria japonica*), and hybrid knotweed (*R. x bohemica*) were recorded within Area 2 of the Proposed Scheme.

Japanese knotweed was recorded along the Clodiagh River during the field surveys carried out between April 2021 and September 2023. Three stands in close proximity to each other were recorded in 2021 and 2023, and one additional stand was identified during the 2023 survey. **Table 9-13** provides a description and location for the IAPS found on site during the field surveys. A map showing the location of these stands in provided in **Figure 9-8**. Note the IAPS recorded in the 2021 and 2023 surveys are located in the same vicinity of Area 2, however, **Table 9-13** provides descriptions for each survey date and highlights the location of stands as well as any temporal changes in their extent.

The first stand is located downstream of Clonaslee bridge on the left bank of the Clodiagh River (53.15029, -7.52392) (JK01 and JK03 in **Table 9-13**). A small stand is located directly opposite this (JK04). Two more stands of knotweed are located on the left bank and right bank further downstream from this area (53.150173, -7.522841) (JK02 and JK05). These stands were approximately 5 m in length and 1 m in width with old canes as well as new growth visible.

It should be noted that during a resurvey of the Japanese knotweed stands in September 2021, hybrid knotweed, as well as Japanese knotweed, was identified in the larger stand on the right bank of the Clodiagh River (HK01: 53.150388, -7.522849). The leaves on the hybrid plant were primarily that of Japanese knotweed, however, a number of leaves had a more cordate base than would be expected from Japanese knotweed. This plant was therefore recorded as hybrid knotweed. Many knotweed species (i.e., Japanese knotweed, Himalayan knotweed, giant knotweed and hybrid knotweed) are classified as being at risk of causing high impact and are listed under the Third Schedule of the Habitats Regulations and subject to strict controls under Regulation 49.

An individual Japanese knotweed plant was observed outside of the red line boundary, but between Areas 2 and 3 during the otter survey undertaken on the 6th June 2024. During the same survey, an individual Japanese knotweed plant was observed growing within a debris dam downstream of Area 3 (**Table 9-13**). These new plants are assumed to be spreading from the large stands located upstream, within the Scheme Area.

[7] Available at: https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=a41ef4e10227499d8de17a8abe42bd1e [Accessed: October 2024].

Table 9-13: Third Schedule Invasive Alien Plant Species (IAPS) recorded during field surveys (2021 – 2024) in Area 2 of the Proposed Scheme

Stand Code	Description	Location (GPS)	Survey Year
Japanese knotweed – JK01	Japanese Knotweed was recorded on the left-hand side of the Clodiagh River. The first stand is downstream of Clonaslee bridge on the left bank of the river. It is 10 m in length and 1 m in width with old canes as well as new growth present. This stand was located directly on the riverbank near a wall within the back garden of a residential property. Surveyors could not get full access to this stand however, all leaves looked like Japanese knotweed from a distance, and so this stand was identified as Japanese knotweed.	53.15029, -7.52392	2021
JK02	The second and third stands are located on the left and right bank respectively, located approx. 300 m downstream of Clonaslee bridge. These stands were approximately 5 m long, and 1 m wide, and were situated on the riverbank. As with JK01, the surveyors could not get full access to the stands, but all leaves looked like Japanese knotweed from a distance, therefore these stands were identified as Japanese knotweed.	53.150173, -7.522841	2021
Hybrid knotweed - HK01	This stand was located on the right-hand bank of the Clodiagh river, within the same location as the knotweed identified on the right bank at JK02. The majority of leaves within this stand were typical Japanese knotweed shaped leaves however, a number were more typical of hybrid knotweed, having a more cordate base than Japanese knotweed. This stand was therefore identified as hybrid knotweed. This stand was 16 m long and 5 m wide with 2-3 cm thick stems. This stand stretched the entire way from the top of the riverbank down to the wetted width of the watercourse. This stand has been managed by the landowner during the course of hedgerow management. Additionally, a number of individual, small shoots were also visible encroaching into the neighbouring agricultural parcel.	53.150388, -7.522849	2021
JK03	The first stand recorded in 2023 surveys were located downstream of Clonaslee bridge on the left bank of the river. Standing at 12 m long, 1 m wide with old canes as well as new growth present. It is evident that the JK has started growing under the wall in places. Boulders and tarpaulin have been used to stunt growth. Homeowner advised they treated the infestation with roundup. There were some stands on the wall that looked like they had been cut in the past.	53.150353, -7.523898 to 53.150365, -7.523734 (Start to end)	2023
JK04	The second stand recorded during the survey in 2023 was located on the right bank of the river across from JK03. This stand appears to be covered with tarpaulin however, fresh shoots were observed (c. 50 cm high) growing around edges.	53.150342, -7.523794 to 53.150365, -7.523834 (Start to end)	2023
JK05	JK was observed from a distance on the left and right banks of the River Clodiagh along the bankside of the neighbour's garden. Due to accessibility, surveyors could only note JK growing here and were unable to collect enough data to provide an extent of the stands.	53.150388, -7.522849	2023
Individual	Individual plant noted on left bank.	53.151743, -7.522195	2024
Individual	Individual plant noted growing within debris dam in channel.	53.1552769, -7.520739	2024

N

0 0.2 0.4
Kilometres

Legend

- Japanese Knotweed Points 2024
- Japanese knotweed
- Works Area
- Japanese and hybrid knotweed

Data Sources: Tailte Éireann

Client

Laois County Council

Clonaslee FRS

Title

Figure 9-8 Invasive Alien Plant Species recorded during field surveys 2021-2024

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9.3.4 Fauna

A search of the NBDC databases was conducted for records of any rare or protected species within the last 20 years and within 5 km of the study area. NPWS records were also reviewed for information on the presence of protected species within the study area. Refer to **Appendix 9.2** for the table of terrestrial species records returned from the desk study.

9.3.4.1 Bats

9.3.4.1.1 Desk Study

The bat habitat suitability index for Proposed Scheme area was identified using the NBDC Biodiversity Maps tool[8]. The Proposed Scheme area has a suitability index of 33.67 for all bat species combined (**Table 9-14**).

Table 9-14: Suitability index for different bat species (as per Lundy *et al.,* 2011).

Species	Bat Suitability Index
Soprano pipistrelle (*Pipistrellus pygmaeus*)	46
Brown long-eared (*Plecotus auratus*)	41
Common pipistrelle (*Pipistrellus pipistrellus*)	52
Lesser horseshoe bat (*Rhinolophus hipposideros*)	2
Lesser noctule (*Nyctalus leisleri*)	45
Whiskered bat (*Myotis mystacinus*)	36
Daubenton's bat (*Myotis daubentonii)*	34
Nathusius's pipistrelle (*Pipistrellus nathusii*)	2
Natter's bat (*Myotis nattereri*)	45
All Bats	33.67

The desk study returned the following Annex IV bat species: one record of Daubenton's bat (*Myotis daubentonii*) and brown long-eared bat (*Plecotus auritus*), 15 records of lesser noctule (also known as Leisler's bat) (*Nyctalus leisleri*), 22 records of common pipistrelle (*Pipistrellus pipistrellus*), and 13 records of soprano pipistrelle (*Pipistrellus pygmaeus*) (as detailed in Table 4 in **Appendix 9.2**). Based on **Table 9-14**, the highest suitability index scores were recorded for common pipistrelle and soprano pipistrelle, which had a moderate landscape and habitat suitability index score.

9.3.4.1.2 Field Survey

Commuting and foraging habitat

The lands within and surrounding the Proposed Scheme provide a diverse range of habitats for bats with rivers, woodland, treelines, hedgerows, urban green spaces, and open agricultural fields present. The treelines/hedgerows and river corridor along with the surrounding landscape provided ideal bat foraging and commuting habitat. The linear corridor formed by the river and continuous riparian treeline connects this habitat into the wider landscape and it likely to be a significant ecological corridor for bat species.

Preliminary roost assessment

Potential roosting habitat for bats was observed within a 50 m survey corridor of the Proposed Scheme during the high-level walkover survey undertaken within the Scheme area in 2021. Trees and bridges were inspected for potential features that may support roosting or foraging bats. Although no specific bat roosting features were identified during the survey some trees were noted to support low to moderate suitability for roosting bats. Classifications were largely a precautionary measure due to heavy ivy coverage and difficulty to adequately assess features due to the obscurity caused by the ivy. The two bridges at Clonaslee town were not deemed to support bat potential.

[8] https://maps.biodiversityireland.ie/Map

On the 19th July 2023, a ground-based roost assessment was carried out to update the baseline. Eight trees and one stonewall were identified as having low bat suitability within the footprint of the Proposed Scheme. The bridge at Clonaslee town was not deemed to support roosting bats.

A ground-based roost assessment was undertaken on the 6th June 2024 and 24th July 2024 on trees identified through arboricultural assessment as requiring or potentially requiring removal as part of the Proposed Scheme. The survey was undertaken with reference to Collins (2023). A total of 60 no. trees were surveyed. Of these trees, two were considered to potentially support multiple bats (PRF-M), three were considered to potentially support individual bats (PRF-I), and 55 were considered to have no features suitable to support roosting bats. Detailed survey results are presented in **Appendix 9.5**.

Detailed Inspection of PRF-M

One tree (tree number 16) was deemed suitable for detailed inspection with an endoscope as the PRF-M identified was located at ground level within a cavity created by rot. This feature was inspected with an endoscope on the 24th June 2024 under licence (DER/BAT 2024-19). No bats or evidence of bats were identified within the cavity. In addition, the detailed inspection revealed the feature to be unsuitable to support bats, as the cavity did not extend into the tree trunk. The feature was downgraded to “none” (i.e., no suitability to support bats).

Emergence Survey of PRF-M

Three separate emergence surveys of a PRF-M on tree number 8, namely a crack within a bough, were undertaken during summer 2024. The surveys did not identify any bats emerging from the feature. Still images of the views from both vantage points are shown in **Figure 9-9** and **Figure 9-10**. Whereas no bats were recorded emerging from the feature during any of the surveys undertaken, bat activity within the general area was noted during the survey. A summary of general bat activity noted during each survey is provided below.

24th June 2024

Common pipistrelle and soprano pipistrelle were recorded commuting within the area from the north to the south. The first bat recording was made at 21:45, where a common pipistrelle was heard (but not seen). From approximately 22:09, almost constant foraging activity by common pipistrelle and soprano pipistrelle was observed, with a lot of foraging activity occurring below the tree. *Myotis* sp. was also recorded on three occasions from vantage point 2. Twice this species was heard but not seen, and once it was observed commuting.

24th July 2024

Common pipistrelle and soprano pipistrelle were recorded commuting and foraging within the area. The first bat recording was made early during the survey at 21:17 (common pipistrelle - heard not seen). The fact that this individual was recorded so early during the survey suggests that a roost is nearby. The individual was not observed emerging from the tree, however. From approximately 21:38, almost constant foraging activity by common pipistrelle was observed, with some soprano pipistrelle recorded also. *Myotis* sp. was also recorded on a number of occasions from both vantage points.

20th August 2024

The first bat recording was made early during the survey at 21:00 (common pipistrelle - heard not seen). The fact that this individual was recorded so early during the survey suggests that a roost is nearby. No bats were observed emerging from the tree, however. A significant amount of bat activity, mostly foraging, was observed during the survey. A number of different species were recorded including common pipistrelle, soprano pipistrelle, *Myotis* sp. and Leisler's bat. At one point during the survey, a *Myotis* sp. individual was observed landing on the underside of the branch before quickly flying away again. Towards the end of the survey, several bats were observed flying around the feature, and appeared to approach it several times without entering it.

Figure 9-9: Still image of the view of the PRF-M on tree number 8 from vantage point 1, from survey undertaken on the 24th June 2024.

Figure 9-10: Still image of the view of the PRF-M on tree number 8 from vantage point 2, from survey undertaken on the 24th June 2024.

Bat Activity (Static)

Passive monitors were deployed along the main channel of the Clodiagh River in Clonaslee in 2021 and 2023. The static detectors were deployed at three different locations within the ecological study area, as shown in **Figure 9-11**. As noted previously, the data collected from ST1 in September 2021 were lost and data collected from ST3 in 2023 were not analysed due to high levels of audible static. Therefore, data were collected from a total of 13 nights in 2021 and 18 nights in 2023 (**Table 9-15**).

Table 9-15: Number of nights where deployed static detectors recorded bat activity at each static detector in the years 2021 and 2023.

Detector Code	July	August	September	Total Nights Deployed
2021				
ST1	7	-	-	7
ST2	-	6	-	6
2023				
ST4	13	2	3	18

Following the analysis, six bat species, namely common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat, whiskered bat (*Myotis mystacinus*) and brown long-eared bat and two species groups (*Myotis* and *Pipistrellus*) were identified on the recordings. It is highly likely that the *Pipistrellus* spp. recorded are either soprano pipistrelle or common pipistrelle.

Common pipistrelle and soprano pipistrelle were the most commonly recorded species in both 2021 and 2023 (**Table 9-16** and **Table 9-17**). The *Myotis* species group was recorded most frequently on ST1 in July 2021, where it accounted for 19% of all passes. On other survey occasions this species was less common. Passes of Leisler's bat, whiskered bat, Daubenton's bat and brown long-eared bat were relatively low during all surveys undertaken in both 2021 and 2023.

Table 9-16: Static bat activity survey results for ST1 and ST2 in 2021.

Bat Species	Number of Passes	% of total passes	Number of Passes	% of total passes
	ST1		ST2	
	12/07/2021 – 19/07/2021		03/08/2021 – 09/08/2021	
Pipistrellus pygmaeus (Soprano Pipistrelle)	202	40.8	479	45.6
Pipistrellus pipistrellus (Common Pipistrelle)	180	36.4	387	36.9
Myotis (Myotis species group)	94	19.0	62	5.9
*Pipistrellus (*Pipistrelle)	14	2.8	107	10.2
Nyctalus leisleri (Leisler's Bat)	2	0.4	15	1.4
Myotis mystacinus (Whiskered Bat)	2	0.4	-	-
Myotis daubentonii (Daubenton's Bat)	1	0.2	-	-
Total	495	100	1050	100

Table 9-17: Static bat activity survey results for ST4 in 2023.

Bat Species	Number of Passes	% of total passes	Number of Passes	% of total passes
	19/07/2023 – 03/08/2023		18/09/2023 – 21/09/2023	
Pipistrellus pipistrellus (Common Pipistrelle)	1316	50.6	74	19.3
Pipistrellus pygmaeus (Soprano Pipistrelle)	650	25.0	303	78.9
*Pipistrellus (*Pipistrelle species group)	462	17.8	3	0.8
Myotis (Myotis)	157	6.0	3	0.8
Nyctalus leisleri (Leisler's Bat)	14	0.5	-	-
Myotis mystacinus (Whiskered Bat)	1	0.0	-	-
Plecotus auritus (Brown Long-Eared Bat)	0	0.0	1	0.3
Total	2600	100	384	100

N

ST4

ST2

Slieve Bloom Mountains SPA

ST1 & ST3

0 0.2 0.4
Kilometres

Legend

- Bat Static Detector Locations
- Watercourses
- Special Protection Area (SPA)
- Works Area

Data Sources: EPA

Client

Laois County Council

Clonaslee FRS

Title

Figure 9-11 Location of static bat detectors

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9.3.4.2 Otter

9.3.4.2.1 Desk Study

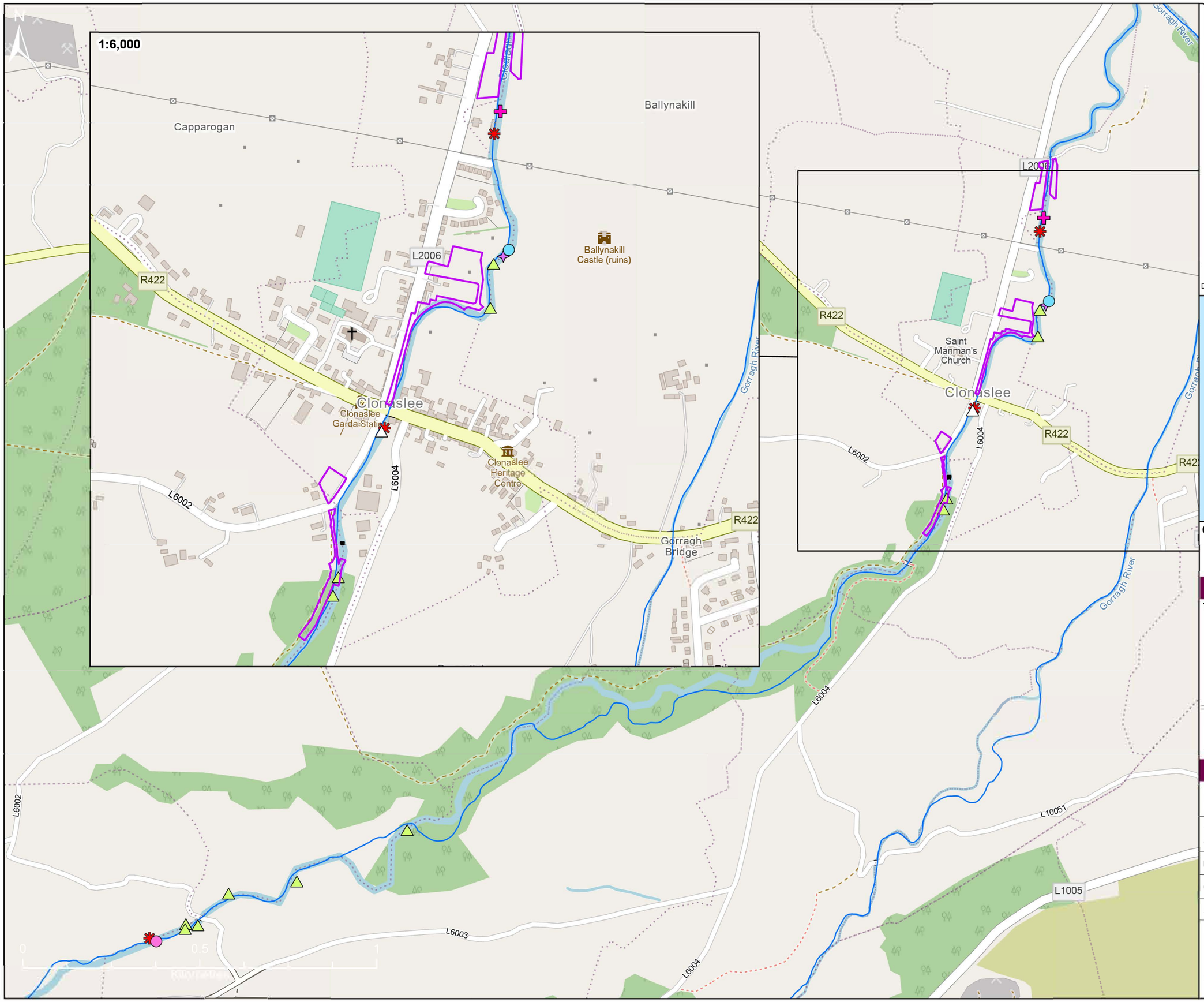
The NBDC search did not identify otter records within the last 20 years. Refer to **Appendix 9.2** for details on terrestrial mammal species returned from the desk study.

9.3.4.2.2 Field Survey

During general walkover surveys undertaken in April 2021, otter prints were observed along several sandy exposed banks downstream of Clonaslee bridge in the River Clodiagh. The exact location of these prints was not recorded. A spraint was recorded on a boulder approximately 200 m downstream of Clonaslee bridge. During the dedicated otter surveys undertaken in August and October 2021, otter spraints, potential resting places (couches and a holt) and potential slides were recorded. The recorded locations of these signs are shown in **Figure 9-12**. Fish bones and scales, as well as crayfish remains were noted within the spraints observed. A potential holt was found within a stone bank-reinforcement structure on the right bank of the River Clodiagh, just downstream of Area 1. The “potential resting site” identified comprised a hollow in a tree, however it was noted as being inactive at the time and likely to be inundated during high flows. The potential couch identified just upstream of Clonaslee bridge comprised an undercut tree.

The Proposed Scheme area was resurveyed in August 2023, following refinement of the Scheme design. No evidence of otter was observed during this survey.

The Proposed Scheme area was surveyed again in June 2024. A single spraint was recorded on a boulder just upstream of the proposed debris trap within Area 1 (53.146156, -7.52647). Fish bones were noted in the spraint. No other signs were identified. The stone bank-reinforcement structure on the right bank of the River Clodiagh, just downstream of Area 1 was checked for signs of otter. This structure did contain various crevices that could be used by otter, as noted in surveys undertaken in 2021, but no clear signs of use (e.g., claw marks, footprints, worn paths) were noted. Furthermore, some of the crevices are likely to be inundated during high flows. Otter were not considered to be using this feature for holting or resting at the time of survey.



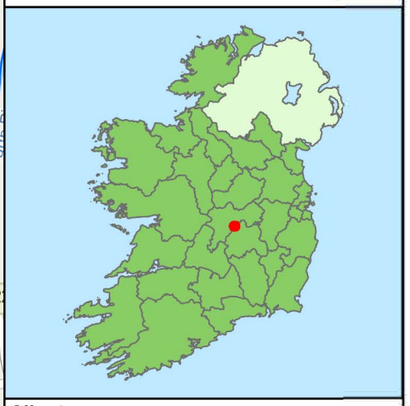
Legend

- Works Area
- Watercourses

Otter Signs

- Potential holt
- Potential resting site
- Potential slide
- Potential slide / Fox trail
- Slide, Spraint & Jelly
- Spraint
- Spraint and possible couch
- Trails

Data Sources: EPA



Client

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Title

Figure 9-12 Otter signs recorded during field surveys in 2021

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9.3.4.3 Badger

9.3.4.3.1 Desk Study

The desk study returned 37 records of badger (as detailed in **Appendix 9.2**). However, these records are old (most recent being from December 2016). Badgers are widespread nationally, and are generally associated with mosaics of pasture, woodland, scrub or hedgerow. They also utilise urban areas, where foraging habitat is available, and disturbance is minimal. The desk study indicates badger may be present within Brittas Wood.

9.3.4.3.2 Field Survey

Although evidence of mammals was noted within the study area (e.g. trails), evidence of badger was not found within 50 m of the Proposed Scheme. No prints, setts, latrines, or snuffle holes were found during any of the surveys undertaken.

9.3.4.4 Other non-volant mammals

9.3.4.4.1 Desk Study

The desk study returned records of pygmy shrew, red squirrel, pine marten and hedgehog within a 5 km radius of the Proposed Scheme. The most recent record was of hedgehog, which was recorded in January 2022. Species identified as part of the desk study are listed in **Appendix 9.2**.

9.3.4.4.2 Field Survey

During the badger survey, evidence of pine marten (scat) was found near the bridge northwest of Scarroon (53.135030, -7.560650), in a location that is no longer part of the Scheme Area, along with evidence and sightings of deer near Brittas Wood.

9.3.4.5 Ornithology

9.3.4.5.1 Desk Study

The search for bird species' records from NBDC within the Proposed Scheme desk study area returned a total of 96 bird species. Of these records 20 were classified as red-listed within the Birds of Conservation Concern in Ireland (BoCCI) 2020-2026 (Gilbert, et al., 2021). Twenty-seven were classified as amber-listed species within the BoCCI 2020-2026. Seven species are listed under Annex I of the EU Bird's Directive (2009/147/EC). Records of hen harrier were returned for the desk study area. Hen harrier is an SCI species of Slieve Bloom Mountains SPA, a portion of which falls within the red line boundary of the Proposed Scheme Area. Species identified as part of the desk study are listed in **Appendix 9.2**.

9.3.4.5.2 Field Survey

The semi-natural habitats surrounding the Proposed Scheme (e.g., the River Clodiagh, treelines, hedgerows, and broadleaved woodland habitat, riparian habitats) provide feeding and nesting habitat for breeding birds. **Table 9-19** provides an overview of bird species encountered during field surveys undertaken between 2021 – 2024. Three birds associated with river habitat were identified during field surveys, namely grey wagtail (*Motacilla cinerea*), dipper (*Cinclus cinclus*) and kingfisher (*Alcedo atthis*).

Grey wagtail breed mainly along streams and rivers, frequently building nests under bridges. A grey wagtail was noted upstream of the Proposed Scheme area near Scarroon during surveys undertaken in August 2021. Grey wagtail have red-list status on the most recent BOCCI list (Gilbert, et al., 2021).

Dipper is a bird associated with rivers and they feed on aquatic macroinvertebrates. They are associated with good water quality and healthy river ecosystems. The Clodiagh River, which has high ecological status (Q 4-5) provides ideal feeding habitat. Dipper nests are traditionally located in a natural crevice in a stream-side cave or waterfall, although the birds readily take to cracks in man-made alternatives such as bridges, walls, weirs, and culverts. The underside of the Clodiagh bridge was inspected for dipper nests but none

were observed. Two dipper were observed foraging along the river during the otter survey carried out in October 2021 and one dipper was observed foraging and resting on an instream boulder during the aquatic survey carried out in August 2023.

Kingfisher is another bird associated with rivers, feeding on small fish. It is also an Annex I bird species. The nearest SPA for which Kingfisher is designated is the River Nore SPA, located 18 km south of the Clonaslee village. The Clodiagh river provides kingfisher feeding habitat with abundant overhanging tree branches providing perches for fishing. Kingfishers breed in tunnels dug in vertical banks along streams and rivers. The birds typically choose a vertical bank clear of vegetation, since this provides a reasonable degree of protection from predators. In August 2021, a kingfisher was observed flying up and downstream a section of the River Clodiagh (53.15139, -7.52197) adjacent to the Proposed Scheme area. An exposed sediment bank was identified nearby on the right bank, however no nesting holes were identified. The kingfisher habitat appraisal undertaken in August 2023 did not identify suitable kingfisher breeding habitat along the River Clodiagh within the Proposed Scheme area. The banks comprised mainly treelines, vegetated banks, or banks reinforced with stone. The entire length of the River Clodiagh within the Proposed Scheme area was walked on the 6th June 2024. Four discrete locations with suitable kingfisher nesting habitat were identified during this survey, as described in **Table 9-18**. Whereas suitable kingfisher nesting habitat was identified, no kingfisher or kingfisher nest holes were noted during the course of the survey.

Table 9-18: Kingfisher nesting habitat identified during walkover survey in 2024.

Number	Nesting Habitat Description	Location relative to Scheme	Lat	Long
1	Located on right bank - 1.2 m high and 6 m wide, exposed earth and roots. Possible kingfisher habitat. Two holes noted but assumed to be from a rat, due to absence of bird droppings and location among tree roots. No obvious kingfisher nest holes observed. Bank is eroding.	Adjacent to Area 2, on bank opposite works area.	53.15018	-7.52306
2	Located on right bank – 1 m high, 2 m wide. No nest holes. Some overhanging vegetation.	Adjacent to Area 2, on bank opposite works area.	53.15021	-7.52263
3	Suitable kingfisher habitat. Located on left bank - approximately 2.2 m high and 17 m wide. Sandy material, bank is vertical with overhanging brambles, but exposed areas with no/sparse overhanging vegetation present. No nest holes observed, but brambles obscured view in places. Located between 53.153355, -7.522387 and 53.153450, -7.522333	Immediately upstream (c. 5 m) of Area 3, on same side of river channel as works.	53.15336	-7.52239
4	Located on right bank adjacent to ICW. Approximately 1.5 m high, 1.5 m wide. Clayey material with some overhanging vegetation. No nest holes	Adjacent to Area 3, on same side of river channel as works.	53.15472	-7.52202

Table 9-19: Incidental observations of bird species recorded during site visits 2021-2023.

Species	Scientific Name	BOCCI Status	Note
Rooks	*Corvus frugilegus*	Green	Rookery present along the left bank of the Clodiagh just upstream of Clonaslee bridge
Buzzard	*Buteo buteo*	Green	Calling overhead near Clodiagh River
Blackcap	*Sylvia atricapilla*	Green	Singing in vegetation along Clodiagh River
Dipper	*Cinclus cinclus*	Green	Feeding along the Clodiagh River
Goldcrest	*Regulus regulus*	Amber	Singing in vegetation along Clodiagh River
Chiffchaff	*Phylloscopus collybita*	Green	Singing in vegetation along Clodiagh and Gorragh River
Swallow	*Hirundo rustica*	Amber	In flight over field at entrance to Britta's wood
Wren	*Troglodytes troglodytes*	Green	Singing in vegetation along Clodiagh and Gorragh River

Species	Scientific Name	BOCCI Status	Note
Blackbird	*Turdus merula*	Green	Singing in vegetation along Gorragh River
Great tit	*Parus major*	Green	Singing in vegetation along Gorragh River
Coal tit	*Periparus ater*	Green	Singing in vegetation along Gorragh River
Woodpigeon	*Columba palumbus*	Green	In flight
Kingfisher	*Alcedo atthis*	Amber	Flying up and down section of river, downstream of Clonaslee bridge
Grey wagtail	*Motacilla cinerea*	Red	Upstream of Proposed Scheme area, at bridge near Scarroon
Pied Wagtail	*Motacilla alba yarrellii*	Green	In flight along Clodiagh River and perching briefly on instream boulder
Sparrow hawk	*Accipiter nisus*	Green	Observed in Brittas Wood during bat emergence surveys in 2024.

9.3.4.6 Invasive Alien Animal Species (IAAS)

9.3.4.6.1 Desk Study

Several records of Third Schedule invasive animal species, namely wild boar (*Sus scrofa*), American mink (*Mustela vison*), grey squirrel (*Sciurus carolinensis*) and fallow deer (*Dama dama*) were returned in the NBDC desk study search. **Appendix 9.2** provides a summary of the IAAS returned from the desk study.

9.3.4.6.2 Field Survey

Signs of deer and possibly mink (*Neovison vison*) were recorded during the site visits. Mink signs were observed upstream of the Proposed Scheme area near Scarroon in 2021. Deer signs were noted in Brittas Wood in 2021.

9.3.4.7 Amphibians and Reptiles

9.3.4.7.1 Desk Study

Five records of common frog (*Rana temporaria*) and one record of smooth newt (*Lissotriton vulgaris*) were recorded within the 5 km NBDC search radius. **Appendix 9.2** provides a summary of these records.

9.3.4.7.2 Field Survey

No incidental records of amphibians or reptiles were made during field surveys.

9.3.4.8 Terrestrial Invertebrates

9.3.4.8.1 Desk Study

Records for four vulnerable (marsh fritillary (*Euphydryas aurinia*), Geyer's whorl snail (*Vertigo geyeri*), marsh whorl snail (*Vertigo antivertigo*), smooth grass snail (*Vallonia pulchella*)) and four near threatened (dingy skipper (*Erynnis tages*), small heath (*Coenonympha pamphilus*), common whorl snail (*Vertigo pygmaea*), striated whorl snail (*Vertigo substriata*)) terrestrial invertebrate species were returned within the 5 km NBDC search radius. Further interrogation of the online NBDC Biodiversity Maps tool revealed that these records were typically from Clonaslee Eskers And Derry Bog pNHA to the west, or in habitats to the south of Clonaslee village (e.g., Slieve Bloom mountains). None of these invertebrate records intersected within the Proposed Scheme area.

9.3.4.8.2 Field Survey

No incidental records of rare or protected terrestrial invertebrates were made during field surveys.

9.3.5 Aquatic Environment

9.3.5.1 Desk Study

9.3.5.1.1 Overview

There are two rivers within Clonaslee village, the River Clodiagh and the River Gorragh. Both rivers are located within the Lower Shannon WFD catchment. The Proposed Scheme provides for flood protection from the River Clodiagh. The River Clodiagh rises in the Slieve Bloom Mountains near the border of counties Laois and Offaly. At the location of the Proposed Scheme, the Clodiagh is a 2nd order river. It flows in a predominantly northerly direction before merging with the Tullamore River. From this point, it flows northwest and joins the River Brosna southwest of Clara. The Brosna then flows southwest and merges with the River Shannon near Shannon Harbour at the border of counties Offaly and Galway. The River Clodiagh at and upstream of the Proposed Scheme is underlain by a locally important aquifer, a regionally important aquifer and a poor aquifer. The catchment at and upstream of the Proposed Scheme comprises a mixture of poorly draining mineral soil, well-draining mineral soil, peat, alluvium as well as made ground in the town of Clonaslee. The River Clodiagh downstream of the Proposed Scheme is part of the OPW Arterial Drainage Schemes (ADS). The OPW is therefore required to maintain this section of the river under sections 37 and 38 of the Arterial Drainage Act, 1945 (as amended).

The Gorragh River is a 2nd order river, located approximately 520 m to the east of the River Clodiagh within Clonaslee village. The Gorragh River flows in a northerly direction before its confluence with the Clodiagh River, approximately 1.5 km north of Clonaslee village.

9.3.5.1.2 EPA Biological Water Quality Review

The WFD is enforced in Ireland under the European Union Environmental Objectives (Surface Waters) Regulations S.I. No. 272 of 2009, as amended. Q-value status, as reported by the EPA, is determined by the biological quality element, macroinvertebrate fauna. The Q-value is assigned on a scale of 1 to 5 with a Q5 representing high quality pristine conditions and a Q1 representing bad seriously polluted conditions. The intermediate values (Q1-2, 2-3, 3-4, etc.) denote transitional conditions. A target for Q4 and above is required for rivers sites to comply with good (Q4) or better (i.e., high status - Q4-5, Q5). The most recent EPA monitoring of the River Clodiagh and River Gorragh (2023) is summarised in **Table 9-20**. The station on the River Clodiagh is located immediately upstream of Clonaslee bridge. There are two stations on the River Gorragh. One station is located at the Gorragh bridge within the village, and the second is located 250 m upstream of the confluence of the River Clodiagh and River Gorragh.

Table 9-20: EPA River Q-value Monitoring 2023.

Station Code	Station Name	River Waterbody Name	Q-Value	Q-Value Status
RS25C060100	CLODIAGH (TULLAMORE) - Just u/s Clonaslee Br	CLODIAGH (TULLAMORE)_010	4-5	High
RS25G090300	Killart House	GORRAGH_010	5	High
RS25G090200	GORRAGH - Gorragh Br E of Clonaslee	GORRAGH_010	5	High

9.3.5.1.3 WFD Status

The WFD status assigned to the Clodiagh (Tullamore)_010 river waterbody in the period 2016-2021 is ‘good’. According to the 3rd cycle WFD risk assessment, this waterbody is *not at risk* of failing to meet its WFD status objectives by 2027. The Clodiagh does not have a high-status objective under the WFD.

The WFD status assigned to the Gorragh_010 river waterbody in the period 2016-2021 is ‘good’. According to the 3rd cycle WFD risk assessment, this waterbody is *at risk* of failing to meet its WFD status objectives by 2027. The River Gorragh has a high-status objective under the WFD.

9.3.5.1.4 Aquatic Biota

The NBDC data search returned eight records of white-clawed crayfish within the search area, with the most recent record dating to the 31/12/2022. This record was from the Barrow catchment to the west of the Proposed Scheme area. An outbreak of crayfish plague in the River Clodiagh near Clonaslee was announced on the 30th August 2021.

Inland Fisheries Ireland undertook electrofishing surveys of the River Clodiagh as part of WFD monitoring in 2015 (Kelly, et al., 2015). The survey site was located 8.5 km west of Tullamore, Co. Offaly. Brown trout was the most abundant species recorded at this site, with 1+ and older outnumbering 0+ significantly. No salmon were recorded in 2015, however salmon was recorded at this site in 2008. Other fish species recorded at this site in 2015 included stone loach (*Barbatula barbatula*), minnow (*Phoxinus phonixus*) and perch (*Perca fluviatilis*). Lamprey (*Lampetra sp.*), European eel, gudgeon (*Gobio gobio*) and 3-spined stickleback (*Gasterosteus aculeatus*) were recorded in previous years (2008 and/or 2011). Larval lamprey surveys undertaken by IFI in the River Clodiagh in 2021 detected mean densities of 98 no./m^2 across four survey sites in the ADS channel. The surveys were undertaken as part of monitoring undertaken for the Habitats Directive Annex II/V fish species (Gallagher, et al., 2022).

The Proposed Scheme area is not within a freshwater pearl mussel (*Margaritifera*) sensitive area.

9.3.5.2 Field Survey

9.3.5.2.1 Habitat Survey

Overview

The Clodiagh River is a relatively small river (c. 5-6 m width). It flows through woodland (Brittas Wood), urban areas (Clonaslee village) and agricultural land (downstream of Clonaslee village) within the Proposed Scheme area. The following summarises the results of habitat surveys undertaken between the years 2021 and 2024.

The Clodiagh River has been historically modified with straightening evident and stone or concrete reinforcement recorded on the banks. Upstream of Clonaslee bridge, well-developed riffle/glide/pool sequences are common. Boulders have been placed instream at regular intervals, and it is assumed these are measures to increase habitat heterogeneity and improve habitat available for fish. The boulders have been placed on the left and right margins of the river channel and deflect flow towards the centre of the channel. A pool was typically present at the downstream end of these in-stream features. Riffle areas were typically shallow but deeper pools were present with large boulders (60 cm+ depth), and this was common in the reach. Bank protection (stone boulders) was noted on the right bank near the water treatment plant (WTP). Historic modifications to the river channel were also noted in the form of a small concrete weirs and a degraded masonry bridge footing. Undercutting of both the right and left banks was noted.

Directly downstream of Clonaslee bridge, instream habitat is more open with bank reinforcement, shallow flow and more cobble/gravel substrate. A few sparse boulders were noted. A retaining wall spans large sections of the left bank. Further downstream, riffle/glide/pool sequences are present with good boulder/cobble substrate. As with the river upstream of Clonaslee bridge, undercut banks were noted in sections.

There is a possibility that the Clodiagh river has affinities to the upland aspect of Annex I floating river vegetation habitat (3260), namely the bryophyte-dominated aquatic communities FW2A *Fontinalis antipyretica – Myriophyllum alterniflorum* aquatic community[9] or FW2B *Rhynchostegium riparioides – Chiloscyphus polyanthos* aquatic community[10]. No vascular plants were recorded within the River Clodiagh during surveys, but mosses were noted growing on boulders and cobbles within the river, with coverage of 2-5% noted (see below).

[9] Description available online at: https://biodiversityireland.ie/ivc-classification-explorer/fw2/fw2a/ [Accessed: 13/11/2024].

[10] Description available online at: https://biodiversityireland.ie/ivc-classification-explorer/fw2/fw2b/ [Accessed 13/11/2024].

Upstream Clonaslee Bridge

Detailed habitat surveys were undertaken at a representative reach (c. 50 m in length) upstream of Clonaslee bridge in 2021 and 2023 (53.148125, -7.525585). The results of both surveys are largely similar, so the most recent survey results (i.e., from 2023) are summarised here. Bank height at this location was approximately 1.5 m, with wetted and bankfull width both recorded at c. 5.4 m. Water depth was approximately 0.15 m in riffle/glide habitat. The channel appeared to be straightened, with what is assumed to be a fisheries enhancement feature located within and upstream of the reach. No siltation was recorded, and a low plume of silt was noted when the bed was disturbed. Cobble dominated the substrate (50%), followed by boulder (20%), coarse gravel (15%), fine gravel (10%) and sand (5%). The substrate was normal with no compaction or excessive scouring noted. Flow discharge was normal and velocity was moderate. No turbidity was noted and colour was low. Shading was heavy. River habitat comprised a mixture of riffle (30%), pool (25%) and glide (45%). A small amount of moss was noted on cobbles and boulders (approximately 2% cover). The physiochemical characteristics taken from this section of the river were recorded during the survey. Dissolved oxygen (DO) was 95% and 9.33 mg/l. Water temperature 15.5 °C, conductivity was 374 µS/cm and pH was 7.89. Land use at the site comprised parkland (left bank) and industrial land (right bank), with broadleaved woodland recorded upstream. No cattle access was noted. Moderate bank erosion was evident. Bankside vegetation comprised nettles, sycamore, bramble, holly, ivy, herb-Robert, vetch, winter heliotrope (*Petasites pyrenaicus*), snowberry, hogweed, hazel, willow, beech and birch. The riparian buffer on the right bank was narrow (c. 2-3 m), and predominantly comprised a mature treeline with scrubby understorey. At and immediately upstream of Clonaslee bridge, no trees were recorded on the right bank. A private garden and water treatment plant were recorded on the right bank top and were separated from the river/riparian buffer by a block wall and stone wall (private garden) and palisade fence (water treatment plant). The riparian buffer on the left bank comprised a narrow (2-6 m) strip of managed amenity grassland with mature and immature trees scattered throughout. A road occurred beyond this amenity area and was separated from it by a low stone wall.

Debris trap and instream works location

Detailed habitat surveys were also undertaken at the proposed location of instream works, and 100 m upstream and downstream of this area in March and June 2024.

At the proposed debris trap location, the substrate was quite coarse, with cobble (30%), coarse gravel (30%) and boulder (25%) being recorded most frequently, and fine gravel (10%) and sand (5%) making up the remainder. A fisheries enhancement feature is located approximately 14 m upstream of the proposed debris trap, comprising boulders placed on the right and left channel margins to concentrate flow into the centre of the river channel. A pool is located immediately downstream of this feature and is assumed to have been created via scouring of the riverbed. This enhancement feature is located within the instream works area. Siltation was low during the survey undertaken in June, but a high silt plume was noted when the bed was disturbed. Bank height at the debris trap was approximately 1.5 m on the left bank, and 1 m on the right bank. Shading at the proposed debris trap location is heavy. River habitat comprised 50% riffle, 20% pool and 30% glide. Flow was very low during the survey undertaken in June, and filamentous algae (c. 5% cover) was noted in the channel. Moss was noted on instream boulders. The channel is assumed to have been straightened in the past. Severe bank erosion was noted. Undercut banks and exposed tree roots were noted on the riverbank face. No aquatic vascular plants were recorded in the channel. The compacted gravel path on the left bank top was located approximately 1.5 m from the river margins. Sycamore and birch trees were recorded growing on the bank face, along with mosses, ivy, sedges and ferns. An earth path leads down to the river just upstream of the debris trap location. The right bank top comprises broadleaf woodland. The right bank face was undercut with exposed tree roots visible.

Upstream and downstream of the proposed debris trap, the substrate was dominated by cobbles and coarse gravel, with boulders present. As noted previously, deliberately placed boulders were noted in the channel, as well as small concrete weirs and a masonry bridge footing. The overall reach was characterised by riffle/pool/glide habitat, with deep pools created downstream of the fisheries enhancement measures and the masonry bridge footing. Moss was noted on instream boulders with an estimated cover of about 5 %. Bank height ranged from 0.5 m to 2 m, and wetted width was typically between 6.5 m and 7 m. Bank erosion and undercutting was noted in places. Some trees had fallen across the river but were not interacting with the actual channel at the time of survey (i.e., the trees were above the water level in both March and June 2024). Bank reinforcement (masonry blocks) was present downstream of the works area on the right bank.

Upstream of the instream works area, the riparian habitat comprised woodland and scrub. Tree species recorded included holly, oak, ash, hazel, willow, sycamore and beech, with blue bells, honeysuckle, brambles, ferns, moss and dead wood recorded in the understorey. A compacted gravel path was recorded

on the left bank top and occurred between 1.5 and 12 m from the river margin. On the right bank top, earth paths were recorded within the woodland. Downstream of the instream works area, the riparian habitat comprised a narrow strip of mature treelines with a scrubby understorey (right bank) or scrub grading to maintained grass (left bank). As noted above (description of habitat upstream of Clonaslee bridge), industrial lands and hardstanding associated with urban areas were located on the left and right bank top downstream of the instream works area.

Brittas Stream

A small stream (hereafter referred to as "Brittas Stream") which rises near Brittas Lake (located approximately 1.5 km west of Clonaslee village) flows into the River Clodiagh immediately downstream of the proposed debris trap. This stream has not been mapped by the EPA but appears on historic 25" and 6" maps. It is culverted under the gravel path adjacent to the River Clodiagh. The inlet of the culvert was blocked during surveys in March 2024 however water was flowing through it. The outlet of the culvert was perched above the stream bed, with a drop of approximately 5 cm. Water depth within the culvert was very shallow (approximately 1 cm). The stream immediately upstream of the inlet was about 1 m in width. Flow at the inlet location was stagnant and a thick layer of silt and detritus (c. 5 cm) was recorded on the substrate. The stream at this location was about 40 cm deep. The riparian vegetation was quite overgrown, with holly and birch trees growing on the bank with an understorey of ivy, mosses, fern and bramble. Agricultural land comprised the left bank top land use whereas broadleaf woodland (Brittas wood) comprised the right bank top land use. Shading at the culvert inlet was heavy. The high and steep nature of the left bank and silty substrate immediately upstream of the Proposed Scheme area indicates that the stream may have been excavated in the past. The stream is shallower just upstream of the culvert inlet, and more open. Filamentous green algae was noted growing on the substrate which was heavily silted. Further upstream near the access road to Brittas Lake (53.146354, -7.541803), the stream had coarser substrate (cobbles and gravel) with faster flowing riffle habitat. The stream was viewed from the bridge at this location.

When the site was resurveyed in June 2024, the Brittas Stream was completely dry, and accumulated silt in the channel upstream of the culvert had been excavated.

9.3.5.2.2 Fish Habitat Appraisal

Salmonids

Overall, the River Clodiagh supports optimal habitat for salmonids, in particular the habitat upstream of Clonaslee bridge. The surveys undertaken within the representative reach upstream of Clonaslee bridge in April 2021 and August 2023 identified very good to excellent salmonid spawning habitat. This was due to suitable water quality, suitable spawning substrate, lack of silt in gravels and the presence of deep holding pools for adult fish. Salmonid spawning habitat at the proposed debris trap location is considered to be good to very good. Silt was noted in the substrate. Overall, the substrate is quite coarse (25% boulder, 30% cobble) but patches of suitable spawning habitat were noted in the channel. It is noted that this area occurs just beyond the tail end of the pool created by the (assumed) fisheries enhancement feature – this is typically considered ideal spawning habitat due to flow, depth and flow of water through gravel beds. There is suitable spawning habitat located upstream and downstream of the proposed debris trap, with spawning substrate and holding pools present.

Excellent juvenile salmonid habitat was recorded throughout the survey area and within the representative reach, with extensive areas of shallow, fast flowing water recorded, with moderately coarse substrate. Cover in the form of boulders, undercut banks, woody debris (within and above the channel) and overhanging vegetation was also noted. Excellent juvenile habitat was noted at the proposed debris trap location and upstream and downstream of same due to the presence of coarse substrate and shallow, fast flowing water.

The weirs and masonry bridge footing identified within the survey area are unlikely to act as complete barriers to salmonid migration.

Brown trout parr and a 1+ brown trout was captured during the kick-net surveys undertaken as part of the macroinvertebrate and crayfish surveys in 2023. Furthermore, salmonid parr were frequently observed through the bathyscope in the river during surveys in 2021 and 2023.

The Brittas Stream at the Proposed Scheme area does not provide optimal habitat for salmonids. The habitat at this location was rated as 'none' for both juveniles and adults. The perched nature of the culvert on the Brittas Stream within the Scheme area, combined with shallow water depths within the culvert and debris blockages at the inlet means it is likely to act as a barrier to migrating salmonids. More suitable habitat (fast

flowing water, stony substrate) was noted upstream of the Proposed Scheme area near the access road to Brittas Lake (53.146354, -7.541803). The stream was viewed from a bridge at this point.

The Brittas Stream was completely dry during surveys undertaken in June 2024, thus providing no habitat for salmonids.

Lamprey

Overall, the River Clodiagh supports optimal habitat for lamprey. It is assumed that the only lamprey species likely to occur in the River Clodiagh are brook lamprey, given the presence of the Ardnacrusha Scheme (a significant barrier to fish migration) in the lower reaches of the River Shannon. The surveys undertaken upstream of Clonaslee bridge in April 2021 and August 2023 identified very good to excellent lamprey spawning habitat. This was due to suitable water quality, suitable spawning substrate, lack of silt in gravels and the presence of refuge and hiding places for adult lampreys. Lamprey spawning habitat at the proposed debris trap location was considered to be good to very good. The substratum is dominated by cobble and coarse gravel, with small amounts of sand. The substrate is slightly too coarse to represent 'ideal' spawning conditions, in particular for brook lamprey, but pockets of suitable habitat were noted. As noted for salmonids, this area occurs just beyond the tail end of the pool created by the (assumed) fisheries enhancement feature – this is typically considered ideal spawning habitat due to flow, depth and flow of water through gravel beds. There is suitable spawning habitat located upstream and downstream of the proposed debris trap.

With the exception of a few locations, juvenile lamprey habitat was typically limited to a few patches of silt and sand on the river margins but was overall considered to be very good. A large sandy/silt mound was recorded directly upstream of Clonaslee bridge which is considered likely to contain juvenile lamprey. Juvenile habitat at the bridge was considered to be excellent. Juvenile habitat at the proposed debris trap location was considered to be fair. The habitat was mostly unsuitable but some small patches of deposited sandy silt was noted downstream of some boulders. Ammocete habitat upstream and downstream of the debris trap was similarly limited.

Surveys undertaken in March 2024 concluded that the Brittas Stream at the Proposed Scheme area did not provide optimal habitat for spawning lamprey, and the habitat at this location was rated as 'none-poor'. However, the silty accumulations at the culvert inlet were considered to potentially provide habitat for juvenile lamprey, and the habitat here was rated as 'good'. Given that potential lamprey spawning habitat was noted within the stream upstream of the Proposed Scheme area near the access road to Brittas Lake (53.146354, -7.541803), it was considered that there is potential for lamprey ammocetes to occur within the silt at the culvert inlet. However, the perched nature of the culvert on the Brittas Stream within the Scheme area, combined with shallow water depths within the culvert and debris blockages at the inlet means it is likely to act as a barrier to migrating adult lamprey. When the Brittas Stream where it occurs within the Scheme area was resurveyed in June 2024, the stream was recorded as being completely dry and had been excavated, thus providing no habitat for lamprey.

Eel

Overall, the River Clodiagh supports optimal habitat for eel. Throughout the river within the scheme area, there are suitable refugia in the form of tree roots, instream woody debris, overhanging vegetation, undercut banks and coarse substrate with boulders present. At the representative reach upstream of Clonaslee bridge, at the proposed debris trap location and upstream and downstream of the proposed debris trap, excellent habitat for eel was noted, namely due to the presence of boulders, overhanging vegetation and coarse substrate.

Brittas Stream at the Proposed Scheme area does not provide optimal habitat for eel. During surveys in March 2024, the stream at this location was described as being small, relatively shallow and lacking coarse substrate. The overhanging vegetation and detritus at the culvert inlet may provide some refuge for eel. The perched nature of the culvert on the Brittas Stream within the Scheme area, combined with debris blockages at the inlet means it may act as a barrier to eel. The habitat here was rated as 'fair'. As with lamprey and salmonids, the stream upstream of the works area provides more suitable habitat for eel. The stream was completely dry and had been excavated during surveys undertaken in June 2024, thus providing no habitat for eel.

9.3.5.2.3 White-clawed Crayfish Survey and Habitat Appraisal

Overall, crayfish habitat was excellent within the Clodiagh River, with boulder/cobbles, instream woody debris, leaf litter and over hanging banks creating refugia. Upstream of Clonaslee bridge ideal habitat was

present, with coarse substrate (boulders and cobble) providing habitat for crayfish to shelter. Well-developed riffle-glide-pool sequences were noted, which are helped by boulders which have been placed in the river channel. Under-cut banks are present with a good amount of detritus and woody debris providing habitat and a food source for juveniles. Directly downstream of the bridge, habitat is open with bank reinforcement, shallow flow and a more cobble/gravel dominated substrate. A few sparse boulders provided some habitat. Riffle/glide/pool sequences are present downstream with good boulder/cobble substrate, undercut banks in sections, woody debris and detritus. Near the ICW there are soft banks for burrowing present. Downstream of the ICW habitat is less ideal with bank reinforcements and less boulder habitat. Crayfish habitat at the proposed debris trap, and upstream and downstream of same, is considered to be excellent.

Brittas Stream at the Proposed Scheme area does not provide optimal habitat for crayfish. During surveys undertaken in March 2024, Brittas Stream at the Proposed Scheme area was noted as possibly providing some habitat for juvenile crayfish. The stream at this location is small, relatively shallow and lacked coarse substrate. The overhanging vegetation and detritus at the culvert inlet may provide some refugia and food sources. The habitat here was rated as 'fair'. As with lamprey and salmonids, the stream upstream of the works is likely to be more suitable for crayfish. The stream was completely dry and had been excavated during surveys undertaken in June 2024, thus providing no habitat for the species. Taking this into consideration, the stream is considered unlikely to support crayfish, with the exception of perhaps providing refuge or foraging habitat in winter when water is flowing in the channel.

No crayfish were observed during kick sampling in April 2021. No crayfish were observed within the survey reaches during the dedicated crayfish surveys undertaken on the 11th August 2021. However, on the 11th August 2021 otter spraint with crayfish carapace remains was noted on a boulder upstream of Clonaslee bridge at 53.14619, -7.52655, indicating that crayfish were present within the river at the time. During the resurvey of a few sections in the River Clodiagh on the 17th August 2021, 21 dead crayfish were found, with a range of sizes (3 – 11 cm total length), and crayfish plague was suspected. In addition, one live, white-clawed crayfish (4 cm total length) and one dead (9 cm total length) were identified in an area surveyed 2.5 km southwest of Clonaslee on the Clodiagh River on the 17th August 2021 (no longer part of the ecology survey area and therefore not described above). Three otter spraints with crayfish carapace were identified on a boulder at this location also. Dead crayfish specimens were sent to the Marine Institute and the NBDC and NPWS were informed. As noted above, an outbreak of crayfish plague in the River Clodiagh near Clonaslee was announced on the 30th August 2021. No crayfish were observed during kick sampling or dedicated crayfish surveys undertaken on the 24th August 2023. This is likely due to the crayfish plague outbreak in the Clodiagh. The results of the most recent crayfish surveys (2023), inclusive of photographs of each 100 m reach assessed are provided in **Appendix 9.3**.

9.3.5.2.4 Macroinvertebrate Survey

A macroinvertebrate survey was undertaken at a representative reach of the River Clodiagh upstream of Clonaslee Bridge in April 2021 and August 2023.

In April 2021, 16 macroinvertebrate taxa were recorded within the river. Five group A taxa (pollution sensitive) were recorded in the river, and included one mayfly *Rhithrogenia semicolorata* (dominant), and four stonefly taxa including Taeniopterygidae (numerous), Chloroperlidae (single individual), *Amphinemura sulcicollis* (few) and *Isoperla grammatica* (few). Two group B taxa (less pollution sensitive) were recorded - the stonefly *Leuctra* spp. (common) and the mayfly *Alainites muticus* (few). Eight Group C (pollution tolerant) species were recorded, namely the mayfly *Baetis rhodani/atlanticus* (numerous), flies from the families Simuliidae (numerous) and Chironomidae (few), caseless caddisflies from the family Rhyacophilidae (few) and Hydropsychidae (few) and the riffle beetles *Elmis aenea* (few), *Limnius voolckmari* (few) and *Esolus* sp./ *Oulimnius* sp. (few). Finally, the group E (most pollution tolerant) oligochaete from the family Tubificinae was recorded in few numbers. Based on this macroinvertebrate community structure a Q-value score of Q4-5 (high Q-value status) was inferred.

In August 2023, 16 macroinvertebrate taxa were recorded within the river. Three group A taxa (pollution sensitive) were recorded and included two mayflies *Rhithrogenia semicolorata* (common) and Heptageniidae *indet*. (common), and one stonefly species from the family Nemouridae (few). Three group B taxa (less pollution sensitive) were recorded - the stonefly *Leuctra spp*. (common), the mayfly *Alainites muticus* (few) and cased caddisfly from the family *Goeridae* (few). Ten Group C (pollution tolerant) species were recorded, namely the mayflies *Baetis rhodani/atlanticus* (common) and *Seratella ignita* (few), flies from the families *Simuliidae* (numerous), Pediciidae (few) and *Chironomidae* (few), caseless caddisflies from the families Rhyacophilidae (single individual), Philopotamidae (few) and Hydropsychidae (single individual) and the riffle beetles *Elmis aenea* (few) and *Limnius volckmari* (few). Based on this macroinvertebrate community

structure a Q-value score of Q4-5 (high Q-value status) was inferred. This score in in-keeping with the Q-value assigned to the river by the EPA in 2023 at this location.

9.3.6 Evolution of the Environment in the Absence of the Proposed Scheme

The Water Action Plan 2024 will continue to be implemented with the intention of improving water quality even in the absence of the Proposed Scheme. Flooding will continue to affect areas identified to be at risk in the absence of the scheme. This could have ongoing and intermittent, negative effects on water quality in the case that surface waters flood through Clonaslee village, mobilising contaminants before draining back to the River Clodiagh. Large woody debris arising from Brittas wood will continue to migrate downstream and may or may not be removed from the channel at Clonaslee bridge (should it become trapped) or further downstream as part of OPW maintenance works on the ADS channel in the Clodiagh River.

9.4 Important Ecological Features (IEF)

The identification of IEFs scoped into the impact assessment is based on their ecological evaluation combined with whether or not they are at risk of significant effects from the Proposed Scheme. Receptors can be at risk of potential significant effects but may not necessarily be scoped into impact assessment. This is because, in the context of national roads projects, ecological resources of local importance (lower value), or less, do not represent 'key ecological receptors' for which detailed assessments are required (NRA, 2009). Key ecological receptor is the broadly equivalent term used in the NRA guidance (NRA, 2009) for IEFs.

9.4.1 Terrestrial

All ecological features identified within the ZoI for the Proposed Scheme have been identified and assessed as to whether they are considered Important Ecological Features (IEF) to be scoped into the assessment of significant effects (**Table 9-21**). IEFs are defined as 'habitats, species and ecosystems, including ecosystem function and processes that may be affected, with reference to a geographical context in which they are considered important' (CIEEM, 2018).

Table 9-21: Summary valuation of terrestrial ecological features and identification of features scoped into the impact assessment.

Receptor	Highest Value	Rationale for Ecological Valuation	Potential for significant effects as a result of the Proposed Scheme	IEF
European Sites (Slieve Bloom Mountains SPA)	**International**	Designated international site.	Yes. The Proposed Scheme is located within this SPA.	**Yes**
European Sites (Charleville Wood SAC)	**International**	Designated international site.	Yes. There is direct hydrological connectivity with this SAC, which could result in significant effects on the European Site.	**Yes**
European Sites (River Barrow and River Nore SAC; Blackwater River (Cork/Waterford) SAC, Bricklieve Mountains and Keishcorran SAC, Glenade Lough SAC, Kilroosky Lough Cluster SAC, Lough Bane and Lough Glass SAC, Lough Corrib SAC, Lough Gill SAC, Lough Lene SAC, Lough Owel SAC, Lower River Suir SAC, River Moy SAC, White Lough Ben Loughs and Lough Doo SAC, Lough Hoe Bog SAC and Lough Nageage SAC)	**International**	Designated international site.	Yes. Despite the absence of a direct hydrological link between the Proposed Scheme and these SACs, all of these sites have white-clawed crayfish designated as a QI. There is the potential, although slight, that machinery, equipment or PPE used during the construction and operational phase of the Proposed Scheme could also be used in the catchments supporting these SACs. Given the potential magnitude of the effect of the spread of crayfish plague into watercourses (risk of 100% mortality in affected populations), and the uncertainty as to whether it could occur during the construction or operational phase, this species, and therefore these sites, are considered to be within the potential ZoI.	**Yes**
Slieve Bloom Mountains Ramsar Site	**International**	Designated international site.	No. There is no connectivity between the Proposed Scheme and habitats within this Ramsar site as it is located 4 km from the Proposed Scheme and occurs upgradient of it. The Proposed Scheme and lands within 750 m of same do not provide important hen harrier habitat (i.e., there is no heather moorland or young forestry plantations nearby). All of the Slieve Bloom breeding pairs identified during the 2022 national survey of breeding hen harrier were located within upland, heather habitats and none in afforested habitats (Ruddock, et al., 2024). There is no significant breeding habitat within the Proposed Scheme area for red grouse, peregrine or merlin.	No
National Sites (Screggan Bog NHA, Charleville Wood pNHA, Clonad Wood pNHA)	**National**	Designated national sites.	Yes. As these sites occur either immediately adjacent to the River Clodiagh or within the floodplain of the River Clodiagh downstream of the Proposed Scheme, there is potential for	Yes

Receptor	Highest Value	Rationale for Ecological Valuation	Potential for significant effects as a result of the Proposed Scheme	IEF
			significant negative indirect effects on these sites via: • Habitat degradation and alteration. • Spread of IAPS.	
National Sites (Hawkswood NHA, Grand Canal pNHA)	**National**	Designated national sites.	No. The hydrological link between Hawkswood NHA and the river Clodiagh is considered tenuous due to the distance between the River Clodiagh and this NHA (320 m at the closest point) and the presence of other watercourses, agricultural land, woodland and hedgerows between this NHA and the river (which would serve to attenuate pollutants). Furthermore, historic maps do not indicate that the lands adjacent to the River Clodiagh in this area are liable to flood. The hydrological link between the Grand Canal pNHA and the River Clodiagh and River Brosna is also insignificant. The flood maps do not indicate any interaction between the Grand Canal itself and the flood plain of the aforementioned rivers. Rather, the flood maps indicate that some habitats that are adjacent to the canal but within the pNHA may be inundated during a flood event. The closest location where the flood extents overlap with the terrestrial areas of the pNHA is approximately 26.2 km downstream of the Proposed Scheme (habitats immediately north of the 31st Lock). The Grand Canal pNHA is fed by the River Shannon immediately upstream of the confluence of the River Shannon and River Brosna. However, this confluence is located 53.8 km downstream of the Proposed Scheme. Taking the above into consideration, it is not considered likely that significant effects on the Grand Canal pNHA would arise as a result of the Proposed Scheme.	No
National Sites (Pallas Lough pNHA, Raheen Lough pNHA)	**National**	Designated national sites.	No. Connectivity with these sites was identified as they occur within 20 km of the Proposed Scheme and are noted for their ornithological interest. However, there is no significant ex-situ habitat for the birds that occur within these	No

Receptor	Highest Value	Rationale for Ecological Valuation	Potential for significant effects as a result of the Proposed Scheme	IEF
			pNHAs within or adjacent to the Proposed Scheme area. Accordingly, there is no potential for significant effects on these pNHAs.	
National Sites (Slieve Bloom Mountains pNHA, Slieve Bloom Mountains Nature Reserve)	**National**	Designated national sites.	No. There is no connectivity between the Proposed Scheme and habitats within these sites as they are all at least 1 km from the Proposed Scheme and occur upgradient of it. The Proposed Scheme and lands within 750 m of same do not provide important hen harrier habitat (i.e., there is no heather moorland or young forestry plantations nearby).	No
GA1 Improved agricultural grassland	**Local (Lower Value)**	Potential direct and indirect effects have been identified; however, the ecological features are valued as local (lower) value due to their low botanical diversity and are not considered an IEF.	Yes. Potential direct and indirect effects on these features have been identified, as: • Habitat loss, fragmentation, degradation, and alteration.	No
GA2 Amenity grassland (Improved)	**Local (Lower Value)**			
WD5 Scattered trees and parkland	**Local (Lower Value)**			
WS1 Scrub	**Local (Lower Value)**			
BL3 Stone walls and other stonework	**Local (Lower Value)**			
WL1 Hedgerow	**County Importance**	The treelines and hedgerows within the Proposed Scheme area provide important ecological corridors within the wider landscape, in particular to the Slieve Bloom Mountains Ramsar site/SPA/SAC/pNHA and Brittas Wood. Many of the treelines within the Proposed Scheme area are mature with a species rich understorey. Hedgerows within the Proposed Scheme area are less species rich and have been managed but nevertheless are important due to their role as an ecological corridor.	Yes. Potential direct and indirect effects on these features have been identified, as: • Habitat loss, fragmentation, degradation, and alteration.	Yes
WL2 Treelines	**County Importance**			
WD1 Mixed broadleaved woodland (Brittas Wood)	**County Importance**	Brittas Wood is a mature broadleaved woodland with a species rich understorey. Although it comprises non-native species such as beech and sycamore, mature broadleaved woodland habitat is relatively rare and is therefore considered to be of county importance.	Yes. Potential direct and indirect effects on this habitat have been identified, as: • Habitat loss, fragmentation, degradation, and alteration	Yes
Protected Flora/Species of Conservation Concern	**n/a**	No protected flora or plant species of conservation concern were identified within the environs of Clonaslee village.	No. Direct or indirect effects to this feature are not predicted, as no protected flora or plant species of conservation concern have been	No

Receptor	Highest Value	Rationale for Ecological Valuation	Potential for significant effects as a result of the Proposed Scheme	IEF
			identified within the environs of Clonaslee village.	
Bats (Commuting & foraging)	**Local (Higher Value)**	Local Importance (higher level) due to the assemblage of common and widespread species recorded in the baseline assessment. The most common species identified during bat activity surveys were pipistrelles (i.e. common and soprano). Pipistrelles are the most common bat species in Ireland.	Yes. Potential direct and indirect effects to this feature have been identified, as: • Habitat loss, degradation, fragmentation, and alteration; and • Disturbance from noise, vibration, lighting, and human presence.	Yes
Bats (Roosting)	**Local (Higher value)**	Ground level roost assessment identified trees that may support individual bats and multiple bats within the Proposed Scheme area. Further survey of PRF-M features did not reveal any roosting bats. Only a small number of PRF-I features will be affected by the scheme.	Yes. Potential direct and indirect effects to this feature have been identified, as: • Habitat loss, and • Disturbance from noise, vibration, lighting, and human presence.	Yes
Badger	**Local (Higher value)**	Baseline ecological surveys did not identify badger signs (setts, latrines, prints etc.) within the Proposed Scheme area.	No. No field survey evidence of badger within the Proposed Scheme area. It is acknowledged that badger are likely to occur in Brittas Wood and the Clonaslee environs, however given the lack of badger signs identified during surveys, the population potentially affected by the Proposed Scheme is considered to be less than 1% of the local population as described in the (NRA, 2009). Therefore, the effect of the loss of habitat supporting commuting and foraging badger is considered negligible. However, as badger are mobile, occurring within a dynamic and changing environment, the precautionary principle has been applied and mitigation measures to account for potential changes in the baseline are provided in **Section 9.6.6**.	No.
Otter (foraging & commuting)	**Local (Higher Value)**	Otter signs identified throughout the Proposed Scheme area in 2021, however no otter signs noted in surveys undertaken in 2023. A single otter spraint found in 2024.	Yes. Otter spraint found within scheme area in most recent survey undertaken (2024). Potential direct and indirect effects to this feature have been identified, as: • Disturbance from noise, vibration, lighting, and human presence. • Habitat loss, degradation and fragmentation	Yes

Receptor	Highest Value	Rationale for Ecological Valuation	Potential for significant effects as a result of the Proposed Scheme	IEF
Otter (Breeding & resting)	**Local (Higher Value)**	Potential breeding and resting sites identified throughout the Proposed Scheme area in 2021, however no breeding or resting sites confirmed during surveys undertaken in 2023 and 2024.	No. No likelihood for significant effects as the most recent surveys did not identify otter breeding or resting sites. However, as otter are mobile, occurring within a dynamic and changing environment, the precautionary principle has been applied and mitigation measures to account for potential changes in the baseline are provided in **Section 9.6.6**.	No
Birds (foraging & breeding)	**Local (Higher Value)**	Incidental observations of common bird species during surveys including amber (kingfisher) and red listed species (grey wagtail) associated with river and stream habitats. Kingfisher nesting habitat identified within and adjacent to the scheme area, but no nest holes found.	Yes. Potential direct and indirect effects to this feature have been identified, as: • Habitat loss, fragmentation, degradation, and alteration; and • Disturbance from noise, vibration, lighting, and human presence.	Yes
Hen harrier	**International**	SCI species of Slieve Bloom Mountains SPA	Yes. The Proposed Scheme is located within the Slieve Bloom Mountains SPA.	Yes
Other protected mammals (hedgehog, pygmy shrew, pine marten, Irish stoat, red squirrel, Irish hare, and deer species)	**Local (Higher value)**	No significant protected mammal findings recorded during the field surveys.	No. Due to lack of significant protected mammal findings recorded during the field surveys, combined with the short-term, temporary, and localised nature of the proposed works and minimal vegetation removal. Nevertheless, it is assumed that certainty species may be present (e.g., hedgehog) and standard mitigation is provided to protect these non-IEF species in **Section 9.6.6**	No
Amphibians and reptiles	**Local (Higher Value)**	No amphibians or reptiles recorded during field surveys. No breeding habitat for common frog or smooth newt identified within the Proposed Scheme area.	No. No evidence of amphibians or reptiles within the Proposed Scheme area identified as part of field surveys.	No
Terrestrial invertebrates (local)	**Local (Lower Value)**	It is assumed that the Proposed Scheme area is suitable for foraging and breeding behaviour for a wide range of common terrestrial invertebrates. The records of rare and protected invertebrates returned from the NBDC data search did not intersect with the Proposed Scheme. No incidental observations of rare or protected terrestrial invertebrates were made.	No. Direct effects on rare or protected terrestrial invertebrates are not predicted, as no protected species or species of conservation concern were identified within the ecological study area either through desk study or incidental field observations. Indirect effects on Desmoulin's whorl snail (a QI of Charleville Wood SAC) are considered as part of effects on designated sites (above).	No

The ecological valuation concluded that the following ecological features are deemed to be IEFs and should be assessed:

- International Sites: (Slieve Bloom Mountains SPA, Charleville Wood SAC, River Barrow and River Nore SAC; Blackwater River (Cork/Waterford) SAC, Bricklieve Mountains and Keishcorran SAC, Glenade Lough SAC, Kilroosky Lough Cluster SAC, Lough Bane and Lough Glass SAC, Lough Corrib SAC, Lough Gill SAC, Lough Lene SAC, Lough Owel SAC, Lower River Suir SAC, River Moy SAC, White Lough Ben Loughs and Lough Doo SAC, Lough Hoe Bog SAC and Lough Nageage SAC)
- National Sites: (Screggan Bog NHA, Charleville Wood pNHA, Clonad Wood pNHA)
- WL1 Hedgerow
- WL2 Treelines
- WD1 Mixed broadleaved woodland (Brittas Wood)
- Otter (Commuting and foraging)
- Bats (Roosting, commuting & foraging)
- Birds (Foraging & breeding)
- Hen harrier

9.4.2 Aquatic

An evaluation of the aquatic ecological receptors is provided in **Table 9-22** and IEFs identified. All ecological receptors within the ZoI of the Proposed Scheme were assessed according to criteria for site evaluation outlined in the NRA Guidelines for Ecological Impact Assessment of National Road Projects (NRA, 2009).

Table 9-22: Summary valuation of aquatic ecological features and identification of features scoped into the impact assessment.

Receptor	Highest valuation	Evaluation Rationale	Potentially affected by the Proposed Scheme	IEF (Yes/No)?
River Clodiagh	National Importance	The River Clodiagh is not a designated salmonid water and is not designated as an SAC or SPA for aquatic species. However, the river has a Q-value of 4-5, which is indicative of a high-status waterbody. High status rivers are relatively rare nationally and are of high biodiversity value. Furthermore, based on field surveys undertaken within the Clodiagh, there is a possibility that the Clodiagh river has affinities to the upland aspect of Annex I floating river vegetation habitat (3260).	**Yes.** Instream works and bankside works are proposed during Construction Phase. Maintenance required during operational phase. Operational Phase flooding.	Yes
River Gorragh	National Importance	The River Gorragh is not a designated salmonid water and is not designated as an SAC or SPA for aquatic species. However, the river has a Q-value of 5, which is indicative of a high-status waterbody. It also has a high-status objective. High status rivers are relatively rare nationally and are of high biodiversity value.	**Yes.** Due to flood waters flowing into this river during the Construction and/or Operational Phase. No works are proposed within or adjacent to this river during the Construction Phase.	Yes
Brittas Stream	Local Importance (Lower Value)	Degraded stream that has been heavily modified within the Proposed Scheme area. The stream was noted to be dry in June 2024.	**Yes.** Instream works and bankside works are proposed during Construction Phase. Maintenance required during operational phase.	No

Receptor	Highest valuation	Evaluation Rationale	Potentially affected by the Proposed Scheme	IEF (Yes/No)?
White-clawed crayfish	International importance	White-clawed crayfish is listed on Annex II and Annex V of the Habitats Directive. The species is considered to be of international importance. This species was recorded within the River Clodiagh in 2021. An outbreak of crayfish plague was confirmed in August 2021, and no crayfish were found during surveys in 2023.	**Yes.** White-clawed crayfish were not found during dedicated surveys undertaken in 2023, and it is possible the population within the Clodiagh at Clonaslee has suffered extirpation due to crayfish plague. However, populations within other river waterbodies (e.g., the population within River Barrow and River Nore SAC, located approximately 2 km to the east) could be indirectly affected by the Proposed Scheme should crayfish plague be spread from the River Clodiagh as a result of works.	Yes
Salmonids	National Importance	Salmonids were observed within the River Clodiagh during aquatic ecology surveys. Atlantic salmon, an Annex II species, is known to occur within the Clodiagh. Excellent salmonid habitat was found within the River Clodiagh. IFI noted in their submission that the Clodiagh is a very important salmonid river.	**Yes.** Instream works and bankside works are proposed during Construction Phase. Maintenance required during operational phase. Culvert remediation proposed.	Yes
European eel	National importance	The European eel is critically endangered and as such is assessed here as being of national importance. Excellent habitat for eel recorded within the River Clodiagh.	**Yes.** Instream works and bankside works are proposed during Construction Phase. Maintenance required during operational phase. Culvert remediation proposed.	Yes
Lamprey (brook and/or river)	National importance	Lamprey are listed on Annex II of the Habitats Directive. There is suitable spawning habitat for lamprey throughout the River Clodiagh, and excellent nursery habitat in places. Lamprey are known to occur within the River Clodiagh.	**Yes.** Instream works and bankside works are proposed during Construction Phase. Maintenance required during operational phase. Culvert remediation proposed.	Yes
Other fish species (Minnow, Stoneloach)	Local importance (lower value)	Widespread and common species.	**Yes.** Instream works and bankside works are proposed during Construction Phase. Maintenance required during operational phase. Culvert remediation proposed.	No

The ecological valuation concluded that the following ecological features were deemed to be aquatic IEFs and should be assessed:

- River Clodiagh;
- River Gorragh;
- White-clawed crayfish;
- Salmonids;
- European eel; and
- Lamprey.

9.5 Description of the Likely Significant Effects

The following section details the potential impacts of the Proposed Scheme on biodiversity in the absence of mitigation measures. CIEEM (2018) Guidelines for Ecological Impact Assessment (EcIA) have been adopted to inform the impact assessment.

The importance of the woodland habitat within the Proposed Scheme area (Brittas Wood, treelines, hedgerows) is reflected in the Proposed Scheme design, which has been designed to minimise the loss of mature trees and wooded vegetation.

The assessment has been completed against the Project Description for the Proposed Scheme set out in **Chapter 5: Project Description**.

9.5.1 'Do Nothing' Scenario

Section 9.3.6 presents an analysis of the evolution of the natural environment with respect to biodiversity in the absence of the Proposed Scheme. This section presents an accurate assessment of the 'Do Nothing' Scenario for biodiversity and the reader should revert to this section of this chapter.

9.5.2 Terrestrial Ecology and Designated Sites

9.5.2.1 Sources of Construction Phase Effects

The construction phase activities listed in **Table 9-23** are likely to give rise to ecological impacts, in the absence of suitable mitigation.

Table 9-23: Construction Phase Impacts and Effects.

Impact Source	Construction Activity	Potential Ecological Impact & Effect
Habitat loss, degradation and/or fragmentation	Vegetation removal and earthworks	Vegetation removal and earthworks during site clearance will result in the loss of habitat and its supporting function for a number of species within the footprint of the Proposed Scheme. This activity will also result in potential for habitat degradation due to polluted run-off, dust generation, disturbance from construction and spread of invasive species. Such degradation could also result in effects on species dependent on these habitats.
	Construction of structures and hard surfaces	Permanent loss of habitat. Potential for pollution events during construction (e.g. from hydrocarbons or sedimentation) which can reduce the quality of habitats directly or indirectly.
Disturbance / displacement	Excavations, modifications of existing stonewalls and footpaths, resulting in noise and vibration.	Excavations and construction works can result in the disturbance of animal species, which is especially significant during breeding season; high levels of noise and vibration may also result in avoidance of the local area.
	Artificial lighting	Lighting used during hours of darkness may cause disturbance to bats and other foraging mammals in the area. Artificial lighting can affect emergence and foraging regimes in addition to prey abundance/availability for bats.
	Movement of construction personnel, plant and vehicles	Potential to cause disturbance to wildlife through noise, vibration and human presence.
Pollution to water and air	Construction site drainage	Run-off of pollutants may have an indirect effect on habitats and species, especially those which are water-dependant. Pollutants including silts, hydrocarbons and cement (surface water and groundwater impacts are discussed in **Section 9.5.3.3.4** of this chapter, **Chapter 10: Land, Soils, Geology and Hydrology** and **Chapter 11: Water**.)
	Air pollution and dust deposition	Localised air pollution and dust deposition may have a negative effect on any habitats or species of conservation value in the area. Particulate matter can have negative effects resulting in physical smothering of vegetation, affecting their function and survival. It may also cause local smothering of nearby aquatic receptors or

Impact Source	Construction Activity	Potential Ecological Impact & Effect
		affect the respiratory system of birds. (Air pollution and dust deposition levels are assessed in **Chapter 12: Air Quality**).
Spread of invasive species/pathogens	Movement of construction personnel, vehicles and construction materials; including any excavated spoil.	Potential to cause the spread of invasive species and/ waterborne pathogens - (Japanese knotweed and crayfish plague).

9.5.2.2 Assessment of Effects on IEFs during Construction Phase

The following section presents the assessment of effects on terrestrial biodiversity and designated sites within the ZoI of the Proposed Scheme. As outlined in **Section 9.4,** this assessment is focussed on the Important Ecological Features (IEFs) identified.

9.5.2.2.1 Designated Sites (Slieve Bloom Mountains SPA)

9.5.2.2.1.1 Habitat loss, degradation and fragmentation

The Proposed Scheme is located within the northern margins of the Slieve Bloom Mountains SPA, which is designated for hen harrier. The Proposed Scheme area within the SPA comprises mixed broadleaved woodland, with the surrounding environment characterised by agricultural and built land, and mature broadleaved woodland. Regarding hen harrier habitat, the conservation objectives (COs) for the Slieve Bloom Mountains SPA relate to maintaining the extent and condition of heath and bog and associated habitats, maintaining the extent and condition of low intensity managed grasslands and associated habitats, maintaining the extent and condition of hedgerows, and achieving an even and consistent distribution of age-classes across the forest estate (NPWS, 2022b). According to the Site Synopsis for this SPA, much of the slopes of the SPA are afforested, and overall coniferous plantations account for c. 60% of the site (NPWS, 2015). The Proposed Scheme will result in the removal of 10 no. trees from within the SPA. All of these trees are broadleaved species within Brittas Wood and are not associated with important hen harrier habitat within the SPA. All of the Slieve Bloom breeding pairs identified during the 2022 national survey of breeding hen harrier were located within upland, heather habitats and none in afforested habitats (Ruddock, et al., 2024). The magnitude is considered to be a maximum loss of 10 no. trees (approximately 694 m^2) in total from within the SPA. The effect will be negative, permanent and irreversible. However, due to the relatively minor magnitude and extent of this effect, it is considered to be ***not significant***.

9.5.2.2.1.2 Disturbance or Displacement of Species

As noted in the previous section, the location of the works in Area 1 (within the Slieve Bloom Mountains SPA) does not contain suitable breeding habitat for hen harrier. The Proposed Scheme work area is limited to mixed broadleaved woodland (Brittas Wood) on the outskirts of the SPA. It also comprises a public amenity area utilised by pedestrians and dog walkers. As well as the Proposed Scheme itself, the lands within 750 m of it do not contain suitable breeding habitat for this SCI species. These lands comprise agricultural land, broadleaved woodland, hedgerows and urban areas associated with Clonaslee village. However, it is possible that hen harrier forage along the hedgerows within the vicinity of the Proposed Scheme.

Construction work will be isolated to Brittas Wood, Clonaslee village, the ICW boundary and an agricultural field north of the village. This habitat is not ideal hen harrier habitat. Hen harriers prefer upland habitats for nesting and foraging and are therefore highly unlikely to utilise the habitats in proximity to the Scheme area. Therefore, the magnitude of the effect is considered to be the negligible. In the unlikely event that any effects occurred, these would be negative but reversible after construction works are completed and short-term in nature. Due to the magnitude, reversibility and short-term nature of the effect, the potential disturbance or displacement of hen harrier during the construction phase is predicted to be ***not significant***.

9.5.2.2.2 Designated Sites (Charleville Wood SAC)

There is a risk of pollutants, namely silt and hydrocarbons to enter the River Clodiagh through the instream works proposed for construction of the debris trap in Area 1 of the Proposed Scheme, as well as the proposed bankside works, in the absence of mitigation. Furthermore, there is a risk of IAPS spread

(Japanese knotweed) downstream as a result of the Proposed Scheme. As such, there is potential for indirect habitat deterioration effects within Charleville Wood SAC as a result of the Proposed Scheme. Two QIs are listed for this SAC, namely alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)* [91E0] and Desmoulin's whorl snail [1016].

9.5.2.2.2.1 Habitat loss, degradation and alteration; spread of IAPS; water quality

Habitat deterioration effects from construction phase contaminants and IAPS are likely to be restricted to habitats within the floodplain of the River Clodiagh. According to the Conservation Objectives (CO) document for Charleville Wood SAC, alluvial forest habitat, for which this SAC is designated, is present around Charleville Lake and occurs in mosaic with other native woodland types (NPWS, 2021a). The document also states that it is important to note that further unsurveyed areas may be present within the SAC. Mapping in the CO document (Map 2) indicates that the habitat occurs on the banks of the River Clodiagh within the SAC, as well as the area around Charleville Lake. There is one known site in Charleville Wood SAC for Desmoulin's whorl snail which is found on the margins of Charleville Lake within the 1km grid square N3122 (NPWS, 2021a). The swamp habitat fringing Charleville Lake is the main area of habitat that supports Desmoulin's whorl snail. Another sub-site is in an area of wet woodland with sedges (*Carex* spp.) to the east of the lake (NPWS, 2021a). EPA river flow mapping does not indicate that the River Clodiagh flows into Charleville Lake, however it is possible that this could occur during a flood event. Catchment-based Flood Risk Assessment and Management (CFRAM) river flood extents for the lands within Charleville Wood SAC are currently under review. Therefore, the precautionary principle has been applied and it is assumed that during a flood event, there may be direct hydrological connectivity between the River Clodiagh and Charleville Lake.

Siltation of Desmoulin's whorl snail habitat and hydrocarbon pollution of Desmoulin's whorl snail habitat as well as alluvial forest has the potential to result in significant effects on Charleville Wood SAC. Furthermore, Japanese knotweed can be harmful to QI habitats and species due to its aggressive growth, resilience and the ecological impacts it imposes. Japanese knotweed can quickly dominate an area, outcompeting with native flora for resources and altering habitats. Alluvial forests are characterised by their rich biodiversity and unique ecosystem functions, and are especially vulnerable to such invasions, as they rely on a balance of species interactions to maintain their ecological integrity. Japanese knotweed invasion could result in the loss of flora on which Desmoulin's whorl snail relies (e.g., large sedges, reeds) and could also result in too much shade and/or drying out of the snail's habitat. Given that in-stream works are highly unlikely to be permitted during flood events as standard health and safety protocol, it is acknowledged that the likelihood of some of the above sources of significant effects (silt, hydrocarbons) migrating into the alluvial forest and supporting habitat for Desmoulin's whorl snail of Charleville SAC is reduced. Nevertheless, flood waters could mobilise hydrocarbon spills on the bank top which have not been properly treated, for example, or mobilise silt from exposed ground within the works area. Furthermore, hydrocarbon spills within the works area could migrate to the River Clodiagh via storm water drains or sloping ground, and eventually reach the SAC.

The extent of the effect is the habitats associated with Charleville Wood SAC within the floodplain of the River Clodiagh. Due to the prevalence of Third Schedule invasive plant species within Area 2 of the Proposed Scheme and the risk to water quality deterioration as a result of bankside and instream works, the precautionary principle has been applied, and the magnitude is considered to be potentially significant (i.e., large areas of habitat within the SAC could theoretically be affected). The duration of the effect of the spread of Third Schedule invasive species has the potential to be long-term, whereas construction phase hydrocarbon pollution or siltation events would be short-term in duration. The effect is considered to be reversible after construction works are completed. The effect is predicted to be ***significant*** and negative, if no mitigation and/or management is implemented.

9.5.2.2.2.2 Changes in groundwater quality and/or yield

Charleville Wood SAC and the Proposed Scheme are within the Geashill groundwater body. This SAC has groundwater dependent QI habitat and species, namely alluvial forests and Desmoulin's whorl snail. The Conservation Objective (CO) for alluvial forests states that a hydrological regime of appropriate flooding depth and height of the water table is essential to maintain alluvial forests, while the CO for Desmoulin's whorl snail states that the hydrological regime is to maintain the current water levels in the lake subject to natural processes (NPWS, 2021a).

Groundwater flows to the surface water bodies and springs within the flow direction, controlled by topography, in the Geashill groundwater body. The flow path lengths within this groundwater body are

described by the GSI are short (< 30 – 300 m) (GSI, 2003). Given that the flow paths are relatively short, and that the SAC is located more than 9 km north of the Proposed Scheme, groundwater flow will likely be into the Clodiagh River within the footprint of the Proposed Scheme. Dewatering of groundwater infiltrating excavations may be required during the Construction Phase. However, given the distance between the Proposed Scheme and this SAC, and the small scale of any dewatering that will be required for the Proposed Scheme relative to the extent of the aquifer underlying both the Proposed Scheme and Charleville Wood SAC (Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones), significant effects on yield or groundwater quality are not anticipated. Furthermore, according to **Chapter 10: Land, Soil and Hydrogeology**, given the expected depth to bedrock, limited depth of excavation required across Areas 1, 2 and 3 of the Proposed Scheme and areal extent of the excavtions, it is considered unlikely that the deeper regional water table will be encountered.

Based on the above, the extent of the effect would be localised to lands within and adjacent to the Proposed Scheme, and would not extend as far as the SAC itself. The magnitude of the effect on Charleville Wood SAC would therefore be negligible. The duration of the effect (locally) would be short-term and the effect would be reversible. Due to the magnitude, reversibility and short-term nature of the impact, the effect of changes to groundwater quality or yield during the construction phase is predicted to be ***not significant***.

9.5.2.2.2.3 Effects on species

Indirect effects on species associated with designated sites with connectivity to the Proposed Scheme have been identified through the effect of potential habitat deterioration as described above. Direct effects on species are also possible through the toxic effects of accidental contaminant losses to the River Clodiagh during the construction phase. The extent of the effect would be the River Clodiagh and downstream habitats within the river's floodplain such as Charleville Lake, where Desmoulin's whorl snail is known to occur. Hydrocarbon pollution of habitat supporting Desmoulin's whorl snail has the potential to result in significant negative effects on this species through direct toxicity, which could result in mortality of individuals. The magnitude of the effect cannot be quantified but could be the mortality of a proportion of the population. The effect could be long-term and irreversible if a significant mortality event occurred. Due to the potential magnitude of the effect, the effect is predicted to be negative and ***significant***, if no mitigation is implemented.

9.5.2.2.3 Designated Sites (SACs designated for White-Clawed Crayfish)

As crayfish plague was confirmed in the River Clodiagh in 2021, there is a risk of crayfish plague transfer to other waterbodies from the Clodiagh River as a result of the Proposed Scheme. Although there is a possibility that the pathogen is no longer present within the River Clodiagh (the pathogen is likely to die out once all host crayfish perish (Brady, et al., 2024), surveys in Ireland have found crayfish plague to persist in catchments both upstream and downstream of an infected site a year after the first reported outbreak. This was observed in the River Bruskey in the Erne catchment (Brady, et al., 2024). Furthermore, the Marine Institute, as part of the National Crayfish Plague Surveillance Programme (2020/2021) detected crayfish plague via eDNA analysis in sites within the Shannon Estuary South in both 2020 and 2021 (Swords & Griffin, 2022). Therefore, without tests confirming the absence of crayfish plague from the Clodiagh River, the possibility that it still persists must be assumed.

Fifteen SACs which all have the white-clawed crayfish listed as a QI were taken into consideration as part of the assessment due to the presence of crayfish plague in the Clodiagh River. These include the following SACs: River Barrow and River Nore SAC, Blackwater River (Cork/Waterford) SAC, Bricklieve Mountains and Keishcorran SAC, Glenade Lough SAC, Kilroosky Lough Cluster SAC, Lough Bane and Lough Glass SAC, Lough Corrib SAC, Lough Gill SAC, Lough Lene SAC, Lough Owel SAC, Lower River Suir SAC, River Moy SAC, White Lough Ben Loughs and Lough Doo SAC, Lough Hoe Bog SAC, Lough Nageage SAC.

The proposed construction activities within the Clodiagh River could inadvertently facilitate the transfer of the pathogen responsible for crayfish plague, via machinery, equipment, and PPE.

In the absence of mitigation measures to control the spread of this pathogen, the potential for likely significant effects on the QI white-clawed crayfish associated with the fifteen SACs as listed above cannot be ruled out. Although spread from the Proposed Scheme area to SACs a significant distance from the Proposed Scheme is unlikely (e.g., Lough Nageage SAC in Co. Donegal), given the potential magnitude of the effect of the spread of this pathogen into watercourses (risk of 100% mortality in affected populations), and the uncertainty as to whether it could occur, all SACs for which white-clawed crayfish is listed as a QI are considered in this assessment as a precaution. The effect of spread of crayfish plague could be of the

extent of the entire waterbody into which it is introduced. In the absence of appropriate mitigation, there is potential for ***significant***, negative, irreversible, permanent effects.

9.5.2.2.4 Designated Sites (Screggan Bog NHA, Charleville Wood pNHA and Clonad Wood pNHA)

9.5.2.2.4.1 Habitat loss, degradation and alteration

The Proposed Scheme has downstream, hydrological connectivity with Screggan Bog NHA, Charleville Wood pNHA and Clonad Wood pNHA via the Clodiagh River. There is a risk of pollutants, namely silt and hydrocarbons to enter the River Clodiagh through the instream works proposed for construction of the debris trap in Area 1 of the Proposed Scheme, as well as the proposed bankside works, in the absence of mitigation. Furthermore, there is a risk of IAPS spread (Japanese knotweed) downstream as a result of the Proposed Scheme. As such, there is potential for indirect habitat deterioration (loss, degradation and alteration) within Screggan Bog NHA, Charleville Wood pNHA and Clonad Wood pNHA as a result of the Proposed Scheme. Due to the overlap between Charleville Wood pNHA and Charleville Wood SAC, it is considered that any effect on Charleville Wood pNHA would be the same as that for Charleville Wood SAC. Therefore, for assessment of effects on Charleville Wood pNHA, please refer to **Section 9.5.2.2.2**.

Habitat deterioration effects from construction phase contaminants and IAPS are likely to be restricted to habitats within the floodplain of the River Clodiagh. Screggan Bog NHA and Clonad Wood pNHA are located immediately adjacent to and within the flood plain of the River Clodiagh. There is potential for sensitive habitats associated with these pNHAs (e.g., species rich marsh vegetation, bog habitat, woodland) to be indirectly affect by the Proposed Scheme through accidental hydrocarbon or other contaminant spills which could pollute these habitats during a flood event.

Excessive siltation and hydrocarbon pollution of sensitive habitats has the potential to result in significant effects on habitats and fauna of the NHA and pNHAs located downstream of the Proposed Scheme. Furthermore, Japanese knotweed can be harmful to habitats and species due to its aggressive growth, resilience and the ecological impacts it imposes. Japanese knotweed can quickly dominate an area, outcompeting with native flora for resources and altering habitats.

The extent of the effect is the habitats associated with Screggan Bog NHA and Clonad Wood pNHA within the floodplain of these sites. Due to the prevalence of Third Schedule invasive plant species within Area 2 of the Proposed Scheme and the risk to water quality deterioration as a result of bankside and instream works, the precautionary principle has been applied, and the magnitude is considered to be potentially significant (i.e., large areas of habitat could theoretically be affected). The duration of the effect of the spread of Third Schedule invasive species has the potential to be long-term, whereas construction phase hydrocarbon pollution or siltation events would be short-term in duration. The effect is considered to be reversible after construction works are completed. The effect is predicted to be ***significant***, if no mitigation and/or management is implemented.

9.5.2.2.4.2 Effect of species

Refer to **Section 9.5.2.2.2.3** above which addressed the potential for significant effects on Desmoulin's whorl snail, which is located within Charleville Wood SAC/pNHA.

9.5.2.2.5 Woodland habitats (WD1 Mixed Broadleaved Woodland; WL1 Hedgerows; WL2 Treelines)

9.5.2.2.5.1 Habitat Loss and Fragmentation

To facilitate the construction of the Proposed Scheme, habitat and tree removal will be required. Accordingly, the Proposed Scheme will result in the permanent loss, fragmentation and alteration of these habitats. Expected habitat loss (area for woodland, length for hedgerow/treeline) has been quantified below.

Tree removal within IEF habitats is as follows:

- WD1 (Brittas Wood) at debris trap and culvert inlet location: approximately 666 m^2, inclusive of canopy spread (9 no. trees);

- WD1 (Brittas Wood) along proposed embankment: approximately 28 m^2, inclusive of canopy spread (1 no. tree);
- WL1 (Area 2): approximately 30 m;
- WL2 (Area 2): 10 m (4 no. trees)[11]; and
- WD1 (Area 3): approximately 253 m^2; (1 no. tree and surrounds, plus section of hedge/woodland near entrance to field).

The trees to be removed within the private garden in Area 2 and the small planted ornamental trees on Chapel street are not considered IEFs, and as such, assessment of the loss of these trees/habitat is not undertaken here.

Within Brittas Wood (Area 1), the extent of the effect is predicted to be the WD1 mixed broadleaved woodland habitat within the footprint of the works area. The magnitude is considered to be a maximum loss of 10 no. trees (approximately 694 m^2) in total from Brittas wood. The removal of these trees will create gaps in the tree line along the left bank of the River Clodiagh and within the woodland itself. This effect is considered to be permanent and irreversible as the flood defences and associated access routes to same will be replacing this habitat. The effect predicted to be ***not significant*** due to the relatively small magnitude (10 trees) of the effect (in the context of the wider landscape and woodland), and the location of trees to be removed (on the woodland margins at Brittas Stream culvert and along the margins of an existing gravel path). The implications of tree removal along the River Clodiagh in terms of shading/loss of riparian habitat is addressed in **Section 9.5.3.3.1**.

Within Area 2, the removal of approximately 30 m of WL1 hedgerow habitat, which currently forms garden/field boundaries, will be required to facilitate access between the compound location and the flood wall works area (i.e., 3 discrete c. 10 m lengths from hedgerows H3, H4 and H5). These lengths of WL1 habitat to be removed may be of some local importance for wildlife, but are not particularly species-rich, do not serve as important ecological corridors, and are of limited intrinsic ecological value given their current managed nature. The effect will be permanent but reversible, as replanting of the removed hedges is possible on completion of works. Taking the above into consideration, the loss of WL1 hedgerow habitat in Area 2 is considered to be ***not significant***.

Within Area 2, the removal of 10 m of WL2 treeline habitat on the left bank of the River Clodiagh will be required to facilitate works to the flood wall on Chapel Street. Note that this treeline does not include the widely spaced wild cherry cultivars planted along the road in Clonaslee, further north. These trees (the cherry cultivars) have negligible ecological value and are not considered to be part of this treeline or IEFs for the purposes of this assessment. The WL2 habitat affected may be of some local importance for wildlife but is not species-rich. This treeline occurs adjacent to a significant existing gap in the ecological corridor, created by the R422 bridge over the River Clodiagh (Clonaslee Bridge). Given the existing fragmentation of the ecological corridor at this location and the presence of trees on the right bank, the extent of the effect will be restricted to the immediate area where habitat will be removed. The magnitude of the effect is approximately 10 m of WL2 (4 no. trees). The effect will be permanent and irreversible as replacement planting at this location is not considered possible. Taking the above into consideration, the loss of WL2 treeline habitat in Area 2 is considered to be ***not significant***.

Within Area 3, the removal of approximately 253 m^2 of WD1 woodland will be required where it occurs on the southern side of the access road to the ICW (i.e. the road between the ICW and Tullamore Road). This will result in the loss and fragmentation of linear woodland habitat at this location. The gaps created within the linear strip of woodland adjacent to the ICW access road will be approximately 14 m in length towards the east of this woodland strip, and approximately 11.5 m towards the west. A strip of vegetation along the left bank of the River Clodiagh (including a crab apple *Malus sylvestris* - tree no. 152) at this location will be retained. The strip of woodland that will be fragmented along the access road is approximately 36 m in length. Therefore, the majority (c. 71 %) of the length of this woodland strip will be lost. This section of linear woodland is not expected to form a vital role as an ecological corridor in the wider landscape, as it terminates at the Tullamore Road, and the main linear habitat it is linked with is the hedgerow on the eastern side of Tullamore Road (i.e., H7), which is linked to the main ecological corridor within the Scheme Area (i.e., the Clodiagh River and treelines/woodland adjacent to it) further south. As such, the effect of removal is not

[11] It may be possible to retain these trees, unless the roots extend underneath the proposed wall. Wall excavation shall be witnessed by a Construction Stage Arborist. For the purposes of assessment, it is assumed that these trees will be removed.

expected to extend beyond the red line boundary of the Proposed Scheme. The magnitude of this effect on the habitat itself is approximately 25.5 m and 253 m^2. The effect is permanent and irreversible where tree removal is required for the proposed embankment. The effect is reversible where tree removal is required to facilitate sight lines towards the west of this section of woodland, as replacement planting would be possible here. Taking the above into consideration, the effect of habitat loss and fragmentation of WD1 in Area 3 is predicted to be ***not significant***.

9.5.2.2.5.2 Accidental damage to habitats

In addition to direct effects from habitat removal, there is a risk of significant effects on treelines, hedgerow and mixed broadleaved woodland habitat adjacent to or within the footprint of the proposed works through indirect damage to the canopy and roots of trees and shrubs (e.g., due to excavation nearby or tracking within root protection zones). The extent of this effect would be the trees/hedgerows and associated flora immediately adjacent to the works area. In a conservative scenario with no mitigation measures in place, the magnitude of the effect could be several trees or several hundred metres of hedgerow or treeline. The effect would be permanent but reversible as replacement planting would be possible. However, it could take many years for any replacement planting to replicate the habitat that was lost. Taking the potential magnitude into consideration, the effect is considered to be ***significant***.

9.5.2.2.5.3 Habitat degradation

The release of dust and vehicle emissions during the construction phase of the Proposed Scheme has the potential to affect woodland habitat through smothering of vegetation and air pollution. The potential impacts to air quality from the construction phase of the Proposed Scheme that may affect mixed broadleaved woodland, treelines and hedgerows is primarily a result of the generation of traffic emissions (i.e., vehicles and machinery) from material haulage and plant, and dust emissions from various construction works (i.e., excavations, works on Chapel Street wall, embankment construction, stockpiles). The extent of the effect on sensitive sites is predicted to be within 200 m of the Proposed Scheme (dust) and the redline boundary of the Proposed Scheme (vehicle emissions). As discussed in **Chapter 12: Air Quality**, the risk to sensitive ecological receptors from dust emissions arising from earthworks, construction and track out is *negligible* to *medium*. Only one area was identified as being at medium risk for one activity (track out), namely Area 1 Brittas Wood. All other activities in all areas were of *negligible* or *low* risk to sensitive ecological receptors. The magnitude of the effect is considered to be the potential minor degradation of adjacent habitats as a result of dust deposition. The effect is considered to be reversible after construction works are completed and short-term in nature. Due to the magnitude, reversibility and short-term nature of the impact, the effect of potential habitat degradation during the construction phase is predicted to be ***not significant***. With regards to vehicle emissions from construction traffic, the following has been extracted from **Chapter 12: Air Quality**: The transport of material to and from the site will generate additional temporary traffic on the existing road network. The TII guidelines state that increases in Annual Average Daily Traffic (AADT) flows of less than 10% during the construction phase are unlikely to result in significant air quality effects. Given that the expected peak traffic volumes will be below the 10% of baseline traffic, the impact to air quality from construction traffic is not considered significant. The air quality impact on human receptors as a result of construction traffic is considered imperceptible. This conclusion is pertinent to the habitat quality of hedgerows/treelines/mixed broadleaved woodland, therefore, in keeping with the conclusion of that chapter, the effects of air pollution on woodland habitat is considered to be ***not significant***.

In relation to pollution (i.e., accidental spillages), the effect of a fuel spill on woodland habitat during the construction phase of the Proposed Scheme has the potential to result in habitat degradation. The extent of the effect is predicted to be confined to within and directly adjacent to the proposed works areas where a spill may occur, but also habitats downstream if the spill occurred within or entered the River Clodiagh. The magnitude of the effect would be the degradation of these habitats as a result of pollutant spills. The duration of the effect is considered to be short-term as recovery from a significant spill can take a number of years. This effect is also considered to be reversible. While it is unlikely that a pollution event of such a magnitude to cause irreparable damage would occur during construction, a precautionary approach is being taken, as the effect could be more significant depending on the nature, duration, and extent of the impact. Therefore, it is considered that the effect, in the absence of mitigation, would be ***significant***.

There is a risk of accidental spread of Japanese knotweed from Area 2 into other parts of the scheme. Japanese knotweed can be harmful to habitats and species due to its aggressive growth, resilience and the ecological impacts it imposes. The extent of the effect is the habitats within the Scheme area, but also any habitats occurring downstream on the banks of the River Clodiagh. Due to the prevalence of Third Schedule

invasive plant species within Area 2 of the Proposed Scheme, and recent evidence of downstream spread in the absence of works, the precautionary principle has been applied, and the magnitude is considered to be potentially significant (i.e., large areas of habitat could theoretically be affected). The duration of the effect of the spread of Third Schedule invasive species has the potential to be long-term. The effect is considered to be reversible. Due to the large magnitude of the effect, the effect is predicted to be ***significant***, if no mitigation and/or management is implemented.

9.5.2.2.6 Otter (Commuting & foraging)

9.5.2.2.6.1 Disturbance

The increased levels of human presence, noise and vibration during the construction of the Proposed Scheme could potentially displace commuting and foraging otter from habitats within the ZoI of the Proposed Scheme during the construction phase. In addition, excavations may present a hazard to otter (e.g., through entrapment). The magnitude of these effects will depend on the nature and duration of construction works, and the use of the river corridor by otter, which based on recent surveys appears to be low (see **Section 9.3.4.2**). Construction works associated with the Proposed Scheme will be short-term in nature. Any disturbance or displacement effects will also be short-term and unlikely to affect the conservation status of otter within the ZoI of the Proposed Scheme. The extent of the effect is the entire works area within the Proposed Scheme but could extend beyond this area should otter commuting routes or foraging areas be subject to disturbance (e.g. through night-time lighting, human presence and activity). Given that otter are most active at night, and that no holts or couches were found during the most recent surveys undertaken, the most likely source of disturbance will be construction phase lighting from the Proposed Scheme. It is proposed that standard construction working hours will apply as follows: Monday to Friday: 07:00 to 19:00; Saturdays: 07:00 to 13:00; and no work on Sundays and Bank Holidays. Deviation from these times will only be allowed where prior written approval has been received from the local authority. Therefore, construction lighting during the summer months will not be required due to the prolonged day length. Lighting may be required during the darker months. The magnitude of the effect could be the disturbance of the local otter population. The duration of the effects will not extend further than the construction timeframe associated with the construction works and is considered to be short-term (24 months). This effect is considered to be reversible after construction works are completed. If disturbance/displacement creates a barrier within the landscape during the construction phase of the Proposed Scheme, this disturbance/displacement has the potential to affect otter several kilometres from the Proposed Scheme area. In the absence of mitigation, these works could result in ***significant*** effects.

9.5.2.2.6.2 Habitat loss, degradation and fragmentation

Riparian habitats are important for otter, which utilise riparian areas for holting, resting and commuting. The Proposed Scheme will result in the permanent loss of riparian habitat on the left bank of the River Clodiagh at the proposed debris trap. The magnitude of the effect is estimated to be approximately 20.5 m^2 of riparian habitat at the proposed slipway on the left bank, and the left and right bank face of the River Clodiagh 10 m upstream and 10 m downstream of the debris trap (see **Section 9.5.3.3.1** for details). The effect of works is considered to be negative. The duration of the effect is permanent. The effect is irreversible locally. Given the relatively small magnitude of the effect, the extent of suitable habitat for otter within Brittas Wood and the small scale nature of works proposed on the right bank of the River Clodiagh at the proposed debris trap (the majority of works are proposed on the left bank, no tree removal is proposed on the right bank), it is considered that riparian habitat loss will result in ***not significant*** effects on otter.

Instream works and works adjacent to the Clodiagh River may result in the fragmentation of otter commuting habitat. Outside of Brittas Wood, the effects will be minimal - the proposed works within Areas 2 and 3 will not interact with the river channel. In addition, the proposed works in Area 2 will be carried out from the land side of an existing wall and the proposed works in Area 3 will not be carried out within riparian habitat (works in this area are restricted to the field in Area 3 and an area of hardstanding/lawn within the ICW). Within Brittas Wood, access to the river channel and riparian habitat along the length of the dry works area, in particular along the left bank, will be restricted and has the potential to reduce foraging and commuting efficiency for otter. However, this restriction will be temporary (the construction of the debris trap will be limited to the instream works window of July to September, unless otherwise approved by Inland Fisheries Ireland). It is likely that otter will be subject to a temporary negative effect at a local scale as a result of the works, particularly in Brittas Wood. However, given the extent of suitable foraging habitat upstream and downstream of the Proposed Scheme area, the relatively small instream works area, and the retention of woodland habitat on the right bank adjacent to the in-stream works area where otter could commute, and the

low level of otter activity recorded in the most recent surveys undertaken – the effect is considered to be ***not significant***.

The foraging habitat, and therefore foraging resources for otter could deteriorate during the construction phase of the Proposed Scheme due to adverse changes in surface or ground water affecting fish species (or crayfish, should they occur downstream of the works area). Construction effects with respect to surface and ground water are assessed in **Section 9.5.3**, **Chapter 10: Land, Soil and Hydrogeology and Chapter 11: Water**. These assessments are also pertinent to the foraging habitat quality and resources of otter. As noted in **Section 9.5.3.3.4**, indirect effects of contaminant losses to watercourses on aquatic fauna are considered to be significant, negative, short-term to medium-term and reversible. Therefore, in the absence of mitigation, it is deemed these works could also cause ***significant*** effects on otter which depend on aquatic fauna for food.

9.5.2.2.7 Bats (Roosting, commuting & foraging)

9.5.2.2.7.1 Habitat loss, degradation & fragmentation

Several habitats are particularly important for foraging bats including freshwater, woodland, grassland and linear habitats such as hedgerows and treelines. Freshwater habitats are excellent feeding grounds for bats as many insects have aquatic larval stages and bats take advantage of the emerging insects. The Proposed Scheme will result in the loss of woodland and treeline habitat likely being used by commuting and foraging bats, as described in **Section 9.5.2.2.5.1** above. Linear habitats (e.g., hedgerows, treelines, rivers, tree-lined footpaths etc.) and woodland edges are important features in the landscape for bats as they utilise these habitats for commuting from one area of their habitat to another. These features act as navigational landmarks and can also provide some protection from predators. Many bat species will not fly across open areas and instead will follow linear features that provide shelter from wind for both the bats and their insect prey, as well as cover from predators. Gaps as small as 10 m may prevent bats using hedgerows and treelines (Entwistle, et al., 2001), however, it is possible that this effect would be lessened where the treeline or hedgerow occurs adjacent to a watercourse, as the watercourse itself would contribute to the overall ecological corridor.

Habitat loss and fragmentation during the construction phase of the Proposed Scheme has the potential to affect bats several kilometres from the redline boundary as bat roosts can be a number of kilometres from their foraging grounds. The effect is predicted to be permanent and irreversible where habitats are removed to facilitate the construction of permanent features associated with the Proposed Scheme (i.e., embankments and the debris trap). Within Area 1 (Brittas Wood), the removal of trees is not expected to significantly affect commuting or foraging bats. This is because works are proposed along an area that is already open within the woodland (i.e., along the gravel pathway), and edge habitat that would be used by commuting bats will still exist here during and after the construction phase. Therefore, it will still be possible for bats to commute along this area. In relation to tree removal adjacent to the River Clodiagh in Area 1, trees will only be removed from one location on the left bank. Trees and riparian vegetation on the right bank will not be affected, thus maintaining the ecological function of this corridor. Therefore, ***no significant effects*** on commuting and foraging bats at this location are anticipated.

As noted above, the hedgerows to be removed in Area 2 do not serve as important ecological corridors. The removal of these hedgerows is not expected to significantly affect commuting and foraging bats. Within Area 2, the removal of WL2 treeline habitat on the left bank of the River Clodiagh is required. This treeline occurs adjacent to a significant existing gap in the ecological corridor, created by the R422 bridge over the River Clodiagh (Clonaslee Bridge, approximately 15 m in width). Given the existing fragmentation of the ecological corridor at this location and the presence of trees on the right bank opposite the location of where trees will be removed, ***no significant effects*** on commuting bats at this location are anticipated. The effect will be permanent and irreversible as replacement planting at this location would not be possible. Similarly, the removal of trees from the private garden in Area 2 on the left bank of the River Clodiagh will not result in the fragmentation of an ecological corridor, given the presence of a mature treeline on the right bank of the River Clodiagh at this location and the presence of the river itself.

Within Area 3, fragmentation of linear woodland habitat will occur as a result of the Proposed Scheme, where it occurs adjacent to the ICW access road. This section of linear woodland is not expected to form a vital role as an ecological corridor in the wider landscape, as described in **Section 9.5.2.2.5.1**. Furthermore, the removal of vegetation from this woodland is unlikely to significantly affect bats utilising the woodland parallel to the River Clodiagh and the River Clodiagh itself as an ecological corridor. This is because a buffer of vegetation (inclusive of a crab apple tree with a crown spread of roughly 4 m) will be retained between the

River Clodiagh and the proposed location of vegetation clearance. The effect will be permanent. The effect will be reversible where vegetation is required to be removed to facilitate sightlines, but irreversible where vegetation is required to be removed to facilitate the proposed embankment. Taking the above into consideration, the effects of habitat fragmentation are ***not expected to be significant***.

The foraging habitat, and therefore foraging resources for bat species could deteriorate during the construction phase of the Proposed Scheme due to adverse changes in surface or ground water affecting aquatic invertebrate species. Bats will feed on the aerial life stage of aquatic invertebrate species such as midges, mayflies and caddieflies. Construction effects with respect to surface and ground water are assessed in **Section 9.5.3**, **Chapter 10: Land, Soil and Hydrogeology** and **Chapter 11: Water**. These assessments are also pertinent to the foraging habitat quality of bats. As noted in **Section 9.5.3.3.4** below, indirect effects of contaminant losses to watercourses on aquatic fauna are considered to be significant, negative, short-term to medium-term and reversible. Therefore, in the absence of mitigation, it is deemed these works could also cause ***significant*** effects on bat species dependent on the aerial life-stage of aquatic invertebrates.

No confirmed roosts were identified within the Proposed Scheme area. However, a number of trees were identified as having the potential to support bats. The majority of these trees had features with the potential to support individual bats (PRF-Is). Three trees with the potential to support individual bats (PRF-Is) will be removed to facilitate the Proposed Scheme. No trees with features to potentially support multiple bats (PRF-M) will be removed, however, it will be necessary to track machinery within the root protection zone of tree number 8 in Brittas Wood. This tree was the only tree surveyed within the Scheme area with a PRF-M feature. Emergence surveys of this tree did not reveal the presence of roosting bats, however a lot of activity around the tree and feature was noted during surveys.

The effect of tree removal will be permanent and irreversible. The loss of trees with PRF-I features is unlikely to impact on the local bat assemblage given their limited ability to support roosting bats and the presence of other suitable trees within the local landscape. However, precautionary measures are included as part of mitigation with respect to the felling of these trees, and works adjacent to tree number 8, since their potential for roosting could change over time.

Overall, there will be ***no significant effect*** on roosting bats with respect to the trees proposed to be felled as part of the Proposed Scheme.

9.5.2.2.7.2 Disturbance

The Proposed Scheme will require construction works along the River Clodiagh, which has been shown to be utilised by commuting and/or foraging bats. The Proposed Scheme has the potential to disturb commuting and foraging bats during the construction phase via light pollution, as artificial lighting is required to facilitate works.

It is proposed that standard construction working hours will apply as follows: Monday to Friday: 07:00 to 19:00; Saturdays: 07:00 to 13:00; and no work on Sundays and Bank Holidays. Deviation from these times will only be allowed where prior written approval has been received from the local authority. The Proposed Scheme will be constructed over a two-year time period. Construction lighting during the summer months will not be required due to the prolonged day length. Lighting will be used during the darker months when bats are likely to be less active and/or in hibernation. The effect from construction lighting on commuting and foraging bats will therefore be reduced to periods where lighting times and working hours will conflict with early spring (i.e. February/March), late autumn (i.e. October) and early winter (i.e. November) bat activity. Artificial lighting at these times could negatively affect foraging and commuting bats. If disturbance/displacement creates a barrier within the landscape during the construction phase of the Proposed Scheme, this disturbance/displacement has the potential to effect bats several kilometres from the redline boundary as bat roosts can be a number of kilometres from their foraging grounds. The magnitude would be the disturbance of commuting, foraging and roosting bats within the Proposed Scheme area. This effect is considered to be short-term in duration as the construction works will take place over a maximum time period of 24 months. It is also considered to be reversible once works cease. In the absence of mitigation, these works could result in ***significant*** effects.

9.5.2.2.8 Birds (breeding & foraging)

9.5.2.2.8.1 Habitat loss & degradation

Removal of vegetation within the Proposed Scheme area, as well as accidental damage to hedgerows, treelines or woodland habitats could result in the loss of habitat for breeding and foraging birds. Habitat loss or degradation would comprise that described in **Section 9.5.2.2.5**, as well as any loss of non-IEF habitat (small patch of scrub and ornamental planting in private garden in Area 2). Most of the birds observed within the Scheme Area are likely to nest within hedgerows and trees. However, grey wagtail and dipper may build nests in rock crevices, tree roots, cavities or on ledges under bridges or walls adjacent to rivers and streams. Therefore, permanent loss of riparian habitat at the proposed debris trap location could result in loss of nesting habitat for grey wagtail and dipper. Kingfisher nesting habitat was found within the Proposed Scheme area, however, works associated with the Proposed Scheme will not result in the loss of any kingfisher nesting habitat. The effect of habitat loss on breeding birds during the construction phase of the Proposed Scheme is predicted to be confined to within the proposed works areas. The magnitude of the effect would be restricted to the Proposed Scheme area. Habitat loss associated with land take for permanent features of the Proposed Scheme (e.g., the embankment and debris trap slipway) will be permanent and irreversible. The timing of the construction works will influence the magnitude (i.e., vegetation removal between March and August, inclusive, are more likely to disturb breeding birds). This effect is considered to be reversible where removal is required to facilitate access routes (e.g. in areas 2 and 3) as replanting would be possible. Due to the relatively minor magnitude and extent of this effect during the construction phase of the Proposed Scheme, the effect is considered to be ***not significant***.

The foraging habitat for grey wagtail, dipper and kingfisher could deteriorate during the construction phase of the Proposed Scheme due to adverse changes in surface or ground water affecting aquatic prey species. Construction effects with respect to surface and ground water are assessed in **Section 9.5.3**, **Chapter 10: Land, Soil and Hydrogeology** and **Chapter 11: Water**. These assessments are also pertinent to the foraging habitat quality of grey wagtail, dipper and kingfisher. As noted in **Section 9.5.3.3.4**, indirect effects of contaminant losses to watercourses on aquatic fauna are considered to be ***significant***, negative, short-term to medium-term and reversible. Therefore, in the absence of mitigation, it is deemed these works could also cause significant effects on bird species dependent on aquatic macroinvertebrates or fish.

9.5.2.2.8.2 Disturbance

The increased levels of human presence, noise and vibration during the construction of the Proposed Scheme could potentially displace breeding birds from habitats within the ZoI of the Proposed Scheme. The magnitude of this effect will depend on the nature and duration of construction works. Construction works associated with the Proposed Scheme will be short-term in nature. Any disturbance or displacement effects will also be short-term and unlikely to affect the conservation status of breeding bird species within the ZoI of the Proposed Scheme. Regarding kingfisher, suitable nesting habitat was identified within and adjacent to the Proposed Scheme area, however nest holes were not found. The extent of the effect is the entire works area within the Proposed Scheme. The magnitude of the effect is considered to be the disturbance of breeding birds of a range of species. The duration of the effects will not extend further than the construction timeframe associated with the construction works and is considered to be short-term (24 months). The timing of the construction works will influence the magnitude (i.e. vegetation removal between March and August, inclusive, are more likely to disturb breeding birds). This effect is considered to be reversible after construction works are completed. The effect during the construction phase of the Proposed Scheme is predicted to have a short-term and reversible effect on this IEF, which is considered ***not significant***.

9.5.2.2.8.3 Mortality or injury

If site clearance works were to be undertaken during the breeding bird season (March to August, inclusive) it is plausible that nest sites holding eggs or chicks will be destroyed and birds killed. As such, the mortality of breeding birds during site clearance of the Proposed Scheme has the potential to have a short-term effect on the breeding bird population locally. To comply with the legal protection afforded to breeding birds under the Wildlife Acts, mitigation measures must be employed, as set out in **Section 9.6.5**. The extent of the effect is the entire works area within the Proposed Scheme. The magnitude of the effect could be the killing and/or injury of nesting birds and their young within the footprint of the Proposed Scheme. The timing of the construction works will influence the magnitude (i.e., vegetation removal between March and August, inclusive, are more likely to disturb breeding birds). This effect is considered to be reversible (i.e. through population recovery) after construction works are completed. Due to the magnitude, this effect during the

construction phase of the Proposed Scheme is predicted to have a short-term and reversible effect on this IEF, which in the absence of mitigation measures, would be considered ***significant***.

9.5.2.2.9 Hen Harrier

The potential for significant effects on hen harrier has been considered as part of the assessment of potential effects on the Slieve Bloom Mountains SPA. In accordance with this assessment, ***no significant*** effects on hen harrier are anticipated as a result of the Proposed Scheme (see **Section 9.5.2.2.1**).

9.5.2.3 Sources of Operational Phase Effects

The key sources of impact on ecology from the Operational Phase of the Proposed Scheme are impacts on the aquatic environment. However, effects on the aquatic environment could indirectly affect Designated Sites and otter. The sources of effects are regular maintenance of the debris trap and Brittas Stream culvert inlet, hydrological impacts and Operational Phase flooding. Irregular removal of debris has the potential to release sediment built up behind the accumulated debris causing temporary water quality and habitat degradation. Changes to the hydrological regime of the River Clodiagh during the operational phase could affect alluvial woodland and habitats supporting Desmoulin's whorl snail downstream of the Proposed Scheme. Given the presence of crayfish plague in the River Clodiagh, maintenance activities that require interference with the river channel could result in the spread of crayfish plague into other river catchments, should equipment, plant and PPE not be disinfected following works.

It will be necessary to remove some of the existing street lighting along Chapel Street to facilitate works along the wall in Area 2. Reinstatement of the street lighting will be required post works. Depending on the type of street lighting installed, impacts on bats or other nocturnal fauna such as otter could arise as a result of operational phase lighting.

9.5.2.4 Assessment of Effects on IEFs during the Operational Phase

9.5.2.4.1 Designated Sites (Charleville Wood SAC, Screggan Bog NHA, Charleville Wood pNHA and Clonad Wood pNHA)

9.5.2.4.1.1 Habitat disturbance – Maintenance of Brittas Stream culvert inlet and debris trap

Siltation of downstream reaches of the River Clodiagh arising as a result of operational phase maintenance activities (debris removal and maintenance of the Brittas Stream culvert) is anticipated to be a localised effect that could affect water quality within the River Clodiagh (see **Section 9.5.3.5.4**). Silt from upstream sources in the River Clodiagh catchment could accumulate behind debris within the proposed debris trap or Brittas Stream culvert, and then create a plume downstream when disturbed. Charleville Wood SAC is the closest European Site that supports water dependent habitats and species with connectivity to the Proposed Scheme. The location of Charleville Wood pNHA overlaps with Charleville Wood SAC. This SAC/pNHA is located 13 km downstream of the Proposed Scheme. Screggan Bog NHA and Clonad Wood pNHA are located approximately 10.2 km and 8.3 km downstream, respectively. In relation to Charleville Wood SAC, according to the CO document, there is one known site in Charleville Wood SAC for Desmoulin's whorl snail which is found on the margins of Charleville Lake within the 1km grid square N3122 (NPWS, 2021a). EPA river flow mapping does not indicate that the River Clodiagh flows into Charleville Lake, although as noted above, there could be connectivity between these two waterbodies during a flood event. Similarly, Screggan Bog NHA and Clonad Wood pNHA are assumed to be located within the River Clodiagh flood plain. It is assumed for the purposes of this assessment that maintenance activities that could result in siltation occurring downstream will not be undertaken during flood events (i.e., debris removal will be undertaken after a flood has occurred). It is anticipated that this effect would therefore be localised and restricted to the channel of the River Clodiagh (and not adjacent habitats within the flood plain downstream). It is assumed that silt plumes potentially arising from maintenance activities would settle out within the River Clodiagh channel prior to reaching these designated sites. Furthermore, it is assumed that vehicles used to clear debris will be appropriately maintained and thus there is a low likelihood of a fuel or chemical leak from same occurring during maintenance activities. The effect would be localised, and the magnitude would depend on the amount of silt that has accumulated. Taking into consideration the relatively minor and infrequent nature of maintenance works required and the distance between the Proposed Scheme and downstream Designated Sites during these activities, any effects would be negative but are anticipated to be ***not significant***. The duration of the effect would be short-term. The effect is considered to be reversible.

9.5.2.4.1.2 Habitat Disturbance - Siltation

There is a risk of run-off from the slipway to the River Clodiagh, as well the embankment in Area 1 during the operational phase (see **Section 9.5.3.5.7**). These sloping features of the Proposed Scheme design could create preferential surface water flow pathways to the River Clodiagh. The run-off could be silt laden, or introduce unnatural material into the river such as hardcore or grit, which could have negative effects on instream habitat and fauna. If the surface of the slipway and gravel path was regularly maintained, the effect could be chronic during the lifetime of the Proposed Scheme. It is anticipated that the extent of the effect would be localised and restricted to the channel of the River Clodiagh, and effects on habitats within the flood plain of downstream Designated Sites would be irreversible, permanent, neutral and ***not significant***. Refer to **Section 9.5.3.5.7** for an assessment of effects on the River Clodiagh.

9.5.2.4.1.3 Habitat Disturbance - Flooding

During the operational phase, a reduction in urban flooding will occur. Floodwaters passing through urban environments typically entrain pollutants such as litter, sediments, heavy metals and hydrocarbons from roads and footpaths, and potentially cause surcharging of sewer systems resulting in increased risk of biological contamination. This has a negative impact on the watercourse to which the floodwaters return. Therefore, the reduction in urban flooding during the operational phase could result in a *positive* effect on water quality. Floodwaters passing over agricultural land or adjacent to the ICW could entrain sediment and nutrients, which could flow into both the River Clodiagh and River Gorragh. Flood modelling shows that during the operational phase, there is no increased risk or change in the nature of flooding over agricultural lands or in lands around the ICW (see **Figure 9-14**), and this effect is therefore considered to be *neutral*. effect is considered to be permanent and irreversible. The effect on water quality, and as a result habitat quality within designated sites in the River Clodiagh floodplain is anticipated to be ***not significant***.

9.5.2.4.1.4 Changes to downstream hydraulic conditions

The construction of embankments and floodwalls could lead to changes in channel velocities and potential changes to patterns of bed material transport (deposition / scouring) during a flood event during the operational phase. The Annex I habitat alluvial forests is listed for Charleville Wood SAC/pNHA which occurs downstream of the Proposed Scheme area. According to the Conservation Objectives (CO) document for this SAC, the habitat is present around Charleville Lake and occurs in mosaic with other native woodland types (NPWS, 2021a). The document also states that it is important to note that further unsurveyed areas may be present within the SAC. Mapping in the CO document (Map 2) indicates that the habitat occurs on the banks of the River Clodiagh within the SAC. Appropriate hydrological regimes are necessary for the maintenance of alluvial vegetation. Therefore, any changes to the hydrological regime as a result of the proposed scheme could theoretically affect the alluvial woodland listed for Charleville Wood SAC/pNHA. Similarly, hydrological regimes are important for sustaining Desmoulin's Whorl Snail *Vertigo moulinsiana* populations. According to the CO document for this SAC, there is one known site in Charleville Wood SAC for Desmoulin's whorl snail which is found on the margins of Charleville Lake within the 1km grid square N3122.

Significant effects on alluvial forest and Desmoulin’s whorl snail in Charleville Wood SAC, as a result of the Proposed Scheme are not anticipated, however. Firstly, regarding alluvial forest, it is noted in the Conservation Objectives document for this SAC that “the water level of Charleville Lake, and hence the degree of inundation of the alluvial forests habitat, is controlled by a sluice”. Similarly, regarding Desmoulin’s whorl snail, the CO document states “in this SAC, the lake is controlled by a sluice/weir and this should be maintained to ensure that water levels are kept as close as possible to current levels”. EPA river flow network data and historic maps indicate that the River Clodiagh does not flow into Charleville Lake. The lake appears to be fed by a 2nd order stream flowing into the lake from the east called “Haras Hill”. Therefore, it is assumed that any changes to the hydrological regime of the River Clodiagh as a result of the Proposed Scheme are highly unlikely to affect the hydrological regime of Charleville Lake, and therefore are highly unlikely to affect alluvial forest dependent on inundation by the lake or Desmoulin’s whorl snail. Secondly, as outlined in **Section 9.5.3.5.1**, changes to hydraulic conditions in the River Clodiagh are anticipated to be minor and localised. Effects arising from the Scheme will not extend downstream as far as Charleville Wood SAC. Effects would be ***not significant***.

9.5.2.4.2 Designated Sites (SACs designated for White-Clawed Crayfish)

Any maintenance activities that require interference with the river channel could result in the spread of crayfish plague into other river catchments, or re-introduction of crayfish plague into the River Clodiagh, should equipment, plant and PPE not be disinfected before and after works. The effect of spread of crayfish plague could be of the extent of the entire waterbody into which it is introduced. The magnitude could be significant, as crayfish plague can result in 100% mortality of crayfish in a waterbody. In the absence of appropriate mitigation, there is potential for ***significant***, negative, irreversible, permanent effects.

9.5.2.4.3 Otter & Bats

Minor disturbance of *local* otter could arise as a result of operational phase maintenance activities at the proposed debris trap and Brittas stream culvert, which will involve removal of accumulated debris. However, these activities will be infrequent, undertaken during day light hours, and undertaken in an area already subject to a level of human disturbance from recreational walkers (i.e. Brittas Wood). The proposed maintenance activities on the debris trap and Brittas Stream culvert will occur from either on or immediately adjacent to a gravel path regularly used by walkers. The duration of the effect would be brief (i.e., less than a day) during maintenance activities and reversible. Given the duration and nature of the works, the magnitude would be expected to be minor. Taking the above into consideration, the Proposed Scheme will ***not result in significant effects*** on otter in terms of disturbance from human activity during the operational phase.

The reinstatement of operational phase lighting could affect bats and otter commuting or foraging along the River Clodiagh at Chapel Street. Given that street lighting is already present at this location, it is assumed that fauna commuting or foraging within this area will already be exposed to a degree of disturbance from night-time lighting. Nevertheless, there is uncertainty regarding the design of the reinstated lighting, and therefore the possibility for negative effects on otter and bats as a result of disturbance or displacement must be assumed. The duration of the effect would be permanent and irreversible, and the magnitude could be significant disturbance of species, depending on the lighting that is reinstated. Taking the above into consideration, there is potential for ***significant***, negative, irreversible, permanent effects.

9.5.2.4.4 Other terrestrial IEFs

There are no operational impacts foreseen in relation to any other terrestrial habitats, flora or fauna.

9.5.3 Aquatic Ecology

9.5.3.1 Relevant Characteristics of the Proposal

Instream works are required within the River Clodiagh and within the Brittas Stream to allow for the installation of a debris trap on the River Clodiagh and remediation works on the Brittas Stream culvert, including the installation of a headwall on the upstream side. Water management will be required to facilitate the creation of a ‘dry’ working area. The site extents chosen for the installation of the debris trap extent 10 m upstream and downstream of the debris trap location to give adequate space for management of the river flow. The dimensions of the proposed debris trap are 7.0 m x 3.5 m x 1.2 m (L x W x D). Excavated riverbed material will be saved and reinstated over the debris trap base once it is installed. The site extents for the culvert remediation work will extend a maximum of 5 m upstream.

Bankside works will be required along the River Clodiagh as part of the construction of a slipway to the proposed debris trap, new embankments, a new retaining wall and bolstering of the existing stone wall on Chapel Street with a specifically designed flood relief wall, and below ground flow cut-off. There is no requirement for interference with the channel or bank face of the River Clodiagh for these works. The embankments and new retaining wall are set back from the river and works to the existing stone wall on Chapel Street are restricted to the landside of the wall. The total length of river channel adjacent to these areas is approximately 520 m on the left bank and 70 m on the right bank.

Maintenance of the proposed debris trap and culvert inlet will be required during the operational phase.

9.5.3.2 Sources of Construction Phase Effects

The key sources of effects on aquatic receptors from the Construction Phase of the Proposed Scheme are habitat loss, invasive species and pathogens, suspended solids and sediment, concrete and hydrocarbons. Temporary changes to river flow regime could also lead to construction phase effects. Earthworks, instream works, and use of hydrocarbons and wet concrete all have the potential to negatively affect the aquatic environment via reduction in water quality, sedimentation of the river, spread of crayfish plague and loss or damage to riparian and instream habitat.

Sediment release to aquatic systems and eventual deposition on instream habitat is a common source of impact and river habitat degradation. Sources of sediment typically include earthworks, instream works, erosion of soil, stockpiles, temporary access tracks and vehicular activity near drains and watercourses. High levels of silt can impact upon sensitive aquatic species such as macroinvertebrates, salmonids, lamprey and white-clawed crayfish both directly and indirectly. Fish may be temporarily displaced from habitats with elevated suspended sediment levels. If of a sufficient severity, direct impacts can also occur through clogging and damage to gills which in very severe cases can result in mortality. When suspended sediment settles on a riverbed, this can degrade the substrate habitat for salmonids and lamprey which require clean gravels to spawn. Where spawning has already occurred, increased fine sediment on the substrate surface and interstitial spaces can decrease the permeability of spawning gravels reducing oxygen flow across egg membranes resulting in mortality of the eggs. Female, white-clawed crayfish which carry their eggs are also vulnerable to suspended solids (Reynolds, et al., 2010). Increased sediment can result in changes in species assemblages and food chain structures. For example, a change from clean gravel substrate to one that is silt dominated can alter macroinvertebrate species composition with conditions favouring those species which are more tolerant of silted substrates. This alters food resources available for fish. Increases in turbidity and sediment deposits can reduce light levels reaching aquatic plants and reducing growth (Kemp, et al., 2011).

Accidental spillages of hydrocarbons and/or other chemical substances during construction could result in impacts upon water quality via surface water runoff. Accidental release of concrete or cement grout into the river channel during bankside works or the construction of the proposed debris trap and installation of the culvert inlet could have significant toxic effects on downstream aquatic fauna as these products can contain chemicals which are detrimental to aquatic life. For example, lime is a major component of cement. It dissolves easily in water (water soluble) and changes the pH of water increasing the alkalinity (pH 11-13), which causes burns on fish and kills fish and other aquatic life. Other chemicals can be bound up in sediments and can have adverse effects on sediment dwelling species or are released when sediment is remobilised. Other sources of high-alkalinity run-off include wheel washing facilities, uncured or recently cured concrete, pump-out water from ‘dry’ areas and washing out of bulk liquid cement containers.

Construction works also carry potential for invasive alien species and pathogen spread or introduction. The spread of Japanese knotweed downstream or into other river channels as a result of soil disturbance could have negative effects on riparian habitats and river hydromorphology. Plant, equipment and personal protective equipment (PPE) that comes into contact with water can carry waterborne pathogens. As crayfish plague was confirmed in the River Clodiagh in 2021, there is a risk of crayfish plague transfer to other waterbodies from the Clodiagh as a result of the Proposed Scheme. Although there is a possibility that the pathogen is no longer present within River Clodiagh (the pathogen is likely to die out once all host crayfish perish (Brady, et al., 2024)) surveys in Ireland have found crayfish plague to persist in catchments both upstream and downstream of an infected site a year after the first reported outbreak. This was observed in the River Bruskey in the Erne catchment (Brady, et al., 2024). Furthermore, the Marine Institute, as part of the National Crayfish Plague Surveillance Programme (2020/2021) detected crayfish plague via eDNA analysis in sites within the Shannon Estuary South in both 2020 and 2021 (Swords & Griffin, 2022). Therefore, in the absence of tests confirming the absence of crayfish plague from the River Clodiagh, the possibility that it still persists must be assumed.

Where dewatering is required, large settlement ponds can interfere with localised flow levels, particularly during low flow, and be hard to manage during very high rainfall, which can lead to spillage of contaminated water.

Loss and degradation of instream habitat and riparian habitat upstream of the Brittas Stream culvert and at the debris trap location may also occur as a result of the Proposed Scheme.

Given the significant degree of overlap between the effects of the Proposed Scheme on riparian habitat, in stream habitat and aquatic fauna, the following assessment, for the most part, considers these receptors together.

9.5.3.3 Assessment of Effects on IEFs during Construction Phase

9.5.3.3.1 Riparian habitat - Loss of Riparian Habitat

A new, earthen embankment (linear length = 135 m) on the western bank and an instream debris trap are proposed in Area 1. Aside from the debris trap location, where the embankment will slope down to the river bank, the embankment toe will be set back from the riverbank by a minimum of 4 m, and generally in the range of 5 to 8 m along its length. Natural, bankside riparian vegetation will be retained between the channel and the existing footpath at the base of the embankment. A slipway is required to allow for vehicle access to the debris trap. As described previously, it will have a slope and make-up suitable for tree removal plant and will extend from the Brittas Loop access roadway to the river edge. It will be necessary to remove several trees (5 no. – trees 14 - 18) to facilitate the construction of this slipway. The riparian buffer between the proposed debris trap and gravel path in Brittas wood is approximately 3.4 m in depth. The slipway will be approximately 3 m wide, but making allowance for side slopes, a loss of riparian vegetation across a length of 6 m is assumed. Permanent bank erosion measures on the right and left banks of the river upstream and downstream of the proposed debris trap will be required. Bankside scour protection will be rocky riprap, which will be embedded into the earthen banks, or willow spiling. This will be agreed with Inland Fisheries Ireland in advance. For the purposes of assessment, it is assumed that works to the banks of the River Clodiagh will be required 10 m upstream and 10 m downstream of the debris trap on both the left and right banks. The effect of works on riparian habitat is considered to be negative. The extent of the effect is the riparian habitat within the footprint of the proposed slipway, and 10 m up and downstream of the proposed debris trap. The magnitude of the effect is estimated to be approximately 20.5 m^2 of riparian habitat at the proposed slipway, and the left and right banks of the River Clodiagh 10 m upstream and 10 m downstream of the debris trap. The duration of the effect is permanent. The effect is irreversible locally. Given the relatively small extent of the proposed works, ***no significant effects*** on the hydromorphology of the River Clodiagh at this location are anticipated. However, any bank protection measures will need to be carefully designed and construction to ensure they function as intended, and measures are outlined **Section 9.6.7.1.6**. Indirect effects of riparian habitat alterations on aquatic fauna are also considered to be negative, permanent and irreversible, due to loss of bankside cover (e.g., overhanging vegetation, submerged tree roots etc.). However, given the extent of suitable habitat within the River Clodiagh and the relatively small extent of the proposed works, the effects on aquatic fauna are expected to be ***not significant***.

It will be necessary to remove a number of trees from the left bank top of the River Clodiagh in a private garden and along Chapel Street in Area 2. The extent of the effect is localised to the trees being removed. The magnitude of the effect is 32 no. trees from Area 2 (tree nos. 64-67 inclusive; 80-88 inclusive and 90 - 108 inclusive). The duration of the effect is permanent. The effect is negative. The effect is reversible where replacement planting is feasible (private garden) but irreversible where replacement planting is not possible (e.g., immediately north of Clonaslee bridge, and along Chapel Street). The majority of these trees are relatively small, non-native single trees planted within BL3 and GA2 habitat and provide very limited functions for the River Clodiagh and fauna (salmonids, lamprey, invertebrates) therein. As such, the effect of this bank top tree removal is predicted to be ***not significant***. Indirect effects of tree removal in Area 2 on aquatic fauna are also considered to be negative, permanent and reversible/irreversible (depending on whether replacement planting is possible – see above), but ***not significant***.

Within Area 3, the removal of a large beech tree and surrounding vegetation will be required on the left bank top of the River Clodiagh. The duration of the effect is permanent. The effect is negative. The effect is irreversible as replacement planting is not possible. Given the extent of mature trees along the left and right bank of the River Clodiagh upstream of this location, the loss of this vegetation is not anticipated to significantly affect the functioning of the River Clodiagh or the fauna (salmonids, lamprey, invertebrates) therein. As such, the effect of this bank top tree removal is predicted to be ***not significant***.

9.5.3.3.2 Instream habitat - Loss of Instream Habitat

The proposed debris trap comprises a concrete base extending the full width of the river and pre-cast concrete poles. The concrete base will be set 500 mm below the riverbed level to allow reinstatement of riverbed material above. The debris trap will be subject to detailed design post planning, but for the purposes of this assessment it is assumed to comprise six poles, each measuring 300 mm in diameter, with a buried concrete foundation. A site-specific scour analysis will be carried out at detailed design stage to assess the need to extend the debris trap foundation to form bed scour protection. Such scour protection would comprise an extension of the debris trap foundation, matching the top level of it (i.e. 500 mm below the natural bed level). For the purposes of this assessment, the conservative assumption is that bed scour

protection may be required at the debris trap, and that the magnitude of bed scour protection will match the instream works zone which is 10 m upstream and downstream and at the banks. This is a greater extent than will be required upon detailed design. Bankside scour protection will be rocky riprap, which will be embedded into the earthen banks, or willow spiling. This will be agreed with Inland Fisheries Ireland in advance. There will be a very small, localised permanent and irreversible loss of instream habitat as a result of the debris trap. Since the debris trap foundation and any extension of same for scour protection will be buried in the river substrate, the permanent loss of river habitat will be restricted to the footprint of the poles of the debris trap. The effect is considered to be negative. Taking into consideration the small magnitude of the effect and localised extent, and that excellent fisheries habitat was recorded within the River Clodiagh throughout the study area, the effect of this loss of instream habitat on the habitat itself as well as aquatic fauna is predicted to be ***not significant***.

Potential operational phase effects on instream habitat arising as a result of the debris trap are addressed in **Section 9.5.3.5.3**.

9.5.3.3.3 Aquatic fauna – Direct Mortality and Habitat Fragmentation in Area 1

The project could result in temporary fragmentation of the River Clodiagh as a result of instream works. Depending on how works are undertaken, and the timing of instream works, instream works could prevent the unhindered movement of fish at this location. The effect is considered to be negative, and the magnitude could extend to the upper reaches of the River Clodiagh if fish migration was blocked during the summer migration period. The effect is considered to be potentially ***significant***, ***reversible*** and ***temporary*** in duration.

There is potential for direct mortality of fish species within temporary dry areas if not rescued and relocated prior to dewatering. This effect is negative. The extent would be the instream works area on the River Clodiagh and the instream works area on the Brittas Stream (should this stream be wet at the time of survey). The magnitude would depend on the number of fish within the affected reaches but could be several hundred fish (assuming a density of 0.5 individuals per m^2). In the absence of appropriate mitigation, there is potential for ***significant, reversible, short-term*** effects.

9.5.3.3.4 Instream Habitat and Water Quality – Deterioration due to Siltation, Concrete Pouring, Accidental Spills of Concrete, Hydrocarbons or Chemicals.

The instream works area, which measures approximately 366 m^2, will likely be subject to constant water ingress from the River Clodiagh and potentially the Brittas Stream, even in low flow conditions. Water will need to be pumped-out from these areas to facilitate dry conditions, and there is a high risk that this water will be contaminated with high levels of suspended sediment, hydrocarbons and highly alkaline concrete or cement washings. There is also a risk of contaminant loss to the River Clodiagh in the event of flood waters flowing into the dry working area. In the absence of appropriate management and treatment, discharges of contaminated water from the instream works area into the River Clodiagh could have negative effects on instream habitats and fauna (e.g. through habitat degradation, mortality, displacement – see above). Similarly, loss of pollutants to the River Clodiagh or Brittas Stream as a result of bankside works could have negative implications for instream habitats and fauna. There is potential for accidental hydrocarbon spills and run-off from stockpiles, new embankments and earthworks to flow into the River Clodiagh and Brittas Stream. There is also potential for contamination of the River Clodiagh downstream of the Chapel Street works area due to the potential for materials used for the wall foundation to migrate through gravels (if present) and into the river channel. The extent of this effect would be the immediate vicinity of the works area, but it could also extend downstream within the river channel. During a flood event, there is a risk that contaminant loss into the lower reaches of the River Gorragh could occur. As shown in **Figure 9-14**, flood waters from the River Clodiagh flow into the River Gorragh in the 1% AEP flood event. The effect would be short-term to medium-term, depending on the severity of the contaminant loss. The effect is considered to be ***significant and reversible***.

9.5.3.3.5 Hydrological Regime – Changes Due to Dewatering and Water Storage

Where dewatering is required, large settlement ponds or tanks can interfere with localised flow and water levels, particularly during low flow, and be hard to manage during very high rainfall, which can lead to spillage of contaminated water.

Negative effects on the flow regime from works during the Construction Phase could occur if water is not managed appropriately. The extent of the effect would likely be localised to reaches within close proximity to the works. The magnitude would be minor, given the relatively small scale of the Proposed Scheme. Effects could be ***significant*** if water levels adjacent to the works area dropped to dangerously low levels for aquatic fauna such as fish due to pumping activity. The effect would be ***temporary***. The effect of contaminated water loss is assessed in the previous section.

9.5.3.3.6 Invasive Species and Pathogen Spread

Construction activities could lead to the dispersal of scheduled invasive species (Japanese knotweed) or pathogens (crayfish plague) either via machinery, material, clothing or personnel. The introduction and spread of non-native invasive species or pathogens can have significant effects on the ecological functioning of terrestrial and aquatic habitats. In general, invasive species are aggressive colonisers of the habitat that they occupy, crowding out native species in addition to creating shading effects which reduces native species cover. They can also cause erosion, especially on riverbanks, when they die back in winter. This can, in turn have a significant effect on water quality. Crayfish plague can result in 100% mortality of native, white-clawed crayfish within a waterbody.

The effect of spread of Japanese knotweed during the construction phase of the Proposed Scheme is predicted to be of local spatial extent, limited to the immediate environs of where the invasive species has been introduced. However, there is potential for Japanese knotweed to spread a considerable extent downstream, as only small fragments of the plant are required to generate new growth. Similarly, during a flood event, fragments could be flushed into the River Gorragh. As shown in **Figure 9-14**, flood waters from the River Clodiagh flow into the River Gorragh in the 1% AEP flood event. This effect can be potentially permanent if management regimes are not implemented, however, it is considered reversible once management regimes are implemented. The effect of spread of crayfish plague could be of the extent of the entire waterbody into which it is introduced and could be irreversible. In the absence of appropriate mitigation, there is potential for ***significant, negative, permanen*t** effects.

9.5.3.4 Sources of Operational Phase Effects

The key sources of impact on aquatic receptors from the Operational Phase of the Proposed Scheme are impacts on river hydromorphology. There is potential for downstream reaches of the river to be starved of large woody debris as a result of the proposed debris trap. Woody debris plays an important role in creating river habitat complexity and channel roughness, and can provide refuge for salmonids, eel and crayfish. The proposed debris trap could also lead to changes in the pattern of bed material transport (deposition / scouring) at the trap location. Furthermore, the proposed flood walls and embankments will constrict flood waters to the lands within the boundaries of these structures. Overbank flow of river water onto the floodplain during flood events dissipates the energy of flood waters. The construction of embankments and floodwalls could lead to changes (i.e., increase or decrease) in channel velocities and consequently the suitability of habitats for fish, and potential changes to patterns of bed material transport (deposition / scouring) during a flood event.

Regular maintenance of the debris trap and Brittas Stream culvert inlet will also be required. Irregular removal of debris has the potential to release sediment built up behind the accumulated debris causing temporary water quality and habitat degradation. Debris accumulations behind the debris trap as well as excessive scouring at the debris trap location could act as a barrier to the migration of salmonids and lamprey into upstream spawning areas. Finally, given the presence of crayfish plague in the River Clodiagh, maintenance activities that require interference with the river channel could result in the spread of crayfish plague into other river catchments, should equipment, plant and PPE not be disinfected following works. Similarly, maintenance activities could result in future re-introduction of crayfish plague into the river should equipment, plant and PPE not be disinfected prior to works commencing.

9.5.3.5 Assessment of Effects on IEFs during Operational Phase

9.5.3.5.1 Hydromorphology – Changes to Hydraulic Conditions as a result of Flood Walls and Embankments

An evaluation of the compliance of the Proposed Scheme with the WFD has been undertaken separately by Lauren Williams (2024), and the report is included as part of this planning application under separate cover.

The aim of the report was to provide an evaluation of whether new physical modifications under the Proposed Scheme could prevent WFD Article 4(1) objectives from being achieved for any affected water body, and hence whether the project can be authorised under the WFD. The following sections are extracted from this report.

Detailed analysis of hydraulic modelling for the 50% AEP and 1% AEP flood scenarios was undertaken. The only notable changes to mean cross-section velocity and froude number as a result of the Proposed Scheme are at a short reach in Area 1 (Brittas Wood) in relation to the proposed debris trap. During 50% AEP flows mean cross section velocity will decrease immediately upstream of the debris trap whilst downstream it will increase compared to baseline. The effect is very localised - there is no post-scheme change relative to baseline within approximately 10 m upstream or downstream of the structure. The effect of impoundment (i.e., decreased upstream channel velocity and Froude number) is even more evident at higher flows (1% AEP flood event). The debris trap is thus likely to create a beneficial hydraulic refuge for fish during elevated flows. Noted also is that mean annual flows are, by definition, lesser than the modelled flood flows and any effect of the debris trap would remain highly localised. Hydraulically, the debris trap thus affects a very short channel reach and is positive for biological quality elements during elevated flows (as it introduces hydraulic refuge). Given there is an abundance of good/excellent salmonid habitat available, there will be no significant effect on fish recruitment and population structure (as a potentially defining biological quality element (BQE) under WFD Annex V) at a waterbody scale.

Apart from the highly localised effect of the debris trap (slight negative and slight positive effects), the hydraulic analysis shows no changes to the hydraulic regime throughout the rest of Area 1 and imperceptible to no change in Areas 2 and 3. There will be no significant changes to bed sediment mobilisation, transport or deposition as relates to macroinvertebrate and salmonid spawning / nursery habitat. No changes arise in terms of river continuity, i.e., the debris trap does not introduce a barrier to fish movement. With mitigations in place to ensure roughness in the debris trap foundation, plus reinstatement of bed substrates (gravel, cobble) as part of the construction phase (reinstatement of bed substrates is currently part of the design), there will be no long-term significant changes to hydromorphology (as defined by attributes in WFD Annex V) that could impinge on biological quality elements or supporting physico-chemical elements that define water body status. Good surface water body status will be maintained in line with WFD objectives.

Taking the above into consideration, significant effects on hydraulic conditions, and consequently aquatic biota within the River Clodiagh as a result of the Proposed Scheme are not anticipated. The effect is considered to be ***not significant***, ***neutral, permanent and irreversible***.

9.5.3.5.2 Hydromorphology – Starvation of Large Woody Debris Downstream of the Proposed Debris Trap

The operational phase impacts of the debris trap in terms of starvation of large woody debris downstream of the proposed trap must be assessed in the context of the current baseline within the River Clodiagh. Firstly, the River Clodiagh is part of the OPW ADS. The OPW is therefore required to maintain this section of the river. In practice, channel maintenance operations normally involve removing accumulated foreign or natural material that impedes the free flow of water. Predominately this consists of the removal of silt and vegetation from the bed of the channel. In addition, other larger vegetation such as trees, which impinge on channel capacity are either removed in whole or impingement is reduced by selective removal of lower branches (OPW, 2022). If no build-up of material is present, the channel may not be disturbed at all. The average channel requires maintenance every four to six years, however some channels may only require maintenance every twenty years due to the self-cleaning characteristics of the channel. It is anticipated that periodic removal of debris from the ADS channel downstream of the Proposed Scheme area is undertaken. Secondly, in flood events, where flows are capable of moving large pieces of wood into downstream reaches, it is probable that large pieces (e.g., channel-spanning pieces of wood) will be trapped, and later removed, at Clonaslee bridge. There is very little clearance at this bridge, even in low flows, to allow large pieces of wood to move downstream (**Figure 9-13**). The design objective of the debris trap is to allow debris to pass that can fit through the bridge, and to catch debris that cannot.

Given the design objective of the debris trap and the assumed baseline situation described above, it is not considered likely that the debris trap will result in significant effects in relation to starvation of downstream reaches of large woody debris. The effect would likely extend as far as Clonaslee Bridge. It is noted that numerous (assumed) fish enhancement features already exist between the debris trap and Clonaslee Bridge. Therefore, the magnitude of the effect on instream habitat and aquatic fauna would be expected to be minor. The effect on instream habitat and aquatic fauna is considered to be ***not significant, neutral and***

permanent. The effect is considered reversible as remediation measures could be put in place (e.g., through the placement of large woody debris into downstream reaches).

Figure 9-13: Image of Clonaslee bridge at low flow (left) and high flow (right).

9.5.3.5.3 Hydromorphology – Scouring at the Debris Trap

The analysis of the hydraulic modelling for the Proposed Scheme described in **Section 9.5.3.5.1** and in the WFD compliance report (Williams, 2024) showed that during 50% AEP flows mean cross section velocity will decrease immediately upstream of the debris trap whilst immediately downstream it will increase compared to baseline, which could lead to localised scouring of the river bed. The effect is very localised, i.e., there is no post-scheme change relative to baseline within approximately 10 m upstream or downstream of the debris trap structure. During the modelled 1% AEP post-scheme event, velocity and froude number *decrease* notably upstream of the structure, with no change downstream. As noted previously, for the purposes of this assessment, the conservative assumption is that bed scour protection may be required at the debris trap. A site-specific scour analysis will be carried out at detailed design stage to assess the need to extend the debris trap foundation to form bed scour protection. Such scour protection would comprise an extension of the debris trap foundation, matching the top level of it (i.e. 500mm below the natural bed level), similar to the IFI guidelines (2016) requirement for embedment of a culvert structure. This design will ensure an adequate invert level both upstream and downstream such that there will be no barrier to fish migration in the operation phase. The effect of the debris trap and the associated bed protection could slightly alter localised salmonid habitat, shifting it from potential spawning /nursery habitat towards nursery/holding habitat very locally, but there will be a very minor loss of salmonid habitat (i.e., the footprint of the debris trap poles) and no significant change to the overall availability of spawning and nursery habitat in the system. The scour protection could become damaged during a particular high flow event or may become scoured out further downstream causing a step in the channel that could adversely affect upstream movement of fish over time. Given the results of the hydraulic modelling, this effect is unlikely to occur, but if it did it could be a **significant negative** but **temporary** and **reversible** effect, because it can be remediated with appropriate action. As a precaution, there will be a requirement to monitor scour at the debris trap location and take remedial action if required as set out in **Section 9.8.4**.

9.5.3.5.4 Habitat Disturbance – Maintenance of Brittas Stream Culvert Inlet and Debris Trap

Removal of trash and vegetation at the Brittas Stream culvert inlet is proposed to be undertaken quarterly, and removal of debris accumulated at the debris trap is proposed to be undertaken as required. Repairs will also be undertaken on these structures as required. Irregular removal of debris has the potential to release sediment built up behind the debris potentially resulting in water quality and habitat degradation, which could have negative effects on aquatic habitats, water quality and fauna. The effect would be local in extent, and the magnitude would depend on the amount of silt that has accumulated. In the absence of appropriate mitigation, there is potential for ***significant, negative, reversible, short-term*** effects.

9.5.3.5.5 Pathogen Spread – Maintenance of Brittas Stream Culvert Inlet and Debris Trap

Any maintenance activities that require interference with the river channel could result in the spread of crayfish plague into other river catchments, or re-introduction of crayfish plague into the River Clodiagh, should equipment, plant and PPE not be disinfected before and after works. The effect of spread of crayfish plague could be of the extent of the entire waterbody into which it is introduced. The magnitude could be significant, as crayfish plague can result in 100% mortality of crayfish in a waterbody. In the absence of appropriate mitigation, there is potential for ***significant, negative, irreversible, permanent*** effects.

9.5.3.5.6 Habitat Fragmentation

Removal of debris accumulated at the debris trap is proposed to be undertaken as required. Debris accumulations behind the debris trap during the migration period for fish could act as a barrier to the migration of salmonids and lamprey into upstream spawning areas, if not removed promptly. The effect could extend to the upper reaches of the River Clodiagh by preventing the migration of fish to these areas. Given that removal of debris is proposed as part of the operational maintenance, the effect is considered to be ***significant, negative, reversible*** and ***temporary*** in duration, but unlikely.

Excessive scouring at the debris trap location could lead to exposure of the concrete base of the debris trap. This effect would most likely occur on the downstream side where velocity is modelled to increase during the higher return period events (50% AEP). Over time, this scouring could lead to the creation of a fish migration barrier in the form of a concrete step in the channel. As noted previously, a site-specific scour analysis will be carried out at detailed design stage to assess the need to extend the debris trap foundation to form bed scour protection. Accordingly, the above effect is considered unlikely to occur, but if it did the effect could be **significant**. On the other hand, a slightly deepened scour pool at the downstream end of the bed protection could arise, which could improve salmonid holding habitat locally. The effect could extend upstream of the debris trap if fish migration was blocked by a vertical step. The magnitude could be significant if a substantial barrier developed at the trap location. The effect would be **temporary** and **reversible** because it can be remediated with appropriate action. As a precaution, there will be a requirement to monitor scour at the debris trap location and take remedial action if required as set out in **Section 9.8.4**.

As noted, the perched nature of the Brittas Stream culvert combined with shallow water depths within it (potentially higher during high flows) means it is likely to act as a barrier to the movement of aquatic fauna. This stream is ephemeral (the stream was dry when surveys were undertaken in June 2024), and the hydromorphological quality immediately upstream of the culvert is poor. Nevertheless, if inappropriately designed, the proposed culvert inlet could further impact the movement of aquatic species, or negatively affect future passage improvement measures should they be considered necessary (e.g., by IFI). This effect is considered **negative** and **permanent**. The effect could extend into the upper reaches of the Brittas Stream. Given the small size, the ephemeral nature of the stream and the presence of an existing barrier (i.e., the perched culvert), the magnitude of the effect on aquatic fauna is likely to be negligible, and the effect is assessed as being **not significant**. The effect could be reversed through remediation.

9.5.3.5.7 Siltation/River Substrate Alteration of River Clodiagh

There is a risk of run-off from the slipway to the River Clodiagh, as well the embankment in Area 1 during the operational phase. These sloping features of the Proposed Scheme design could create preferential surface water flow pathways to the River Clodiagh. Depending on construction design and materials, the run-off could be silt laden, or introduce unnatural material into the river such as hardcore or grit, which could have negative effects on instream habitat and fauna. The effects could extend for a distance downstream. If the surface of the slipway and gravel path was regularly maintained, the effect could be chronic during the lifetime of the project, and therefore is considered to be permanent for the purposes of assessment. The effect would be negative, ***significant*** and potentially irreversible if substantial amounts of coarse material and silt was flushed into the river.

9.5.3.5.8 Water Quality - Post Scheme Flooding

During the operational phase, a reduction in urban flooding will occur. Floodwaters passing through urban environments typically entrain pollutants such as litter, sediments, heavy metals and hydrocarbons from roads and footpaths, and potentially cause surcharging of sewer systems resulting in increased risk of biological contamination. This has a negative impact on the watercourse, and flora and fauna therein, to which the floodwaters return. Therefore, the reduction in urban flooding during the operational phase will

have a permanent, positive, irreversible and ***not significant*** impact on water quality within the River Clodiagh and River Gorragh. Consequently, there is also potential for indirect permanent, positive, irreversible and ***not significant*** effects on aquatic fauna (e.g., salmonids, lamprey, eel).

Floodwaters passing over agricultural land or adjacent to the ICW could entrain sediment and nutrients, which could flow into both the River Clodiagh and River Gorragh. Flood modelling shows that during the operational phase, there is no increased risk or change in the nature of flooding over agricultural lands or in lands around the ICW (see **Figure 9-14**). Accordingly, the magnitude of this effect is negligible. The effect on water quality and aquatic fauna is therefore considered to be neutral, irreversible, ***not significant*** and permanent.

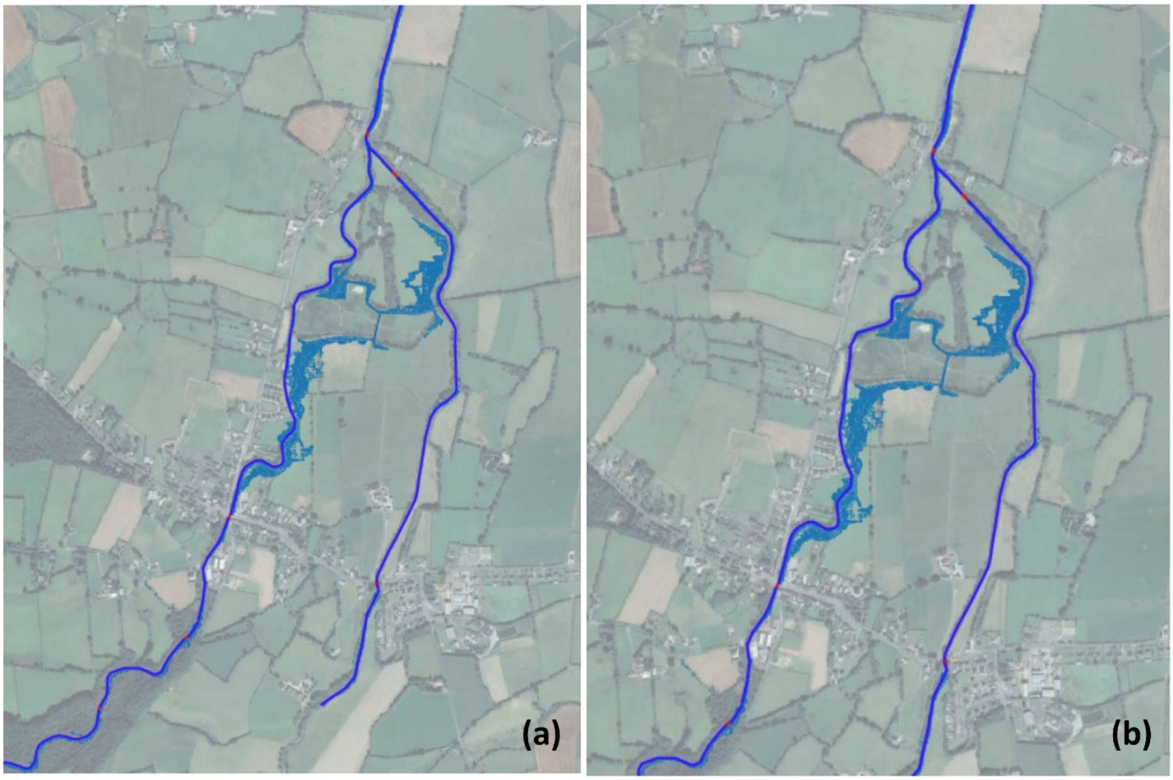

Figure 9-14: 1% AEP Model Predicted flooding in (a) Present Day Do Nothing Scenario and (b) Post-Scheme 1% AEP Model Predicted flooding. The Present Day Do Nothing Scenario assumes that the two informal flood defences, namely the existing wall on Chapel Street and an embankment upstream of the ICW access bridge, remain intact and act as flood defences.

9.5.4 Summary of Potential for Likely Significant Effects

9.5.4.1 Construction Phase

Table 9-24 summarises the potential for likely significant effects from the construction phase of the Proposed Scheme.

Table 9-24 Summary of the potential for significant effects during the Construction Phase of the Proposed Scheme on terrestrial and aquatic IEFs.

Receptor	Highest valuation	Summary of Effects	Significance of Effect (without mitigation)	Mitigation required (Yes/No)?
Slieve Bloom Mountains SPA	International	Habitat loss, degradation, fragmentation	Negative, permanent, irreversible locally, **not significant**	No

Receptor	Highest valuation	Summary of Effects	Significance of Effect (without mitigation)	Mitigation required (Yes/No)?
		Disturbance or displacement of species	Negative, short-term, reversible, **not significant**	No
Charleville Wood SAC	International	Habitat loss, degradation and alteration; spread of IAPS; water quality	Negative, short-term or long-term, reversible – **significant**.	**Yes**
		Changes in groundwater quality and/or yield	Neutral, short-term, reversible, **not significant**	No
		Direct effects on species	Negative, long-term, irreversible, **significant**	**Yes**
SACs designated for white-clawed crayfish (listed in **Section 9.5.2.2.3**)	International	Pathogen spread	Negative, permanent, irreversible - **significant**	**Yes**
Screggan Bog NHA, Charleville Wood pNHA, Clonad Wood pNHA	National	Habitat loss, degradation and alteration due to construction phase contaminant loss and spread of IAPS.	Negative, short-term or long-term, reversible – **significant**.	**Yes**
		Direct effects on species	Negative, long-term, irreversible, **significant**	**Yes**
Brittas Wood, Treelines, Hedgerow	County	Habitat loss and fragmentation, due to the removal of trees in Brittas Wood (area 1).	Negative, permanent, and irreversible, **not significant.**	No
		Habitat loss and fragmentation due to the removal of trees and hedgerow in area 2	Negative, permanent, reversible/irreversible, **not significant.**	No
		Habitat loss and fragmentation due to the removal of trees/woodland in area 3	Negative, permanent, irreversible/reversible locally, **not significant.**	No
		Accidental damage to habitats	Negative, permanent, reversible locally, **significant.**	**Yes**
		Habitat degradation (air quality)	Negative, short-term, reversible, **not significant**	No
		Habitat degradation (contamination though chemical spills)	Negative, short-term, reversible locally, **significant.**	**Yes**
		Habitat degradation (IAPS spread)	Negative, long-term, reversible locally, **significant.**	**Yes**
Otter (commuting & foraging)	Local (higher)	Disturbance	Negative, short-term, reversible, **significant**	**Yes**
		Habitat loss, degradation & fragmentation	Negative, permanent/temporary, reversible/irreversible, **not significant**	No
		Deterioration of foraging resources	Negative, short-term to medium-term, reversible, **significant**	**Yes**
Bats (roosting, commuting & foraging)	Local (higher)	Habitat loss and degradation	Negative, permanent, irreversible or reversible, **not significant**.	No

Receptor	Highest valuation	Summary of Effects	Significance of Effect (without mitigation)	Mitigation required (Yes/No)?
		Deterioration of foraging resources	Negative, short-term to medium-term, reversible, **significant**	**Yes**
		Loss of trees with potential roost features	Negative, permanent, irreversible, **not significant**	No
		Disturbance	Negative, short-term, reversible, **significant**	**Yes**
Birds (breeding & foraging)	Local (higher)	Habitat loss and degradation	Negative, permanent, irreversible or reversible, **not significant**.	No
		Degradation of aquatic foraging resources	Negative, short-term to medium-term, reversible, **significant**	**Yes**
		Disturbance	Negative, short-term, reversible, **not significant**	No
		Mortality or injury	Negative, short-term, reversible, **significant**	**Yes**
Hen Harrier	International	Disturbance or displacement of species	Negative, short-term, reversible, **not significant**	No
River Clodiagh	National	Loss of riparian habitat	Negative, permanent and reversible /irreversible locally, **not significant.**	No
		Loss and alteration of instream habitat in Area 1	Negative, permanent and irreversible locally, **not significant**	No
		Instream habitat and water quality – deterioration due to siltation, concrete pouring, accidental spills of concrete, hydrocarbons or chemicals.	Negative, short-term – medium-term, reversible - **significant**	**Yes**
		Hydrological regime – changes due to dewatering or water storage	Negative, temporary, reversible, **significant**	**Yes**
		Invasive plant species spread/introduction	Negative, permanent, reversible - **significant**	**Yes**
River Gorragh	National	Instream habitat and water quality – deterioration due to siltation, concrete pouring, accidental spills of concrete, hydrocarbons or chemicals (during flood event)	Negative, short-term – medium-term, reversible - **significant**	**Yes**
		Invasive plant species spread/introduction (during flood event)	Negative, permanent, reversible - **significant**	**Yes**
White-clawed crayfish	International	Mortality due to potential spread of crayfish plague	Negative, permanent, irreversible - **significant**	**Yes**
Salmonids, European eel, lamprey (brook and/or river)	National	Direct mortality	Negative, short-term, reversible - **significant**	**Yes**
		Indirect effects due to loss and alteration of instream habitat in Area 1	Negative, permanent, irreversible – **not significant**	No
		Habitat fragmentation – River Clodiagh	Negative, temporary, reversible - **significant**	**Yes**

Receptor	Highest valuation	Summary of Effects	Significance of Effect (without mitigation)	Mitigation required (Yes/No)?
		Indirect effects due to deterioration in water quality	Negative, short-term to medium-term, reversible - **significant**	**Yes**
		Indirect effects due to loss of riparian habitat	Negative, permanent, irreversible – **not significant**	No

9.5.4.2 Operational Phase

Table 9-25 summarises the potential for likely significant effects from the operation phase of the Proposed Scheme.

Table 9-25: Summary of the potential for significant effects during the Operational Phase of the Proposed Scheme on aquatic and terrestrial IEFs.

Receptor	Highest valuation	Summary of Effects	Significance of Effect (without mitigation)	Mitigation required (Yes/No)?
Charleville Wood SAC	International	Habitat disturbance – maintenance of Brittas Stream culvert inlet and debris trap	Negative, short-term, reversible – **not significant**	No
		Changes to downstream hydraulic conditions	Neutral, permanent, irreversible – **not significant**	No
		Habitat disturbance - siltation	Neutral, permanent, irreversible – **not significant**	No
		Habitat disturbance - flooding	Positive/neutral – permanent, irreversible – **not significant**	No
Screggan Bog NHA, Charleville Wood pNHA and Clonad Wood pNHA	National	Habitat disturbance – maintenance of Brittas Stream culvert inlet and debris trap	Negative, short-term, reversible – **not significant**	No
		Habitat disturbance - siltation	Neutral, permanent, irreversible – **not significant**	No
		Habitat disturbance - flooding	Positive/neutral – permanent, irreversible – **not significant**	No
SACs designated for white-clawed crayfish (listed in **Section 9.5.2.2.3**)	International	Pathogen spread	Negative, permanent, irreversible - **significant**	**Yes**
Otter (commuting & foraging)	Local (higher)	Disturbance due to operational phase maintenance	Negative, brief, reversible – **not significant**	No
		Disturbance due to operational phase lighting	Negative, permanent, irreversible - **significant**	**Yes**
Bats (commuting & foraging)	Local (higher)	Disturbance due to operational phase lighting	Negative, permanent, irreversible - **significant**	**Yes**
River Clodiagh	National	Hydromorphology – changes to hydraulic conditions due to flood walls and embankments	Neutral, permanent, irreversible – **not significant**	No

Receptor	Highest valuation	Summary of Effects	Significance of Effect (without mitigation)	Mitigation required (Yes/No)?
		Hydromorphology – Starvation of large woody debris downstream of the proposed debris trap	Neutral, permanent, reversible – **not significant**	No
		Hydromorphology – Scouring at the debris trap	Negative, temporary, reversible – **significant**	**Yes**
		Habitat disturbance - Maintenance of debris trap and Brittas Stream culvert	Negative, short-term, reversible - **significant**	**Yes**
		Siltation/river substrate alteration due to run-off from slipway and gravel path	Negative, permanent, irreversible - **significant**	**Yes**
River Clodiagh & River Gorragh	National	Water quality – post scheme flooding (agricultural and ICW lands)	Neutral, permanent, irreversible – **not significant**	No
		Water quality – post scheme flooding (urban environment)	Positive, permanent, irreversible - **not significant**	No
White-clawed crayfish	International	Mortality due to potential spread of crayfish plague	Negative, permanent, irreversible - **significant**	**Yes**
Salmonids, European eel, lamprey (brook and/or river)	National	Indirect effects due to starvation of large woody debris downstream of the proposed debris trap	Neutral, permanent, reversible – **not significant**	No
		Indirect effects due to maintenance activities at the debris trap and Brittas Stream culvert, including inadvertent fragmentation of the Clodiagh River channel.	Negative, short-term, reversible - **significant**	**Yes**
		Fragmentation and habitat deterioration of the River Clodiagh through scouring at the debris trap.	Negative, temporary, reversible - **significant**	**Yes**
		Indirect effects of siltation/river substrate alteration due to run-off from slipway and gravel path	Negative, permanent, irreversible - **significant**	**Yes**
		Habitat fragmentation – Brittas Stream culvert	Negative, permanent, irreversible – **not significant**	No
		Indirect effects due to water quality – post scheme flooding (agricultural and ICW lands)	Neutral, permanent, irreversible – **not significant**	No
		Indirect effects due to water quality – post scheme flooding (urban environment)	Positive, permanent, irreversible - **not significant**	No

9.6 Mitigation Measures

Mitigation measures are considered to be those measures which aim to minimise, or even cancel, the negative effects 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. The proposed mitigation measures here address the impacts identified.

Mitigation measures have also been proposed for certain IEFs and non-IEFs despite no significant impacts having been identified in the Impact Assessment in **Section 9.5**.This is to account for possible changes in the baseline between the preparation of this chapter and the commencement of the construction phase

should planning for the Proposed Scheme be granted, and to ensure compliance with legal protections for various species.

9.6.1 Appointment of Environmental Team

Prior to commencement of any works related to the Proposed Scheme, the following key environmental personnel shall be appointed:

- **Ecological Clerk of Works** (ECoW): to undertake all pre-construction ecological surveying, ensure that activities on site are conducted in accordance with the planning permission as they pertain to ecological matters, to ensure that the mitigation measures outlined in the Construction Environmental Management Plan (CEMP) (including any updates following consent) are implemented in full, and to supervise works with respect to sensitive habitats and/or species (including the control/eradication of invasive species). Additional information on the ECoW role is provided in **Section 9.6.1.1.1**.
- **Client Environmental Representative** (CER): Laois County Council (LCC) shall appoint the CER before the commencement of works. The CER shall act as the 'LCC representative' and liaise directly with the Contactor's environmental staff, the ECoW, review reporting deliverables, and supervise site activities as required.

Figure 9-15 Illustrates the relationship/hierarchy within the environment team regarding biodiversity matters.

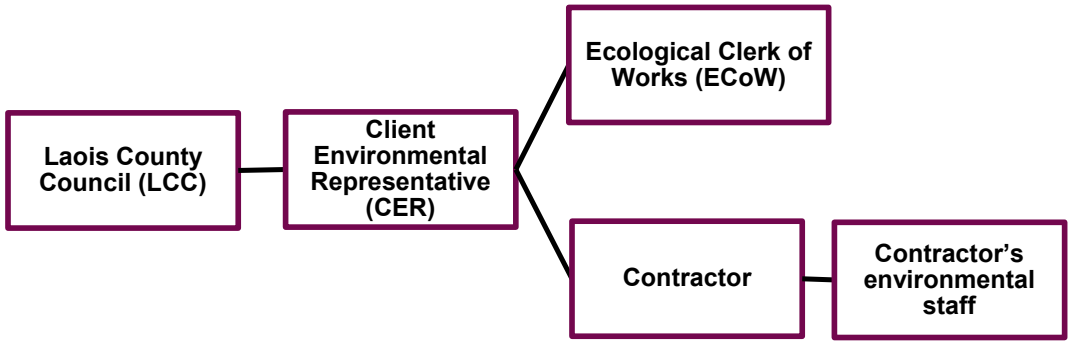

Figure 9-15: Environmental team hierarchy regarding biodiversity matters.

9.6.1.1.1 Ecological Clerk of Works

A suitably qualified and experienced ecologist shall be appointed to the role of Ecological Clerk of Works (hereafter, ECoW) for the Proposed Scheme. The ECoW will be appointed prior to the commencement of any construction or enabling works. The ECoW must be appointed and employed by LCC or CER, and not by the Contractor, to maintain a degree of independence. The ECoW shall report directly to the CER. The CER or LCC will ensure that the ECoW is delegated sufficient powers under the construction contract, so that they will be able to instruct the Contractor to stop works and to direct the carrying out of emergency mitigation/clean-up operations. The ECoW will also be LCC's liaison for the purposes of consulting environmental bodies including Inland Fisheries Ireland and the NPWS.

In advance of works commencing on site, all personnel will receive on-site induction by the ECoW and Contractor relating to the ecological constraints and mitigation measures associated with the site. It will be the responsibility of the Contractor to ensure that any new personnel who are employed during the construction work also receive the on-site induction. The ECoW will provide tool box talks, where required, to all site personnel.

Prior to the commencement of construction works, the scope, programme and phasing of update habitat and species surveys will be defined by the ECoW in consultation with LCC, the CER and main Contractor. Given the duration of the construction works, the update habitat and species surveys will need to be appropriately phased, mindful of the planned work and seasonal constraints. This is to ensure that an up-to-date baseline

is maintained to inform decision making including with respect to the need for derogation licensing. It will be the role of the ECoW to undertake any required pre-construction surveys, and to undertake ecological monitoring before and during the construction phase as required.

The ECoW will oversee the implementation of the eradication of IAPS on site, however, the "sign off" of the works required to remove/eradicate IAPS will be completed by a specialist Contractor specialising in such eradication.

The ECoW shall undertake site visits and monitoring at a frequency appropriate to the construction works being undertaken, the associated risk to ecological receptors and the conditions at time of construction. The frequency of attendance on site shall be determined by the ECoW in consultation with the Contractor and CER.

The ECoW shall oversee the demarcation and erection of protective fencing around working areas in advance of works commencing.

Note: When mitigation measures extend beyond the construction phase, and thereafter require 'monitoring' during the operational phase, LCC will be responsible for the commission of a suitably qualified person(s) to undertake this work.

9.6.2 Construction Environmental Management Plan

A CEMP has been prepared for the Proposed Scheme. The CEMP includes all the mitigation measures set out below with respect to the construction phase, as well as any other relevant chapters within the EIAR (e.g., **Chapter 10: Land Soil and Hydrogeology** and **Chapter 11: Water)**. The Contractor will be obliged to update the CEMP to include any requirements conditioned in a planning permission. It will be the role of the ECoW to ensure that all the relevant ecological mitigation measures set out within the CEMP are implemented.

9.6.3 Pre-Construction Surveys

In advance of enabling works, the ECoW will complete preconstruction confirmatory surveys of selected ecological features whose distribution is dynamic over time, and which are known to have potential to occur within the ZoI of the Proposed Scheme works. Pre-construction surveys will be required with respect to the following ecological features, IEFs and non-IEFs:

- **Invasive Alien Plant Species (IAPS)**: The presence of Japanese knotweed and a hybrid species have been identified in the footprint and vicinity of the Proposed Scheme (the hybrid was not recorded within the footprint of the Proposed Scheme). The survey will be undertaken within the entire Proposed Scheme area. All stands of Third Schedule species will be taped off to prevent accidental spread. An Invasive Alien Species Avoidance and Management Plan will also be prepared by an ecologist/invasive species specialist and shall build on the baseline data presented in this chapter and include the findings of the pre-construction survey. The Plan will include any measures to manage, control or eradicate any IAPS identified prior to and during the construction phase of the Proposed Scheme. The Plan will also identify any licensing or approvals necessary from NPWS, EPA or other party to enable the implementation of the plan.
- **Otter.** Pre-construction surveys by an experienced ecologist will be carried out for otter. This includes a survey of all areas within 150 m of the Proposed Scheme. Otter surveys will be carried out in accordance with NRA guidance (NRA, 2008b). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required.
- **Badger.** Pre-construction surveys by an experienced ecologist will be carried out for badger. This includes a survey of all areas within 150 m of the Proposed Scheme. These will be undertaken in a representative season to ensure accuracy. Badger surveys will be carried out in accordance with NRA guidance (NRA, 2008c). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required.
- **Bats.** Pre-construction surveys by an experienced bat ecologist will be performed where tree removal or removal of tree limbs is required. The survey shall determine whether there are likely to have been

material changes to any of the trees assessed in terms of their potential to support roosting bats since the ground level tree assessment surveys were carried out in summer 2024, prior to any felling or disturbance works occurring. The ground level tree assessment shall be updated for all trees where material changes are considered to have occurred, in whole or part; particularly if bat roost potential has increased or evidence of bats roosting is found. The survey shall determine the status of the trees with respect to roosting bats. Bat surveys shall be carried out with reference to Bat Mitigation Guidelines for Ireland (v.2) (Marnell, et al., 2022) and Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th Ed.) (Collins, 2023). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will not be required for bats.

- **Kingfisher**. Pre-construction surveys by an experienced ecologist will be carried out for kingfisher. This includes a survey of the banks of the Clodiagh river within 100 m of the red line boundary[12]. The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for additional mitigation measures, such as the requirement for exclusion areas within the vicinity of nests should they be recorded.
- **Breeding Birds**. Pre-construction surveys for breeding birds, in particular grey wagtail and dipper will be undertaken. If none are found works will commence as scheduled. If evidence of breeding is encountered, derogation licence will be sought from NPWS.

Based on the findings of the pre-construction surveys, mitigation for each of these species set out in the EIAR will be reviewed and, if necessary, augmented accordingly by the ECoW; particularly with respect to whether any derogation licensing or other approvals are triggered by the findings of the pre-construction surveys. Any adjustment to the mitigation measures will be agreed with the CER in advance of them being implemented.

The pre-construction surveys will be supplemented by further inspection by the ECoW (as deemed necessary by them) immediately prior to site clearance.

All surveys will be undertaken by suitably qualified ecologists with demonstrable experience in the survey and assessment of the feature.

9.6.4 Environmental Emergency Response/Contingency Plan

Prior to commencing works, the Contractor shall prepare an Environmental Emergency Response Plan/ Contingency Plan. The plan will detail the procedures to be undertaken in the event of the release of any sediment into a watercourse, a serious spillage of chemical, fuel or hazardous wastes (e.g. concrete), or other such risks that could lead to a pollution incident, including flood risks. The plan will be updated regularly and shall include a Spill Response Plan with the following as a minimum:

- Containment measures;
- Emergency discharge routes;
- List of appropriate equipment and clean-up materials;
- Maintenance schedule for equipment;
- Details of trained staff, location and provision for 24-hour cover;
- Details of staff responsibilities;
- Notification procedures to inform the EPA or Environmental Department of Laois County Council;
- Audit and review schedule;
- Telephone numbers of statutory water consultees; and
- List of specialist pollution clean-up companies and their telephone numbers.

[12] https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance

An emergency-operating plan will be established to deal with incidents or accidents during construction that may give rise to pollution within any watercourses. This will include:

- Means of containment in the event of accidental spillage of hydrocarbons or other pollutants. The emergency response plan should include a register of the significant potential pollutants and their locations on Site;
- An inventory of suitable pollution prevention and remediation equipment. This will include any equipment and materials held by the regulatory agencies and equipment and materials that may be sourced from commercial suppliers. Typical examples include filter media designed to prevent sediment run off over land in the form of sediment curtains; filter media designed to inhibit sediment discharges from pipes or to be installed in river beds to trap sediment; temporary storage tanks which are readily transported and erected on site; oil pollution booms, skimmers etc.
- Procedures for addressing fires on Site, including water sources and discharge of fire-fighting run-off;
- An appropriate number of 'siltbusters' which will be on standby for use in emergency situation;
- A monitoring plan for emergency situations.

9.6.5 IEF Mitigation (Terrestrial Ecology & Designated Sites)

9.6.5.1 Construction Phase

9.6.5.1.1 Designated sites

Potential significant effects on designated sites from the Proposed Scheme as a result of potential contaminant (e.g., hydrocarbons, chemicals, cement, silt) loss to the River Clodiagh and spread of IAPS and aquatic pathogens were identified. The following mitigation is outlined for the protection of designated sites:

- Appointment of an Ecological Clerk of Works (ECoW), to oversee the construction of the Proposed Scheme, ensure works are carried out in an ecologically sensitive manner, and undertake monitoring as appropriate (see **Section 9.6.1.1.1** and **Section 9.8**);
- Demarcation of sensitive working areas;
- Site inductions and toolbox talks to inform site workers regarding the ecological sensitivities, presence of IAPS and any appropriate actions they should follow;
- Full implementation of mitigation measures in relation to IAPS as specified in **Section 9.6.5.1.4**;
- Full implementation of mitigation measures in relation to crayfish plague as specified in **Section 9.6.7.1.7**;
- Full implementation of mitigation measures to protect groundwater as specified in **Chapter 10: Land Soil and Hydrogeology** and **Chapter 11: Water**; and
- Full implementation of mitigation measures to protect water quality as specified in **Section 9.6.7** and **Chapter 11: Water**.

9.6.5.1.2 Habitats

The following mitigation is outlined for the protection of habitats, namely Brittas Wood, treelines and hedgerows. Potential significant effects on these habitats were identified as a result of accidental damage to habitats (e.g., due to incursions into root protection zones), potential degradation of habitats due to contamination (e.g., accidental hydrocarbon or chemical spills) and spread of IAPS. The following mitigation measures will be implemented:

- Trees along the Proposed Scheme area that are to be retained, both within and adjacent to the Proposed Scheme area (where the root protection area of the tree extends into the Proposed Scheme area), will be fenced off prior to works commencing and for the duration of construction to avoid damage to the tree canopy and root systems of the trees. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist;

- The area within the RPA of all trees will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g., hydrocarbons) or concrete washout areas will not be undertaken within 10 m of any retained trees, hedgerows and treelines;
- To avoid unintended incursion by personnel, equipment and materials, the construction site boundary will be fenced off and site access/egress points constructed. Only site access/egress points will be used by personnel and equipment. Signage will be placed at intervals along the fencing stating, “no access or storage of materials beyond this point” (or similar). The signage to face inwards into the construction site. As part of the on-site ECoW induction for construction personnel, it will be stated that there will be no access to personnel or equipment and no storage of construction materials beyond the fenced construction boundary. Fencing of the Proposed Scheme boundary will be undertaken as part of the enabling works. The ECoW will advise on any other vegetation within the Proposed Scheme boundary which can be retained during the construction works, and this will be fenced-off with suitable protective fencing as specified by the ECoW. The fencing will form a clear barrier between retained habitats within and adjacent to the Proposed Scheme boundary;
- The sequencing of earthworks and excavations must be carefully planned by the Contractor and approved by the ECoW to ensure that large areas of exposed soil are not left as such for extended periods of time;
- Topsoil-stripping of each phase of works must be delayed until shortly before construction begins, rather than stripping the whole site many months before construction.

In order to remediate habitat loss (noting that habitat loss was not identified as a “significant effect”) within the Proposed Scheme area, the following measures shall be implemented:

- Remediation/reinstatement of habitat will start preferably during the construction phase or as soon as construction works have ceased;
- Remediation/reinstatement will involve the implementation of the Biodiversity Management and Enhancement Plan (BMEP), which has been prepared and can be found in **Appendix 9.6**. Regarding habitats, this plan provides for:
  - Replacement tree planting;
  - Topsoil and subsoil management and reinstatement during the construction phase;
  - Grass and wildflower regeneration;
  - Monitoring of the effectiveness of these measures (see **Section 9.8.1**); and
  - Adaptive management of these measures if required.
- Full implementation of mitigation measures to protect groundwater as specified in **Chapter 10: Land Soil and Hydrogeology** and **Chapter 11: Water**; and
- Full implementation of mitigation measures to protect water quality as specified in **Section 9.6.7** and **Chapter 11: Water**;
- Full implementation of mitigation measures regarding IAPS as specified in **Section 9.6.5.1.4**.

Planting of trees and shrubs will preferably be completed prior to completion of the Proposed Scheme.

9.6.5.1.3 Otter

Potential significant effects on otter were identified as a result of disturbance and deterioration of foraging resources. The following measures are proposed to avoid/minimise any impact on otter during the construction phase:

- Any excavations greater in depth than 30 cm which are left open overnight will either be temporarily covered over or a temporary ramp (e.g. scaffold board at suitable angle) will be inserted. This to prevent the entrapment of otter within the excavations and/or to enable their escape from the excavation;
- A watching brief during vegetation clearance as detailed above will help to protect against accidental mortality of otter;

- Disturbance as a result of night-time light pollution will be reduced through implementation of measures required for bats, as set out in **Section 9.6.5.1.6**;
- Impacts on foraging resources will be mitigation through the implementation of water quality protection measures set out in **Chapter 10: Land Soil and Hydrogeology**, **Chapter 11: Water**; and **Section 9.6.7;**
- Based on the current baseline, and prior to works, a pre-construction survey will be required to confirm the status of otter as identified and described in **Section 9.6.3**;
  - The pre-construction survey will assess the presence of potential resting sites or holts along the watercourse;
  - No confirmed holts were identified at the time of survey. Should any holts be identified then a further survey including camera trapping (under licence) may be required to confirm activity;
  - In the event that holts are confirmed during pre-construction surveys and are to be closed, this will be carried out under the supervision of an appropriately qualified ecologist under licence from the NPWS, in accordance with the necessary derogation licence and with reference to the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2008b). The need for derogation licence will be determined by the ECoW;
  - During the pre-construction survey, any otter holts identified within 150 m of the Proposed Scheme will be clearly identified to all personnel working in the vicinity of the holt. Temporary boundary tape fencing (or similar) can used at the discretion of the ECoW to identify such holts subject to such measures themselves not impacting on the use of the holt;
  - In the event that derogation licence(s) will be required, these could require the loss of holt(s) to be compensated through the construction of artificial holt(s). The locations of such holts will be determined by the ECoW in liaison with the Contractor and the requirement of any derogation licence.

9.6.5.1.4 Invasive Alien Plant Species

The RPS ecological surveys carried out identified IAPS namely Japanese knotweed within the footprint (Area 2) of the Proposed Scheme. The mitigation measures below are set to address potential impacts from the introduction and spread of IAPS upon ecological receptors.

The Local Authority shall appoint a suitably qualified contractor to deal with any Third Schedule Invasive Alien Plant Species within the proposed works areas prior to any works commencing. This specialist will prepare an Invasive Alien Species Management Plan (IASMP) that will be followed during the treatment of the IAS identified within the Proposed Scheme area. It is assumed that it will be necessary to eradicate IAPS concurrently with the construction phase. This would need to be carefully planned, implemented and managed as part of the Proposed Scheme. At the time of writing, the works will be completed with reference to the following guidance:

- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010);
- Guidelines for the Management of Waste from National Road Construction Proposed development (NRA, 2014);
- The management of Invasive Alien Plant Species on National Roads – Standard (TII, 2020a);
- The management of Invasive Alien Plant Species on National Roads – Technical Guidance (TII, 2020b);
- Invasive Species Ireland guidance (http://invasivespeciesireland.com).

The locations of known stands of IAPS will be avoided as much as possible during the proposed works. Exclusion fencing and signage will be installed to prevent interaction of construction vehicles with the area where possible. Strict biosecurity measures are proposed for the duration of the works. The IASMP shall include the following as a minimum:

- General measures to avoid spreading invasive species during construction or soil movement;
- Treatment plan to include in-situ chemical treatment, root barrier membranes and/or excavation and disposal at a suitably licensed facility as appropriate;

- Guidance regarding off-site disposal and licencing - if material contaminated with Third Schedule IAPS, is removed off site it will require a licence from the NPWS in advance of any removal, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477) as amended;
- Biosecurity measures to ensure invasive species are not spread between sites; and
- Good machinery hygiene including steam cleaning machinery and disinfection of water pumps etc.

The ECoW must be present on site to supervise the works and ensure the IASMP is fully implemented.

9.6.5.1.5 Protection of Birds

Significant effects on birds were identified as a result of potential degradation of aquatic foraging habitat and accidental mortality or injury. To mitigate these effects, the following is proposed:

- All vegetation removal will be completed outside the breeding bird season (1 March to the 31 August, inclusive) with the following exception:
  - where breeding birds are confirmed absent by the ECoW immediately prior to the vegetation being removed. Areas found not to contain nests will be cleared within three days of the nest survey, otherwise repeat surveys will be required.
- Impacts on foraging resources will be mitigated through the implementation of water quality protection measures set out in **Chapter 10: Land Soil and Hydrogeology**, **Chapter 11: Water**; and **Section 9.6.7;**
- Preconstruction survey for evidence of kingfisher nesting as described in **Section 9.6.3**. This will include a survey of the banks of the Clodiagh river within 100 m of the red line boundary[13]. The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for additional mitigation measures, such as the requirement for exclusion areas within the vicinity of nests should they be recorded.

9.6.5.1.6 Protection of Foraging and Commuting Bats

Potential significant effects on bats were identified as a result of disturbance and deterioration of foraging resources. To minimise potential disturbance to commuting and foraging bats, construction operations during the hours of darkness will be kept to a minimum. If construction lighting is required, lighting shall be directed away from all habitats where bats are potentially foraging and commuting (i.e., woodland, treelines, hedgerows, watercourses. This can be achieved by using directional lighting (i.e. lighting which only shines on the proposed works and not nearby countryside) to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

Full implementation of mitigation measures to protect water and groundwater as specified in **Chapter 10: Land Soil and Hydrogeology**, **Chapter 11: Water** and **Section 9.6.7** of this chapter will serve to protect bats from the indirect effects of water quality deterioration.

9.6.5.1.7 Protection of Roosting Bats

No confirmed bat roosts were identified within the Proposed Scheme, however, several trees proposed to be felled were identified as having features that could support individual bats (PRF-I). A single tree was assessed as having a feature that could support multiple bats (PRF-M), but emergence surveys did not detect bats emerging from this feature. In addition, the ground level roost assessment survey of tree no. 50 and 151, and hedge no. 140 was slightly limited due to dense vegetation and/or the presence of livestock.

Whereas roosting bats were not identified as an IEF, bats are protected under the Habitats Regulations, and precautions must be taken to avoid the deliberate killing or injury of bats (Marnell, et al., 2022). The following shall be undertaken:

- Pre-construction surveys of all trees to be felled shall be undertaken as described in **Section 9.6.3**.

[13] https://www.nature.scot/doc/disturbance-distances-selected-scottish-bird-species-naturescot-guidance

- The findings of the pre-construction survey will be reviewed in relation to whether the updated findings trigger a requirement for additional survey work (e.g. tree-climbing or emergence surveys), additional mitigation, or a species derogation licence from NPWS. Based on the current baseline, no such derogation licensing is necessary.
- The killing or injury of individuals will be avoided by implementing a 'soft felling' technique for all trees with an overall assessment of PRF-I or where soft felling is required necessary as a precaution, as follows:
  - Where it is safe and appropriate to do so for both bats and humans, each tree should be pushed lightly using heavy plant/machinery two to three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. This shall ensure the optimum warning for any roosting bats that may still be present;
  - The tree should then be pushed to the ground slowly and should remain in place until it is inspected by the ECoW;
  - Felled trees should be left grounded for 24 hours prior to removal/disposal to allow any bats (or other wildlife) beneath foliage to escape overnight;
  - Tree should be sectioned or felled entire, without increased force (e.g. without being pulled or pushed to the ground by machinery); and
  - Trees will only be felled "in section" where the sections can be rigged to avoid sudden movements or jarring of the sections.
- The tree with a PRF-M (tree no. 8) will not be felled as a result of the Proposed Scheme. However, it is located within the works area, and could be used by bats in the future. As a precaution, the root system of this tree will be protected through the use of appropriate matting as advised by an arborist. No branches of the tree shall be removed. Construction phase lighting will not be directed at this tree.

9.6.5.2 Operational Phase

9.6.5.2.1 Designated Sites

Potential significant effects on designated sites from the Proposed Scheme as a result of potential spread of aquatic pathogens were identified. The following mitigation is outlined for the protection of designated sites:

- Full implementation of mitigation measures in relation to crayfish plague as specified in **Section 9.6.7.2.2**.

9.6.5.2.2 Bats & Otter

It will be necessary to remove and reinstate some of the existing street lighting along Chapel Street to facilitate works along the wall.

To protect bats and otter from the potential negative effects of street lighting, any street lighting installed must comply with The Bat Conservation Trust and Institution of Lighting Professionals guidance on "Bats and Artificial Lighting at Night" (ILP, 2023), and shall not be directed towards the River Clodiagh or adjacent riparian vegetation. This shall involve, at a minimum:

- Seeking input from a suitably qualified ecologist on lighting design;
- Avoiding the illumination of key habitats (i.e., the River Clodiagh, riparian vegetation, trees and hedgerows);
- Use of appropriate luminaire specifications (e.g., use of LED luminaires, adoption of a warm white light source (2700Kelvin or lower), light sources to feature peak wavelengths higher than 550nm, use of luminaires with a negligible or zero Upward Light Ratio, mounting of luminaires horizontally, with no light output above 90° and/or no upward tilt).

9.6.6 Non-IEF Mitigation (Terrestrial Ecology)

9.6.6.1 Construction Phase

9.6.6.1.1 Watching Brief during Site Clearance

All vegetation removal shall be monitored by the ECoW to ensure there is no disturbance of any protected species e.g., otter, badger, birds, bats, stoat, hedgehog etc. If disturbance occurs, the ECoW will treat each species appropriately, e.g., contact NPWS for otter and bats, relocate hedgehogs etc.

Where dense vegetation or inaccessibility prevents adequate determination of the presence or absence of otter holts or badger setts as part of the pre-construction surveys, these areas will require monitoring during vegetation clearance to ensure that any holts or setts present will be found and treated appropriately.

9.6.7 IEF Mitigation (Aquatic Ecology)

9.6.7.1 Construction Phase

9.6.7.1.1 Ecological Clerk of Works

The ECoW shall implement the following mitigation measures and survey requirements for aquatic ecological receptors:

- Together with the ECoW, environmental triggers for safe undertaking of the high-risk work items will be agreed between the Contractor, LCC, the CER along with any other experts or technical specialists needed for high risk aspects of the project and understood and transferred to a spreadsheet by the ECoW. An experienced ECoW may assist with determining these values, but the responsibility rests with LCC. Triggers for the commencement and abandonment of works will be set. The triggers must be very clearly defined for each work item. The work items will include but will not be limited to the following:
  - Site set-up and materials/equipment delivery
  - Earthworks and excavation
  - Instream and bankside works on the Brittas Stream and River Clodiagh
  - Concrete pouring
  - Removal of temporary shuttering

  Commencement and abandonment triggers for the above items will be agreed for the following parameters:
  - Rainfall
  - Water levels
  - Onsite weather conditions
  - Turbidity levels and total suspended solids (TSS)
  - pH
  - Soil wetness
  - Integrity of mitigation measures
- Monitoring of the above parameters shall be recorded and retained by the ECoW throughout the construction phase. A schedule of monitoring is provided in **Table 9-27**.
- The ECoW will have the authority to instruct the cessation of works when agreed abandonment triggers are met.

9.6.7.1.2 Preconstruction Consultation & Method Statements

Before works commence, IFI and the NPWS shall be notified of the proposed works. A detailed method statement for works within and adjacent to the Brittas Stream and River Clodiagh will be prepared. The method statement shall include a map showing the locations of access and egress locations, surface water features, works exclusion zones, site compounds, storage areas for hazardous liquids (e.g., fuel, oil), stockpiles, settlement tanks and silt fencing. The method statement and maps will be submitted to the ECoW, CER, IFI and the NPWS for approval and any further requirements deemed necessary shall be agreed with the ECoW, CER, IFI and the NPWS no less than 6 weeks in advance of works commencing.

9.6.7.1.3 Water Quality Protection and Management

Chapter 11: Water and **Chapter 10: Land Soil and Hydrogeology** provide general mitigation measures for the protection of water quality during the construction phase. **Chapter 11: Water** includes measures to manage surface water during the construction phase. The mitigation measures in these chapters address the management and protection of water quality during the overall construction phase by outlining and various best practice measures regarding:

- Dewatering;
- The pouring and handling of concrete;
- The use of plant at and near water, and within the Site;
- The management, use and storage of hydrocarbons and other chemicals on site;
- Emergency procedures for accidental spills and leaks from plant and equipment;
- The use and siting of silt fences and straw bales;
- The management and siting of stockpiles; and
- The avoidance of underground services (foul water pipes etc.).

The following specific additional measures are required to ensure the protection of aquatic ecological receptors:

9.6.7.1.3.1 Water Management

- All water protection measures will be incorporated into a detailed Water Management System (WMS) which will be prepared by the Contractor;
- The WMS will be drawn up in consultation with the ECoW and CER and will take into account any changes in the physical conditions of the site e.g. river flows or ground conditions, which may have occurred subsequent to the submission of the application;
- Surface water runoff or groundwater encountered during the excavation of the proposed underground structures and foundations shall be pumped clear from the excavations. Water shall be directed toward a sump within the excavations. Using submersible pumps can generate more sediment through water turbulence. To avoid this, a corner of the excavation shall be used as a sump and care taken to avoid disturbing that corner. The pipe intake shall be fitted with a device to minimise disturbance of sediment within the sump, such as a perforated oil drum, a short length of wide bore perforated pipe or concrete manhole rings containing granular fill;
- Dewatering pumps will have appropriate capacity to pump out the residual seepage from excavations to maintain the works area excavation dry. The pumps shall be integrated sumps or shall sit within a fully bunded impermeable surface which is monitored and emptied regularly;
- It will not be possible to allow pumped water to percolate to the ground, due to the presence deep water extraction boreholes in the vicinity. Therefore, water from excavations shall be pumped to appropriately sized mobile ‘Siltbuster’ or similar equivalent specialist water treatment system to treat sediment polluted waters from any works process should that occur. Siltbusters are mobile silt traps that can remove fine particles from water and are specifically designed for use on construction-sites. The use of proprietary equipment such as ‘Siltbuster’ type tanks to assist with the reduction of suspended solids is noted in ‘Good Practice during Wind Farm Construction’ (a joint publication by Scottish Renewables,

Scottish Natural Heritage, Scottish Environmental Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Marine Scotland Science and AEECoW), which was published in 2019[14]. Sufficient numbers of 'Siltbusters' will be stored on site to be rapidly employed when needed. Inland Fisheries Ireland should be consulted if the use of chemical coagulants as part of the treatment process is required (e.g., where clay or very fine silt must be filtered) for subsequent discharge to the River Clodiagh;

- Dewatering outfall pipes will be placed well downstream of the works, and protection such as large stones or geotextile matting provided to avoid scouring of the bed and/or banks at the outfall;
- The outfall pipes will be fitted with a silt sock. This will also act as a further baffle to further slow and spread outfall rate;
- The number of 'Siltbusters' or similar equivalent specialist water treatment system required shall be determined by the Contractor, using the information as obtained from site investigations to ensure that the treatment provided suits the actual ground conditions encountered during the construction works;
- The water treatment system must be sized to allow for:
  - Expected rainfall intensity;
  - Expected rainfall duration;
  - Water ingress during instream works; and
  - Size of the drained area.
- Pumped-out water from all excavations must be treated to a standard that will not affect water quality. Pump-out water can be treated on-site (e.g., sediment settlement and pH monitored) or can be removed off-site for discharge at a licenced treatment facility. Attenuation and treatment on site must ensure discharge water does not exceed 25 mg/l TSS and must be within the pH bracket of ≥ 6 ≤ 9;
- Discharge water from the 'Siltbuster' or similar equivalent specialist water treatment system will be inspected by the ECoW with a handheld turbidity/conductivity/pH probe (see **Table 9-27**). If any of the parameters exceed environmental triggers set out in advance, the flow will be stopped immediately, and appropriate remedial works will be carried out. This may involve pH correction and the deployment of additional emergency 'silt busters' or similar;
- Uncontrolled water leaks from pumps and hoses can create additional surface water problems. To avoid damage, discharge hoses shall be routed out of the way of vehicle movements. Wherever hoses pass over a solid edge (the top of an excavation or a concrete sump, for example), care shall be taken to ensure no damage can occur. Regular daily checks shall be carried out on the pump, hoses and couplings for leaks and kinks by site personnel, with any problems being fixed immediately;
- Should water pumped from excavations become contaminated (e.g., from a hydrocarbon spill or leak), pumped water must be tankered off site and treated at an appropriately licensed facility;
- Sediment collected within the settlement tanks shall not be disposed of on site. Sediment accumulating within settlement tanks shall be carefully removed and disposed of off-site to an appropriate waste facility;
- Should overland flow or surface water run-off into excavations affect the integrity of the various mitigation measures in place, temporary interceptor drains will be installed within the Site, as per a detailed method statement, with the locations agreed with the CER and ECoW. The drains will be used to divert runoff around the works area to a location within the Site that is low risk (e.g., where silt fencing has already been installed) where it can be redistributed over the ground surface as sheet flow;
- A mobile 'Siltbuster' or similar equivalent specialist water treatment system will be available on-site for emergencies in order to treat sediment polluted waters from any works process should that occur;

[14] https://www.scottishrenewables.com/assets/000/000/453/guidance_-_good_practice_during_wind_farm_construction_original.pdf?1579640559

9.6.7.1.3.2 Silt

- There shall be no direct discharge of untreated water from excavations, surface runoff, dewatering activities, washdown or any other construction works directly to any surface water body or surface water drainage network at any time.
- The sequencing of excavations must be carefully planned by the contractor to ensure that large areas of exposed soil are not left as such for extended periods of time.
- Topsoil-stripping of each phase of works must be delayed until shortly before construction begins, rather than stripping the whole site many months before construction.
- Excavation and topsoil stripping will commence as per the environmental triggers agreed.
- As much existing vegetation within and around the site perimeter, stockpiles and haul roads as possible will be retained and protected during construction with fencing, signs etc.
- A works exclusion zone adjacent to the entire river channel adjacent to the works area will be established in consultation with the ECoW and clearly demarcated in advance of works commencing;
- Silt fencing will be used to isolate the Site from receiving surface water bodies. The siting of silt fencing shall be agreed with the Contractor, ECoW and CER. It may not be necessary or possible to install silt fencing in some works area, such as where works are proposed on the land side of an existing wall to be retained (e.g., Chapel Street). However, in other areas silt fencing will be required (e.g., Area 1 and Area 3). The following criteria, as per CIRIA C648 must be adhered to for the installation/operation of silt fencing:
  - Where space permits, and where considered necessary by the ECoW, a double silt fence shall be installed;
  - The double silt fence shall be installed as follows:
    - The inner silt fence fabric is buried at least 100 mm into the ground;
    - The outer silt fence fabric is folded at ground level and not buried;
  - Where a single layer of silt fencing is installed, the fence fabric must be buried at least 100 mm into the ground;
  - Silt fencing must be installed along a level contour so water does not pond more than 400 mm at any point;
  - An undisturbed area behind the fence must be retained for runoff to pond and sediment to settle;
  - No more than 0.5 ha of concentrated flow shall drain to any point along the silt fence;
  - The fabric will be fixed to strong supporting posts at regular intervals;
  - The silt fences will be positioned at central and right angles to flow, with the ends curving up slope to ensure water ponds behind the fence and does not flow around it;
  - The fence will be supported by a wire mesh if the fabric selected does not have sufficient strength;
  - Accumulated silt will be cleared regularly; commercially produced silt fences have a printed indicator line over which silt should not accumulate;
  - The silt fence must be capable of preventing 180µ (micron) and above sediment from passing through;
  - Silt fences must not be decommissioned until all land is vegetated;
  - The buried inner silt fence is removed first;
  - The outer folded silt fence is removed last, when the inner silt fence ground has revegetated.
  - Where space allows, silt fencing must be positioned at a minimum of 10 metres from surface water bodies. The 2 layers of silt fencing shall be spaced in 1 metre intervals.
  - Every precaution will be taken to ensure that the installation of the silt fencing itself does not result in emissions of silt to the River Clodiagh. To this end, sequential excavation and reinstatement of turves as the silt fence is trenched will be implemented. Silt fencing will be placed as close as

possible to the construction works while allowing for sufficient space for maintenance and clearance of silt and debris.

  - The ECOW shall regularly inspect the silt fences as per the monitoring programme (**Table 9-27**);
  - In no circumstances will works be undertaken on the river side of silt fences.

- Any drains within the Site or affected by construction activities will be isolated with check-dams and/or silt curtains in series.
- Exposed soil adjacent to the River Clodiagh and Brittas Stream will be protected from erosion/loss of soil particles with biodegradable geotextile matting made from natural fibres that will remain *in-situ*. The weave must be coarse enough to stabilize the soil while permitting plants to grow through it. It will not be necessary to remove this matting at the project's completion.
- Drainage inlets on Chapel Street downgradient of the works area will be either blocked or protected as per the following criteria:
  - Drain inlets will be protected with a drain guard designed to filter oil and silt from stormwater run-off (e.g., https://ssienvironmental.ie/product/drain-guard/);
  - In addition to the above, sandbags will be placed around the inlet to provide additional protection from sediment.

9.6.7.1.3.3 Fuels and Chemicals

- Concrete works during the Construction Phase, will avoid any contamination of ground and water through the use of appropriate design and methods implemented by the Contractor and in accordance with industry standards (e.g., Guidance for Consultants and Contractors, CIRIA - C532', CIRIA, 2001);
- Concrete pouring will be undertaken in accordance with the agreed commencement and abandonment triggers (see **Section 9.6.7.1.1**);
- Shuttering will be designed to accommodate increases in the volume of material contained within the shuttered area due to rainfall;
- Discharge water generated during placement of concrete will be stored and removed off site for treatment and disposal;
- Wherever possible, concrete should be carefully placed by the use of a hydraulic pump to minimise the risk of concrete spillages, especially for operations over a watercourse. Ends of pump hoses should be secured by means of a rope during concreting over and adjacent to watercourses to prevent the discharge hose accidentally depositing concrete away from the pour site. If concrete is to be placed by means of skips, the opening gate of the delivery chute should be securely fastened by a lock chain to prevent accidental opening of the skip over water, especially if that would cause spillage during concrete placement manoeuvres;
- At the delivery point either for pump-placed or skip-placed concrete, measures for preventing concrete spillage from truck mixers contaminating the ground and leaching out into the groundwater must be in place for all concreting operations. Washing out of truck mixers, concrete pumps, skips and other items of plant and equipment needing to be cleaned of concrete after use must only take place at a designated area, away from the watercourse. Compressors or generators used for connecting operations should be fitted with drip trays to collect fuel and oil spills that might otherwise contaminate the groundwater and lead to pollution of the watercourses;
- Dry low strength concrete, that will set to form an impermeable barrier in order to prevent washout of cementitious material into shallow groundwater during the construction of the cut-off trench in Area 2, as set out in **Chapter 10: Land Soil and Hydrogeology**, shall be utilised;
- See **Chapter 11: Water** and **Chapter 10: Land Soil and Hydrogeology** for further measures.

9.6.7.1.4 Instream Works

- All measures set out in **Section 9.6.7.1.3** will apply to the Proposed instream works;

- As noted in **Chapter 5: Project Description**, it is proposed to pour the concrete base of the debris trap in two parts to facilitate diverting the river to one side of the river bed for each stage of works. The works area will be dammed on three sides using large sand bags. Pumping will be required from within the works area to deal with water seeping through the temporary dams or through the ground;

Timing of Instream Works

- Instream works will be required for the construction of the debris trap on the River Clodiagh and the new culvert inlet on the Brittas Stream. Instream works must avoid the spawning period of fish in the River Clodiagh. The fisheries open season is from 1st July to 30th of September, and instream works shall be restricted to this period;
- Instream and bankside works shall only be undertaken as per the triggers agreed between the ECoW and Contractor. A workable stream and river water level will be agreed with the ECoW and Contractor before works commence. As best practice works should be undertaken during dry weather, when there is no risk of flooding and when the soil is dry enough for works to commence (no overland flow or soil saturation).

Works Exclusion Zone

- Prior to works commencing, the ECoW, together with the Employers Representative and Contractor will establish a works exclusion zone adjacent to the instream works area, to protect riparian vegetation. The exclusion zone will demarcate the areas where construction plant, equipment and personnel may not enter, and will ensure the working area is restricted to the minimum possible size;
- Access routes for material delivery, plant and construction personnel must be from the left bank (looking downstream) only within Brittas Wood.

Creation of Dry Area

- It will be necessary to create a dry working area to facilitate the installation of the debris trap. The concrete base of the debris trap will be poured in a minimum of two parts, by diverting the river to one of the river-bank sides for each stage of works. An objective of the methodology will be to provide for the unhindered passage of fish at all times. Under no circumstances will soil or clay be used to create a dry working area. The dry working area will be constructed of small or large geotextile bags filled with sand. Sandbags can be wrapped in impermeable geotextile if necessary to prevent excessive water ingress. Sand within the sandbags must be clean and free of silt;
- The concrete base will be poured within trench boxes to prevent unnecessary over-excavation of the riverbed and a binding layer of concrete will be placed at the bottom of the excavation to seal the bottom of the excavation;
- Dewatering will continue within the trench during all concrete placement, via a submersible pump placed in a sump, to ensure positive flow into the excavation rather than escaping outwards. Pumped water containing cementitious fines will require additional treatment prior to discharge to the river;
- The Contractor will have a flood warning action plan in place prior to commencing works. Upon a flood warning being issued by Met Éireann all plant and equipment will be removed from the channel and any excavations backfilled and compacted to replicate the conditions prior to the works. In addition, the height of the sandbags must be higher than the water level that could be reasonably expected during the duration of the works. This is to prevent concrete and other pollutant escapement if unexpected flooding was to occur. The scheme designer should be consulted in determining this level, as outputs from the hydraulic model may be required;
- Monitoring of water levels within the River Clodiagh must be undertaken upstream and downstream of the instream works area, to assess whether dewatering within the instream works area is causing low water levels within the adjacent channel. This shall be undertaken daily when dewatering is being undertaken. The ECoW will have the authority to instruct works to cease if dewatering is causing water levels in the adjacent river channel to fall to levels that would result in potential mortality of fish, until the problem is resolved.
- Before any excavation within the channel, the top 50 cm of bed material must be scraped off and stockpiled (separate to other materials) for use in reinstatement.

Fish Protection, Rescue and Relocation

There must be a licenced, experienced and qualified ecologist on-hand at the time the instream works area is dewatered.

- Any fish (e.g., eels, lamprey ammocoetes and salmonids) that emerge during the water draw down must be collected in clean buckets of water and returned to the channel, a short distance upstream of works. In the unlikely event that crayfish are found, they must not be transferred to another watercourse, but returned to the channel a short distance upstream of works;
- Given the size of the area to be dewatered on the River Clodiagh, a fish rescue must be undertaken in advance of water draw down. Once the area has been sealed, electrofishing will be conducted within the area to be dewatered under approval and supervision of IFI staff (subject to licence and agreement with IFI). Any rescued fish shall be temporarily held in containers of clean, well-oxygenated river water or immediately transferred to the area upstream of the contained area. Species that are likely to be encountered include eel, salmonids, lamprey, minnow, stickle-back and stoneloach. In the unlikely event that crayfish are found, they must not be transferred to another watercourse, but returned to the channel a short distance upstream of works;
- An aquatic ecologist will remain onsite during the initial pump-out and water draw down inside the contained area to observe any sign of fish such as lamprey ammocoetes that may have remained in the channel following electrofishing. Any fish that emerge during the water draw down must be collected in clean buckets of oxygenated water and returned to the channel, a short distance upstream of works. In the unlikely event that crayfish are found, they must not be transferred to another watercourse, but returned to the channel a short distance upstream of works;
- It is unlikely that lamprey ammocetes will occur within the area to be excavated. Nevertheless, as a precaution, excavated material will be spread out on sheeting adjacent to the river channel and immediately searched by the aquatic ecologist so that lamprey ammocoetes can be collected and released.
- Artificial lighting at night has the potential to disrupt and disorientate fish and increase exposures to predation. Lighting during the construction phase will avoid direct illumination of the Clodiagh River. For works during winter months certain limited activities may require lighting which will be cowled to minimise light spill onto watercourses.

River Margin and Channel Reinstatement

- Prior to removal of sandbags at the instream works area, damaged riverbanks and margins must be reinstated inside the instream and bankside works area. Materials and methods used to reinstate the banks will be dependent on scour and erosion protect requirements, which will be determined following detailed design. The following outlines criteria that must be adhered to as part of the detailed design and construction methods for river bank reinstatement and scour/erosion protection:
  - The use of hard engineering solutions for scour/erosion protection shall be limited to areas where it is deemed to be absolutely necessary. It is assumed riprap will have to be installed on the left bank at the proposed slipway.;
  - Riprap placed on the channel margins shall comprise locally sourced, clean boulders that have been approved by IFI and that broadly mimic the naturally occurring substrate. IFI is the appropriate body to be contacted by the ECoW to establish current (at the time) approved supplier(s) of such materials prior to the reinstatement period;
  - Riprap protection must be carefully designed and placed to ensure flow paths under and around the bank side of the boulders do not develop;
  - Alternative solutions for scour/erosion protection shall be considered at detailed design stage and shall include soft engineering approaches such as willow spiling. A rationale for the design choice, including reasons for rejection of a soft engineering approach should this occur, must be provided to the client;
  - Should soft engineering approaches such as willow spiling be included within the design, a plan for the long-term management of such structures must be prepared.
- Reinstatement of the stockpiled river substrate within the instream works area shall match the profile of the bed level on the outside of the instream works area, and at the upstream and downstream ends, such that there is no significant step-change in lateral or longitudinal riverbed profile;

- The dry area must be rewetted gradually and carefully, in accordance with a method statement approved by IFI and triggers set by the ECoW, to avoid wash-out of substrates owing to river flows from the upstream end of the contained area;
- River margin and channel reinstatement shall be supervised by the ECoW.

9.6.7.1.5 Vegetation Clearance Adjacent to River Clodiagh and Brittas Stream

Vegetation clearance adjacent to watercourses presents a risk of siltation of the river channel and destabilisation of river banks. The following mitigation will be implemented for all vegetation clearance proposed adjacent to the River Clodiagh and Brittas Stream:

- As per the construction programme outline in **Chapter 5: Project Description**, vegetation clearance is proposed to be undertaken outside the breeding bird season in the month of February, prior to works within each area commencing. As vegetation clearance will be undertaken prior to instream works commencing, it is vital that the clearance activities do not result in bank destabilisation or losses of silt to the River Clodiagh in the period following vegetation clearance. This shall be achieved as follows:
  - Vegetation will be cut down to 0.5 m above ground;
  - Tree stumps shall be retained;
  - The soil/root system on the bank will not be disturbed;
  - Screens shall be utilised where required to ensure branches and sawdust does not fall into river channel and to minimise dust deposition;
  - An ECoW shall monitor vegetation clearance.

It is proposed to replant by hand all trees that will be removed for these works within Area 1 to accommodate the Proposed Scheme. The manner and location of this replanting will be undertaken in agreement with Coillte.

9.6.7.1.6 Debris trap and slipway design

- As stated in the project description, during detailed design, the risk of excessive scour around the debris trap poles will be assessed. A site-specific scour analysis will be carried out at detailed design stage to assess the need to extend the debris trap foundation to form bed scour protection. The design will be discussed with IFI before finalising;
- Locally sourced stone compatible with local geology will be used to construct the slipway. Although not identified as a significant effect, as best practice, as much tree and shrub cover as possible will be retained during the construction of the slipway. Native trees of Irish provenance suited to the locality (e.g., willow or alder) will be planted in scattered aggregations in areas where tree loss is unavoidable, in consultation with Coillte. IFI must be consulted regarding the design of the slipway;
- The foundation of the debris trap shall be designed to include roughness elements, as opposed to having a smooth surface. The inclusion of roughness elements shall support the stabilisation of instream river material reinstated on top of the foundation;
- Drainage of the slipway must be carefully designed to ensure overland flow from the embankment and slipway does not result in silt-laden water flowing into the River Clodiagh. The slipway must also be carefully designed to ensure materials used to surface it (e.g., gravel, hardcore) do not get washed or pushed into the river during rainfall or maintenance activities. This could be achieved though the incorporation of drainage channels within the embankment that divert water to into vegetation on the landside of the embankment where it can percolate to ground, and the inclusion of a raised lip or similar at the slipway margin. The drainage design of the slipway and embankment shall be approved by IFI.

9.6.7.1.7 Biosecurity

Adherence to biosecurity protocols for avoidance of spread of pathogens will be followed by Contractors and surveyors (Caffrey, 2010). Careful disinfection and biosecurity measures are essential to prevent transfer of damaging pathogens, e.g., crayfish plague. This will apply to all personnel working in or near water, plus machinery that meets surface water and/or drainage to surface waters.

Crayfish plague presence in the River Clodiagh introduces the need for heightened biosecurity protocols associated with instream and bankside works. The following biosecurity will be implemented.

- The ECoW will provide a toolbox talk to all personnel on site regarding crayfish plague and the importance of implementing biosecurity protocols in advance of works commencing;
- All PPE, plant and equipment used on site will be fully disinfected (as per the below protocol) **prior to arrival on site**. All staff must have access to clean PPE and equipment;
- On completion of any field operation or when moving from one location or waterway to another, staff must clean and disinfect all PPE and equipment using the following protocol:
  - Visually inspect for evidence of attached invasive species material or adherent mud or debris. Remove any such material before disinfecting. During inspection and cleaning, pay particular attention to places where the seeds or fragments of invasive species could be accidentally trapped, such as the treads of boots, tracks of vehicles etc. Remove anything found and leave it at the site;
  - For heavily soiled equipment, boots and PPE, use a hard-bristle brush to remove mud and debris, and then spray with disinfectant solution such as Virkon Aquatic, Virasure or alternative disinfectant or use a boot bath, for example. Remove anything found and leave it at the site;
  - Wipe down or spray PPE and equipment that has come into contact with river water using an absorbent cloth soaked in disinfectant such as Virkon Aquatic, Virasure or another appropriate disinfectant before leaving the site. Cleaning must be undertaken thoroughly and as soon as possible, paying particular attention to waders, boots and areas that are damp and hard to inspect. Hot water (at least 45°C) or a high-pressure spray, shall be used;
  - Where plant and machinery has come into contact with river water it must be sprayed with disinfectant such as Virkon Aquatic, Virasure or alternative disinfectant, using a knapsack with a high-volume nozzle, before leaving the site. Cleaning must be undertaken thoroughly and as soon as possible, paying particular attention to areas that are damp and hard to inspect. Hot water (at least 45°C) or a high-pressure spray, shall be used; and
  - All PPE and equipment must be allowed to dry fully for at least 48 hours. Where complete drying is not possible, cleaned items must be disinfected. Extreme care should be taken when using disinfectants and the manufacturer's guidelines should always be followed.

9.6.7.2 Operational Phase

9.6.7.2.1 Maintenance of debris trap and Brittas Stream Culvert

Debris removal during the operational phase will be undertaken by LCC. A Standard Operating Procedure (SOP) will be developed by LCC, in consultation with a suitably qualified ecologist and IFI to account for monitoring and debris clearance operations at the Brittas Stream culvert and the River Clodiagh debris trap. Operational phase monitoring requirements at the debris trap are set out in **Section 9.8.4**. At a minimum, the following must be addressed:

- Regular monitoring of accumulated debris at the trap and Brittas Stream culvert must be undertaken. The frequency of monitoring will be agreed with IFI and LCC, but at the very least monitoring will be undertaken immediately after a flood event. Debris that has accumulated at the trap location must be removed immediately to prevent potential barrier issues for fish. Debris must not be allowed to accumulate at the culvert and debris trap to the extent that fine sediment is retained upstream as a result. The former measure (i.e., prompt removal of debris) will address this issue. Management activity at the debris trap and culvert shall be recorded and records shall be retained by LCC. At a minimum, the following details shall be recorded: date of management, type of management activity, size of debris captured, amount of debris captured, photographic record, integrity of debris trap and culvert;
- The management of the debris trap and culvert shall be adapted over time, if necessary; and
- Given the assumed presence of crayfish plague in the River Clodiagh, accumulated woody debris must be either retained within Brittas wood at a suitable location (this is preferred, and it could be used to create habitat for a variety of terrestrial fauna) or safely disposed of at an appropriate facility. Under no circumstances shall debris accumulated at the trap be stored or used (e.g., as enhancement measures) elsewhere.

9.6.7.2.2 Biosecurity during operation

The measures outlined in **Section 9.6.7.1.7** will be adhered to by all personnel undertaking maintenance activities on the debris trap and Brittas Stream culvert during the operational phase.

9.6.8 Non-IEF Mitigation Measures (Aquatic Ecology)

9.6.8.1 Enhancement of the River Clodiagh

It is worth noting that the River Clodiagh ADS channel has been subject to post-maintenance surveys by IFI since the late 1990s, and the use of instream woody habitat has been identified as an action to assist in the recovery of the river channel. In their Environmental River Enhancement Programme annual report (2017), IFI state "*The addition of LWH [large woody habitat] has the potential to significantly enhance the ecological potential of the experimental sites and support higher gravel abundance, depths and depth variations, greater flow diversity, improved hydraulic regime and therefore support higher trout densities*" (Coghlan et al., 2018). IFI will be consulted at detailed design stage in relation to potential enhancement measures that could be integrated into the Proposed Scheme.

9.6.8.2 Brittas Stream Culvert Inlet

The Brittas Stream culvert remediation is required to be constructed in accordance with the requirements of the OPW and IFI. It is noted that at present, the perched nature of this culvert combined with shallow water depths within it and debris blockages at the inlet means it is likely to act as a barrier to fish. The hydromorphological quality of the stream immediately upstream of the culvert is poor. Furthermore, the stream was dry during surveys undertaken in June 2024. Notwithstanding the above, it is possible the stream is utilised intermittently by aquatic fauna. Therefore, if possible, the culvert inlet should be designed to ensure passage of aquatic fauna at the inlet is not hindered. This is to ensure any future remediation works on this culvert to enhance fish passage are not affected by proposed works at the inlet. The design will be discussed with IFI before finalising.

9.7 Residual Impacts

9.7.1 Construction Phase

With all mitigation measures in place during the construction phase, residual construction phase effects are predicted to be ***not significant*** (see **Table 9-28**).

9.7.2 Operational and Maintenance Phase

With all mitigation measures in place during the operational phase, residual operational phase effects are predicted to be ***not significant*** (see **Table 9-28**).

9.8 Monitoring

Monitoring measures, and targets as appropriate have been recommended in relation to the Proposed Scheme for the construction and operational phases set out in the following sections.

9.8.1 Construction Phase (Terrestrial Ecology)

The following monitoring will be implemented during the construction phase of the Proposed Scheme and **Table 9-26** summarises the commitments:

- The required monitoring during the construction phase of the Proposed Scheme has been outlined above under various sections under the mitigation measures heading (**Section 9.6**) e.g., ECoW - Site Clearance, Invasive Alien Plant Species Management;

- A checklist will be filled in on a weekly basis to show how the measures above have been complied with. Any environmental incidents or non-compliance issues will immediately be reported to the project team;
- The Contractor will be continuously monitoring the works and will be fully briefed and aware of the environmental constraints and protection measures to be employed; and
- The works will be periodically monitored during the construction phase by the ECoW. Following completion of the works, the ECoW will complete a final audit report to show how the works complied with the environmental provisions described in this chapter.

Table 9-26: Schedule of monitoring – terrestrial ecology

Parameter	Technique	Frequency	Data Management	Response to Elevated levels/Conditions	Responsible Persons
Site Clearance	Oversee clearance process to minimise ecological damage. Provide summary of vegetation removed.	Daily during site clearance works	To be recorded on a spreadsheet and within a photographic log for reference.	Cease works if there is a risk to receiving environment or protected fauna until problem is resolved.	ECoW
Mitigation measures integrity checks	Documented checks of the integrity of all terrestrial mitigation measures (protective tree fencing, works exclusion zones, night time lighting). Time and location referenced photographic records to be taken.	Weekly, with increased frequency during high-risk activities	To be recorded on a spreadsheet and within a photographic log for reference.	Cease works if integrity of any mitigation measure is compromised, where there is a likely risk to the receiving environment, until problem is resolved.	ECoW

9.8.2 Operational & Maintenance Phase (Terrestrial Ecology)

The following monitoring will be implemented during the operational and maintenance phase of the Proposed Scheme:

Habitat Reinstatement

- Monitoring of the effectiveness of the habitat reinstatement as outlined in the BMEP will be undertaken. Monitoring will be undertaken to assess site stabilisation and revegetation progress such as seed germination, recruitment of native species and determining/correcting any problems (i.e. erosion), following the Construction Phase
- Regrowth of IAPS should be monitored annually for 7 years post construction of the scheme, or in accordance with monitoring specified in the IAPS Management Plan. Should regrowth occur, further control measures should be implemented suitable to the species and size of the stand, in agreement with the landowner;
- Areas of replacement planting particularly in Area 1 Brittas Wood, will be monitored monthly for one year following the construction phase by a suitably qualified ecologist. The site shall be monitored annually for at least 5-years post construction.

9.8.3 Construction Phase (Aquatic Ecology)

Throughout the construction phase the ECoW will be responsible for monitoring site conditions and water quality within the River Clodiagh and Brittas Stream.

In advance of the construction phase commencing, and throughout the construction phase, the ECoW will undertake turbidity monitoring to establish baseline turbidity levels. Turbidity will be monitored via handheld sondes upstream and downstream of the works area and at the discharge of settlement tanks. Alternatively, fixed turbidity monitors, installed at locations agreed with the ECoW, could be used to monitor turbidity levels within the River Clodiagh in real time. As noted above, the ECoW will agree triggers for commencing and abandoning works with the Contractor and the CER in advance of works commencing. However, an increase

in turbidity levels by 20% over the baseline should trigger an abandonment of works and implementation of immediate corrective actions.

Onsite water attenuation and treatment systems must ensure suspended solid concentrations within discharges do not exceed 25 mg/l and must be within the pH bracket of ≥ 6 ≤ 9. Suspended solids concentration provides an absolute measure of sediment concentration within a water sample and requires laboratory determination. This parameter is therefore limited in terms of its usefulness from an operational perspective. It will be necessary to measure pH and turbidity concentrations within the River Clodiagh and at settlement tank discharges (see **Table 9-27**). In order to utilise in-situ turbidity information for actionable indications of construction impact, a broad correlation will be made between the in-situ turbidity data and laboratory analysed suspended solids concentrations. The method for correlating TSS and turbidity will likely require samples of local sediments and river waters at different states to be taken to the lab for gravimetric analysis of TSS and correlated turbidity. This relationship will be used to establish a suspended solids/turbidity trigger level for works.

Visual inspections of the River Clodiagh and Brittas Stream for hydrocarbon sheen, as well as on going monitoring of the weather forecast, onsite weather conditions, overland flow and soil wetness conditions on Site will also be undertaken by the ECoW.

Table 9-27 outlines a schedule of monitoring required during the construction phase.

Table 9-27: Schedule of monitoring – aquatic ecology.

Parameter	Technique	Frequency	Data Management	Response to Elevated levels/Conditions	Responsible Persons
Turbidity/Total Suspended Soilds (see text), pH.	Handheld Sondes upstream and downstream of Site within the River Clodiagh and at discharges from settlement tanks. Alternatively, fixed turbidity monitors, installed at locations agreed with the ECoW, could be used to monitor turbidity levels within the River Clodiagh in real time.	The frequency of monitoring shall be determined by the EcOW. The frequency shall be appropriate to the conditions at time of construction and will reflect the risk of the various activities (e.g., instream works, concrete pouring, excavation, headwall installation).	To be recorded on a spreadsheet for reference.	Cease works if levels exceed the abandon triggers agreed in advance of works. Bolster existing mitigation measures. Carry out investigative survey (walkover, use of probes as required).	ECoW
Hydrocarbon sheen	Visual inspection of River Clodiagh and Brittas Stream upstream and downstream of Site. Time and location referenced photographic records to be taken.	As above.	To be recorded on a spreadsheet for reference.	Cease works if hydrocarbon sheen observed until source of pollution is identified and remedied if arising from construction works. Deploy mitigation (e.g., boons) as required.	ECoW
Weather forecast data	Weather forecast information for rain, wind and storm will be obtained from at least two reliable sources namely Met Eireann and AccuWeather.com. The most pessimistic forecast will be used initially until a picture of which forecast is the more accurate for the area is established.	As above.	To be recorded on a spreadsheet for reference.	Cease works if weather conditions are worse than forecast and exceed the abandon triggers agreed in advance of works.	ECoW

Parameter	Technique	Frequency	Data Management	Response to Elevated levels/Conditions	Responsible Persons
Weather on the ground	A check that the weather on the ground is no worse than the forecasted weather.	As above.	To be recorded on a spreadsheet for reference.	Cease works if weather conditions are worse than forecast and exceed the abandon triggers agreed in advance of works.	ECoW
Mitigation measures integrity checks	Documented checks of the integrity of any silt fencing, settlement tanks, percolation areas, etc. Integrity checks of machine routes and any exclusion zones. Time and location referenced photographic records to be taken.	As above.	To be recorded on a spreadsheet and within a photographic log for reference.	Cease works if integrity of any mitigation measure is compromised, where there is a likely risk to the receiving environment, until problem is resolved.	ECoW
Water level	Visual inspection of River Clodiagh upstream and downstream of instream works area, to assess whether dewatering within the instream works area is causing low water levels within the adjacent channel. Time and location referenced photographic records to be taken.	As above.	To be recorded on a spreadsheet and within a photographic log for reference.	Cease works if dewatering is causing water levels in the adjacent river channel to fall to levels that would result in potential mortality of fish, until problem is resolved.	ECoW
	Review of water level at Bracknagh Bridge gauge	As above.	To be recorded on a spreadsheet.	Cease works if water levels exceed the abandon triggers agreed in advance of works until water levels recede.	ECoW

9.8.4 Operational Phase (Aquatic Ecology)

Refer to **Chapter 11: Water** for details of operational phase water quality monitoring requirements. Any applicable water quality monitoring measures will serve for aquatic habitat protection purposes.

Monitoring of the performance of the scour protection will be undertaken and reviewed by a suitably qualified aquatic ecologist. The following will be undertaken:

- Within the first month (month 1) of completion of the debris trap, monitoring for intervention trigger points regarding scour and erosion (see point 5) will be undertaken twice per week at the debris trap (see point 3 also).
- During the subsequent two months (months 2 and 3) monitoring will be undertaken weekly at the debris trap (see point 3 also);
- Monitoring will always be undertaken following a flood event and during debris removal as part the Operation and Maintenance Plan (see **Chapter 5: Project Description**);
- Time and location referenced photographic records will be taken during each monitoring occasion;
- Intervention trigger points will be agreed with IFI and the design engineers (i.e., a degree of scour that is detriment to the structural design of the trap or to fish passage). In the event trigger points are exceeded, remediation measures will be undertaken in consultation with IFI.

9.9 Interactions and Cumulative Effects

Please refer to **Chapter 18: Interactions and Cumulative Effects** for a detailed assessment of the in-combination effects and EIAR Chapter interactions.

9.10 Conclusion

The Proposed Scheme has the potential to result in a range of effects on ecological receptors, during both the construction and operational phase. The design, mitigation measures and monitoring proposed for the Proposed Scheme will ensure significant effects on ecological receptors will not arise. The ***residual effects on biodiversity are expected to be not significant***, as shown in **Table 9-28**.

Table 9-28 presents a summary of the potential impacts, mitigation measures, monitoring commitments and residual effects for both terrestrial and aquatic ecology.

Table 9-28: Summary of impacts, mitigation measures and residual effects.

Receptor	Description of Impact	Importance of Receptor	Significance of Effect (without mitigation)	Controls, Monitoring & Mitigation Measures	Residual Effect
Slieve Bloom Mountains SPA	Habitat loss, degradation, fragmentation	International	Negative, permanent, irreversible, locally, **not significant**	Not required.	**Not significant**
	Disturbance or displacement of species		Negative, short-term, reversible, **not significant**	Not required.	**Not significant**
Charleville Wood SAC	Habitat loss, degradation and alteration; spread of IAPS; water quality	International	Negative, short-term or long-term, reversible –**significant**.	Retention of ECoW for construction phase. Mitigation measures for water quality protection (as set out in **Section 9.6.7**). IAPS management as set out in **Section 9.6.5.1.4**. Monitoring as set out in **Section 9.8.1 and 9.8.2**.	**Not significant**
	Changes in groundwater quality and/or yield		Neutral, short-term, reversible, **not significant**	Not required.	**Not significant**
	Direct effects on species		Negative, long-term, irreversible, **significant**	Retention of ECoW for construction phase. Mitigation measures for water quality protection (as set out in **Section 9.6.7**). IAPS management as set out **in Section 9.6.5.1.4**. Monitoring as set out in **Section 9.8.1 and 9.8.2**.	**Not significant**
	Habitat disturbance – maintenance of Brittas Stream culvert inlet and debris trap during operation		Negative, short-term, reversible – **not significant**	Not required.	**Not significant**
	Changes to downstream hydraulic conditions during operation		Neutral, permanent, irreversible – **not significant**	Not required.	**Not significant**
	Habitat disturbance during operational phase – siltation		Neutral, permanent, irreversible – **not significant**	Not required.	**Not significant**
	Habitat disturbance during operational phase - flooding		Positive/neutral – permanent, irreversible – **not significant**	Not required.	**Not significant**
SACs designated for white-clawed crayfish (listed in section 9.5.2.2.3)	Pathogen spread (construction and operation)	International	Negative, permanent, irreversible - **significant**	Mitigation set out in **Section 9.6.7.1.7** and **9.6.7.2.2**	**Not significant**
Screggan Bog NHA, Charleville Wood pNHA,	Habitat loss, degradation and alteration due to construction phase contaminant loss and spread of IAPS.	National	Negative, short-term or long-term, reversible –**significant**.	Retention of ECoW for construction phase. Mitigation measures for water quality protection (as set out in **Section 9.6.7**). IAPS management as set out in **Section 9.6.5.1.4**. Monitoring as set out in **Section 9.8.1 and 9.8.2**.	**Not significant**

Receptor	Description of Impact	Importance of Receptor	Significance of Effect (without mitigation)	Controls, Monitoring & Mitigation Measures	Residual Effect
Clonad Wood pNHA	Direct effects on species		Negative, long-term, irreversible, **significant**		**Not significant**
	Habitat disturbance – maintenance of Brittas Stream culvert inlet and debris trap		Negative, short-term, reversible – **not significant**	Not required.	**Not significant**
	Habitat disturbance during operational phase - siltation		Neutral, permanent, irreversible – **not significant**	Not required.	**Not significant**
	Habitat disturbance during operational phase - flooding		Positive/neutral – permanent, irreversible – **not significant**	Not required.	**Not significant**
Brittas Wood, Treelines, Hedgerow	Habitat loss and fragmentation, due to the removal of trees in Brittas Wood (Area 1).	County	Negative, permanent, and irreversible, **not significant.**	Not required but refer to BMEP.	**Not significant**
	Habitat loss and fragmentation due to the removal of trees and hedgerow in Area 2		Negative, permanent, reversible/irreversible locally, **not significant.**		
	Habitat loss and fragmentation due to the removal of trees/woodland in Area 3		Negative, permanent, irreversible/reversible locally, but **not significant.**		
	Accidental damage to habitats		Negative, permanent, reversible locally, **significant.**	Retention of EcoW for construction phase. Measures set out in **Section 9.6.5.1.2**. Monitoring set out in **Section 9.8.1**.	**Not significant**
	Habitat degradation (air quality)		Negative, short-term, reversible, **not significant**	Not required but see **Chapter 12: Air Quality**.	**Not significant**
	Habitat degradation (contamination though chemical spills)		Negative, short-term, reversible locally, **significant.**	Retention of ECoW for construction phase. Measures set out in **Chapter 10: Land, Soil and Hydrogeology**. Measures set out in **Section 9.6.4 and 9.6.7**.	**Not significant**
	Habitat degradation (IAPS spread)		Negative, long-term, reversible locally, **significant.**	Retention of ECoW for construction phase. IAPS management as set out in **Section 9.6.5.1.4** and monitoring as set out in **Section 9.8.1 and 9.8.2**.	**Not significant**
Otter (commuting & foraging)	Disturbance (construction)	Local (higher)	Negative, short-term, reversible, **significant**	Retention of ECoW for construction phase. Pre-construction surveys. Measures set out in **Section 9.6.6.1.1, 9.6.5.1.3, Section 9.6.7** and **Section 9.6.5.2.2**. Monitoring set out in **Section 9.8**.	**Not significant**
	Habitat loss, degradation & fragmentation		Negative, permanent/temporary, reversible/irreversible, **not significant**		
	Deterioration of foraging resources		Negative, short-term to medium-term, reversible, **significant**		

Receptor	Description of Impact	Importance of Receptor	Significance of Effect (without mitigation)	Controls, Monitoring & Mitigation Measures	Residual Effect
	Disturbance due to operational phase maintenance		Negative, brief, reversible – **not significant**		
	Disturbance due to operational phase lighting		Negative, permanent, irreversible - **significant**		
Bats (roosting, commuting & foraging)	Habitat loss and degradation	Local (higher)	Negative, permanent, irreversible or reversible, **not significant**.	Retention of ECoW for construction phase. Pre-construction surveys. Measures set out in **Sections 9.6.5.1.6, 9.6.5.1.7, 9.6.7** and **9.6.5.2.2**. Monitoring set out in **Section 9.8**.	**Not significant**
	Deterioration of foraging resources		Negative, short-term to medium-term, reversible, **significant**		
	Loss of trees with potential roost features		Negative, permanent, irreversible, **not significant**		
	Disturbance		Negative, short-term, reversible, **significant**		
	Disturbance due to operational phase lighting		Negative, permanent, irreversible - **significant**		
Birds (breeding & foraging)	Habitat loss and degradation	Local (higher)	Negative, permanent, irreversible or reversible, **not significant**.	Retention of ECoW for construction phase. Pre-construction surveys. Measures set out in **Sections 9.6.6.1.1, 9.6.5.1.5** and **9.6.7**. Monitoring set out in **Section 9.8**.	**Not significant**
	Degradation of aquatic foraging resources		Negative, short-term to medium-term, reversible, **significant**		
	Disturbance		Negative, short-term, reversible, **not significant**		
	Mortality or injury		Negative, short-term, reversible, **significant**		
Hen harrier	Disturbance or displacement of species	International	Negative, short-term, reversible, **not significant**	Not required.	**Not significant**
River Clodiagh	Loss of riparian habitat	National	Negative, permanent and irreversible locally, **not significant.**	Not required, but refer to BMEP	**Not significant**
	Loss and alteration of instream habitat in Area 1		Negative, permanent and irreversible locally, but **not significant**	Not required	**Not significant**
	Instream habitat and water quality – deterioration due to siltation, concrete pouring,		Negative, short-term – medium-term, reversible locally - **significant**	Retention of EcoW for duration of construction phase. Mitigation set out in **Section 9.6.7**, monitoring set out in **Section 9.8.3**.	**Not significant**

Receptor	Description of Impact	Importance of Receptor	Significance of Effect (without mitigation)	Controls, Monitoring & Mitigation Measures	Residual Effect
	accidental spills of concrete, hydrocarbons or chemicals.				
	Hydrological regime – changes due to dewatering or water storage		Negative, temporary, reversible, locally –**significant**	Retention of EcoW for duration of construction phase. Mitigation set out in **Section 9.6.7.1.4**, monitoring set out in **Section 9.8.3**.	**Not significant**
	Invasive plant species spread/introduction		Negative, permanent, reversible - **significant**	IAPS management as set out in **Section 9.6.5.1.4**. Monitoring as set out in **Section 9.8.1 and 9.8.2**.	**Not significant**
	Hydromorphology – changes to hydraulic conditions due to flood walls and embankments		Neutral, permanent, irreversible – **not significant**	Not required	**Not significant**
	Hydromorphology – Starvation of large woody debris downstream of the proposed debris trap		Neutral, permanent, reversible – **not significant**	Not required but see **Section 9.6.8**	**Not significant**
	Hydromorphology – Scouring at the debris trap		Negative, permanent, reversible – **significant**	Mitigation set out in **Section 9.6.7.1.6.** Monitoring set out in **Section 9.8.4.**	**Not significant**
	Habitat disturbance - Maintenance of debris trap and Brittas Stream culvert		Negative, short-term, reversible - **significant**	Mitigation set out in **Section 9.6.7.2.1**. Monitoring set out in **Section 9.8.4**	**Not significant**
	Siltation/river substrate alteration due to run-off from slipway and gravel path		Negative, permanent, irreversible - **significant**	Mitigation set out in **Section 9.6.7.1.6**.	**Not significant**
River Gorragh	Instream habitat and water quality – deterioration due to siltation, concrete pouring, accidental spills of concrete, hydrocarbons or chemicals (during construction phase flood event)	National	Negative, short-term – medium-term, reversible locally - **significant**	Retention of EcoW for duration of construction phase. Mitigation set out in **Section 9.6.7**, monitoring set out in **Section 9.8.3**.	**Not significant**
	Invasive plant species spread/introduction (during construction phase flood event)		Negative, permanent, reversible - **significant**	IAPS management as set out in **Section 9.6.5.1.4**. Monitoring as set out in **Section 9.8.1 and 9.8.2**.	**Not significant**
River Clodiagh & River Gorragh	Water quality – post scheme flooding (agricultural and ICW lands)	National	Neutral, permanent, irreversible – **not significant**	Not required.	**Not significant**

Receptor	Description of Impact	Importance of Receptor	Significance of Effect (without mitigation)	Controls, Monitoring & Mitigation Measures	Residual Effect
	Water quality – post scheme flooding (urban environment)		Positive, permanent, irreversible - **not significant**	Not required.	**Not significant**
White-clawed crayfish	Mortality due to potential spread of crayfish plague	International	Negative, permanent, irreversible - **significant**	Mitigation set out in **Section 9.6.7.1.7 and 9.6.7.2.2**	**Not significant**
Salmonids, European eel, lamprey (brook and/or river)	Direct mortality	National	Negative, short-term, reversible - **significant**	Retention of EcoW. Mitigation measures set out in **Section 9.6.7 and 9.6.8**. Monitoring set out in **Section 9.8.3 and 9.8.4**.	**Not significant**
	Indirect effects due to loss and alteration of instream habitat in Area 1		Negative, permanent, irreversible – **not significant**		
	Habitat fragmentation – River Clodiagh		Negative, short-term, reversible - **significant**		
	Indirect effects due to deterioration in water quality		Negative, short-term to medium-term, reversible - **significant**		
	Indirect effects due to loss of riparian habitat		Negative, permanent, irreversible – **not significant**		
	Indirect effects due to starvation of large woody debris downstream of the proposed debris trap		Neutral, permanent, reversible – **not significant**		
	Indirect effects due to maintenance activities at the debris trap and Brittas Stream culvert, including inadvertent fragmentation of the Clodiagh River channel.		Negative, short-term, reversible - **significant**		
	Fragmentation and habitat deterioration of the River Clodiagh through scouring at the debris trap.		Negative, permanent, reversible - **significant**		
	Indirect effects of siltation/river substrate alteration due to run-off from slipway and gravel path		Negative, permanent, irreversible - **significant**		
	Indirect effects due to water quality – post scheme flooding (agricultural and ICW lands)		Neutral, permanent, irreversible – **not significant**		

Receptor	Description of Impact	Importance of Receptor	Significance of Effect (without mitigation)	Controls, Monitoring & Mitigation Measures	Residual Effect
	Indirect effects due to water quality – post scheme flooding (urban environment)		Positive, permanent, irreversible - **not significant**		
	Habitat fragmentation – Brittas Stream culvert		Negative, permanent, irreversible – **not significant**		

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