

CLONASLEE FLOOD RELIEF SCHEME

Natura Impact Statement

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Contents

1	INTRODUCTION	. 1
1.1	Purpose of Document	. 1
2	LEGISLATIVE CONTEXT AND GUIDANCE	. 2
2.1	Legislative Context	. 2
2.1.1	Habitats Directive	. 2
2.1.2	Irish Legislation	. 2
2.2	Guidance and Approach	3
2.3	Supporting Information	4
3	PROJECT DESCRIPTION	. 5
3.1	Location of the Proposed Scheme	5
3.2	Proposed Scheme	5
3.2.1	Flood Relief Scheme Design Approach	5
3.2.2	Operational and Maintenance Phase	. 6
4	APPROPRIATE ASSESSMENT SCREENING – SUMMARY	. 8
5	METHODOLOGY	12
5.1	Desk Study	12
5.2	Field Survey	12
521	Survey Schedule	12
522	Walkover Surveys	13
523	Habitats and Flora	13
524	Invasive Alien Plants and Animal Species	14
525	White-Clawed Cravitish Habitat Annraisal	1/
526	Crayfish Hand Search	15
53		15
531	Deck study	15
532	Field study	15
533	Habitat Sunyey	15
5.5.5	Deta Validity	16
5.4		10
5.5 6		10
6 1	Site Leastion and Context	10
0.1		19
0.2	European Siles	19
0.3		20
0.3.1		20
0.3.Z	Hapitals	20
0.3.3	Invasive Allen Plant Species	20
0.4	Aqualic Ecology	23
0.4.1	Uverview	23
0.4.2		23
0.4.3	WFD Status	23
6.4.4	Field Survey	24
6.5	Groundwater	25
6.6	Flooding	25
1	APPROPRIATE ASSESSMENT STAGE 2 – NATURA IMPACT STATEMENT	29
/.1 7.0		29
1.2	Assessment of Proposed Development Against Conservation Objectives	29
7.2.1	Charleville Wood SAC (Site Code: 000571)	29
7.2.2	Sites Designated for the protection of White-Clawed Crayfish	34
7.3	Potential In-Combination Effects	36
7.3.1	Projects	36
7.3.2	Plans	39

7.3.3	In-Combination Conclusion	. 42
8	MITIGATION	. 43
8.1	Appointment of Environmental Team	. 43
8.1.1	Ecological Clerk of Works	. 43
8.2	Construction Environmental Management Plan	. 44
8.3	Pre-Construction Surveys	. 44
8.4	Environmental Emergency Response/Contingency Plan	. 45
8.5	Water Quality Protection Measures	. 45
8.5.1	Ecological Clerk of Works	. 45
8.5.2	Preconstruction Consultation & Method Statements	. 46
8.5.3	Water Quality Protection and Management	. 46
8.5.4	Water Management	. 49
8.5.5	Instream Works	. 51
8.5.6	Vegetation Clearance Adjacent to River Clodiagh and Brittas Stream	. 52
8.5.7	Debris trap and slipway design	. 53
8.5.8	Foul Water	. 53
8.6	Biosecurity	. 53
8.7	Invasive Alien Plant Species	. 54
9	MONITORING	. 56
9.1	Construction Phase	. 56
9.2	Operational and Maintenance Phase	. 58
9.2.1	Operational & Maintenance Phase	. 58
10	RESIDUAL EFFECTS	. 59
10.1	Charleville Wood SAC (000571)	. 59
10.2	River Barrow and River Nore SAC (002162)	. 60
10.3	Blackwater River (Cork/Waterford) SAC (002170)	. 61
10.4	Bricklieve Mountains and Keishcorran SAC (001656)	. 61
10.5	Glenade Lough SAC (001919)	. 62
10.6	Kilroosky Lough Cluster SAC (001786)	. 63
10.7	Lough Bane and Lough Glass SAC (002120)	. 63
10.8	Lough Corrib SAC (000297)	. 64
10.9	Lough Gill SAC (001976)	. 64
10.10	Lough Lene SAC (002121)	. 65
10.11	Lough Owel SAC (000688)	. 66
10.12	Lower River Suir SAC (002137)	. 66
10.13	River Moy SAC (002298)	. 67
10.14	White Lough, Ben Loughs and Lough Doo SAC (001810)	. 67
10.15	Lough Hoe Bog SAC (000633)	. 68
10.16	Lough Nageage SAC (002135)	. 69
11	CONCLUSION	. 70
12	REFERENCES	. 71

Tables

Table 3-1: Scheme Design Approach	. 5
Table 3-2: Summary of the Proposed Scheme	. 6
Table 3-3: Operational and Maintenance Activities	. 6
Table 4-1: European Sites and QI/SCI Receptors Potentially Affected by the Proposed Scheme	. 8
Table 5-1: Summary of terrestrial ecology surveys relevant to this NIS	12
Table 5-2: Summary of aquatic ecology surveys relevant to this NIS.	13

Table 5-3: Summary of ecology survey validity.	. 16
Table 5-4: Summary of Consultations	. 16
Table 6-1: EPA River Q-value Monitoring - 2023	. 23
Table 7-1: Conservation objectives of Charleville Wood SAC.	. 29
Table 7-2: Planning Search Results from the County Planning and EIA Portal Maps	. 37
Table 7-3: Planning Search Results - Plans and Programmes	. 39
Table 9-1: Schedule of monitoring – terrestrial ecology	. 56
Table 9-2: Schedule of monitoring – aquatic ecology.	. 57

Figures

Figure 3-1: Location of the Proposed Scheme	7
Figure 4-1: European Sites relevant to the Proposed Scheme	11
Figure 6-1: Invasive Alien Plant Species recorded during field surveys 2021-2024	22
Figure 6-2: 1% AEP Model Predicted flooding in (a) present-day 'do-nothing' scenario and (b) post- scheme scenario	27
Figure 6-3: 1% AEP event in the undefended scenario	28
Figure 8-1: Environmental team hierarchy regarding biodiversity matters	43

Appendices

APPENDIX A Project Description

1 INTRODUCTION

1.1 Purpose of Document

RPS was commissioned by Laois County Council to prepare a Natura Impact Statement (NIS) to inform the Competent Authority's Appropriate Assessment (AA) with respect to a proposed Flood Relief Scheme (FRS) within Clonaslee village, Co. Laois (hereafter referred to as the "Proposed Scheme").

The need for a NIS was confirmed following the completion of a report to inform Screening for AA for the Proposed Scheme, which concluded that likely significant effects on European Sites as a result of the Proposed Scheme could not be ruled out. Both the report to inform screening for AA and the NIS have been prepared with reference to the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, and Part XAB of the Planning and Development Act 2000 (as amended), which transpose into Irish law the EU Habitats Directive.

This report assesses whether the Proposed Scheme will have an adverse effect on the integrity of any European Site, on the basis of objective evidence and in view of best-scientific knowledge and with reference to published conservation objectives of those European Sites.

This document has been prepared and reviewed by qualified and experienced RPS ecologists.

The document is structured as follows:

Section 2 – Legislative Context and Guidance sets out the Guidance and Approach which was used to complete Stage 2 – Appropriate Assessment

Section 3 – Project Description sets out the Proposed Scheme which has been subject to Stage 1 – Screening Assessment.

Section 4 – Appropriate Assessment Screening - Summary

Section 5 - Methodology summarises the methodology of the relevant ecological survey work which has been undertaken.

Section 6 – Existing Environment describes the environmental context of the Proposed Scheme and summarises the findings of the relevant ecological survey work which has been undertaken.

Section 7 – Appropriate Assessment Stage 2 - Natura Impact Statement assesses whether the likely significant effects identified at Stage 1 will result in any adverse effects on the integrity of any European Site and considers in-combination effects.

Section 8 – Mitigation sets out any mitigation measures which are required and will be implemented to avoid adverse effect on the integrity of European Sites.

Section 9 – Monitoring sets out the monitoring requirements for the Proposed Scheme.

Section 10 – Residual Effects sets out the final predicted effects on the Conservation Objectives of each identified European Site after mitigation measures have been implemented.

Section 11 – Conclusion set outs the NIS concluding statement.

2 LEGISLATIVE CONTEXT AND GUIDANCE

2.1 Legislative Context

2.1.1 Habitats Directive

With the introduction of the Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora) came the obligation to establish the Natura 2000 network, comprising a network of areas of highest biodiversity importance for rare and threatened habitats and species across the EU.

The Natura 2000 network of sites comprises Special Areas of Conservation (SACs) designated for protection under the Habitats Directive; and Special Protection Areas (SPAs) designated for protection under the Birds Directive (Directive 2009/147/EC on the conservation of wild birds). SACs and SPAs (including candidate and proposed sites) make up the pan-European network of Natura 2000 sites, and they are referred to collectively as "European Sites".

In this report, candidate and proposed SACs and SPAs are referred to as "SACs" and "SPAs" throughout the appraisal, 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 and, therefore, the AA procedure does not treat them differently. For the purposes of AA, they are one and the same.

SACs are designated for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species (other than birds). SPAs are designated for the conservation of Annex I birds and other regularly occurring migratory birds and their habitats. The annexed habitats and species for which each site is designated correspond to the Qualifying Interests (QIs) of the sites in the case of SACs, and Special Conservation Interests (SCIs) of the sites in the case of SPAs. From these QIs and SCIs, the conservation objectives of the European Site are derived.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to have a significant effect on or to adversely affect the integrity of European sites. Article 7 of the Habitats Directive extends the scope of its Articles 6(3) and 6(4) to the Birds Directive. Article 6(3) of the Habitats Directive requires that:

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

Thus, Article 6(3) provides a two-stage process:

- The first stage involves a screening for AA to determine whether the relevant plan or project is likely to have a significant effect on a European site or sites; and
- The second stage arises where, having screened the Project, the relevant public authority determines that an AA is required, in which case it must then carry out that AA.

2.1.2 Irish Legislation

The Habitats Directive has been transposed into Irish law by the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended).

Under Section 177U of the Planning and Development Act 2000 (as amended), the competent authority shall determine that an AA of a proposed development is required if it cannot be excluded, on the basis of

objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European Site(s).

Under Section 177V the competent authority shall take into account each of the following matters in their AA determination:

(a) The NIS (defined below)

(b) Any supplemental information furnished in relation to an NIS

(c) If appropriate, any additional information sought by the planning authority and furnished by the applicant in relation to a NIS

(d) Any additional information furnished to the competent authority at its request in relation to a NIS

(e) Any information or advice obtained by the competent authority

(f) If appropriate, any written submissions or observations made to the competent authority in relation to the application for consent for proposed development

(g) Any other relevant information.

Under the Planning and Development Act 2000 (as amended) (177T), an NIS is defined as "a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites". The NIS must "include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for one or more than one European site in view of the conservation objectives of the conservation objectives of the site or sites".

2.2 Guidance and Approach

The principal national and European guidelines have been followed in the preparation of this document. The following list identifies these and other pertinent guidance documents:

- European Commission (EC) (2021) Assessment of Plans and Projects in relation to Natura 2000 Sites Methodological Guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
- Office of the Planning Regulator Practice Note (PN01) 'Appropriate Assessment Screening for Development Management' (OPR, 2021).
- EC Notice C (2018) 7621 'Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC', Office for Official Publications of the European Communities, Luxembourg (EC, 2018).
- EC (2013) EC Interpretation Manual of European Union Habitats. Version EUR 28. European Commission.
- Department of the Environment, Heritage and Local Government (DEHLG) (2010a) Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government, Dublin.
- DEHLG (2010b) DEHLG Circular National Parks and Wildlife Service (NPWS) 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government, Dublin.
- EC (2000) Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg.

There have been important changes to AA practice since both the EC (2021) and the DEHLG (2010a) guidance, arising from practice and rulings in UK, European, and Irish courts. These changes have been addressed in the preparation of this report.

2.3 Supporting Information

This NIS is informed by the report to inform screening for AA, the detailed Project Description (**Appendix A**), and the results of desk and field surveys that provide supporting information (methods and results presented in **Section 5** and **Section 6**, respectively) on the potential impacts of the Proposed Scheme on relevant receptors which have been used to inform the assessment of adverse effects, which is set out in **Section 7**.

3 PROJECT DESCRIPTION

The full Project Description of the Proposed Scheme, which provides details on design, construction methods and operational maintenance is included in **Appendix A**. The Project Description provides detail on the objectives of the Proposed Scheme and the specific construction methodologies. The following section provides a short summary of the Proposed Scheme.

3.1 Location of the Proposed Scheme

The Proposed Scheme is located in Clonaslee in County Laois. Clonaslee is a small village, located in the foothills of the Slieve Bloom Mountains.

Clonaslee village has a history of river flooding due to its location on the Clodiagh River, which flows through it. The main source of flooding in Clonaslee is the high-water levels in the Clodiagh River which originate from the Slieve Bloom Mountains. High water levels in the Clodiagh River are quick to occur and quick to dissipate. A flood event of note occurred in November 2017, when Chapel Street and the adjacent properties were subject to flooding. This coincided with a breach in the existing wall along the river. Anecdotal evidence indicates water seeps through this wall and bubbles up through the road along Chapel Street in times of high-water levels.

Figure 3-1 and Figure 4-1 shows the location of the Proposed Scheme relative to European Sites.

3.2 **Proposed Scheme**

3.2.1 Flood Relief Scheme Design Approach

The Proposed Scheme was developed following a detailed hydrological and hydraulic study of the catchment. Potential options were developed and compared using the OPW's Multi-Criteria Analysis (MCA) guidelines. All potential options were required to deliver a Target Standard of Protection (SoP) for the 1% Annual Exceedance Probability (AEP) rainfall event. The MCA identified the preferred scheme based on technical, social, environmental, and economic criteria.

All proposed flood relief works are planned for the Clodiagh River; no flood relief works are considered necessary on the Gorragh River.

Each of the flood relief measures has been developed to solve a specific source of flood risk in the Scheme Area as described in **Table 3-1**.

Table 3-1: Scheme Design Approach.

Source of Flood Risk	Specific Flood Relief Measure
A tributary from Brittas Lake joining the Clodiagh River upstream of the village, was identified as a flood source during Public Information Events. The root cause of flooding here is an existing culvert in Brittas Wood that is almost totally blocked.	Remediation to the culvert (600mm pipe road crossing) including a headwall on the upstream side to reduce blockage risk and ease of maintenance.
Potential for water coming out of bank from the Clodiagh River at Brittas Wood, leading to adjacent land flooding and flowing into the village.	Construction of an embankment above predicted flood levels.
Blockage in the river caused by woody debris accumulation at the bridge in Clonaslee village.	Installation of a debris trap upstream of the bridge at a location that can be easily accessed for debris removal.
The existing stone wall on Chapel St currently acts as a flood defence. It is structurally vulnerable, and information gleaned at Public Information Events indicates water visibly seeps through the wall and from under the road.	Bolstering the existing stone wall with a specifically designed flood relief wall, and below ground flow cut-off.

Source of Flood Risk	Specific Flood Relief Measure
An existing informal embankment to the north of the village acts as a flood defence. It is structurally vulnerable and has gaps possibly caused by livestock.	A new embankment constructed parallel to the existing.
Potential for water coming out of bank from the Clodiagh River and increasing flooding of the Integrated Constructed Wetlands Treatment Plant owned and operated by Uisce Éireann (UÉ).	A new retaining wall adjacent to the Integrated Constructed Wetlands (ICW) to mitigate flood increases over the wetlands.

A summary of the Proposed Scheme is set out in **Table 3-2**. The Proposed Scheme has been separated into three areas (**Area 1, Area 2, Area 3**) and associated temporary construction compounds (**Figure 3-1**).

Table 3-2: Summary of the Proposed Scheme.

Location	Defence Elements
Area 1: Brittas Wood	EmbankmentDebris trap with access slipwayCulvert remediation
Area 2: Chapel Street	Flood wall
Area 3: Tullamore Rd and Integrated Constructed Wetland (ICW)	Flood wallEmbankment

3.2.2 Operational and Maintenance Phase

It is expected that the operation and maintenance activities required will be undertaken by existing Laois County Council maintenance personnel. An Operation and Maintenance Programme will be prepared for the Proposed Scheme. **Table 3-3** provides a description of the expected maintenance activities required for the Proposed Scheme.

Table 3-3: Operational and Maintenance Activities.

Element	Activity	Frequency
Flood walls	Inspections	Annually
	Repairs	As required
	Vegetation control	Annually
Debris Trap	Inspections	Monthly
	Repairs	As required
	Removal of debris	
Culverts	Inspections	Annually
	Repairs	
	Removal of trash and vegetation	Quarterly
Embankments	Inspections and maintenance	Annually
	Vegetation control	Annually
	Vermin control	Bi-annually
Back drainage improvements		Bi-annually



Works Area

>>> WFD Rivers

Special Protected Area

Data Sources: NPWS, EPA



Laois County Council

Clonaslee FRS

Figure 3-1 Location of the **Proposed Scheme**

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4 APPROPRIATE ASSESSMENT SCREENING – SUMMARY

A report to inform screening for AA was prepared for the Proposed Scheme, which identified the European Sites and the QIs and SCIs associated with same that could be significantly affected by the Proposed Scheme. The possibility of likely significant effects could not be excluded for three QIs of 16 European sites (SACs).

The key findings from the assessment of likely significant effects conclude that, in the absence of mitigation measures during the construction phase to control surface water pollution and the spread of invasive alien plant species and waterborne pathogens, the potential for likely significant effects on European Sites cannot be ruled out. In the absence of mitigation measures during the operational phase to control the spread of waterborne pathogens the potential for likely significant effects on European Sites cannot be ruled out. The European Sites, and the QIs associated with same that could be affected by the Proposed Scheme are listed in **Table 4-1**. These receptors will be carried through to the detailed impact-prediction stage of this NIS. The Proposed Scheme, relative to European Sites, is shown in **Figure 4-1**.

European Site (Code)	Qualifying Interest Habitats & Species (*=Priority Habitat)	Conservation Objectives	Potential significant effects identified as a result of:
Charleville Wood SAC (000571) (NPWS, 2021a)	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	To restore the favourable conservation condition of alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)* in Charleville Wood SAC	 Indirect habitat deterioration due to accidental losses of pollutants (e.g., silt, hydrocarbons) to the River Clodiagh during the construction phase. Indirect habitat deterioration/loss due to downstream spread of Japanese knotweed via the River Clodiagh during the construction phase.
	Desmoulin's whorl snail (<i>Vertigo moulinsiana</i>) [1016]	To maintain the favourable conservation condition of Desmoulin's Whorl Snail (<i>Vertigo</i> <i>moulinsiana</i>) in Charleville Wood SAC	 Indirect habitat deterioration due to accidental losses of pollutants (e.g., silt, hydrocarbons) to the River Clodiagh during the construction phase. Indirect habitat deterioration/loss due to downstream spread of Japanese knotweed via the River Clodiagh during the construction phase. Direct toxic effects on Desmoulin's Whorl Snail due to accidental losses of pollutants (e.g., hydrocarbons) to the River Clodiagh during the construction phase.
River Barrow and River Nore SAC (002162) (NPWS, 2011)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of white- clawed crayfish in the River Barro w and River Nore SAC.	• Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Blackwater River (Cork/Waterfor d) SAC	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conser vation condition of White- clawed Crayfish in the Blackwater River (Cork/Waterford) SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase

Table 4-1: European Sites and QI/SCI Receptors Potentially Affected by the Proposed Scheme.

European Site (Code)	Qualifying Interest Habitats & Species (*=Priority Habitat)	Conservation Objectives	Potential significant effects identified as a result of:
(002170) (NPWS, 2012)			
Bricklieve Mountains and Keishcorran SAC (001656) (NPWS, 2021b)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of white- clawed Crayfish in Bricklieve Mountains and Keishcorran SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Glenade Lough SAC (001919) (NPWS, 2021c)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Glenade Lough SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Kilroosky Lough Cluster SAC (001786) (NPWS, 2021d)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Kilroosky Lough Cluster SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Lough Bane and Lough Glass SAC (002120) (NPWS, 2021e)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To restore the favourable conservation condition of White- clawed Crayfish in Lough Bane and Lough Glass SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Lough Corrib SAC (000297) (NPWS, 2017a)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Lough Corrib SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Lough Gill SAC (001976) (NPWS, 2021f)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Lough Gill SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Lough Lene SAC (002121) (NPWS, 2021g)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To restore the favourable conservation condition of White- clawed Crayfish in Lough Lene SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Lough Owel SAC (000688) (NPWS, 2018)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Lough Owel SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Lower River Suir SAC (002137) (NPWS, 2017b)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Lower River Suir SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
River Moy SAC (002298) (NPWS, 2016)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in River Moy SAC.	• Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
White Lough, Ben Loughs and Lough Doo SAC	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in White Lough, Ben Loughs and Lough Doo SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase

European Site (Code)	Qualifying Interest Habitats & Species (*=Priority Habitat)	Conservation Objectives	Potential significant effects identified as a result of:
(001810) (NPWS, 2021h)			
Lough Hoe Bog SAC (000633) (NPWS, 2017c)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Lough Hoe Bog SAC.	 Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase
Lough Nageage SAC (002135) (NPWS, 2021i)	White-clawed Crayfish (<i>Austropotamobius</i> <i>pallipes</i>) [1092]	To maintain the favourable conservation condition of White- clawed Crayfish in Lough Nageage SAC.	• Mortality of white-clawed crayfish due to accidental spread of crayfish plague during both the construction and operational phase



5 METHODOLOGY

5.1 Desk Study

A desk study was carried out to collate and review available information, datasets and documentation sources relevant for the completion of the NIS. The desktop study had regard to the following sources:

- Information on the location, nature and design of the Proposed Scheme;
- Environmental Protection Agency (EPA) online interactive mapping tools (<u>https://gis.epa.ie/EPAMaps</u>) and (<u>https://www.catchments.ie/maps/</u>) for water quality data including surface and ground water quality status, river networks and river catchment boundaries;
- Mapping of European Site boundaries and conservation objectives for relevant sites, available online from the NPWS (<u>https://www.npws.ie/protected-sites</u>);
- Distribution records for QI and SCI species of European Sites (where available) held online by the National Biodiversity Data Centre (NBDC) <u>www.biodiversityireland.ie;</u>
- Geological Survey Ireland (GSI) (https://www.gsi.ie/en-ie/Pages/default.aspx); and
- Tailte Éireann– Mapping and Aerial photography (<u>https://www.arcgis.com/apps/webappviewer/index.html?id=3ae19cc156bf4706a929304bf8fcc4f6</u>).

5.2 Field Survey

Ecological surveys were conducted by RPS ecologists along the route of the Proposed Scheme on various dates between 2021 and 2024. Specific methodologies for field surveys that are of relevance to this NIS are set out below.

5.2.1 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 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. **Table 5-1** and **Table 5-2** 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 presented.

Table 5-1: Summary of terrestrial ecology surveys relevant to this NIS.

Field Survey	Extent of survey	Overview of survey	Date(s)
Walkover Survey	Survey in April 2021 focused on the River Clodiagh 1.1km downstream of Clonaslee bridge and 500m upstream plus 50 m either side of river. 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 2021 June 2024
Habitats, Protected and Notable Flora	Surveys focused on the footprint of the Proposed Scheme and immediate adjoining lands (where accessible).	Phase 1 Habitat classification to Fossitt (2000). Search for species listed in Flora Protection Order and	August 2023

Field Survey	Extent of survey	Overview of survey	Date(s)
		Red Lists (Wyse <i>et al.</i> , 2016; Lockhart <i>et al.</i> , 2012) as part of habitat survey.	
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

Table 5-2: Summary of aquatic ecology surveys relevant to this NIS.

Survey	Date	Survey extent
Walkover survey, crayfish habitat appraisal	21 st April 2021	1.1 km downstream of Clonaslee bridge and 500 m upstream.
Crayfish survey and habitat appraisal	11 th 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	17 th August 2021	Resurvey of areas not visible on 11 th August 2021 upstream of Clonaslee bridge.
Crayfish survey and habitat appraisal	24 th August 2023	800 m downstream of Clonaslee bridge and 500 m upstream.
Crayfish habitat appraisal	12 th March and 6 th June 2024	Brittas Stream at and immediately upstream of the culvert within the Proposed Scheme area

5.2.2 Walkover Surveys

An initial site survey was carried out on the 21st April 2021 for the original Proposed Scheme design. The survey extents in April 2021 comprised the River Clodiagh within the scheme area, namely a section 1.1 km downstream of Clonaslee bridge and 500 m upstream. The lands within 50 m either side of river were also walked. The surveys undertaken comprised multidisciplinary walkover surveys. 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.

5.2.3 Habitats and Flora

The initial site surveys were carried out in April 2021 for the original Proposed Scheme design. 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). '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).

A walkover survey undertaken on the 6th June 2024 validated the habitat data collected in August 2023.

5.2.4 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 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), as amended. A walkover survey undertaken on the 6th June 2024 validated the IAPS data collected in August 2023.

5.2.5 White-Clawed Crayfish Habitat Appraisal

Strict biosecurity protocols were employed to ensure there was no potential for spread of disease for all surveys undertaken. *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.

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. The Brittas Stream is a small stream which rises near Brittas Lake (located approximately 1.5 km west of Clonaslee village) and 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 white-clawed crayfish occurs in areas with relatively hard, mineral-rich waters on calcareous and rapidly weathering rocks. Crayfish are found in a wide variety of environments and are typically found in watercourses 0.75 m to 1.25 m deep. However, they can also occur in shallow riffles and in streams less than 0.5 m wide with just a few centimetres of water (Holdich, 2003). They occupy cryptic habitats under rocks and submerged logs, among tree roots, algae and macrophytes, although they usually emerge to forage. Juveniles in particular may also be found among cobbles and detritus such as leaf litter. Adults may burrow into suitable substrates, particularly in the winter months.

The rating of habitat for 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 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.

5.2.6 Crayfish Hand Search

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" 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.

5.3 Limitations

5.3.1 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.

5.3.2 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.

5.3.3 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. This roadside survey was deemed suitable for the purposes of assessing this

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

5.4 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 5-3** 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.

Survey	Date most recent survey undertaken	Age of data (as of February 2025)	Data valid?
Habitat survey & botanical survey including IAPS	August 2023	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 habitats. The habitat and botanical data are considered valid to inform the assessment.
Crayfish habitat appraisal	August 2023	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 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 crayfish habitat data are considered valid to inform the assessment.
Crayfish survey and habitat appraisal, walkover survey	August 2023	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 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.

Table 5-3: Summary of ecology survey validity.

5.5 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 5-4** summarises the feedback relevant to this NIS received to date, together, with how this feedback has been addressed in the preparation of this report.

Table 5-4:	Summary	of (Consultations
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Consultee	Feedback	Where considered in this NIS
	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,	Aquatic ecology surveys have been undertaken. The survey methodology and results relevant to this NIS are

Consultee	Feedback	Where considered in this NIS
Inland Fisheries Ireland (IFI) Consultation Request (Response received - Date: 09/01/2024)	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.	described in Section 5.2 and the data collected are presented in Section 6.4 . Detailed assessments and descriptions of instream habitat are provided within the EIAR Biodiversity Chapter (this information is not directly relevant to the NIS and so not repeated here).
	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 of relevance to the NIS are outlined in Section 8. Instream works are proposed to be undertake during the period 1 st July to 30 th 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 be 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 Project Description in Appendix A re. efficacy of the structure. Impacts on instream habitat are considered as part of the EIAR Biodiversity Chapter (this impact is not directly relevant to the NIS).
	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.	A schedule of construction phase and operational phase monitoring is provided in Section 9 . The requirement and criteria for an environmental emergency response/contingency plan is outlined in Section 8.4 .
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. This is provided within the Project Description (Appendix A).
	Potential bat roost survey of trees proposed for felling required.	This has been addressed in the EIAR Biodiversity Chapter. Potential impacts on bats are not relevant to this NIS.

Consultee	Feedback	Where considered in this NIS
	Pre-construction surveys for otter required, and if resting or breeding habitat confirmed a derogation licence will be required.	The closest SAC for which otter are listed as a QI is the River Barrow and River Nore SAC. Significant effects on otter associated with this SAC were ruled out within the report to inform screening for AA. The requirement for pre-construction surveys to protect local otter is addressed within the EIAR.
	Indicative construction plan should be prepared and issued to NPWS for comment.	Indicative construction programme issued to NPWS for comment on the 14 th June 2024. Comments received June 25 th and programme updated accordingly. Programme reissued for further NPWS commentary. Response was received from NPWS on 16 th July stating they had no further comments.

6 EXISTING ENVIRONMENT

6.1 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 Proposed Scheme will be constructed on a Coillte amenity trail in Brittas Wood; on Chapel Street within the village itself; in a private garden adjoining Chapel Street; in an agricultural field to the north of the village; and adjacent to an Uisce Éireann Integrated Constructed Wetlands wastewater treatment facility.

The Proposed Scheme is partially located within the Slieve Bloom Mountains SPA, which is designated for hen harrier (*Circus cyaneus*). The Slieve Blooms SAC is located just over one kilometre to the south of the Proposed Scheme. Charleville Wood SAC is hydrologically connected with the Proposed Scheme. **Figure 4-1** shows the location of the Proposed Scheme relative to European Sites.

6.2 European Sites

The report to inform Screening for AA identified several European Sites within the Zone of Influence (ZoI) of the Proposed Scheme. Of the Sites within the ZoI, the following were considered to be at risk of likely significant effects as a result of the Proposed Scheme:

- Charleville Wood SAC (000571);
- River Barrow and River Nore SAC (002162);
- Blackwater River (Cork/Waterford) SAC (002170);
- Bricklieve Mountains and Keishcorran SAC (001656);
- Glenade Lough SAC (001919);
- Kilroosky Lough Cluster SAC (001786);
- Lough Bane and Lough Glass SAC (002120);
- Lough Corrib SAC (000297);
- Lough Gill SAC (001976);
- Lough Lene SAC (002121);
- Lough Owel SAC (000688);
- Lower River Suir SAC (002137);
- River Moy SAC (002298);
- White Lough Ben Loughs and Lough Doo SAC (001810);
- Lough Hoe Bog SAC (000633); and
- Lough Nageage SAC (002135).

6.3 Terrestrial Ecology

6.3.1 Overview

Clonaslee village is located within the foothills of the Slieve Bloom Mountain range. The physical landscape within the environs of Clonaslee village grades from mountain to hill physiographic units in the south, to flat to undulating physiographic units towards the north. The main land use within the immediate vicinity of the village is agricultural. Woodland occurs to the south and west. 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.

6.3.2 Habitats

Habitat mapping of the Proposed Scheme was carried out by RPS ecologists. Habitats were identified and classified according to the Guidelines set out in 'A *Guide to Habitats in Ireland*' (Fossitt, 2000), which classifies habitats based on the vegetation present and management history. The potential correspondence with or affinities of identified habitats with those listed on Annex I of the Habitats Directive was also identified. Habitats identified within and immediately adjacent to the Proposed Scheme area included improved agricultural grassland, amenity grassland (improved), (mixed) broadleaved woodland, scattered trees and parkland, hedgerows, treelines, scrub, stone walls and other stonework, buildings and artificial surfaces, eroding/upland rivers and reed and large sedge swamp. None of the terrestrial habitats identified within the Proposed Scheme area corresponded with any Annex I habitat type.

The desk study identified 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 downstream of the Proposed Scheme (by river). An Annex I habitat old oak woodlands (91A0) is present c. 1.5 km west of the Proposed Scheme.

6.3.3 Invasive Alien Plant Species

A search of the NBDC database was conducted for records of invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats Regulations) 2011, as amended. A 5 km buffer around the Proposed Scheme was used for this search.

Himalayan Balsam (*Impatiens glandulifera*), was the only IAPS species listed under the Third Schedule of the European Communities (Birds and Natural Habitats Regulations) 2011, as amended, identified as part of this search.

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

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 (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 Proposed Scheme boundary, but between Areas 2 and 3 during a walkover survey undertaken in June 2024. During the same survey, an individual Japanese knotweed plant was observed growing within a debris dam downstream of Area 3. These new plants are assumed to be spreading from the large stands located upstream, within the Scheme Area. The location of the IAPS recorded during field surveys is shown in **Figure 6-1**.



Legend

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

Data Sources: Tailte Éireann



Client

Laois County Council

Clonaslee FRS

Title

Figure6-1 Invasive Alien Plant Species recorded during field surveys 2021-2024



6.4 Aquatic Ecology

6.4.1 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 village 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.

6.4.2 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 of Q4 and above is required for river sites to comply with good (Q4) or better (i.e., high status - Q4-5, Q5) status. The most recent EPA monitoring of the River Clodiagh and River Gorragh (2023) is summarised in **Table 6-1**. 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 Clonaslee village, and the second is located 250 m upstream of the confluence of the River Clodiagh and River Gorragh.

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

Table 6-1: EPA River Q-value Monitoring - 2023.

6.4.3 WFD Status

The WFD status assigned to the Clodiagh (Tullamore)_010 river waterbody in the period 2016-2021 is 'good'. 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'. 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.

6.4.4 Field Survey

6.4.4.1 Habitat Survey - Summary

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 community¹ or FW2B *Rhynchostegium riparioides – Chiloscyphus polyanthos* aquatic community². 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.

6.4.4.2 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'. The stream upstream of the works is likely to be more suitable

¹ Description available online at: <u>https://biodiversityireland.ie/ivc-classification-explorer/fw2/fw2a/</u> [Accessed: 13/11/2024].

² Description available online at: <u>https://biodiversityireland.ie/ivc-classification-explorer/fw2/fw2b/</u> [Accessed 13/11/2024].

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 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.

6.5 Groundwater

The Proposed Scheme is located within two groundwater bodies (GWB), Geashill and Clonaslee West. The following summaries of these GWBs are taken from the GSI characterisation reports (GSI, n.d.) and (GSI, 2003):

Geashill – The GWB occupies the area between Offaly, Laois, and Westmeath. It is bounded on the northwest by the contact between the low transmissivity rock units of this GWB and the karstified pure bedded limestones of the adjacent Tullamore GWB. Surface water catchment divides define south-east and northeast edges of the GWB, the latter two of which are coincident with the river basin district boundary. Nearly all aquifers within the GWB are locally important, which are moderately productive only in local zones. The very small area in the north-east of dolomitised limestone is classified as a regionally important karstified aquifer dominated by diffuse flow. The dinantian pure unbedded limestones, and the dinantian lower and upper impure limestone aquifers are more than several hundreds of metres thick. However, permeability tends to decrease rapidly with depth. Most flow occurs in the upper ≤ 15 m. The dolomitised limestones will have an epikarstic layer, below which there is a diffusely-karstified network of fissures and collapse conduits down to around 30 m below rock head. The streams and rivers crossing the aquifer are likely to be gaining, and groundwater comes to surface as springs. Due to the shallow groundwater flow in these aquifers, the groundwater and surface waters may be closely linked where subsoils are thinner. There are several fens and wetlands in the area that are dependent on groundwater.

Clonaslee West - This groundwater body is located at the base of the northwestern slopes of the Slieve Bloom mountains. The eastern and southern boundary are defined by surface water catchments. The northwestern and southeastern boundaries are formed by the contact with lower transmissivity bedrock. The general groundwater flow direction is naturally downhill (north and northwest) radiating from the peak of the Slieve Bloom Mountains. Depending upon topography, the water table can vary between a few metres up to 20 m below ground surface. Groundwater flow follows topography, radiating north and north-westwards outwards from Slieve Bloom. Groundwater discharges to the small springs, streams emerging mid-way down the slopes, and near the contact with the overlying impure limestones. The rivers crossing the aquifer in areas where the subsoil is not too thick are gaining.

6.6 Flooding

Flood modelling has been undertaken by RPS for the Proposed Scheme. The extent of the predicted flooding in the present-day 'do-nothing' scenario and post-scheme scenario during the 1% Annual

Exceedance Probability (AEP) is shown in **Figure 6-2**. 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. It should be noted that in 2017, Chapel Street wall was damaged by a vehicle and this event coincided with a flood event causing damage to adjacent properties. The proposed scheme is intended create purpose built defences at the current wall and embankment locations. For this reasons, the predicted flooding for the present-day and post-scheme scenario look quite similar. To get an understanding of the flood risk to properties in the scenario where the informal defences fail, a model was created with those defences removed. The results of this model are shown in **Figure 6-3**. The 1% AEP represents medium-probability flood events that have approximately a 1-in-a-100 chance of occurring or being exceeded in any given year.



Figure 6-2: 1% AEP Model Predicted flooding in (a) present-day 'do-nothing' scenario and (b) post-scheme scenario



Figure 6-3: 1% AEP event in the undefended scenario.

7

APPROPRIATE ASSESSMENT STAGE 2 – NATURA IMPACT STATEMENT

7.1 Introduction

The requirement to carry out a NIS follows on from the conclusion of the Stage 1 screening appraisal (see **Section 4**). In order to determine if the identified source-pathway-receptor linkages could result in an adverse effect on the integrity of the European Sites screened in, the following steps have been taken:

- Identification of the information required, including the Proposed Scheme, linkages to European Sites, and description of relevant European Sites;
- Examination of the site-specific conservation objectives and attributes of QIs/SCIs of relevant European Sites; and
- Prediction of any adverse effect on the integrity of European Site(s) from the Proposed Scheme, including in-combination effects.

The connectivity between the Proposed Scheme and all relevant European Sites has been assessed in the report to inform Screening for AA. The possibility of likely significant effects could not be excluded for three QIs of 16 European Sites (SACs) (see **Section 4**). This NIS only assesses QIs in relation to which it could not be excluded based on objective information following screening that the Proposed Scheme, either alone or in combination with other projects, would have a likely significant effect. This analysis is set out in the report to inform Screening for AA, and the relevant QIs and associated European sites are summarised in **Section 0** (see **Table 4-1**) of this report.

7.2 Assessment of Proposed Development Against Conservation Objectives

7.2.1 Charleville Wood SAC (Site Code: 000571)

Each Conservation Objective for a European Site is defined by a list of attributes and associated targets. The Conservation Objectives and their attributes and targets for the relevant QIs of the Charleville Wood SAC (NPWS, 2021a) are outlined in **Table 7-1**.

Table 7-1: Conservation objectives of Charleville Wood SAC.

	Attribute	Measure	Target			
91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion						
albae)*						
Conservation Objective: To restore the favourable conservation condition of Alluvial forests with Alnus glutinosa and						
Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)* in Charleville Wood SAC, which is defined by the						
following list of attributes and targets:						
1.	Habitat area	Hectares	Area stable or increasing, subject to natural processes.			
2.	Habitat distribution	Occurrence	No decline, subject to natural processes.			
3.	Woodland size	Hectares	Area stable or increasing. Where topographically possible,			
			"large" woods at least 25ha in size and "small" woods at least			
			3ha in size			
4.	Woodland structure:	Percentage; metres;	Total canopy cover at least 30%; median canopy height at			
	cover and height	centimetres	least 7m; native shrub layer cover 10-75%; native herb/dwarf			

shrub layer cover at least 20% and height at least 20cm;

bryophyte cover at least 4%

Natura Impact Statement

	Attribute	Measure	Target		
5.	Woodland structure: community diversity	Hectares	Maintain diversity and extent of community types		
6.	Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland capopy		
7.	Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation		
8.	Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood of at least 20cm diameter		
9.	Woodland structure: veteran trees	Number per hectare	No decline		
10.	Woodland structure: indicators of local distinctiveness	Occurrence; population size	No decline in distribution and, in the case of red listed and other rare or localised species, population size		
11.	Woodland structure: indicators of overgrazing	Occurrence	All five indicators of overgrazing absent		
12.	Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy		
13	Vegetation composition: typical species	Occurrence	At least 1 target species for 91E0* woodlands present; at least 6 positive indicator species for 91E0* woodlands present		
14.	Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent		
15	Vegetation composition: problematic native species	Percentage	Cover of common nettle (Urtica dioica) less than 75%		
1016 Desmoulin's Whorl Snail <i>Vertigo moulinsiana</i>					
Conservation Objective : To maintain the favourable conservation condition of Desmoulin's Whorl Snail (Vertigo					
1.	Distribution	Number of occupied 1km	No decline, subject to natural processes. There is one known site for this species in the SAC within N3122. See map 3		
2.	Occurrence in suitable habitat	Percentage of positive records in a representative number of samples	No decline, subject to natural processes. A baseline figure of 50% positive samples is set		
3.	Density within habitat	Number of adults per sample	No decline, subject to natural processes; at least 67% of samples should have more than 20 individuals		
4.	Habitat area	Hectares	Area of suitable habitat stable or increasing, subject to natural processes; no less than 5ha of at least sub-optimal habitat		
5.	Tree canopy extent	Percentage cover	Tree canopy cover around lake stable at current levels, subject to natural processes		
6.	Habitat quality: water	Hydrological regime	Maintain at current levels, subject to natural processes		

levels

7.2.1.1 Alluvial Woodland

7.2.1.1.1 Ecology and Conservation Status

91E0 alluvial woodland is a priority Annex I habitat. All types occur on heavy soils which are periodically inundated by the annual rise of river levels, but which are otherwise well-drained and aerated during low water (NPWS, 2019a). As part of NPWS Article 17 Reporting, nineteen sites surveyed for this habitat received a favourable structure and functions assessment, fourteen sites received an unfavourable-inadequate assessment, with seven sites receiving an unfavourable-bad assessment (NPWS, 2019b). Three pressures on this habitat have been identified as part of the Article 17 Report, namely I02 other invasive alien species (other than species of union concern) (high importance), I04 problematic native species (medium importance) and B09 clear-cutting, removal of all trees (medium importance). These three pressures are also listed as threats (with the same level of importance assigned). An additional threat identified in the Article 17 reporting is I05 plant and animal diseases, pathogens and pests (medium importance). The overall status of this habitat in Ireland is bad and the trend is declining. The Natura 2000 standard data form for Charleville Wood SAC identifies outdoor sports and leisure activities, recreational activities; trapping, poisoning, poaching, and walking, horseriding and non-motorised vehicles as threats and pressures with a "high" ranking. Poaching; taking / removal of terrestrial plants, general, and wildlife watching are listed as "low" ranking threats and pressures for the SAC.

7.2.1.1.2 Assessment of Adverse Effects on Integrity

The Proposed Scheme does not overlap spatially with the alluvial woodland within Charleville Wood SAC. Accordingly, there is no potential for direct effects on this woodland as a result of the Proposed Scheme and any adverse effects would be indirect. The Proposed Scheme will not result in any reduction in dead wood or veteran trees (8-9) within the woodland and will not introduce any grazing pressures (11) (numbers in brackets correspond to rows regarding alluvial woodland in **Table 7-1**).

Construction Phase Effects

The attributes that could be affected by the Proposed Scheme are those which could be influenced by the spread of invasive flora into the woodland, or the contamination of the woodland as a result of contaminants being transferred from the site downstream (such as hydrocarbons or concrete from accidental spills) during the construction phase. Japanese knotweed, which occurs within the footprint of the Proposed Scheme, can quickly dominate an area, outcompeting native flora for resources and altering habitats. Over time and in the absence of management, Japanese knotweed spread into the woodland could result in this invasive plant outcompeting native flora within the woodland, which could ultimately result in a reduction in the area, distribution and size (1-3) of Annex I alluvial woodland within the SAC. The construction of the Proposed Scheme could result in the accidental release of cement, hydrocarbons and other potentially polluting chemicals or materials into the River Clodiagh during construction. This could result in adverse changes in surface water quality within the River Clodiagh. Such adverse changes could result in changes to water quality and possibly habitats within the river's floodplain downstream of the polluting event(s). This could indirectly result in a change in habitat extent along the affected section, on at least a temporary basis.

Woodland cover (4), community diversity and extent (5), natural regeneration (6), indicators of local distinctiveness (10) and vegetation composition (12-15) could all be negatively affected as a result of the spread of Japanese knotweed into the woodland and the contamination of alluvial woodland soils with hydrocarbons or other chemicals arising from accidental spills within the Proposed Scheme.

Operational Phase Effects

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. Appropriate hydrological regimes are necessary for the maintenance of alluvial vegetation. As set out in the report to inform screening for AA, significant effects on alluvial forest as a result of the Proposed Scheme affecting the hydrological regime, are not anticipated. The CO document for this SAC states that "the water level of Charleville Lake, and hence the degree of inundation of the alluvial
forests habitat, is controlled by a sluice". 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. Secondly, this SAC is located approximately 13 km downstream of the Proposed Scheme. Taking into consideration this distance, the presence of numerous streams that provide flows into the River Clodiagh between the Proposed Scheme area and Charleville Wood SAC and the relatively minor nature of the proposed works, changes to the hydrological regime of the River Clodiagh are anticipated to be minor and localised, and any effects arising from the Scheme will not extend downstream as far as Charleville Wood SAC. 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. This report also concludes that changes to hydraulic regime are anticipated to be highly localised to the area within the vicinity of the 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. Silt from upstream sources could accumulate behind debris within the proposed debris trap or Brittas Stream culvert, and then create a plume downstream when disturbed. It is assumed for the purposes of this assessment that maintenance activities that could result in the disturbance of accumulated silt 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 be localised and restricted to the channel of the River Clodiagh and is not likely to significantly affect any of the attributes or targets that define favourable conservation status of the alluvial woodland within Charleville Wood SAC. Given the distance between the Proposed Scheme and Charleville Wood SAC, silt plumes potentially arising from maintenance activities are anticipated to settle out within the River Clodiagh channel prior to reaching Charleville Wood SAC. 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.

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. 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 this effect would be localised and restricted to the channel of the River Clodiagh and is not likely to significantly affect any of the attributes or targets that define favourable conservation status of the alluvial woodland within Charleville Wood SAC.

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 and will not adversely affect the integrity of alluvial woodland within Charleville Wood SAC.

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 6-2**). The effect on water quality is considered to be neutral and will not adversely affect the integrity of alluvial woodland within Charleville Wood SAC.

Therefore, taking into consideration the relatively minor and infrequent nature of maintenance works required and the distance between the Proposed Scheme and Charleville Wood SAC during these activities, adverse effects on integrity as a result of operational phase maintenance are not anticipated.

Conclusion

Overall, the Proposed Scheme has the potential to affect the integrity of alluvial woodland within Charleville Wood SAC as a result of potential effects on habitat area and distribution, woodland size, woodland structure and vegetation composition during the construction phase. Mitigation measures are required to address these effects, and are set out in **Section 8** and **9**. Operational phase effects are not anticipated.

7.2.1.2 Desmoulin's Whorl Snail

7.2.1.2.1 Ecology and Conservation Status

Desmoulin's whorl snail is the largest of all the *Vertigo* species. It favours damp or wet habitats, where it lives mostly in moss, leaves and decaying vegetation (NPWS, 2019a). It feeds on bacterial films and decaying vegetation, and has a requirement for tall, structured vegetation containing tall riparian grasses and sedges (NPWS, 2019a). Desmoulin's whorl snail requires a stable hydrology with the water table at, or slightly above, the ground surface for much of the year and very low-amplitude seasonal flooding. The overall status of Desmoulin's whorl snail is assessed as inadequate and deteriorating (NPWS, 2019a). The main pressures and threats affecting this species are L02 natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) (high importance), L01 abiotic natural processes (e.g. erosion, silting up, drying out, submersion, salinization) (high importance), A07 abandonment of management/use of other agricultural and agroforestry systems (all except grassland) (medium importance) and A10 extensive grazing or undergrazing by livestock (medium importance) (NPWS, 2019c). The Natura 2000 standard data form for Charleville Wood SAC identifies outdoor sports and leisure activities, recreational activities; trapping, poisoning, poaching, and walking, horseriding and non-motorised vehicles as threats and pressures with a "high" ranking. Poaching; taking / removal of terrestrial plants, general, and wildlife watching are listed as "low" ranking threats and pressures for the SAC.

7.2.1.2.2 Assessment of Adverse Effects on Integrity

The Proposed Scheme does not overlap spatially with Charleville Wood SAC. Accordingly, there is no potential for direct effects on Desmoulin's whorl snail as a result of the Proposed Scheme and any adverse effects would be indirect.

The spread of invasive flora (Japanese knotweed) and contamination of the whorl snail's habitat with silt, hydrocarbons or other chemicals used in construction could affect the attributes that define favourable conservation status of this species. 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. Pollution of habitat supporting Desmoulin's whorl snail has the potential to result in the deterioration of the condition of the snail's habitat and also potentially result in negative effects through direct toxicity, which could result in mortality of individuals.

Construction Phase Effects

Deterioration in habitat condition or loss of habitat as a result of invasion by Japanese knotweed or deterioration due to contamination of the habitat with silt, hydrocarbons or concrete, for example, could affect the habitat area (4) within the SAC, and consequently the distribution, occurrence and density (1-3) of whorl snail within the SAC (numbers in brackets correspond to rows regarding Desmoulin's whorl snail in **Table 7-1**). Over time and in the absence of management, Japanese knotweed spread into the SAC could result in this invasive plant outcompeting native flora within the SAC, which could ultimately result in a reduction in the tree canopy extent (5) around the lake.

Operational Phase Effects

As described in **Section 7.2.1.1.2** above, changes to hydraulic regime within the River Clodiagh are anticipated to be highly localised to the area within the vicinity of the debris trap. The hydrological regime of habitat supporting Desmoulin's whorl snail (6) is not anticipated to be affected by the Proposed Scheme.

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. Silt from upstream sources could accumulate behind debris trapped within the proposed debris trap or Brittas Stream culvert, and then create a plume downstream when disturbed. 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. 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. However, 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). 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.

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. 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 this effect would be localised and restricted to the channel of the River Clodiagh and is not likely to significantly affect any of the attributes or targets that define favourable conservation status of Desmoulin's whorl snail within Charleville Wood SAC.

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 and will not adversely affect the integrity of Desmoulin's whorl snail within Charleville Wood SAC.

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 6-2**). The effect on water quality is considered to be neutral and will not adversely affect the integrity of Desmoulin's whorl snail within Charleville Wood SAC.

Therefore, taking into consideration the relatively minor and infrequent nature of maintenance works required, the distance between the Proposed Scheme and Charleville Wood SAC during these activities, adverse effects on integrity as a result of operational phase maintenance are not anticipated.

Conclusion

Overall, the Proposed Scheme has the potential to affect the integrity of Desmoulin's whorl snail within Charleville Wood SAC as a result of potential effects on the distribution, occurrence and density of the species within the SAC and impacts on its habitat during the construction phase. Mitigation measures are required to address these effects, and are set out in **Section 8** and **9**. Operational phase effects are not anticipated.

7.2.2 Sites Designated for the protection of White-Clawed Crayfish

7.2.2.1 White-Clawed Crayfish

The 15 SACs designated for white-clawed crayfish have a number of site-specific attributes and targets set out that are required to either maintain or restore favourable conservation status (see sections **10.2** to **10.16** for the site-specific attributes and targets for each SAC). The conservation objectives of each SAC have

been reviewed, and the attributes and targets that may be affected by the scheme have been identified. Those attributes and targets that may be affected by the Proposed Scheme relate to the following:

- Distribution (target is specific to the SAC, but is typically "no reduction in baseline" or restoration of
 presence within the SAC);
- **Population structure: recruitment** (target is typically juveniles and/or females with eggs within the SAC or in at least 50% of positive samples);
- **Population size** (this attribute has been identified for some SACs, with the target typically being no reduction in baseline, with the size specific to the relevant SAC).
- **Disease** (target is "no instances of disease").

The remaining attributes relate to negative indicator species, water quality and habitat heterogeneity. Given that the identified source and pathway for effects on white-clawed crayfish from the Proposed Scheme is from the accidental transfer of crayfish plague via personnel or equipment (e.g., footwear or machinery used during construction or operation), the Proposed Scheme will not result in impacts on water quality or habitat. Therefore, these attributes and targets are not considered relevant and are not considered further.

7.2.2.1.1 Ecology and Conservation Status

The white-clawed crayfish is the largest freshwater arthropod found in Ireland. The white-clawed crayfish is generally associated with good quality waters but in Ireland it can occur in water of lower quality. Habitat heterogeneity is important for the species. White-clawed crayfish faces an existential threat from twin impacts of non-indigenous crayfish species and crayfish plague (NPWS, 2019a). The overall status of the species is bad with a deteriorating trend. This represents a genuine decline since the last reporting period and is mainly due to bad future prospects for the species due to the presence of the crayfish plague (NPWS, 2019a). I05 plant and animal diseases, pathogens and pests has been identified as a pressure of medium importance. I05 plant and animal diseases, pathogens and pests and I01 invasive alien species of Union concern have been identified as threats with high importance (NPWS, 2019c).

7.2.2.1.2 Assessment of Adverse Effects on Integrity

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.

Construction and Operational Phase Effects

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. This is also true for the operational phase, where machinery and personnel will be required to maintain the proposed culvert inlet on the Brittas Stream as well as the proposed debris trap on the Clodiagh River.

In the absence of mitigation measures to control the spread of this pathogen, adverse effects on the integrity of the SACs listed for white-clawed crayfish could occur. This is due to potential effects on the attributes and targets listed in **Section 7.2.2.1** above (distribution, population structure: recruitment, population size and disease). As noted in the report to inform screening for AA - 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, adverse effects on the integrity of all SACs for which white-clawed crayfish is listed as a QI are considered in this assessment.

Conclusion

Overall, the Proposed Scheme has the potential to affect the integrity of white-clawed crayfish within the SACs that have been designated due to the presence of this species. Potential adverse effects have been identified due to potential effects on the distribution, population structure: recruitment, population size and occurrence of disease during the construction and operational phase. Mitigation measures are required to address these effects and are set out in **Section 8**.

7.3 Potential In-Combination Effects

The report to inform screening for AA for the Proposed Scheme assessed the potential effects of the Proposed Scheme both alone and in-combination with other plans and projects. National, regional and local strategic plans related to development planning were assessed to identify specific activities which have the potential to act in-combination with the Proposed Scheme. To assess the likelihood of adverse effects arising due to in-combination effects of the Proposed Scheme and other developments, a search was conducted of planning applications to Laois County Council, EIAs, Strategic Infrastructure Development and Strategic Housing Development applications, Section 8 Developments and forestry licences in the vicinity of the Proposed Scheme.

7.3.1 Projects

Given the relatively small scale, extent, and duration of the Proposed Scheme works, only planning applications within 5 km of the Proposed Scheme were considered. In order to identify projects with the potential to interact with the Proposed Scheme, a comprehensive search of the following data sources was undertaken:

- Department of Housing, Local Government and Heritage (DHLGH) EIA portal map viewer³;
- An Bord Pleanála⁴ website to identify any relevant applications, including Strategic Infrastructure Development (SID) and Strategic Housing Development (SHD) in the past five years in close proximity to the proposed Works;
- National planning application map viewer⁵.

The above searches were limited to the five-year period preceding the date of issue of this report and excluded developments that have been constructed (where this information is available), retention applications (i.e., typically local-scale residential or commercial developments where an impact has already occurred), withdrawn, and refused applications. **Table 7-2** below outlines projects in close proximity to the Proposed Scheme.

In addition, forestry licences within the River Clodiagh catchment were reviewed on the online Forestry Licence Viewer⁶, as well as any drainage activities proposed or recently undertaken by the OPW in the downstream Brosna ADS channel.

No afforestation is proposed within the River Clodiagh catchment upstream of the Proposed Scheme. In the last number of years, however, a considerable number of clear felling and thinning activities, as well as a small number of forestry roads, have been approved or are pending approval in the catchment. It is assumed that the approved and pending forestry licence applications in the Slieve Bloom mountains to the south of the Proposed Scheme have been subject to AA screening at the least, and would only be consented if, following assessment, significant effects or adverse effects on integrity could be ruled out. In terms of potential water quality impacts on downstream European Sites (i.e., Charleville Wood SAC), given the extent of approved and pending forestry licence applications in the River Clodiagh catchment, and the potential for significant effects on water quality arising from the Proposed Scheme alone in the absence of mitigation, it is considered that in-combination effects on Charleville Wood SAC cannot be ruled out.

An NIS for statutory arterial drainage maintenance activities that were proposed take place over the five-year period 2018-2022 in the Brosna ADS channel was prepared by JBA (2018). The Arterial Drainage Scheme is located between Co. Offaly and Co. Westmeath. It includes 613.2 km of watercourse and 46 km of embankment. Provided works for the 2018-2022 period are complete, significant in-combination effects are not anticipated for this cycle. However, it is assumed future maintenance work within the ADS channel will be required at least once in the next cycle. If there is overlap between the maintenance activities and the

³Available online at: <u>https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1</u> [accessed February 2024].

⁴Available online at: <u>www.pleanala.ie</u> [accessed February 2024].

⁵ Available online at: <u>https://myplan.ie/national-planning-application-map-viewer/</u> [accessed February 2024].

⁶ https://flv.apps.services.agriculture.gov.ie/ [accessed April 2024].

construction phase of the Proposed Scheme, significant in-combination effects on downstream European Sites, namely Charleville Wood SAC, could arise.

Numerous local planning applications at different stages of the planning process were found within 5 km from the Proposed Scheme. Adherence to the overarching policies and objectives of Laois County Development Plan 2021-2027 and any future development plans ensure that local planning applications and subsequent grant of planning comply with the core strategy of proper planning and sustainability and with the requirements of relevant EU Directives, national legislation, and environmental considerations. The majority of the developments listed in **Table 7-2** below do not have the potential to result in significant in-combination effects with the Proposed Scheme due to their small scale and nature (e.g., reg. ref. 2429), and there is a possibility that some may have already been constructed. However, should some of the larger scale developments (e.g., reg. ref. 22361) may be hydrologically linked with the River Gorragh or River Clodiagh, and if the construction phase of these developments and the Proposed Scheme overlap, there is potential for in-combination effects if appropriate mitigation measures are not in place. Operational phase in-combination effects are not anticipated.

Planning Application Reference Number	Project/Applicant Name and Proposed Location	Development Description	Application Status/Outcome	Approximate Distance and Direction from Proposed Works	Date Planning Application Granted
2348	Declan Callaghan Chairman of Clonaslee St. Manman's GAA Club Clonaslee	Erect 6 no. 20m high lighting columns with 48 no 1.5KW LED Floodlights to main playing pitch; 25m long x 4.9m high concrete hurling wall with 1.2m high sports fencing to the top of the wall, 3m long x 4.9m high wing walls to include 25m x 25m AstroTurf playing surface, 2.4m high surround sports fencing and 2 no 12m high lighting columns with 2 no 1.5KW LED Floodlights; 6 no 15m high lighting columns to training pitch with 18 no 1.5KW LED floodlights; 24 no 6m high octagonal public lighting columns to existing walking track with 24 no Axia LED Lanterns; Construction of extension to existing car park, onto our own lands, to allow for increased parking spaces and all associated site works	Grant permission	149.1 m NW	08/05/2023
23284	Mountmellick Credit Union Limited, Chapel Street Clonaslee	Retain the demolition of the existing office building and full planning permission for the construction of a new replacement office	Grant permission (conditional)	19.5 m W	04/03/2024

Table 7-2: Planning Search Results from the County Planning and EIA Portal Maps

Planning Application Reference Number	Project/Applicant Name and Proposed Location	Development Description	Application Status/Outcome	Approximate Distance and Direction from Proposed Works	Date Planning Application Granted
		building and all associated site works.			
20554	Residential development (Edel O'Brien, Chapel Street Clonaslee)	Retain 2 rear facing pitched roof extensions (24.1 sq. m), a steel-clad shed (29.7 sq. m), a change of use of a domestic garage into residential accommodation (41.9 sq. m), the removal of a steel-clad car port (19.9 sq. m) and permit to construct a single storey extension (17.3 sq. m) to the side of the existing dwelling to connect the former garage to the existing dwelling and all associated site works	Grant permission (conditional)	49.4 m W	20/01/2021
22361	Retail (John Maher, Bellair, Clonaslee)	Retention/permission for rear extension to existing shop/hardware store, also to retain change of use of adjoining dwelling structure to use as part of above mentioned shop/hardware store. Application also for full permission to construct new building comprising sit down delicatessen, as well as changing rooms, shower rooms and sauna for bicycle tourists and all associated works.	Grant permission (conditional)	735 m E	05/10/2022
2429	Clonaslee Tidy Towns, Main Street, Clonaslee	Develop a bus shelter with permission to comprise of retention permission to retain a conc. base and planning permission to erect a bus shelter and to include all associated site works	Grant permission	88 m E	12/07/2024
20593	Agriculture buildings (Dan Maher, Graigueafulla, Clonaslee)	Construct a new slatted tank with associated holding yard, a new silage slab, a new cattle crush, and all ancillary site works	Grant permission (conditional)	1.9 km E	09/02/2021

7.3.2 Plans

A search was conducted of national, regional, and local plans which were deemed relevant to the Proposed Scheme. Search results are outlined in **Table 7-3**. This list is not exhaustive of all plans and programmes, but instead focuses on plans which may result in in-combination effects within relevant European Sites.

Table 7-3: Planning Search Results - Plans and Programmes

Plan	Conflicting Policies	Protective Policies/Actions
National Biodiversity Plan 2023-2030	n/a	Objective 1: Adopt a Whole of Government, Whole of Society Approach to Biodiversity.
		Objective 2 : Meet Urgent Conservation and Restoration Needs.
		Objective 3 : Secure Nature's Contribution to People.
		Objective 4 : Enhance the Evidence Base for Action on Biodiversity.
		Objective 5 : Strengthen Ireland's Contribution to International Biodiversity Initiatives.
Water Action Plan 2024 – A River Basin Management Plan for	n/a	The following evidence-based priorities have been adopted for this river basin planning cycle:
Ireland		Ensure full compliance with relevant FU legislation
		Prevent deterioration
		 Meet the water standards and objectives for designated protected areas.
		Protect high-status waters.
		 Implement targeted actions and pilot schemes in focus sub-catchments aimed at (i) targeting water bodies close to meeting their objective and (ii) addressing more complex issues that will build knowledge for future cycles.
Laois County Development Plan 2021-2027	NRPO 6 - Preserve the major natural amenities of the County (i.e., Slieve Bloom Mountains and River Valleys) and to provide parks and open spaces in association with them along with facilitating walking and cycling routes linking the mountains, river valleys and major parks.	CS 02 - Implement all land use planning policy and objectives in a manner which takes account of and is consistent with the Core Strategy in order to accelerate a transition to a greener, low carbon and climate resilient county with a focus on reduced travel demand through the promotion of sustainable settlement patterns. CS 03 - In the assessment of development proposals, to take account of transport corridors, environmental carrying
	TM 6 - Support in principle the development or expansion of a tourism around the Slieve Bloom Mountains, Laois' Inland Waterways, Laois' historic towns and villages, heritage-based tourism, activity-based tourism, geo tourism, eco-tourism, food-based	capacity, availability and/or capacity to provide waste water and water supply services, potential to conflict with Water Framework Directive objectives, potential to impact on the integrity of European Sites and Annexed Habitats and species, features of biodiversity value including ecological networks, impact on landscape and visual characteristics, education and other socioeconomic objectives.
	tourism, diaspora-based tourism and spiritual tourism. Proposals for sustainable tourism development will be required to demonstrate a need to locate in a particular area and demonstrate compliance with	SCPO 12 - Require the use of SuDS within Local Authority Developments and other social infrastructure projects in accordance with the Greater Dublin Regional Code of Practice for Drainage Works.

Protective Policies/Actions
 NRPO 9 - Encourage and facilitate the development of green infrastructure that recognises the synergies that can be achieved with regard to the following: Provision of open space amenities. Sustainable management of water. Protection of cultural heritage. Protection of protected landscape sensitivities. SWD 2 - Implement policies contained in the Greater Dublin Strategic Drainage Study (GDSDS) in relation to SUDS and climate change. SWD 3 - Ensure new development is adequately serviced with surface water drainage infrastructure which meets the requirements of the Water Framework Directive, associated River Basin Management Plans and CFRAM Management Plans. SWD 4 - Require that planning applications are accompanied by a comprehensive SUDs assessment that addresses run-off quantity, run-off quality and its impact on the existing habitat and water quality. FRM 7 - Protect and enhance the County's floodplains and wetlands as 'green infrastructure' which provides space for storage and conveyance of floodwater, enabling flood risk to be more effectively managed and reducing the need to provide flood defences in the future, subject to normal planning and environmental criteria. FRM 9 - Ensure that where flood risk management works take place that the natural and cultural heritage, rivers, streams and watercourses are protected and enhanced. FRM 11 - Consult, where necessary, with Inland Fisheries Ireland, the National Parks and Wildlife Service and other relevant agencies in the provision of flood alleviation measures in the County. ES 18 - Maintain and improve the water quality in rivers and other water courses in the county, including ground waters. The Council will have cognizance of notware spreaded the the targe of the Water Framework Directive ES 24 - Protect and develop, in a sustainable manner, the existing groundwater sources and aquifers in the County and control development in a manner consis

with the County Water Source Protection Zones.

Plan	Conflicting Policies	Protective Policies/Actions
		ES 31 - New developments which include on-site wastewater treatment in an Extreme Vulnerability Inner Source Protection Area shall be restricted.
		ES 34 - Consult as necessary with other competent authorities with responsibility for environmental management.
		ES36 - Ensure that developments that may adversely affect water quality will not proceed unless mitigation measures are employed, such as settlements ponds, interceptors etc.
		ES38 - Ensure that all air emissions associated with new developments are within Environmental Quality Standards as out in the Air Quality Standards Regulations 2011 (SI No. 180 of 2011) (or any updated/superseding documents).
		ES 40 - Encourage the use of appropriate mitigation measures, such as dust dampeners, chimney stack scrubbers, etc. to minimise the potential impacts of developments on air quality.
		ES 45 - Ensure that relevant planning applications comply with the provisions of any Noise Action Plan or noise maps relating to the area.
		ES 46 - Restrict development proposals causing noise pollution in excess of best practice standards.
		ES 48 - Ensure new development does not cause an unacceptable increase in noise levels affecting noise sensitive properties. Proposals for new development with the potential to create excessive noise will be required to submit a construction and/or operation management plan to control such emissions.
		ES 49 - Require activities likely to give rise to excessive noise to install noise mitigation measures and monitors. The provision of a noise audit may be required where appropriate.
		ES 50 - Ensure that external lighting and lighting schemes are designed so that light spillage is minimised, thereby limiting light pollution into the surrounding environment and protecting the amenities of nearby properties and wildlife, including protected species.
		ES 51 - Encourage the maintenance of dark skies in rural areas and limit light pollution in urban and rural areas.
		BNH 1 - Protect, conserve, and seek to enhance the county's biodiversity and ecological connectivity.
		BNH 2 - Conserve and protect habitats and species listed in the Annexes of the EU Habitats Directive (92/43/EEC) (as amended) and the Birds Directive (2009/147/EC), the Wildlife Acts 1976 and 2010 (as amended) and the Flora Protection Orders.
		BNH 3 - Support and co-operate with statutory authorities

BNH 3 - Support and co-operate with statutory author and others in support of measures taken to manage

Plan	Conflicting Policies	Protective Policies/Actions
		proposed or designated sites in order to achieve their conservation objectives and maintain the favourable conservation status and conservation value of Sites under National and European legislation and International Agreements and maintain and /develop linkages between them where feasible.
		BNH 5 - Projects giving rise to significant cumulative, direct, indirect or secondary impacts on Natura 2000 sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall not be permitted on the basis of this Plan (either individually or in combination with other plans or projects) [1]. Screening for AAs and AAs undertaken shall take into account invasive species as relevant.
		BNH13 - It is a policy objective of the Council to require new developments to identify, protect and enhance ecological features by making provision for local biodiversity (for example, through provision of swift boxes or bricks, bat roost boxes, green roofs, etc.) and improve the ecological coherence of wider green infrastructure.
		BNH28 - Ensure that hedgerow removal to facilitate development is kept to an absolute minimum and, where unavoidable, a requirement for mitigation planting will be required comprising a hedge of similar length and species composition to the original, established as close as is practicable to the original and where possible linking in to existing adjacent hedges. Native plants of a local provenance should be used for any such planting.

7.3.3 In-Combination Conclusion

Numerous local planning applications at different stages of the planning process were found less than 5 km from the Proposed Scheme. Adherence to the overarching policies and objectives of Laois County Development Plan 2021-2027 and any future development plans ensure that local planning applications and subsequent grant of planning comply with the core strategy of proper planning and sustainability and with the requirements of relevant EU Directives, national legislation, and environmental considerations. The only potential in-combination effects identified were those occurring during the construction phase of the Proposed Scheme. This is based on the assumption that the permitted projects listed in **Table 7-2** have not yet been constructed.

Given the extent of approved and pending forestry licence applications in the River Clodiagh catchment, and the potential for significant effects on water quality arising from the Proposed Scheme alone in the absence of mitigation, it is considered that significant in-combination effects on Charleville Wood SAC cannot be ruled out. Furthermore, future maintenance works within the ADS channel, if undertaken concurrently with the construction phase of the Proposed Scheme, could result in significant in-combination effects on downstream European Sites, namely Charleville Wood SAC.

No other plans or projects were identified as having the potential to contribute to in-combination effects on the identified European Sites, in combination with the Proposed Scheme, which is overall a relatively small scale and short-term scheme to construct.

8 MITIGATION

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.

8.1 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 8.1.1.
- 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 8-1 Illustrates the relationship/hierarchy within the environment team regarding biodiversity matters.



Figure 8-1: Environmental team hierarchy regarding biodiversity matters.

8.1.1 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 (see **Figure 8-1**). 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 IFI 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 toolbox 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. 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 oversee the demarcation and erection of protective fencing around working areas in advance of works commencing.

• 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.

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.

8.2 **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 relevant chapters within the EIAR prepared for this planning application. 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.

8.3 **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:

• 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 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 NIS 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.

Based on the findings of the pre-construction surveys, mitigation set out in the NIS will be reviewed and, if necessary, augmented accordingly by the ECoW. 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.

8.4 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.

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' (or similar) which will be on standby for use in emergency situation;
- A monitoring plan for emergency situations.

8.5 Water Quality Protection Measures

8.5.1 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)
- рН
- 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 9-2**.
- The ECoW will have the authority to instruct the cessation of works when agreed abandonment triggers are met.

8.5.2 **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.

8.5.3 Water Quality Protection and Management

8.5.3.1 Silt/Suspended Solids

- A sediment control plan will form part of the CEMP and will be developed further by the Contractor prior to the commencement of work. This plan will identify actions on site to minimise the loss of topsoils and soils and their potential for erosion, such as stabilising side surfaces to prevent erosion through appropriate slope angles. Soils removed during excavations will be reinstated as soon as possible and backfilled and compacted to replicate the conditions prior to the works. Excess soil will be disposed of at a licenced waste disposal facility.
- 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 9-2**);
 - In no circumstances will works be undertaken on the river side of silt fences.
- 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.
- Dewatering pumps shall be placed in sumps surrounded by drainage stone.
- Stockpiling will only be allowed in designated areas.
- Where stockpiling of topsoil is required, stockpiles shall be limited to heights not exceeding two metres, shall be battered back to a stable slope, and shall not be unnecessarily trafficked. There will be no stockpiles within 20 m of the main channel of the River Clodiagh or any drains that connect to the river. Care will be taken in reworking this material to minimise the effects of weathering, dust generation, groundwater infiltration and generation of runoff. Construction compounds are located north of Brittas Wood works area and north of the Chapel St works area where there will be designated stockpiling areas.
- Ditches and trenched silt fencing shall be installed around stockpile areas (restricted to the compounds).
- Sandbags and/or straw bales will be installed as check dams in drainage ditches to attenuate runoff and reduce erosion.
- Regular road washing will be undertaken to prevent build-up of mud from construction vehicles, which may runoff into watercourses. Wheel wash facilities will be provided at exit points of all compound sites.
- Buffer zones of at least 1 m shall be delineated along greenfield riparian works areas within which tracking of machinery and storage of construction materials will be prohibited.

8.5.3.2 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 8.5.1);
- Dedicated, suitably prepared concrete washout areas for concrete chute and bowser washout, and cleaning of concrete contaminated plant and materials shall be established. Signs will be erected at works sites to inform concrete delivery drivers that washout is not permitted outside these areas;
- Disposal of raw or uncured waste concrete shall be controlled using approved waste disposal and/or concrete wash-out pits to ensure that seepage to drains from the site is avoided;
- Water collected in wash pits will be tankered off-site for treatment at an appropriate licensed facility, ensuring none is allowed to overflow or infiltrate to ground;
- Discharge water generated during placement of concrete will be stored and removed off site for treatment and disposal;
- Best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / formwork, ensuring adequate curing times shall be employed. Where shuttering is used, measures will be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils;
- 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;

- Shuttering will be designed to accommodate increases in the volume of material contained within the shuttered area due to rainfall;
- Dry low strength concrete, which 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 shall be utilised;
- All fuels and oils shall be stored in bunded, level trays at least 20 m from any watercourses or surface water feature. Trays will be bunded to 110% of the capacity of the fuel volume;
- All areas where liquids (including fuel) are stored, or cleaning is carried out, will be in designated impermeable areas that are isolated from the surrounding area;
- The location of any fuel storage facilities shall be considered in the design of the construction compounds. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded;
- Runoff from construction plant washdown will be collected and passed through an oil-water separator before release into the environment;
- Refuelling activities will be restricted to designated, bunded areas, at least 20 m from any watercourse or surface water feature;
- All construction plant will be regularly maintained and checked for oil and fuel leaks before use. Drip trays to be available on site;
- Consideration will be given to the use of biodegradable fuels and oils, where possible.
- Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire construction phase will be implemented;
- Spill kits will be provided and will be kept close to the storage area;
- Operatives will be trained in the use of spill kits and keeping spill kits at each work site.

8.5.3.3 Construction debris

Construction debris entering the River Clodiagh due to wall construction will be limited by installing edge
protection along the riverfront or a floating boom cordoning off an area of the river below the works to be
implemented. The installation and maintenance of edge protection or a floating boom must be overseen
by the ECoW and approved by IFI.

8.5.4 Water Management

- A surface water management plan will be developed to mitigate any risks associated with surface water runoff and also prevent or reduce impacts to groundwater quality.
- Water management measures described in the CEMP will be implemented by the Contractor during the construction phase.
- 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 2019⁷. 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 9-2**). 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.

⁷ <u>https://www.scottishrenewables.com/assets/000/000/453/guidance -</u> good practice during wind farm construction original.pdf?1579640559

- 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.

8.5.5 Instream Works

- All measures set out in Section 8.5.3 and 8.5.4 will apply to the Proposed instream works;
- As noted in the Project Description (Appendix A), 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 riverbed for each stage of works.
 The works area will be dammed on three sides using large sandbags. 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 CER 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 when dewatering is being undertaken
 at a frequency determined by the ECoW. 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.
- Backup pumps and generators will be in place where over-pumping is taking place to mitigate flood risk.
- 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.

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 riverbank 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;
- The instream works areas will be left clean of all residual construction waste and potential pollutants before re-flooding;
- River margin and channel reinstatement shall be supervised by the ECoW.

8.5.6 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 riverbanks. 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 the **Project Description (Appendix A)**, 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 do not fall into the 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.

8.5.7 Debris trap and slipway design

- As stated in the **Project Description (Appendix A)**, 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. 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.

8.5.8 Foul Water

 If no foul sewer connection is available at the compound and works sites, foul water will be stored and tankered away for treatment as needed.

8.6 **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.

8.7 Invasive Alien Plant Species

The RPS ecological surveys carried out identified IAPS namely Japanese knotweed and a hybrid knotweed within the study area boundary and vicinity (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.

LCC 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 across the Proposed Scheme. 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 MONITORING

9.1 **Construction Phase**

The following monitoring will be implemented during the construction phase of the Proposed Scheme and **Table 9-1** and **Table 9-2** summarise 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, 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 NIS.

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. Time and location referenced photographic records to be taken.	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.	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

Table 9-1: Schedule of monitoring – terrestrial 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.

Discharges from onsite water attenuation and treatment systems must not exceed 25 mg/l total suspended solids (TSS) and must be within the pH bracket of $\geq 6 \leq 9$. 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 9-2**). 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 9-2 outlines a schedule of monitoring required during the construction phase.

Table 9-2: Schedule	e of monitoring -	aquatic ecology.
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Parameter	Technique	Frequency	Data Management	Response to Elevated levels/Conditions	Responsible Persons
Turbidity/ Total Suspended Solids (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
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

Parameter	Technique	Frequency	Data Management	Response to Elevated levels/Conditions	Responsible Persons
Mitigation measures integrity checks	Documented checks of the integrity of any silt fencing, settlement tanks 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

9.2 Operational and Maintenance Phase

9.2.1 Operational & Maintenance Phase

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

• 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.

10 RESIDUAL EFFECTS

With all measures and mitigations implemented in accordance with **Section 8** and **9**, the Proposed Scheme will result in no adverse effects during both the construction and operational phase.

To aid the Competent Authority, **Section 9.1 – 9.16**, below, set out the residual effects in relation to the sitespecific conservation objective targets and attributes for the relevant QI habitats and species of Charleville Wood SAC, River Barrow 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.

10.1 Charleville Wood SAC (000571)

Attribute	Measure	Target	Residual effects on the Conservation Objectives			
[91E0] Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) Conservation Objective: To restore the favourable conservation condition of Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) in Charleville Wood SAC, which is defined by the following list of attributes and targets:						
Habitat area	Hectares	Area stable or increasing, subject to natural processes	No adverse effect. Mitigation measures specified to protect			
Habitat distribution	Occurrence	No decline, subject to natural processes	water quality and prevent the			
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	ensure the maintenance and will not prevent the restoration of these attributes and targets.			
Woodland structure: cover and height	Percentage; metres; centimetres	Total canopy cover at least 30%; median canopy height at least 7m; native shrub layer cover 10- 75%; native herb/dwarf shrub layer cover at least 20% and height at least 20cm; bryophyte cover at least 4%	-			
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	_			
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes of target species for 91E0* woodlands and other native tree species occur in adequate proportions to ensure survival of woodland canopy				
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	No adverse effect . Mitigation not required. The Proposed Scheme will not result in any changes to the hydrological regime within this SAC.			
Woodland structure: dead wood	Number per hectare	At least 19 stems/ha of dead wood of at least 20cm diameter	No adverse effect . Mitigation not required. The Proposed Scheme will not result in any reduction in dead wood within the woodland.			
Woodland structure: veteran trees	Number per hectare	No decline	No adverse effect . Mitigation not required. The Proposed Scheme will not result in any reduction in veteran trees within the woodland.			
Woodland structure: indicators	Occurrence; population size	No decline in distribution and, in the case of red listed and other rare or localised species, population size	No adverse effect . Mitigation measures specified to protect water quality and prevent the			

Attribute	Measure	Target	Residual effects on the Conservation Objectives
of local distinctiveness			spread of IAPS will serve to ensure the maintenance and will not prevent the restoration of these attributes and targets.
Woodland structure: indicators of overgrazing	Occurrence	All five indicators of overgrazing absent	No adverse effect . Mitigation not required. The Proposed Scheme will not result in any grazing pressures within this SAC.
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover at least 90% of canopy; target species cover at least 50% of canopy	No adverse effect . Mitigation measures specified to protect water quality and prevent the
Vegetation composition: typical species	Occurrence	At least 1 target species for 91E0* woodlands present; at least 6 positive indicator species for 91E0* woodlands present	spread of IAPS will serve to ensure the maintenance and will not prevent the restoration of these attributes and targets
Vegetation composition: negative indicator species	Occurrence	Negative indicator species cover not greater than 10%; regeneration of negative indicator species absent	these attributes and targets.
Vegetation composition: problematic native species	Percentage	Cover of common nettle (<i>Urtica dioica</i>) less than 75%	
1016 Desmoulin's W Conservation Obje <i>moulinsiana) in Cha</i>	<mark>/horl Snail Vert</mark> ctive: To mainta rleville Wood SA	igo moulinsiana in the favourable conservation condition of Desmou C, which is defined by the following list of attributes	lin's Whorl Snail (Vertigo and targets:
Distribution	Number of occupied 1km squares	No decline, subject to natural processes. There is one known site for this species in the SAC within N3122. See map 3	No adverse effect . Mitigation measures specified to protect water quality and prevent the
Occurrence in suitable habitat	Percentage of positive records in a representative number of samples	No decline, subject to natural processes. A baseline figure of 50% positive samples is set	spread of IAPS will serve to ensure the maintenance of these attributes and targets.
Density within habitat	Number of adults per sample	No decline, subject to natural processes; at least 67% of samples should have more than 20 individuals	
Habitat area	Hectares	Area of suitable habitat stable or increasing, subject to natural processes; no less than 5ha of at least sub-optimal habitat	
Tree canopy extent	Percentage cover	Tree canopy cover around lake stable at current levels, subject to natural processes	
Habitat quality: water levels	Hydrological regime	Maintain at current levels, subject to natural processes	No adverse effect . Mitigation not required. The Proposed Scheme will not result in any changes to the hydrological regime within this SAC.

MDW0867- RPS- AA=XX-R-EN-0103 | S5.P01 | 27th February 2025

clawed crayfish in the River Barrow and River Nore SAC, which is defined by the following list of attributes and targets:

River Barrow and River Nore SAC (002162)

Target

Conservation Objective: To maintain the favourable conservation condition of White-

Residual effects on the Conservation Objectives

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Measure

[1092] White-clawed crayfish (Austropotamobius pallipes)

10.2

Attribute

Attribute	Measure	Target	Residual effects on the Conservation Objectives
Distribution	Occurrence	No reduction from baseline	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Population str ucture: recruit ment	Percentage occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Negative indic ator species	Occurrence	No alien crayfish species	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of di sease	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Water quality	EPA Q value	At least Q3- 4 at all sites samp led by EPA	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.
Habitat quality heterogeneity:	Occurrence of positive habitat features	No decline in hete rogeneity or habit at quality	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.3 Blackwater River (Cork/Waterford) SAC (002170)

Attribute	Measure	Target	Residual effects on the Conservation Objectives		
[1092] White-cl Conservation C clawed Crayfisl s:	[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objectives: To maintain the favourable conservation condition of White- clawed Crayfish in the Blackwater River (Cork/Waterford) SAC, which is defined by the following list of attributes and target s:				
Distribution	Occurrence	No reduction from baseline	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		
Population str ucture: recruit ment	Percentage occ urrence of juven iles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		
Negative indic ator species	Occurrence	No alien crayfish species	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.		
Disease	Occurrence	No instances of disease	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		
Water quality	EPA Q value	At least Q3- 4 at all sites sampled by E PA	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.		

10.4 Bricklieve Mountains and Keishcorran SAC (001656)

Attribute	Measure	Target	Residual effects on the Conservation Objectives	
[1092] White-o	clawed Crayfish	n (Austropotamobius j	pallipes)	
Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish (Austropotamobius				
pallipes) in Bri	icklieve Mounta	ins and Keishcorran	SAC, which is defined by the following list of attributes and targets:	

Attribute	Measure	Target	Residual effects on the Conservation Objectives
Distribution	Number of occupied 1km squares	No reduction from baseline	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Population str ucture: recruit ment	Percentage occ urrence of juven iles and females with eggs	Juveniles and/or females with eggs in at least 50% of positive samples taken at appropriate time and methodology	
Population size	Catch per unit effort	No reduction from baseline of 1.0	
Negative indic ator species	Occurrence	No non- indigenous crayfish specie s	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of disease	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.5 Glenade Lough SAC (001919)

Attribute	Measure	Target	Residual effects on the Conservation Objectives
[1092] White-cl Conservation C <i>pallipes</i>) in Gle	lawed Crayfish (<i>Aus</i> Dbjective: To mainta nade Lough SAC, v	tropotamobius pallipes) in the favourable conse vhich is defined by the f) rvation condition of White-clawed Crayfish (<i>Austropotamobius</i> ollowing list of attributes and targets:
Distribution	Number of occupied 1km squares	No reduction from ba seline	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Population str ucture: recruit ment	Percentage occur rence of juveniles and females with eggs	Juveniles and/or fem ales with eggs in at le ast 50% of positive samp les taken at appropriate time and methodology	
Population size	Catch per unit effort	No reduction from baseline of 2.27	
Negative indic ator species	Occurrence	No non- indigenous crayfish s pecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of disea se	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.

Attribute	Measure	Target	Residual effects on the Conservation Objectives
		functioning of the habitat	
Habitat quality heterogeneity:	Occurrence of po sitive habitat feat ures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.6 Kilroosky Lough Cluster SAC (001786)

Attribute	Measure	Target	Residual effects on the Conservation Objectives		
[1092] White-cl Conservation C <i>pallipes</i>) in Kilro	[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish (<i>Austropotamobius pallipes</i>) in Kilroosky Lough Cluster SAC, which is defined by the following list of attributes and targets:				
Distribution	Number of occupied 1km squares	No reduction from baseline	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		
Population str ucture: recruit ment	Percentage occ urrence of juven iles and females with eggs	Juveniles and females with eggs in at least 50% of positive samples taken at appropriate time and methodology			
Population size	Catch per unit effort (CPUE)	No reduction from baseline of 1.0 for Kilroosky Lough; no reduction in baseline of 0.5 for Dummy's Lough			
Negative indic ator species	Occurrence	No non- indigenous crayfish species	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.		
Disease	Occurrence	No instances of disease	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly Ph and nutrient levels, to support the natural structure and functioning of the habitat	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.		
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.		

10.7 Lough Bane and Lough Glass SAC (002120)

Attribute	Measure	Target	Residual effects on the Conservation Objectives		
[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To restore the favourable conservation condition of White-clawed Crayfish (<i>Austropotamobius pallipes</i>) in Lough Bane and Lough Glass SAC, which is defined by the following list of attributes and targets:					
Distribution	Number of occupied 1km squares	Restore presence in lake	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		

Attribute	Measure	Target	Residual effects on the Conservation Objectives
Negative indic ator species	Occurrence	No non- indigenous crayfish sp ecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.8 Lough Corrib SAC (000297)

Attribute	Measure	Target	Residual effects on the Conservation Objectives		
[1092] White-cl Conservation C which is define	[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish in Lough Corrib SAC, which is defined by the following list of attributes and targets:				
Distribution: rivers	Occurrence	No reduction from bas eline	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		
Distribution: Lough Corrib	Occurrence	No reduction from bas eline			
Population str ucture: recruit ment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries and occupied parts of Lough Corrib			
Negative indic ator species	Occurrence	No alien crayfish speci es	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.		
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.		
Water quality	EPA Q value	At least Q3- 4 at all sites sampled b y EPA	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.		
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline in habitat heterogeneity o r habitat quality	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.		

10.9 Lough Gill SAC (001976)

Attribute	Measure	Target	Residual effects on the Conservation Objectives	
[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>)				

Attribute	Measure	Target	Residual effects on the Conservation Objectives
Conservation C <i>pallipes</i>) in Lou	bjective: To main gh Gill SAC, whic	tain the favourable conse h is defined by the followi	ervation condition of White-clawed Crayfish (<i>Austropotamobius</i> ing list of attributes and targets:
Distribution	Number of occupied 1km squares	No reduction from bas eline.	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Population str ucture: recruit ment	Percentage occ urrence of juven iles and females with eggs	Juveniles and females with eggs in at least 50% of positive samples taken at appropriate time and methodology	
Population size	Catch per unit effort	No reduction from baseline of 0.25	
Negative indic ator species	Occurrence	No non- indigenous crayfish sp ecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
River water quality	EPA Q value	At least Q3- 4 at all sites sampled b y EPA	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.
Lake water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.10 Lough Lene SAC (002121)

Attribute	Measure	Target	Residual effects on the Conservation Objectives
[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To restore the favourable conservation condition of White-clawed Crayfish (<i>Austropotamobius pallipes</i>) in Lough Lene SAC, which is defined by the following list of attributes and targets:			
Distribution	Number of occupied 1km squares	Restore presence in lake	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Negative indic ator species	Occurrence	No non- indigenous crayfish sp ecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.

Attribute	Measure	Target	Residual effects on the Conservation Objectives
		functioning of the habitat	
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.11 Lough Owel SAC (000688)

Attribute	Measure	Target	Residual effects on the Conservation Objectives	
[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish in Lough Owel SAC, which is defined by the following list of attributes and targets:				
Distribution	Number of occupied 1km squares	No reduction from bas eline.	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.	
Population str ucture: recruit ment	Occurrence of j uveniles and fe males with eggs	Juveniles and/or females with eggs should be present in all occupied 1km squares, subject to natural processes and availability of suitable habitat		
Negative indic ator species	Occurrence	No non- indigenous crayfish sp ecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.	
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.	
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of lake habitat 3140	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.	
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline in heteroge neity or habitat quality	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.	

10.12 Lower River Suir SAC (002137)

Attribute	Measure	Target	Residual effects on the Conservation Objectives	
[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC, which is defined by the following list of attributes and targets:				
Distribution	Occurrence	No reduction from bas eline.	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.	
Population str ucture: recruit ment	Occurrence of j uveniles and fe males with eggs	Juveniles and/or females with eggs in all occupied tributaries		

Attribute	Measure	Target	Residual effects on the Conservation Objectives
Negative indic ator species	Occurrence	No alien crayfish speci es	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Water quality	EPA Q value	At least Q3- 4 at all sites sampled b y EPA	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No reduction in habitat heterogeneity or habitat quality	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.13 River Moy SAC (002298)

Attribute	Measure	Target	Residual effects on the Conservation Objectives	
[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish in River Moy SAC, which is defined by the following list of attributes and targets:				
Distribution	Occurrence	No reduction from bas eline.	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.	
Population str ucture: recruit ment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries		
Negative indic ator species	Occurrence	No alien crayfish speci es	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.	
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.	
Water quality	EPA Q value	At least Q3- 4 at all sites sampled b y EPA	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.	
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline in heteroge neity or habitat quality	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.	

10.14 White Lough, Ben Loughs and Lough Doo SAC (001810)

Attribute	Measure	Target	Residual effects on the Conservation Objectives
[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish (<i>Austropotamobius pallipes</i>) in White Lough, Ben Loughs and Lough Doo SAC, which is defined by the following list of attributes and targets:			
Distribution	Number of occupied 1km squares	No reduction from bas eline.	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Population str ucture: recruit ment	Percentage occ urrence of juven iles and females with eggs	Juveniles and/or femal es with eggs in at least 50% of positive sample s taken at appropriate time and methodology	

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Attribute	Measure	Target	Residual effects on the Conservation Objectives
Population size	Catch per unit effort	No reduction from baseline of 0.79	
Negative indic ator species	Occurrence	No non- indigenous crayfish sp ecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.
Water quality	Water chemistry measures	Maintain appropriate water quality, particularly pH and nutrient levels, to support the natural structure and functioning of the habitat	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.

10.15 Lough Hoe Bog SAC (000633)

Attribute	Measure	Target	Residual effects on the Conservation Objectives				
[1092] White-cla Conservation C SAC, which is c	[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish in Lough Hoe Bog SAC, which is defined by the following list of attributes and targets:						
Distribution	Number of occupied 1km grid squares	No decline	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.				
Population str ucture: recruit ment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs should be present in all occupied 1km squares, subject to natural processes and availability of suitable habitat					
Negative indic ator species	Occurrence	No non- indigenous crayfish sp ecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.				
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.				
Water quality	EPA Q value	At least Q3- 4 at all sites sampled b y EPA	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.				
Habitat quality heterogeneity	Occurrence of p ositive habitat fe atures	No decline habitat quality	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.				

10.16 Lough Nageage SAC (002135)

Attribute	Measure	Target	Residual effects on the Conservation Objectives				
[1092] White-cl Conservation C SAC, which is c	[1092] White-clawed Crayfish (<i>Austropotamobius pallipes</i>) Conservation Objective: To maintain the favourable conservation condition of White-clawed Crayfish in Lough Nageage SAC, which is defined by the following list of attributes and targets:						
Distribution	Number of occupied 1km squares	No reduction from bas eline.	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.				
Population str ucture: recruit ment	Percentage occurrence of juveniles and females with eggs	Juveniles and females with eggs in at least 50% of positive samples taken at appropriate time and methodology					
Population size	Catch per unit effort	No reduction from baseline of 0.1	-				
Negative indic ator species	Occurrence	No non- indigenous crayfish sp ecies	No adverse effects. Mitigation not required. The Proposed Scheme will not result in the introduction of alien crayfish species into this SAC.				
Disease	Occurrence	No instances of diseas e	No adverse effects. Mitigation measures specified to prevent the spread of crayfish plague.				
Water quality	Water chemistry measures	No decline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect water quality within this SAC.				
Habitat quality : heterogeneity	Occurrence of p ositive habitat fe atures	No decline from the baseline	No adverse effects . Mitigation not required. The Proposed Scheme will not affect habitat quality within this SAC.				

11 CONCLUSION

This NIS has considered the potential for effects arising from the Proposed Scheme that would have the potential to adversely affect the integrity of European Sites, with regard to their QIs and conservation objectives. The potential for direct, indirect and in-combination effects on relevant QIs of the following designations has been assessed in this NIS:

- Charleville Wood SAC (000571);
- River Barrow and River Nore SAC (002162);
- Blackwater River (Cork/Waterford) SAC (002170);
- Bricklieve Mountains and Keishcorran SAC (001656);
- Glenade Lough SAC (001919);
- Kilroosky Lough Cluster SAC (001786);
- Lough Bane and Lough Glass SAC (002120);
- Lough Corrib SAC (000297);
- Lough Gill SAC (001976);
- Lough Lene SAC (002121);
- Lough Owel SAC (000688);
- Lower River Suir SAC (002137);
- River Moy SAC (002298);
- White Lough Ben Loughs and Lough Doo SAC (001810);
- Lough Hoe Bog SAC (000633);
- Lough Nageage SAC (002135).

In conclusion, it is the opinion of RPS that in view of best scientific knowledge and applying the precautionary principle, and in light of the conservation objectives of the relevant European sites, the Proposed Scheme, either individually or in combination with other plans or projects, will not have adverse effects on the integrity of any European site(s), given the implementation of the mitigation measures outlined in this NIS.

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CLONASLEE FLOOD RELIEF SCHEME

Environmental Impact Assessment Report Chapter 5: Project Description



CHAPTER 5 - PROJECT DESCRIPTION

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Contents

5	PRO.	JECT DE	ESCRIPTION	1
	5.1	Flood F	Relief Scheme Design Approach	1
	5.2	Descrip	tion of the Proposed Scheme	2
		5.2.1	Area 1 – Brittas Wood	4
		5.2.2	Area 2 – Chapel Street	14
		5.2.3	Area 3 – Tullamore Road and ICW	19
		5.2.4	Summary of Proposed Physical Works	24
		5.2.5	Freeboard and Resilience to Climate Change	24
	5.3	Constru	uction Phase – Specific Methodologies	26
		5.3.1	Area 1 Brittas Wood	26
		5.3.2	Area 2 Chapel Street	28
		5.3.3	Area 3 Tullamore Road	29
	5.4	Constru	uction Phase – General Information	30
		5.4.1	Construction Programme and Phasing	30
		5.4.2	Site Access Points	32
		5.4.3	Construction Compounds	32
		5.4.4	Construction Hours	33
		5.4.5	Construction Plant	33
		5.4.6	Construction Personnel	33
		5.4.7	Utilities Diversion and Protection	34
		5.4.8	Demolition Works	37
		5.4.9	Excavations	37
		5.4.10	Sediment and Erosion Control	37
		5.4.11	Instream Works	37
		5.4.12	Water Management	37
		5.4.13	Construction Materials	38
		5.4.14	Risk of Flooding During Construction	38
		5.4.15	Traffic Management and Road Closures	39
		5.4.16	Construction Lighting	39
		5.4.17	Waste Management	39
		5.4.18	Commitments Register	40
	5.5	Operati	on and Maintenance Phase	40
		5.5.1	Waste Arisings and Management	41
		5.5.2	Emissions	41

Tables

Table 5-1: Scheme Design Approach	1
Table 5-2: Summary of Proposed Scheme	2
Table 5-3: Proposed Works	24
Table 5-4: Freeboard Criteria	25
Table 5-5: Construction Plant List	33
Table 5-6: Operational and Maintenance Activities	41

Figures

Figure 5-1: Proposed Scheme	3
Figure 5-2: Proposed Defence Area 1: Brittas Wood	5
Figure 5-3: Cross-Section of the Debris Trap and Slipway	7

CHAPTER 5 - PROJECT DESCRIPTION

Figure 5-4: Plan and Long Section of Area 1 Embankment	9
Figure 5-5: Cross Sections of Area 1 Embankment	10
Figure 5-6: Location where the Brittas Lake Tributary joins the Clodiagh	11
Figure 5-7: Precast concrete headwall type to be installed on the inlet to the culvert	12
Figure 5-8: Temporary Construction Compound A	13
Figure 5-9: Area 2 Wall - Plana and Long Section	15
Figure 5-10: Area 2 Wall - Cross Sections	16
Figure 5-11: Temporary Construction Compound	18
Figure 5-12: Area 3 Proposed Defences	20
Figure 5-13: Area 3 Defences - Plan and Long Sections	22
Figure 5-14: Area 3 Defences - Cross Sections	23
Figure 5-15: Projected Construction Programme	31
Figure 5-16: Utility Survey of Chapel St	35
Figure 5-17: Chapel St Existing Services Cross-Section	36

Appendices

Appendix 5-1: Book of Planning Drawings

5 **PROJECT DESCRIPTION**

5.1 Flood Relief Scheme Design Approach

The Proposed Scheme was developed following a detailed hydrological and hydraulic study of the catchment. Potential options were developed and compared using the OPW's Multi-Criteria Analysis (MCA) guidelines. All potential options were required to deliver a Target Standard of Protection (SoP) for the 1% Annual Exceedance Probability (AEP) fluvial event. The MCA identified the preferred scheme based on technical, social, environmental, and economic criteria.

All proposed flood relief works are planned for the Clodiagh River; no flood relief works are considered necessary on the Gorragh River.

Each of the flood relief measures has been analysed and developed in detail to solve a specific source of flood risk in the Scheme Area as described in **Table 5-1**.

Table 5-1: Scheme Design Approach

Source of Flood Risk	Specific Flood Relief Measure
A tributary from Brittas Lake joining the Clodiagh River upstream of the village, was identified as a flood source during Public Information Events. The root cause of flooding here is an existing culvert in Brittas Wood that is almost totally blocked.	Remediation to the culvert (600mm pipe road crossing) including a headwall on the upstream side to reduce blockage risk and ease of maintenance.
Potential for water coming out of bank from the Clodiagh River at Brittas Wood, leading to adjacent land flooding and flowing into the village.	Construction of an embankment above predicted flood levels.
Blockage in the Clodiagh River caused by woody debris accumulation at the Clodiagh Bridge in Clonaslee village.	Installation of a debris trap upstream of the bridge at a location that can be easily accessed for debris removal.
The existing stone wall on Chapel St currently acts as a flood defence. It is structurally vulnerable, and information gleaned at Public Information Events indicates water visibly seeps through the wall and from under the road.	Bolstering the existing stone wall with a specifically designed flood relief wall, and below ground flow cut-off.
An existing informal embankment to the north of the village acts as a flood defence. It is structurally vulnerable and has gaps possibly caused by livestock.	A new embankment constructed parallel to the existing.
Potential for water coming out of bank from the Clodiagh River and increasing flooding of the Integrated Constructed Wetlands (ICW) Treatment Plant owned and operated by Uisce Éireann (UÉ).	A new retaining wall adjacent to the ICW to mitigate flood increases over the wetlands.

The flood wall heights have been designed to include for 300 mm 'freeboard'. This sets the top level of the wall 300 mm above the maximum predicted flood level in the design event. This is to allow for contingency in the design and allow for the wave effect of floodwater. For embankments, an extra 200 mm freeboard is added, to cater for the additional risk of the embankment material settling over time. This will give a total freeboard of 500mm for embankments.

5.2 Description of the Proposed Scheme

The following sections provide an overview of the proposed Clonaslee Flood Relief Scheme. The Proposed Scheme is divided into three areas as shown in **Figure 5.1. Table 5-2** lists the proposed defence elements in each area.

 Table 5-2: Summary of Proposed Scheme

Location	Defence Elements			
Area 1: Brittas Wood	EmbankmentDebris trap with access slipwayCulvert remediation			
Area 2: Chapel Street	Flood wall			
Area 3: Tullamore Rd and Integrated Constructed Wetland (ICW)	Flood wallEmbankment			

The full set of planning drawings for the scheme are included in Appendix 5-1 for ease of reference.



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5.2.1 Area 1 – Brittas Wood

Area 1 is located within Brittas Wood which is includes a publicly accessibly amenity trail owned and operated by Coillte (refer to **Figure 5-2**). The proposed works in Area 1 – Brittas Wood are designed to fulfil three crucial flood defence functions:

- 1. Catch fallen trees and other large debris that cause a blockage risk to the Clodiagh Bridge in Clonaslee village;
- 2. Ensure that increased water levels due to debris trap blockages will not create a flood risk;
- 3. Facilitate ongoing maintenance and cleaning of the existing Brittas Lake Stream crossing culvert (600 mm diameter); and

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.

As obstructions to flow will be introduced to the channel, measures will be taken to ensure this does not lead to excessive scour or erosion on the adjacent banks. Soft engineering methods such as willow spiling are preferred for bank erosion protection. The final design will be discussed and agreed with IFI prior to implementation.

Further detailed drawings are included in Appendix 5-1.



5.2.1.1 Debris Trap

The risk to blockage of the Clodiagh Bridge comes from large fallen trees in Brittas Wood. To capture this type of debris, a coarse debris trap is required in the form of 'tree poles'. This is the only proposed in-stream work on the Scheme and requires careful water flow management to allow construction of the substantial foundation and the poles themselves.

The key features of the debris trap are the following:

- A concrete base extending the full width of the Clodiagh River the concrete base will be set 500mm below the riverbed level to allow re-naturalisation of riverbed material above;
- The base 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;
- Concrete poles cast in place the concrete poles measure approx. 3 m height from the riverbed and will be 300 mm in diameter; and
- Willow spiling erosion protection on the adjacent riverbanks.

A slipway is required to allow for maintenance access to the debris trap. The proposed slipway extends from the Brittas Wood trail pathway to the edge of the River Clodiagh. **Figure 5-3** shows the debris trap as it will be located in the river channel. This figure also shows details of the proposed embankment which is discussed further in the next section. A locked gate and fence will be installed across the slipway which will be opened only to facilitate machine access to the debris trap during maintenance works.





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5.2.1.2 Embankment

As discussed in **Section 5.3.1**, Brittas Wood includes a publicly accessible amenity trail which is used by walkers and cyclists from the local area. It is proposed to construct a flood relief embankment on a portion of this amenity trail. The proposed embankment will prevent increased water levels due to debris trap blockages from creating a flood risk. Its required extent is shown in **Figure 5-4**. A tree survey has been completed to inform the design of the embankment and to minimise tree removal. All trees that will be removed to accommodate the construction phase of the Proposed Scheme will be replaced once construction works are completed. Please see **Appendix 9-6 Biodiversity Management and Enhancement** plan for details on tree removal and replacement.

The key features of the embankment are the following:

- It is a trapezoidal structure composed of non-porous clay material;
- To minimise disturbance to the woodland vegetation, its footprint is within the curtilage of the existing amenity pathway;
- It will be 135 m in length with a maximum height above existing ground level of 0.8 m, and a maximum width of 6 m.
- An impermeable barrier must be built into the embankment to prevent seepage of water through and underneath the embankment. This will be achieved by constructing a concrete core, which will need to be excavated below the existing ground level;
- Pipelines associated with Uisce Éireann water supply boreholes are located within the footprint of the embankment. These pipelines will be excavated and backfilled with concrete. This will provide the cutoff described above and provide protection to the pipelines during construction of the embankment;
- The crest of the embankment will be paved to allow traffic (from Coillte, Uisce Éireann and private Landowner) to drive on top of the embankment and amenity users to walk/cycle along the embankment. The re-paved embankment will have a crest width of 3.00 m, and the side slopes of 1:3. It will merge into the existing ground level at each end i.e., there will be no perceivable step or ramp-up onto the embankment;
- The shoulder and side slopes of the embankment will be reinstated with the topsoil removed in preparation for the works and allowed to regrow naturally.

A ground penetrating radar (GPR) survey has been completed to provide the location of watermains in the trail pathway. These will be further verified by slit trenching prior to detailed design. Plan, Long Section and Cross sections of this embankment taken at three locations are shown in **Figure 5-4 and Figure 5-5** below. These include watermain locations, associated concrete protection and surface finishes.



DATUM: 112.00m AOD																																											
PROPOSED EMBANKMENT LEVELS (includes 150mm Surface Finish)	116.163 -	116.156 -	116.138 -	116.102 -	116.084 -	116.066 -	116.048 -	116.030 - 116.013 -	115.995 -	115.977 -	115.959 - 115.941 -	115.923 -	115.905 -	115.887 -	115.869 - 115.851 -	115.833 -	115.815 -	115.793 -	115.748 -	115.658 -	115.612 -	115.567 -	- 220.011	115.432 -	115.387 -	115.342 -	115.297 - 115.251 -	115.206 -	115.161-	- 115.071-	115.026 -	114.981-	114.935 - 114.890 -	114.845 -	114.800 -	114.756 -	114.712 -	- 114.667 - 114.622 -	114.577 -	114.532 -	114.486 - 114.441 -	114.441 114.396 -	114.351-
EXISTING GROUND LEVELS		115.931 -	115.848	115.775 -	115.747 -	115.719 -	115.687 -	115.656 - 115.625 -	115.594 -	115.551 -	115.505 - 115.459 -	115.412 -	115.389 -	115.372 -	115.349 – 115.322 –	115.295 -	115.261-	115.221 -	115.181-	115.114 -	115.076 -	115.038 -	114.9//	114.841	114.773 —	114.707	114.641 - 114.576 -	114.499	114.399	114.231	114.139 -	114.072	114.032 – 113.998 –	113.966 -	113.940 -	113.914	113.889 -	113.871 - 113.857 -	113.865 -	113.875	113.881 - 113.888 -	113.894	113.902
EMBANKMENT HEIGHT	0.126	0.225 -	0.290	- CIC.0 - 722.0	0.337	0.348	0.361 -	0.374 -	0.401	0.426	0.454	0.511	0.516	0.515	0.520	0.538 -	0.554	0.572	0.567	0.544	0.537 -	0.530	0,040 0 7 A A C	0.591 -	0.614	0.635 -	0.655 -	0.707 -	0.762	0.839	0.887	606.0	0.904	0.879	0.860	0.842 -	0.823	0.765	0.712	0.657 -	0.605	0.502	0.449
CHAINAGE (m)	2.50	5.00	7.50	12.50	15.00	17.50	20.00 -	22.50	27.50 -	30.00	35.00	37.50	40.00	42.50	45.00 - 47.50 -	50.00	52.50	55.00	57.50	62.50 -	65.00	67.50	/ 0.00	75.00	77.50	80.00	82.50 <u> </u>	87.50 -	90.09	95.00	97.50 -	100.00	102.50 -	107.50 -	110.00	112.50 -	115.00	- 06./11 - 00.001	122.50 -	125.00 -	127.50	132.50	135.00

LONG SECTION 1A - AREA 1 EMBANKMENT

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5.2.1.3 Culvert Remediation

The Brittas Lake Tributary joins the River Clodiagh at the location shown in **Figure 5-6**. The Brittas Wood amenity trail crosses this small stream at that location via a culvert that is 600mm in diameter and 6.5m in length.

The culvert entrance has a history of blocking which can cause water to back up and overflow onto the Brittas trail pathway, before flowing down into Clonaslee village. To facilitate maintenance into the future and to prevent vegetation encroaching on the culvert inlet, a headwall will be installed on the upstream side.

The key features of the proposed works are as follows:

- Maintaining the existing 600mm pipeline in place thereby avoiding disturbance to the Clodiagh riverbank;
- Provide maintenance access to the upstream inlet to the culvert via localised vegetation removal; and
- Provide a new headwall on the inlet to the culvert to facilitate cleaning and maintenance into the future.

A precast concrete headwall available on the market will be used as shown in **Figure 5-7**. Culvert headwalls require edge protection. In keeping with the character of the area, a timber post and rail fence will be used.



Figure 5-6: Location where the Brittas Lake Tributary joins the Clodiagh

The culvert will be designed and installed in accordance with the requirements of the OPW and IFI. It is possible the stream is utilised intermittently by aquatic fauna. Therefore the culvert inlet improvement will not create any barriers against the passage of aquatic fauna. The design will be discussed with IFI before finalising.



Figure 5-7: Precast concrete headwall type to be installed on the inlet to the culvert

5.2.1.4 Area 1 Supporting Temporary Infrastructure and Site Enabling Works

5.2.1.4.1 Temporary Construction Compound

A temporary construction compound is needed in the vicinity of the Brittas Wood trail head entrance for welfare units, parking, set down of deliveries and storage of imported embankment material. The agricultural field north of the Brittas Wood trail head entrance has been selected for the location of this temporary construction compound (Compound A). A standard layout of this compound is shown in **Figure 5-8**. The existing entrance into this field will be widened to facilitate safe access and egress of Heavy Vehicles (HVs). The temporary construction compound field and entrance accommodating works will be reinstated to its original form post construction.



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The sequence for establishing the compound is described further in Section 5.5.3.

5.2.1.4.2 Vegetation Removal and Replanting

Tree felling will be required within and around the construction footprint in Area 1 and also to accommodate machine movements along the amenity path. A total of 9 no trees are required to be removed, and it is proposed to cut these trees down to stump level, where possible; thus, minimising ground disturbance. The felling activities required as part of the Proposed Scheme will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017).

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

5.2.1.4.3 Utilities Diversion and Protection

The protection of Uisce Éireann (UÉ) infrastructure in Area 1 which is associated with the Clonalsee Wastewater Treatment plant (Area 3) is an important objective for the design, both during and the construction and operational phase of the Proposed Scheme. Please see **Section 5.5.7** for details on how utilities will be protected or diverted during the construction phase of the Proposed Scheme.

5.2.2 Area 2 – Chapel Street

The most prominent element of the Proposed Scheme is the works to the existing wall along Chapel Street in Clonaslee Village. This wall also extends into private property as it curves around the river bend. This wall acts as a flood defence, but its vulnerability is evident through records of past flood events in this location.

The Proposed Scheme builds onto the existing wall with a reinforced concrete 'secondary' wall. This will have the effect of widening the wall by approximately 0.5 m. This width includes an allowance for stone cladding to maintain the appearance of the wall.

During high water levels, one might expect to see water from the river backing up through the surface water drainage system and surcharging manholes and gullies. However, surveys have shown that the road drainage does not discharge directly to the Clodiagh, instead flowing to field drainage ditches to the north of the village. If surface water drainage lines are found discharging directly to the river, they will be installed with a non-return valve, to ensure floodwater does not back-up onto the street.

5.2.2.1 Flood Defence Wall

As mentioned in **Section 5.3.2**, the existing wall structure, which is currently acting as an informal flood defence, will be retained and become part of the proposed flood defence wall. Remediation will be required on the existing wall, consisting of repointing the stonework. The main element of the wall work will be completed on the roadside of the existing wall.

Cross sections of the wall (A-A on Chapel Street and B-B in Private Property) are shown in **Figure 5-9 and Figure 5-10**. The total wall length is approximately 235m; 135m along Chapel Street and 100m in private property. It should be noted that the existing wall has sufficient height for the flood defence. The existing wall's height ranges from 0.8 m to 1.2m from the existing adjacent road level; 0.5 m to 0.7 m higher than the predicted floodwater level. The Proposed Scheme therefore does not need to increase the existing wall height. To address the risk of water seeping underneath the wall, a trench will be dug to below bed level and backfilled with non-porous concrete.



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5.2.2.2 Area 2 Supporting Temporary Infrastructure and Site Enabling Works

5.2.2.2.1 Temporary Construction Compound

The construction site area is limited due to the fact that it is on a public road and within a private garden. For this reason, a construction compound is required and will be located in the field immediately to the north of the works area as shown in **Figure 5-17**.

The sequence for establishing the compound is described further in **Section 5.4.3**. This field has a medium voltage overhead powerline passing through it. Best practice safety control measures will be put in place when working in the vicinity of overhead power lines. The option to divert the powerline will also be discussed and agreed with the ESB in advance of any works within this area.

5.2.2.2 Vegetation Removal and Replanting

Tree felling and hedgerow removal will be required within and around the construction footprint in Area 2, namely along Chapel St and within the garden of a private landowner. 23 no of trees are required to be removed. It is proposed to cut these trees down to stump level, where possible; thus, minimising ground disturbance. The felling activities within Brittas Wood which are required as part of the Proposed Scheme will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017). It is proposed to replant by hand all trees that will be removed in Area 2 on a like for like basis to accommodate the Proposed Scheme. The manner and location of this replanting will be undertaken in agreement with the third-party landowner and Local Authority.

5.2.2.3 Utilities Diversion and Protection

In preparation for construction in Area 2, the area of wall construction along the roadside will have to be cleared of all utilities before commencing excavations for the wall foundations. Please see **Section 5.5.7** for details on utilities diversions and protection in this area.



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5.2.3 Area 3 – Tullamore Road and ICW

The works to be carried out in Area 3 – Tullamore Road and ICW include an embankment and a retaining wall as shown in **Figure 5-12**, located along the western and eastern banks of the Clodiagh River, downstream of Clonaslee Village.

The proposed embankment area is located in an agricultural field to the west of the River Clodiagh and the proposed wall is located within the ICW property to the east of the River Clodiagh.

This construction site to the west of the Clodiagh River will be of sufficient size to have a welfare unit and some storage space for stripped topsoil and embankment material. Of key consideration is the safe access and egress onto the adjacent road. Some hedgerow removal will be required to allow construction traffic to utilise the existing adjacent junction layout. This hedgerow will be reinstated post construction in agreement with the third party landowner.

Storage area available in the embankment construction site will be used for wall construction material. Material will not be stored within the ICW site as the operation and maintenance of the ICW must continue during the works period.





LEGEND - Area 3 Embankment

PLANNING APPLICATION BOUNDARY

PLANNING EMBANKMENT

PROPOSED WALL (including Footing Width) EXISTING RIVER

BAL

NOTES: • Refer to Key Layout Plan -DG0002 for Site Layout Details.

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5.2.3.1 Embankment

The proposed embankment in Area 3 runs parallel to the Clodiagh River and Tullamore Road, west of existing embankment. It is positioned to avoid the existing mature treeline along the riverbank. The key features of the embankment are:

- The embankment will be offset from the existing embankment and treeline on the left bank of the Clodiagh River and will provide a secondary line of defence;
- It will be 130 m in length with a maximum width of 7.5 m;
- The inlet pipe to the ICW will pass under the embankment at right angles;
- The embankment will tie into the side slope of the road to the north of Area 3;
- The design level of the embankment is 0.5 m above the predicted Flood Water Level in the 1% AEP event, giving it an average height of 0.8 m above existing ground level;
- Its core will consist of non-porous clay material and extend 1m below ground level to prevent a flow path underneath the embankment;
- It will have a crest with of 2 m and side slopes of 1 in 3; and
- The embankment will be topsoil and grass seeded and fenced off on its western side to prevent livestock erosion.

5.2.3.2 Flood Defence Wall

The wall will be constructed within the Uisce Éireann ICW grounds (refer to **Figure 5-13**). Key features of the wall are as follows:

- A reinforced concrete wall, 70 m in length and approximately 0.6 m in height;
- The proposed wall extends below ground by 0.6 m to prevent a flow path underneath the wall;
- The proposed wall is L-shaped, is reinforced with concrete and has a 1 m wide footing;
- The proposed wall has a shuttered concrete finish; and
- The design level of the proposed wall is 0.3 m above the predicted Flood Water Level in the 1% AEP event, giving it an average height of 0.6 m above existing ground level.

Plan, long sections and cross sections of the Area 3 defences are shown in the figures below.



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5.2.3.3 Area 3 Supporting Temporary Infrastructure and Site Enabling Works

In preparation for construction in this area, some enabling works are required. The construction site is located in on pastoral land adjacent to a narrow straight section of local road (Tullamore Road), with vegetation lining the road on either side. Consideration will be given to the ICW wastewater treatment area, its incoming pipelines and associated infrastructure.

5.2.3.3.1 Temporary Construction Compound

Temporary construction compound B will be the main supporting compound for Area 3. Please see Section 5.3.2.2.1 for details on location and standard layout. Construction methodology is detailed in Section 5.5.3.

5.2.3.3.2 Vegetation Removal and Replanting

Tree felling and vegetation removal will be required within and around the construction footprint in Area 3. One tree and some hedgerow/bushes are required to be removed. It is proposed to cut these trees down to stump level, where possible; thus, minimising ground disturbance where possible. The felling activities required as part of the Proposed Scheme will be the subject of a Limited Felling Licence (LFL) application to the Forest Service in accordance with the Forestry Act 2014 and the Forestry Regulations 2017 (SI 191/2017).

It is proposed to replant by hand all trees that will be removed for these works on a like for like basis within Area 3. The manner and location of this replanting will be undertaken in agreement with third party landowners and Uisce Éireann.

5.2.4 Summary of Proposed Physical Works

Table 5-3 contains a summary of all proposed flood defence elements to be delivered under the Clonaslee Flood Relief Scheme.

Area	Location	Emerging preferred option description	Dimensions	Materials
		New embankment	135m x 3m x 0.80m (L x W x H) 1:3 slope	Impermeable Clay
Area 1	Brittas Loop Walk path	Debris Trap	7.0m x 3.5m x 1.2m (L x W x D)	Concrete
		Culvert Headwall	3m x 2m x 1.6m ((L x W x H))	Concrete
Area 2	Along Chapel Street/ landowner boundary	Bolstering existing stone wall	235m x 0.50m x 1.5m (L x W x H)	Reinforce Concrete Stone finish
Area 3 –	Tullamore Road, left bank field upstream of ICW access bridge	New embankment	140m x 2m x 0.77m (L x W x H) 1:3 slope	Impermeable Clay
	Irish Water ICW, right bank upstream of entrance to ICW	New retaining wall	70m x 0.25m x 0.95m (L x W x H)	Reinforce Concrete

Table 5-3: Proposed Works

5.2.5 Freeboard and Resilience to Climate Change

The objective of the Proposed Scheme is to design for current predicted flooding and make sure that the scheme is adaptable for climate change. To assess the possible future upgrades that may be required to accommodate climate change, flood modelling has been carried out for two standard climate change scenarios:

 The Mid-Range Future Scenario (MRFS) represents the central projections for the impact of climate and other future catchment changes (such as urbanisation and land-use changes), on Flood Risk Management in Ireland. Peak flows are anticipated to increase by 20% under the Mid-Range Future Scenarios.

• The High-End Future Scenario (HEFS) represents projections at the high end of what could happen if the worst climate and catchment changes are realised. For the HEF Scenarios, peak flows are projected to increase by 30%.

A comparative analysis of flood water level increments across both scenarios has been carried out for Area 1, 2 and 3 and each defence element within Area 1,2, and 3, with the Proposed Scheme incorporating allowances for freeboard. Freeboard is typically applied to compensate for the unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood, such as uncertainty of the effect of bridges, hydrological uncertainty and uncertainty in roughness values applied to the model. Freeboard allowances are set as per the criteria in **Table 5-4**. As demonstrated in **Table 5-4**, the proposed defence heights will cater for the High-End Future Climate Change Scenario, albeit with a reduced freeboard.

Table 5-4: Freeboard Criteria

Location	Proposed Defences	Design Freeboard	Reduction in current Freeboard when peak flow is increased by 30% under Climate Change HEFS
Area 1 - Brittas Wood	Embankment	Freeboard of 0.50m for the current 1% AEP	Freeboard reduced to 0.23m in the HEFS
Area 2 - Chapel Street	Flood Wall	Minimum Freeboard requiremen of 0.30m for the current 1% AEF	t Freeboard reduced to 0.55m in the HEFS
		Building to the existing wall height provides a freeboard of over 0.6 m	
Area 3 - Tullamore Rd	Embankment	Freeboard of 0.50m for the current 1% AEP	Freeboard reduced to 0.34m in the HEFS
Area 3 - Tullamore Rd	Flood wall	Freeboard of 0.30m for the current 1% AEP	Freeboard reduced to 0.14m in the HEFS

5.3 Construction Phase – Specific Methodologies

This section details the construction methodologies of the flood defence elements proposed for Area 1, 2 and 3.

5.3.1 Area 1 Brittas Wood

The proposed construction methods for each element in Area 1 are described in the following sections.

5.3.1.1 Debris Trap

Construction of the debris trap is the only element of the Proposed Scheme that is considered 'in-stream' work. All works proposed are subject to the provisions of the Local Government (Water Pollution) Act 1977 (as amended) and the Fisheries (Consolidation) Act 1959 (as amended). The general control measures described further in Section 5.5.11 will apply to these works in addition to the specific method described in the following sections.

5.3.1.1.1 River Flow Management

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.

The appointed Contractor must 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.

Measures to protect the water environment during the construction works will follow:

- The relevant section of the NRA's documents *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes* (NRA, 2005).
- The fisheries board documents Maintenance and protection of the inland fisheries resource during road construction and improvement works (2007).
- Requirements of the *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters 2016* would also be followed where relevant.

The concrete base of the debris trap will be poured in two parts to facilitate diverting the river to one side of the riverbed for each stage of works. The works area will be dammed on three sides using large sandbags. Pumping will be required from within the works area to deal with water seeping through the temporary dams or through the ground. This water will be passed through filter bags before returning to the river.

5.3.1.1.2 Concrete Base Pours

The concrete base will be poured within trench boxes to prevent unnecessary over-excavation of the riverbed. The debris trap base will be constructed in the following steps:

- Access of all personnel, plant, concrete deliveries etc. will be via the Brittas Wood trail head entrance.
- Following river flow diversion works, the foundation will be excavated, and trench supports installed, in consultation with a competent temporary works designer.
- Excavated material will be transported to temporary construction Compound A.
- A blinding 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;
- Reinforcement cages will be pre-tied where possible and lifted into position using the excavator.
- Concrete will be placed within designed formwork using 14-tonne excavator and a concrete skip and will be compacted using a 2" poker.
- Formwork joints will be sealed to prevent grout loss.
- Slots to receive the debris trap poles will be cast into the base.

5.3.1.1.3 Debris Pole Installation and Riverbed Restoration

The debris trap poles will be precast off-site and delivered when ready to install. They will be dropped in place in the foundation, propped for line and level and grouted/concreted in place. Excavated riverbed material will be saved and reinstated over the debris trap base once all concrete and grout have come up to design strength, as verified by laboratory testing. The riverbed shall be fully reinstated before re-diverting flows over the area.

5.3.1.1.4 Maintenance/Access Slipway

Upon completion of the debris trap construction, the construction access slipway will be regraded and surfaced to provide an access to the debris trap for future maintenance and debris removal. The operation and maintenance activities are described further in **Section 5.5**.

A description of the slipway makeup is as follows:

- Geotextile fabric will be placed along the regraded area.
- Placement and compaction of crushed stone evenly along the slipway.
- The surface structure will be honeycomb with anti-sliding studs. The material type will be recycled UV-Stabilised high-density polyethylene (HDPE).
- The voids will be filled with gravel or soils for seeding grass or similar.
- A locked gate and fence will be installed across the slipway which will be opened only to facilitate machine access to the debris trap during maintenance works.

5.3.1.2 Culvert Remediation

The culvert crossing the Brittas Loop path is sufficiently sized to transfer flows from the Brittas lake tributary to the Clodiagh River. The remediation of the culvert is specifically to prevent the regular blocking on the upstream side.

To prevent blockage in the future the following is proposed:

- Clearing of the culvert inlet zone of small trees and bushes.
- Temporarily over-excavate around the culvert inlet.
- Install a precast concrete headwall at the culvert inlet. (Note: a stonework headwall built around the culvert outfall to the Clodiagh is in good condition and should be retained).
- Backfill around new headwall and install edge protection rails.

This work should be done during the summer months when the stream is dry.

5.3.1.3 Embankment

As outlined in Section 5.2.1 above, the proposed embankment provides flood protection in the event that the debris trap is blocked during a flood event. The embankment will be constructed of impermeable clay along the footprint of the existing trail path. A stone road surfacing will be reinstated on top of the new embankment, with the side-slopes topsoiled and allowed regenerate naturally.

Seepage underneath the embankment will be prevented by a concrete cut-off underneath the embankment. This mass concrete will also serve to provide a protective slab to the water abstraction watermain pipes located within the footprint. The construction of the flood embankment will involve the following steps:

- Topsoil will be stripped from the working area and stored on site to be reinstated upon completion;
- The trail path surfacing will be stripped and relocated for reuse as construction hardstanding if possible;

- The location of each water pipe will be determined via slit trenching in consultation and agreement with Uisce Éireann;
- Material over each watermain will be excavated to within 200 mm of the pipe, in no longer than 6 m lengths. The protective concrete will be placed before excavating over the next section;
- Suitable embankment clay material will be imported to site. This will be stored within the temporary construction Compound A and brought to required locations using an excavator and dumper;
- Embankment front and back slopes will be profiled to meet the required gradient of 1 in 3;
- The trail path will be reinstated over the embankment using timber edging and rolled compacted stone;
- The embankment side slopes will be reinstated with the original topsoil and allowed to regrow naturally;
- Drainage will be installed at the toe of the embankment, and through the embankment, to ensure natural run-off to the river can be conveyed.

5.3.2 Area 2 Chapel Street

The proposed construction methods for each element in Area 2 are described in the following sections.

5.3.2.1 Flood Wall Construction

As outlined in **Section 5.2.2**, the existing wall will be retained and bolstered with a designed flood retaining wall. The overall wall structure is required to hold back flood water and prevent flows from seeping under the wall. It will be built in stages as outlined in the following sections.

A 'cut-off' trench is required to prevent flood water from seeping underneath the wall and will be delivered in the following steps:

- A temporary works design will be required for support of the existing wall, particularly during the
 excavation stage of the works;
- With suitable supports in place, the cut-off trench will be dug in sections, using a trench box for side supports;
- Due to the proximity to the River Clodiagh, water ingress to the trench will be actively managed. Dewater methodologies are discussed further in Section 5.4.12;
- The type of pumps will be chosen to minimise noise impact (i.e. submersible electric pumps should be used, running from a silenced generator placed a sufficient distance from any sensitive receptors), especially if needed to run overnight or over weekends;
- The cut-off will be achieved by backfilling the trench with dry, low strength concrete, that will set to form an impermeable barrier. To prevent washout of cementitious material through the porous ground into the river, dewatering pumping will need to continue within the trench while the concrete sets to maintain a net flow into the excavation. Pumped water containing cementitious fines will require additional treatment prior to discharge to the river;
- This process will be completed in sections along the wall, as dictated by the temporary works design and the Contractor programme.

The reinforced concrete wall will be delivered in the following steps:

- The cut-off trench concrete will provide a suitable working surface for completion of the reinforced concrete wall element;
- The wall will be designed to be poured in sections (6m long approximately) to allow for ease of construction, and to allow for concrete shrinkage and movement once complete;
- Base steel cages will be pre-fixed off site to for time and safety benefit on site;
- Once the steel is in place, the base will be shuttered and poured. Seepage of concrete into the river will be less of a risk at this stage but careful management of concrete placement and truck wash-out etc. will still be enforced;

- For the vertical section of the wall, a single shutter will be placed on the roadside, using the existing wall as the inside shutter;
- A compressible filler board will be placed along the existing wall before fixing the wall steel and pouring. This is to create a structural separation between the old and new wall. This is required to allow movement in the new wall thus preventing cracking;
- All concrete will be placed using an excavator and concrete skip and best practice concrete spillage and washout control measures implemented.

The wall finishing will be delivered in the following steps:

- The top of the wall base will be kept below ground level to allow the laying of drainage, other services and planting along the new wall face;
- The wall itself will be clad with stone. The final design will be completed in consultation with a Grade 1 Conservation Architect;
- Existing styles crossing the wall will be retained and constructed on the new side, where possible, please see **Appendix 16-8 Conservation Report** for recommendations);
- Street lighting will be reinstated post construction.

5.3.3 Area 3 Tullamore Road

The proposed works in Area 3 will be served by the temporary construction Compound B and the proposed construction methods for each element in Area 3 are described in the following sections.

5.3.3.1 Embankment

As outlined in **Section 5.2.3**, the proposed embankment provides a formal flood defence outside of an existing embankment underneath the Clodiagh River west bank treeline. The embankment will be constructed of impermeable clay with a capping of topsoil of 150mm in depth to allow for grass seeding. Seepage underneath the embankment will be prevented by a 1 m deep cut-off, created by a trench backfilled with compacted impermeable clay. The construction of the flood embankments will involve the following steps:

- Topsoil will be stripped from the working are and stored onsite to be reinstated upon completion;
- Suitable embankment clay material will be imported to site. This will be stored within the working area and brought to required locations using an excavator and dumper;
- Excavation of the cut-off trench will be undertaken by an excavator, and clay placed and compacted in layers until the defences have reached the necessary height;
- Embankment front and back slopes will be profiled to meet the required gradient of 1 in 3. A steeper slope may be used if deemed appropriate for maintenance;
- The embankment will be topsoiled and sown in grass;
- Drainage will be installed at the toe of the embankment, and through the embankment, to ensure natural run-off to the river can be conveyed;
- Finally, the embankment will be fenced off to prevent erosion from livestock into the future.

5.3.3.2 Retaining Flood–Wall - ICW

This wall will prevent out of bank flooding, ensuring flooding to the ICW will not increase as a result of the Proposed Scheme. A standard flood wall detail is shown in **Figure 5-14** above.

The wall will be constructed from cast in-situ reinforced concrete in the following steps:

- Stripping and storage of topsoil for reuse;
- Removal of existing footpath / asphalt, small trees and vegetation will be required along the entrance of the ICW;

- Excavation to the required depth will be undertaken up to 1.10m below existing ground level;
- Blinding concrete will be placed to enable the fixing of steel reinforcement for the base of the wall;
- Shuttering will be placed to enable pouring of the base of the wall;
- The wall reinforcement steel will then be fixed and shuttered before pouring the walls;
- Temporary works designs will be required for all trench supports and concrete formwork;
- Standard concrete pollution control measures and wash-out protocols will be followed considering the proximity to the river.

5.4 **Construction Phase – General Information**

The delivery of the Proposed Scheme will be supported by the development of a Construction Environmental Management Plan (CEMP). The CEMP will include the mitigation and monitoring measures detailed in the preliminary CEMP that supports this planning application (and reiterated in **Chapter 20 Schedule of Environmental Commitments**), as well as any conditions and additional measures that may form part of a planning consent. The mitigation and monitoring measures detailed therein will be implemented by the appointed contractor to ensure the protection of the environment and human health as assessed within the EIAR.

5.4.1 Construction Programme and Phasing

The construction activities are planned to take place during a 24-month construction campaign. The specific schedule for activities within each area of the Proposed Scheme will be finalised on appointment of a Contractor. Preference will be given to working during the summertime to avoid water high river and groundwater levels. There will be restrictions on the instream works discussed as a result of fish spawning season.

A likely construction programme is shown in **Figure 5-15** and will largely depend on the time of year that works commence.

1. 24 months total works programme			Year 1										Year 2										Year 3														
Works Area	Works Description	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
AII	Utility diversions (enabling works)					1			1									1			1			1					1								
Area 1																																				\square	\square
	Req. Vegetation Clearance																																				
	Embankment																																				
	Culvert Headwall Installation																																				
	Debris Trap																																				
Area 2																																					
	Req. Vegetation Clearance																																				
	Excavation and cut-off																																				
	Conc Wall Construction																																				
Area 3																																					
	Req. Vegetation Clearance																																				
	Embankment																																				
	Wall																																				
				Enat	bling \	Work	s																														
				Emb	ankm	ient C	Const	ructio	on Cr	ew																											
			Instream Works																																		
			1	Wall	Cons	structi	ion C	rew																													

Figure 5-15: Projected Construction Programme

5.4.2 Site Access Points

Access to the construction site in Area 1 will be via the existing amenity trail head entrance. This trail head entrance also includes a public amenity carparking space.

The Area 1 construction site is 80 m south of the trail head entrance along an existing amenity trail path. Construction machinery will be required to use the amenity path to reach the construction works area. Enabling works to make this pathway suitable to act as a construction site entrance will include the following:

- Erecting 'heras' fencing (or similar) on either side of the path to keep construction traffic within the footprint of the existing path;
- Designated passing zones will be set up where the path width allows. This measure will protect grassed and vegetated areas to either side of the path;
- Where necessary, tree protective barriers will be installed in consultation with an Arborist; and
- Laying of geotextile on the existing path and overlaying with compacted hardcore.

Removal of imported hardstanding and reinstatement work will be carried out upon completion in consultation and agreement with Coillte.

Access to the wall section on private property in Area 2 will be via an adjacent field which will also be used as a supporting temporary construction compound (Compound B).

Access to construction sites in Area 3 will be via an existing entrance to the embankment field. Accommodating works in the form of entrance widening will require some tree removal and vegetation removal. Tree removal will be undertaken under licence and all will be replanted post construction on a like for like basis in agreement with the landowner.

Access to all construction compound A and B will be via existing gate entrances. Accommodating works in the form of entrance widening and vegetation removal will be required. Both entrances will be reinstated to pre-construction form in agreement with landowners.

5.4.3 Construction Compounds

The appointed Contractor will set up the temporary construction compounds. Compounds will include site offices, welfare facilities, bunded fuel storage areas, designated storage area and construction staff parking. Wastewater will connect to foul sewer networks where available. Where not available, the contractor will provide welfare facilities in accordance with best practice.

The locations of potential temporary compounds are shown in Figures 5.8 and 5.11, and listed below:

- **Compound Site A Brittas Wood** This area is intended to store embankment material, and dealing with large delivery vehicles that will not be able to access the Brittas Wood works area; and
- **Compound Site B Chapel Street** This location will house the main compound for welfare/offices etc. Wall reinforcement steel and formwork will be stored here.

The sequence for establishing site compounds will be as follows:

- 1. Erect advance warning, site entrance and other temporary road signage to a Traffic Management Plan agreed with the Local Authority;
- 2. Erect perimeter hoarding/fencing in consultation with the Tree Protection Plan (See Appendix 17-2);
- 3. Set pest control measures around the perimeter;
- 4. Widen existing access gate areas and install site gate with suitable setback hoarding;
- 5. Strip topsoil from required hardstanding areas;
- 6. Store topsoil to best practice standards to avoid rainwater erosion, compaction, nuisance weed growth etc;

- 7. Hardstanding to be laid on a geotextile layer;
- 8. Surface water run-off from the hardstanding area will be prevented from flowing onto the public road or directly into a watercourse;
- 9. Set up required welfare units and site offices;
- 10. Water supply, wastewater connections, power connection etc. to be agreed with utility providers;
- 11. Designated pedestrian, parking, set-down areas to the clearly demarcated with barriers and signage.

5.4.4 Construction Hours

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.

5.4.5 Construction Plant

The following plant could be required (to be confirmed by the appointed Contractor) for the purposes of construction activities. **Table 5-5** outlines the equipment required within the construction plant.

Table 5-5: Construction Plant List

Equipment	Description
Mobile telescopic crane	Used for installation/removal of 1-ton sandbags for cofferdams
Chain saw	Tree felling, likely only in use for 2 or 3 days
Mini excavator with hydraulic breaker	Breaking out footpaths etc., 1 day or less at any given location
Mini tracked excavator	Trench excavation for foundations
Articulated dump truck (tipping fill)	Loading/unloading of truck with rubble/fill
Concrete pump + cement mixer truck (discharging)	Concrete pours at construction stage
Dumper (idling)	General use
Vibratory roller	Only to be used for 1 or 2 weeks (not in tandem w/ excavator or concrete truck)
Mini planer	May not be required
Articulated dump truck	1 per hour
Hand-held circular saw (petrol)	Cutting footpaths, road surface etc., 1 day or less at any given location, stone cladding of walls

5.4.6 Construction Personnel

It is anticipated that 20-25 persons will be involved in the construction activities with 5 to 6 persons working across different areas simultaneously.

All project personnel and contractors will be required to be fully compliant with their responsibilities as defined by:

- Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);
- Safety, Health and Welfare at Work (General Application) (Amendment) Regulations 2023 (S.I. No.255 of 2023);
- Safety, Health and Welfare at Work (Construction) (Amendment) Regulations 2021(S.I. No. 528/2021).
- The Safety, Health and Welfare at Work (Diving) Regulations 2018

- All other appropriate legislation in force at the time of their deployment
- All applicable Code of Practices to the works.

5.4.7 Utilities Diversion and Protection

A review of existing utilities and associated infrastructure was undertaken as part of the design development process. The utility providers identified within, or adjacent to, the footprint of the Proposed Scheme include:

- Electricity Supply: ESB Networks
- Water Mains and Foul Sewers: Uisce Éireann
- Telecommunications: Eir, Virgin Media, E-Net
- Gas Networks: Gas Networks Ireland

The interactions of the Proposed Scheme with utilities linked to each of the providers are provided in **Chapter 15: Material Assets Utilities and Waste**. Interactions will be considered on an individual basis and each conflict location will be discussed with the relevant utility provider.

5.4.7.1 Area 1

5.4.7.1.1 Water Abstraction Infrastructure

Protection of Uisce Éireann (UÉ) infrastructure in Area 1 which is associated with the Clonalsee Water Treatment plant (Area 3) is an important objective for the design, both during and the construction and operational phase of the Proposed Scheme. As is described further in **Section 5.4.1.3**, a protective concrete slab has been incorporated into the embankment design. This protection slab will be completed as enabling works prior to the progression of any other construction works in the area. Exclusion zones around water abstraction points will be fenced off at the same time to prevent any unintentional incursion on the borehole areas.

5.4.7.2 Area 2

The area of wall construction along the roadside will have to be cleared of all utilities before commencing excavations for the wall foundations.

Access to the wall section in private property will be via an adjacent field which will also be used as a supporting temporary construction compound (Compound B).

Data requests from utility providers have identified the following underground services in the Chapel Street roadway. These have been verified by GPR survey. Their location and level will be verified by slit trenching prior to completion of detailed design. **Figure 5-16** shows the extent of services in the road.

There are also overhead low voltage power lines and public lighting columns along the wall alignment. Power line diversions will be developed and agreed with the ESB in preparation for the utility diversion works.

Temporary diversions will be required for:

- Low Voltage ESB overhead powerlines;
- Individual property power connections; and
- Street lighting columns.

The detailed design of these diversions will be developed with the ESB and will ensure only a minor interruption to service for the residents.

The nearest service to the wall is the trunk watermain supplying Tullamore town. This 381mm diameter cement watermain will be protected during construction. A temporary works design will be required for the protection measures.



Figure 5-16: Utility Survey of Chapel St

Figure 5-17 shows a cross section of the road at location A-A as indicated above.

Chapel Street Cross Section A-A



Figure 5-17: Chapel St Existing Services Cross-Section

5.4.7.3 Area 3

Utilities in this area are associated with inlet wastewater pipelines to the ICW. There are key water supply and wastewater pipelines in the works area:

- Wastewater pipeline from Clonaslee Village entering the ICW Treatment Plant; and
- Trunk watermain serving Tullamore.

The location and depth of these pipelines will be confirmed by slit trenching prior to detailed design. A 'Build over Agreement' with Uisce Éireann will be in place to ensure all parties are satisfied that the wastewater assets are protected *in-situ* and allowances and contingencies are in place for potential future upgrades.

5.4.8 Demolition Works

The demolition requirements for the implementation of the Proposed Scheme are detailed in **Chapter 15**: **Material Assets- Waste/Utilities**. The main element of demolition comprises the existing road excavation required to construct the wall foundations in Area 1 and Areas 3. This will generate waste associated with kerbing, road surfacing, road drainage etc. Where possible material will be reused in the construction of new infrastructure, e.g., gully pots retained for use. Material that cannot be reused will be disposed at an appropriate licenced waste disposal facility.

5.4.9 Excavations

Excavation requirements for the implementation of the Proposed Scheme are summarised in **Chapter 15**: **Material Assets- Waste/Utilities**. It is unlikely that excavated material from embankments and walls will be used elsewhere as part of the works. Excess material will be disposed of at a licenced waste disposal facility.

5.4.10 Sediment and Erosion Control

A sediment control system will be provided in all works areas; including appropriate erosion and silt controls (e.g., settling ponds/tanks, silt fence, silt curtains) to prevent any flow of surface water from the site into the River Clodiagh and its tributaries.

An updated CEMP will be prepared by the Contractor prior to the commencement of any works in line with all conditions and obligations which apply to any relevant grant of permission.

If approval is granted for the Proposed Scheme, the CEMP will be updated in line with the requirements of any relevant planning conditions and additional mitigation that may form part of a grant, and the most up-todate best practise guidelines and measures at the time of construction.

Further details regarding erosion and sediment control are provided in the **Chapter 9: Biodiversity and Chapter 11 Water**.

5.4.11 Instream Works

Instream works will be required to facilitate construction of the Debris Trap in Area 1 of the Proposed Scheme. Works will be undertaken during low level conditions as far as practicable and within the seasonal restrictions placed on the programme relating to fisheries. The remaining works (the embankments and flood walls) will be completed outside the River Clodiagh, avoiding the need for instream works. Appropriate sediment control measures will be placed to avoid material entering the river.

5.4.12 Water Management

During construction, water management measures will be implemented as outlined in Chapter 11: Water.

All works will be completed in accordance with the following guidance which the contractor is required to adhere to during construction phase:

 Construction Industry Research and Information Association (CIRIA) guidance – Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (CIRIA, 2001)

- Control of Water Pollution from Linear Construction Project: Technical Guidance (CIRIA, 2006)
- Control of Water Pollution from Linear Construction Projects. Site Guide (CIRIA, 2006)
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters (IFI, 2016)

There will be no direct discharge of water from any element of the works without suitable attenuation and treatment. Treated water will be discharged back into the watercourse. If over pumping is proposed treatment and/or settlement of water may be required prior to discharging back to the watercourse.

Wherever possible, vehicles will be refuelled off- site, particularly for regular road-going vehicles. On-site refuelling of machinery will be carried out at designated refuelling in the temporary construction compounds. All refuelling will be carried out at a minimum of 50m from the nearest watercourse. Only designated trained and competent operatives will be authorised to refuel plant on-site. Mobile measures such as drip trays and fuel absorbent mats will used during refuelling operations as required. All plant and machinery will be equipped with fuel absorbent material and pads to deal with any event of accidental spillage.

5.4.13 Construction Materials

The range of materials to be used during construction are captured in the Carbon Assessment in **Chapter 13: Climate**. This information is based on the quantities calculated at preliminary design stage and the materials and quantities will be revised, if and where required, as part of the detailed design stage.

The most significant imported material will be concrete and aggregates used for temporary hardstanding, flood defence below-ground construction and reinforced concrete construction.

For the purpose of traffic and climate assessments it is assumed that stone and concrete will be delivered to site from Tullamore town, the nearest, large town on a direct route from the Proposed Scheme, with several operating licenced quarries.

5.4.14 Risk of Flooding During Construction

5.4.14.1 Area 1

Along the Brittas Lake tributary flood risk will be managed by:

- Monitoring of weather events to ensure the stream has a clear discharge to the river when excessive rainfall is forecast;
- Completion of the works in a forecast dry spell to minimise flood risk;
- An over-pumping temporary works design should allow for a safe overflow route in the event that a flood event occurs when over-pumping is in place.

River flow management during construction of the debris trap may be vulnerable to flood events. This risk will be managed by:

- Monitoring of weather events;
- Works will be scheduled in July September which should correspond to low water levels;
- Management of flow through the works will be via gravity and pumping will be avoided;
- Works will incorporate an overflow route through the works area should a flood event occur.

5.4.14.2 Area 2

The existing Chapel St wall acts as a flood defence in low return period rainfall events. Measures will be put in place to ensure this wall does not become more vulnerable to breaching during construction. This will include some or all of the following measures:

- Monitoring of weather events;
- Phasing of the works to ensure a section of wall is not exposed for a prolonged period of time;

- Use of temporary flood defence measures in areas of works (e.g., sandbags, water dam structures or similar);
- Removal of existing flood defences, if necessary, in discrete sections to minimise flood risk.

5.4.15 Traffic Management and Road Closures

Please see the **Construction Traffic Management Plan** for full details on the proposed traffic management measures that will be in place during the construction phase. A summary is provided below:

Area 1 – Public access to the Brittas Loop Trail will be restricted, and signage erected at the trail head to direct people to the alternative entrance on the eastern side of the Clodiagh River.

Area 2 – It is envisioned that the wall works will to be completed under a single lane closure.

Area 3 – No closures will be required in this Area. Close co-ordination with Uisce Éireann Operations will be required to ensure unhindered access to the ICW.

Site Compounds – A Construction Traffic Management Plan will determine the traffic management and standard warning signage associated with plant access and egress requirements in these locations.

Construction traffic arising from the works themselves are assessed in the **Traffic Management Plan** and **EIAR Chapter 6: Traffic and Transport**.

5.4.15.1 Construction Traffic

Detailed information on anticipated traffic movements is detailed in **Chapter 6 Traffic and Transport**. Indicative daily movements for one construction team operating on site are provided below:

- Six vehicles (cars/vans) will arrive on site in the morning (07:00 08:00) and depart in the evening (18:00 19:00)
- An average of 16 HV will arrive and depart the site throughout the typical working day (07:00 19:00) with a maximum of 32 HV movements per day

For the purpose of the traffic assessment, a total of 3-4 crews operating at all times has been assumed. Total traffic movements will depend on construction methodology and actual number of crews during construction stage.

5.4.15.2 Road/Lane Closures

The proposed road/lane closures and diversions required for the construction activities to be undertaken are detailed in **Chapter 6: Traffic & Transportation**.

5.4.16 Construction Lighting

During construction, lighting will be required during hours of darkness. Low-energy LED options will be utilised where feasible. Emergency back-up lighting will be provided.

Security lighting will be required at night-time in designated areas such as the temporary construction compounds. Directional lighting will be used to ensure minimal disturbance to bats by avoiding light spill onto boundary features (hedgerows, scrub, and trees) and by avoiding uplighting.

5.4.17 Waste Management

The Contractor will be responsible for a Waste Management Plan (WMP), which will outline the best practice procedures during the construction phases of the Proposed Scheme. The WMP will detail the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the Proposed Scheme. Disposal of waste will be seen as a last resort.

The WMP will be produced in line with the EPA's 2021 document 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' 2021. The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory

framework for meeting higher environmental standards set out by other national and EU legislation. The Act requires that any waste related activity has to have all necessary licenses and authorisations.

It will be the duty of the Waste Manager on the Site to ensure that all contractors hired to remove waste from the Site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits/licenses and authorisations.

The Contractor will be in charge of the implementation of the objectives of the WMP, ensuring that all hired waste contractors have the necessary permits/licenses and authorisations and that the waste management hierarchy is adhered.

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

5.4.17.1 Resource Management

The principal objective of sustainable resource and waste management is to use material resources more efficiently, to reuse, recycle and recover material and reduce the amount of waste requiring final disposal.

Chapter 15: Material Assets Waste/Utilities provides details on the anticipated quantities of materials that will arise during site clearance, demolition and excavations. One of the key objectives is to ensure the reuse of material generated by the construction of the Proposed Scheme where feasible and fit for purpose.

The main types of materials that will be brought to site during the construction phase include embankment clay material, granular material, concrete, steel reinforcement, pipework and stone.

As outlined in **Chapter 15: Climate**, materials with a reduced environmental impact will be incorporated into the design through either the re-use of materials or incorporation of recycled materials in place of conventional building materials. The following materials will be considered for the construction phase:

- Ground Granulated Blast Furnace Slag (GGBS) and Pulverised Fuel Ash Used as replacements for Portland cements to increase sustainability and reduce carbon footprint of civil and structural works.
- Locally sourced and supplied, where possible, stone, bricks, pavers, coping etc.

5.4.18 Commitments Register

A register of the environmental commitments (i.e., the mitigation measures and monitoring to be undertaken during the construction phase, operational and maintenance phase of the Proposed Scheme) is provided in **Chapter 20: Schedule of Environmental Commitments**.

This summary (along with the complete EIAR) will be used to inform the commitments register in the updated CEMP, which will be developed by the appointed Contractor. Any conditions of planning (should consent be granted) and any commitments made during the consent application process will also be added to the commitments register. The Contractor will be required to implement the Schedule of Environmental Commitments during the construction and operation phases under supervision from Laois County Council (LCC). An Environmental Monitoring Group will be set up to ensure adequate implementation of the Schedule of Environmental Commitments which will include representatives from LCC and OPW.

5.5 **Operation and Maintenance Phase**

It is expected that the operation and maintenance activities required will be undertaken by existing Laois County Council maintenance personnel.

The following sections provides a description of the operations associated with the maintenance of the Proposed Scheme.

An Operation and Maintenance Plan will be prepared for the Proposed Scheme. **Table 5-6** provides a description of the expected maintenance activities required for the Proposed Scheme.

Element	Activity	Frequency
Flood walls	Inspections	Annually
	Repairs	As required
	Vegetation control	Annually
Debris Trap	Inspections	Monthly
	Repairs	As required
	Removal of debris	As required
Culverts	Inspections	Annually
	Repairs	As required
	Removal of trash and vegetation	Quarterly
Embankments	Inspections and maintenance	Annually
	Vegetation control	Annually
	Vermin control	Bi-annually
	Back drainage improvements	Bi-annually

Table 5-6: Operational and Maintenance Activities

5.5.1 Waste Arisings and Management

Chapter 15: Material Assets- Waste/Utilities outlines the waste materials that will arise during operation.

5.5.2 Emissions

There will be no point source of emissions to air resulting from the operation of the Proposed Scheme. During flood events surface water will be naturally flow to the River Clodiagh, i.e., there will be no pumping and its associated emissions.