

# Natura Impact Statement for the Maintenance of Nenagh Arterial Drainage Scheme 2023

## Final Report

November 2022

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## Revision history

Revision Ref/Date	Amendments	Issued to
S3 P01 October 2022	Draft report	OPW
A1 C01 November 2022	Final report for consultation	OPW

## Contract

This report describes work commissioned by the Office of Public Works under contract 188877 Work Package 2- 2021 Environmental Consultancy services. Sophie Evans, Martyna Grochulska and Steven Heathcote of JBA Consulting carried out this work.

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## Purpose

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## Executive summary

JBA Consulting has been commissioned by the Office of Public Works (OPW) to carry out a Natura Impact Statement for the Maintenance of the Nenagh Arterial Drainage Scheme (the "Scheme"). The Scheme implements the legal duty on the OPW under the Arterial Drainage Acts of 1945 and 1995 to maintain scheme channels and bridge/culvert structures that form part of the scheme and provide drainage of the benefiting lands.

The Scheme consists of 88 channels, with a total length of 164km, in the Nenagh River catchment in County Tipperary. The Scheme involves a range of standard maintenance activities, including in-channel vegetation management, silt removal, bridge/culvert maintenance and tree works. These are all carried out following detailed Environmental procedures (EPs) contained in OPW's Environmental Guidance: Drainage Maintenance and Construction (Brew & Gilligan 2019), which set out the minimum environmental and ecological standards that activities should follow.

A screening assessment identified that the Scheme could have likely significant effects on one Natura 2000 site, namely Lough Derg (Shannon) SPA. This report presents the examination of these effects to determine if they would result in an adverse effect on site integrity and if so, whether avoidance and mitigation could be applied to the Scheme to reduce these below the level at which adverse impacts would occur. Details of the screened-in site is presented, including qualifying interest features, conservation objectives and threats and pressures.

A combination of desk-based assessments and field survey work were used to identify the baseline ecological conditions on and adjacent to the Scheme channels in proximity to the Natura 2000 site. Field assessment comprised of a walkover survey of all channels within the SPA and a small buffer around it.

A detailed assessment of potential adverse impacts was carried out following the Source-Receptor-Pathway approach. Assessment of potential adverse impacts of the Scheme on European sites highlighted that the adverse impacts that require mitigation are disturbance to SPA bird species, and loss of core habitat through suspended solid release. Avoidance and mitigation measures to ensure that the conservation objectives of these species, and therefore integrity of the Lough Derg (Shannon) SPA are not impacted were identified. Most of the mitigation is contained OPW's environmental procedures and specify measures where particular ecological features may be impacted. A small number of additional avoidance and mitigation measures are also included in this report that will need to be implemented during Scheme activities in specific channels.

An in-combination assessment was completed looking at relevant plans and projects. No plans or projects were identified which would give rise to any adverse impacts on the integrity of the relevant European sites, when assessed in combination with the proposed Scheme.

The NIS has concluded that, given the avoidance and mitigation measures proposed, the proposed drainage maintenance operations in the Nenagh Arterial Drainage Scheme will not have an adverse impact on the integrity of any European Site, in light of its conservation objectives and best scientific knowledge, either alone or in combination with other plans or projects.

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## Abbreviations

AA	Appropriate Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CJEU	Court of Justice of the European Union
EPA	Environmental Protection Agency
GWB	Groundwater body
IROPI	Imperative Reasons of Overriding Public Interest
LSE	Likely Significant Effect
NBDC	National Biodiversity Data Centre
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
OPW	Office of Public Works
QI	Qualify Interest
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SPA	Special Protection Area
SWD	Surface water dependent
WFD	Water Framework Directive
ZOI	Zone of Influence

# 1 Introduction

## 1.1 Background

JBA Consulting has been appointed by the Office of Public Works (OPW), to undertake environmental consultancy services in relation to statutory arterial drainage maintenance activities from 2022 on the Nenagh Arterial Drainage Scheme.

The proposed Scheme is the Maintenance of the Nenagh Arterial Drainage Scheme, furthermore, referred to as the "Scheme", and is required as part of maintenance activities under the Arterial Drainage Acts of 1945 and 1995, and includes the Scheme channels along the Nenagh River and its tributaries.

A review and update of the Appropriate Assessment (AA) screening in 2022 (JBA 2022) identified that an Appropriate Assessment (Stage 2) is required at this location due to the presence of one Special Protection Area (SPA) within the potential zone of influence (ZoI) of the proposed maintenance works for the Nenagh Arterial Drainage Scheme.

Previous assessments were undertaken for the Scheme for the purposes of Appropriate Assessment by JBA in 2014 (JBA 2014) and 2017 (JBA 2017). Due to the identification of likely significant effects in 2014 and confirmed during the re-assessment in 2022, this Natura Impact Statement (NIS) has been prepared to re-assess the impacts on the Natura 2000 sites and the overall network, and review and update appropriate avoidance and mitigation measures where necessary.

## 1.2 Legislative Context

The Habitats Directive (Directive 92/43/EEC) aims to maintain or restore the favourable conservation status of habitats and species of community interest across Europe. The requirements of Articles 6(3) and 6(4) of the Habitats Directive have been transposed into Irish legislation by means of *inter alia* the European Communities (Birds and Natural Habitats) Regulations 2011-2021 as amended.

Under the Directive a network of sites of nature conservation importance have been identified by each Member State as containing specified habitats or species requiring to be maintained or returned to favourable conservation status. In Ireland, the network consists of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), and also candidate sites, which form the Natura 2000 network.

Article 6(3) of the Habitats Directive requires that, in relation to European designated sites (i.e. SACs and SPAs that form the Natura 2000 network), *"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"*.

A competent authority, in this case the OPW as a public body, can only agree to a plan or project after having determined that it will not adversely affect the integrity of any European site, in light of its conservation objectives and best scientific evidence, either alone or in combination with other plans or projects.

Under article 6(4) of the Directive, if adverse impacts are likely, and in the absence of alternative options, a plan or project must nevertheless proceed for imperative reasons of overriding public interest (IROPI), including social or economic reasons, a Member State is required to take all compensatory measures necessary to ensure the overall integrity of the Natura 2000 site.

The Planning and Development Act 2000, and amendments, consolidates all planning legislation from 1963 to 1999 and is the basis for the Irish planning code, setting out the detail of regional planning guidelines, development plans and local area plans as well as the basic framework of the development management and consent system. The Act sets

out the requirement of a Natura Impact Statement for a plan, to meet the requirements of article 6(3) of the Habitats Directive, the consideration of in-combination effects and classify any implications in view of the conservation objectives of Natura 2000 sites.

### 1.3 Appropriate Assessment Process

Guidance on the AA process was produced by the European Commission (EC) in 2002, which was subsequently developed into guidance specifically for Ireland by the Department of Environment, Heritage and Local Government (DoEHLG) (2010). These guidance documents identify a staged approach to conducting an AA, as shown in Figure 1-1.



**Figure 1-1: The Appropriate Assessment Process (from: Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities, DoEHLG, 2009 rev 2010)**

#### 1.3.1 Stage 1 - Screening for AA

The initial screening stage of the Appropriate Assessment is to determine:

- whether the proposed plan or project is directly connected with, or necessary for, the management of the European designated site for nature conservation
- if it is likely to have a significant adverse effect on the European designated site, either individually or in combination with other plans or projects

For those sites where potential adverse likely significant effects (LSE) are identified, either alone or in combination with other plans or projects, further assessment is necessary to determine if the proposals will have an adverse impact on the integrity of a European designated site, taking into account the sites conservation objectives (i.e. the process proceeds to Stage 2).

#### 1.3.2 Stage 2 - AA

This stage requires a more in-depth evaluation of the plan or project, and the potential direct and indirect adverse impacts arising from it on the integrity and the interest features of the European designated site(s), alone and in-combination with other plans and projects, taking into account the site's structure, function and conservation objectives and best scientific knowledge in the field. Where required, mitigation or avoidance measures will be suggested.

The competent authority can only agree to the plan or project after having ascertained that it will not adversely affect the integrity of the site(s) concerned. If this cannot be determined, and where mitigation cannot be achieved, then alternative solutions will need to be considered (i.e. the process proceeds to Stage 3).

#### 1.3.3 Stage 3 – Alternative solutions and IROPI

Where adverse impacts on the integrity of Natura 2000 sites are identified, and mitigation cannot be satisfactorily implemented, alternative ways of achieving the objectives of the plan or project that avoid adverse impacts need to be considered. If none can be found, the process proceeds to Stage 4. Where adverse impacts of a plan or project on the integrity of Natura 2000 sites are identified and no alternative solutions exist, the plan or

project will only be allowed to progress if imperative reasons of overriding public interest can be demonstrated. In this case compensatory measures will be required.

#### **1.4 Arterial Drainage Maintenance background**

Between 1945 and 1995, under the Arterial Drainage Act (1945), the OPW completed 34 Arterial Drainage Schemes on river catchments, along with five estuarine embankment schemes (over 11,500km of channel and 730km of embankments). The OPW is statutorily obligated to maintain arterial drainage channels under the 1945 Arterial Drainage Act, and since their completion, maintenance of these Arterial Drainage Schemes has been ongoing, with the majority of channels maintained every five years. However, larger channels tend to be only maintained every ten years, on average.

## 2 Methodology

### 2.1 Guidance

This NIS has been prepared having regard to the Birds and Habitats Directives, the European Communities (Birds and Natural Habitats) Regulations 2011-2021 as amended and relevant jurisprudence of the EU and Irish courts. The following documents have also been used to provide guidance for the assessment:

- DoEHLG (2010) Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government.
- European Commission (EC) (2019) 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. 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. European Commission.
- EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission.
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal, Second Ed., Version 2.1.
- National Parks and Wildlife Service (NPWS) (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report.
- NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report.
- NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS report.
- OPR (2021) Appropriate Assessment Screening for Development Management. OPR Practice Note PN01.
- Ryan Hanley (2014) Stage 1: Appropriate Assessment Screening Methodology for the Maintenance of Arterial Drainage Schemes.
- Ryan Hanley (2014) Source » Pathway » Receptor Chains for Appropriate Assessment. Arterial Drainage Maintenance Categories.

### 2.2 Ecological surveys

To inform the Appropriate Assessment process, a number of assessments and ecological surveys have been conducted, including:

- An ecological desk-based assessment to collate information on designated sites and protected and notable species, reported in detail in the AA screening (JBA 2022).
- An ecological walkover survey conducted on 6<sup>th</sup> October 2022, by JBA Ecologists Hannah Mulcahy and Johanna Healy.

During the ecological walkover the habitats previously mapped in 2017 were reviewed and where necessary updated or boundaries revised. Aerial photographs and site maps assisted the habitat survey. Habitats have been named and described following Fossitt (2000). Nomenclature for higher plants principally follows that given in Stace (2019).

Protected species, including mammals (e.g. Otter, Badger) and birds, were surveyed based upon sightings and signs of activity during the habitat survey and also by the identification of potentially suitable habitats. This included a preliminary assessment of features with suitability for roosting bats and recording of any Invasive Non-Native Species (INNS) found. All evidence of protected habitats and species was recorded in a digital database where relevant, and all information gathered was provided to the OPW on a separate GIS database.

The results of these surveys have informed this NIS where relevant.

### 2.3 The Adverse Effect on Site Integrity test

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of qualifying interest. The maintenance of habitats and species within European sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Upon the conclusion of the AA, the competent authority should grant consent to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site(s) concerned.

An assessment of whether there could be an adverse effect on site integrity is done using the source-pathway-receptor model which is a conventional model used for determining the risk of impact to a site or qualifying interest (OPR 2021; Ryan Hanley 2014b). Risk is the likelihood or expected frequency of a specified adverse consequence or impact. Applied to the Scheme, it expresses the likelihood of an adverse impact arising because of the Scheme activities. A hazard presents a risk when it is likely to affect something of value (i.e. the European sites and their Qualifying Interests (QIs)). It is the combination of the probability of the hazard occurring and its consequences that is the basis of a risk assessment which an NIS essentially is:

$$\text{Risk} = \text{probability of an event} \times \text{consequential damage}$$

The source-pathway-receptor model is a useful tool to determine if a risk is present, and to help quantify the risk to see if the threshold of an adverse effect on site integrity is reached. For a risk to be present, all three elements must be present.

**Source:** The source considered in this NIS is the proposed works or activity that will occur as a result of the Scheme. Key considerations in assessing the source are the nature and scale of the potential impacts that may arise, such as the type of contaminants that may arise, the contaminant loading and other physical attributes. The point of occurrence is a critical reference point for assessing the attributes of the source of any potential adverse impacts.

**Pathway:** Pathways are established by surface water, ground water and land and air connections. The pathway includes everything between the source and the receptor; from point of release of potential adverse impacts, such as contaminants, to the receptor. The location, nature, connectivity and extent of wells, groundwater dependent ecosystems, aquifers and faults can all influence the nature of a pathway. Rivers, streams and drainage ditches could all act as potential pathways for potential waterborne impacts. Where the pathway includes surface or groundwater bodies, the WFD status of that body is reviewed as this informs the ability of it to transfer impacts and its resistance and resilience of adverse impacts. Land and air pathways to be considered include those that may transfer direct physical impacts, noise and visual disturbance (vibrations) and dust or other airborne particles.

**Receptor:** The receptor is the QI features of the relevant European sites, their Conservation Objectives (COs) and the overall integrity of the European sites. To determine the significance of potential adverse impacts on the integrity of the European site, the COs of each site are assessed relative to the potential impacts that may occur because of the proposed works. The conservation objectives are the fundamental unit on

which the assessment is based. If the project were to undermine or make these objective more difficult to achieve, the conservation status of the QI features becomes harder to achieve, and the quality and condition of the site will be reduced, reducing the 'integrity' of the Natura 2000 site. Each Natura 2000 site will either have specific or generic conservation objectives. Detailed site-specific conservation objectives have now been provided for most SACs and SPAs throughout Ireland.

The overall aim of COs is to maintain or restore the favourable conservation conditions of the Annex I habitats and/or the Annex II species for which a SAC has been selected, under which the site-specific objectives contain more detailed attributes, measures and targets.

Favourable conservation status of a **habitat** is achieved when:

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

The favourable conservation status of a **species** is achieved when:

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

The conservation objectives for SPAs are also to maintain or restore the favourable conservation condition of the bird species listed as QIs for SPAs, which are defined by the following list of attributes and targets:

- Population trend: Measure of percentage change and whether the long-term population trend stable or increasing.
- Distribution: Number, range, timing and intensity of use of areas. There is to be no significant decrease in the range, timing or intensity of use of areas by specific or generic bird species, other than that occurring from natural patterns of variation.

The conservation objectives for non-breeding birds QIs for SPAs are as follows:

- To maintain the favourable conservation condition of the non-breeding water bird Special Conservation Interest species listed for a SPA.
- To maintain the favourable conservation condition of the wetland habitat for a SPA as a resource for the regularly occurring migratory water birds that utilise it.

Some European sites do not have site specific COs, instead with the general objectives listed above assigned to each QI. Where these sites are screened into the assessment, detailed COs have been derived from other nearby European sites with the same QIs. In these cases, the necessary assumption has been made that the sites have similar characteristics, and the conservation objectives are likely to be similar for the specific habitat or species type in terms of conservation requirements.

Site integrity is assessed on the basis of each conservation objective of each qualifying interest feature. Should any conservation objective be undermined by the proposed work, the site integrity will therefore be adversely affected. Low-impact effects that are too

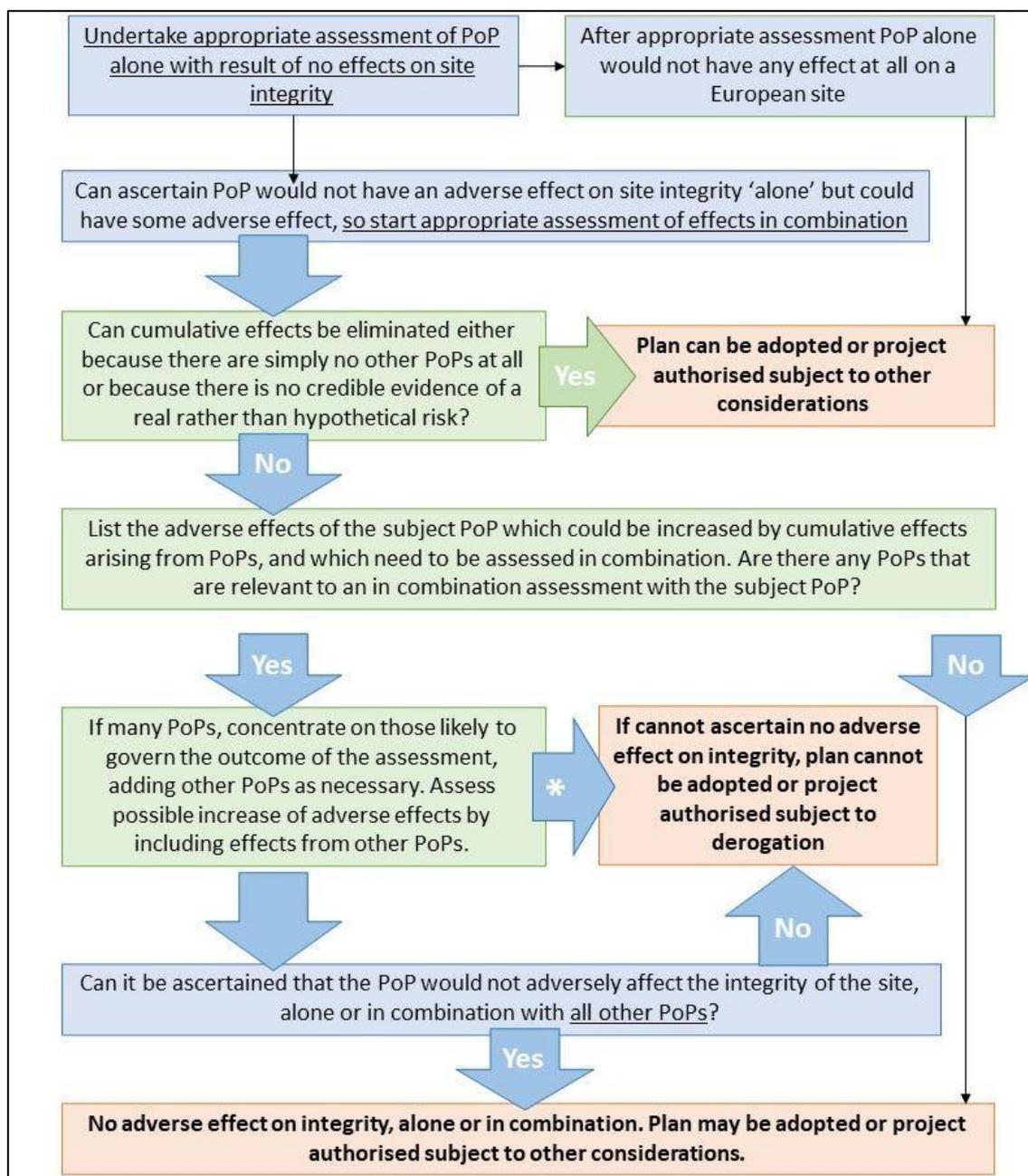
small or short-lived to undermine the achievements of the conservation objectives are therefore not likely to adversely affect the site integrity.

### **2.3.1 Avoidance and mitigation measures**

To ensure that any recommended mitigation measures are sufficient and proven to be successful, they are designed in accordance with the most up to date best practise guidelines and tailored where necessary to the conditions on-site and nature of the relevant receptors. OPW have a detailed process to ensure ecological measures are included during project implementation, along with audits to check compliance. Any avoidance and mitigation measures are assessed for evidence of their effectiveness and the certainty with which they can be implemented, as well as certainty with which they will avoid or reduce impacts. This forms a critical part of the assessment of residual effects and whether these could still result in adverse impacts.

### **2.3.2 In-combination Assessment**

The in-combination assessment followed the process for in-combination set out by the DTA Handbook (Chapman & Tyldesley, 2012). The in-combination impacts are considered only after the assessment of the project alone. If the result of this is that the Scheme will have no effect at all on a Natura 2000 site, then no in-combination assessment is necessary. However, where there is no adverse effect on site integrity, but some adverse effect, an assessment of this adverse effect in-combination with other plans or projects is carried out. Other plans or projects were identified within the relevant pathway screening distance set out in Ryan Hanley (2014a). Plans and projects were searched for using the National Planning Application Database, EIA portal and Myplan.ie databases (all accessible online), and any plans or projects that will take place from 2021 onwards (the period of assessment for the Scheme) were included, as well as projects completed before 2021 where the full impacts of that project are yet to be realised. If no other plans or projects are identified, then the assessment is complete. Where other plans or projects are identified then initially a review is made of its AA screening, or AA, and if the Competent Authority for the plan or project has made a final determination of no effect on the integrity of any Natura 2000 site, either alone or in-combination, this determination is used in this assessment. Where there is not a full AA, or the findings are unclear or out of date, the plan or project documentation is checked for credible evidence of real (not hypothetical) risk to a European site. Where these are identified then a detailed assessment is carried out. The impact assessment follows the method set out in Section 2.3 and applies mitigation where necessary to determine if adverse effects on site integrity are expected from the combination of plans and projects with the Scheme. A summary of the approach is presented in Figure 2-1. The final iteration of the in-combination assessment, including a search of relevant plans or projects, was completed on the 10<sup>th</sup> of October 2022.



**Figure 2-1. Flow diagram of process for in-combination assessment (modified from Chapman & Tyldesley, 2012)**

### 2.3.3 Consultation

No formal consultations for this NIS were completed in preparation of this draft, although there is ongoing dialogue between the OPW, IFI and NPWS in relation to arterial drainage schemes. This draft will form the basis of a consultation with NPWS, as the Statutory Nature Conservation Body, prior to final determination by OPW.

This report has been produced using currently available information, with the most up-to-date versions used. Where new, or updated, information becomes available the OPW will consider and review the findings of this assessment, if necessary.

### 3 Project Description

#### 3.1 The Nenagh Scheme and Proposed Works

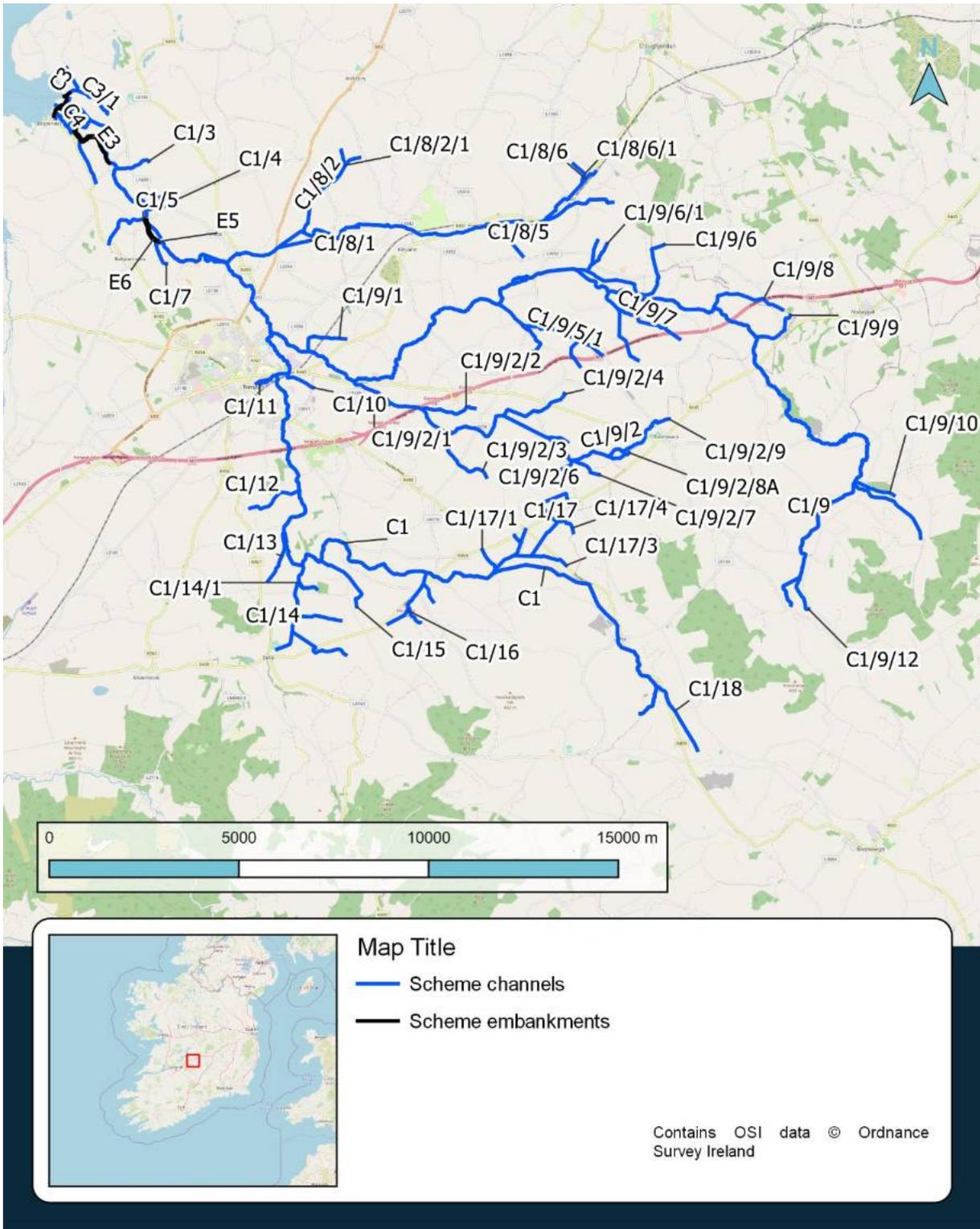
The Nenagh Arterial Drainage Scheme is located in County Tipperary. It includes 164km of watercourse and 6.2km of embankment (Figure 3-1; Figure 3-2) with associated bridges and sluices (Figure 3-3). The Scheme drains water from primarily agricultural land into Lough Derg along its eastern shore (Figure 3-2). The main channel is the Nenagh River which flows from the south of the catchment in a generally north-westerly direction around Nenagh to Lough Derg. The Ollatrim is a significant tributary which drains the eastern part of the catchment and joins the Nenagh River on the eastern edge of Nenagh itself.

#### 3.2 Drainage Maintenance Activities

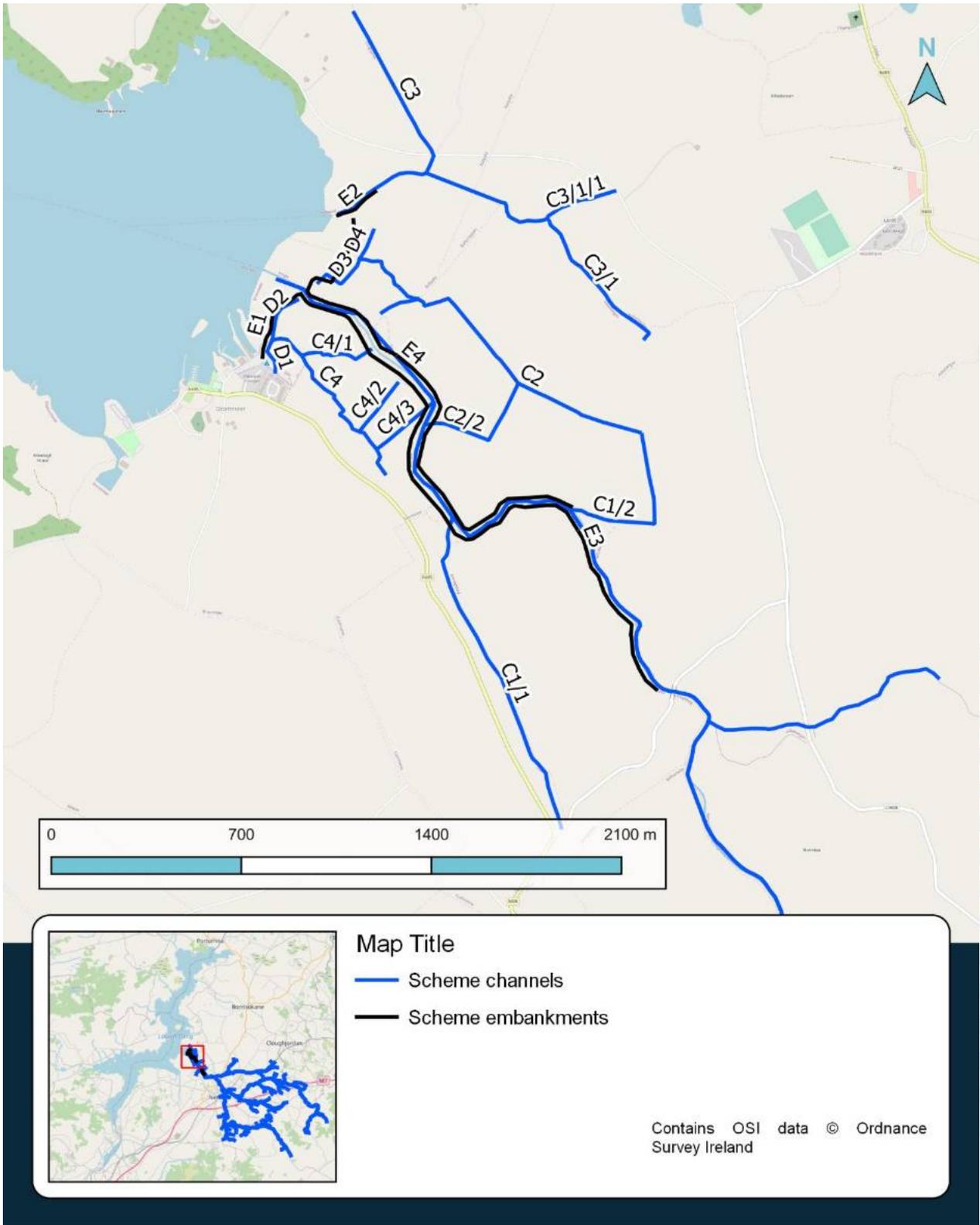
Arterial Drainage maintenance includes a range of operations such as silt and vegetation management, mowing and structure maintenance, and listed as channel, embankment or structure maintenance with the categories set out in Table 3-1. This maintenance is required to retain the arterial drainage scheme design capacity. The maintenance types can happen for two reasons, the first is as part of regular planned works, and the extent of this is shown in Table 3-1, but maintenance may be needed on any of the channels or structures where a change in conditions necessitates the work. For the purpose of this assessment, it is assumed that any of the activities shown in Table 3-1 could occur on any of the channels.

**Table 3-1: OPW Drainage Maintenance Types**

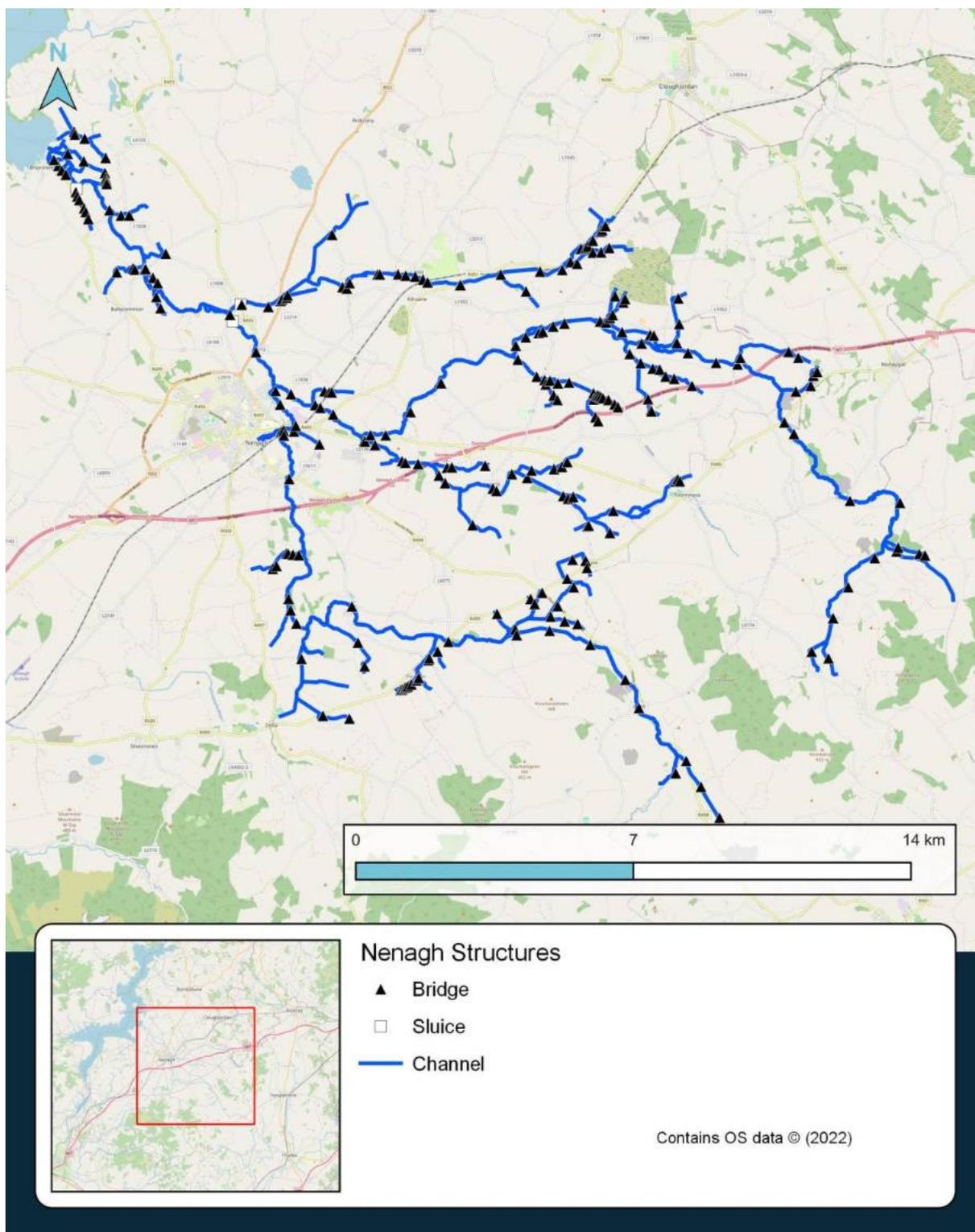
Category	Maintenance Type	Code	Planned Maintenance Extent
Channel Maintenance	Silt and vegetation management	A	88 (164km)
	Aquatic vegetation cutting	B	-
	Bank protection	C	11 (113km)
	Bush cutting/Branch trimming	D	88 (164km)
	Tree cutting	E	12 (123km)
	Other	K	-
Embankment Maintenance	Bush cutting/Branch trimming	D	6 (6.2km)
	Tree cutting	E	6 (6.2km)
	Mulching	F	6 (6.2km)
	Mowing	G	-
	Gate installation	H	-
Structural Maintenance	Sluice maintenance (excluding in-channel works)	I	-
	Bridge maintenance (excluding in-channel works)	J	-
	Bank protection (excluding in-channel works)	C	-
	Bush cutting/Branch trimming	D	-
	Tree cutting	E	-



**Figure 3-1. Nenagh Scheme channels and embankments (main map).**



**Figure 3-2. Nenagh Scheme channels and embankments (outfall details)**



**Figure 3-3. Scheme structure locations**

### 3.2.1 Channel Maintenance Activities

The majority of drainage maintenance activities are focused on channel maintenance. While the frequency of maintenance on an individual channel may vary, with some channels requiring maintenance annually and others only requiring maintenance every twenty years, the average channel requires maintenance every four to six years. In this regard, approximately 2,000km of channels are maintained annually and nearly all of the 11,500km of channels across Irelands Arterial Drainage Schemes will have been maintained at least once over a period of five years. Channel maintenance is organised on a regional basis, with OPW Arterial Drainage Maintenance Regional Offices in Limerick, Headford, Co. Galway and Trim, Co. Meath.

#### ***Scheme Design Standards***

Arterial Drainage Schemes constructed under the Arterial Drainage Act, 1945 were designed to provide an outfall for drainage of agricultural lands, and generally provided protection for a 3-year flood event. Where the creation of an outfall dictated the design bed levels, greater protection than the 3-year flood event was achieved as a consequence. In the case of modern flood relief schemes, flood protection for a 100-year flood event would be the design objective.

The original Scheme designs, including the outfall datum for each of the Arterial Drainage Schemes, are available in the relevant OPW Arterial Drainage Maintenance Regional Office. This includes the mapped Scheme design, and the associated long sections and cross sections. These designs are used to inform channel maintenance.

#### ***Types of Channel Requiring Maintenance***

In the years following the construction of a drainage scheme there is a tendency for the channel capacity to be progressively reduced due mainly to the transportation and deposition of bed materials, the accumulation of silt and the growth of in-channel vegetation. The resultant channel maintenance consists of repetitive works of a cyclical nature, to restore the Schemes design levels i.e. outfall datum in order to maintain the channel's designed capacity to convey water.

Channels are prioritised for maintenance based on the rate of deterioration and the risk arising. The selection takes account of requests from the general public and potential flooding risk to roads, properties, urban areas and sewage works (OPW 2011a).

#### ***Plane Bed to Low Gradient Channels***

Some 60 – 70% of maintained channels are of gentle longitudinal gradient and subject to relatively rapid deposition of silt, especially those that are subject to prolific growth of in-channel vegetation. The majority of maintenance works are therefore located on smaller lower-lying channels, with 90% of works in channels with a base width of <3m (OPW 2011a). In such channels, silt and in-channel vegetation may cause the low flow level to rise by 50-300mm above the Scheme design level. In such circumstances maintenance is focused on restoring both low-flow and flood-flow water levels to original Scheme design.

#### ***Medium to High Gradient Channels***

A smaller proportion of channels are steep and fast flowing and are subject to flash floods, bank erosion and rapid movement of bed gravel. The steeper sections of channel normally require relatively little and infrequent maintenance works (OPW 2011a) as opposed to channels of low gradient which are subject to rapid accumulation of silt and proliferation of vegetation. These channels will have a greater requirement for bank protection works.

#### ***Periods and Cycles of Maintenance***

The average channel requires silt and vegetation management every four to six years. However, channels with prolific weed growth may require maintenance annually, particularly where downstream bridges are at risk of being blocked due to a flow of decaying vegetation in autumn. Conversely, some channels may only require in-stream

maintenance every twenty years due to the self-cleaning characteristics e.g. high gradient channels.

Where the period between previous channel maintenance works has been exceptionally long, dense scrub and woody vegetation can establish along the channel and within the maintenance access corridor. In such circumstances, drainage maintenance works will include the removal of scrub/transitional woodland (code WS1 in the Fossitt Classification, 2000) that has developed along the banksides via bush cutting/branch trimming, tree cutting or mulching. This is undertaken between the 1st September and 28th February to avoid the residential bird nesting season (from the 1st March to 31st August as per the Wildlife Act (1976)).

In contrast, in-stream works for silt and vegetation management are carried out outside of the salmonid spawning season (May to September) and the times that early life stages of salmonid fish will be present as per Section 173 of the Fisheries (Consolidation) Act (1959) on channels with salmonid spawning habitat. Any works required during this period are carried out in consultation with IFI. As a result, there may be a two-stage approach to the works, with silt and in-stream vegetation management carried out during the open season (i.e. summer months), while woody vegetation removal is carried out in the winter months.

Other restrictions on works may also apply in relation to the presence/absence of other protected species such as White-clawed Crayfish and Sea, River and Brook Lamprey which will influence the timing of works.

### 3.2.2 Embankment Maintenance Activities

A total of 5 No. Estuarine Embankment Schemes were constructed under the 1945 Act. In addition, a number of the Arterial Drainage Schemes have embanked sections.

#### ***Scheme Design Standards***

As above for the Arterial Drainage Schemes, Estuarine Embankment Schemes constructed under the Arterial Drainage Act 1945 were designed to provide an outfall for drainage of agricultural lands, and generally provided protection for a 3-year flood event. Where the creation of an outfall dictated the design bed levels, greater protection than the 3-year flood event was achieved as a consequence. In the case of modern flood relief schemes, flood protection for a 100-year flood event would be the design objective.

The original Scheme designs are available in the relevant OPW Arterial Drainage Maintenance Regional Office. This includes the mapped Scheme design, and the associated long sections and cross sections.

#### ***Types of Embankments Requiring Maintenance***

All embankments and associated sluice structures (see section 3.2.3) are inspected annually for signs of disrepair.

Regular inspections are carried out on sections of embankments, which are known from experience to be at risk, together with additional inspections after a storm surge at sea or a high tidal/flood event. Maintenance of embankments includes removal of vegetation to allow for inspection of the embankment, and in some cases the replacement of existing fencing with gates to allow for future access during maintenance.

### 3.2.3 Structural Maintenance Activities

#### ***Structural Design Standards***

During the construction of the Arterial Drainage Schemes under the 1945 Act, some 18,500 No. accommodation bridges were identified and modified, or replaced as required. These bridges provide farmers owning land on both sides of a channels with farm vehicular and/or foot access from one side to the other. The type of bridge provided depended on the width, depth and required flow capacity of the channel, and ranged from

concrete piped culverts to relatively large structures formed on concrete or masonry abutments spanned by structural steel beams, or lattice girders together with concrete or timber decking.

During the Estuarine Embankment Schemes under the 1945 Act, existing sluice structures were identified and modified, or replaced as required. Additional sluice structures were constructed as required bringing the total number to approximately 750. The function of these sluice structures is to allow water from the floodplain behind the embankments to discharge to the main river or estuary.

### ***Types of Structures Requiring Maintenance***

In general, as channel maintenance proceeds, the bridges are examined by the supervisory industrial staff and if required, repairs/replacements are scheduled. The type of bridge structures which are most likely to have fallen into a critical state of disrepair, are those with timber decking supported on steel beams, and those in which abutment foundations are being undercut. There is a standard type of design for the replacement of these structures, which consists essentially of mass concrete abutments with reinforced cast in-situ decking. This type of structure is simple to construct and, under normal circumstances, it will last for many years with little or no maintenance.

On many occasions, it is not necessary to totally replace a bridge, and repairs such as underpinning the foundation or replacement of wing-walls, parapets or sections of the deck may be all that is required to extend the useful life of the structure. Where bridge maintenance may be required, a Bridge Inspection Form will be filled out by the Foreman prior to the works. This will determine the need for further assessment and potentially any mitigation measures that may be required.

All embankments and associated structures are inspected annually for disrepair. Due to the time elapsed since scheme completion, some of these sluice structures have reached their design life and have started to fail. In this instance, full replacement is required. Typically, this involves the installation of pre-cast headwalls and back walls, and the replacement of existing corrugated galvanised steel pipes with PVC plastic pipes.

Sluice doors are the most frequent part of the sluice structure that are required to be repaired or replaced. Repairs to a sluice door consist of replacing the arms/hinges on the existing cast iron door. On occasion, the existing cast iron door would be replaced with a high-density polyethylene (HDPE) door. Blockages often occur at the doors of the sluices due to silt build up. These blockages are removed using along reach excavator working from the bank of the channel.

It is not known where bridges, sluice doors or structures may require maintenance on the Nenagh Scheme. Maintenance of bridges, structures and/or sluices will only occur within the scheme after following the relevant environmental procedures as detailed in the OPW Environmental Procedures document (Brew & Gilligan, 2019) and using specific mitigation measures where identified in environmental assessments. Structures are included in this assessment in as far as works do not take place in the channel. This means that general repairs to the structure, vegetation management and inspections are considered.

This NIS does not include assessment for the removal, demolition, replacement or erection of bridges, sluices or structures.

### **3.2.4 Maintenance works considered outside of the Scheme Design Standards and outside of normal Arterial Drainage Maintenance Works**

Occasionally, works are required that can be considered outside of the scope of the normal Arterial Drainage Maintenance Works to maintain a scheme. Works considered outside of the normal scope of statutory arterial drainage maintenance works are not assessed for impacts in this report.

Works that could be considered outside of the normal scope of works include those involving extensive bank protection measures, removal of mature woodland, unplanned

bridge maintenance works or any other unplanned works within the zone of influence of a Natura 2000 site.

### 3.2.5 Plant and Machinery

The types of machinery typically utilised during maintenance works would include 3600 hydraulic excavators (from 15-20 tonne excavators), mini-diggers, tractors and trailers, tipper lorries, hydraulic shears, hydraulic secateurs, chainsaws, mulchers and mowers. The machinery used is dependent on the maintenance activity being conducted.

The removal of dense in-stream silt and vegetation requires the use of a hydraulic excavator with a 1.5m wide (approximate) bucket (capacity approximate 500ltrs). For standard excavators, works progress at a rate of 700m to 900m per week. In relation to long-reach excavators, works progress at a slower rate of between 200m and 350m per week. Rates may change due to channel width or ground conditions.

### 3.2.6 Maintenance Access Corridors (MAC) and Working Zone

Maintenance sites are generally accessed via the public road and through farmland. A maintenance access corridor is utilised along one side of a channel for maintenance purposes. These established routes are used to track the hydraulic excavators for maintenance and for the disposal of spoil (see section 3.2.8). The same route is generally followed every maintenance cycle. This approach avoids disturbance of habitats on the opposite bank during works.

Where grasslands are present within the maintenance access corridor, the impact is predominantly temporary as the grasslands are trampled by machinery and can recolonise following completion of the maintenance activities. Within woodland and scrub habitats a linear path more typical of disturbed vegetation i.e. scrub/transitional woodland (WS1) will be evident along the maintenance access corridor due to regular machine access. In this regard, the disturbance regime associated with the tracking of plant machinery along the maintenance access corridors on the channel bank arrests succession to mature woodland such that scrub/transitional woodland (WS1) dominates. Where mature trees are present these are generally avoided by plant machinery.

Structures are generally accessed through farmland from the public road above. Plant machinery will utilise the same maintenance access corridor used for channel maintenance to gain access to the structure. Where individual trees, woodland and scrub habitats are present at the location of the structure, these may be removed to facilitate bridge inspection and works. Where mature trees are present these are generally avoided by plant machinery.

The location of drainage maintenance works is generally accessed via public roads and through farmland, with the siting of mobile short-term staff welfare facilities, plant storage and car parking agreed with local landowners. There is no requirement for temporary site lighting.

There is a requirement for water supply and disposal of wastewater from the welfare facilities (see section 3.2.8 in relation to waste disposal).

### 3.2.7 Site Compounds (Welfare Facilities), Access Routes and Haul Roads

Haul roads are generally not required to facilitate drainage maintenance activities. Where access is required in soft ground conditions, plant equipment will be brought in on tracks or temporary matting will be laid to provide a corridor for machinery access. Where matting is utilised, it will be completely removed post completion of works to allow vegetation to recolonise. All plant and machinery are confined to one defined access route to minimise disturbance.

All plant and machinery are regularly maintained and serviced to minimise release of hydrocarbons. All hydraulic excavators and other plant machinery use long life engine oil

and biodegradable hydraulic oil. Fuelling and lubrication are conducted a minimum of 50m away from all channels. Spill kits are present in all plant used in maintenance activities. Integrated submersible pumps are also deployed in the event of structural maintenance and the requirement for dewatering of excavations.

### **3.2.8 Waste Output/Disposal**

The material removed from a channel during silt and vegetation management is normally spread thinly along the bank or on top of existing spoil heaps where present within the access corridor. All dead wood material is left on site to decompose or is removed off site under local landowner agreements. Where mulchers or mowers are deployed, the arisings are left on site to decompose or the mulched material is buried.

Construction and demolition waste from structures includes broken concrete and stone. Steel railings are returned to the depot for recycling. Used engine oil and hydraulic oil is disposed of by a licensed waste handler. Toilet facilities are maintained by a licensed waste handler. Any waste generated on site is returned to the depot for segregation and disposal by a licensed waste handler.

### **3.2.9 Working Hours**

All maintenance activities are undertaken during daylight hours. Standard working hours are 8.00am to 4.30pm, with lunch and tea breaks, Monday to Friday. There is no requirement for temporary site lighting to facilitate works. Machines are powered down when not in use.

### **3.2.10 Environmental Training**

Environmental training of all staff involved in drainage maintenance is an ongoing process. Technical and Operational Staff completed formal training in Environmental Drainage Maintenance (EDM) in 2004. This training course was revised and expanded under the OPW's Environmental River Enhancement Programme (EREP) and was delivered to all staff in 2010. The training programme delivered included presentations in river corridor ecology, the Environmental Drainage Maintenance Guidance Notes (Ten Steps to Environmentally Friendly Maintenance), maintenance strategies involving both 'enhanced maintenance' and 'capital enhancement', and OPW's Environmental Management Protocols and Standard Operating Procedures (SOPs). Both sets of training were developed and delivered by IFI.

The formal approach to EDM Training was complimented with on-site training. Regular site visits from IFI and OPW's Environment Section provided further guidance and advice to operational staff. Auditing of operational staff on the implementation of the Environmental Drainage Maintenance Guidance Notes (Ten Steps to Environmentally Friendly Maintenance) was also carried out by both IFI and OPW's Environment Section.

In addition, other environmental training took place as deemed beneficial, e.g. in 2008, the majority of the technical and operational staff were trained in Otter Awareness. This course, provided by the Department of Zoology, Trinity College Dublin, included presentations on Otter ecology, and on-site identification of Otter signs and suitable habitat.

More recently, an environmental training course was designed and provided by JBA Consulting to all OPW staff in 2017 and 2018. It was given in three different stages. Management staff were given a more detailed 2-day course in Environmental and Ecological training. Ground staff were given 1.5 days of training in the environment and ecology. Modules were designed to assist staff in understanding the relevant legislation, recognising ecologically sensitive habitats and species, invasive non-native species identification and general environmental and ecological training relevant to their work. This included a half day practical session where ecologists demonstrated the identification of the elements taught in the classroom, in the field.

Training in the completion of an Environmental Risk Assessment and Bridge Inspections from an ecological perspective, was designed and provided by JBA Consulting to OPW Foremen and selected engineering staff in 2018. Further to this, all operational staff attended a 1-day environmental training course which included detailed guidance on the OPW's Environmental Management Procedures in 2019.

### 3.2.11 Environmental Audits

A portion of operational crews have been audited annually by the OPW Environment Section, IFI and since 2018 by independent consults for the implementation of the Environmental Drainage Maintenance Guidance Notes (Ten Steps to Environmentally Friendly Maintenance). The OPW's Environmental Management Protocol and EPs. Auditing is carried out by independent consults on a rotational basis to ensure all operational crews are audited at least once every three years. All audit results are forwarded to the relevant engineer for that Scheme within two working weeks. In the event of an audit showing elements of unreasonable non-compliance with procedures, the relevant Engineer will be notified within one working day. Audit results are also forwarded to the OPW Environment Section for inclusion in monthly regional benchmarking reports. In the event of non-compliance audit, refresher training is provided to the staff (in Ten Steps to Environmentally Friendly Maintenance) and a re-audit is carried out within a short period of time.

### 3.2.12 Environmental Management Protocol and Environmental Procedures

The OPW's Environmental Management Procedures (Brew & Gilligan, 2019) set out how regional management staff manage a range of environmental aspects, including programming of works to accommodate certain environmental windows or restrictions on timing of works, and recording of data. A total of 31 No. EPs are applied during operational works. The 31 EPs replace the previous SOPs (OPW 2011b). These EPs set out actions designed to eliminate, or substantially reduce, likely impacts to identified species and their associated habitats. A brief summary of these is as follows:

#### **Planning EPs relevant to Management Staff:**

- Including Environmental Risk Assessment Procedure; and
- Appropriate Assessment Procedure

#### **Implementation EPs - relevant to all staff:**

- Environmental Drainage Maintenance Guidance Notes (10 Steps to Environmentally Friendly Maintenance)
- Tree Management Procedure
- Silt Management Procedure
- Machinery related procedure

#### **Invasive Species EPs - relevant to all staff:**

- Spread of Invasive Plant (Low Biosecurity) Procedure
- Spread of Water Based Invasives (High Biosecurity) Procedure

#### **Species EPs - relevant to all staff:**

- Salmonid Procedure
- Otter Procedure
- Bats Procedure
- Freshwater Pearl Mussel Procedure

#### **Habitat EPs - relevant to all staff:**

- Alluvial (Wet Woodland) Procedure
- Wetland Procedure

The description of activities, assessment and mitigation measures described in this report relate to the content of the published OPW Environmental Procedures (Brew & Gilligan 2019). An Environmental Risk Assessment process has been developed by the OPW which will be filled in by the program producer for >3m base width main channels where maintenance has not occurred for 15 years and embankment works where maintenance has not occurred for 15 years.

## 4 Screening Assessment Results

### 4.1 Introduction

An Appropriate Assessment screening assessment, addressing Stage 1 of the AA process, has already been completed for the Nenagh Arterial Drainage Scheme (JBA 2022). This identified that likely significant effects on Natura 2000 sites may occur as a result of the proposed maintenance activities, and therefore a Stage 2 Appropriate Assessment is necessary.

From the screening exercise it has been determined that likely significant effects may arise on one European site because of the Scheme. The site and the pathways to impact are shown in Table 4-1, along with sites that were considered as they are within the Scheme ZOI but screened out.

**Table 4-1. Screening Assessment Summary**

Site	Surface water	Land and air	Ground water	Comment
Lough Derg (Shannon) SPA	LSE	LSE	LSE	This SAC has habitats which support four protected bird species, and wetland habitats, which could be impacted upon via all three pathways. The birds potentially affected are Cormorant, Tufted Duck, Goldeneye and Common Tern.
Lough Derg, North-East Shore SAC	No LSE	NA	No LSE	Within surface water body (SWB) and groundwater body (GWB) but no pathways for impact due to distance and SWB flow paths.
Killduff, Devilsbit Mountain SAC	No LSE	NA	No LSE	
Ballyduff/Clonfinane Bog SAC	NA	NA	No LSE	Within GWB containing scheme channels but no impacts due to distance in poorly productive aquifer.
Kilcarren-Firville Bog SAC	NA	NA	No LSE	
Slievefelim to Silvermines mountains SPA	NA	NA	No LSE	
Bolingbrook Hill SAC	NA	NA	No LSE	
Silvermine Mountains SAC	NA	NA	No LSE	
Silvermines Mountains West SAC	NA	NA	No LSE	
Arragh More (Derrybreen) Bog SAC	NA	NA	No LSE	
Scohabog (Sopwell) Bog SAC	NA	NA	No LSE	
Lower River Shannon SAC	No LSE	NA	NA	FWPM present in SAC which is c. 20km downstream but the Freshwater Pearl Mussel are not

Site	Surface water	Land and air	Ground water	Comment
				located in parts of the SAC within 20km of the Scheme

For the Lough Derg (Shannon) SPA, all the QIs have been identified as having Likely Significant Effects (LSE) and require further assessment:

- Cormorant (*Phalacrocorax carbo*)
- Tufted Duck (*Aythya fuligula*)
- Goldeneye (*Bucephala clangula*)
- Common Tern (*Sterna hirundo*)
- Wetland and Waterbirds

The screening assessment also identified which Scheme activities are likely to cause these Likely Significant Effects. The sources of impact to be considered in the NIS are set out in Table 4-2.

**Table 4-2. Details of potential sources of impact**

Activity	Impact
Disturbance of species and habitats	
Vehicle movement along maintenance access corridor and during operation; vehicle operations in bridge and sluice maintenance	Habitat disturbance/compaction
	Species disturbance from adjacent habitat: Noise Visual Vibration
Release of suspended solids	
Silt and vegetation management; sluice maintenance	Release of solids downstream – impacting FWPM, other aquatic and riparian species
Release of nutrients/changes in nutrient levels	
Silt and vegetation maintenance	Release from dredged material into bankside habitat
	Re-suspension of deposited nutrients
Vegetation cutting	Release from decaying cut material into embankment and channel
	Release from plant material cut and floating downstream in channel

## 5 Existing Environment

### 5.1 Overview

This section summarises the findings of the ecological walkover surveys of the embankments and channels at the mouth of the Nenagh River for the Scheme.

### 5.2 General ecology of the site

The Nenagh Scheme area is located on the banks of Lough Derg, partially within the Lough Derg SPA. It includes depositing lowland rivers, embankments and drainage ditches. The majority of the surrounding land is improved agricultural grassland, except for along the banks of Lough Derg, which includes a combination of woodlands, freshwater marsh, reedbeds and wet grassland.

The description from 2017, which remains accurate and relevant (as verified by a 2022 walkover survey of the same area) also states the following:

“Common Frog *Rana temporaria*, listed on Annex V under the Habitats Directive, Mute Swan *Cygnus olor*, an Amber Listed water bird, and evidence of Badger *Meles meles*, protected under the 1976 Wildlife Act (and amendments) were observed using the channels to be maintained during the walkover survey, or within the zone of influence of the works. During the winter embankment survey, several active Badger setts with multiple entrances, spoil heaps and various other recent markings were identified as being present on both sides of the river. One of these setts is located within the embankment... Evidence of Otter *Lutra lutra* was also observed during the winter surveys and several couching locations were noted along the river. This area is clearly well used by both Otter and Badger.

The Annex I habitat 91EO Alluvial forests with Alder *Alnus glutinosa* and Ash *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae), was identified during the ecological surveys to be present along the banks of Lough Derg. This habitat is a protected habitat and is growing onto the embankments to be maintained. Mature willows and Ash trees are present along the embankment in this area. Two Buzzards *Buteo buteo* were observed circling over the survey area (right bank) and heard calling, during the winter surveys.”

### 5.3 Habitats

Habitat data has been compiled from walkover surveys completed by JBA Consulting in October 2022, along with NPWS data on habitat distribution. A range of Fossitt habitats were identified during the walkover surveys. They are listed in Table 5-1. Only Annex 1 habitats, or habitats within Natura 2000 sites are discussed in detail.

**Table 5-1: Habitats recorded within surveyed areas**

Habitat Type	Fossitt code	Potential Annex I
Buildings and artificial surfaces	BL3	No
Mesotrophic standing waterbody	FL4	Yes
Reed and large sedge swamps	FS1	Yes
Depositing/ lowland Rivers	FW2	Yes
Drainage ditches	FW4	No
Improved agricultural grassland	GA1	Yes
Dry calcareous and neutral grassland	GS1	No
Hedgerows	WL1	No

Habitat Type	Fossitt code	Potential Annex I
Treelines	WL2	No
Riparian woodland	WN5	No
Wet willow-alder-ash woodland	WN6	Yes
(Mixed) broadleaved/ conifer woodland	WD2	Yes

Of these habitats, there is one confirmed or possible Annex I habitat recorded, listed in Table 5-2. The location of this habitat is shown in Appendix A.

**Table 5-2: Annex 1 habitats recorded within surveyed areas**

Annex I Habitat Type	Equivalent Fossitt Habitats	Location and source
91EO Alluvial forests with Alder and Ash	WN5	Field surveys (2022 & 2017)

### 5.3.1 91EO Alluvial forests with Alder and Ash

Alluvial woodland is present on the left bank of the Nenagh River in a few locations near Lough Derg and shown on the detailed Scheme maps (Appendix A). The main tree species are willows, Alder and Ash *Fraxinus excelsior*. It is also present along the bank of Lough Derg and grows onto the embankment at this location. This habitat represents the Annex I habitat 91EO Alluvial forests with Alder (*Alnus glutinosa*) and Ash (*Fraxinus excelsior*) (*Alno-Padion*, *Alnion incanae*, *Salicion albae*).

## 5.4 Fauna

Evidence of ecologically sensitive fauna found along the surveyed channels during ecological surveys is described in the following sections. Past records of protected fauna collated from NBDC website, recorded as being present within approximately 10 km of the survey area within the last 10 years are found in Appendix C.

### 5.4.1 Aquatic species

It is likely that a range of aquatic species, and particularly fish, use the Scheme channels. The presence of fish is important for maintaining the overall ecosystem of Lough Derg and supporting the SPA bird species.

### 5.4.2 Mammals

Badgers and Otter are known to be present in and around the Scheme channels as noted in section 5.2. There is suitable habitat for a range of other mammal species, although no direct evidence was confirmed.

### 5.4.3 Birds

The four bird species listed on the SPA citation have all been recorded in the vicinity of Scheme channels, although there are no confirmed records of breeding in close proximity to any channel.

- Cormorant (*Phalacrocorax carbo*) [A017]
- Tufted Duck (*Aythya fuligula*) [A061]
- Goldeneye (*Bucephala clangula*) [A067]

- Common Tern (*Sterna hirundo*) [A193]
- Wetland and Waterbirds [A999]

## 6 Natura 2000 sites within the Zone of Influence of the scheme

### 6.1 Introduction

This chapter provides baseline information on the Natura 2000 sites within the ZoI of the drainage maintenance activities. Descriptions of the sites are provided, along with details of the qualifying interests, conservation objectives and site vulnerabilities. The screened in sites are:

- Lough Derg, Shannon SPA (004058)

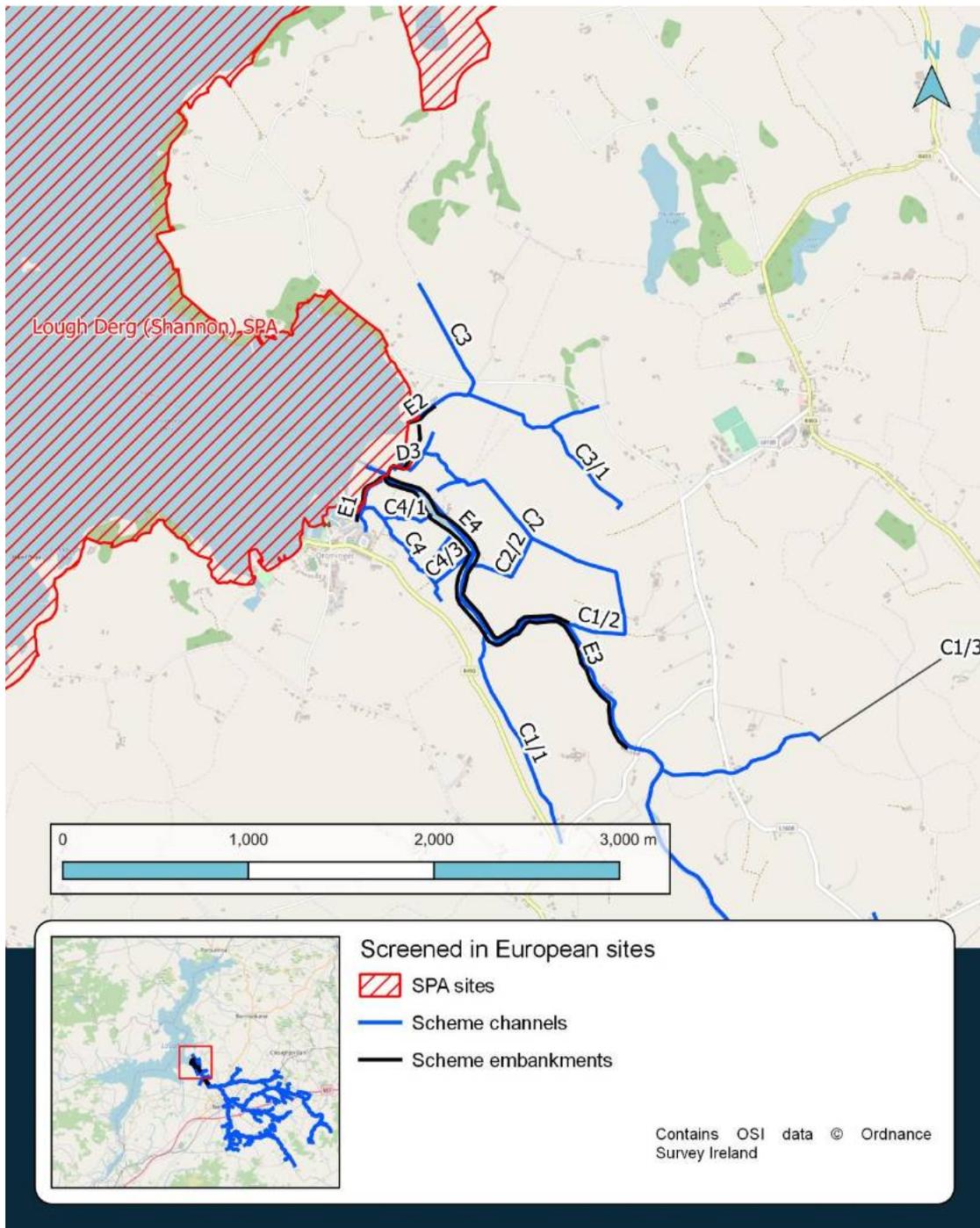


Figure 6-1. Nenagh Scheme location and screened in European sites

## 6.2 Lough Derg (Shannon) SPA (004058)

Lough Derg lies within the counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes, being some 40 km long. Its maximum breadth across the Scarriff Bay -Youghal Bay transect is 13 km but for most of its length it is less than 5 km wide. Lough Derg (Shannon) SPA is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it supports nationally important populations of Tufted Duck and Goldeneye, as well as a range of other species including Whooper Swan. The presence of Whooper Swan, Greenland White-fronted Goose, Hen Harrier and Common Tern is of particular note as these are listed on Annex I of the E.U. Birds Directive. Parts of Lough Derg (Shannon) SPA are a Wildfowl Sanctuary. Full summary of the site is provided at Appendix B.1.

### 6.2.1 Qualifying Interests

The site is a Special Protection Area (SPA) selected for the species listed on the E.U. Birds Directive), as detailed in Table 6-1.

**Table 6-1 Qualifying Interests of Lough Derg (Shannon) SPA**

Code	Qualifying Interest
A017	Cormorant ( <i>Phalacrocorax carbo</i> )
A061	Tufted Duck ( <i>Aythya fuligula</i> )
A067	Goldeneye ( <i>Bucephala clangula</i> )
A193	Common Tern ( <i>Sterna hirundo</i> )
A999	Wetland and Waterbirds

### 6.2.2 Conservation Objectives

The overall Conservation Objective for Lough Derg (Shannon) SPA is to maintain or restore the favourable conservation condition of the species for which the SPA has been selected.

To acknowledge the importance of Ireland's wetlands to wintering waterbirds, "Wetland and Waterbirds" may be included as a Special Conservation Interest for some SPAs that have been designated for wintering waterbirds and that contain a wetland site of significant importance to one or more of the species of Special Conservation Interest. Thus, a second objective is included as follows: to maintain or restore the favourable conservation condition of the wetland habitat at Lough Derg (Shannon) SPA as a resource for the regularly occurring migratory waterbirds that utilise it.

### 6.2.3 Site Vulnerabilities

Negative threats or pressures identified in the Site Synopsis (NPWS, 2014a) for Lough Derg (Shannon) SPA are listed in Table 6-2.

**Table 6-2 Threats or pressures with ranking of impacts (H-high, M-medium, L-low) to Lough Derg (Shannon) SPA**

Threat or pressure	Code	Rank
Hunting	N/A	Medium
Leisure fishing	N/A	Medium
Nautical sports	N/A	High
Fertilisation as a result of agriculture	N/A	High

## 7 Appropriate Assessment

### 7.1 Introduction

The following chapter assesses the potential for an adverse impact on the screened in Natura 2000 site in more detail, using the detailed information assembled from the baseline ecology and designated site details, and examines where adverse impacts may arise from the sources of impact from the Scheme. Where potentially significant adverse impacts are identified, avoidance and mitigation measures are proposed to offset these impacts. These are discussed in the following sections.

### 7.2 Identification of Potential Sources of Impact

### 7.3 Impact Assessment

All combinations of impact sources and ecological receptors are assessed to see if there are adverse effects on site integrity. The assessment and results are presented in Table 7-1.

#### 7.3.1 Do nothing scenario

There is a legal requirement from the Arterial Drainage Acts to maintain the Scheme, so in the absence of a change in the legislation, there is no option to not maintain the scheme. In some cases sites have been developed behind the embankments or in the benefitting lands within the scheme. In the absence of maintenance, the conveyance of the channels would reduce and blockages would likely develop, raising upstream water levels, bank failure would be likely and there would be increased wetness of adjacent habitats including increased flood risk to land and properties.

**Table 7-1. Assessment of Impacts**

Qualifying Interest	Potential Source of Impact	Relevant COs to impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact Assessment
Lough Derg (Shannon) SPA					
A017 Cormorant ( <i>Phalacrocorax carbo</i> )  A061 Tufted Duck ( <i>Aythya fuligula</i> )  A067 Goldeneye ( <i>Bucephala clangula</i> )  A193 Common Tern ( <i>Sterna hirundo</i> )  A999 Wetland and Waterbirds	Physical disturbances of habitats <i>Land</i>	Maintain area of key breeding and wintering sites	The field surveys have confirmed that the maintenance access corridor provides access to all Scheme channels, embankments and structures without needing to pass through or alter semi-natural habitat. There would therefore be no impacts on habitats that are important for the SPA bird populations.	Not required	No adverse impact
	Noise and visual disturbance <i>Land</i>		These bird species will be sensitive to disturbance from machinery and workforces conducting Scheme activities during the over-wintering period (typically October to March, inclusive). This disturbance could cause displacement of populations which can require significant energy expenditure for the birds, which, if undertaken during the cold winter months when birds are already stressed by recent migrations and difficulties in finding food, could have an adverse impact on population trend and distribution.  The Scheme may also cause disturbance to birds that breed in the summer, Cormorant and Common Tern. These birds breed on islands in the Lough away from the shoreline so are unlikely to be disturbed from their nests. They may be disturbed whilst foraging.  The Scheme will only cause temporary disturbances and will only occur on one in four years at most for planned works. This disturbance would not be enough to cause alterations to bird behaviour and distribution, or to restrict access to key areas, so an impact will not meet the threshold of an adverse impact on site integrity.	<b>EP25 birds</b> will be implemented on all Scheme channels within 600m of Lough Derg. Although there is no adverse impact without this, implementing EP25 will further reduce impacts by highlighting the need to choose timings to minimise impacts on wintering or breeding birds.  The relevant channels within 600m are: C1 (0-600 chains), C2 (0-700 chains), C2/1, C3, C3/1 (0-400 chains), C4/1, C4/2, C4/3, D2, D3, D4.  Channels D1 and C4 are excluded as they are at the edge of the developed land around Dromineer and will be subject to much higher levels of background noise and visual impact, so that Scheme activities will not make a significant difference.	No adverse impact
	Release of suspended solids <i>Surface Water</i>		The release of suspended solids during Scheme activities can result in increased downstream deposition, as well as local deoxygenation of the water. This will negatively impact the habitats and food resources that the SPA birds rely on.	<b>EP10 silt management</b> is implemented as standard, but will be done with particular care on channels within 1km of the SPA. For the closest channels, those within 200m, and with the smallest	No adverse impact

Qualifying Interest	Potential Source of Impact	Relevant COs to impact	Impact on Attribute and Target Prior to Mitigation / Avoidance	Avoidance / Mitigation Measures	Residual Impact Assessment
			<p>The OPW teams implement EP10 silt management as standard on all Scheme activities, which helps to minimise any release of solids into the channel. The measures listed in the EP10 are to be implemented when feasible or where conditions allow them to happen, and these are re-affirmed here as mitigation where they are necessary to avoid and reduce impacts of suspended solids.</p>	<p>amount of time for dilution to reduce suspended solid concentrations, the following measures must be implemented:</p> <ul style="list-style-type: none"> <li>- restrict maintenance to the middle 2/3rd section of the channel, and to one riverbank</li> <li>- Leave a 1.5 m buffer of undisturbed ground on the top of the banks to act as a sediment trap</li> </ul> <p>The channels within 200m of the lake are: C1 (0-400 chains), C2 (0-250 chains), C3 (0-300 chains), C4 (0-200 chains), C4/1 D1, D2, D3, D4.</p>	

## 7.1 Site specific mitigation measures

Table 7-2 summarises the specific measures identified in Table 7-1 that are necessary to avoid or mitigate any adverse impacts on the above European site. These site-specific mitigation measures should be read in conjunction with the Scheme description detailed in Section 3, to understand the full scheme of works and all of the required mitigation measures.

**Table 7-2. Specific mitigation measures**

Potential Impact	Specific Avoidance and Mitigation Measures
<p><b>Lough Derg (Shannon) SPA:</b> <b>All QI</b> Noise and visual disturbance</p>	<p><b>EP25 birds</b> will be implemented on all Scheme channels within 600m of Lough Derg. Although there is no adverse impact without this, implementing EP25 will further reduce impacts by highlighting the need to choose timings to minimise impacts on wintering and breeding birds.</p> <p>The relevant channels within 600m are: C1 (0-600 chains), C2 (0-700 chains), C2/1, C3, C3/1 (0-400 chains), C4/1, C4/2, C4/3, D2, D3, D4.</p> <p>Channels D1 and C4 are excluded as they are at the edge of the developed land around Dromineer and will be subject to much higher levels of background noise and visual impact, so that Scheme activities will not make a significant difference.</p>
<p><b>Lough Derg (Shannon) SPA:</b> <b>All QI</b> Release of suspended solids</p>	<p><b>EP10 silt management</b> is implemented as standard but will be done with particular care on channels within 1km of the SPA. For the closest channels, those within 200m, and with the smallest amount of time for dilution to reduce suspended solid concentrations, the following measures must be implemented:</p> <ul style="list-style-type: none"> <li>- restrict maintenance to the middle 2/3rd section of the channel, and to one riverbank</li> <li>- Leave a 1.5 m buffer of undisturbed ground on the top of the banks to act as a sediment trap.</li> </ul> <p>The channels within 200m of the lake are: C1 (0-400 chains), C2 (0-250 chains), C3 (0-300 chains), C4 (0-200 chains), C4/1 D1, D2, D3, D4.</p>

With this mitigation in place the Scheme activities will not adversely affect the integrity of the European site, in light of its conservation objectives and best scientific evidence. To confirm this conclusion, the following checklist, taken from DoEHLG (2009) has been completed (Table 7-3 and Table 7-4).

**Table 7-3: Integrity of Site Checklist- Conservation Objectives (from DoEHLG, 2010)**

Conservation objectives: does the project or plan have the potential to:	Y/N
Cause delays in progress towards achieving the conservation objectives of the sites?	N
Interrupt progress towards achieving the conservation objectives of the sites?	N
Disrupt those factors that help to maintain the favourable conditions of the site?	N

Conservation objectives: does the project or plan have the potential to:	Y/N
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	N

**Table 7-4: Integrity of Site Checklist- Other Objectives (from DoEHLG, 2009)**

Other objectives: does the project or plan have the potential to:	Y/N
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	N
Change the dynamics of the relationships (between, for example, soil and water or plants and animals) that define the structure and/or function of the site?	N
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	N
Reduce the area of key habitats?	N
Reduce the population of key species?	N
Change the balance between key species?	N
Reduce diversity of the site?	N
Result in disturbance that could affect population size or density or the balance between key species?	N
Result in fragmentation	N
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding etc.)?	N

## 8 In-combination impacts

Projects and Plans that have the potential to contribute in-combination impacts and cumulative impacts upon Natura 2000 designated sites are considered in this section, as described in the *Guidelines for the Assessment of Indirect and Cumulative Impacts, as well as Impact Interactions* (Walker and Johnston 1999). Key points considered when assessing cumulative and in-combination impacts include the nature and scale of the potential impacts, including their potential magnitude and significance, the availability and quality of data, and the impacts that may have occurred with similar projects in the area, where available or observed.

The impact assessment identified two possible impacts which do not meet the threshold of adverse effect on site integrity alone, and these are examined to see if they could result in an adverse effect in-combination with other plans or projects. The impacts are:

- Disturbance on all QI of Lough Derg SPA
- Release of suspended solids on all QI of Lough Derg SPA

Information on all plans and projects within 5km of the Scheme were gathered, and these were assessed to see if they could potentially result in similar impacts to the Scheme and, if so, the possibility of the impacts acting in-combination were considered.

### 8.1 Plans

In general, Plans rarely have foreseeable and real (not theoretical) impacts with Scheme implementation. However, where there is spatial and temporal overlap in actions and land designations in Plans, these are examined for potential impacts with the Scheme. The following Plans are considered for in-combination impacts as they either have spatial overlap with the scheme or affect similar ecological receptors:

- River Basin Management Plan for Ireland
- Tipperary County Development Plan

#### 8.1.1 River Basin Management Plan for Ireland 2018-2021 and 2022-2027

The core objectives of the Water Framework Directive are to prevent deterioration, restore good status, reduce chemical pollution and achieve the water related objectives of protected areas. The River Basin Management Plan (RBMP) for Ireland 2018-2021 shows the ecological status of all monitored waters in the 2010-2015 period are as follows: 10.4% are High status, 46.3% are Good status, 25.5% are Moderate status, 17.6% are Poor status and 0.2% are Bad status (Department of Housing, Planning and Local Government, 2018). The plan is now being updated and the 2022-2027 plan is out for public consultation. It maintains the same aims of bringing rivers into good ecological status in line with WFD requirements.

The plan aims to improve the management and water quality of the River Basin, and hence the waterbodies inside the Nenagh Scheme. **Therefore, the Plan would not have any adverse impact alone on any Natura 2000 site and could not have impacts in-combination with the Scheme.**

#### 8.1.2 Tipperary County Development Plan

The Tipperary County Development Plan (2022-2028) has specific policies and objectives that contribute to the conservation and protection of Natura 2000 sites in accordance with the Habitats Directive. The NIS of the development plan (CAAS, 2022) has been carried out and found that there are not likely to be significant, potentially significant or uncertain impacts on the network of Natura 2000 sites as a result of the County Development Plan.

**Therefore, the in-combination effects of the Tipperary County Development Plan (2022-2028) and proposed OPW arterial drainage maintenance operations will not be significant.**

## 8.2 Projects

### 8.2.1 Agricultural activities

Farmers and landowners may also undertake general agricultural operations in areas adjacent to the Nenagh Scheme Channels, which could potentially give rise to impacts of a similar nature to those arising from the planned OPW works. This could potentially result in additional periods of disturbance and a risk to water quality. Many agricultural operations are periodic, not continuous in nature, and qualify as a Notifiable Action that requires consultation with NPWS in advance of the works e.g. reclamation, infilling or land drainage within 30m of the river, removal of trees or any aquatic vegetation within 30m of the river, and harvesting or burning of reed or willow (NPWS 2018).

Agricultural operations must also comply with the EC (Environmental Impact Assessment) (Agriculture) Regulations 2011 and amendment 2017 S.I. No. 456/2011 and 407/2017 in relation to activities covered by the regulations:

- restructuring of rural land holdings,
- commencing use of uncultivated land or semi-natural areas for intensive,
- land drainage works on lands used for agriculture.

A NIS is required under Regulation 9 if it is likely to have a significant effect on a Natura 2000 site. The drainage or reclamation of wetlands is controlled under the Planning and Development (Amendment) (No. 2) Regulations 2011 and the European Communities (Amendment to Planning and Development) Regulations 2011.

**There are currently no agricultural activities registered on the Planning websites where an NIS has been produced, so no in-combination impacts are possible.**

### 8.2.2 OPW arterial drainage maintenance operations

Maintenance operations have been ongoing since the construction of the schemes following the 1945 Arterial Drainage Act, potentially resulting in adverse cumulative effects. However, as the maintenance operations are undertaken to restore the design level only, the hydrological and hydrogeological impact should be no greater than originally occurred upon the scheme's construction; no further deepening or widening will occur.

On a regional scale, neighbouring Arterial Drainage Schemes could be considered to have an adverse impact on Natura 2000 sites, particularly where large sites fall across two, or more scheme areas. However, this is not considered to be an issue for the Nenagh Scheme works.

The closest Schemes are Carrigahorig and Clareen, which both drain into the east of Lough Derg c. 25km north and 2km south of the Nenagh Scheme. The Nenagh and Clareen Schemes are within separate surface water catchments to Carrigahorig.

Sections of the Carrigahorig Scheme have a ground waterbody in common (IE\_SH\_G\_178) with both the Nenagh and Clareen Schemes. However, at the closest point, the Schemes are c. 10km apart (Nenagh from Carrigahorig). Therefore, in-combination impacts are not possible in the low productivity aquifer. Therefore, the potential for adverse in-combination impacts from either of these schemes are negligible.

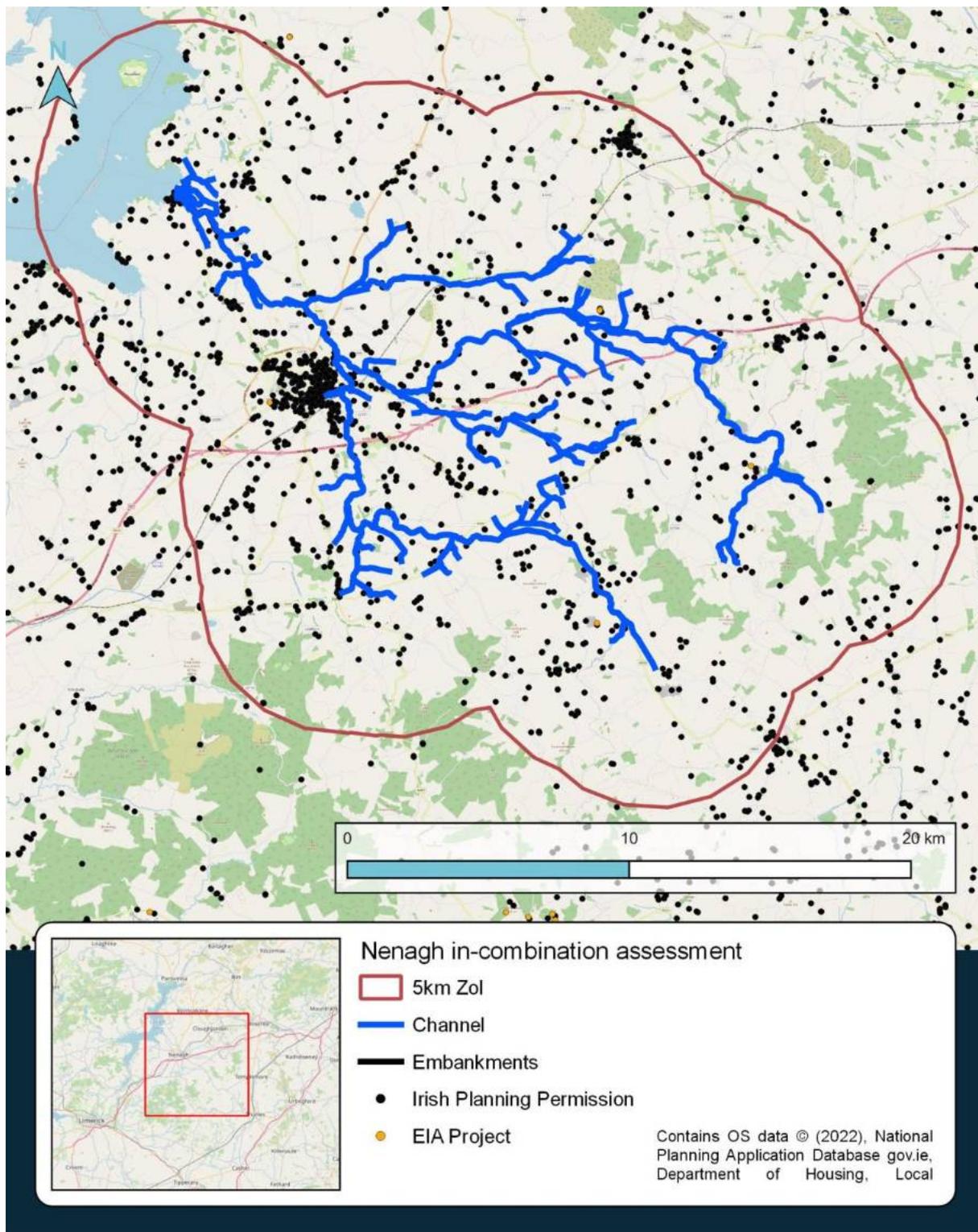
**Therefore, there are no in-combination effects of the Scheme and other OPW arterial drainage maintenance operations.**

### 8.3 EIA and Local Planning Projects

A total of four EIA projects and 800 local planning applications with, if appropriate, planning permission valid until at least 1/1/2022 (withdrawn projects, incomplete applications and refused applications are excluded) are present within the project zone of influence (Figure 8-1). Those projects that have the potential to interact with the Scheme and lead to in-combination effects (as set out above) are discussed in Table 8-1. The main projects likely to result in similar impacts are those on the shoreline of Lough Derg, four of which are current and are discussed in the table below.

The four EIA projects include an increase in waste accepted at an existing tip (Reference 2018008) in Nenagh, and further upstream of Nenagh a pig farm extension (Reference 2020034/2020025), and two quarry extensions (Reference 2020228 and 2922095). These are sufficiently far upstream that there will be no impacts on the Lough Derg (Shannon) SPA.

There are also several proposals for development close to Scheme channels around Urna in close proximity to Lough Derg (e.g. Planning application 15600284). These are all screened from the lake by the presence of woodland around the lake edge, and are therefore will not lead to disturbance of the SPA birds.



**Figure 8-1. Location of EIA and planning projects**

**8.4 Significance of in-combination impacts and additional mitigation**

There are a small number of potential in-combination effects where further consideration of the impacts and possible avoidance and mitigation measures may be needed. These are assessed in Table 8-1.

**Table 8-1: In-combination assessment details**

Scheme non-significant residual impact	Other project and potential in-combination impact	Additional mitigation required?
<b>Lough Derg (Shannon) SPA; all features</b>		
Physical disturbance of habitats Noise and visual disturbance	<p><b>Lough Derg Yacht Club - improvements to the boat mooring facilities at the western shoreline (Tipperary App 20251)</b></p> <p>This project will impact on the shore of Lough Derg adjacent to channel D1 and near to C4 but the impacts are on the already developed shoreline of Lough Derg where there is already a high level of background noise and visual disturbance such that there will be no impacts of the works on the SPA birds.</p>	Not required.
	<p><b>Dromineer Harbour water park (Tipperary App 17600541)</b>  <b>Dromineer Harbour canoe storage (Tipperary App 2260155)</b>  <b>Dromineer Marina Canoe Trail (Tipperary App 16600145)</b></p> <p>The applications relate to recreational activities that will impact on the shore of Lough Derg around 100m south of Scheme channels, but in the built-up area of shoreline at Dromineer. It would therefore not be a significant increase in the background levels of activity and disturbance and result in no impacts alone.</p>	Not required.
	<p><b>Residential developments (Tiperrary Apps 201, 2189, 17600034, 19600152, 19601082, 15600284)</b></p> <p>There are several proposals for development close to Scheme channels around Urra, in close proximity to Lough Derg, These are all screened from the lake by the presence of woodland around the lake edge or are simple modifications to existing properties, and therefore will not cause any disturbance to the SPA.</p>	Not required

## 9 Conclusion

Following a comprehensive evaluation of the potential direct, indirect and in-combination impacts on the qualifying interests and conservation objectives for all European sites in the zone of influence of the Scheme, once relevant mitigation measures have been applied, it has been concluded that the Scheme will have no adverse impacts on the integrity of European sites or coherence of the Natura 2000 network in light of their conservation objectives and best scientific evidence.

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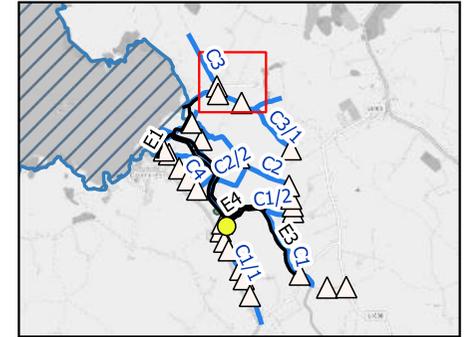
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## Appendices

### A Scheme Channel Maps

The following maps present a detailed view of the Scheme channels. They include the location of the Natura 2000 sites and the Annex 1 habitats present in and around these sites. The absence of Annex 1 habitats on the maps, particularly away from the Natura 2000 site boundaries, does not necessarily imply the absence of such habitats.



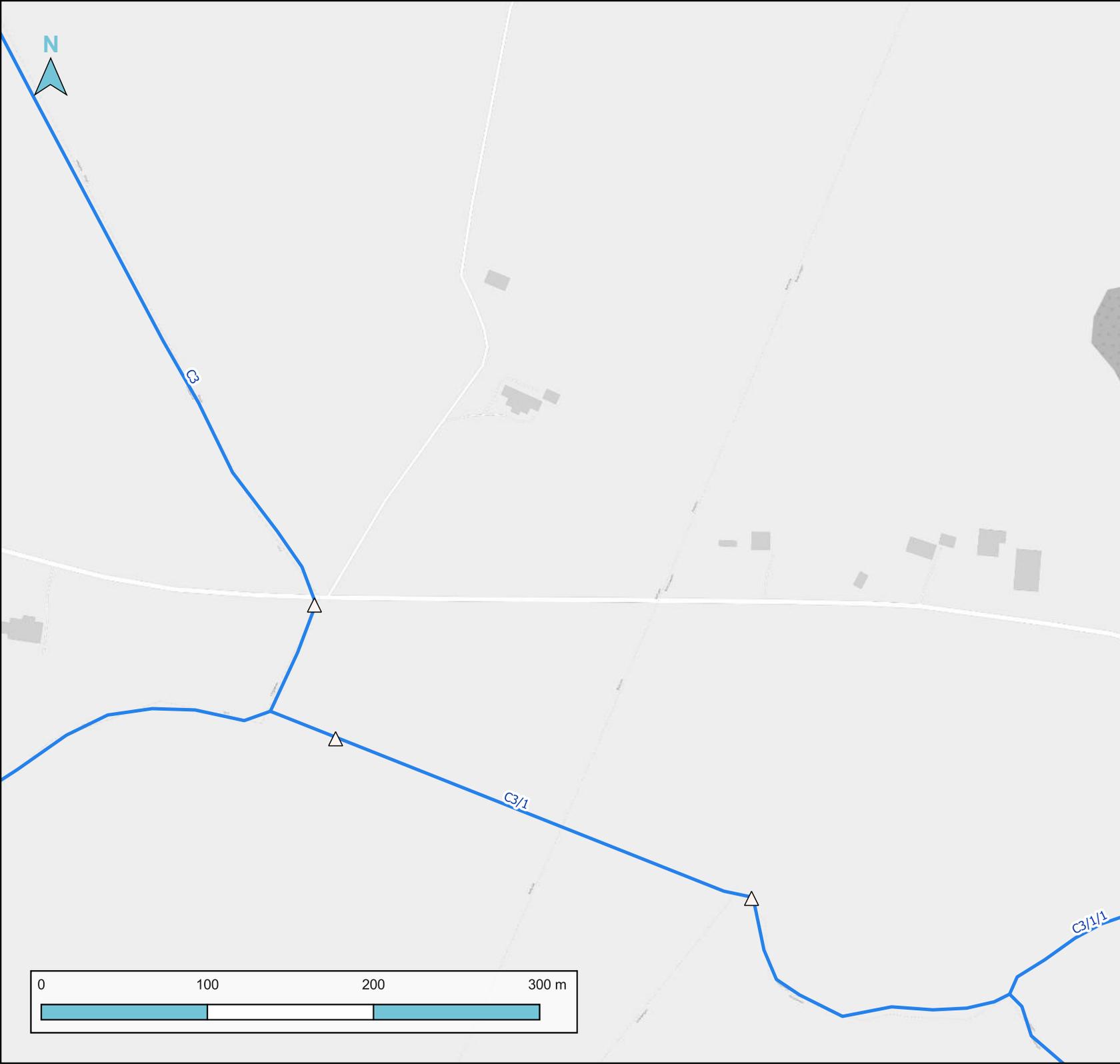
## Nenagh Scheme Channels Map 1 of 11

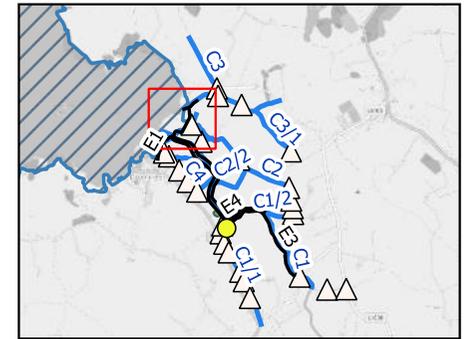
### Legend

-  Nenagh Scheme Channels
-  Nenagh Scheme Bridges

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### Nenagh Scheme Channels Map 2 of 11

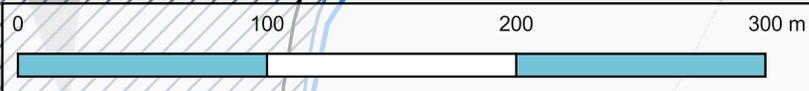
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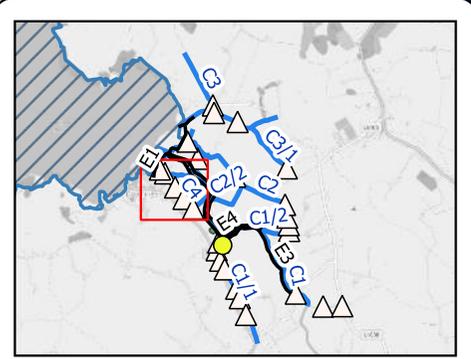
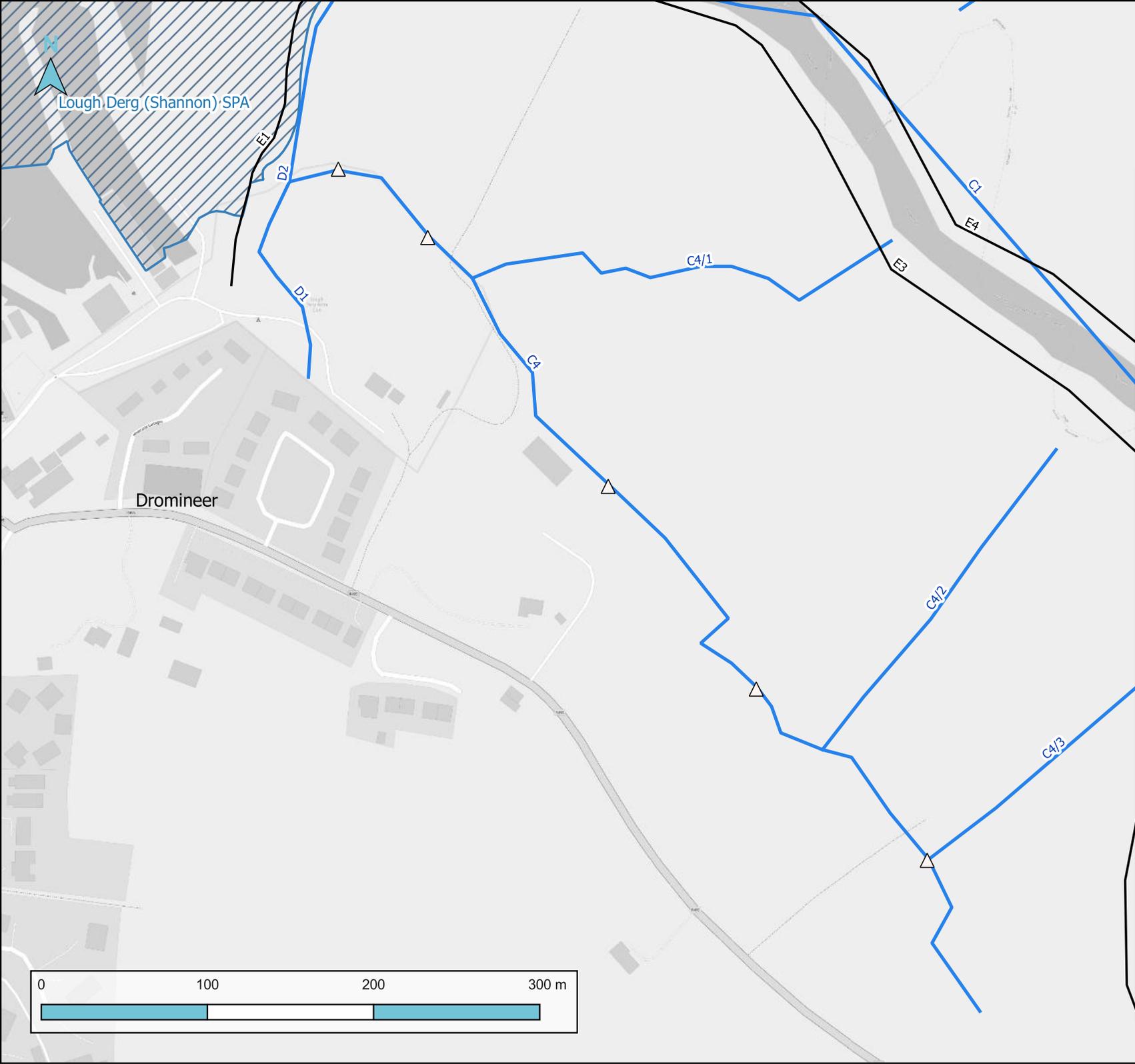
- Nenagh Scheme Embankments
- Nenagh Scheme Channels
- △ Nenagh Scheme Bridges
- ▨ SPA

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Lough Derg (Shannon) SPA





Nenagh Scheme Channels  
Map 3 of 11

### Legend

- Nenagh Scheme Embankments
- Nenagh Scheme Channels
- △ Nenagh Scheme Bridges
- ▨ SPA

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**Figure Title:** Nenagh Scheme Channels  
**File Name:** Nenagh mapping 2022

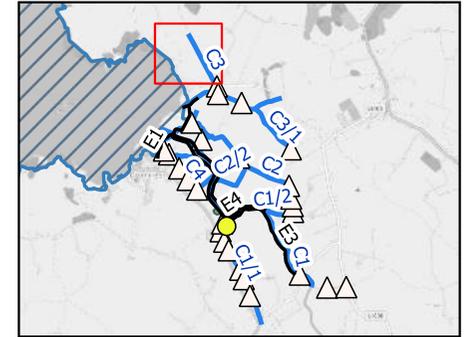


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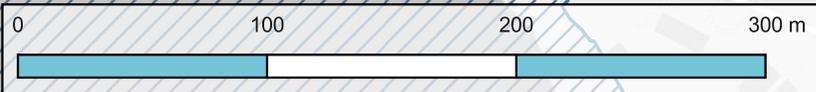


Nenagh Scheme Channels  
Map 4 of 11

### Legend

-  Nenagh Scheme Channels
-  SPA

Lough Derg (Shannon) SPA

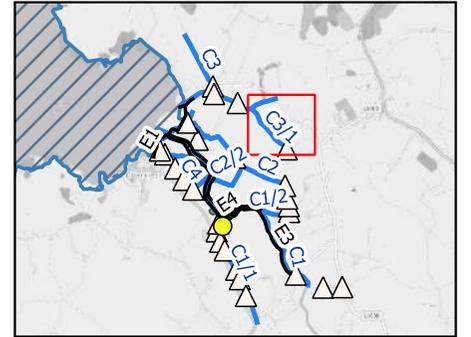
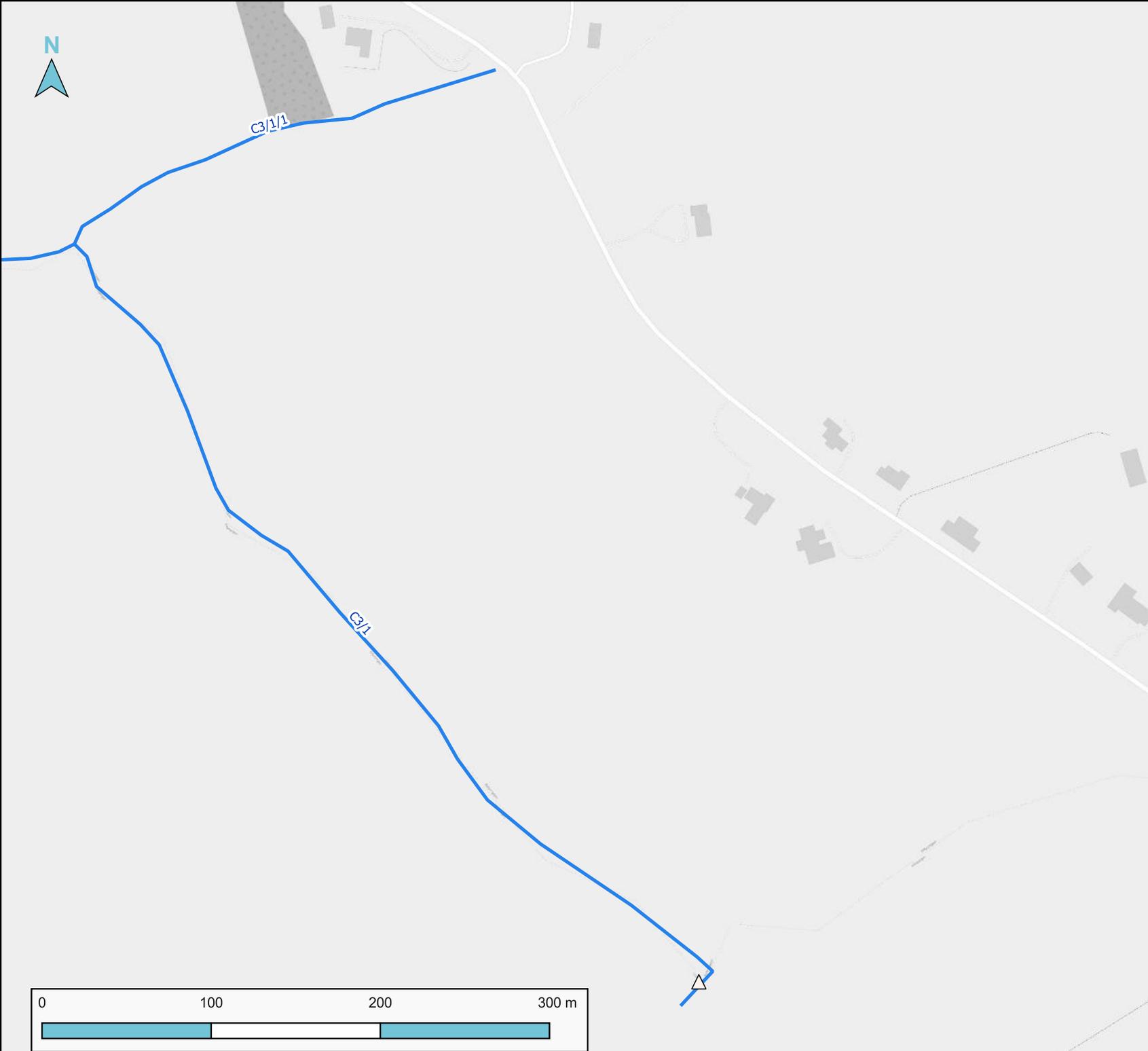


**Drawn By:** SE    **Date:** 07/11/2022  
**Checked By:**    **Date:** 07/11/2022  
**Approved By:**    **Date:** 07/11/2022  
**Status:** S1    **Revision:** P01  
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Nenagh Scheme Channels  
Map 5 of 11

### Legend

-  Nenagh Scheme Channels
-  Nenagh Scheme Bridges

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**Figure Title:** Nenagh Scheme Channels  
**File Name:** Nenagh mapping 2022

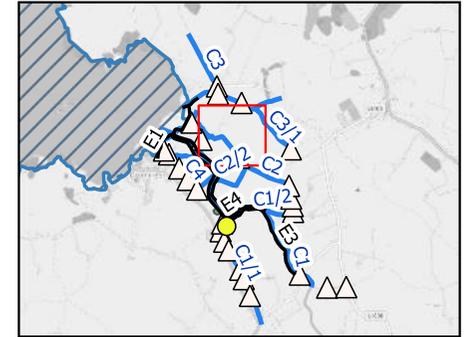


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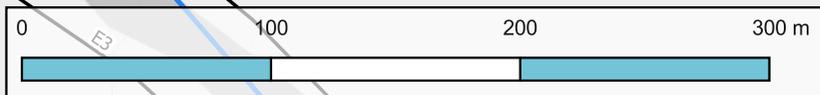
Nenagh Scheme Channels  
Map 6 of 11

### Legend

- Nenagh Scheme Embankments
- Nenagh Scheme Channels
- △ Nenagh Scheme Bridges

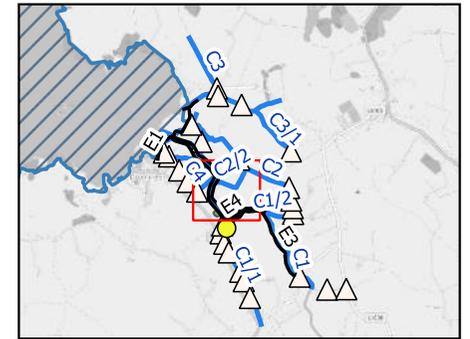
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**Checked By:**    **Date:** 07/11/2022  
**Approved By:**    **Date:** 07/11/2022  
**Status:** S1    **Revision:** P01  
**Figure Title:** Nenagh Scheme Channels  
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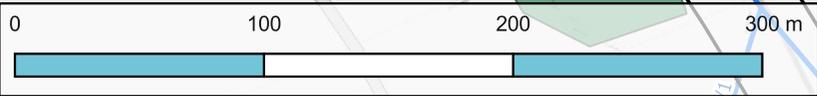
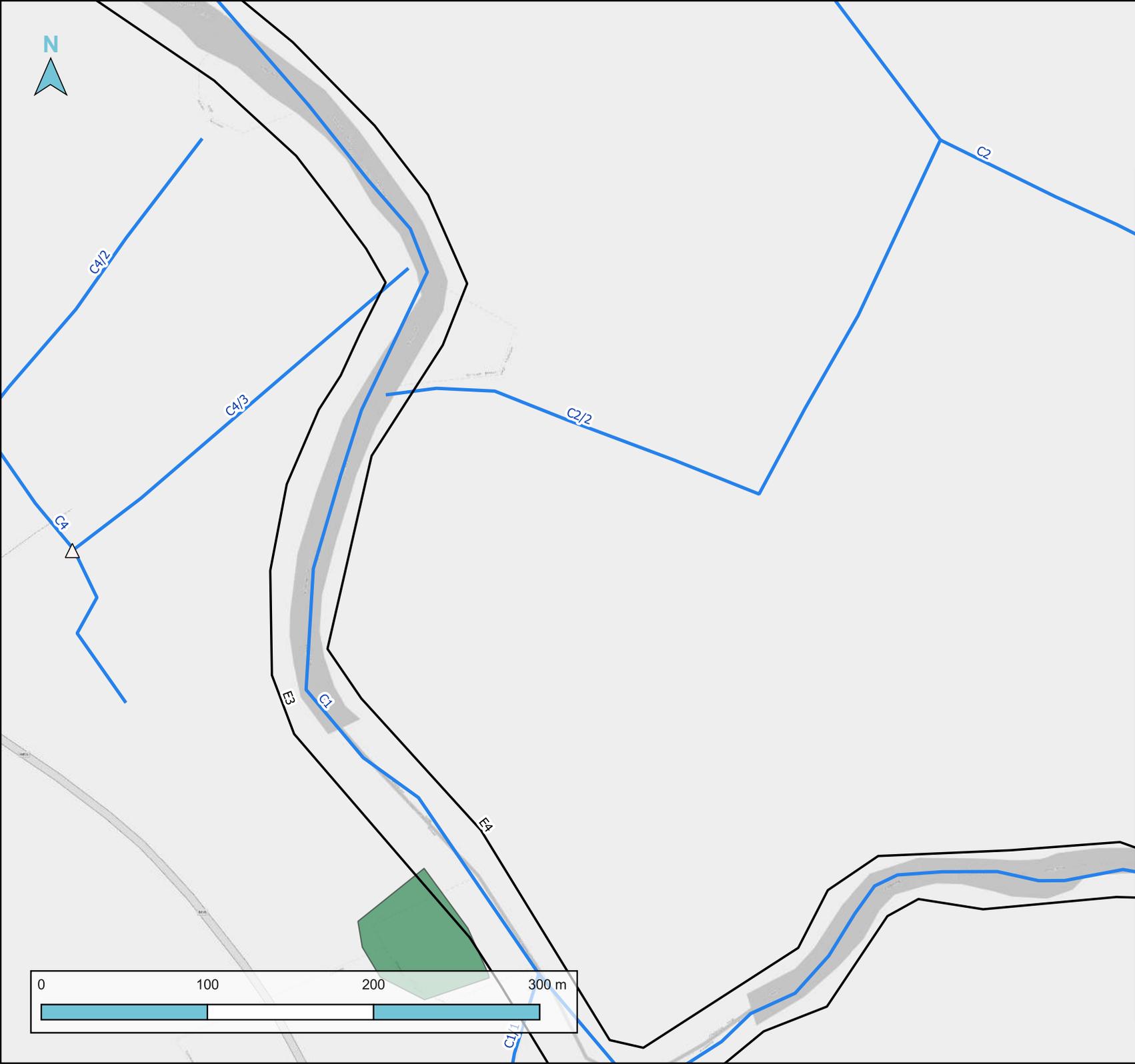
### Nenagh Scheme Channels Map 7 of 11

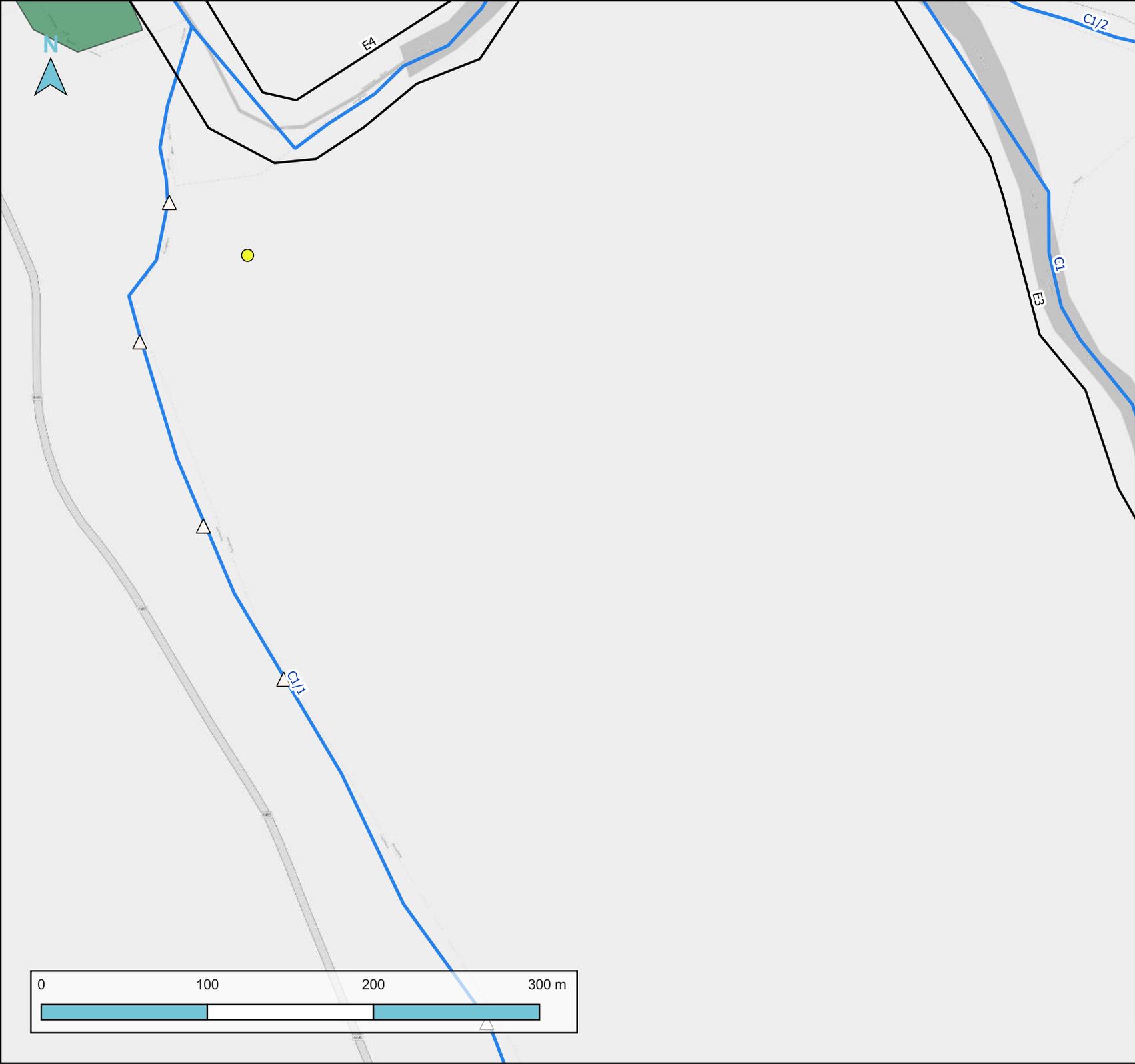
#### Legend

-  Nenagh Scheme Embankments
-  Nenagh Scheme Channels
- Annex 1 habitats**
-  91E0
-  Nenagh Scheme Bridges

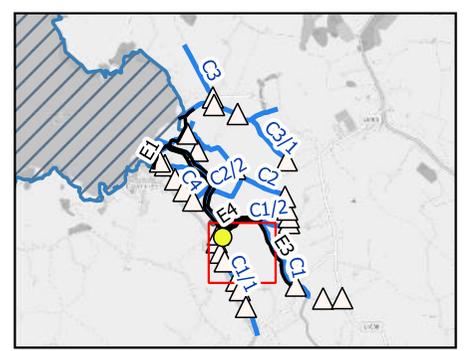
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Nenagh Scheme Channels  
 Map 8 of 11

### Legend

- Nenagh Scheme Embankments
- Nenagh Scheme Channels
- Annex 1 habitats**
- 91E0
- Nenagh Scheme Bridges
- Nenagh Scheme Sluice

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**File Name:** Nenagh mapping 2022

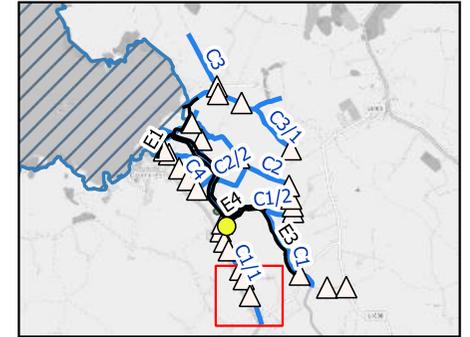


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Nenagh Scheme Channels  
Map 9 of 11

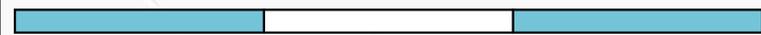
### Legend

-  Nenagh Scheme Channels
-  Nenagh Scheme Bridges

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**Checked By:**    **Date:** 07/11/2022  
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**Figure Title:** Nenagh Scheme Channels  
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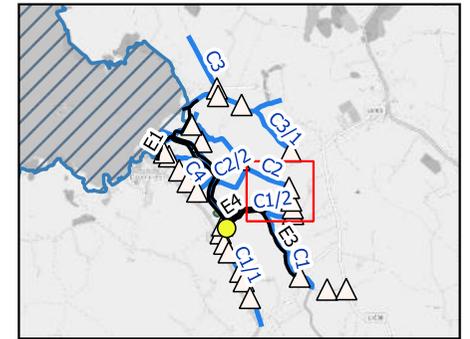
0                      100                      200                      300 m





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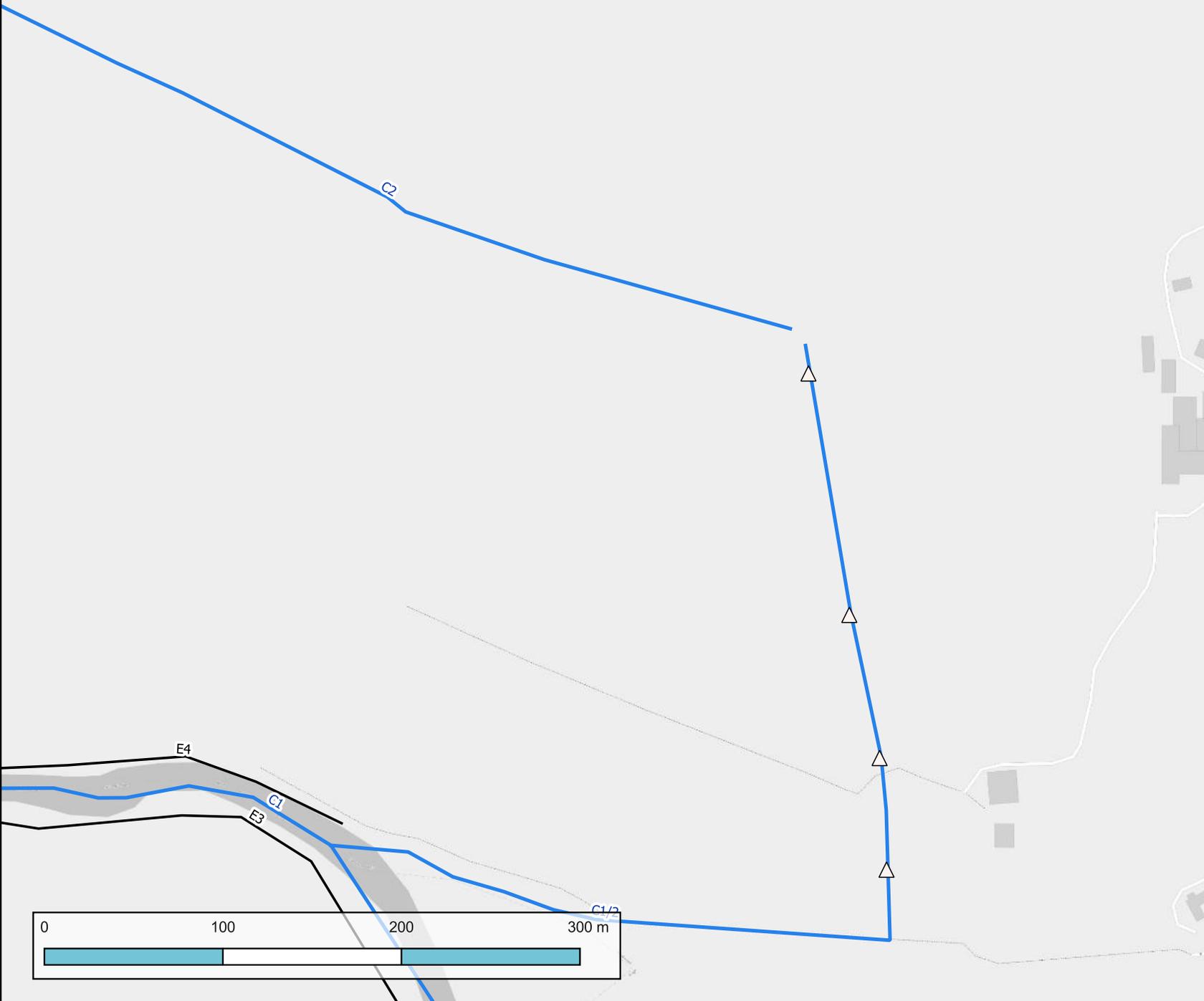
Nenagh Scheme Channels  
Map 10 of 11

### Legend

- Nenagh Scheme Embankments
- Nenagh Scheme Channels
- △ Nenagh Scheme Bridges

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**Approved By:**    **Date:** 07/11/2022  
**Status:** S1    **Revision:** P01  
**Figure Title:** Nenagh Scheme Channels  
**File Name:** Nenagh mapping 2022

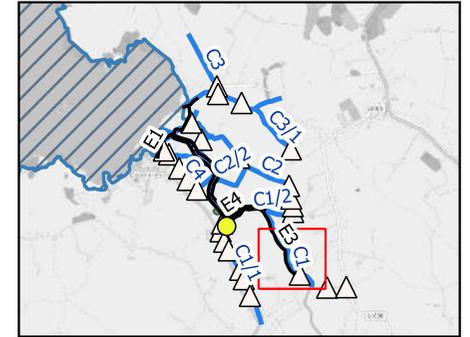
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Nenagh Scheme Channels  
Map 11 of 11

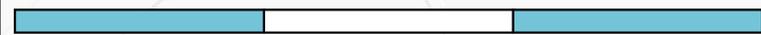
## Legend

- Nenagh Scheme Embankments
- Nenagh Scheme Channels
- △ Nenagh Scheme Bridges

**Drawn By:** SE    **Date:** 07/11/2022  
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**Approved By:**    **Date:** 07/11/2022  
**Status:** S1    **Revision:** P01  
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**File Name:** Nenagh mapping 2022

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0                      100                      200                      300 m



## B Designated Site Details for European Sites in the Appropriate Assessment

### B.1 Lough Derg, Shannon SPA (004058)

Lough Derg lies within counties Tipperary, Galway and Clare and is the largest of the River Shannon Lakes, being some 40 km long. Its maximum breadth across the Scarriff Bay - Youghal Bay transect is 13 km but for most of its length it is less than 5 km wide. The lake is relatively shallow at the northern end being mostly 6 m in depth but in the middle region it has an axial trench and descends to over 25 m in places. The narrow southern end of the lake has the greatest average depth, with a maximum of 34 m. The greater part of the lake lies on Carboniferous limestone but the narrow southern section is underlain by Silurian strata. Most of the lower part of the lake is enclosed by hills on both sides, the Slieve Aughty Mountains to the west and the Arra Mountains to the east. The northern end is bordered by relatively flat, agricultural country. The lake shows the high hardness levels and alkaline pH to be expected from its mainly limestone catchment basin, and it has most recently been classified as a mesotrophic system. The lake has many small islands, especially on its western and northern sides. The shoreline is often fringed with swamp vegetation. Aquatic vegetation includes a range of charophyte species, including the Red Data Book species, *Chara tomentosa*. The shoreline is often fringed by swamp vegetation, comprised of such species as Common Reed (*Phragmites australis*), Great Fen-sedge (*Cladium mariscus*) and Bottle Sedge (*Carex rostrata*).

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Tufted Duck, Goldeneye and Common Tern. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Lough Derg is of importance for both breeding and wintering birds. The site supports a nationally important breeding colony of Common Tern (55 pairs recorded in 1995).

Management of one of the islands used for nesting has increased the area of suitable habitat available and prevented nests being destroyed by fluctuating water levels. Large numbers of Black-headed Gull have traditionally bred on the many islands (2,176 pairs in 1985) but the recent status of this species is not known. The islands in the lake also support a nationally important Cormorant colony - 167 pairs were recorded in 1995; a partial survey of the lake in 2010 recorded 113 pairs. Lough Derg is also a noted breeding site for Great Crested Grebe (47 pairs in 1995) and Tufted Duck (169 pairs in May 1995).

In winter, the lake is important for a range of waterfowl species, including nationally important populations of Tufted Duck (776) and Goldeneye (157) – all figures are mean peaks for 4 of the 5 seasons between 1995/96 and 1999/2000. Other species which occur in winter include Mute Swan (164), Whooper Swan (18), Wigeon (249), Teal (301), Mallard (376), Little Grebe (14), Cormorant (90), Coot (173), Lapwing (922), Curlew (66) and Black-headed Gull (732). Areas to north and south west of Lough Derg have been utilised in the past by small numbers of Greenland Whitefronted Goose – 19 geese were recorded on callowland near Portumna in 1996/97. A relatively small flock based in the Lough Derg-Lough Graney area and possibly further afield have been recorded in the Scarriff Bay area – 20 geese recorded in 2004. Few sightings, at either location have been made in recent years.

Hen Harrier are also known to roost in the reedbeds on the margins of the site during the winter.

Lough Derg (Shannon) SPA is of high ornithological importance as it supports nationally important breeding populations of Cormorant and Common Tern. In winter, it has nationally important populations of Tufted Duck and Goldeneye, as well as a range of other species including Whooper Swan. The presence of Whooper Swan, Greenland White-fronted Goose,

Hen Harrier and Common Tern is of particular note as these are listed on Annex I of the E.U. Birds Directive. Parts of Lough Derg (Shannon) SPA are a Wildfowl Sanctuary.

(Source: NPWS, 2014a)

## C Protected Flora and Fauna and Invasive Species

Protected flora and fauna present or adjacent to the Scheme within the last 10 years, compiled from the National Biodiversity Data Centre map database.

**Table C9-1. Notable species records**

Common name	Latin Name	Date of last record	Designation
<b>Birds</b>			
Barn Owl	<i>Tyto alba</i>	01/01/2021	Birds of Conservation Concern - Red List
Barn Swallow	<i>Hirundo rustica</i>	16/07/2020	Birds of Conservation Concern - Amber List
Barnacle Goose	<i>Branta leucopsis</i>	31/12/2011	Birds of Conservation Concern - Amber List
Black-headed Gull	<i>Larus ridibundus</i>	11/01/2018	Birds of Conservation Concern - Red List
Common Coot	<i>Fulica atra</i>	11/01/2018	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Common Goldeneye	<i>Bucephala clangula</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Common Grasshoper Warbler	<i>Locustella naevia</i>	31/12/2011	Birds of Conservation Concern - Amber List
Common Kestrel	<i>Falco tinnunculus</i>	16/07/2020	Birds of Conservation Concern - Amber List
Common Kingfisher	<i>Alcedo atthis</i>	10/01/2017	EU Birds Directive >> Annex I Species Birds of Conservation Concern - Amber List
Common Linnet	<i>Carduelis cannabina</i>	31/12/2011	Birds of Conservation Concern - Amber List
Common Pochard	<i>Aythya farina</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Common Redshank	<i>Tringa totanus</i>	13/01/2018	Birds of Conservation Concern - Red List
Common Sandpiper	<i>Actitis hypoleucos</i>	31/12/2011	Birds of Conservation Concern - Amber List
Common Snipe	<i>Gallinago gallinago</i>	18/10/2017	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Common Starling	<i>Sturnus vulgaris</i>	22/05/2016	Birds of Conservation Concern - Amber List
Common Swift	<i>Apus apus</i>	11/05/2022	Birds of Conservation Concern - Amber List
Eurasian Curlew	<i>Numenius arquata</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Red List
Eurasian Teal	<i>Anas crecca</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Eurasian Wigeon	<i>Anas penelope</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Eurasian Woodcock	<i>Scolopax rusticola</i>	16/03/2018	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List

Common name	Latin Name	Date of last record	Designation
European Golden Plover	<i>Pluvialis apricaria</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Red List
Gadwall	<i>Anas strepera</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Great Black-backed Gull	<i>Larus marinus</i>	31/12/2011	Birds of Conservation Concern - Amber List
Great Cormorant	<i>Phalacrocorax carbo</i>	31/12/2011	Birds of Conservation Concern - Amber List
Great Crested Grebe	<i>Podiceps cristatus</i>	31/12/2011	Birds of Conservation Concern - Amber List
Hen Harrier	<i>Circus cyaneus</i>	11/04/2018	Birds of Conservation Concern - Amber List
Herring Gull	<i>Larus argentatus</i>	31/12/2011	Birds of Conservation Concern - Red List
House Martin	<i>Delichon urbicum</i>	16/07/2020	Birds of Conservation Concern - Red List
House Sparrow	<i>Passer domesticus</i>	22/05/2016	Birds of Conservation Concern - Amber List
Lesser Black-backed Gull	<i>Larus fuscus</i>	31/12/2011	Birds of Conservation Concern - Amber List
Little Egret	<i>Egretta garzetta</i>	31/12/2011	EU Birds Directive >> Annex I Species
Little Grebe	<i>Tachybaptus ruficollis</i>	11/01/2018	Birds of Conservation Concern - Amber List
Mediterranean Gull	<i>Larus melanocephalus</i>	31/12/2011	EU Birds Directive >> Annex I Bird Species Birds of Conservation Concern - Amber List
Merlin	<i>Falco columbarius</i>	12/02/2018	EU Birds Directive >> Annex I Bird Species Birds of Conservation Concern - Amber List
Mew Gull	<i>Larus canus</i>	31/12/2011	Birds of Conservation Concern - Amber List
Mute Swan	<i>Cygnus olor</i>	20/02/2018	Birds of Conservation Concern - Amber List
Northern Lapwing	<i>Vanellus vanellus</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Red List
Northern Pintail	<i>Anas acuta</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Red List
Northern Shoveler	<i>Anas clypeata</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Red List
Red-breasted Merganser	<i>Mergus serrator</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species
Rock Pigeon	<i>Columba livia</i>	31/12/2011	EU Birds Directive >> Annex II, Section I Bird Species
Sand Martin	<i>Riparia riparia</i>	22/09/2017	Birds of Conservation Concern - Amber List
Sky Lark	<i>Alauda arvensis</i>	31/12/2011	Birds of Conservation Concern - Amber List
Spotted Flycatcher	<i>Muscicapa striata</i>	31/12/2011	Birds of Conservation Concern - Amber List
Stock Pigeon	<i>Columba oenas</i>	22/04/2016	Birds of Conservation Concern - Amber List
Tufted Duck	<i>Aythya fuligula</i>	31/12/2011	EU Birds Directive >> Annex II, Section II Bird Species Birds of Conservation Concern - Amber List
Water Rail	<i>Rallus aquaticus</i>	31/12/2011	Birds of Conservation Concern - Amber List

Common name	Latin Name	Date of last record	Designation
Whooper Swan	<i>Cygnus cygnus</i>	05/11/2020	EU Birds Directive >> Annex I Bird Species Birds of Conservation Concern - Amber List
Yellowhammer	<i>Emberiza citrinella</i>	22/05/2021	Birds of Conservation Concern - Red List
<b>Mammals</b>			
Brown Long-eared Bat	<i>Plecotus auritus</i>	07/08/2014	EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Daubenton's Bat	<i>Myotis daubentonii</i>	24/08/2011	EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Eurasian Badger	<i>Meles meles</i>	10/07/2018	Protected Species: Wildlife Acts
Eurasian Pygmy Shrew	<i>Sorex minutus</i>	22/05/2016	Protected Species: Wildlife Acts
Eurasian Red Squirrel	<i>Sciurus vulgaris</i>	10/10/2017	Protected Species: Wildlife Acts
European Otter	<i>Lutra lutra</i>	01/02/2012	EU Habitats Directive >> Annex II EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Lesser Noctule	<i>Nyctalus leisleri</i>	07/08/2014	EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Pine Marten	<i>Martes martes</i>	21/09/2021	EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	07/08/2014	EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	06/08/2014	EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
West European Hedgehog	<i>Erinaceus europaeus</i>	22/06/2021	Protected Species: Wildlife Acts
<b>Invertebrates</b>			
Freshwater White-clawed Crayfish	<i>Austropotamobius pallipes</i>	18/07/2018	EU Habitats Directive >> Annex II EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
<b>Invasive species</b>			
New Zealand Flatworm	<i>Arthurdendyus triangulatus</i>	02/06/2014	High Impact Invasive Species
Jenkins' Spire Snail	<i>Potamopyrgus antipodarum</i>	09/08/2018	Medium Impact Invasive Species
American Mink	<i>Mustela vison</i>	25/10/2016	High Impact Invasive Species    Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Butterfly-bush	<i>Buddleja davidii</i>	23/08/2021	Medium Impact Invasive Species
Common Broomrape	<i>Orobanche minor</i>	20/07/2019	High Impact Invasive Species    Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Common Broomrape	<i>Orobanche minor</i>	23/03/2018	Medium Impact Invasive Species
Himalayan Honeysuckle	<i>Leycesteria formosa</i>	27/10/2019	Medium Impact Invasive Species
Himalayan Knotweed	<i>Persicaria wallichii</i>	22/06/2018	High Impact Invasive Species    Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)

Common name	Latin Name	Date of last record	Designation
Japanese Knotweed	<i>Fallopia japonica</i>	20/07/2020	High Impact Invasive Species    Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Rhododendron	<i>Rhododendron ponticum</i>	13/06/2014	High Impact Invasive Species    Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Spanish Bluebell	<i>Hyacinthoides hispanica</i>	02/05/2022	Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)

## D Details of Planned Maintenance Activities

The details of maintenance for each channel are shown in Table D9-2 and embankments in Table D9-3. These details form the basis of the Scheme description. However, they are not a comprehensive list of works, and as explained in the project description, there is likely to be the need for unplanned and sometimes emergency maintenance works. These are considered in the assessment in so far as they fall within the described activities of the Scheme.

**Table D9-2. Maintenance details for channels in Nenagh Arterial Drainage Maintenance scheme**

Channel Ref	Freq. of Maint.	Year of Last Maint.	Timing	Machine Type	Works					Length (m)	Notes
					A	B	C	D	E		
C1a	10	26/07/2017	Details not provided		x		x	x	x	23.681	Selective tree management, minor selective bank protection
C1b	10	26/07/2017			x		x	x	x	1.008	Selective tree management, minor selective bank protection
C1c	4	26/07/2017			x		x	x	x	2.804	Selective tree management, minor selective bank protection
C1d	10	26/07/2017			x		x	x	x	5.015	Selective tree management, minor selective bank protection
C1/1	4	15/02/2012			x			x		1.262	
C1/10	4	30/11/2011			x			x		0.854	
C1/11	4	28/03/2012			x			x		0.079	
C1/11	4	28/03/2012			x			x		0.936	
C1/12	4	16/07/2014			x			x		1.554	
C1/13	4	17/07/2013			x			x		1.454	
C1/14	4	20/05/2015			x			x		2.632	
C1/14/1	4	12/05/2010			x			x		0.58	
C1/14/1	4	12/05/2010			x			x		0.249	
C1/14/1/A	4	19/05/2010			x			x		1.172	
C1/14/2	4	17/04/2013			x			x		1.82	
C1/15	4	10/04/2013			x			x		1.889	
C1/16	4	13/03/2013			x			x		0.307	
C1/16	4	13/03/2013			x			x		1.513	
C1/16/1	4	06/03/2013			x			x		0.56	
C1/16/2	4	13/03/2013			x			x		0.564	
C1/17	4	30/05/2012		x			x		4.396		
C1/17/1	4	02/05/2012		x			x		0.664		
C1/17/2	4	09/05/2012		x			x		0.777		
C1/17/2/1	4	02/05/2012		x			x		0.26		
C1/17/3	4	16/05/2012		x			x		1.014		
C1/17/4	4	23/05/2012		x			x		0.659		
C1/18	4	01/05/2013		x			x		2.088		
C1/19	4			x		x	x	x		Selective tree management in flood channel, minor selective	

Channel Ref	Freq. of Maint.	Year of Last Maint.	Timing	Machine Type	Works					Length (m)	Notes
					A	B	C	D	E		
											bank protection
C1/2	4	12/12/2006			x			x		0.655	
C1/3	4	15/07/2015			x			x		0.949	
C1/4	4	01/07/2015			x			x		0.652	
C1/4/1	4	08/07/2015			x			x		0.265	
C1/4/A	4	24/06/2015			x			x		0.563	
C1/5	4	17/06/2015			x			x		1.503	
C1/6	4	12/08/2015			x			x		0.562	
C1/7	4	29/07/2015			x			x		0.722	
C1/8	4	22/07/2015			x		x	x	x	7.38	
C1/8	4	02/07/2015			x		x	x	x	4.171	Selective tree management, minor selective bank protection
C1/8/1	4	29/07/2015			x			x		0.838	
C1/8/2	4	19/11/2014			x			x		2.725	
C1/8/2/1	4	19/11/2014			x			x		0.409	
C1/8/5	4	17/12/2014			x			x		1.329	
C1/8/6	4	20/04/2016			x			x		2.024	
C1/8/6/1	4	26/05/2010			x			x		0.709	
C1/9	10	19/07/2017			x		x	x	x	7.115	Selective tree management, minor selective bank protection
C1/9	10	19/07/2017			x		x	x	x	13.093	Selective tree management, minor selective bank protection
C1/9	10	19/07/2017			x		x	x	x	0.137	Selective tree management, minor selective bank protection
C1/9	10	19/07/2017			x		x	x	x	7.983	Selective tree management, minor selective bank protection
C1/9/1	4	11/02/2015			x			x		1.349	
C1/9/10	4	07/09/2016			x			x		1.099	
C1/9/11	4	29/06/2016			x			x		2.516	
C1/9/12	4	05/10/2016			x			x		1.007	
C1/9/2	4	05/07/2017			x			x	x	10.137	Selective tree management
C1/9/2/1	4	22/02/2017			x			x		0.525	
C1/9/2/2	4	08/03/2017			x			x		1.554	
C1/9/2/3	4	29/03/2017			x			x		1.912	
C1/9/2/4	4	03/05/2017			x			x		2.034	
C1/9/2/5	4	10/05/2017			x			x		0.531	
C1/9/2/6	4	17/05/2017			x			x		0.43	
C1/9/2/7	4	24/05/2017			x			x		0.814	
C1/9/2/8A	4	05/04/2006			x			x		0.628	
C1/9/2/9	4	12/04/2006			x			x		0.593	

Channel Ref	Freq. of Maint.	Year of Last Maint.	Timing	Machine Type	Works					Length (m)	Notes
					A	B	C	D	E		
C1/9/5	4	29/04/2015			x			x		1.943	
C1/9/5/1	4	06/05/2015			x			x		2.333	
C1/9/5/1/1	4	13/05/2015			x			x		0.844	
C1/9/5/A	4	22/08/2012			x			x		0.374	
C1/9/6	4	13/08/2014			x			x		4.062	
C1/9/6/1	4	16/04/2014			x			x		0.937	
C1/9/6/1/1	4	26/01/2011			x			x		0.017	
C1/9/6/1/1	4	15/01/2014			x			x		0.617	
C1/9/7	4	01/02/2017			x			x		2.601	
C1/9/7/1	4				x			x		1.6	
C1/9/8	4				x			x		2.221	
C1/9/9	4	15/02/2017			x			x		1.381	
C2	4	27/04/2016			x			x		1.31	
C2/1	4	19/05/2010			x			x		0.144	
C2/2	4	26/05/2010			x			x		0.473	
C3	4	18/05/2016			x			x		1.048	
C3/1	4	06/08/2014			x			x		1.119	
C3/1/1	4	03/08/2011			x			x		0.274	
C4	4	25/05/2016			x			x		0.723	
C4/1	4	10/08/2005			x			x		0.277	
C4/2	4	10/07/2002			x			x		0.228	
C4/3	4	24/06/1994			x			x		0.261	
D1	4	21/11/2007			x			x		0.13	
D2	4	03/10/2007			x			x		0.192	
D3	4				x			x		0.223	
D4	4	07/09/2011			x			x		0.118	

**Table D9-3. Maintenance details for embankments in Nenagh Arterial Drainage Maintenance scheme**

Embankment Ref	Freq.	Year of Last Maint.	Timing of Works	Machine Type	Type of Maintenance					Length (km)	Notes
					D	E	F	G	H		
E1					x	x	x			0.297	Inspection, selective vegetation management and mulching of embankment cross section
E2					x	x	x			0.166	Inspection, selective vegetation management and mulching of embankment cross section
E3					x	x	x			2.43	Inspection, selective vegetation management and mulching of embankment cross section
E4					x	x	x			2.029	Inspection, selective vegetation management and mulching of

Embankment Ref	Freq.	Year of Last Maint.	Timing of Works	Machine Type	Type of Maintenance					Length (km)	Notes
					D	E	F	G	H		
											embankment cross section
E5					x	x	x			0.671	Inspection, selective vegetation management and mulching of embankment cross section
E6					x	x	x			0.66	Inspection, selective vegetation management and mulching of embankment cross section

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