Connemara Greenway - Clifden to Oughterard

Natura Impact Statement

May 2012

MGE0269CR0007

Connemara Greenway Project – Clifden to Oughterard

Natura Impact Statement

DOCUMENT CONTROL SHEET

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1 INTRODUCTION

1.1 SCOPE

RPS has been commissioned by the Galway County Council to prepare a Natura Impact Statement (NIS) for the Connemara Greenway – Clifden to Oughterard. The assessment has been conducted in line with the Habitats Directive 92/43/EEC, Article 6(3).

In May 2011 Galway County Council appointed RPS as environmental consultants for the Connemara Greenway – Clifden to Oughterard Project. The Project will consist of developing a walking/cycle track (Greenway) along the dismantled Galway to Clifden railway line from Oughterard to Clifden. The purpose of the project is to provide all members of the local community and visitors alike, with a safe and accessible way of using the dismantled railway line for walking and cycling. The Project will also benefit the local economy.

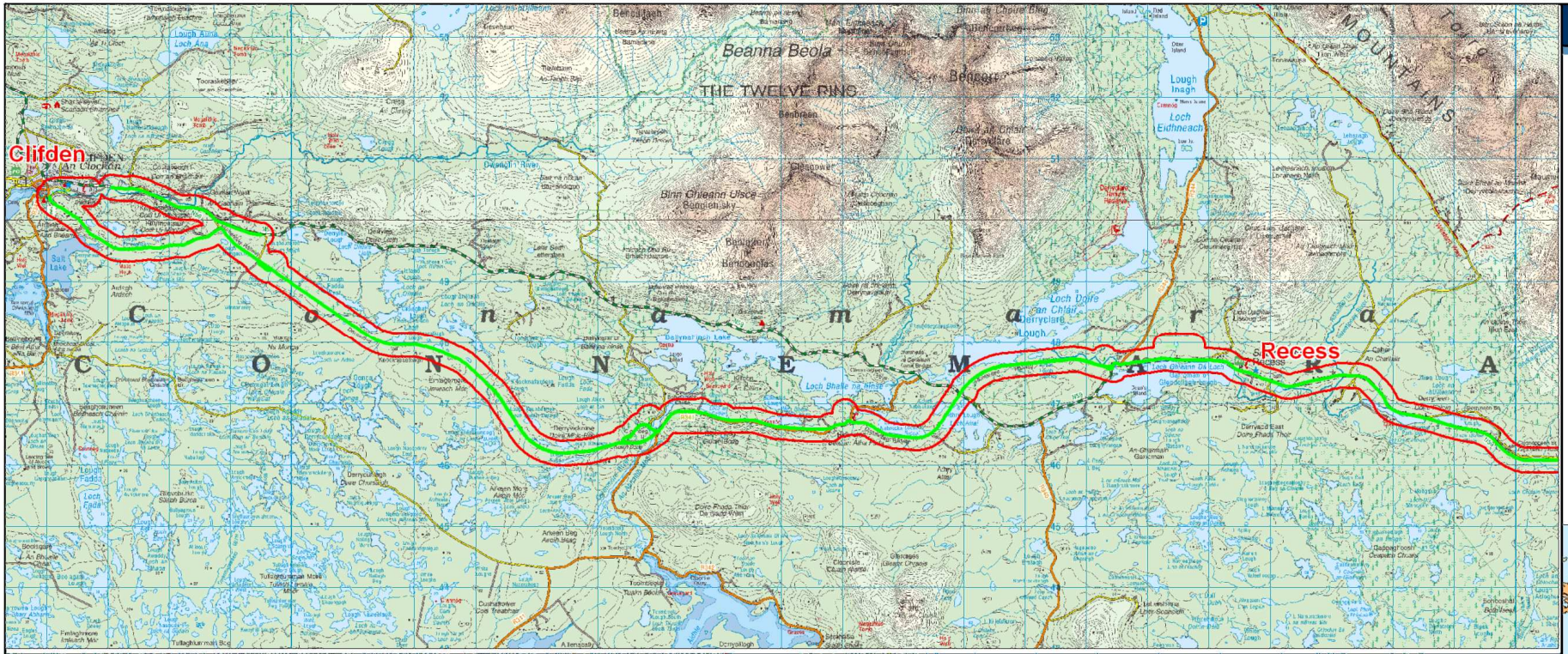
The Greenway will form part of the Bord Fáilte National Cycle Network. The National Cycle Network, as promoted in '*A Strategy for the Development of Irish Cycle Tourism*' (2007) sets out a plan of long-distance cycle routes across the country.

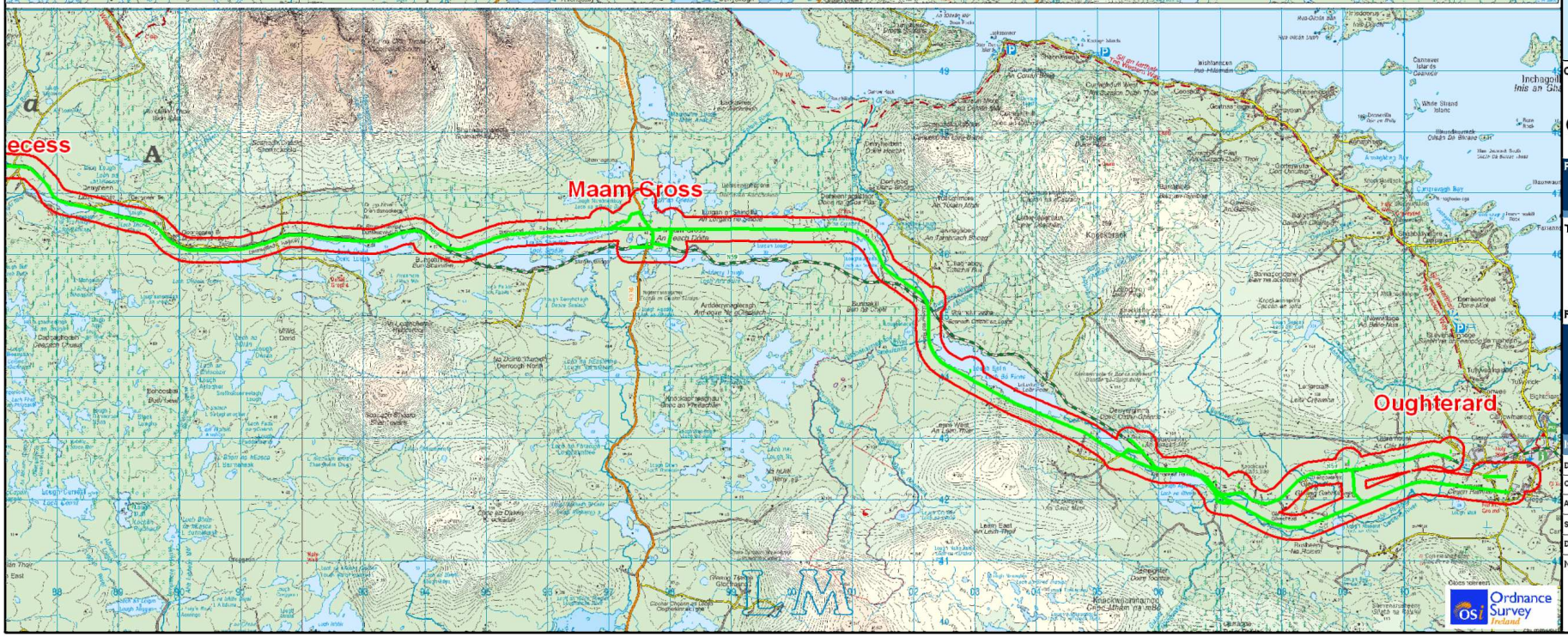
The Project is being developed by local community groups in Clifden, Recess and Oughterard with support from Fáilte Ireland, Galway County Council and Forum Connemara Ltd.

The design of the greenway has been progressed by the completion of an "*Environmental Impact Statement*" (EIS) in parallel with this Natura Impact Statement. Details of the construction and operation of the proposed Greenway set out in this report form the scope of this NIS.

1.2 STUDY AREA

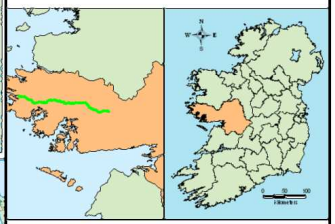
The Connemara Greenway Project proposes to develop the dismantled Galway to Clifden railway line into a walking/cycling track (Greenway) between Oughterard and Clifden a distance of over 52.4km. **Figure 1.1** shows the proposed route.





Legend

- Proposed Greenway
- Study Area



Client

Galway County Council

Project

Connemara Greenway

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Connemara Greenway Project - Clifden to Oughterard Study Area

Figure 1.1

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The Galway to Clifden railway line ceased operations in 1935 and was subsequently dismantled. The remnants of the railway line between Oughterard and Clifden are the focus of this Project. There is a well defined corridor for much of the length of the dismantled railway line, with some of the original rail bridges still intact. At a number of locations along its corridor, the dismantled railway line merges and crosses over existing local roads and the main Galway to Clifden road (N59). The landscape across which the dismantled railway corridor crosses, varies along its length with extensive areas of bog, scrub, forestry, bog woodland, mountains, rivers, numerous small and some large lakes, improved grassland and farmland being encountered.

The study area contains several environmental designations (Natura 2000 Sites) and the route of the proposed Greenway runs through or lies adjacent (within 1km) to four candidate Special Areas of Conservation (cSACs) and two Special Protection Areas (SPAs) as follows:

- Lough Corrib cSAC (Site Code: 000297),
- Lough Corrib SPA (Site Code: 004042),
- Maumturk Mountains cSAC (Site Code: 002008),
- Twelve Bens/Garraun Complex cSAC (Site Code: 002031),
- Connemara Bog Complex cSAC (Site Code: 002034), and
- Connemara Bog Complex SPA (Site Code: 004181).

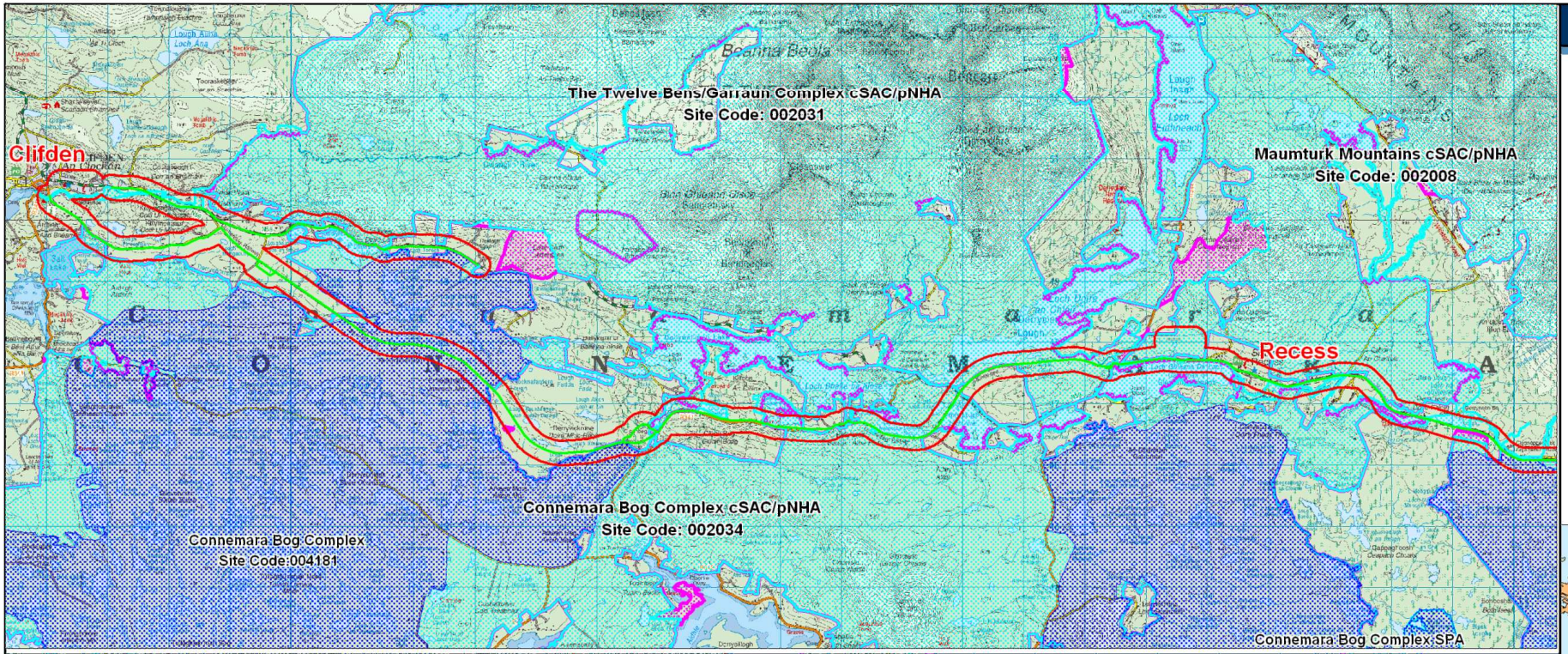
The locations of these cSACs and SPAs relative to the route of the proposed Greenway are shown in **Figure 1.2**.

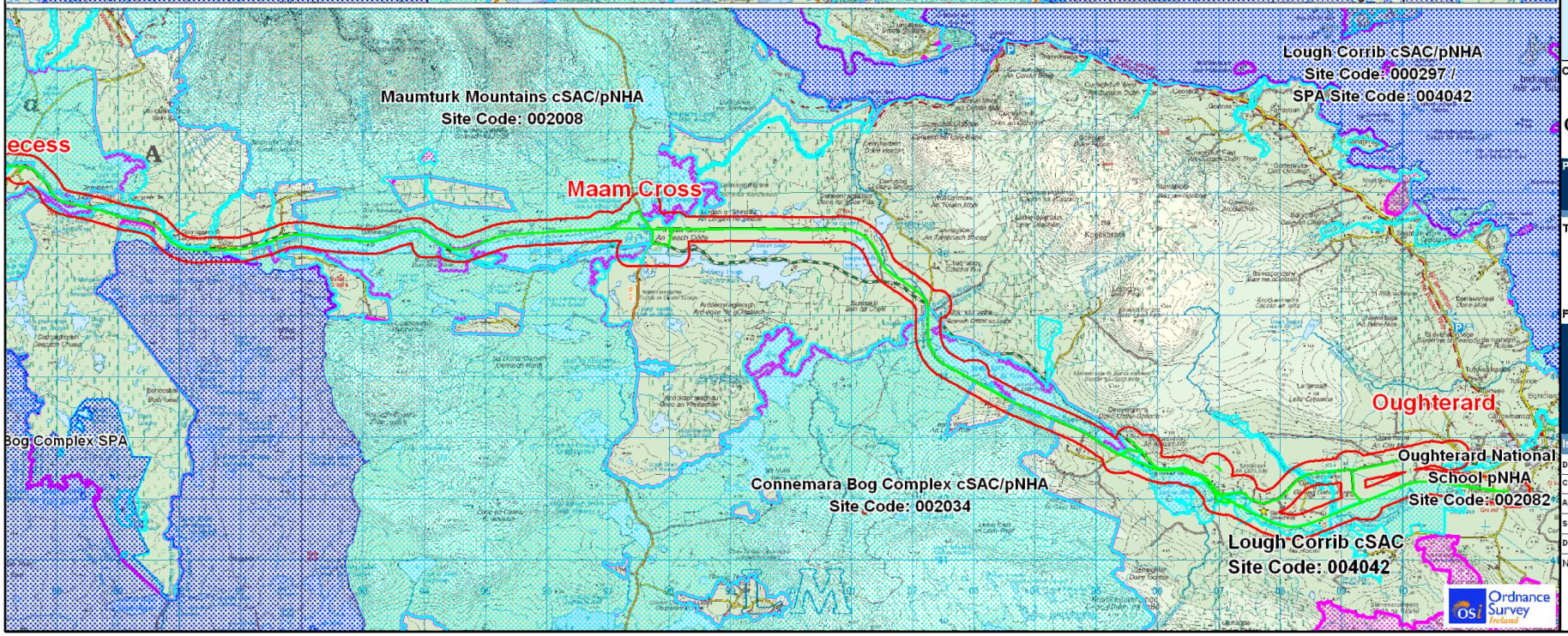
The overall finding from the Appropriate Assessment Screening Stage was that the scale and magnitude of impacts on all the above Natura 2000 sites were uncertain (**Appendix A**). It was considered that there may be significant impacts arising from the proposed Greenway on these Natura 2000 sites. In order to quantify and qualify such potential impacts, it was recommended that a full Appropriate Assessment be carried out in order to determine the impacts of the proposed on the aforementioned Natura 2000 sites. The preparation of a Natura Impact Statement was therefore recommended.

Due to their proximity to the proposed Greenway the following six sites are considered further in this Appropriate Assessment Screening Report:

- Lough Corrib cSAC (Site Code: 000297) and Lough Corrib SPA (Site Code: 004042),
- Maumturk Mountains cSAC (Site Code: 002008),
- Twelve Bens/Garraun Complex cSAC (Site Code: 002031),
- Connemara Bog Complex cSAC (Site Code: 002034), and
- Connemara Bog Complex SPA (Site Code: 004181).

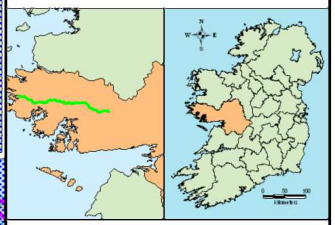
This document comprises the 'Natura Impact Statement' to facilitate the Appropriate Assessment of the project by the Competent Authority, i.e. An Bord Pleanala.





Legend

- Proposed Greenway
- Study Area
- Special Area of Conservation (SAC)
- Natural Heritage Area (NHA)
- Special Protection Area (SPA)



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Environmental Designations

Figure 1.2

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1.3 METHODOLOGY

1.3.1 General

The assessment was prepared in accordance with the following guidelines;

- Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities (DEHLG, 2009),
- The Status of EU Protected Habitats and Species in Ireland (NPWS, 2008),
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2000),
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2002),
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; (EC, 2007a),
- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002),
- Advice Notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003),
- European Communities (Environmental Impact Assessment) Regulations, 1989 to 2001,
- Planning and Development Act, 2000 (as amended),
- Institute of Ecology and Environmental Management Draft Guidelines for Ecological Impact Assessment (IEEM 2005),
- Interpretation Manual of European Union Habitats. Version EUR 27. (EC, 2007), and
- Consultation with the Public, Statutory and other bodies/ individuals.

A full desktop study of available biological information pertaining to the study area was carried out. In addition, a number of ecological assessments have been completed within the study area.

These studies include;

- Habitat Mapping,
- Botanical Surveys,
- Mammal Surveys,

- Bird Surveys, and
- Aquatic Ecology and Fisheries Habitat Surveys.

The data collected during these surveys provides detailed information on the existing environment. The habitat mapping information and aquatic ecology assessments are used for assessing the impacts of the proposed Greenway on the terrestrial and aquatic environment.

1.4 BACKGROUND AND NEED FOR THE PROPOSED PROJECT

It is proposed to develop a walking/cycle track (Greenway) along the existing dismantled Galway to Clifden railway where possible. This Greenway development is a community driven project by local community groups in Clifden, Recess and Oughterard with support from Fáilte Ireland, Galway County Council and Forum Connemara Ltd.

It is hoped that this development would benefit local communities by providing a secure and safe environment for walkers and cyclists, leading to an increased opportunity for physical exercise. It would also provide a unique and novel experience for visitors to the area.

As part of Fáilte Ireland's West Tourism Development Plan 2008-2010 the four strategic goals are to:

1) Develop the region as Ireland's primary outdoor and adventure destination while focusing on environmental sustainability.

2) Enhance the cultural experience for visitors.

3) Continue to develop tourism hubs in order to exploit synergies.

4) Improve access to and within the region.

The relevant planned action included as part of the first strategic goal above is to develop the region as Ireland's primary outdoor and adventure destination while focusing on environmental sustainability. Specific key actions within this strategic goal which specify the need for the proposed Greenway include:

- Support the feasibility of re-opening the Galway-Clifden railway line as a Greenway for walking and cycling

Within the West Tourism Development Plan 2008-2010 the environment is considered core to Ireland's tourism with:

- 80% of visitors rating Ireland's scenery as an important reason for visiting Ireland;
- 74% attracted by the natural unspoilt environment.

The provision of the Connemara Greenway Project – Clifden to Oughterard will serve as an important amenity in providing traffic-free safe access to the west of Ireland's natural unspoiled environment. Given its location in a highly scenic, lake-rich, mountainous area it is likely the Greenway will provide local, domestic and overseas visitors with good access to this scenic landscape, which is an important reason for people visiting the area.

As part of the document '*A Strategy for the Development of Irish Cycle Tourism'* (Fáilte Ireland, 2007) a recent decline in the number of overseas cycling tourists has been recognised. As part of a wider cycling tourism strategy the development of a number of Greenway routes throughout the country is seen as an important part in increasing cycling tourism in the country.

It should be recognised that other government priorities can also be addressed through the promotion of cycling by the provision of Greenway routes. These include:

- Sustainable transport – cycling can reduce the number of trips made by cars, thereby improving local air quality, decreasing the amount of greenhouse gas (GHG) emissions, and decreasing the use of finite fossils fuels;

- Improved mental and physical health of the populations – regular physical exercise is required in order to maintain a healthy weight and properly functioning body. Cycling commuting / leisure riding are now recognized as an important element in strategies to improve public health. UK and continental based studies indicate that health benefits of cycling far outweigh the associated risks;

- Improved quality of life in urban and town environments – transferring commuters from cars to bicycles improves the urban / town environment in terms of noise, road safety, and general atmosphere, i.e. the environment becomes less threatening and therefore a more attractive place in which citizens can relax, chat, shop and spend time;

- Regional and small local economic development – cycle tourists stay longer and have more time to spend their money in the local community which is of particular advantage to the rural community.

Further benefits of cycling tourism as outlined in the aforementioned Fáilte Ireland document are:

- Cycle tourists represent a growing and valuable market segment, particularly for rural areas. Cycle tourists will spend at least as much as other visitors in a rural area;

- Cycle tourism is good at generating local trade and offers particular opportunities for rural businesses and services. Spending by cycle tourists helps to support rural pubs, village shops, small-scale rural attractions and rurally based providers of accommodation;

- It offers opportunities for the development of cycle hire and cycling holiday operations in rural areas;

- As cycle tourists will use local businesses there is a greater likelihood that the money they spend will stay in the local economy;

- Cycle tourism is an environmentally sustainable form of tourism with minimal impact on the environment and host communities. This is increasingly important as we aim to reduce CO_2 emissions and reduce global warming;

- It makes good use of existing, often under-utilised resources for example country lanes and by–roads;

- It can provide an alternative use for redundant or derelict resources, for example disused railway lines;

- Cycle tourism can provide new incentives for people to visit an area and can help to attract new types of visitor;

- Cycling can provide an added attraction and activity as part of a multi-activity holiday for visitors, which will help to extend length of stay and encourage repeat visits;

- Encouraging cycle tourism can help to encourage utility cycling as people may rediscover cycling while on holiday and may then be encouraged to cycle more frequently for other purposes;

- Cycle tourism enhances personal health, fitness and well-being.

1.5 ALTERNATIVES CONSIDERED

The alternatives considered as part of this project include the 'do-nothing' scenario and a number of alternative routes proposed as outlined in **Figures 1.3** (**Sheets 1-15**).

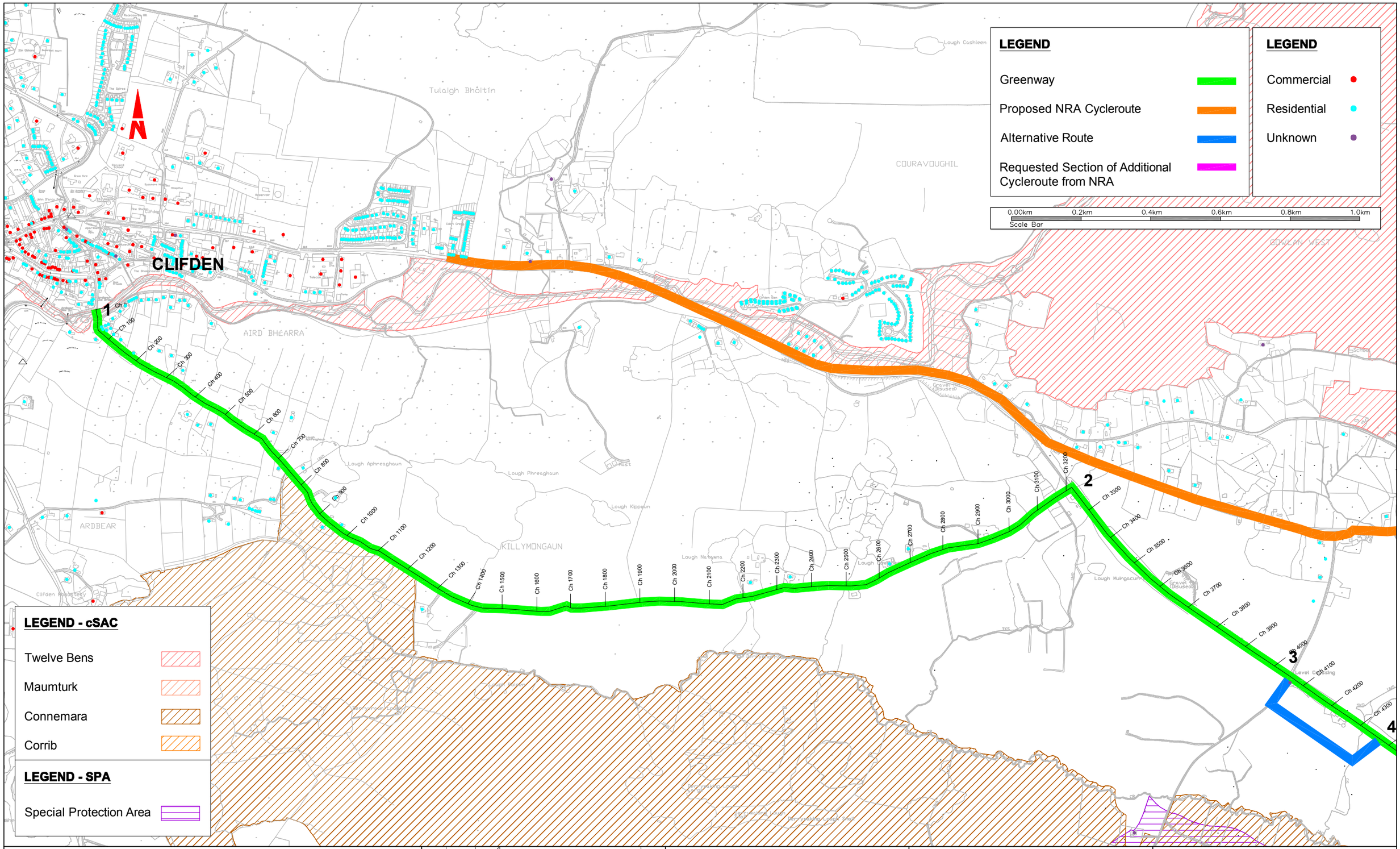
1.5.1 Do-nothing Scenario

If the Greenway is not constructed any additional economic benefit which might be derived from the project will not be realised. Fáilte Ireland's target of re-opening the Galway-Clifden line as a Greenway for walking and cycling will not be realised.

In the absence of the proposed Greenway being constructed the most viable option for cyclists who wish to travel from Oughterard to Clifden will be along the existing N59 or along the proposed N59 upgrade which will contain sections of cycleway. While the N59 is also an attractive route from a landscape perspective, it will not provide a similar wilderness experience and level of safety when it is compared to the proposed Greenway.

1.5.2 Alternatives

The entire length of the disused Oughterard-Clifden railway line has been the primary route under consideration for the location of the proposed Greenway. In certain locations however (where the Greenway runs immediately adjacent to an existing occupied dwelling) it has been necessary to provide an alternative path. These alternative site locations are where the route deviates from the existing roads and disused railway (alternate routes in the townlands of Gowlan West, Garroman, Lurgan and Glengowla West) as outlined in **Figure 1.3 (Sheets 1-15).**



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Project: CONNEMARA GREENWAY PROJECT

Title: FIGURE 1.3 LOCATION MAP

Sheet 1 of 15

Scale	Drawn By	Checked By	Approved By	Date
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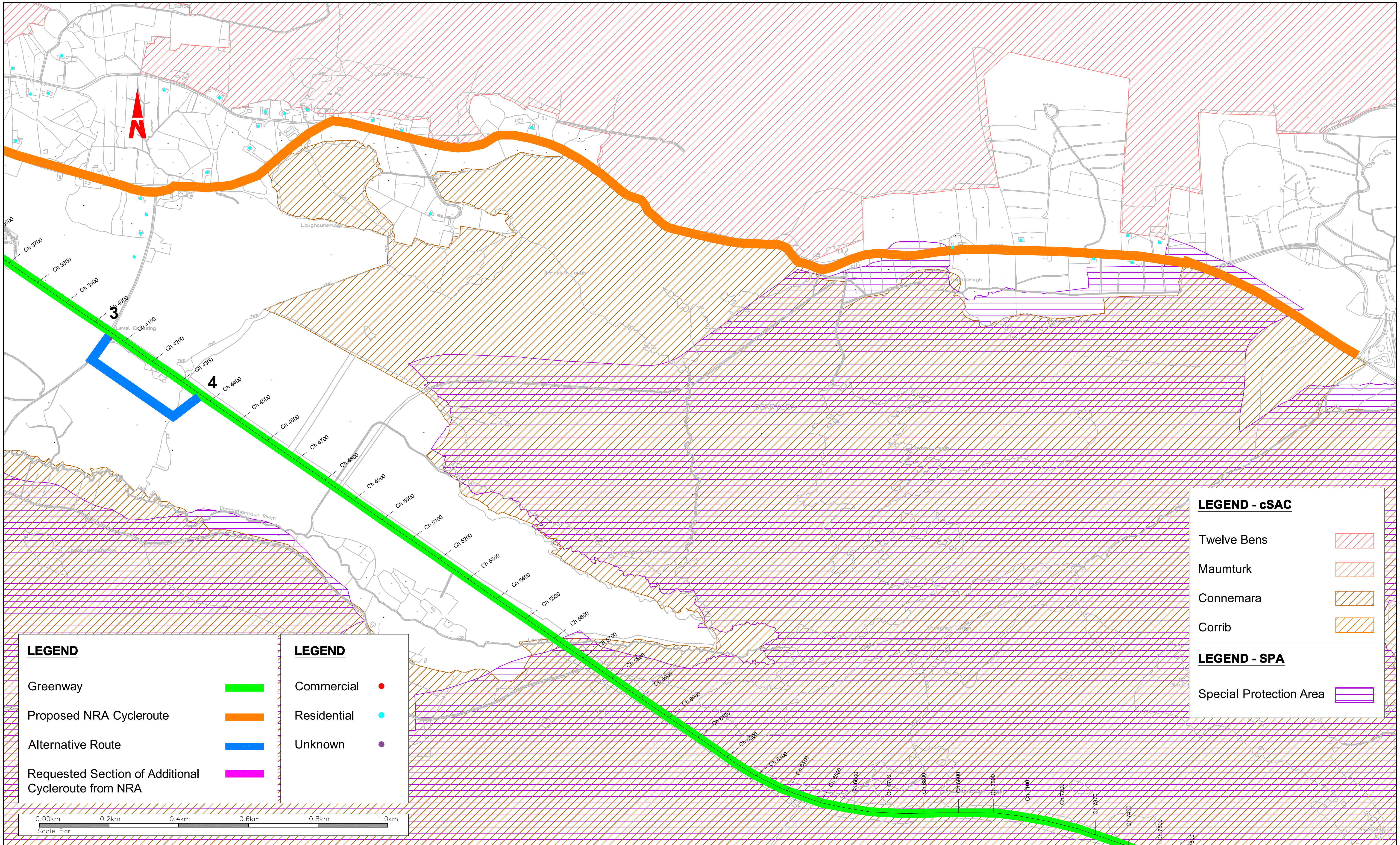

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Project: CONNEMARA GREENWAY PROJECT

Title: **FIGURE 1.3 LOCATION MAP**

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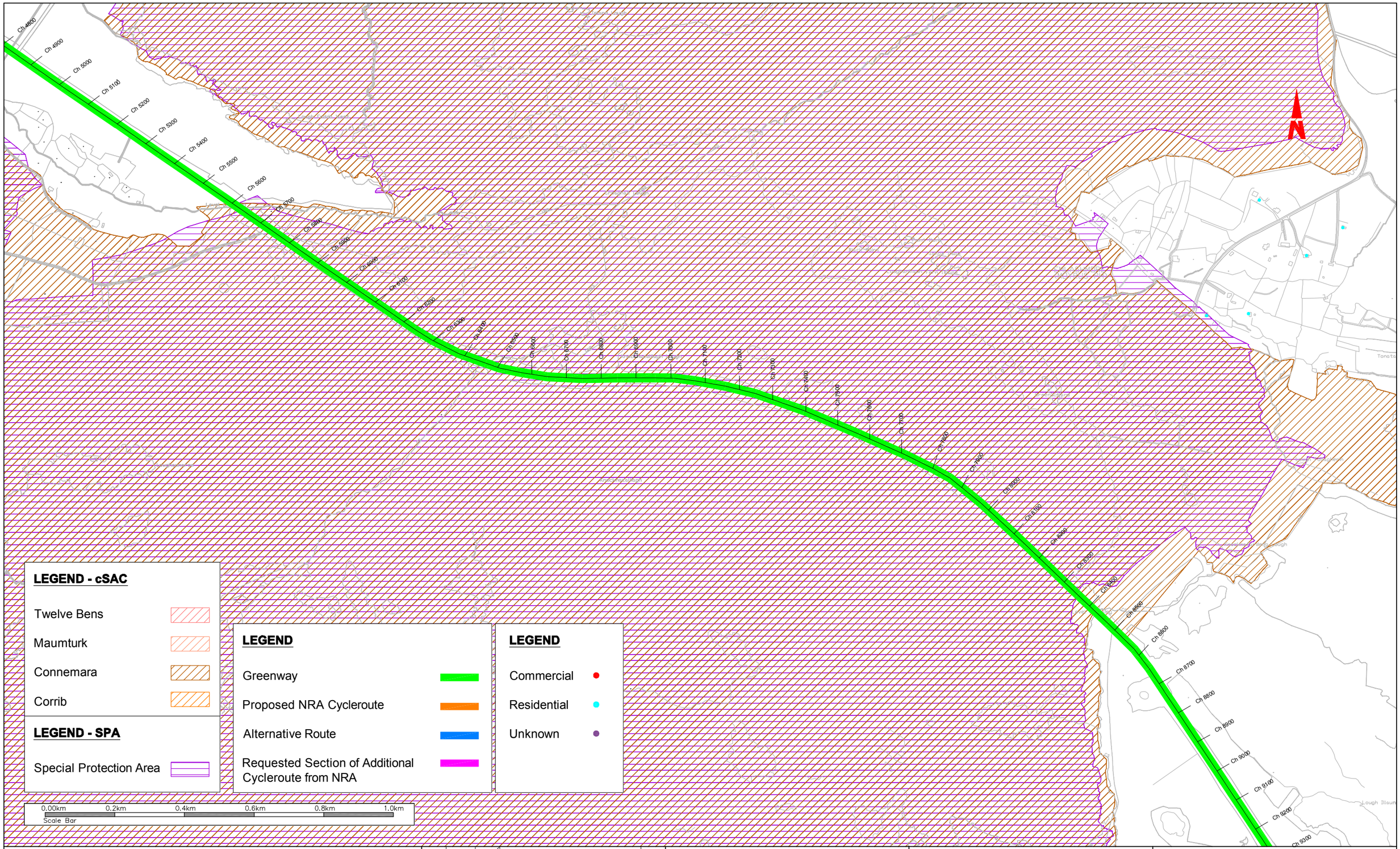
Sheet 2 of 15



LEGEND - cSAC

- Twelve Bens
- Maumturk
- Connemara
- Corrib

LEGEND - SPA

- Special Protection Area

LEGEND

- Greenway
- Proposed NRA Cycleroute
- Alternative Route
- Requested Section of Additional Cycleroute from NRA

LEGEND

- Commercial
- Residential
- Unknown

0.00km 0.2km 0.4km 0.6km 0.8km 1.0km
Scale Bar

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FIGURE 1.3
LOCATION MAP

Sheet 3 of 15

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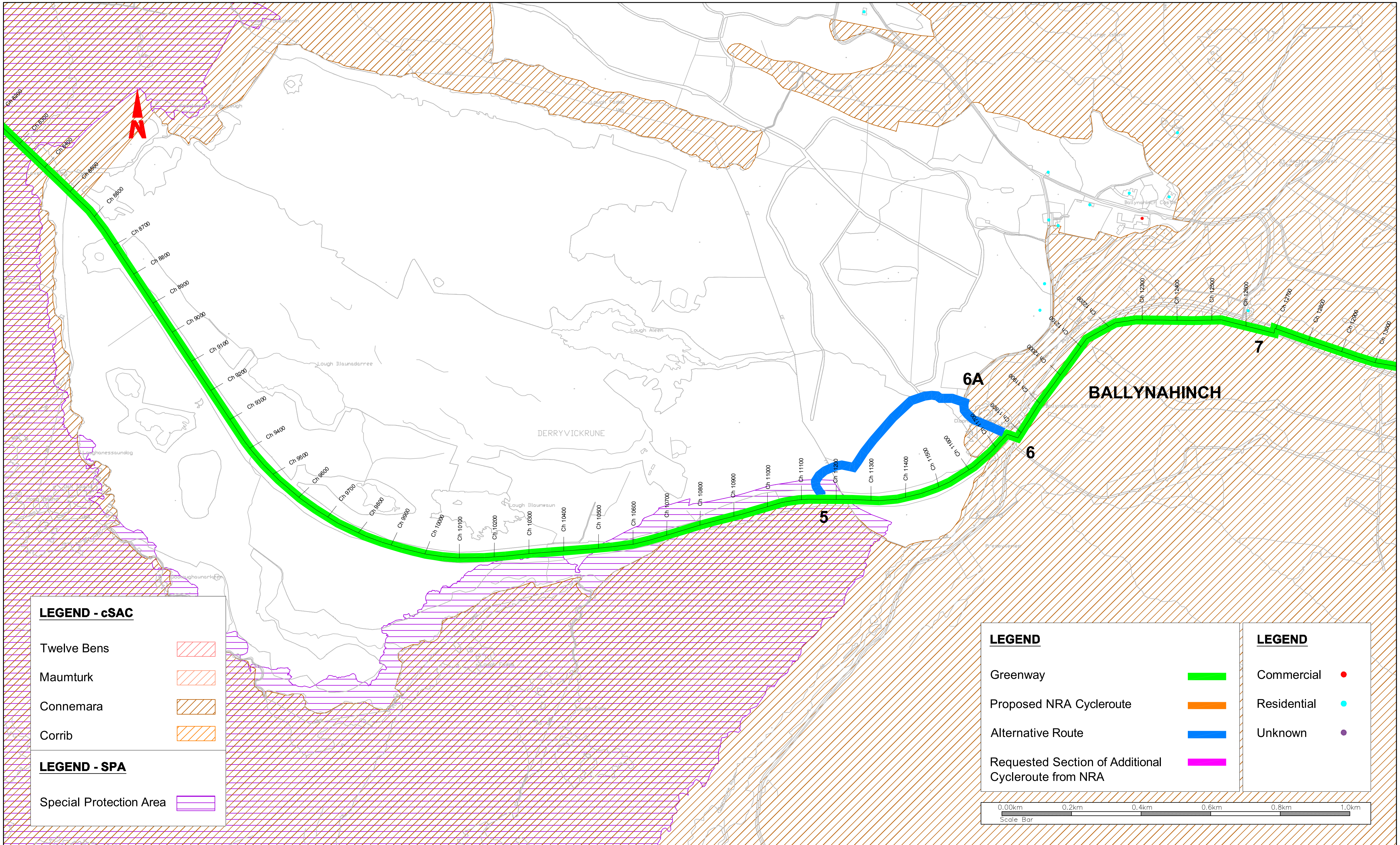

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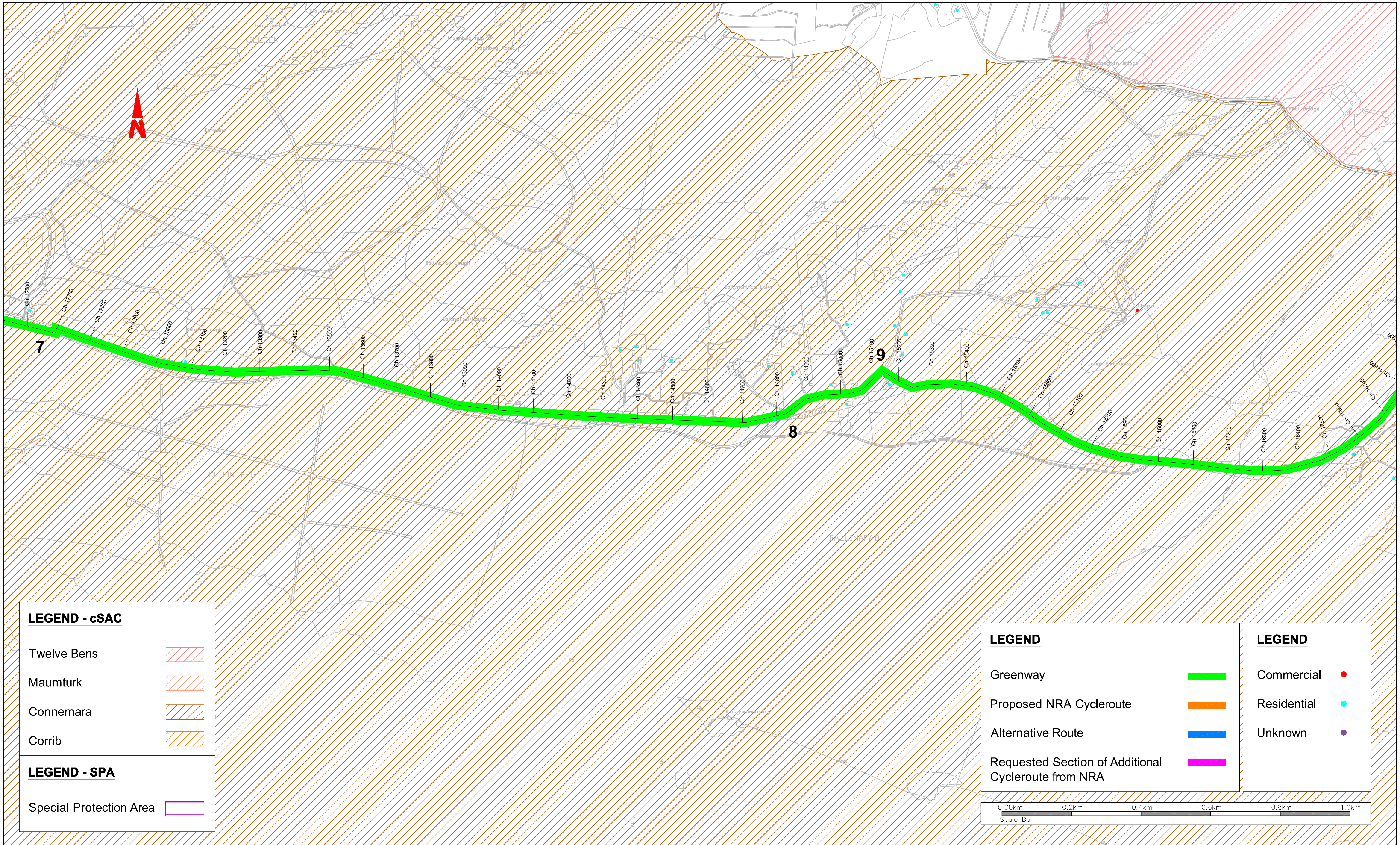

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Title: **FIGURE 1.3 LOCATION MAP**

Sheet 5 of 15

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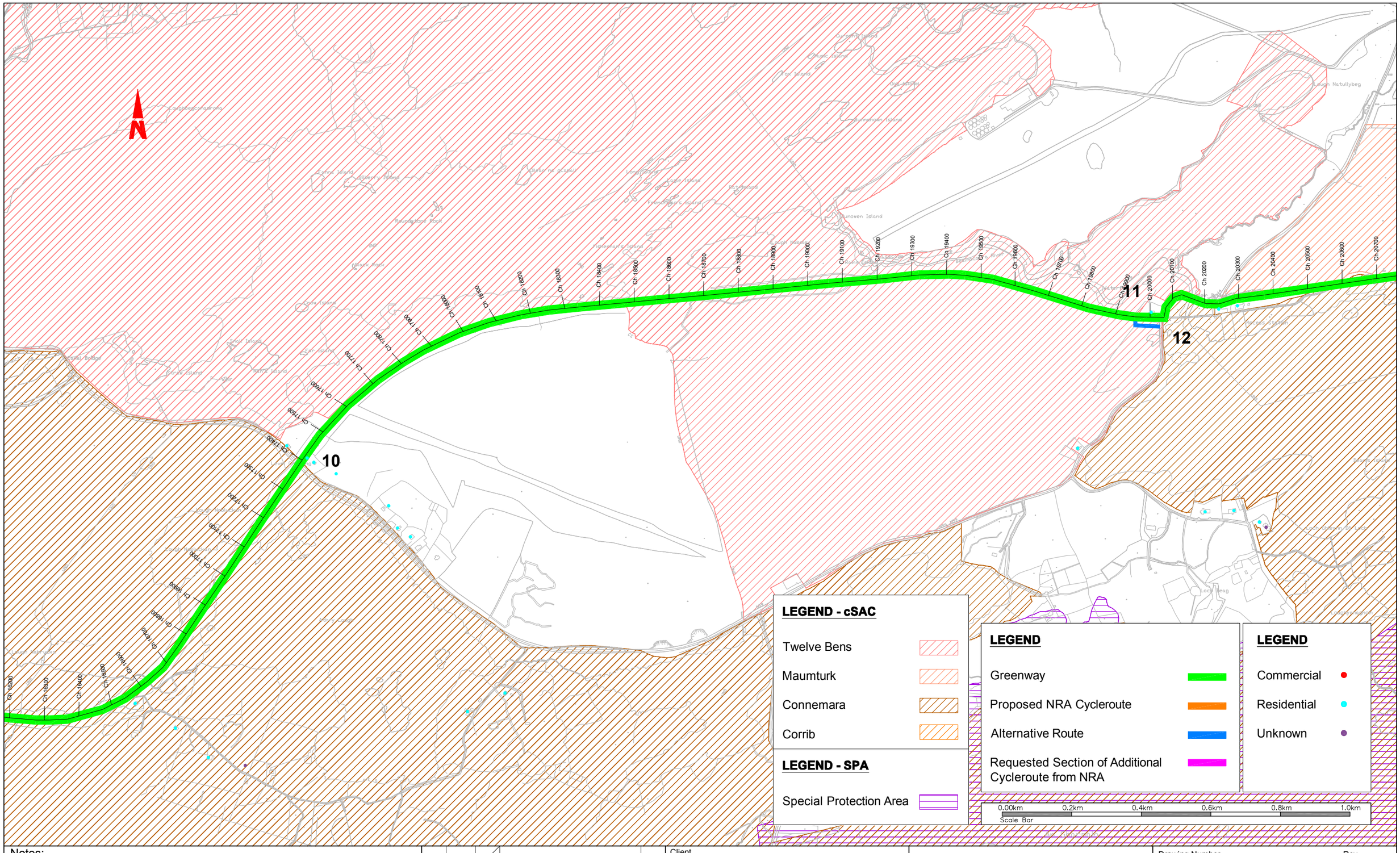

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FIGURE 1.3
LOCATION MAP

Sheet 6 of 15

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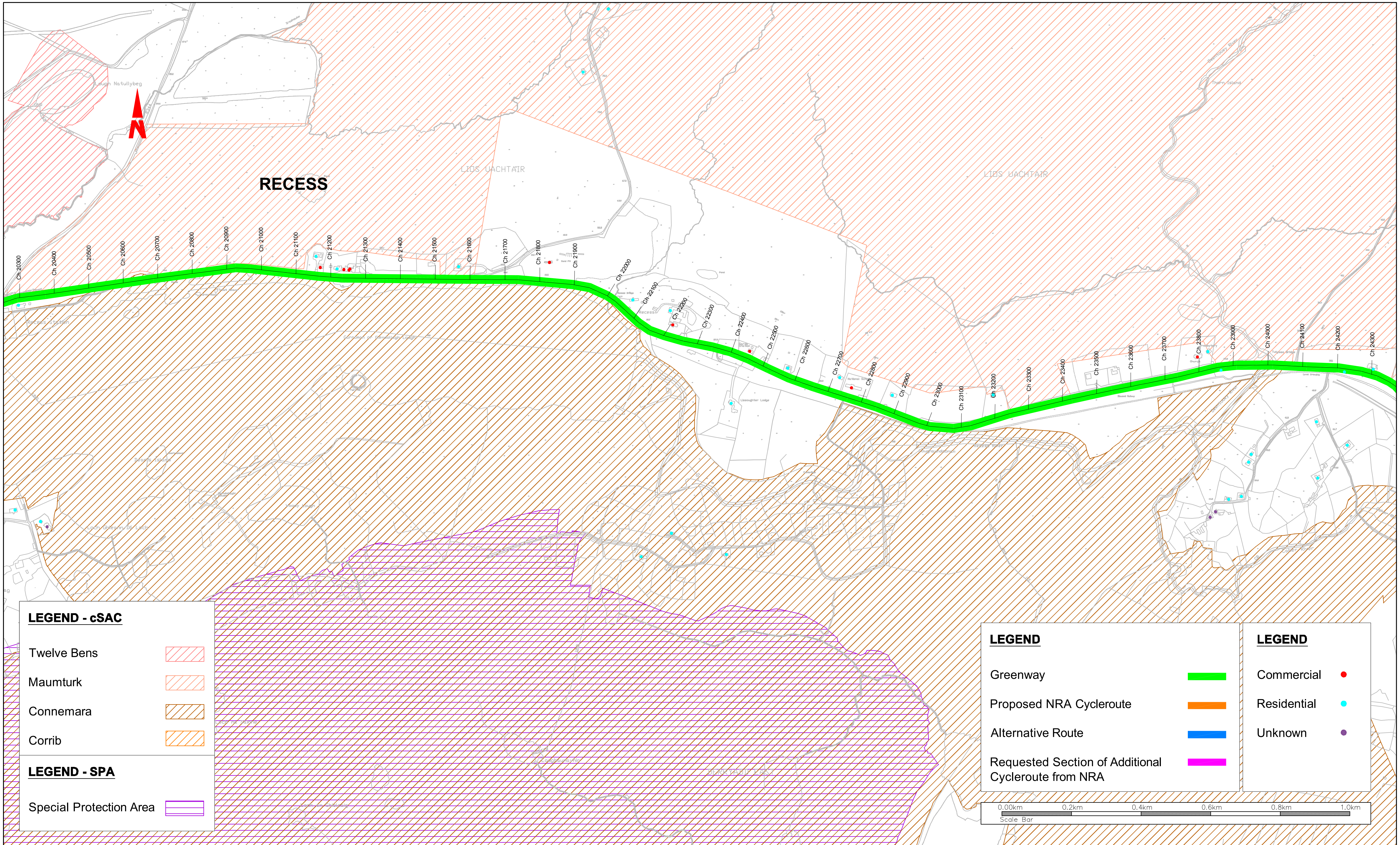

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Title: **FIGURE 1.3 LOCATION MAP**

Sheet 7 of 15

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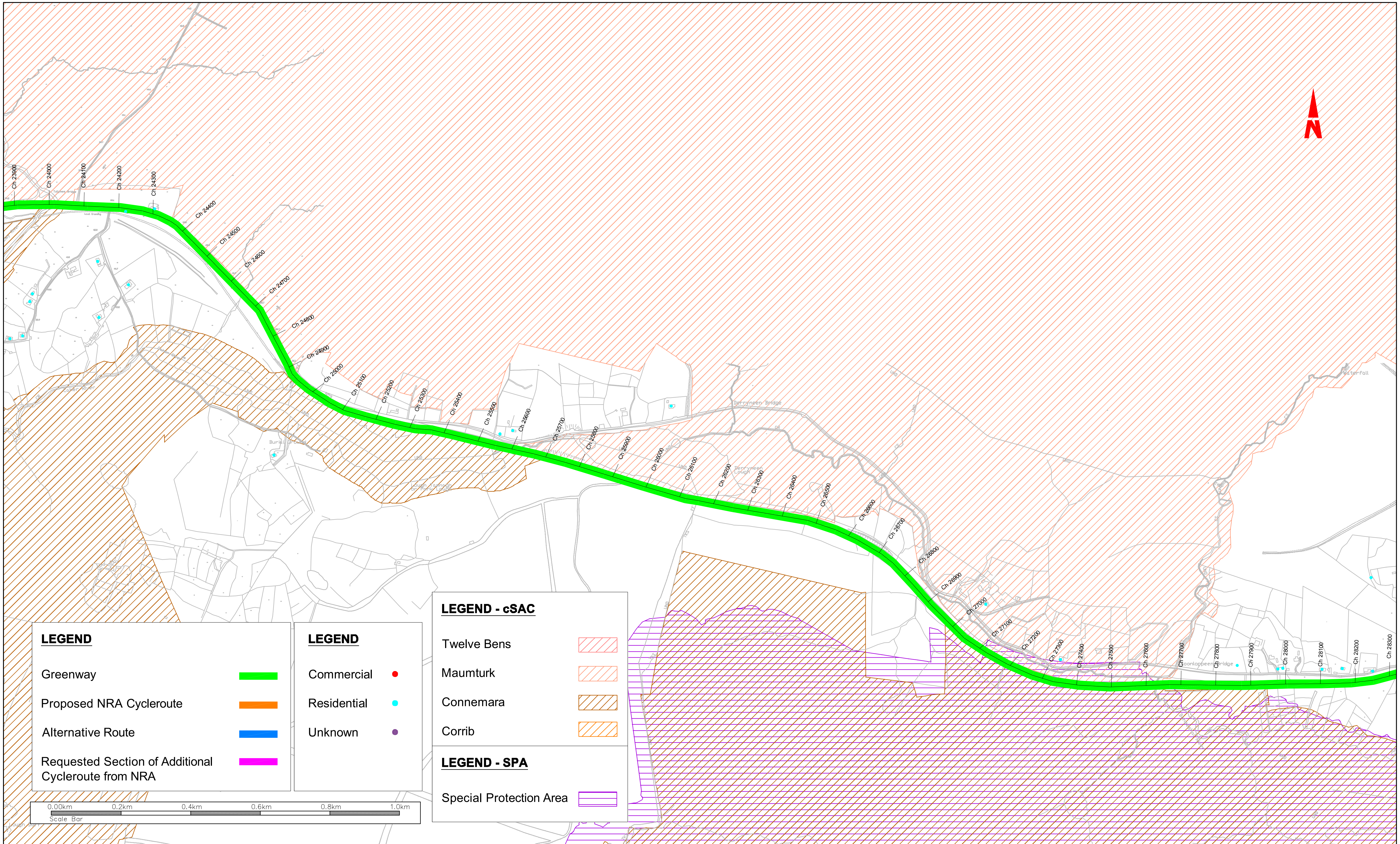

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Title: **FIGURE 1.3 LOCATION MAP**

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Sheet 8 of 15

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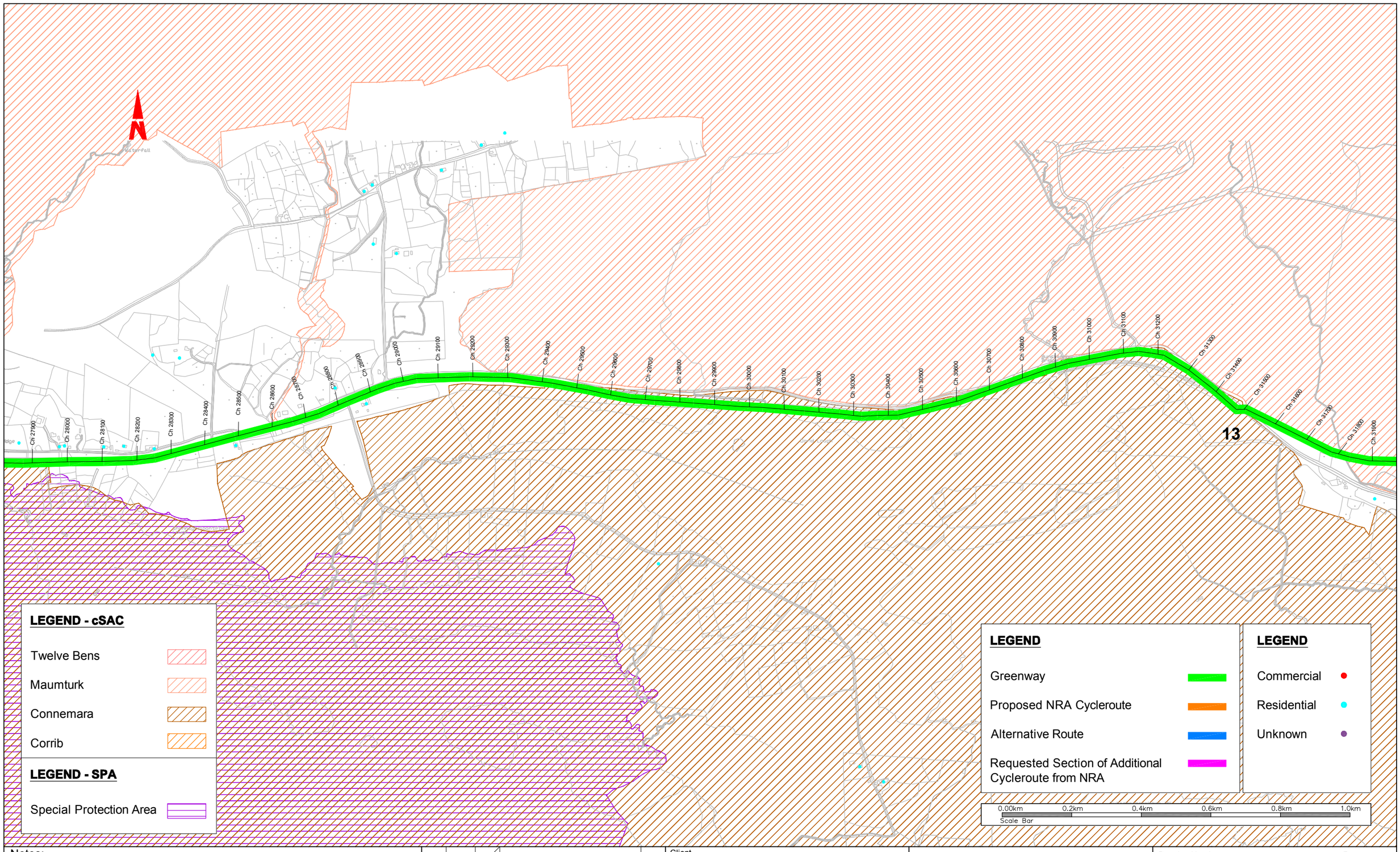

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Title
FIGURE 1.3
LOCATION MAP

Sheet 9 of 15

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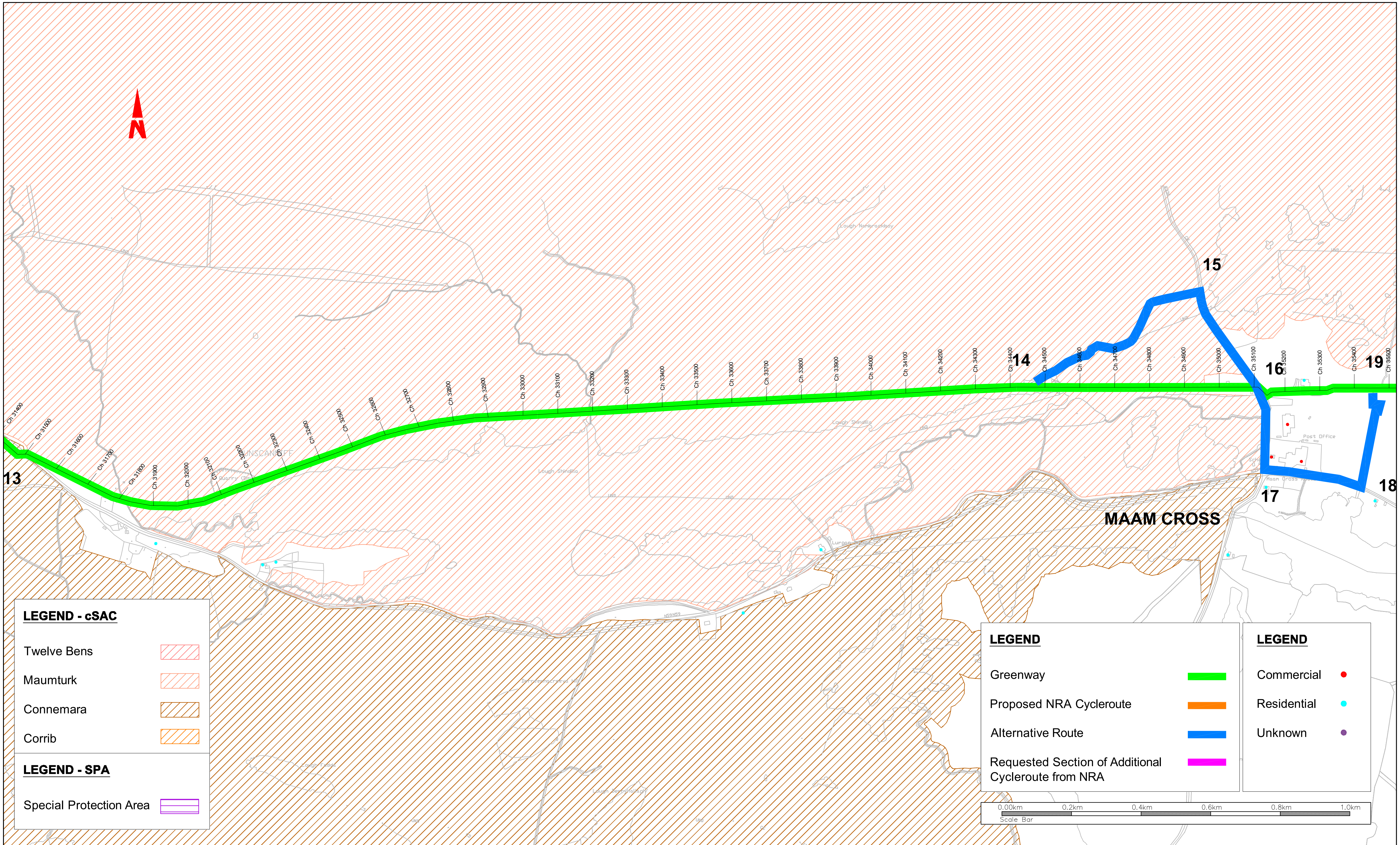

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Title: FIGURE 1.3 LOCATION MAP

Sheet 10 of 15

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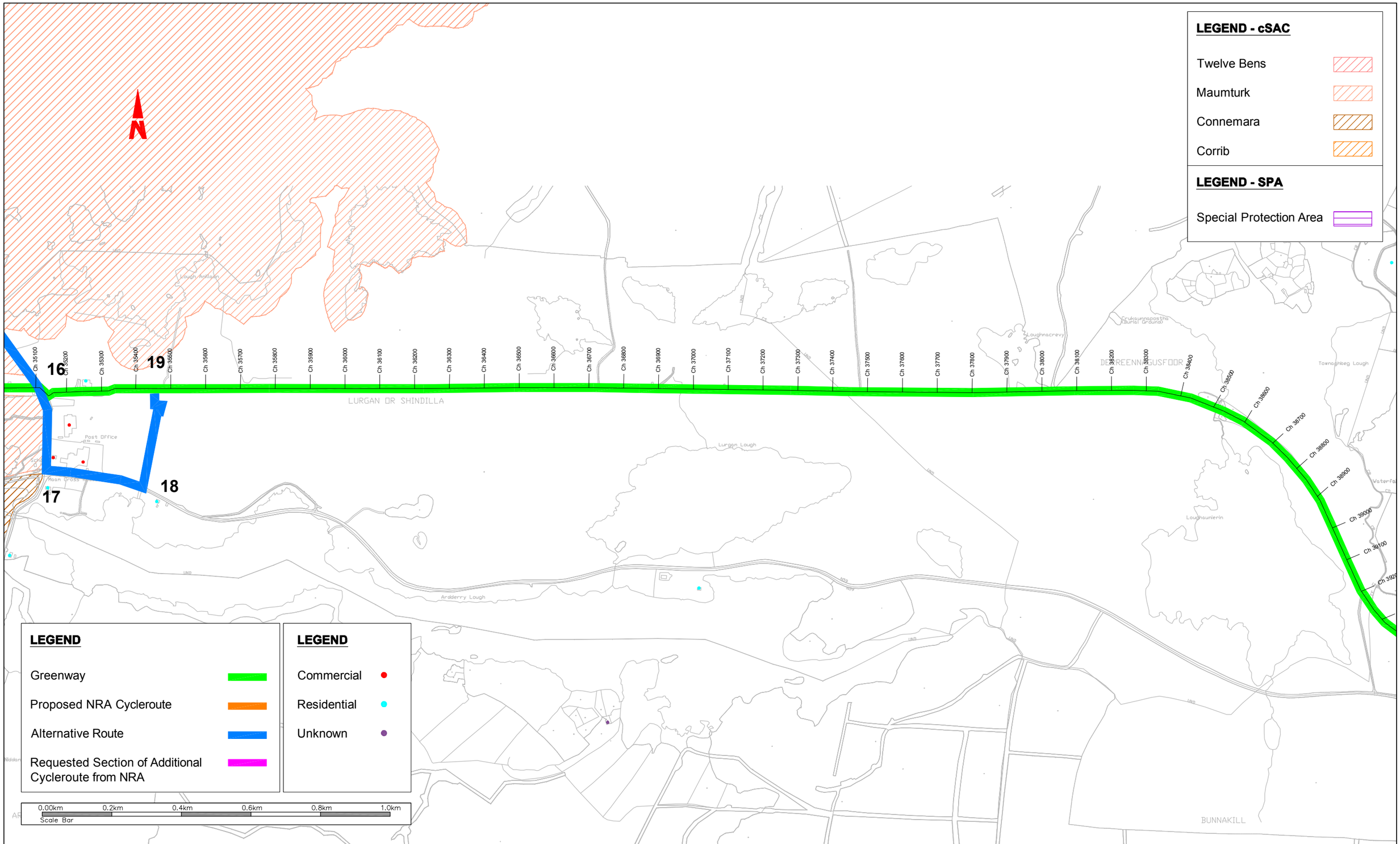

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FIGURE 1.3
LOCATION MAP

Sheet 11 of 15

Scale	Drawn By	Checked By	Approved By	Date
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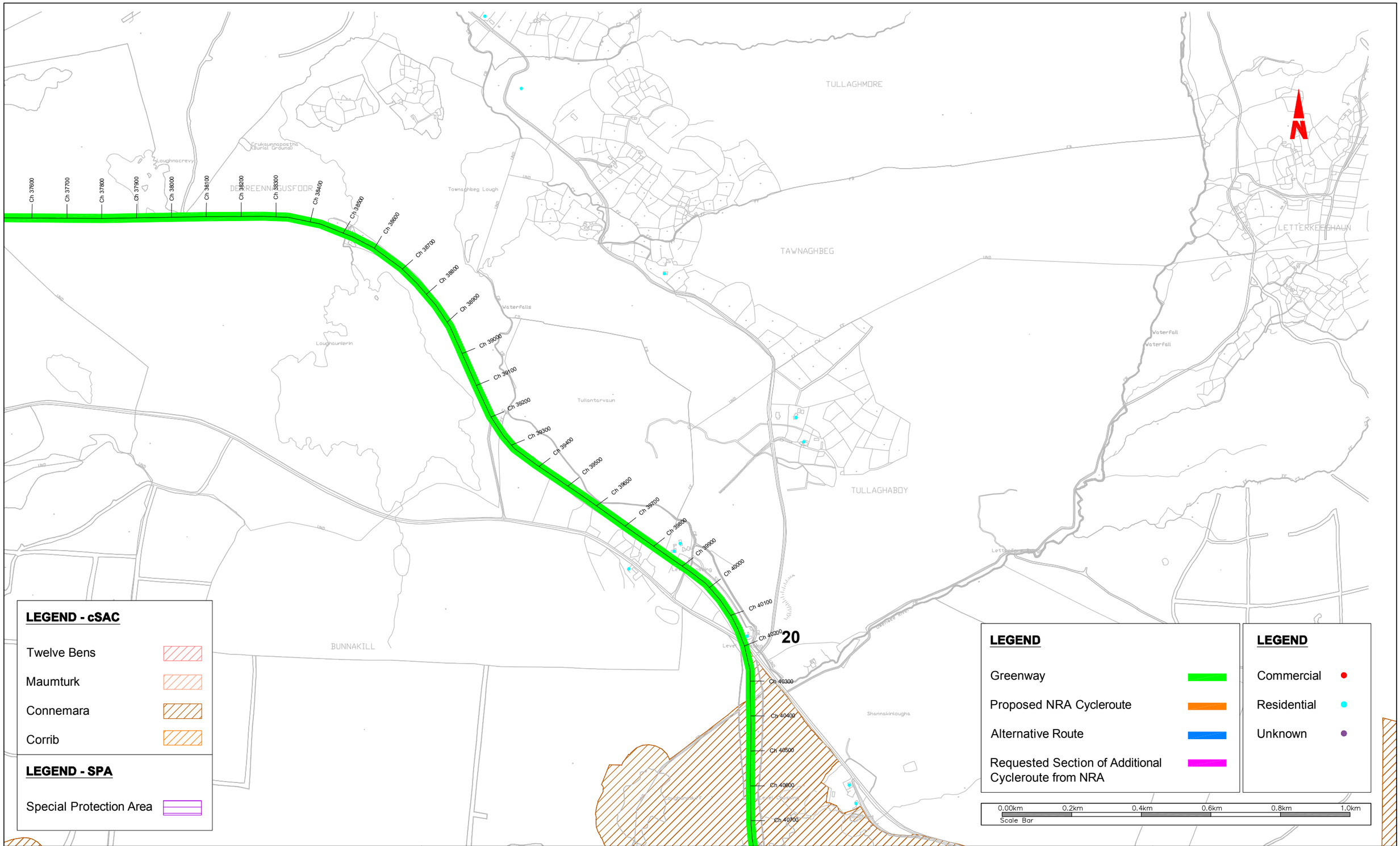

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Title: FIGURE 1.3 LOCATION MAP

Sheet 12 of 15

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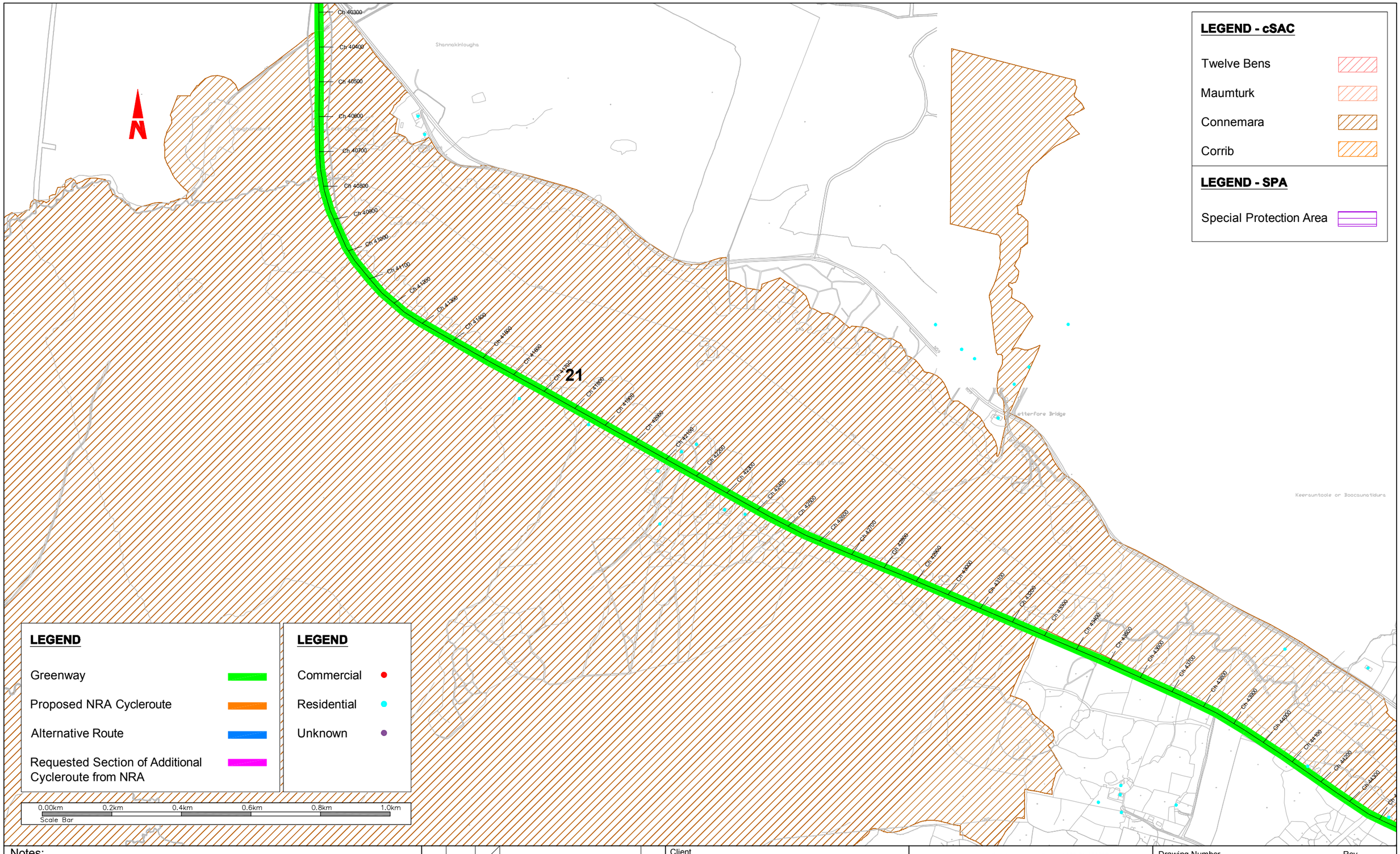

LEGEND - cSAC

- Twelve Bens
- Maumturk
- Connemara
- Corrib

LEGEND - SPA

- Special Protection Area

LEGEND

- Greenway
- Proposed NRA Cycleroute
- Alternative Route
- Requested Section of Additional Cycleroute from NRA

LEGEND

- Commercial
- Residential
- Unknown

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FIGURE 1.3
LOCATION MAP

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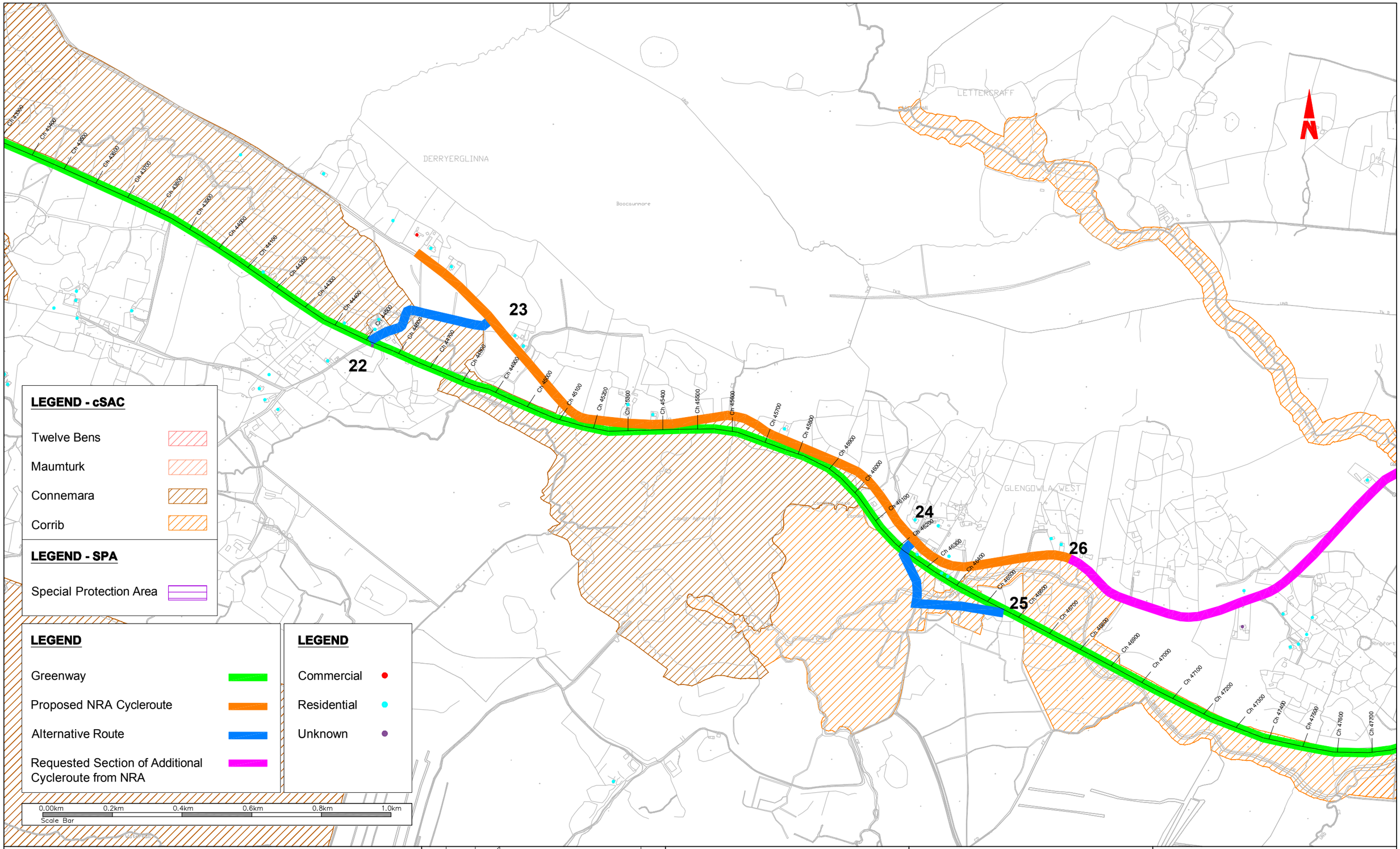

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Title: FIGURE 1.3 LOCATION MAP

Sheet 14 of 15

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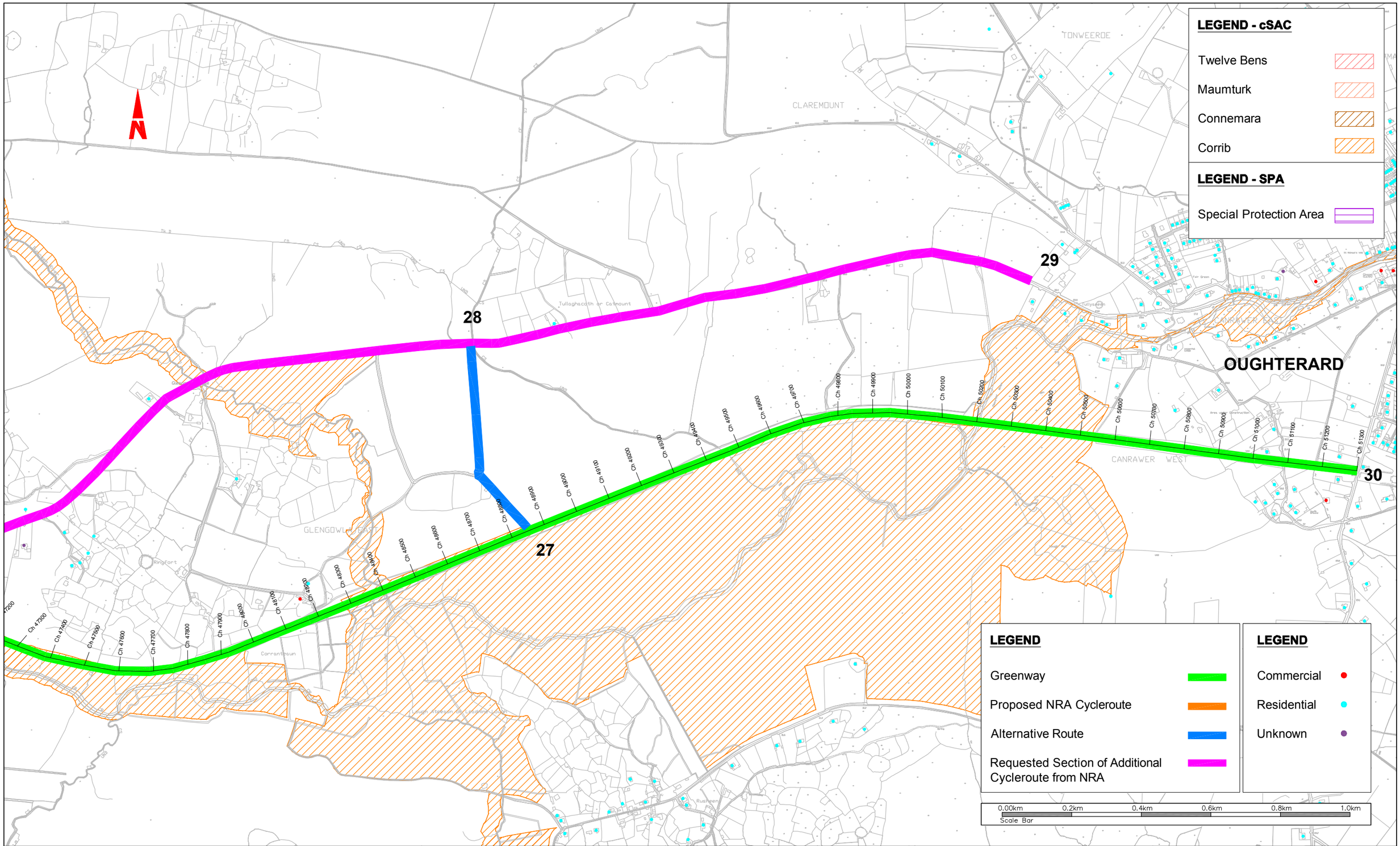

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Title: **FIGURE 1.3 LOCATION MAP**

Sheet 15 of 15

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1.6 APPROPRIATE ASSESSMENT METHODOLOGY

1.6.1 Introduction

The Department of the Environment, Heritage and Local Government guidelines (DEHLG, 2009) outline the European Commission's methodological guidance (EC, 2002) promoting a four-stage process to complete the Appropriate Assessment, and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in **Figure 1.4** below, and an outline of the steps and procedures involved in completing each stage follows. Stages 1 - 2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

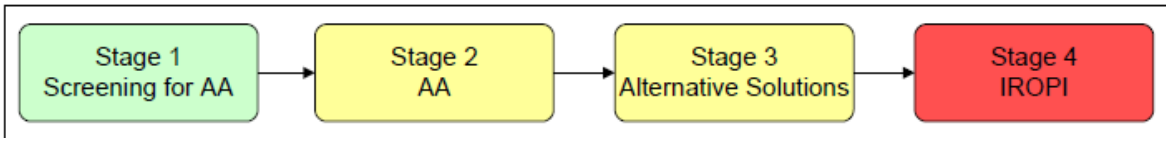


Figure 1.4 Four Stages of Appropriate Assessment

*AA = Appropriate Assessment; IROPI= Imperative Reasons of Overriding Public Interest.

Stage 1: Screening for Appropriate Assessment

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

- whether a plan or project is directly connected to or necessary for the management of the site, and
- whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of its conservation objectives.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 (AA). Screening should be undertaken without the inclusion of mitigation, unless potential impacts clearly can be avoided through the modification or redesign of the plan or project, in which case the screening process is repeated on the altered plan or project. The greatest level of evidence and justification will be needed in circumstances when the process ends at screening stage on grounds of no impact. The AA screening report for this project is included in **Appendix A**.

Stage 2: Appropriate Assessment

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The proponent of the plan or project will be required to submit a Natura Impact Statement, i.e. the report of a targeted professional scientific examination of the plan or project and the relevant Natura 2000 sites, to identify and characterise any possible implications for the site in view of the site's conservation objectives, taking account of in-combination effects. This should provide information to enable the competent authority to carry out the appropriate assessment. If the assessment is negative, i.e. adverse effects on the integrity of a site

cannot be excluded, then the process must proceed to Stage 3, or the plan or project should be abandoned. The AA is carried out by the Competent Authority, and is supported by the Natura Impact Statement. **Figure 1.5** sets out the main steps for Stage Two: Appropriate Assessment.

Stage 3: Alternative Solutions

This stage examines any alternative solutions or options that could enable the plan or project to proceed without adverse effects on the integrity of a Natura 2000 site. The process must return to Stage 2, as any alternative proposal must be subject to a Stage 2 Appropriate Assessment before it can be subject to the Article 6(4) test. If it can be demonstrated that all reasonable alternatives have been considered and assessed, the AA progresses to Stage 4.

Section 177T (7) (c) of the Planning and Development Act 2000, as amended, requires that:

> *(c) Where appropriate a Natura impact report or a Natura impact statement shall include—*
>
> *(i) the alternative solutions that have been considered and the reasons why they have not been adopted,*
>
> *(ii) the imperative reasons of overriding public interest that are being relied upon to indicate that the Land use plan or proposed development should proceed notwithstanding that it may affect the integrity of a European site, and*
>
> *(iii) the compensatory measures that are being proposed.*

Details of alternative options considered are provided in **Section 1.3.2.**

Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)/Derogation

Stage 4 is the main derogation process of Article 6(4), which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a Natura 2000 site. The extra protection measures for Annex I priority habitats come into effect when making the IROPI case[1]. Compensatory measures must be proposed and assessed. The Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister.

[1] IROPI reasons that may be raised for sites hosting priority habitats are those relating to human health, public safety or beneficial consequences of primary importance to the environment. In the case of other IROPI, the opinion of the Commission is necessary and should be included in the AA

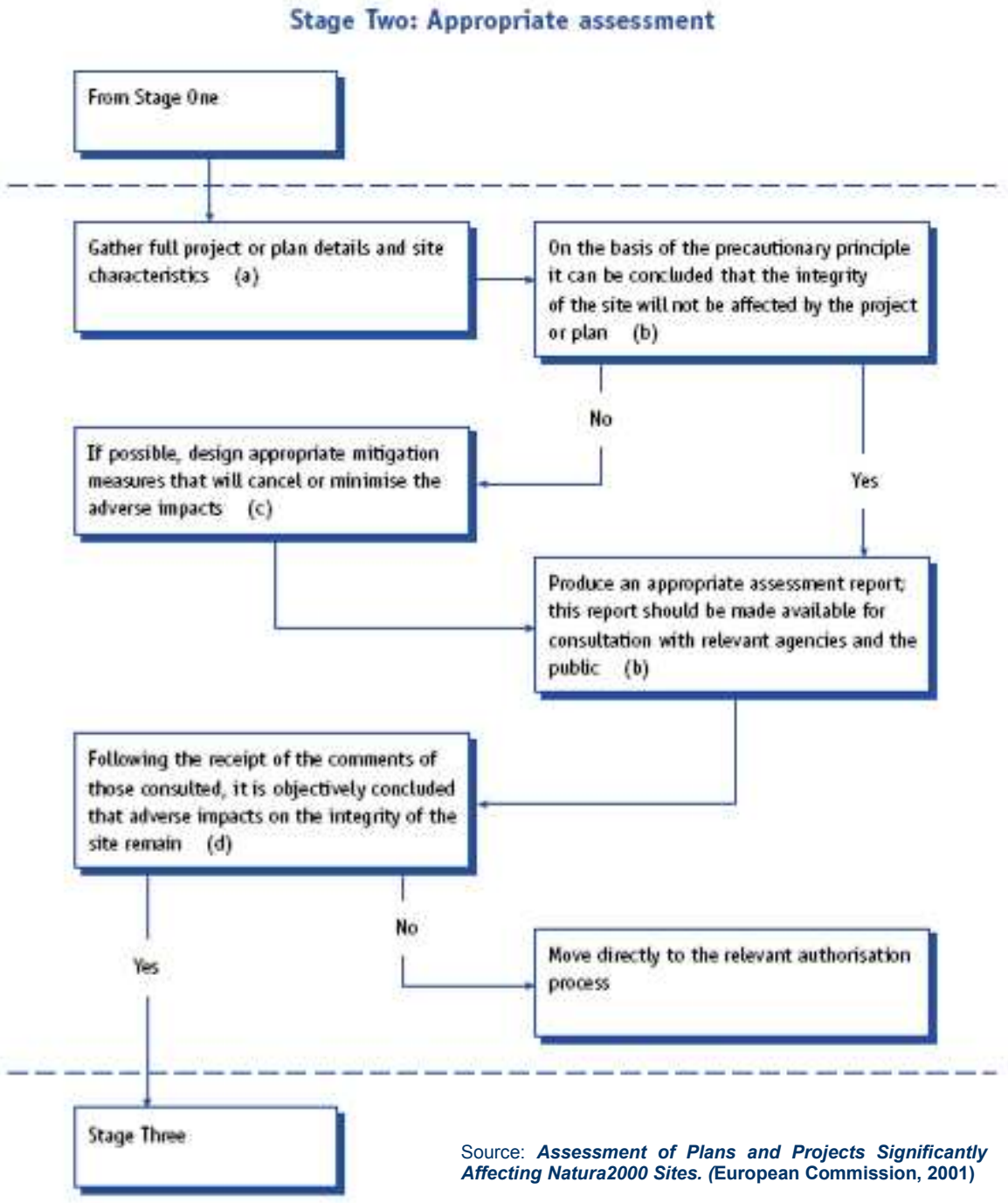


Figure 1.5 Stage Two: Appropriate Assessment

1.7 CONSULTATION RESPONSES

The Development Applications Unit (DAU) of the Department of Arts, Heritage and the Gaeltacht (DAHG) and Inland Fisheries Ireland (IFI) were consulted with regard to the Connemara Greenway. The following reports were issued to both the DAU and IFI prior to this NIS:

- Screening for Appropriate Assessment Connemara Greenway – Clifden to Oughterard (November, 2011);

Consultation responses are provided below in **Table 1.1**.

Table 1.1 Summary of Consultation associated with the EIS for the Connemara Greenway Project - Clifden to Oughterard

Consultation Method	Details	Comments/Findings
Written Consultation	EIS Scoping letter issued to 28 stakeholders on 15th August 2011	Response received from 8 stakeholders.
Other Consultation	Meeting with NPWS on 19th January 2012	Agreed scope of surveys required for an EIS and Natura Impact Statement (NIS).
	Email from NPWS regarding bird species	Sufficient distance between Greenway and Merlin breeding sites to avoid impacts.

2 PROJECT DESCRIPTION

2.1 LOCATION

The proposed Connemara Greenway – Clifden to Oughterard is located for the majority of its route along the dismantled Great Western Railway route from Oughterard to Clifden over a distance of 52.4km.

The Galway to Clifden railway line ceased operations in 1935 and was subsequently dismantled. The remnants of this railway line from Oughterard to Clifden, the focus of this Project, consist of a well defined track for much of its length with a number of intact bridges. It merges and crosses over existing local roads and the N59 at various locations. The proposed Greenway, for the most part, is located between hilly and mountainous areas to the north (i.e. Twelve Bens, Maumturks and Derroura Hills) and an almost continuous band of lakes and adjoining rivers to the south.

The extent of the railway line from Clifden to Oughterard is shown in green in **Figure 1.1**. The principal study area for the purposes of this constraints study will be the existing track of the dismantled railway line and lands 50-100 metres on either side of the track. **Figure 1.1** shows the extent of this study area in red.

2.2 NATURE AND EXTENT OF PROPOSED WORKS

In May 2011 Galway County Council appointed RPS as environmental consultants for the Connemara Greenway – Clifden to Oughterard. The majority of the proposed Greenway is to be located along the dismantled railway line between Oughterard and Clifden.

The full extent of the proposed Greenway is shown in the location maps in **Figures 1.3 (Sheets 1-15).**

2.2.1 Preferred Design Standards

In the design of the proposed Greenway the following publications have been consulted:

- The National Transport Authority's *National Cycle Manual* (NTA, 2011);
- The National Roads Authority's *Design Manual for Roads and Bridges* (NRA, 2001); and
- the jointly published *Traffic Management Guidelines* (DTO et al., 2003).

2.2.2 Detailed Description of the Proposed Greenway Project

2.2.2.1 Laying base course and compaction

- The Greenway base will consist of 150mm of crushed stone to Clause 804, rolled and compacted.

- Geotextile will be used to separate earthworks materials. Geotextile required as part of the works to separate materials at locations shall be manufactured from synthetic or other fibres as required therein and be in the form of thin permeable membranes.

- The ground conditions will vary immensely. Greenways are generally designed for relatively light loadings and it is entirely possible that the most arduous conditions they are subject to will be the construction process itself. Greenways are not roads but at the same time they will have to take the occasional loading of maintenance vehicles.

- The sub-base will generally be wider than the finished surface of the path in order to give support to the edges of the path and will be constructed of whatever materials are available locally. The function of the sub-base is to spread the load and it needs sufficient thickness so that it will not deform under the wheels of maintenance vehicles, cracking or damaging the finished surface.

2.2.2.2 Final Surface

The final surface will consist of Polymer Modified Stone Mastic Asphalt surface courses which shall conform to IS EN 13108-5. This is defined as an application of a polymer modified bitumen emulsion bond coat overlaid by a polymer modified hot bituminous mixture. This specification is for hot laid surfacing with a compacted thickness of 20mm to 40mm, in which the aggregate particles are necessarily gap-graded to form a stone to stone contact and to provide an open surface texture.

The mixture designation shall be SMA 14 Surf PMB 65/105 – 60 des, 30mm thick, as per CL942 of series 900 of the NRA 'Specifications for Road Works'. **Image 2.1** below provides an example of a comparable surface being laid. A typical cross section detail is shown in **Figure 2.1** and typical design detail of the proposed cycleway is provided in **Figure 2.2.**

Image 2.1 Example of a similar final surface being laid

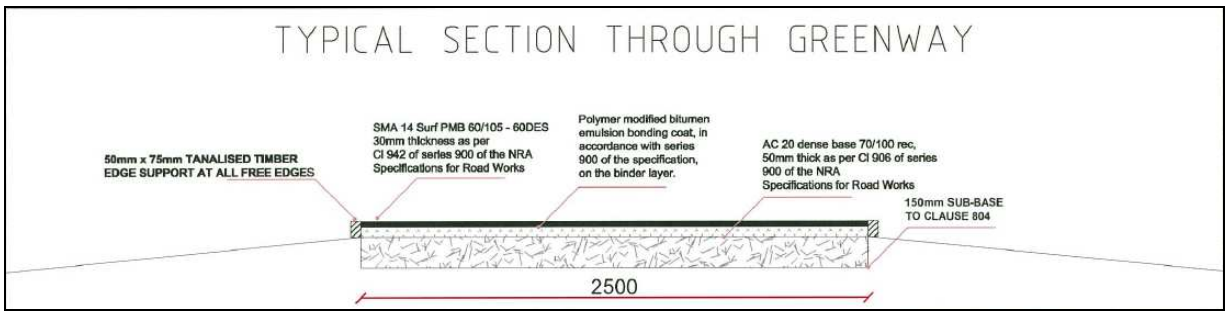


Figure 2.1 Typical Section through Greenway

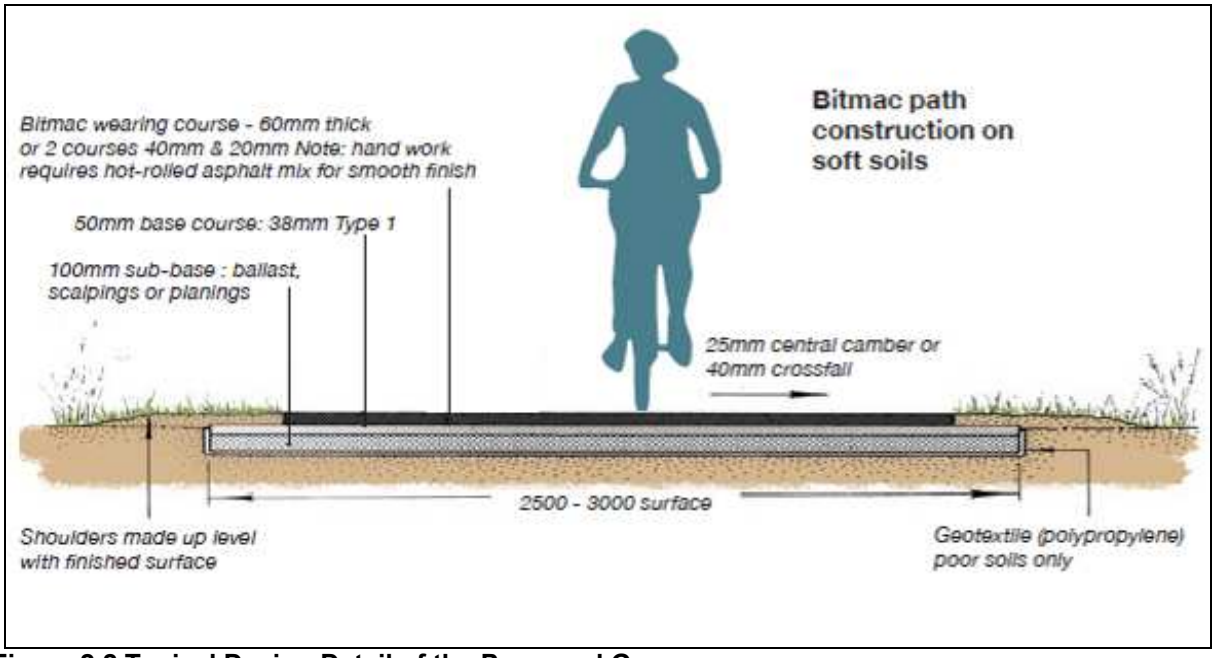


Figure 2.2 Typical Design Detail of the Proposed Greenway

2.2.2.3 Fencing, Gates and Cattle stops

It will be necessary to fence both sides of the Greenway where landowners require it. In cases where fencing is not requested by the landowner the side of the Greenway will be left unfenced. At areas where cattle need to be moved across the proposed Greenway there are a number of different options to enable farmers to move livestock in a safe manner for both stock and Greenway users. Below are a number of different options for cattle stops (**Images 2.2** and **2.3**) and fencing (**Figures 2.3** to **2.4**) which are dependent on the different needs of each farmer. Also detailed below are proposed cattle grids (**Figure 2.5**).

It is envisaged that where fencing is required alongside the proposed Greenway will be the first item to be dealt with by a contractor in order to establish the site boundaries.

Image 2.2 Example of Greenway Section with Cattle Stops

Image 2.3 Example of Greenway Section with Cattle Stops

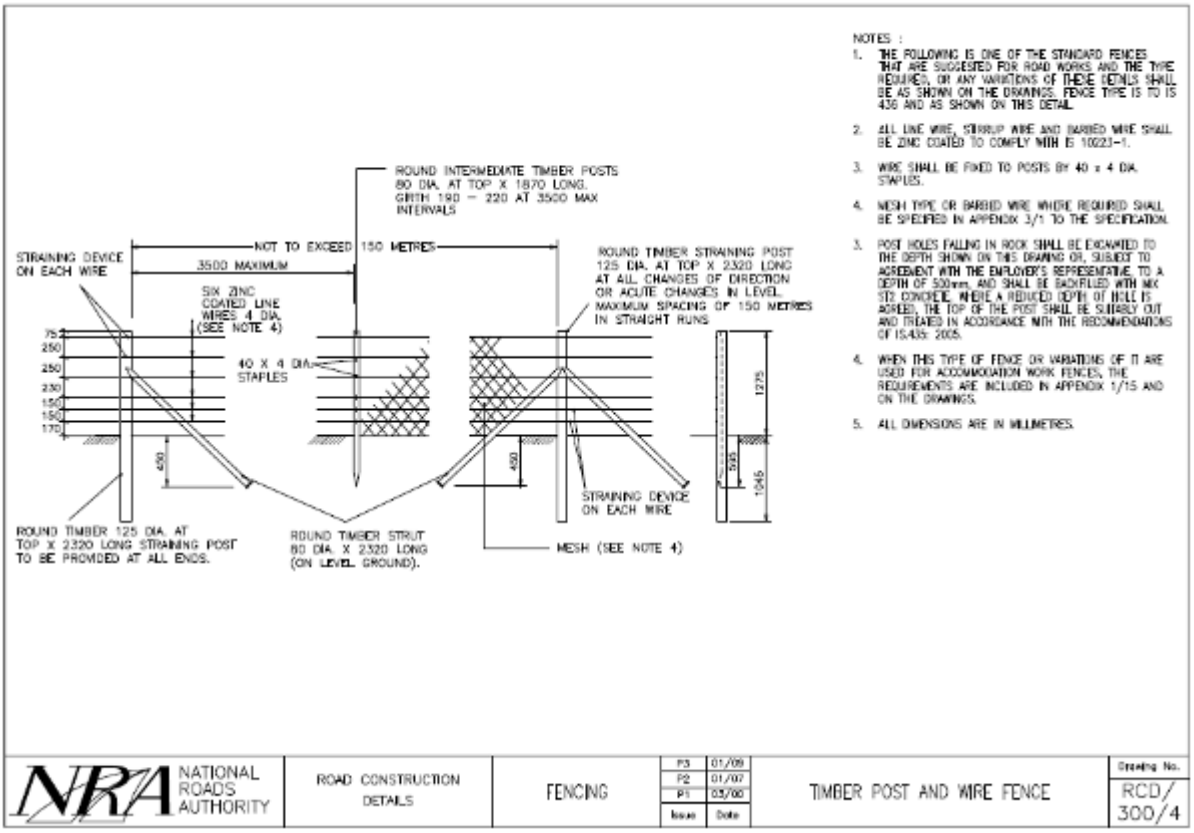


Figure 2.3 Proposed Fencing Detail.

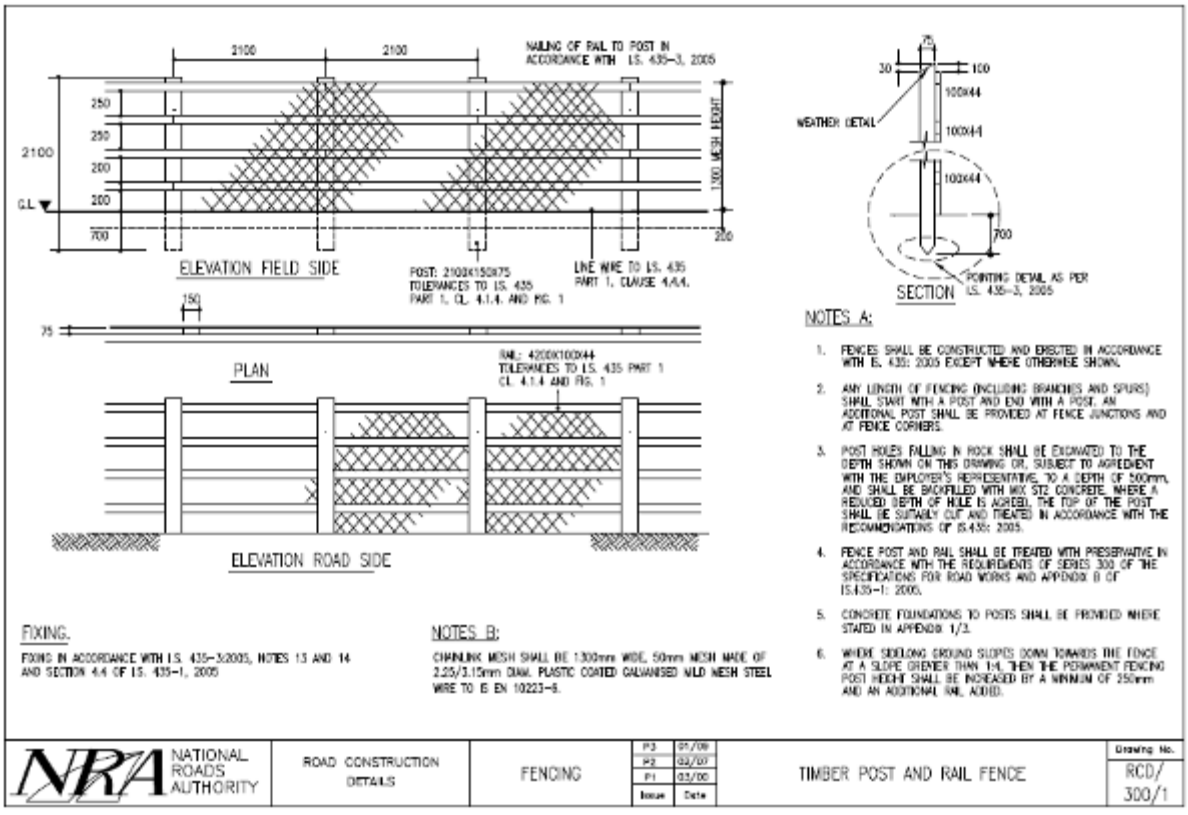


Figure 2.4 Proposed Fencing Detail.

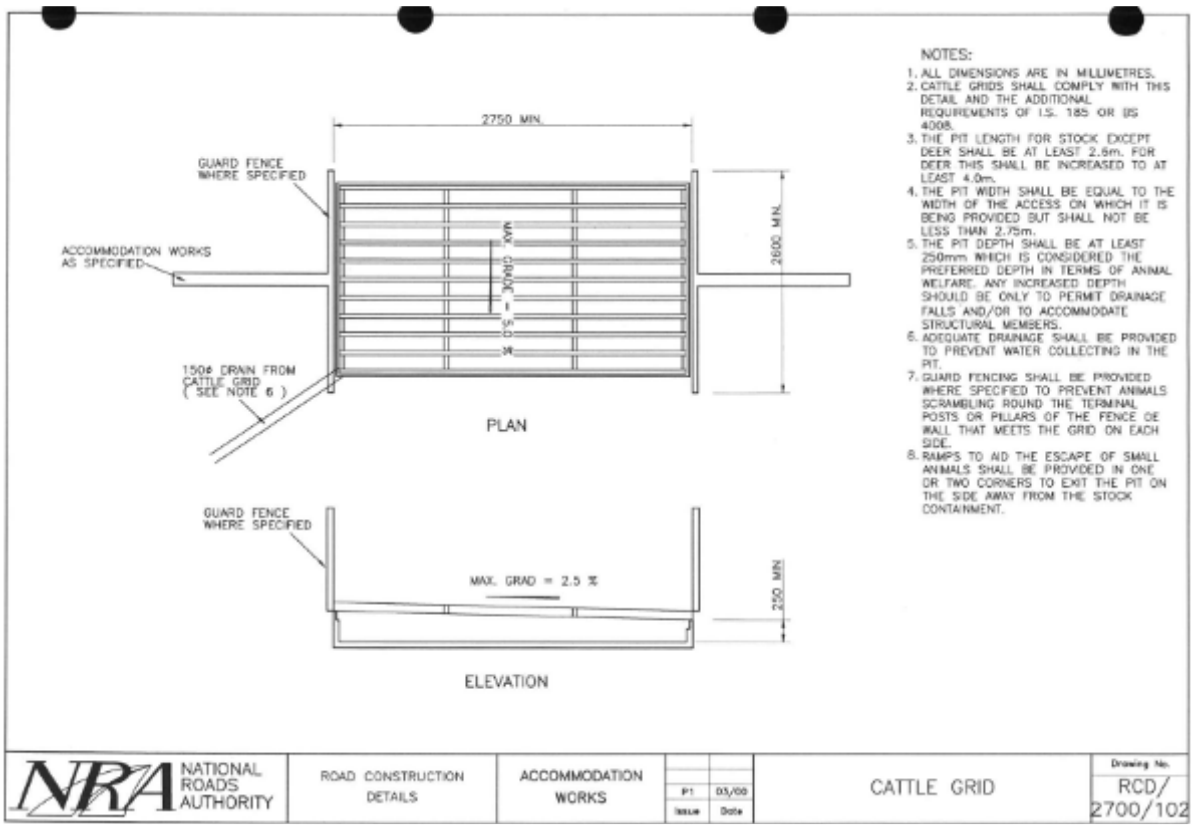


Figure 2.5 Proposed Cattle Grid Detail.

2.2.2.4 Bridges and Structures

It will be necessary to construct seven new timber or steel bridges. The bridges currently in place are dilapidated and in need of replacement. Images of three current bridges are provided below, **Images 2.4** to **2.6**. Bridge names, spans and locations are detailed in **Table 2.1**.

Table 2.1 Bridges to be Replaced throughout the Route

Bridge No.	Bridge Name	Span	Chainage
1	Cloonbeg River Bridge	2 No. 50 Foot Spans	11+700
2	Athry River Bridge	1 No. 20 Foot Span	16+620
3	Bunscanniff Bridge	1 No. 23 Foot Span	30+920
4	Letterfore River Bridge	1 No. 20 Foot Span	44+800
5	Glengowla River Bridge	1 No. 40 Foot Span	46+800
6	Leadmines Bridge	1 No. 20 Foot Span	48+400
7	Oughterard River Bridge	1 No. 40 Foot Span	50+200

New Bridge Structures at Athry Bridge, Bunscanniff Bridge, Letterfore River Bridge and Leadmines Bridge

After inspection by engineering contractors employed by Galway County Council the existing bridge structure at Athry Bridge was considered unreliable. It is proposed to erect a new lightweight steel and timber structure over the existing structure as shown in Sketch 02 of **Appendix C, Arup Bridge Report**.

The design takes account of live loading from pedestrians and cyclists (5kN/m^2) and no vehicular access is to be allowed onto the bridge. The existing bridge structure is to be retained and maintained. Apart from the historical significance of the bridge, the dead weight is necessary to limit pedestrian generated vibrations to acceptable levels. All debris must be removed from the existing deck. The existing bridge will act as a temporary platform for the construction of the new structure. Because of the restricted access to the bridge, it is likely that the main beams will arrive in sections and be spliced together in-situ. A similar design and construction method will be employed at Bunscanniff Bridge, Letterfore River Bridge and Leadmines Bridge.

New Bridge Structures at Cloonbeg River Bridge, Glengowla River Bridge and the Oughterard River Bridge.

The bridge span is short at these locations, at approximately 6m, and so the bridge design solution will involve the erection of a steel structure (with 3 no beams and metal decking) to act as a permanent shutter for an in-situ concrete deck (details shown in Sketch 03 of **Appendix C**). The outline design is based on a single gross weight vehicle of 7.5 tonnes giving rise to axel loads as set out in Annex D of BD21/01 (*Assessment of Highway Bridges and Structures, Vol. 3, Section 4*). If a heavier vehicle is considered appropriate then the design will need to be altered. A similar design and construction method will be employed at Cloonbeg River Bridge, Glengowla River Bridge and the Oughterard River Bridge.

Image 2.4 Oughterard River Bridge currently in place

Image 2.5 Letterfore River Bridge currently in place

Image 2.6 Cloonbeg River Bridge currently in place

Examples of possible bridge designs are shown in **Image 2.7** and **Figure 2.6**.

Image 2.7 Example of Possible Bridge Design

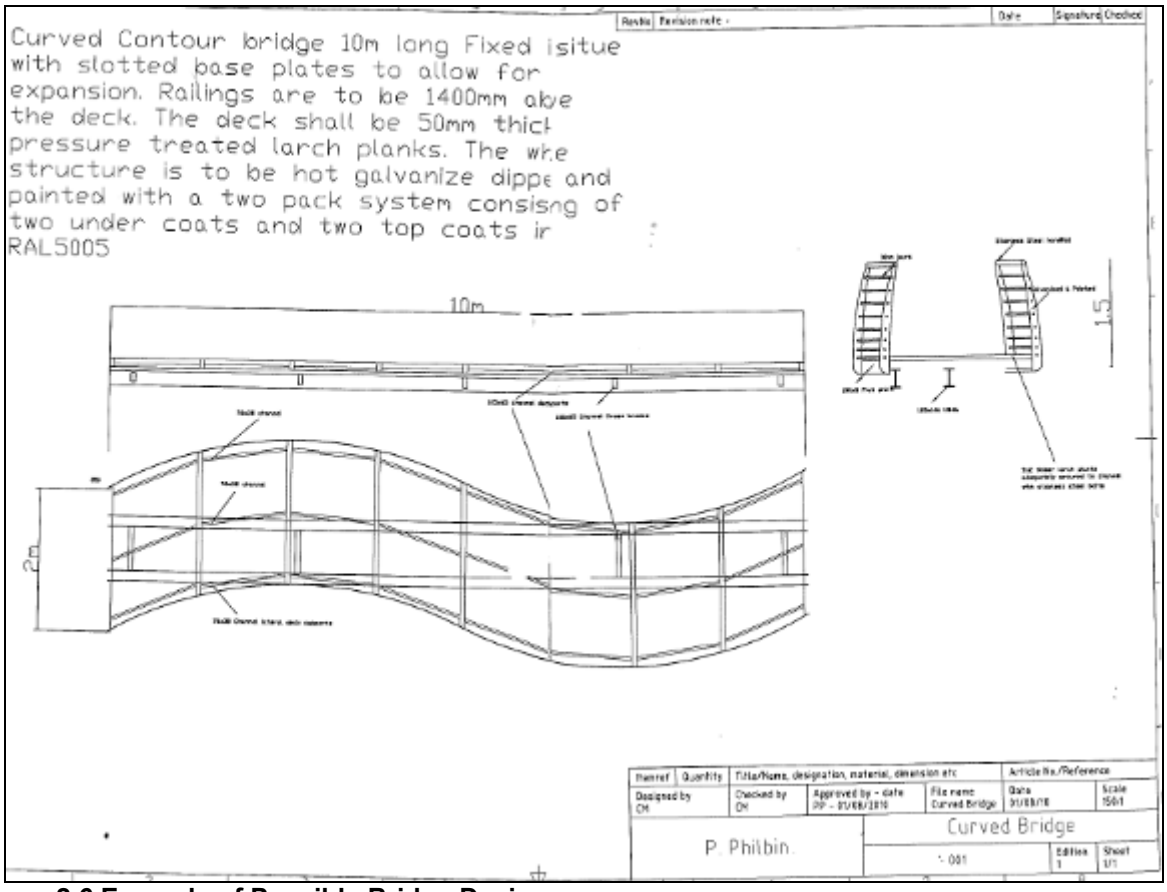


Figure 2.6 Example of Possible Bridge Design

2.2.2.5 Cycle Crossings

Where the Greenway crosses a roadway it is proposed that combined cyclist and pedestrian crossings be installed as detailed in **Figure 2.7** below.

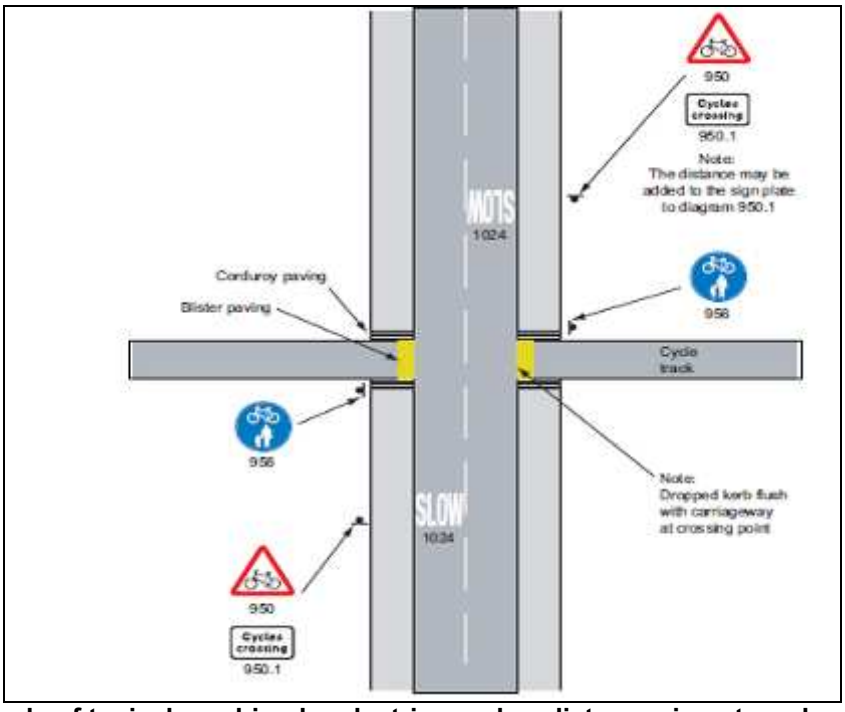


Figure 2.7 Example of typical combined pedestrian and cyclist crossing at roadway

These combined cyclist and pedestrian crossings will be uncontrolled and road traffic will have priority. A variety of uncontrolled crossings will allow cyclists and pedestrians to stop and cross the main traffic safely. These include solutions that passively reduce traffic speeds and/or address the crossing as a two-stage process (example shown in **Figure 2.8**). It is proposed that cyclists and pedestrians must wait for a suitable gap in the traffic before crossing. The volume and speed of traffic on the main road will influence the choice of these solutions. Heavier traffic and higher speeds will generally require controlled crossings.

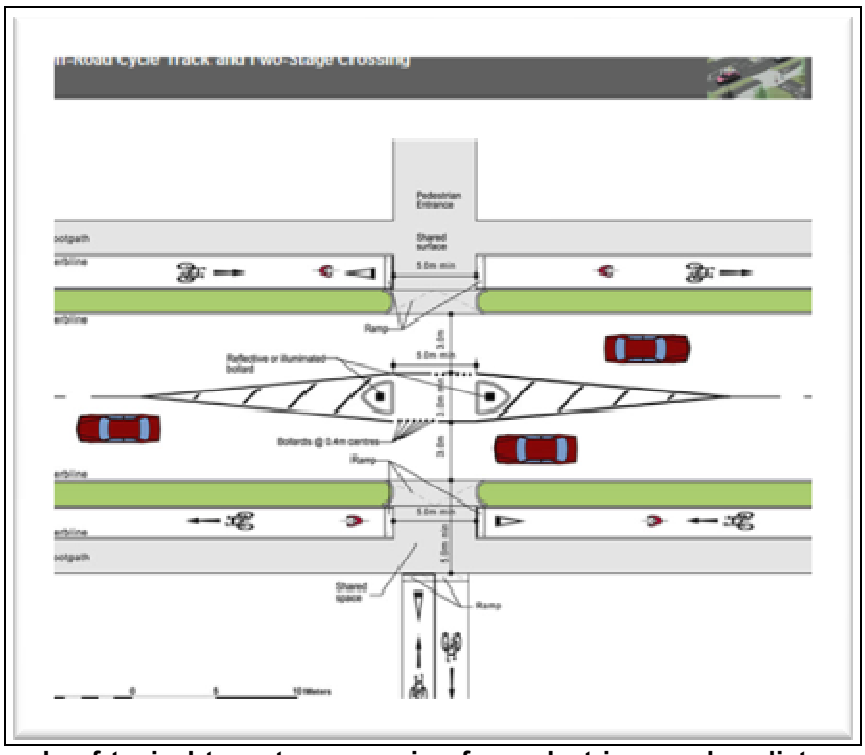


Figure 2.8 Example of typical two-stage crossing for pedestrians and cyclists crossing at busy roadway sections

2.2.2.6 Erection of Signage and Information Boards and Mapping

Signs will be required for:

- Identifying the start of the trail
- Directions to off-trail facilities such as toilets, huts or carparks
- Directions when the trail changes direction or changes terrain sharply (e.g. cross-country trail joins road for short distance and then resumes)
- Road crossings
- Warning and cautions about the trail or features (e.g. slip prone area; narrow, winding trail; single file track or structure)
- Occasional route markers (especially in remote areas) to advise riders that they are still on the trail
- Town names and features/facilities within the towns (cafes, toilets etc)
- Advance information signage (such as “next toilet – 11 km”)

Examples of signs which will be used throughout the proposed Greenway are outlined in **Figure 2.9** below.

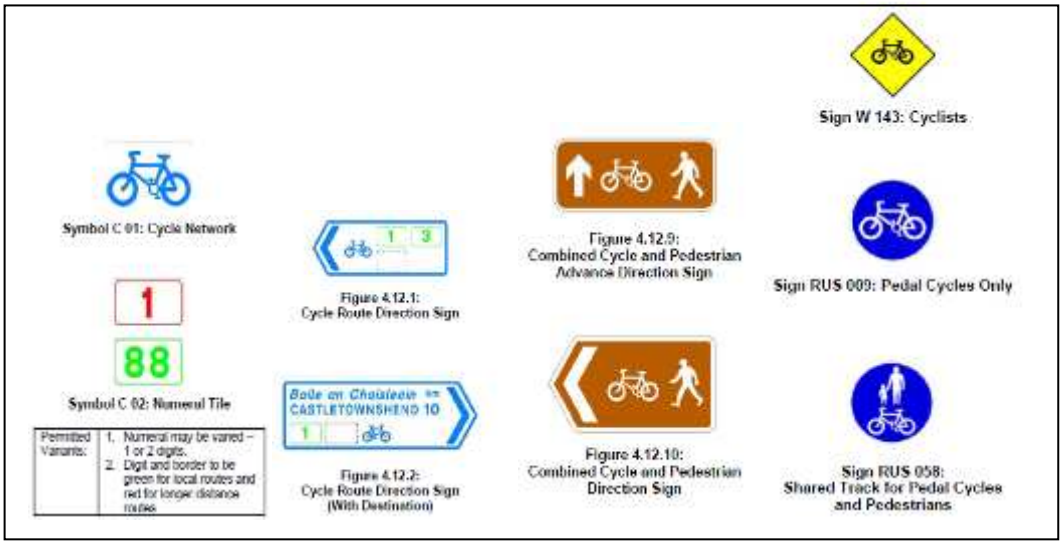


Figure 2.9 Example of typical signs for pedestrians and cyclists throughout the Greenway route

Cycle network signs will have a white background with blue symbols and text. All the signs will display the Cycle Network symbol, Symbol C 01. They will also include one or more Numeral Tiles, Symbol C 02, which contain green or red numerals within borders of the same colour to denote the route numbers of local (green) and longer distance (red) cycle routes.

2.2.2.7 Information Boards

Basic information about the route will be available on information boards at the route head and at popular access points along the trail. Information will include:

- A map showing a clearly defined route with a start and finish point and a 'you are here' pointer.
- Information on the trail grading (difficulty rating) including a definition of the grades.
- The length of the trail from the start to finish, the total ascent in meters and the estimated time to complete the trail for the average user.
- Details of waymarking used on the trail.
- Where a trail traverses open/ exposed terrain a warning about the risks involved should there be a change of weather.
- A contact email for users to provide feedback and/or report incidents or issues on the trail.
- Contact details for the nearest emergency services.
- Information on whether dogs are permitted on the trail.
- The "Leave No Trace" principles.

2.2.2.8 Programme and Phasing of Works for the Greenway Project

It is proposed that works will be carried out over a period of 24 months. Construction of the proposed Greenway will be linear i.e. construction will start at the Clifden end of the project and proceed progressively along the disused railway line eastwards finishing close to Oughterard.

It is proposed to carry out the work using two teams working in tandem and the machinery will comprise 360 degree track machines, dumpers, vibrating rollers, cranes, road graders and road pavers.

2.2.2.9 Excavations and Excavated Materials

The majority of the proposed Greenway will be located on the existing disused railway line between Clifden and Oughterard. There will also be ground disturbances, such as topsoil removal carried out in areas that are undisturbed (alternate routes in the townlands of Gowlan West, Garroman, Lurgan and Glengowla West). It is proposed that the existing topsoil and scrub will be removed from the railway line in preparation for the laying down of the Greenway route surface materials. Any material which will be removed during site preparation will be used to form embankments along the path. It is anticipated that a maximum of 78,000m³ of overburden (predominantly topsoil), will be removed from the proposed route in preparation for the laying of Greenway track surface. This estimate is based upon excavation along the entire length of the proposed Greenway (52km) at a depth of 0.5m and a width of 3m. This amount of overburden is taken as the maximum needed for excavation, although the final quantity is likely to be much less as there is already a significant proportion of the Greenway which is covered with hardcore material and is used as a trackway for vehicles thereby which may result in little excavation needed. It is not envisaged that rock breaking will be required.

2.2.2.10 Site Access and Compounds

Construction materials and machinery will be stored at one of seven compounds located along the route. These site compounds will also serve as access points to the route. As the construction of the Greenway is a linear project there will be no need for new access areas.

As noted above it is envisaged that there will be seven site compounds which include short term staff welfare facilities and plant and materials storage for the proposed works. These locations are outlined in **Figure 1.3 (Sheets 1-15)**.

2.2.2.11 Operation of the Proposed Greenway Project

It is expected that the proposed Greenway Project will cater for approximately 160,000 cyclists and walkers per annum.

There will be ongoing Greenway maintenance after the initial track clearing, formation and development. The following maintenance activities will be required as part of the Greenway upkeep:

- It will be necessary to carry out annual weed spraying of the Greenway surface and preventative measures to ensure the eradication of noxious and nuisance weeds.

- After storm conditions, there will be a need to make storm repairs to both the Greenway surface and the clearing of any debris left on the track from broken tree branches or fallen trees. Track wash outs, surface damage will require repair or redressing to provide a suitable surface again.

- Fences, gates, cattle stops and signage will also require maintenance effort with age, weather, stock, vehicle and vandalism damage.

As part of Fáilte Ireland's 'Leave no trace' initiative it is intended that there will be no litter bins provided along the Greenway. It is also intended that there will only be seating furniture along the route as the provision of picnic tables is seen to encourage litter issues. There will however, be welfare facilities provided every 10km along the route, in particular at the following locations:

- Oughterard - Maam Cross (Facilities at each Location),
- Maam Cross – Recess (Facilities in Maam Cross only),
- Recess - Ballynahinch. (Facilities at Ballynahinch),
- Ballynahinch – Clifden (Facilities at each Location).

3 EXISTING ENVIRONMENT

3.1 GEOLOGY, HYDROLOGY & HYDROGEOLOGY

The Geological Survey of Ireland (GSI) website was consulted for available geological/hydrogeological information.

3.1.1 Bedrock Geology

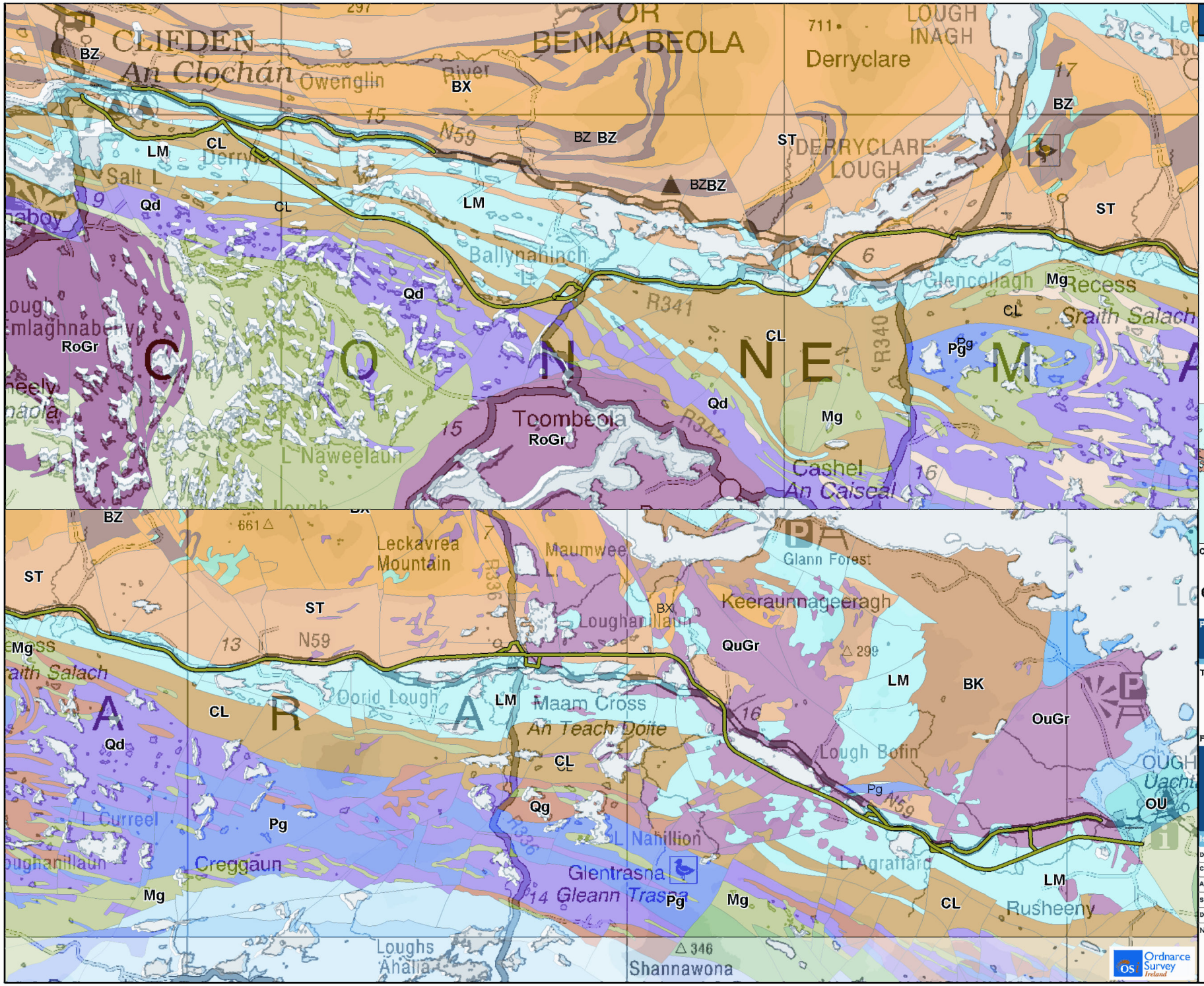
The main rock types encountered along the route are Precambrian Marbles and Precambrian Quartzite's, Gneisses and Schist's. Late Silurian – mid – Devonian Granites are also present along the route. The route the study area between Clifden to Maam Cross is underlain predominantly by the Marbles with Quartzite's, Gneisses and Schist also underlying the route. From Maam Cross to Oughterard the route again passes over the metamorphic rocks described above but the predominant rock type is Oughterard granite. The granite is present in two distinct areas, east of Maam Cross and around Lough Bofin as well as from Lough Agraffard to just west of Oughterard. Details on bedrock geology are shown on **Figure 3.1**.

3.1.2 Quaternary Geology

Quaternary geology is the study of geological deposits deposited or formed in the last 2 million years. It is primarily concerned with the study of soils and other materials overlying bedrock. In Ireland, quaternary deposits largely comprise soils deposited during and subsequent to the most recent ice ages.

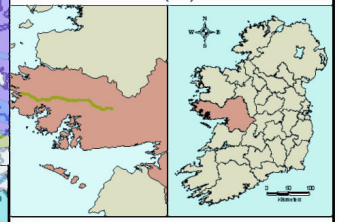
Based on information gleaned from the Teagasc Subsoils Map, (Western RBD Region), subsoils within the study area comprise predominantly of thin blanket peat deposits. Made ground is present along the route associated with the N59 road between Oughterard and Clifden. Made ground is most apparent in the more inhabited parts of the study area but also close to the former railway line and other areas where materials have been sourced for abstraction or moved for construction (residential/civil). There are significant areas of made ground in the villages of Oughterard and Clifden. There is a varying presence of till derived chiefly from granite along the proposed route between the village of Oughterard and Lough Bofin. Sporadic areas of till derived chiefly from metamorphic rock are evident within the study area between Lough Shindilla and Ballynahinch Lake, where it begins to become more prevalent. Bedrock outcrops and subcrops are evident at various points along the study area and are mostly apparent along the proposed route between Recess and Clifden.

Much of the disused railway line is now covered in topsoil, which in drier areas is maintained as a track (Examples shown in **Images 3.1 and 3.2**) and in wetter areas has been colonised by hydrophilic plants. A high percentage of the disused railway line is now used as a track connecting agricultural lands. Details on soils in the study area are shown on **Figure 3.2**.



Legend

- Proposed Route Layout
- Oughterard Granite (OuGr)
- Roundstone Granite (RoGr)
- Ballynakill Schist Formation (BK)
- Streamstown Schist Formation (ST)
- Lakes Marble Formation (LM)
- Cashel Schist Formation (CL)
- Oughterard Limestone Formation (OU)
- Quartz Diorite Gneiss & Granitic Gneiss (Qg)
- Metagabbro & Related Lithologies (Mg)
- Paragneiss, Migmatite Hornfels (Pg)
- Bennabeola Quartzite Formation (BX)
- Barnanoraun Schist Formation (BZ)



Client
Galway County Council

Project
Connemara Greenway

Title
Bedrock Map

Figure 3.1

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Issue Details

Drawn by: MCS		Project No. MGE0269	
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Approved by: WM			
Scale: N.T.S.		Drawing No. MI0002	Rev. D01
Date: March 2012			

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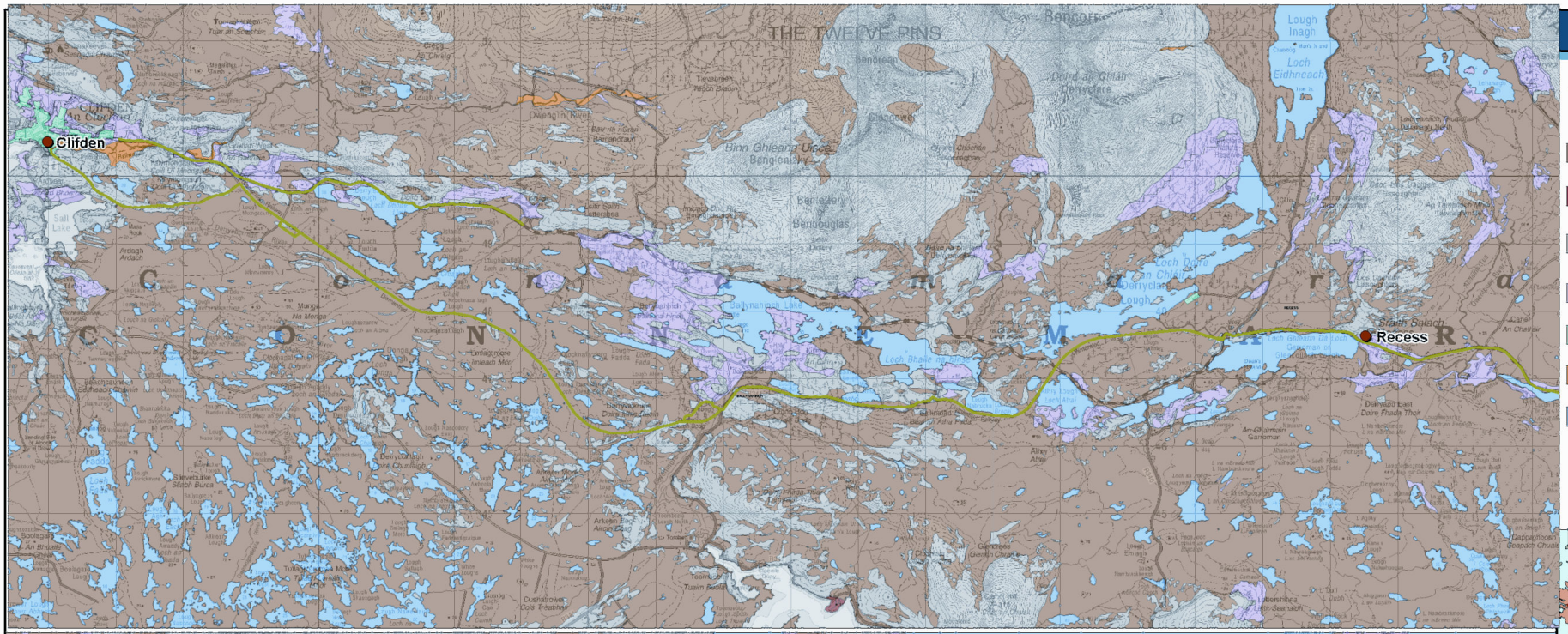
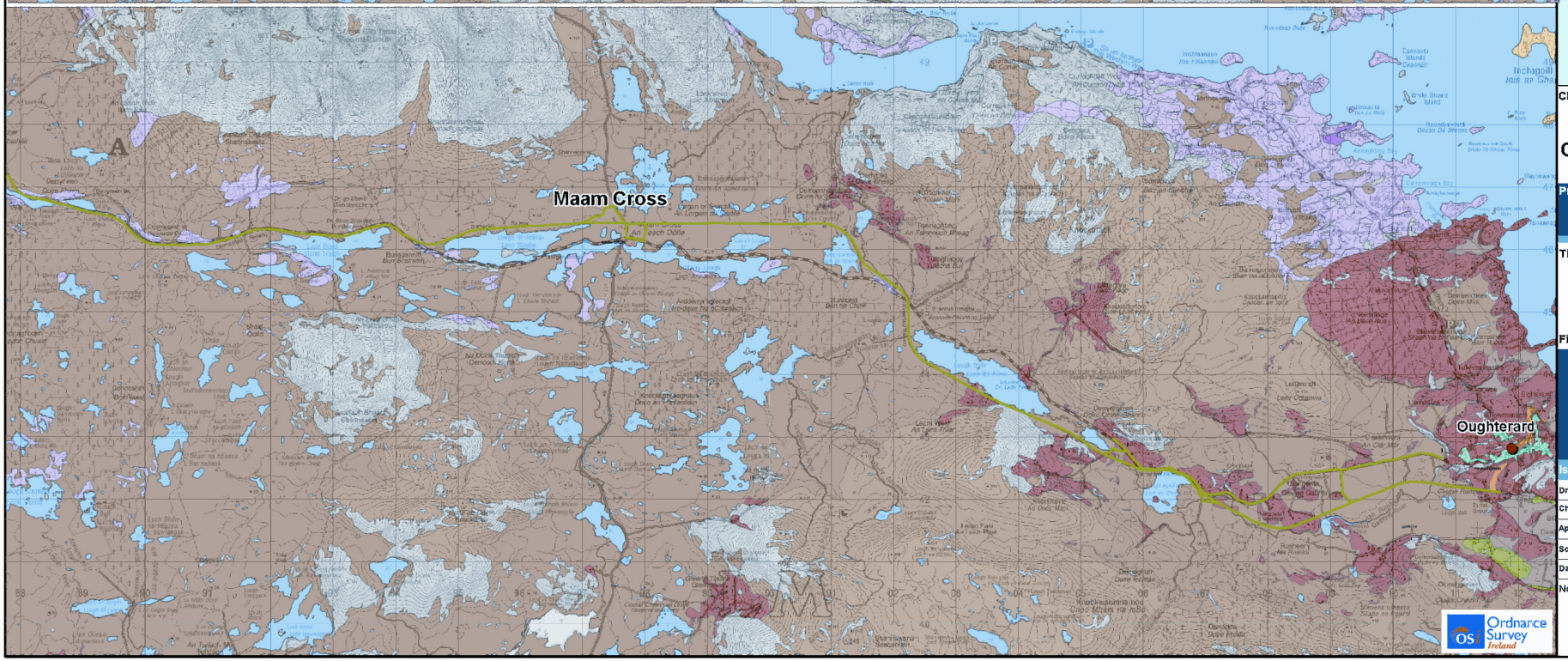
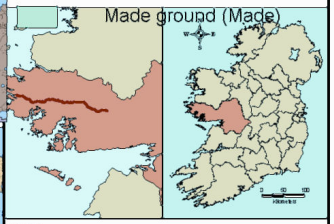




Legend

- Proposed Route Layout
- Blanket Peat (BktPt)
- Till derived chiefly from Granite (TGr)
- Bedrock outcrop & subcrop (Rck)
- Till derived chiefly from Metamorphic Rocks (TMp)
- Made ground (Made)
- Alluvium (A)
- Water



Client

Galway County Council

Project

Connemara Greenway

Title

Soils Map

Figure 3.2

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Scale:	N.T.S.	Drawing No.	MI0005
Date:	March 2012	Rev.	D01

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Image 3.1 An example of the proposed route and former railway within townland of Emlaghmore, facing west, with improved topsoil raised above the surrounding bog.

Image 3.2 An example of the proposed route and railway to the immediate north of Lough Shindilla, facing west southwest, where it is being used as a farm track.

3.1.3 Surface Hydrology

The proposed Greenway crosses 45 No. surface waterbodies from small drains to reasonably large rivers and lakes. These existing watercrossing structures will be largely retained, with some modifications and some replacements.

Along the entire scheme the watercourses generally rise to the north of the road flowing southwards with a few exceptions (including the causeway crossings of lakes, crossing of lake outlets and a small number of crossings that rise to the south of the proposed alignment).

The road project passes through six principal river catchments as summarised in **Table 3.1** and shown in **Figure 3.3.**

Table 3.1 Principal Catchments in the Study Area

Principal River Catchments	Catchment Code	Western River Basin Hydrometric Area	Outlet
Owenglin	00135	32	Clifden Bay
Derryehorraun	000T4	31	Clifden Bay
Owenmore	00135	31	Cloonile Bay
Screebe	000R4	31	Camus Bay
Owenree	00143	30	Lough Corrib
Owenriff	00143	30	Lough Corrib

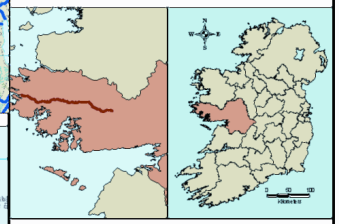
The study area watercourses are characterised as steep hillside streams, large valley / lowland rivers or rivers out-flowing from the large lakes. Each watercourse type has a different low flow regime. Steep hill side streams in the region have been observed to run dry following short term dry periods; flows in the large valley rivers which drain the hill side streams in turn can be greatly reduced with baseline flows arising from the slow ground water drainage from the adjoining mountain and valley bog lands. The lake out-flows rivers are less susceptible to short term dry periods with the lake slowly discharging the vast stored volumes while also receiving baseline flows from adjacent bog land areas and valley rivers.

The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The collated information relating the water quality and macro-invertebrate community composition is condensed to a numerical scale of Q-values or Biotic Index. The indices are grouped into four classes based on the lake/river's suitability for beneficial uses such as water abstraction, fishery potential, amenity value, etc.

The Greenway traverses a number of watercourses that are monitored varied in quality from being polluted (Q2) to unpolluted (Q4-5) (Classified during the aquatic ecological survey for the scheme). Generally the river reaches downstream of forested / recently deforested areas have a lower quality status than the remainder of the river systems. There are 24 No. EPA water quality monitoring stations within the study area river catchments, **Table 3.2** below summarises the data for the 15 No. stations located adjacent or downstream of the Greenway scheme. The water quality at these stations is generally classified as unpolluted.

Legend

- Proposed Route Layout
- Catchment boundary
- Groundwater Monitoring Sites
- WFD Surface Water Monitoring Sites



Client
Galway County Council

Project
Connemara Greenway

Title
River Catchments

Figure 3.3

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Date:	March 2012	Rev.	D01

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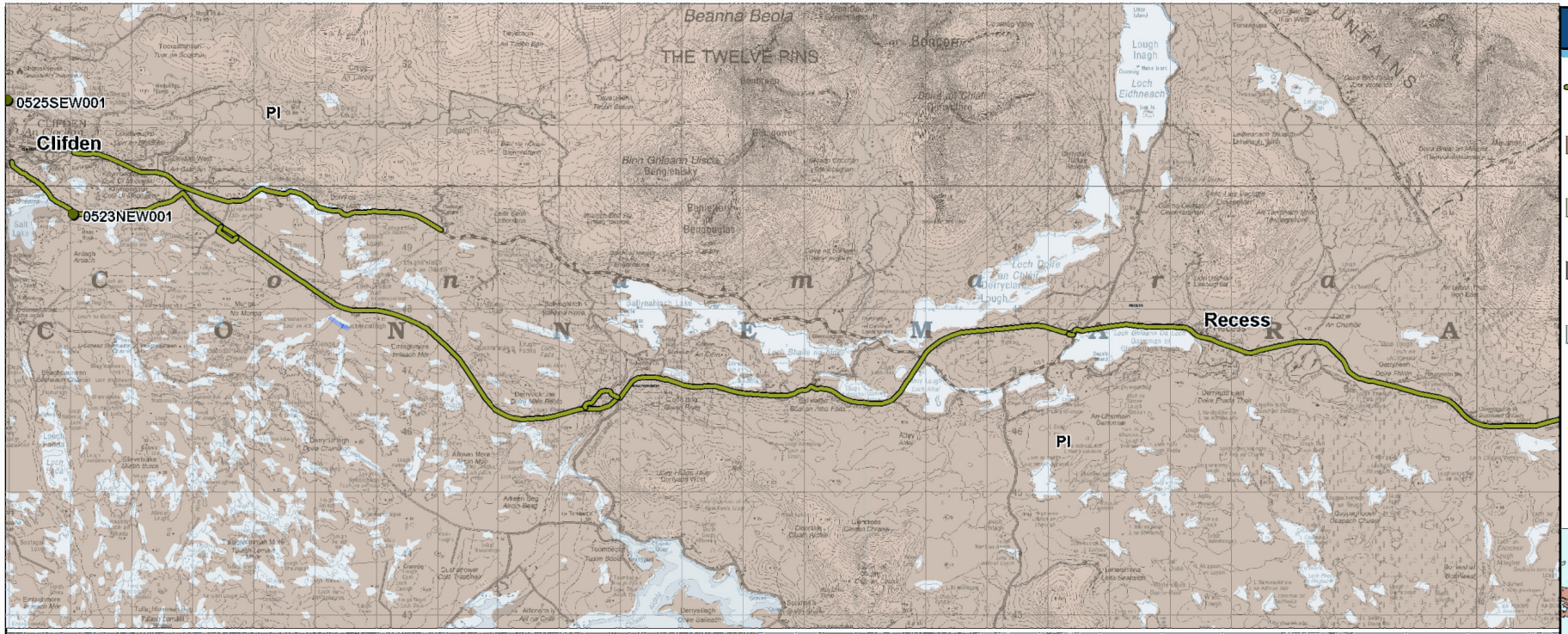
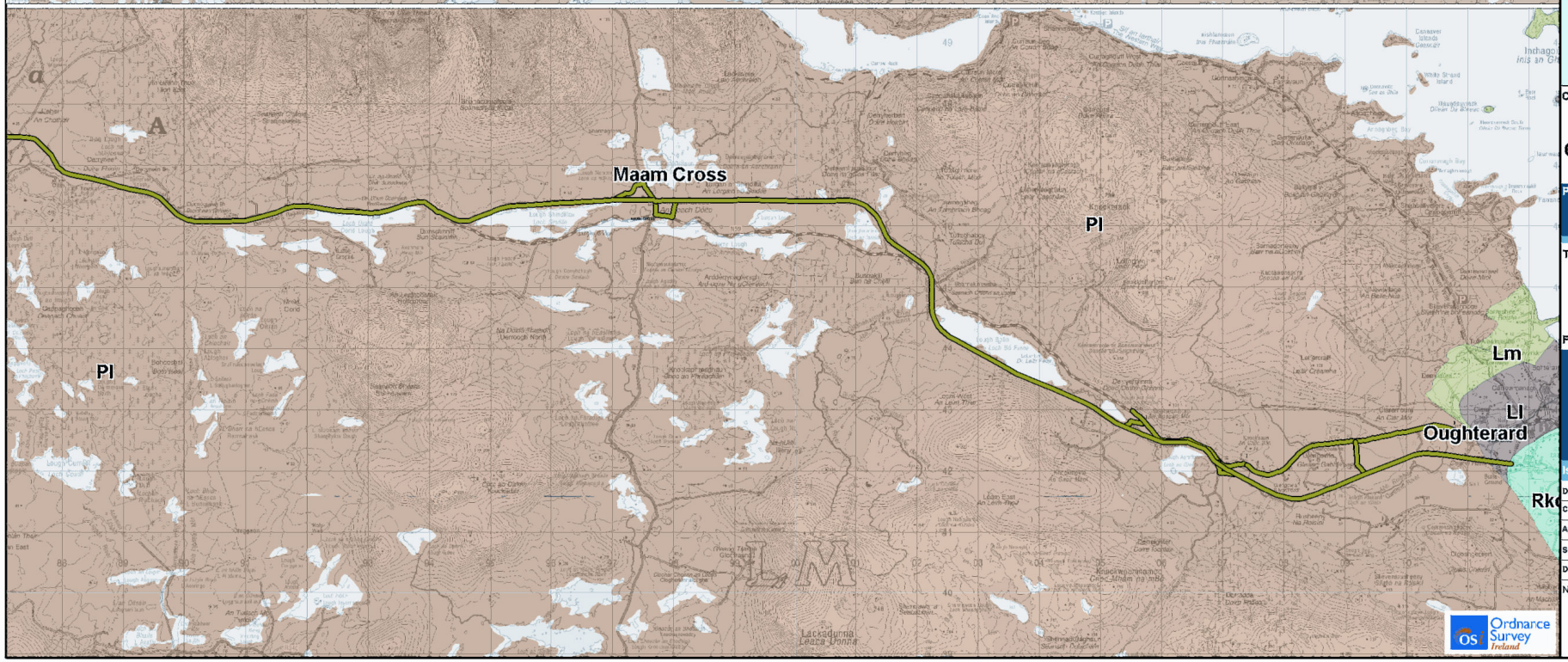
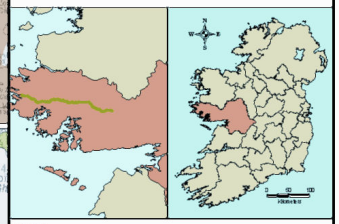




Legend

- Proposed Route Layout
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Lm - Locally Important Aquifer Bedrock which is Generally Moderately Productive
- Ll - Locally Important Aquifer Bedrock which is Moderately Productive only in local zones
- Rkc - Regionally Important Aquifer - Karstified (conduit)
- GSI Wells



Client
Galway County Council

Project
Connemara Greenway

Title
Aquifer Map

Figure 3.4

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Table 3.2 River Water Quality

Ref	River Catchment	River Name	Station_ID	Location	Q-value	Relevance
1	Owenglin	Owenglin	32O030200	Bridge S.W. of Clifden Lodge	4-5	Adjacent to Scheme
1	Owenglin	Owenglin	32O030300	Br at S.E. end of Clifden	4	Downstream of Scheme
2	Derryehorraun	Derryehorraun	32D040200	Just u/s Salt Lough	4-5	Downstream of Scheme
3	Owenmore	Recess	31R010300	D/s Owentooey River confl.	4	Adjacent to Scheme
3	Owenmore	Recess	31R010100	Bunskannive Bridge	4-5	Adjacent to Scheme
3	Owenmore	Recess	31R010400	Weir Bridge	4	Adjacent to Scheme
3	Owenmore	Recess	31R010700	Cloonbeg Bridge	5	Downstream of Scheme
3	Owenmore	Recess	31R010200	Cloonloppeen Bridge	4	Adjacent to Scheme
3	Owenmore	Owentooey	31O030100	Tullywee Bridge	4-5	Adjacent to Scheme
3	Owenmore	Glencoaghan	31G010200	Glencoaghan Bridge	4-5	Adjacent to Scheme
4	Screebe	Screebe	31S010100	Old Railway Br u/s L. Shindilla	4-5	Adjacent to Scheme
5	Owenree	Owenwee (Corrib)	30O030100	Bridge S.E. of Bofin Lodge	4-5	Adjacent to Scheme
6	Owenriff	Owenriff (Corrib)	30O020190	Bridge u/s Lough Corrib	4	Downstream of Scheme
6	Owenriff	Owenriff (Corrib)	30O020100	1 km u/s Oughterard Bridge	4-5	Adjacent to Scheme
6	Owenriff	Owenriff (Corrib)	30O020070	1 km d/s Lough Agraffard	4-5	Adjacent to Scheme

Hundreds of lakes have been identified within the six river catchments associated with the proposed development. Of these, 25 No. lakes/ponds are located immediately adjacent (upstream and downstream) of the proposed Greenway alignment

Table 3.3 below presents the lakes located adjacent to the scheme, the approximate surface area (Ha) chainage extents and distance and surface area.

Table 3.3 Lakes adjacent to the proposed Greenway

Name	Chainage Extents	Distance from Greenway (km)	Area (Ha)
Lough Phreaghaun	850-900	0.2	5.5
Derrywaking Lough	1900-2100	0.17	6.2
Lough Muingacurry	3400-3500	0.05	0.9
Lough Fadda West	4900-5900	0.2	6.9
Croaghat Lough	6000-7200	0.05	18.26
Ballynahinch Lake	12200-15300	4.3	166.02
Nabrucka (Lough)	15300-16500	0.75	18.26
Athry Lough	16800-17400	0.85	35.27

Name	Chainage Extents	Distance from Greenway (km)	Area (Ha)
Derryclare Lough	17500-20100	0.75	223.5
Garroman or Glendollagh Lough	20100-22100	2.65	83.39
Loughaundoonan	22900-23000	0.1	0.91
Tawnagh or Park Lough	24600-25600	1.05	9.41
Derryneen Lough	25800-26300	0.55	5.41
Chluain Toipin (Loch)	27900-28600	0.65	16.66
Oorid Lough	29200-31200	2.1	60.53
Shindilla (Lough)	32100-34500	2.6	65.61
Ardderry Lough	33900-37700	1.325	81.06
Ardderry Pond	37800-37900	0.125	0.98
Maam Cross Pond 1	34700-34800	0.1	1.09
Maam Cross Pond 2	34900-35100	0.15	1.74
Lurgan Lough	36800-37400	0.75	15.51
Loughaunierin	39300-38600	0.75	21.24
Bofin Lough	43400-40700	2.55	92.49
Adrehid Lough	44000-44500	0.55	7.5
Agraffard Lough	45400-46000	0.8	30.11
Ateaenn Lough	48250-48400	0.2	3.81
Lough Mall	50400-50600	0.2	3.5

3.1.4 Hydrogeology

The bedrock underlying the majority of the study area is classified by the Geological Survey of Ireland (GSI) as a 'Poor Aquifer'. Outside the village of Oughterard the proposed route is underlain by small segments of rock which are classified by the GSI as 'Regionally Important Aquifer – Karstified', 'Locally Important Aquifer (bedrock which is moderately productive only in local zones)' and 'Locally Important Aquifer (bedrock which is generally moderately productive)'. The aquifer classification in the study area is shown on **Figure 3.4**.

The study area is located within the Clifden Marbles Groundwater Body (GWB) which is the management unit for the purposes of the Water Framework Directive (WFD). This GWB is composed predominantly of Precambrian Marbles, (Lakes Marbles Formation) interspersed with bands of schists (Cashel Schists). There are no groundwater dependent terrestrial ecosystems (GWDTE) identified within this groundwater body. The Clifden Marbles groundwater body is classified as having Good Status under the WFD. The objective set for this water body is to protect its good status.

The GSI has published in 2011 an updated vulnerability map for County Galway. The vulnerability across the study area ranges from Extreme to Low.

The GSI records show that there is one well located within 1km of the proposed Greenway. This well is used for domestic and agricultural purposes. One well was also identified 1km outside of Clifden. Wells in proximity to the proposed Greenway are outlined in **Table 3.4**.

Table 3.4 GSI Well Data

No.	GSI Name	Type	Depth (Metres)	Townland	Source Use	Yield Class	Yield m^3/day	Comments
1	0525SEW001	Borehole	35.3	Clifden	Agri & domestic use	Poor	21.8	Unknown
2	0523NEW001	Borehole	27.4	Killymongaun	Unknown	Poor	21.8	Unknown

The GSI maintains a database of karst features in Ireland. The majority of the proposed Greenway route will not run through karstified landscape. There is some karstification in proximity to Oughterard but the karst database indicates only two karst features in proximity to the site. These are two boreholes north of Oughterard, 1123NWK001 and 1123NWK002, both of which are located approximately 1.1km from the nearest point of the Greenway.

Groundwater Flow

Diffuse groundwater recharge occurs via rainfall percolating through the subsoil and rock outcrops. Due to the low permeability of some subsoil deposits and the aquifers, a high proportion of the effective rainfall will quickly discharge to the streams. The stream density is relatively high, reflecting the high proportion of surface runoff.

Shallow groundwater is likely to discharge to most streams in the Groundwater Body (GWB), but the limited bedrock transmissivity means that the baseflow component of the total streamflow will be low. Small springs and seeps are likely to issue at the stream heads and along their course.

In the absence of inter-granular permeability, groundwater flow is expected to be concentrated in upper fractured and weathered zones and in the vicinity of fault zones, which may have some degree of karstification. Flow paths are likely to be up to 150 m with groundwater discharging rapidly to nearby streams and small springs. Flow directions are expected to be in general to the west, toward the coast.

Groundwater discharges locally to streams and rivers crossing the aquifer and also to small springs and seeps. Owing to the poor productivity of the aquifers in this body it is unlikely that any major groundwater - surface water interactions occur. Baseflow to rivers and streams is likely to be relatively low.

3.1.5 Flooding

A search of the OPW National Flood Hazard Mapping website, www.floodmaps.ie, was performed to obtain information on flooding history in the vicinity of the Greenway study area. This information may be useful in the appropriate assessment process given the high occurrence of water courses in the study area. Any potential for water pollution may be increased in the case of flood events.

Much of the lands adjacent to the proposed Greenway are prone to flash flooding due to the high run-off from steep mountainous terrain arising in the hillside streams and valley / Lowland Rivers and low permeability of surrounding peat. However, based on the OPW database (www.floodmaps.ie), the reported incidences of regular extensive road flooding instances are relatively few.

The flood events recorded in proximity to the Greenway are illustrated in **Figure 3.5**. In all circumstances the flood events reoccur where the rivers overflow their banks after extremely heavy rain.

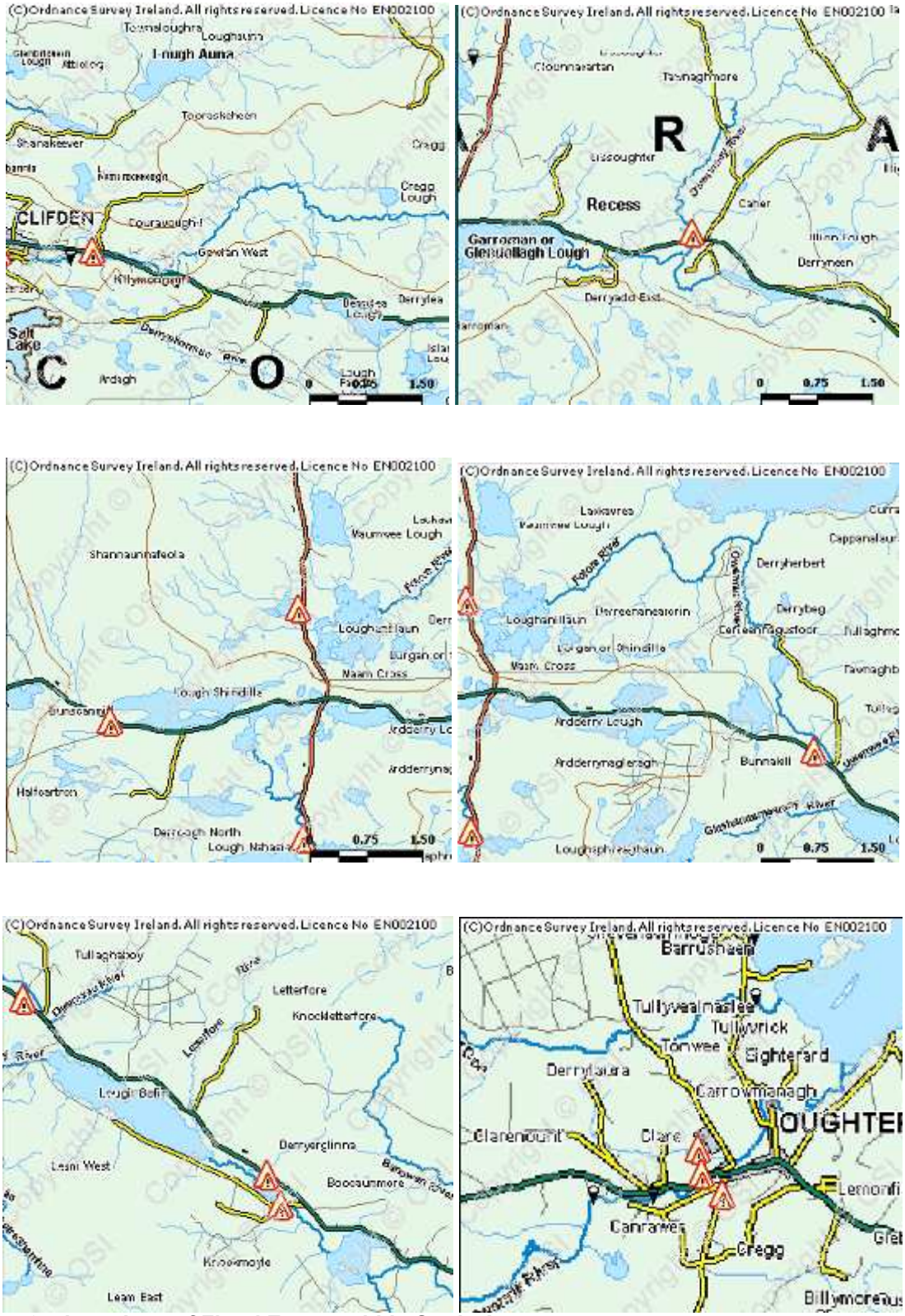


Figure 3.5 Locations of Flood Events within Study Area

3.2 DESIGNATED SITES OF CONSERVATION IMPORTANCE

The proposed Greenway runs through and adjacent (within 1km) to a number of Natura 2000 sites. The locations of designated sites in proximity to the Greenway are shown in **Figure 1.2**.

Details for the Natura 2000 sites, including site characteristics, qualifying interests, potential pressures and threats and conservation objectives are set out in the following sections. This information is obtained from the site synopses and the Natura 2000 Standard Data Forms produced by the NPWS, which contain a description of the scientific interest and conservation importance of each designated site. The site synopses for the designated sites are provided in **Appendix B.**

The scope of this Natura Impact Statement will be confined to the following six Natura 2000 sites as identified during Stage 1, Appropriate Assessment Screening:

- Lough Corrib cSAC (Site Code: 000297),
- Lough Corrib SPA (Site Code: 004042),
- Maumturk Mountains cSAC (Site Code: 002008),
- Twelve Bens/Garraun Complex cSAC (Site Code: 002031),
- Connemara Bog Complex cSAC (Site Code: 002034), and
- Connemara Bog Complex SPA (Site Code: 004181).

3.2.1 Lough Corrib cSAC

Lough Corrib cSAC is of major conservation importance due to the presence of fourteen habitats listed on Annex I of the EU Habitats Directive, six of which are given priority status. The lake is host to internationally important populations of wildfowl listed on Annex I of the EU Birds Directive and is designated as an SPA under the same directive.

The qualifying habitats and species found within Lough Corrib cSAC are provided in **Table 3.5** and **Table 3.6** respectively.

Table 3.5 Lough Corrib cSAC Habitats

Habitat code	Habitat name (cSAC Qualifying Interest)	% Cover (approx.)	Representivity
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	85	A
3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	3	A
7110	**Active raised bogs**	**1**	**B**
91A0	Old sessile oak woods with Ilex and Blechnum in British Isles	1	A
6410	Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae)	1	B
7230	Alkaline fens	1	A
7210	**Calcareous fens with Cladium mariscus and species of the Caricion davallianae**	1	A

Habitat code	Habitat name (cSAC Qualifying Interest)	% Cover (approx.)	Representivity
8240	**Limestone pavements**	1	A
6210	**Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)**	**1**	**B**
91D0	**Bog woodland**	1	A
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	1	C
7220	**Petrifying springs with tufa formation (Cratoneurion)**	**1**	**C**
7120	Degraded raised bogs still capable of natural regeneration	1	B
7150	Depressions on peat substrates of the Rhynchosporion	1	A

Habitats highlighted in **Bold** and are Priority Habitats

Representivity equates to the degree of representativity as a measure of 'how typical' a habitat type is (the representativity of the habitat type concerned on the site in question, either for a group of habitat types or for a particular combination of different habitat types). **A:** excellent representativity, **B:** good representativity **C:** significant representativity, and **D:** non-significant presence.

The population significance is based on the relative size or density of the population in the site with that of the national population. Population Significance (p) is ranked on a scale from A to D as follows; A - 100>=p>15%, B - 15>=p>2%, C - 2>=p>0% and D - Non-significant population.

Table 3.6 Lough Corrib cSAC Species

Species code	Species name	Population significance
1095	Sea Lamprey (*Petromyzon marinus*)	C
1106	Atlantic Salmon (*Salmo salar*)	C
1096	Brook Lamprey (*Lampetra planeri*)	C
1303	Lesser Horseshoe Bat (*Rhinolophus hipposideros*)	C
1355	Otter (*Lutra lutra*)	C
1092	Freshwater Crayfish (*Austropotamobius pallipes*)	C
1029	Freshwater Pearl Mussel (*Margaritifera margaritifera*)	C
1833	Slender Naiad (*Najas flexilis*)	B
1393	Shining Sickle Moss (*Drepanocladus vernicosus*)	C

3.2.2 Lough Corrib SPA

Lough Corrib is one of the most important ornithological sites in the country. The EU Birds Directive (79/409/EEC) requires designation of SPAs for:

- Annex I Listed rare and vulnerable species,
- Regularly occurring migratory species, such as ducks, geese and waders, and
- Wetlands, especially those of international importance, which attract large numbers of migratory birds each year (Internationally important means that 1% of the population of a species uses the site, or more than 20,000 birds regularly use the site).

Lough Corrib supports two wintering species having populations of international importance and a further sixteen species having populations of national importance.

The Annex I species which occur within Lough Corrib SPA are detailed in **Table 3.7** and the regularly occurring migratory birds (not listed in Annex I), are detailed in **Table 3.8**.

Table 3.7 Lough Corrib Annex I Bird Species

Species code	Species name	Population significance
A193	Common Tern (*Sterna hirundo*)	C
A194	Arctic Tern (*Sterna paradisaea*)	B
A395	Greenland White-fronted Goose*(Anser albifrons flavirostris)*	C
A140	Golden Plover *(Pluvialis apricaria)*	C
A038	Whooper Swan *(Cygnus cygnus)*	C

Table 3.8 Lough Corrib SPA Regularly Occurring Migratory Birds Not Listed On Annex I

Species code	Species name	Population significance
A065	Common Scoter *(Melanitta nigra)*	A
A179	Black-headed Gull *(Larus ridibundus)*	B
A182	Common Gull *(Larus canus)*	A
A183	Lesser Black-backed Gull *(Larus fuscus)*	C
A050	Widgeon *(Anas penelope)*	C
A051	Gadwall *(Anas strepera)*	B
A052	Teal *(Anas crecca)*	C
A053	Mallard (*Anas platyrhynchos)*	C
A056	Shoveler *(Anas clypeata)*	B
A059	Pochard *(Aythya ferina)*	A
A061	Tufted duck *(Aythya fuligula)*	B
A067	Goldeneye *(Bucephala clangula)*	C
A125	Coot *(Fulica atra)*	A
A142	Lapwing*(Vanellus vanellus)*	C
A160	Curlew *(Numenius arquata)*	C
A017	Cormorant *(Phalacrocorax carbo)*	C

3.2.3 Maumturk Mountains cSAC

The Maumturk Mountains cSAC is one of the largest and most diverse sites of conservation importance in Ireland, with a wide range of habitats and species. The site is of interest as it is a good example of an extensive mountain landscape, containing blanket bog, large areas of heath, siliceous rocky vegetation, oligotrophic lakes and upland grassland. The main feature of conservation value within the Maumturk Mountains cSAC is the blanket bog habitat and associated oligotrophic waters. The blanket bog is present across the cSAC area. The active blanket bog extends over much of the area. The qualifying habitats and species found within Maumturk Mountains cSAC are provided in **Table 3.9** and **Table 3.10** respectively.

Table 3.9 Maumturk Mountains cSAC Habitats

Habitat code	Habitat name (cSAC Qualifying Feature)	% Cover (approx.)	Representivity**
4060	Alpine and Boreal heaths	11	C
8220	Siliceous rocky slopes with chasmophytic vegetation	1	C
7130	**Blanket bog (*active only)**	10	B
3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	2	A
4010	Northern Atlantic wet heaths with *Erica tetralix*	5	B
7150	Depressions on peat substrates of the Rhynchosporion	1	B

*Habitats highlighted in **Bold** are Priority Annex I Habitats

Table 3.10 Maumturk Mountains cSAC Species

Species code	Species name	Population significance
1106	Atlantic Salmon (*Salmo salar*)	C
1833	Slender Naiad (*Najas flexilis*)	B

3.2.4 Twelve Bens/Garraun Complex cSAC/pNHA (Site Code: 002031)

The Twelve Bens/Garraun Complex cSAC is one of the largest and most diverse sites of conservation importance in Ireland, with a wide range of habitats and species.

The main feature of conservation value within the Twelve Bens/Garraun Complex is the blanket bog habitat and associated oligotrophic waters, between them these make up 50% of the cSAC. The Non-Priority Annex I habitat blanket bog contains areas of the priority Annex I habitat active blanket bog, which extends over 44% the entire cSAC area.

The qualifying habitats and species found within The Twelve Bens/Garraun Complex cSAC are provided in **Table 3.11** and **Table 3.12,** respectively.

Table 3.11 The Twelve Bens/Garraun Complex cSAC Habitats

Habitat code	Habitat name (cSAC Qualifying Feature)	% Cover (approx.)	Representivity
7130	**Blanket bog (*active only)**	44	B
8220	Siliceous rocky slopes with chasmophytic vegetation	2	A
8210	Calcareous rocky slopes with chasmophytic vegetation	1	A
8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	1	A
4060	Alpine and Boreal heaths	1	B
3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	6	A
91A0	Old sessile oak woods with Ilex and Blechnum in British Isles	1	A
7150	Depressions on peat substrates of the Rhynchosporion	1	A

*Habitats highlighted in **Bold** are Priority Annex I Habitats

Table 3.12 The Twelve Bens/Garraun Complex cSAC Species

Species code	Species name	Population significance
1106	Atlantic Salmon (*Salmo salar*)	C
1355	Otter (*Lutra lutra*)	C
1029	Freshwater Pearl Mussel (*Margaritifera margaritifera*)	B
1833	Slender Naiad (*Najas flexilis*)	B

3.2.5 Connemara Bog Complex cSAC/pNHA (Site Code: 002034)

The main feature of conservation value within the Connemara Bog complex is the blanket bog habitat and associated oligotrophic waters, between them these make up 79% of the cSAC. The blanket bog is present across the cSAC area. The active blanket bog extends over much of the area.

The qualifying habitats and species found within Connemara Bog Complex cSAC are provided in **Table 3.13** and **Table 3.14,** respectively.

Table 3.13 Connemara Bog Complex cSAC Habitats

Habitat code	Habitat name (cSAC Qualifying Feature)	% Cover (approx.)	Representivity
3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	13	A
3160	Natural dystrophic lakes and ponds	2	A
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	1	C
4010	Northern Atlantic wet heaths with Erica tetralix	2	B
4030	European dry heaths	2	B
6410	Molinia meadows on calcareous, peaty or clavey-silt-laden soils (*Molinion caeruleae*)	1	C
7130	**Blanket bog (*active only)**	66	A
91A0	Old sessile oak woods with Ilex and Blechnum in British Isles	1	B
7230	Alkaline fens	1	B
1150	Coastal lagoons	1	A
7140	Transition mires and quaking bogs	1	A
7150	Depressions on peat substrates of the *Rhynchosporion*	1	A
1170	Reefs	1	C

*Habitats highlighted in **Bold** and are Priority Habitats

Table 3.14 Connemara Bog Complex cSAC Species

Species code	Species name	Population significance
1106	Atlantic Salmon (*Salmo salar*)	C
1355	Otter (*Lutra lutra*)	C
1065	Marsh Fritillary (*Euphydryas aurinia*)	C
1833	Slender Naiad (*Najas flexilis*)	B

3.2.6 Connemara Bog Complex SPA (Site Code: 004181).

The qualifying birds including Annex I Species and Migratory Birds not listed on Annex I found within Connemara Bog Complex SPA are provided in **Table 3.15** and **Table 3.16,** respectively.

Table 3.15 Connemara Bog Complex SPA Annex I Bird Species

Species Code	Species Name	Population significance
A098	Merlin (*Falco columbarius*)	B
A140	Golden Plover *(Pluvialis apricaria)*	A
A395	Greenland White-fronted Goose *(Anser albifrons flavirostris)*	C

Table 3.16 Connemara Bog Complex SPA Regularly Occurring Migratory Birds Not Listed On Annex I

Species code	Species name	Population significance
A017	Cormorant *(Phalacrocorax carbo)*	B
A182	Common Gull (*Larus canus*)	B

3.2.7 Potential Pressures and Threats to Qualifying Interests of Natura 2000 sites

Tables 3.17 to **3.19** set out the main threats and impacts to the qualifying habitats and species of each Natura 2000 site where the Greenway is proposed.

Table 3.17 Potential Pressures and Threats on Annex I Habitats in relevant Natura 2000 sites

Habitat Type (Annex I of the Habitats Directive)	Main Threats and Impacts
Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	Fertilisation, grazing, forestry, leisure fishing, hunting, human induced hydraulic changes, eutrophication and invasive species.
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	Fertilisation, grazing, forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion and invasive species.
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	Drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Active raised bogs*	**Peat cutting, grazing, burning.**
Old sessile oak woods with Ilex and Blechnum in British Isles	Internal effects include inappropriate grazing levels and invasive species, whereas external threats include clearance for agriculture or felling for timber.
Alkaline fens	Fertilisation, grazing, forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
Calcareous fens with Cladium mariscus and species of the Caricion davallianae	Overgrazing, restructuring agricultural land holding, peat extraction, mechanical removal of peat, water pollution, landfill, land reclamation and drying out in general. Infilling ditches, dykes, ponds, marshes and pits.

Habitat Type (Annex I of the Habitats Directive)	Main Threats and Impacts
Limestone pavements*	**Removal of limestone pavement, removal of scrub, dispersed habitation, stock feeding, agricultural improvement, quarry, disposal inert material, electricity lines, infilling wetlands, routes, abandonment of grazing, agricultural structure, burning, discharges, disposal household waste, dumping dredgings, forestry, grazing, improved access, landfill, nautical sports, paths and restructuring agric land holding.**
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)	Invasion by a species, undergrazing, fertilisation, agricultural improvement, abandonment of pastoral systems, sand & gravel extraction.
Bog woodland*	**Burning, mechanical removal of peat, drainage.**
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Fertilisation, grazing, forestry, peat extraction, pollution, drainage, invasive species.
Petrifying springs with tufa formation (Cratoneurion)*	**Peat cutting, arterial drainage, local drainage, water abstraction, agricultural reclamation.**
Degraded raised bogs still capable of natural regeneration	Peat cutting, arterial drainage, local drainage, water abstraction, agricultural reclamation.
Depressions on peat substrates of the *Rhynchosporion*	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Blanket bog (*active only)	Extraction of peat, Overstocking, Burning, Agricultural reclamation, Mechanical peat extraction, Wind Farm Development.
Natural dystrophic lakes and ponds	Overgrazing, fertilization, peat cutting, afforestation, and the presence of alien species
Northern Atlantic wet heaths with Erica tetralix	Overgrazing by sheep, burning, communications networks, paths, tracks or cycling paths, energy transport, other forms – wind generated energy, improved access to the site, outdoor sports and leisure activities, walking, horse riding and non-motorised vehicles, motorised vehicles, mountaineering, rock climbing, speleology, pollution, air pollution – acidification – from acid rain, trampling and overuse.
European dry heaths	Overgrazing by sheep, burning, communications networks, paths, tracks or cycling paths, energy transport, other forms – wind generated energy, improved access to the site, outdoor sports and leisure activities, walking, horse riding and non-motorised vehicles, motorised vehicles, mountaineering, rock climbing, speleology, pollution, air pollution – acidification – from acid rain, trampling and overuse.
Coastal lagoons	Hunting, paths, tracks, improved access to site, outdoor sports leisure, water pollution, reclamation, drainage, modification of hydrography, management of water levels, eutrophication, and accumulation of organic material.
Transition mires and quaking bogs	Overgrazing, restructuring agricultural land holding, forestry planting, peat extraction, hand-cutting of peat, mechanical removal of peat, water pollution, landfill, land reclamation and drying out, general, infilling ditches, dykes, ponds, marshes and pits, drainage, other human induced changes in hydraulic conditions.
Reefs	Professional fishing, Taking of Fauna, Taking of Flora, Water Pollution, Climate change, invasion of a non-native

Habitat Type (Annex I of the Habitats Directive)	Main Threats and Impacts
	species.
Siliceous rocky slopes with chasmophytic vegetation	Overgrazing by sheep, Mining and extraction activities, Quarries, Paths, tracks or cycling paths, Improved access to the sites, Outdoor sports and leisure activities, Mountaineering, rock climbing, speleology, Air pollution – acidification, Trampling, overuse
Calcareous rocky slopes with chasmophytic vegetation	Overgrazing by sheep, Mining and extraction activities, Mountaineering, rock climbing, speleology and Air pollution – acidification.
Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	Overgrazing by sheep, Mining and extraction activities, Quarries, Paths, tracks or cycling paths, Improved access to the sites, Outdoor sports and leisure activities, Mountaineering, rock climbing, speleology, Air pollution – acidification, Trampling, overuse.
Alpine and Boreal heaths	Overgrazing, burning, outdoor recreation, quarries, communications networks, wind farm developments.

* Priority Habitats

Table 3.18 Potential Pressures and Threats on Annex II Species in relevant Natura 2000 sites

Species Type	Main Threats and Impacts
Otter (*Lutra lutra*)	Use of pesticides, fertilization, hunting, trapping, poisoning, water pollution, infilling of ditches, dykes, ponds, pools, marshes or pits, management of aquatic and bank vegetation for drainage purposes, removal of sediments, canalization of inland water course.
Slender Naiad (*Najas flexilis*)	Water pollution, water abstraction, invasive species, forestry and farming.
Atlantic Salmon (*Salmo salar*)	Water pollution, invasive species, forestry, farming and fishing.
Freshwater Pearl-mussel (*Margaritifera margaritifera*)	Water pollution, water abstraction, invasive species, forestry and farming.
Sea Lamprey *(Petromyzon marinus)*	Fish passages, water pollution (including discharges), commercial fishing, invasive species, forestry and farming.
Brook Lamprey *(Lampetra planeri)*	Fish passages, water pollution (including discharges), commercial fishing, invasive species, forestry and farming.
Lesser Horseshoe Bat (*Rhinolophus hipposideros)*	Loss of suitable summer and winter roosting sites due to the demolition or renovation of derelict buildings for human occupation, loss of commuting routes linking roosts to foraging sites, and loss of suitable foraging sites are the major threats to this species. The use of insecticides, habitat destruction such as felling of trees and scrub clearance and deterioration of old buildings.
White-clawed Crayfish (*Austropotamobius pallipes)*	Water pollution, invasive species, forestry and farming.
Shining Sickle-moss (Drepanocladus vernicosus)	Fertilisation, abandonment of pastoral systems, undergrazing, forestry planting, water pollution, drainage.
Marsh Fritillary (*Euphydryas aurinia*)	Abandonment of pastoral systems, roads, motorways and urbanised areas.

Table 3.19 Potential Pressures and Threats on Annex I Species in relevant Natura 2000 sites

Species Type	Main Threats and Impacts
Common Tern (*Sterna hirundo*)	Leisure Fishing, Water Pollution, Hunting, Fertilisation, Grazing.
Arctic Tern (*Sterna paradisaea*)	
Greenland White-fronted Goose *(Anser albifrons flavirostris)*	
Golden Plover *(Pluvialis apricaria)*	
Whooper Swan *(Cygnus cygnus)*	
Merlin (*Falco columbarius*)	

3.2.8 Conservation Objectives of the Natura 2000 Sites

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status the habitats and species within areas designated as cSACs and SPAs. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites. According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, is stable or increasing,
- the ecological factors that are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined below.

The favourable conservation status of a species is achieved when:

- population data on the species concerned indicate that it is maintaining itself, and the natural range of the species is neither being reduced or likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

3.2.8.1 Designated Sites Conservation Objectives

A Conservation Management Plan has not been prepared for the Lough Corrib cSAC, Connemara Bog Complex cSAC, Twelve Bens/Garraun Complex cSAC or Maumturk Mountains cSAC. The following conservation objective has been provided by the NPWS for these cSAC sites:

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected (see **Tables 3.5-3.6 and Table 3.9-3.14**).

A Conservation Management Plan has not yet been prepared for the Lough Corrib SPA and Connemara Bog Complex SPA. The following conservation objectives have been provided by the NPWS for these SPA sites:

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (see **Tables 3.7, 3.8, 3.15 and 3.16**).

3.2.9 NPWS Rare and Protected Species Data

The NPWS Rare and Protected Species database was consulted for records on species of conservation importance in the area. The site for the proposed development lies within the 10km Grid squares (hectads) L65, L74, L75, L84, L94, M04 and M14. According to this database, there are records for twenty-eight rare and protected species within the three grid squares. However, the NPWS dataset is known to be incomplete, particularly for fish, bats and birds, and so the absence of records for a species does not necessarily mean that the species does not occur in the area.

The relevant hectads are shown in **Figure 3.7**. Rare and protected species recorded within these squares are shown in **Table 3.20.**

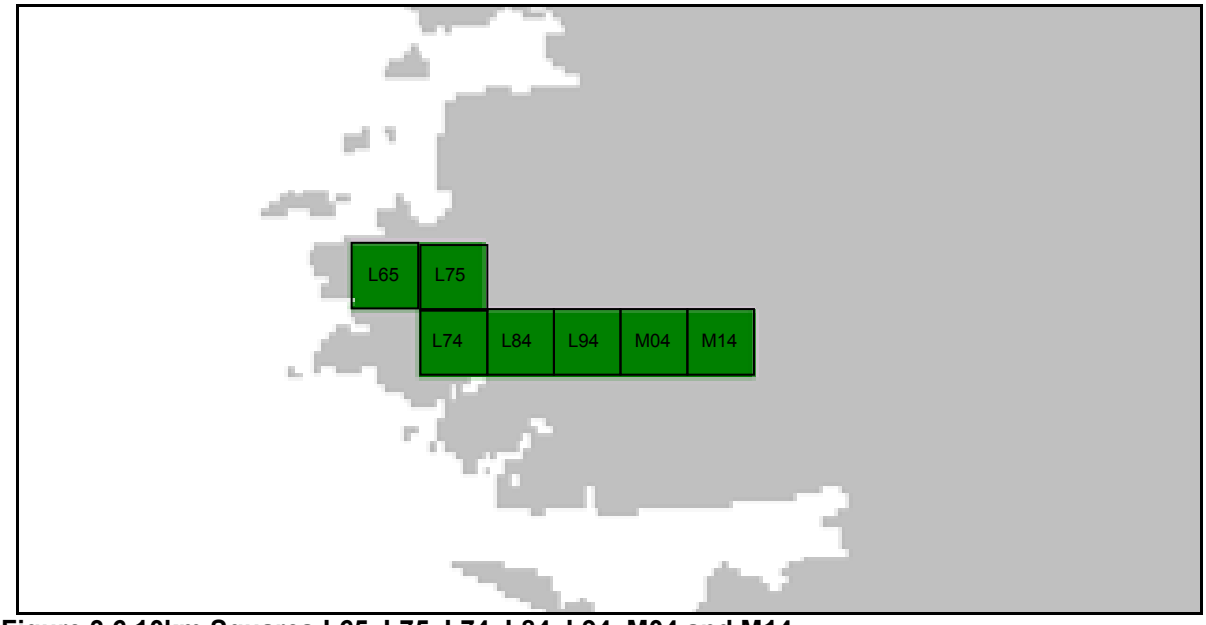


Figure 3.6 10km Squares L65, L75, L74, L84, L94, M04 and M14

Table 3.20 NPWS Rare and Protected Species Records

Scientific Name	Common Name	Location
Cervus elaphus	Red Deer	All Grid Squares
Cryptogramma crispa	Parsley Fern	Ballynahinch (Grid Square L74)
Dama dama	Fallow Deer	Grid Square M14
Deschampsia setacea	Bog Hair-grass	Oorid Lough (Grid Square L94), Owenree River (Grid Square M04)
Eriophorum gracile	Slender Cottongrass	Maam Cross
Gnaphalium sylvaticum	Heath Cudweed	Ballynahinch (Grid Square L74)
Zootica vivipara	Common Lizard	Maam Cross, E Clifden, the Twelve Pins (Grid Square L75, L74, L84, L94, M04)
Lepus timidus subsp. hibernicus	Irish Hare	Grid Squares L65, L75, L84, L94, M14
Lutra lutra	Otter	Grid Squares L65, L75, L74, L84, M04, M14
Lycopodiella inundata	Marsh Clubmoss	Oorid Lough (Grid Square L94), Owenwee River (Grid Square M04)
Margaritifera margaritifera	Freshwater Pearl Mussel	Owenriff River, Derryneen, Owentooey, Ballynahinch Lake, Recess, Glengawbeg / Ghleann Gabh
Martes martes	Pine Marten	Grid Squares L65, L75, L74, L84, M14
Meles meles	Badger	Grid Squares L75, L84, L94

Scientific Name	Common Name	Location
Mustela erminea subsp. hibernica	Irish Stoat	Clifden
Najas flexilis	Slender Naiad	Lough Bofin
Papaver hybridum	Rough Poppy	Ben Lettery
Pilularia globulifera	Pillwort	Ballynahinch Lake, Glendollagh
Rana temporaria	Common Frog	All Grid Squares
Scleranthus annuus	Annual Knawel	Oughterard
Vicia orobus	Wood Bitter-vetch	Maam Cross
Viola lactaea	Pale Dog-violet	Clifden Road (Grid Square M04)

3.2.10 Terrestrial Invertebrate Data

3.2.10.1 Lepidoptera

There is a record of 2-9 individuals of Marsh Fritillary from M14 from a 2000-2009 survey as detailed on the Butterfly Ireland website. The NPWS have no records in the area although there has been a recent sighting of this species from a location near Maam Cross (NPWS pers. comm.). The Marsh Fritillary is the only species which is afforded legal protection, as part of Annex II of the EU Habitats Directive. This species, whose food plant is Devil's Bit Scabious (*Succisa pratensis*), has become endangered due to the destruction of its boggy habitat.

3.2.11 Bird Atlas Data

The New Atlas of Breeding Birds in Britain and Ireland: 1988-1991 (Gibbons et. al., 1993) was consulted for information on breeding birds recorded within 10km grid squares L65, L74, L75, L84, L94, M04 and M14 within which the study area is located. **Table 3.21** presents details of bird species of high conservation concern recorded as breeding within 10km Grid Squares L65, L74, L75, L84, L94, M04 and M14 and during the 1988-1991 survey. The following sources of information were consulted in order to determine the conservation status of bird species:

- Annex I of the EU 'Birds Directive',
- The 'Red List' of Birds of Conservation Concern in Ireland (BoCCI) (Lynas et. al. 2007), and,
- The Irish Red Data Book (RDB) (Whilde 1993).

Table 3.21 Bird Species of High Conservation Concern Recorded by Gibbons et. al. (1993), from 10km National Grid Squares L65, L74, L75, L84, L94, M04 and M14.

Common Name	L65	L75	L74	L84	L94	M04	M14	Annex I	BoCCI red list
Hen Harrier (*Circus ayaneus*)		Poss/ Prob						Yes	No
Common Scoter (*Melanitta nigra*)							Conf	No	Yes
Golden Plover (*Pluvialis apricaria*)			Poss/ Prob	Conf				Yes	Yes
Lapwing (*Vanellus vanellus*)		Poss/ Prob					Poss/ Prob	No	Yes
Chough (*Pyrrhocorax pyrrhocorax*)	Conf							Yes	No
Yellow Hammer (*Emberiza citrinella*)		Poss/ Prob				Poss/ Prob	Conf	No	Yes
Merlin (*Falco colombarius*)	Poss/ Prob	Conf	Poss/ Prob	Poss/ Prob	Conf			Yes	No
Black-headed Gull (*Chroicocephalus ridibundus*)						Conf	Conf	No	Yes
Corncrake (*Crex crex*)		Poss/ Prob		Poss/ Prob				Yes	Yes
Curlew (*Numenius arquata*)	Poss/ Prob	Poss/ Prob	Poss/ Prob		Conf		Poss/ Prob	No	Yes
Redshank (*Tringa totanus*)							Poss/ Prob	No	Yes
Sandwich Tern (*Sterna sandvicensis*)	Conf							Yes	No
Common Tern (*Sterna hirundo*)	Conf		Conf	Conf			Conf	Yes	No
Arctic Tern (*Sterna paradisaea*)			Conf				Conf	Yes	No
Red Grouse (*Lagopus lagopus scoticus*)		Conf	Conf				Poss/ Prob	No	Yes
Peregrine (*Falco peregrinus*)	Un-known*	Un-known*	Un-known*	Un-known*	Un-known*	Un-known*	Un-known*	Yes	No

(*no information is available on individual hectads for this species)

Eight species listed under Annex I of the EU Birds Directive were recorded as breeding within the relevant hectads in the 1988-1991 Bird Atlas Survey. These are Hen Harrier, Golden Plover, Chough, Merlin, Corncrake, Sandwich Tern, Common Tern and Arctic Tern. Peregrine may also occur within the hectads, as Peregrine is present as a confirmed breeding species in both 100km squares 'L' and 'M'.

Hen Harrier in Ireland breeds mainly in areas dominated by heather and in young conifer plantations. Hen Harrier was recorded as possibly/probably breeding in Grid Square L75 during the 1988-1991 Bird Atlas Survey. The large tracts of heather and presence of conifer plantations in the western section of the study area provide suitable habitat for this species.

Golden Plover is known to breed in blanket bogs, heather moors and acidic grasslands. It has been confirmed as breeding within Grid Square L84 and recorded as possibly/probably breeding in Grid Square L74.

Chough, also known as the 'Sea Crow' has been confirmed as breeding in Grid Square L65. Choughs build their nests on ledges in crevices and caves of coastal cliffs, although some pairs use inland crags and cliffs. Some Choughs in Ireland are also known to nest in ruined buildings along the coast. It is unlikely that this species occurs within the study area, as it is too far inland.

Merlin is known to breed on large areas of bog, moorland and in coastal areas. Merlin was confirmed as breeding in Grid Squares L75 and L84 in the 1988-1991 Bird Atlas Survey and was recorded as possibly/probably breeding in Grid Squares L65, L74 and L84.

Corncrake in Ireland is under severe threat. Corncrake was recorded in L75 and L84 during the 1988-1991 Bird Atlas Survey. The Corncrake population in Ireland has suffered a marked decline in recent times, largely due to changes in farming practices. This bird is known to breed in damp hay meadows (with tall grasses) and wet marshland. It is possible that this species occurs in the study area.

Sandwich Tern was confirmed as breeding in Grid Square L65. These birds are known to nest on islands, shingle spits and sand dunes. It is unlikely that this species occurs within the study area due to lack of suitable habitat. It is more likely that the L65 record is from west of Clifden, on the coast.

Common Tern was confirmed as breeding in Grid Squares L65, L75, L84 and M14. Common Terns nest colonially on the ground generally on the coast, but also inland on islets in freshwater lakes. This species may occur on the islets in the freshwater lakes in the study area.

Arctic Tern was confirmed as breeding in Grid Squares L74 and M14 during the 1988-1991 Bird Atlas Survey. Arctic Tern is mainly a coastal breeding bird, but in Ireland the species is also known to breed on the fresh water lakes of Lough Corrib. This species is unlikely to occur within the study area, as it is too far inland.

Peregrine was confirmed as breeding within the 100km squares L and M during the 1988-1991 Bird Atlas Survey. Peregrine breeds on coastal and inland cliffs. It is unlikely that this species occurs within the study area, due to lack of suitable habitat.

Eight bird species included on the BoCCI red list have been recorded for the relevant hectads in the Atlas of Breeding Birds, namely Common Scoter, Golden Plover (discussed above), Lapwing, Yellowhammer, Black-headed Gull, Corncrake (discussed above), Curlew, Redshank and Red Grouse. **Common Scoter** was confirmed as breeding within Grid Square M14 in the 1988-1991 Bird Atlas survey. This species is known to occur on Lough Corrib, which accounts for this record.

Lapwing was recorded as possibly/probably breeding within Grid Squares L75 and M14 during the 1988-1991 Bird Atlas Survey. This species breeds on grassland habitats which offer some cover, such as arable fields or rough grassland. The study area contains pockets of suitable habitat for Lapwing.

The habitat preferences of the **Yellowhammer** include arable habitats with some scrub or hedgerow. Yellowhammer was confirmed breeding in Grid Square M14, and recorded as possibly/probably breeding in Grid Squares L75 and M04. The study area contains pockets of suitable breeding habitat for this species.

Black-headed Gulls breed in large colonies in marshes, reedbeds or on islands in lakes. This species was confirmed breeding in Grid Squares M04 and M14 during the breeding birds' survey. The study area contains pockets of suitable breeding habitat for this species.

Curlews tend to breed in a variety of habitats including arable fields, bogs and maritime grassland. Curlew was confirmed as breeding in Grid Square L94 during the last survey, and was recorded as possibly breeding in four other Grid Squares – L65, L75, L74 and M14. The habitats within the study area provide suitable breeding ground for this species.

Redshank was recorded as possibly/probably breeding in Grid Square M14 during the breeding birds' survey. This species breeds on wet meadows, marshland and heath. The habitats within the study area provide suitable breeding ground for this species.

Red Grouse was confirmed as breeding in Grid Squares L74 and L75 during the 1988-1991 Bird Atlas Survey. This species is found on mountains, moorland and lowland raised bogs. The large tracts of bog and heath within the study area provide suitable habitat for this species.

'The Atlas of Wintering Birds in Britain and Ireland (Lack, 1986) was consulted for information on wintering birds recorded within 10km grid squares L65, L74, L75, L84, L94, M04 and M14 within which the study area is located. **Table 3.22** presents details of bird species of high conservation concern recorded as wintering within 10km Grid Squares L65, L74, L75, L84, L94, M04 and M14.

Table 3.22 Wintering Birds by Lack (1986) from 10km National Grid Squares L65, L74, L75, L84, L94, M04 and M14.

Common Name	L65	L75	L74	L84	L94	M04	M14	Annex I	BoCCI red list
Black Guillemot (*Cepphus grylle*)			Conf					No	No
Black-legged Kittiwake (*Rissa tridactyla)*	Conf	Conf						No	No
Brambling *(Fringilla montifringilla)*							Conf	No	No
Common Bullfinch *(Pyrrhula pyrrhula)*					Conf			No	No
Common Coot (*Fulica atra*)	Conf	Conf			Conf			No	No
Common Guillemot (*Uria aalge*)	Conf	Conf						No	No
Common Pochard (*Aythya ferina*)	Conf	Conf			Conf	Conf		No	No
Common Scoter (*Melanitta nigra*)	Conf	Conf					Conf	No	Yes
Dunlin (*Calidris alpina*)			Conf					Yes	No
Eurasian Jay *(Garrulus glandarius)*							Conf	No	No
Eurasian Siskin *(Carduelis spinus)*							Conf	No	No
Eurasian Sparrowhawk (*Accipiter nisus*)	Conf	Conf						No	No
Eurasian Treecreeper *(Certhia familiaris)*				Conf				No	No
Eurasian Wigeon *(Anas penelope)*							Conf	No	No
Eurasian Woodcock (*Scolopax rusticola*)	Conf	Conf						No	No
Eurasian Woodcock *(Scolopax rusticola)*					Conf			No	No
European Goldfinch *(Carduelis carduelis)*				Conf	Conf			No	No
European Greenfinch *(Carduelis chloris)*				Conf	Conf	Conf		No	No
Fieldfare (*Turdus pilaris*)	Conf	Conf				Conf	Conf	No	No
Gadwall (*Anas strepera*)					Conf	Conf		No	No
Golden Plover *(Pluvialis apricaria)*							Conf	Yes	No
Goldeneye *(Bucephala clangula)*					Conf	Conf	Conf	No	No
Great Black-backed Gull (*Larus marinus*)						Conf		No	No
Great Cormorant *(Phalacrocorax carbo)*						Conf	Conf	No	No
Great Crested Grebe (*Podiceps cristatus*)					Conf		Conf	No	No
Great Northern Diver (*Gavia immer*)	Conf	Conf						Yes	No

Common Name	L65	L75	L74	L84	L94	M04	M14	Annex I	BoCCI red list
Great Skua *(Stercorarius skua)*							Conf	No	No
Greater Scaup (*Aythya marila*)	Conf	Conf						No	No
Greater White-fronted Goose *(Anser albifrons)*						Conf		Yes	No
Greenland White-fronted Goose *(Anser albifrons flavirostris)*				Conf	Conf			Yes	No
Grey Heron (*Ardea cinerea*)					Conf			No	No
Herring Gull *(Larus argentatus)*							Conf	No	Yes
House Sparrow (*Passer domesticus*)					Conf	Conf		No	No
Kingfisher (*Alcedo atthis*)	Conf	Conf					Conf	Yes	No
Little Gull (*Larus minutus*)	Conf	Conf						Yes	No
Long-tailed Tit *(Aegithalos caudatus)*							Conf	No	No
Mallard (*Anas platyrhynchos)*				Conf				No	No
Merlin (*Falco colombarius*)							Conf	Yes	No
Mistle Thrush (*Turdus viscivorus*)	Conf	Conf						No	No
Northern Lapwing (*Vanellus vanellus*)	Poss/ Prob	Poss/ Prob						No	Yes
Peregrine Falcon (*Falco peregrinus*)					Conf		Conf	Yes	No
Red Grouse *(Lagopus lagopus)*					Conf			No	Yes
Red-throated Diver (*Gavia stellata*)	Conf	Conf						Yes	No
Redwing *(Turdus iliacus)*					Conf	Conf	Conf	No	No
Ringed Plover (*Charadrius hiaticula*)			Conf					No	No
Rock Pipit (*Anthus spinoletta/petrosus agg*.)			Conf					No	No
Rook (Corvus frugilegus)			Conf		Conf			No	No
Short-eared Owl (*Asio flammeus*)			Conf					Yes	No
Snipe *(Gallinago gallinago)*					Conf	Conf		No	No
Stock Pigeon *(Columba oenas)*							Conf	No	No
Teal *(Anas crecca)*					Conf	Conf	Conf	No	No
White-throated Dipper *(Cinclus cinclus)*				Conf		Conf		No	No
Whopper Swan (*Cygnus cygnus*)				Conf	Conf			Yes	No
Widgeon *(Anas penelope)*			Conf					No	No
Wood Pigeon *(Columba palumbus)*					Conf			No	No

3.2.12 Flora Atlas Data

The principal source of information regarding the distribution of flora in Ireland is the New Atlas of the British and Irish Flora (Preston *et al*., 2002). The data included in this atlas is from the 1987-1999 atlas survey. This atlas shows data for vascular plants in individual hectads (10 km by 10 km squares). The proposed Greenway falls within hectads L65, L74, L75, L84, L94, M04 and M14 **(Figure 3.7)**. The records for these hectads were consulted and a search was carried out to investigate if any rare or protected plant species had been recorded in the squares, during the 1987-1999 atlas survey (and previous surveys) carried out by the Botanical Society of the British Isles (BSBI). The search included the vascular plants that are listed in Annex II of the EU Habitats Directive, Flora Protection Order (FPO) of 1999, the Wildlife Act 1976, the Irish Red Data Book (IRDB) and the NPWS site synopsis. The results of this investigation are displayed in **Table 3.23**.

Table 3.23 Flora Atlas Data

Scientific Name	Common Name	L64	L65	L75	L74	L84	L94	M04	M14
Agrostemma githago	Corncockle	-	-	-	-	-	-	-	§
Bromus racemosus	Smooth Brome	*	*	-	-	-	-	-	-
Deschampsia setacea	Bog Hair-grass	-	-	-	+	+	+	*	§
Erica ciliaris	Dorset Heath	-	-	-	+	-	-	-	+
Erica mackaiana	Mackay's Heath	-	-	-	+	-	-	-	-
Eriophorum gracile	Slender Cottongrass	-	-	-	+	+	+	-	+
Frangula alnus	Alder Buckthorn	-	-	-	-	-	-	§	+
Gnaphalium sylvaticum	Heath Cudweed	-	-	-	-	-	-	-	-
Hammarbya paludosa	Bog Orchid	-	-	-	-	-	-	§	-
Najas flexilis	Slender Naiad	-	-	+	-	-	-	+	-
Orchis morio	Green-winged orchid	-	-	-	+	-	-	-	-
Papaver hybridum	Rough Poppy	-	-	-	-	-	-	-	-
Potentilla fruticosa	Shrubby Cinquefoil	-	-	-	-	-	-	-	§
Saussurea alpina	Alpine Saw-wort	-	-	+	-	-	-	-	-
Saxifraga oppositifolia	Purple Saxifrage	-	-	+	-	+	-	-	-
Scleranthus annuus	Annual Knawel	-	-	-	-	-	-	-	§
Spiranthes romanzoffiana	Irish Lady's-tresses	-	-	-	-	-	-	§	-
Vicia orobus	Wood Bitter-vetch	-	-	-	-	-	§	-	+
Viola lactaea	Pale Dog-violet	-	-	-	-	-	-	-	-

+ Plant species recorded in 10 km squares during the 1987-1999 BSBI Flora Atlas Survey.
** Plant species recorded in 10 km squares during the 1970-1986 BSBI Flora Atlas Survey.*
§ Pre-1970 Flora Atlas Survey record.
- Plant species not recorded in 10 km squares during Flora Atlas Survey.

3.2.12.1 Brief Species Description

Corncockle, while it is a rare species it is a non-native species and therefore is not noteworthy for conservation purposes. It was recorded in Grid Square M14 during a pre-1970 BSBI Flora Atlas Survey but has not been recorded in subsequent surveys. It is therefore assumed that the species has since disappeared from the area and so is unlikely to occur within the study area.

Smooth Brome a native species was recorded in Grid Square L65 in the 1970-1986 Flora Atlas Survey but was not recorded in the 1987-1999 survey. There are no other records for this species in the area. It is therefore assumed that the species has since disappeared from the area and so is unlikely to occur within the study area.

Bog Hair-grass a native species has been recorded in five of the seven relevant hectads, including three records from the most recent survey (Grid Squares L74, L84 and L94). This species is mentioned in the Site Synopsis for the Connemara Bog Complex. The NPWS Rare and Protected Species database contains records for this species from Oorid Lough and the Owenwee River, which are both within the study area. This species is listed in the Irish Red Data Book for Vascular Plants, and is afforded legal protection under the Flora Protection Order, 1999. It is a tufted, slender perennial grass of wet bogs and lake sides and is restricted in Ireland to west Galway. It has been recorded in a total of sixteen sites in the Flora Atlas, but recently has only been seen in nine of these. The main threats to this species are small and large-scale peatland reclamation and development, principally afforestation. It likely that this species occurs within the study area however, it was not recorded during botanical surveys conducted by RPS in 2010 and 2011.

Dorset Heath a non-native species was recorded in Grid Squares L74 and M14 during the 1987-1999 Flora Atlas Survey. However, it is now known to only occur at one site in Ireland, in Roundstone Bog. Here it occurs at the side of the road, suggesting that it may have been planted there[2]. It is highly unlikely that this species occurs within the study area. In Britain, this plant occurs abundantly on heaths in Cornwall, Devon and Dorset but has suffered a major decline in recent years. In Ireland, this plant is considered to be a non-native species and is therefore not noteworthy for conservation purposes. This species is listed as 'Vulnerable' in the Irish Red Data Book, but is not protected under the Flora Protection Order, 1999.

Mackay's Heath, a native species and part of Ireland's 'Lusitanian' flora, is a compact, bushy heather which is listed as 'Rare' in the Irish Red Data Book, but is not protected under the Flora Protection Order, 1999. It is confined to two counties in the west of Ireland (Galway and Donegal), and northern Spain. Its Galway site extends from the south-east of Clifden to the lower slopes of Errisbeg Mountain; therefore it may occur in tracts of bog in the western section of the study area. This species is very similar to Cross-leaved Heath (*Erica tetralix*), and often hybridises with it. Mackay's Heath was recorded in Grid Square L74 during the 1987-1999 Flora Atlas Survey, the species was not recorded during recent botanical surveys.

Slender Cottongrass is a native slender perennial which grows by lake margins and in wet acid bogs. This plant is listed as 'Rare' in the Irish Red Data Book, and is afforded legal protection in Ireland under the Flora Protection Order, 1999. It has been recorded from four of the relevant Grid Squares including L74, L84, L94 and M14. The NPWS Rare and Protected Species database has a record for this Slender Cottongrass from Maam Cross. The species was recorded on the shores of the small lake at Maam Cross. This confirmed the NPWS record for the species at this location. This species was not recorded at any other location.

Alder Buckthorn, a native shrub or small tree found in scrub, woodlands on calcareous soils and on fen peat, was recorded in Grid Square M14 during the 1987-1999 Flora Atlas Survey. There is also a pre-1970 record for this species from M04, but it has not been recorded in this Grid Square during subsequent surveys. This species is listed as 'Rare' in the Irish Red Data Book, but is not afforded legal protection in Ireland.

Heath Cudweed a native species is listed as 'Rare' in the Irish Red Data Book and is legally protected under the Flora Protection Order, 1999. This species is mentioned in the Site Synopsis for the Connemara Bog Complex cSAC. There are two pre-1970 BSBI records for this species from Grid Squares in the area (L74 and M04). However, it has not been recorded during the subsequent BSBI surveys for the relevant Grid Squares. There is a record for this species from Ballynahinch from 1802. There are no more recent records for this species in the area. This species has undergone a dramatic

[2] The Irish Red Data Book 1: Vascular Plants, T.G.F.Curtis & H.N.McGough (1988)

decline in recent years, and has recently been recorded from only 8 sites; Carlow, Tyrone, Down, Donegal, and four sites in Derry. It is therefore assumed that this species has disappeared from the area and it is therefore highly unlikely to occur within the study area.

Bog Orchid, a native Red Data Book species, is afforded legal protection in Ireland under the Flora Protection Order, 1999. It is mentioned in the Site Synopsis for the Connemara Bog Complex cSAC. There is a pre-1970 BSBI record for this species from Grid Square M04, but it has not been recorded in any of the subsequent BSBI surveys. However, the large tracts of bog within the study area provide ideal habitat for this species. It is also easily overlooked and is seldom seen in the same site subsequently[3]. It may therefore be present within the study area; however it was not recorded during recent botanical surveys.

Slender Naiad, a native submerged aquatic herb found in acid to mildly base-rich lakes, was recorded in Grid Squares L75 and M04 during the 1987-1999 Flora Atlas Survey. This species is listed as a qualifying feature for all of the cSACs in the study area. Slender Naiad is listed under the Flora Protection Order, 1999 and is an Annex II species under the EU Habitats Directive. It is therefore of **major conservation importance on an international level**. The NPWS Rare and Protected Species database has a record for this species from Lough Bofin, which borders the study area. This species was not recorded during the botanical surveys for the project.

Green-winged Orchid a native species was recorded in Grid Square L74 during the 1987-1999 Flora Atlas Survey. This species is listed as 'Vulnerable' in the Irish Red Data Book, but is not protected under the Flora Protection Order, 1999 (it was formerly protected under the previous FPO of 1987). The Green-winged Orchid occurs in pastures, meadows and sand hills. It has been recorded from 19 Irish counties and it was formerly present in local abundance in eastern and central Ireland. It has suffered a major decline in recent years, however, and has been recorded from only seven sites since 1970, three of which are in Galway. It is thought that this decline has been caused by land reclamation and agricultural improvement at the old pasture sites in which it was once abundant.

There is a record for **Rough Poppy** a native species from Ben Lettery in the NPWS Rare and Protected Species database. However, this record is from 1895. This species has not been recorded in any of the BSBI Flora Atlas Surveys, and so it is highly unlikely to occur within the study area.

There is a pre-1970 record for the Red Data Book Species **Shrubby Cinquefoil,** a native species, from Grid Square M14. It has not been recorded in subsequent surveys, however, and it is therefore highly unlikely to occur within the study area.

Alpine Saw-wort, a native species was recorded in Grid Square L75 during the 1987-1999 Flora Atlas Survey. This species is listed as 'Rare' in the Irish Red Data Book, and is mentioned in the Site Synopsis for the Twelve Bens/Garraun Complex cSAC. However, this is a montane herb of mountain cliffs and ledges above 300 metres; therefore, it is highly unlikely to occur within the low-lying lands of the study area.

Purple Saxifrage, a native tufted or loosely matted, purple-flowered, arctic-alpine saxifrage was recorded from Grid Squares L75 and L84 during the 1987-1999 Flora Atlas Survey. This species is listed as 'Rare' in the Irish Red Data Book but is not afforded legal protection in Ireland. Again, this montane species is unlikely to occur within the low-lying lands of the study area.

There is a pre-1970 record for **Annual Knawel,** a native species, from Grid Square M14, but this species was not recorded in any subsequent Flora Atlas Survey. The NPWS Rare and Protected Species database has a record of this species from 1899 in Oughterard. It is therefore assumed that this species is no longer present in the study area.

[3] The Irish Red Data Book 1: Vascular Plants, T.G.F.Curtis & H.N.McGough (1988)

There is a pre-1970 record for the native orchid species **Irish Lady's-tresses** from Grid Square M04. However, it has not been recorded in any subsequent surveys, and so it is assumed that it is no longer present in the study area.

Wood Bitter-vetch, a native bushy perennial of meadows, scrub and rocks in hilly districts, is listed as 'Vulnerable' in the Irish Red Data Book and is afforded legal protection in Ireland under the Flora Protection Order, 1999. It was recorded in Grid Square M14 during the 1987-1999 Flora Atlas Survey. There is also a pre-1970 record for this species from Grid Square L94, but it has not been recorded in this Grid Square in subsequent surveys. The NPWS Rare and Protected Species database has a record for this species from Maam Cross dating from 1845, but it hasn't been recorded in this Grid Square since. The NPWS Rare and Protected Species database has several records for this species from the islands of Lough Corrib, which all lie within Grid Square M14. It is probable that the BSBI flora atlas records for this species are also from Lough Corrib, and so it is unlikely to occur within the study area.

There is a record for the native **Pale Dog-violet** in the NPWS database for Grid Square M04 from 1976. This species is also mentioned in the Site Synopsis for the Connemara Bog Complex, however, this species has not been recorded in any of the relevant Grid Squares in any of the BSBI Flora Atlas Surveys, and so it is unlikely to occur within the area.

4 ASSESSMENT OF HABITATS AND SPECIES OF CONSERVATION INTEREST WITHIN STUDY AREA

4.1 ANNEX I HABITATS

The proposed Greenway will be constructed within the boundary of, or adjacent to, six Natura 2000 sites. A total of twenty-four Annex I Habitats and ten Annex II species have been selected as the qualifying interests for the cSAC Natura 2000 sites and six Annex I bird species of the E.U. Birds Directive are the qualifying interests of Lough Corrib SPA. The distribution of these habitats and species within the Natura 2000 sites are detailed in **Tables 3.5 to 3.15**.

The Annex I habitats found in the vicinity of the proposed Greenway include 'Oligotrophic waters containing very few minerals of the sandy plains (3110)', Northern Atlantic wet heaths with Erica tetralix (4010), European dry heaths (4030), Blanket bogs (*if active bog) (7130), 'Depressions on peat substrates of the *Rhyncosporion* (7150)', Alkaline Fens (7230), and Old sessile oak woods with Ilex and Blechnum in British Isles (91A0).

Article 10 of the Habitats Directive refers to features of the landscape, which are of major importance for wild flora and fauna, by virtue of their linear and continuous structures (such as rivers with their banks or the traditional systems for marking field boundaries), or their function as stepping stones (such as ponds or small woods). These features are essential for the migration, dispersal and genetic exchange of wild species. Member States are required to endeavour, where they consider it necessary, in their land use planning and development policies, to encourage the management of these features of the landscape, with a view to improving the ecological coherence of the Natura 2000 network.

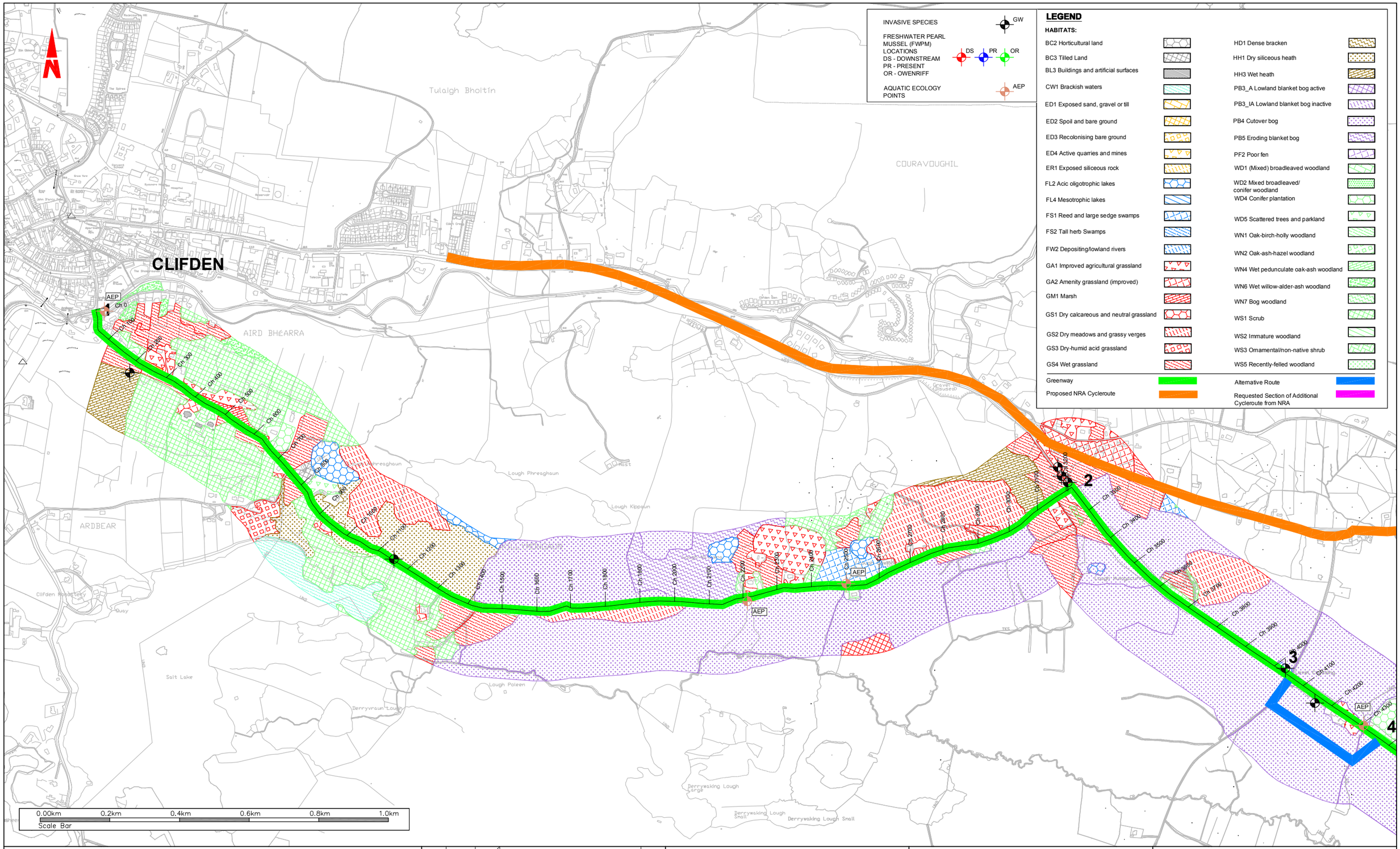
The habitats found within the proposed Study Area corridor are shown in **Figure 4.1**. They are based on detailed walkover surveys and an interpretation of the aerial photography. The habitats recorded are classified in accordance with the guidelines set out in 'A Guide to Habitats in Ireland' (Fossitt, 2000), which classifies habitats based on the vegetation present and management history. The classification is a standard scheme for identifying, describing and classifying wildlife habitats in Ireland. The classification is hierarchical and operates at three levels, outlining the correlation between its habitat categories and the phytosociological units (plant communities) of botanical classifications.

Links with Priority and Non-Priority Annex I habitats of the Habitats Directive (92/43/EEC) are also described as per the relevant sections of the Interpretation Manual of European Union Habitats - EUR27 (**Appendix C**). The Interpretation Manual is a scientific reference document published by the European Commission for the interpretation of Priority and Non-Priority Annex I habitat types of the Council Directive 92/43/EEC. This manual incorporates descriptive sheets for Priority and Non-Priority Habitats, which establishes clear, operational scientific definitions of habitats, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations.

The Status of EU Protected Habitats and Species in Ireland (NPWS, 2008) was also consulted which provides details on the status of listed habitats and species and also provides lists of typical species for these habitats in the Irish context.

The descriptive sheets for Priority or Non-Priority Annex I Habitats are provided where corresponding habitats were identified within the zone of influence of the proposed Greenway.

The habitats found within the study area of the project and their corresponding codes are listed in **Table 4.1**. Those with potential links to Annex I Habitats or which can potentially support Annex II species, which are qualifying interests of the Natura 2000 sites under consideration, are in italics and highlighted in bold.



INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF — DS PR OR

AQUATIC ECOLOGY POINTS — AEP

LEGEND

HABITATS:

- BC2 Horticultural land
- BC3 Tilled Land
- BL3 Buildings and artificial surfaces
- CW1 Brackish waters
- ED1 Exposed sand, gravel or till
- ED2 Spoil and bare ground
- ED3 Recolonising bare ground
- ED4 Active quarries and mines
- ER1 Exposed siliceous rock
- FL2 Acic oligotrophic lakes
- FL4 Mesotrophic lakes
- FS1 Reed and large sedge swamps
- FS2 Tall herb Swamps
- FW2 Depositing/lowland rivers
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- GM1 Marsh
- GS1 Dry calcareous and neutral grassland
- GS2 Dry meadows and grassy verges
- GS3 Dry-humid acid grassland
- GS4 Wet grassland
- HD1 Dense bracken
- HH1 Dry siliceous heath
- HH3 Wet heath
- PB3_A Lowland blanket bog active
- PB3_IA Lowland blanket bog inactive
- PB4 Cutover bog
- PB5 Eroding blanket bog
- PF2 Poor fen
- WD1 (Mixed) broadleaved woodland
- WD2 Mixed broadleaved/ conifer woodland
- WD4 Conifer plantation
- WD5 Scattered trees and parkland
- WN1 Oak-birch-holly woodland
- WN2 Oak-ash-hazel woodland
- WN4 Wet pedunculate oak-ash woodland
- WN6 Wet willow-alder-ash woodland
- WN7 Bog woodland
- WS1 Scrub
- WS2 Immature woodland
- WS3 Ornamental/non-native shrub
- WS5 Recently-felled woodland

- Greenway
- Proposed NRA Cycleroute
- Alternative Route
- Requested Section of Additional Cycleroute from NRA

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D01	23.04.12	AN / DM	DRAFT ISSUE	WM

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Drawing Number: MGE0269/DG0003-01
Rev: F01

Project: CONNEMARA GREENWAY PROJECT

Title: FIGURE 4.1 HABITAT MAP

Sheet 1 of 15

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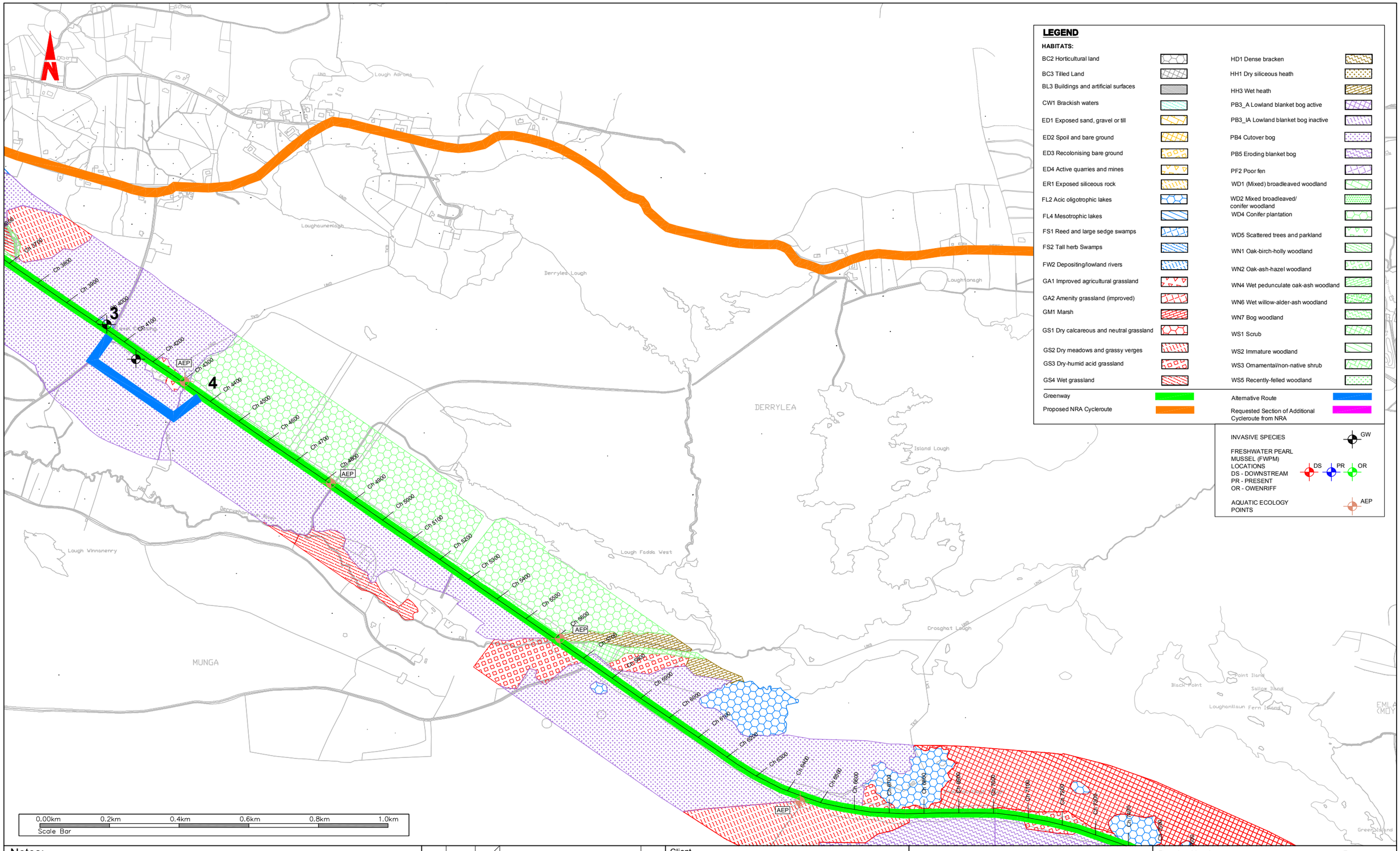

LEGEND

HABITATS:

- BC2 Horticultural land
- BC3 Tilled Land
- BL3 Buildings and artificial surfaces
- CW1 Brackish waters
- ED1 Exposed sand, gravel or till
- ED2 Spoil and bare ground
- ED3 Recolonising bare ground
- ED4 Active quarries and mines
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- FL4 Mesotrophic lakes
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- GS4 Wet grassland
- HD1 Dense bracken
- HH1 Dry siliceous heath
- HH3 Wet heath
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- PB4 Cutover bog
- PB5 Eroding blanket bog
- PF2 Poor fen
- WD1 (Mixed) broadleaved woodland
- WD2 Mixed broadleaved/ conifer woodland
- WD4 Conifer plantation
- WD5 Scattered trees and parkland
- WN1 Oak-birch-holly woodland
- WN2 Oak-ash-hazel woodland
- WN4 Wet pedunculate oak-ash woodland
- WN6 Wet willow-alder-ash woodland
- WN7 Bog woodland
- WS1 Scrub
- WS2 Immature woodland
- WS3 Ornamental/non-native shrub
- WS5 Recently-felled woodland

- Greenway
- Proposed NRA Cycleroute
- Alternative Route
- Requested Section of Additional Cycleroute from NRA

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS — DS, PR, OR
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF

AQUATIC ECOLOGY POINTS — AEP

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Project: **CONNEMARA GREENWAY PROJECT**

Drawing Number: MGE0269/DG0003-02
Rev: **F01**

Title: **FIGURE 4.1 HABITAT MAP**

Sheet 2 of 15

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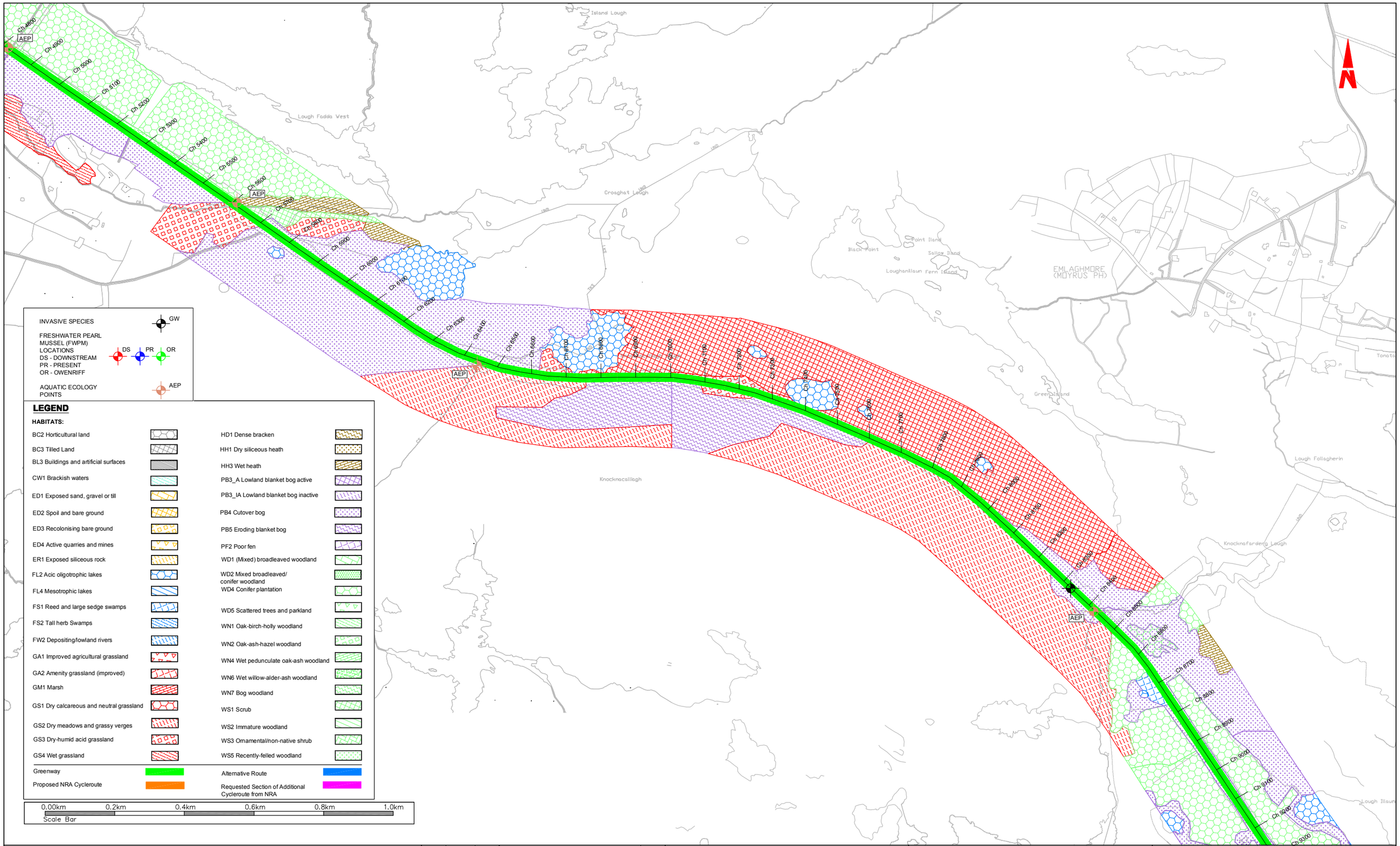

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Drawing Number: MGE0269/DG0003-03
Rev: F01

Project: CONNEMARA GREENWAY PROJECT

Title: FIGURE 4.1 HABITAT MAP

Sheet 3 of 15

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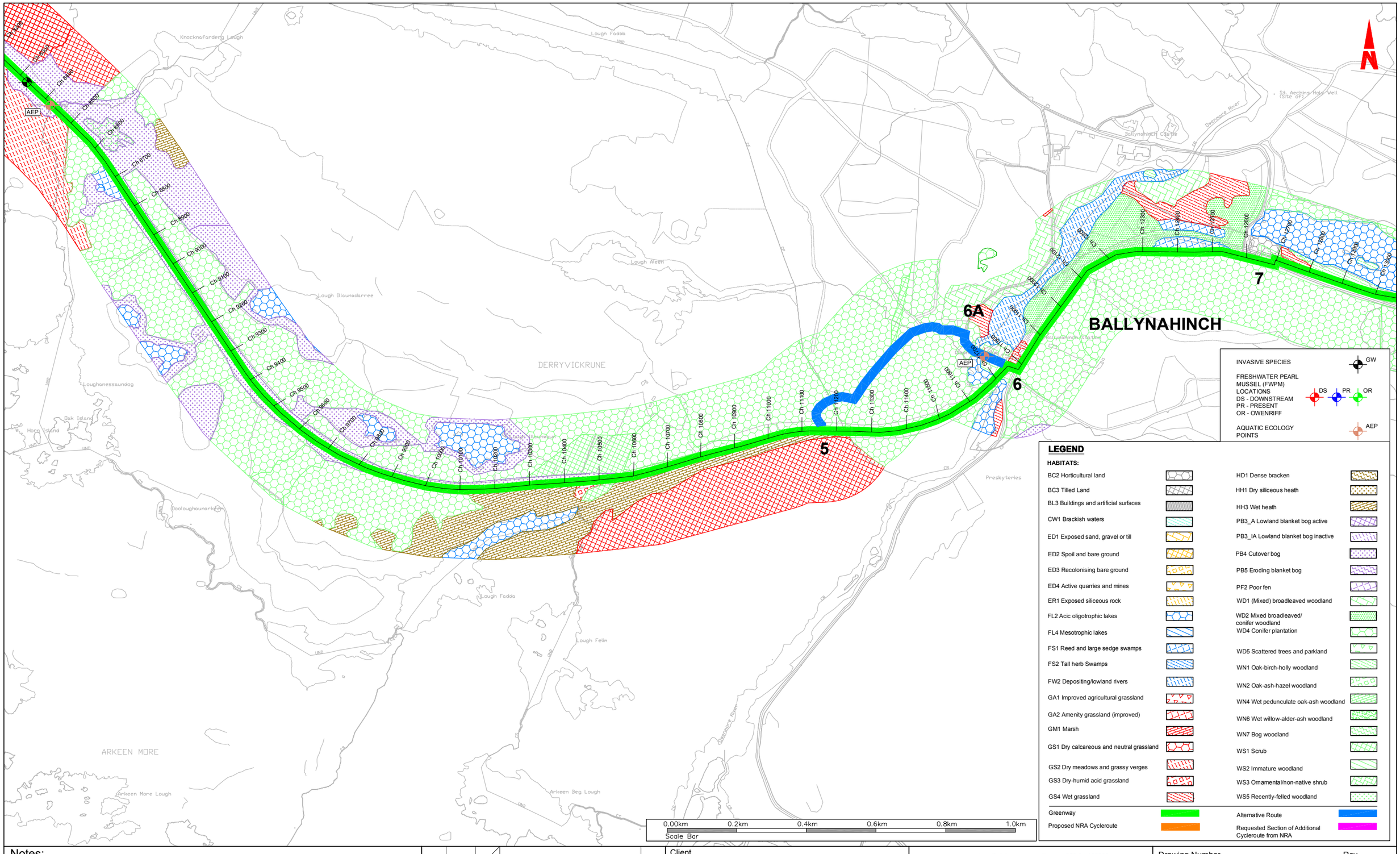

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF — DS PR OR

AQUATIC ECOLOGY POINTS — AEP

LEGEND

HABITATS:

BC2 Horticultural land	HD1 Dense bracken
BC3 Tilled Land	HH1 Dry siliceous heath
BL3 Buildings and artificial surfaces	HH3 Wet heath
CW1 Brackish waters	PB3_A Lowland blanket bog active
ED1 Exposed sand, gravel or till	PB3_IA Lowland blanket bog inactive
ED2 Spoil and bare ground	PB4 Cutover bog
ED3 Recolonising bare ground	PB5 Eroding blanket bog
ED4 Active quarries and mines	PF2 Poor fen
ER1 Exposed siliceous rock	WD1 (Mixed) broadleaved woodland
FL2 Acic oligotrophic lakes	WD2 Mixed broadleaved/ conifer woodland
FL4 Mesotrophic lakes	WD4 Conifer plantation
FS1 Reed and large sedge swamps	WD5 Scattered trees and parkland
FS2 Tall herb Swamps	WN1 Oak-birch-holly woodland
FW2 Depositing/lowland rivers	WN2 Oak-ash-hazel woodland
GA1 Improved agricultural grassland	WN4 Wet pedunculate oak-ash woodland
GA2 Amenity grassland (improved)	WN6 Wet willow-alder-ash woodland
GM1 Marsh	WN7 Bog woodland
GS1 Dry calcareous and neutral grassland	WS1 Scrub
GS2 Dry meadows and grassy verges	WS2 Immature woodland
GS3 Dry-humid acid grassland	WS3 Ornamental/non-native shrub
GS4 Wet grassland	WS5 Recently-felled woodland
Greenway	Alternative Route
Proposed NRA Cycleroute	Requested Section of Additional Cycleroute from NRA

Notes:

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Drawing Number: MGE0269/DG0003-04

Rev: **F01**

Title: **FIGURE 4.1 HABITAT MAP**

Sheet 4 of 15

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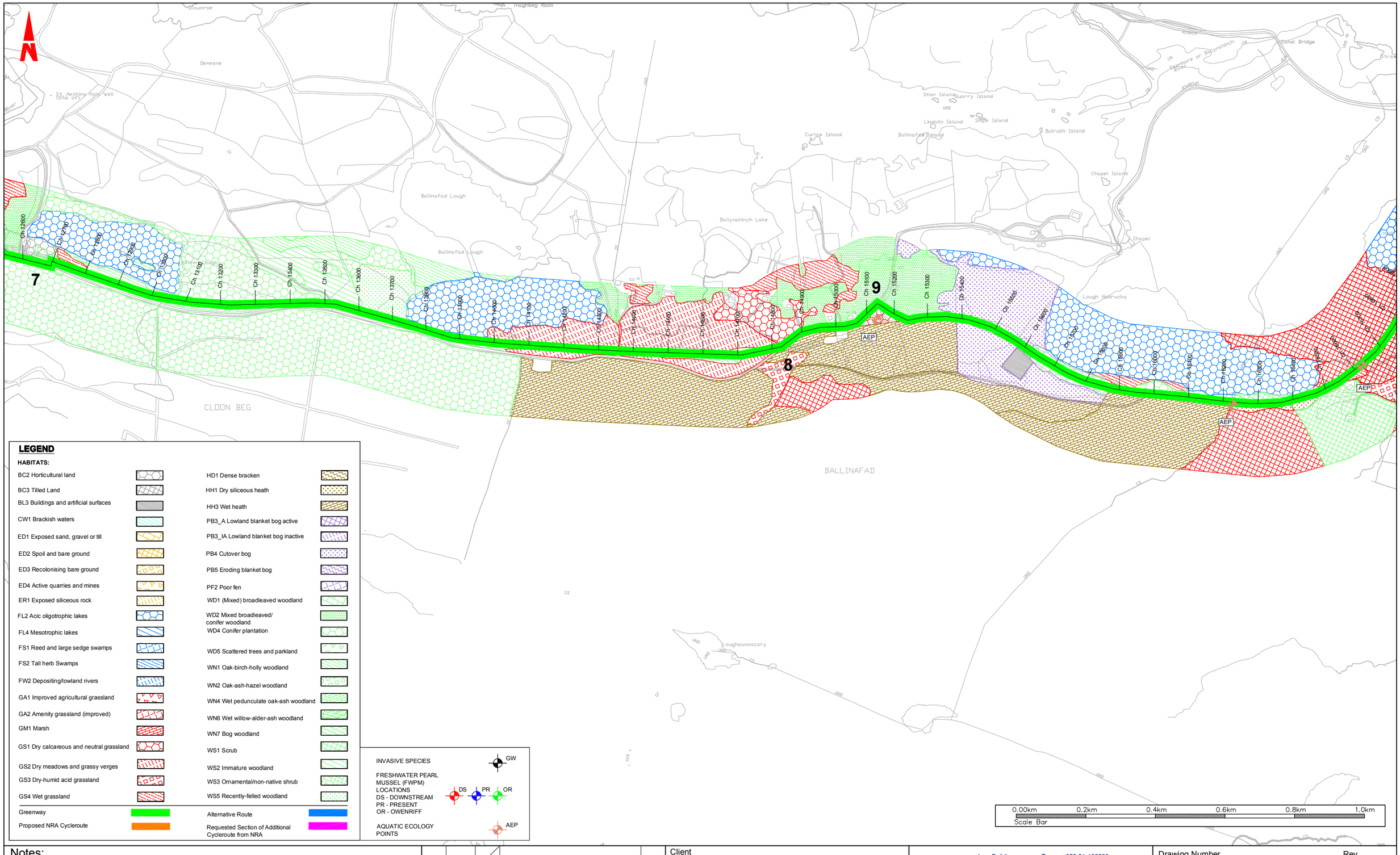

LEGEND

HABITATS:

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FS1 Reed and large sedge swamps		WD5 Scattered trees and parkland	
FS2 Tall herb Swamps		WN1 Oak-birch-holly woodland	
FW2 Depositing/lowland rivers		WN2 Oak-ash-hazel woodland	
GA1 Improved agricultural grassland		WN4 Wet pedunculate oak-ash woodland	
GA2 Amenity grassland (improved)		WN6 Wet willow-alder-ash woodland	
GM1 Marsh		WN7 Bog woodland	
GS1 Dry calcareous and neutral grassland		WS1 Scrub	
GS2 Dry meadows and grassy verges		WS2 Immature woodland	
GS3 Dry-humid acid grassland		WS3 Ornamental/non-native shrub	
GS4 Wet grassland		WS5 Recently-felled woodland	
Greenway		Alternative Route	
Proposed NRA Cycleroute		Requested Section of Additional Cycleroute from NRA	

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF — DS PR OR

AQUATIC ECOLOGY POINTS — AEP

Notes:

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5. Datum: Ordnance Survey Datum, Malin Head

No.	Date	Dn. / Chk.	Amendment / Issue	App
F01	16.05.12	AN / PK	FINAL ISSUE	WM
D01	23.04.12	AN / DM	DRAFT ISSUE	WM

Client: GALWAY COUNTY COUNCIL, County Buildings, Prospect Hill, Galway, Phone: 091 50900, Frank Gilmore, Director Of Services
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Project: **CONNEMARA GREENWAY PROJECT**

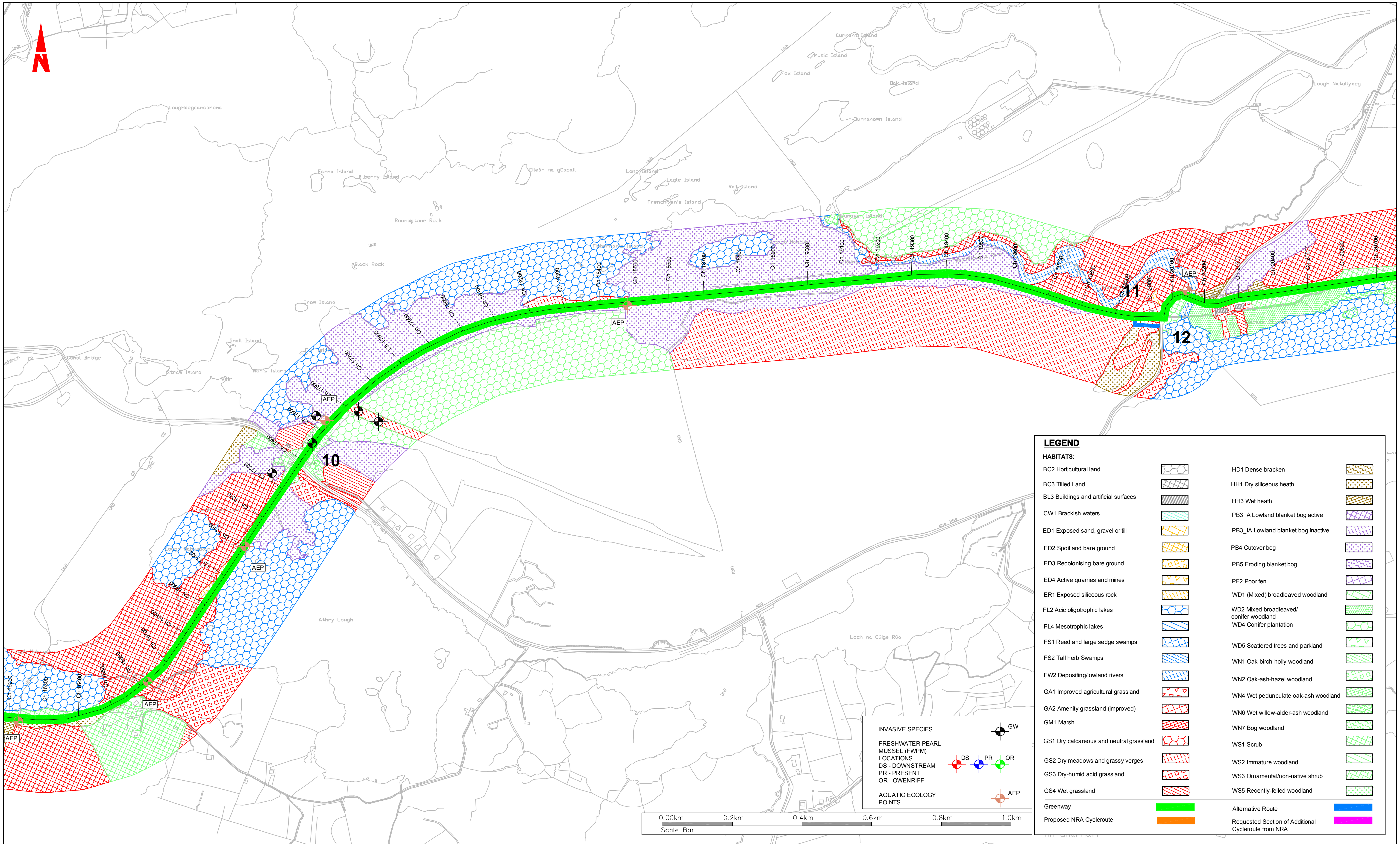
Drawing Number: MGE0269/DG0003-05
Rev: **F01**

Title: **FIGURE 4.1 HABITAT MAP**

Sheet 5 of 15

Scale	Drawn By	Checked By	Approved By	Date
1:10,000 @ A3	MC	PK	WM	April 2012

MGE0269DG0007 NIS Habitat Maps.dwg



LEGEND

HABITATS:

BC2 Horticultural land	HD1 Dense bracken
BC3 Tilled Land	HH1 Dry siliceous heath
BL3 Buildings and artificial surfaces	HH3 Wet heath
CW1 Brackish waters	PB3_A Lowland blanket bog active
ED1 Exposed sand, gravel or till	PB3_IA Lowland blanket bog inactive
ED2 Spoil and bare ground	PB4 Cutover bog
ED3 Recolonising bare ground	PB5 Eroding blanket bog
ED4 Active quarries and mines	PF2 Poor fen
ER1 Exposed siliceous rock	WD1 (Mixed) broadleaved woodland
FL2 Acic oligotrophic lakes	WD2 Mixed broadleaved/ conifer woodland
FL4 Mesotrophic lakes	WD4 Conifer plantation
FS1 Reed and large sedge swamps	WD5 Scattered trees and parkland
FS2 Tall herb Swamps	WN1 Oak-birch-holly woodland
FW2 Depositing/lowland rivers	WN2 Oak-ash-hazel woodland
GA1 Improved agricultural grassland	WN4 Wet pedunculate oak-ash woodland
GA2 Amenity grassland (improved)	WN6 Wet willow-alder-ash woodland
GM1 Marsh	WN7 Bog woodland
GS1 Dry calcareous and neutral grassland	WS1 Scrub
GS2 Dry meadows and grassy verges	WS2 Immature woodland
GS3 Dry-humid acid grassland	WS3 Ornamental/non-native shrub
GS4 Wet grassland	WS5 Recently-felled woodland
Greenway	Alternative Route
Proposed NRA Cycleroute	Requested Section of Additional Cycleroute from NRA

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F01	16.05.12	AN PK	FINAL ISSUE	WM
D01	23.04.12	AN DM	DRAFT ISSUE	WM

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Drawing Number: MGE0269/DG0003-06
Rev: F01

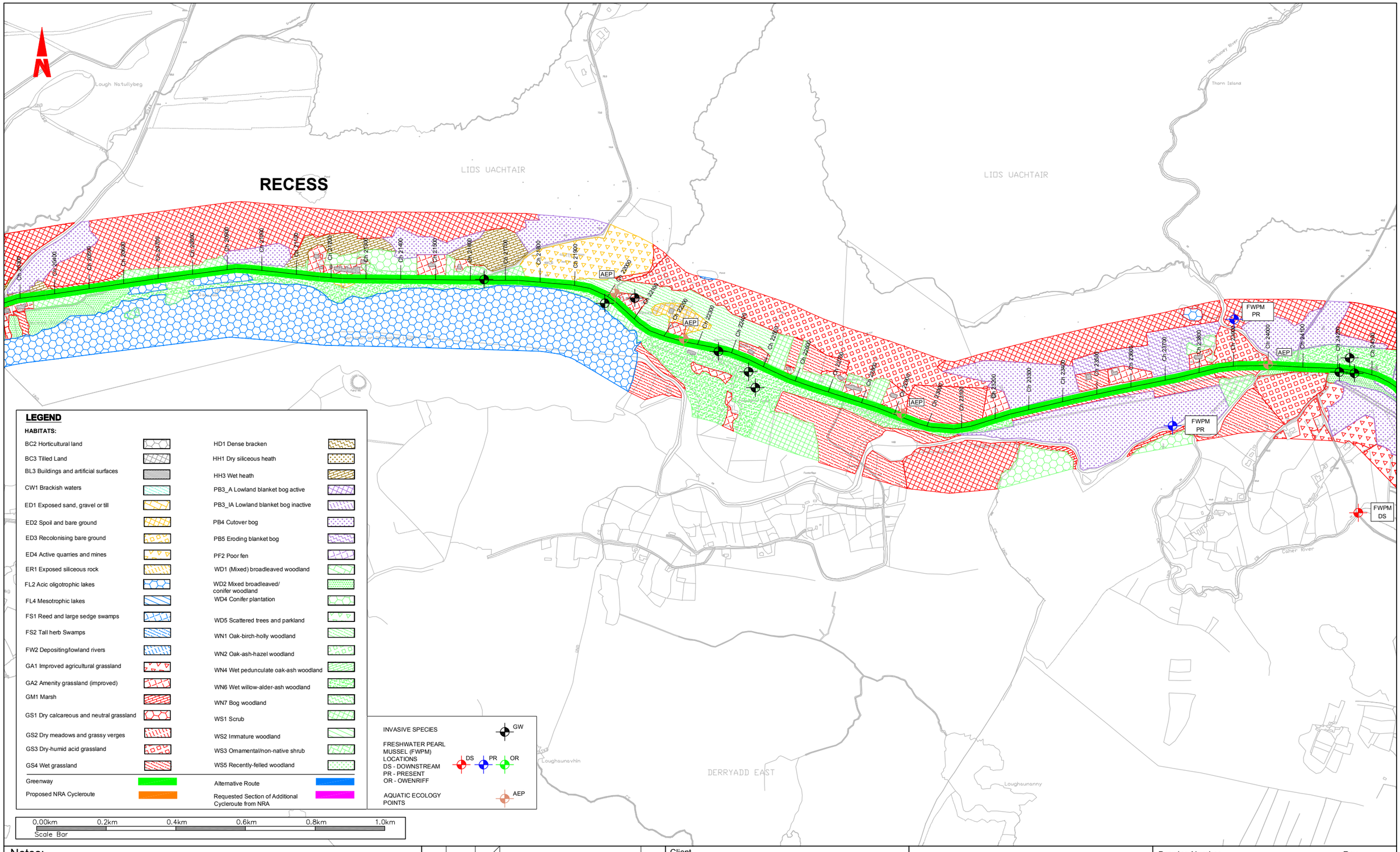
Project: **CONNEMARA GREENWAY PROJECT**

Title: **FIGURE 4.1 HABITAT MAP**

Scale	Drawn By	Checked By	Approved By	Date
1:10,000 @ A3	MC	PK	WM	April 2012

Sheet 6 of 15

MGE0269DG0007 NIS Habitat Maps.dwg



LEGEND

HABITATS:

BC2 Horticultural land		HD1 Dense bracken	
BC3 Tilled Land		HH1 Dry siliceous heath	
BL3 Buildings and artificial surfaces		HH3 Wet heath	
CW1 Brackish waters		PB3_A Lowland blanket bog active	
ED1 Exposed sand, gravel or till		PB3_IA Lowland blanket bog inactive	
ED2 Spoil and bare ground		PB4 Cutover bog	
ED3 Recolonising bare ground		PB5 Eroding blanket bog	
ED4 Active quarries and mines		PF2 Poor fen	
ER1 Exposed siliceous rock		WD1 (Mixed) broadleaved woodland	
FL2 Acic oligotrophic lakes		WD2 Mixed broadleaved/ conifer woodland	
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FW2 Depositing/lowland rivers		WN2 Oak-ash-hazel woodland	
GA1 Improved agricultural grassland		WN4 Wet pedunculate oak-ash woodland	
GA2 Amenity grassland (improved)		WN6 Wet willow-alder-ash woodland	
GM1 Marsh		WN7 Bog woodland	
GS1 Dry calcareous and neutral grassland		WS1 Scrub	
GS2 Dry meadows and grassy verges		WS2 Immature woodland	
GS3 Dry-humid acid grassland		WS3 Ornamental/non-native shrub	
GS4 Wet grassland		WS5 Recently-felled woodland	
Greenway		Alternative Route	
Proposed NRA Cycleroute		Requested Section of Additional Cycleroute from NRA	

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF — DS PR OR

AQUATIC ECOLOGY POINTS — AEP

0.00km 0.2km 0.4km 0.6km 0.8km 1.0km
Scale Bar

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Project: **CONNEMARA GREENWAY PROJECT**

Drawing Number: MGE0269/DG0003-07

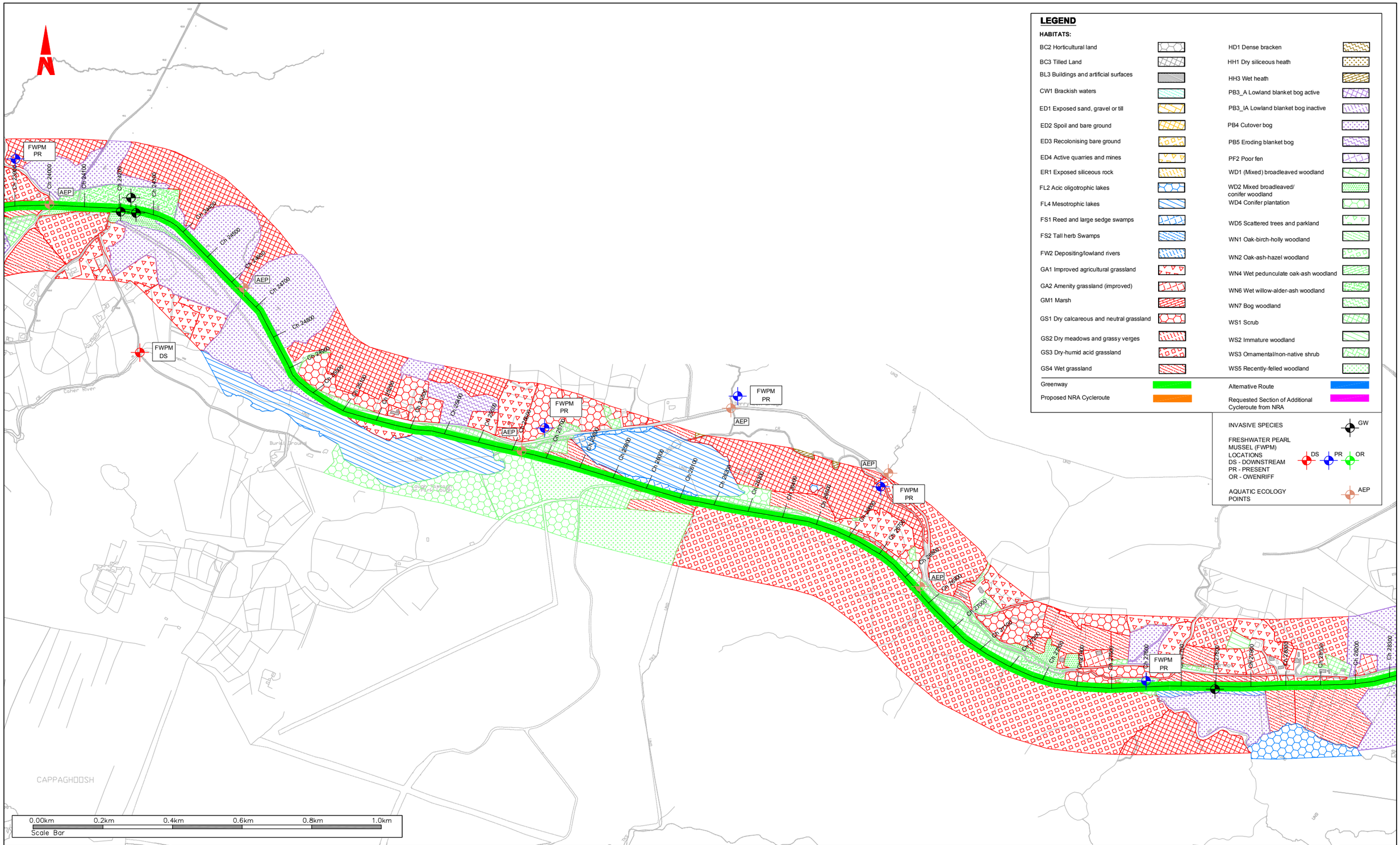
Rev: **F01**

Title: **FIGURE 4.1 HABITAT MAP**

Sheet 7 of 15

Scale	Drawn By	Checked By	Approved By	Date
1:10,000 @ A3	MC	PK	WM	April 2012

MGE0269DG0007 NIS Habitat Maps.dwg



LEGEND

HABITATS:

- BC2 Horticultural land
- BC3 Tilled Land
- BL3 Buildings and artificial surfaces
- CW1 Brackish waters
- ED1 Exposed sand, gravel or till
- ED2 Spoil and bare ground
- ED3 Recolonising bare ground
- ED4 Active quarries and mines
- ER1 Exposed siliceous rock
- FL2 Acic oligotrophic lakes
- FL4 Mesotrophic lakes
- FS1 Reed and large sedge swamps
- FS2 Tall herb Swamps
- FW2 Depositing/lowland rivers
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- GM1 Marsh
- GS1 Dry calcareous and neutral grassland
- GS2 Dry meadows and grassy verges
- GS3 Dry-humid acid grassland
- GS4 Wet grassland
- HD1 Dense bracken
- HH1 Dry siliceous heath
- HH3 Wet heath
- PB3_A Lowland blanket bog active
- PB3_IA Lowland blanket bog inactive
- PB4 Cutover bog
- PB5 Eroding blanket bog
- PF2 Poor fen
- WD1 (Mixed) broadleaved woodland
- WD2 Mixed broadleaved/ conifer woodland
- WD4 Conifer plantation
- WD5 Scattered trees and parkland
- WN1 Oak-birch-holly woodland
- WN2 Oak-ash-hazel woodland
- WN4 Wet pedunculate oak-ash woodland
- WN6 Wet willow-alder-ash woodland
- WN7 Bog woodland
- WS1 Scrub
- WS2 Immature woodland
- WS3 Ornamental/non-native shrub
- WS5 Recently-felled woodland
- Greenway
- Proposed NRA Cycleroute
- Alternative Route
- Requested Section of Additional Cycleroute from NRA

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF — DS PR OR

AQUATIC ECOLOGY POINTS — AEP

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Project: **CONNEMARA GREENWAY PROJECT**

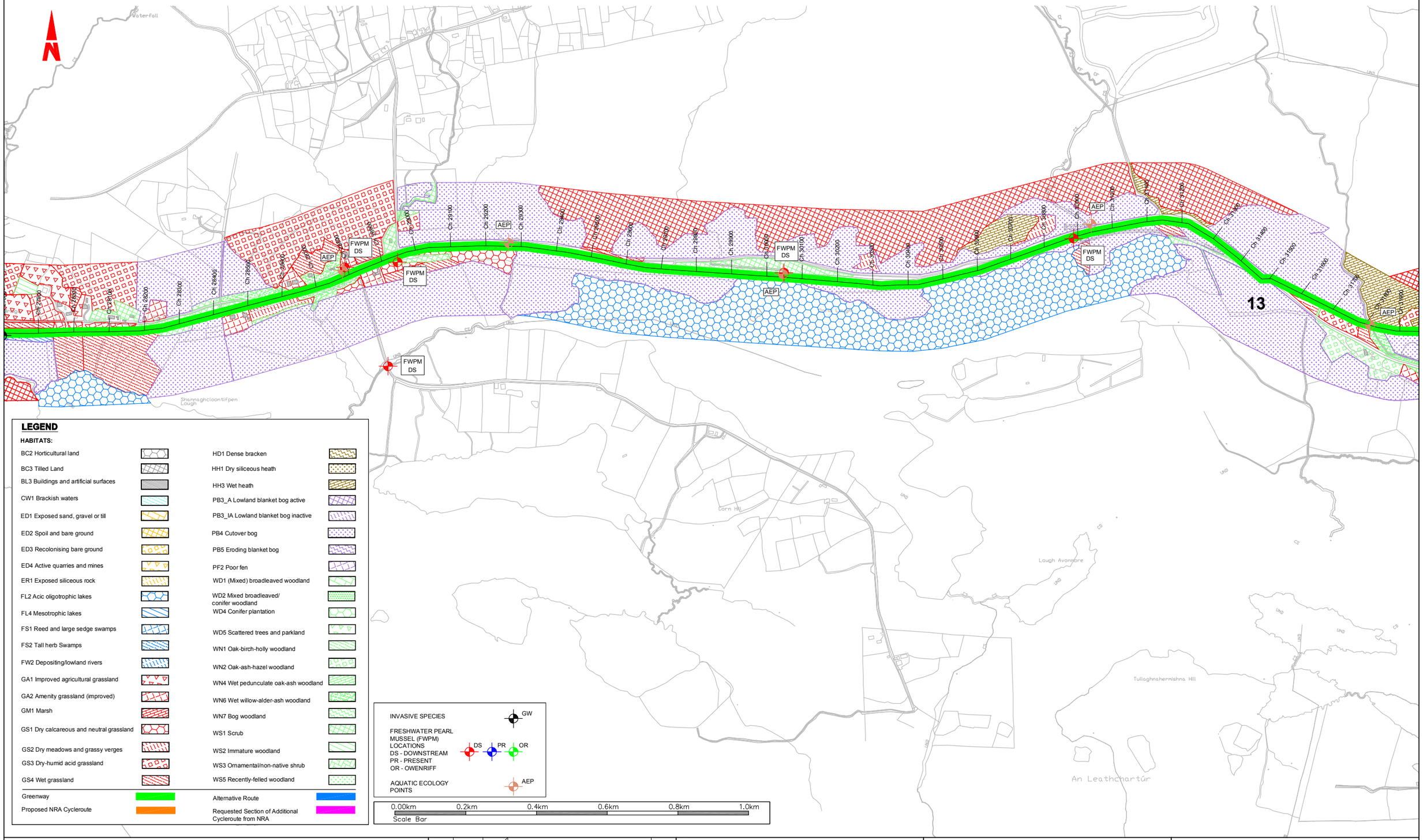
Drawing Number: MGE0269/DG0003-08
Rev: **F01**

Title: **FIGURE 4.1 HABITAT MAP**

Sheet 8 of 15

Scale	Drawn By	Checked By	Approved By	Date
1:10,000 @ A3	MC	PK	WM	April 2012

MGE0269DG0007 NIS Habitat Maps.dwg



LEGEND

HABITATS:

BC2 Horticultural land	HD1 Dense bracken
BC3 Tilled Land	HH1 Dry siliceous heath
BL3 Buildings and artificial surfaces	HH3 Wet heath
CW1 Brackish waters	PB3_A Lowland blanket bog active
ED1 Exposed sand, gravel or till	PB3_IA Lowland blanket bog inactive
ED2 Spoil and bare ground	PB4 Cutover bog
ED3 Recolonising bare ground	PB5 Eroding blanket bog
ED4 Active quarries and mines	PF2 Poor fen
ER1 Exposed siliceous rock	WD1 (Mixed) broadleaved woodland
FL2 Acic oligotrophic lakes	WD2 Mixed broadleaved/ conifer woodland
FL4 Mesotrophic lakes	WD4 Conifer plantation
FS1 Reed and large sedge swamps	WD5 Scattered trees and parkland
FS2 Tall herb Swamps	WN1 Oak-birch-holly woodland
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GM1 Marsh	WN7 Bog woodland
GS1 Dry calcareous and neutral grassland	WS1 Scrub
GS2 Dry meadows and grassy verges	WS2 Immature woodland
GS3 Dry-humid acid grassland	WS3 Ornamental/non-native shrub
GS4 Wet grassland	WS5 Recently-felled woodland
Greenway	Alternative Route
Proposed NRA Cycleroute	Requested Section of Additional Cycleroute from NRA

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF — DS PR OR

AQUATIC ECOLOGY POINTS — AEP

0.00km 0.2km 0.4km 0.6km 0.8km 1.0km
Scale Bar

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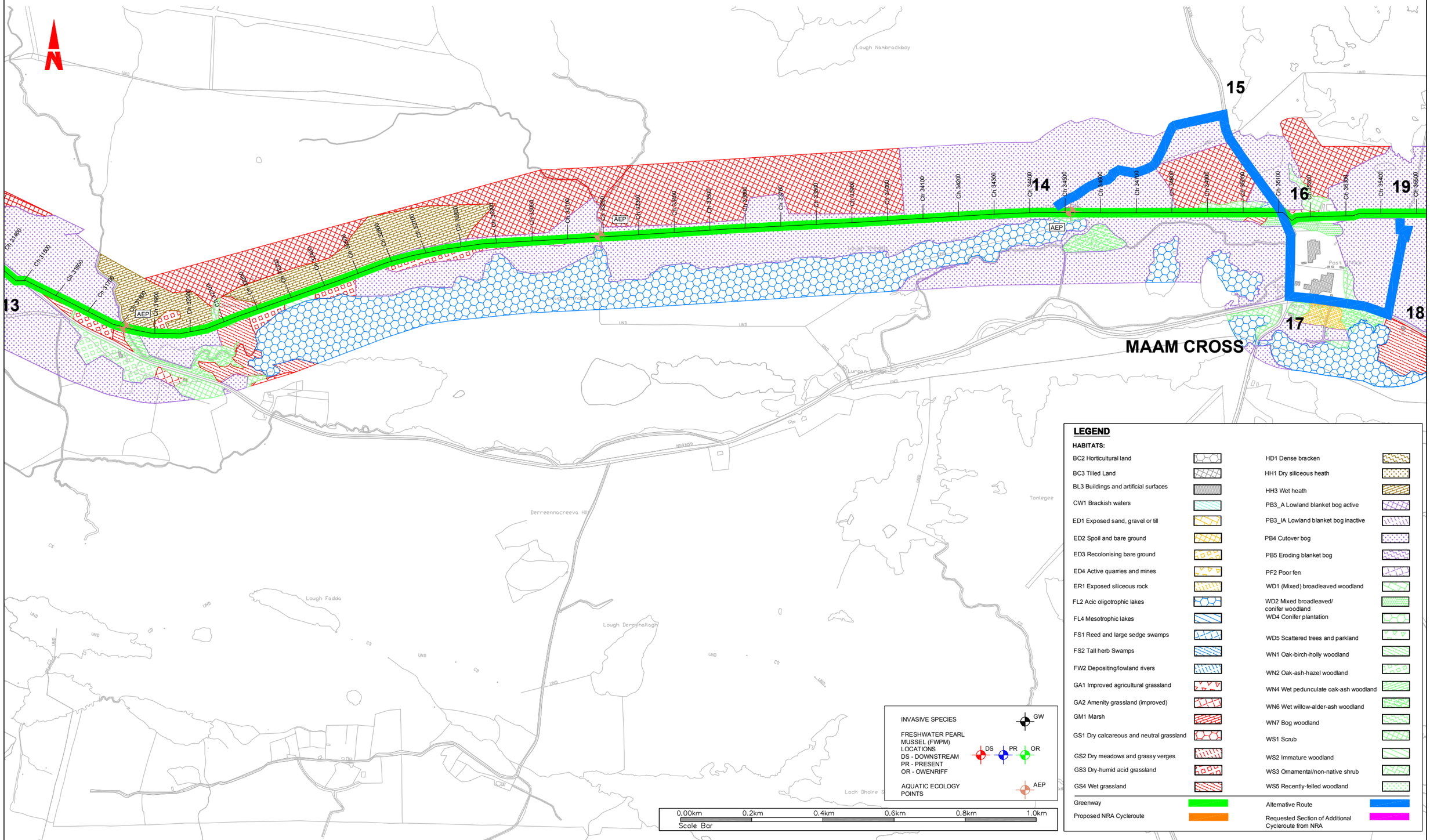
Project: CONNEMARA GREENWAY PROJECT

Title: FIGURE 4.1 HABITAT MAP

Sheet 9 of 15

Scale	Drawn By	Checked By	Approved By	Date
1:10,000 @ A3	MC	PK	WM	April 2012

MGE0269DG0007 NIS Habitat Maps.dwg



LEGEND

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Project
CONNEMARA GREENWAY PROJECT

Drawing Number
MGE0269/DG0003-10

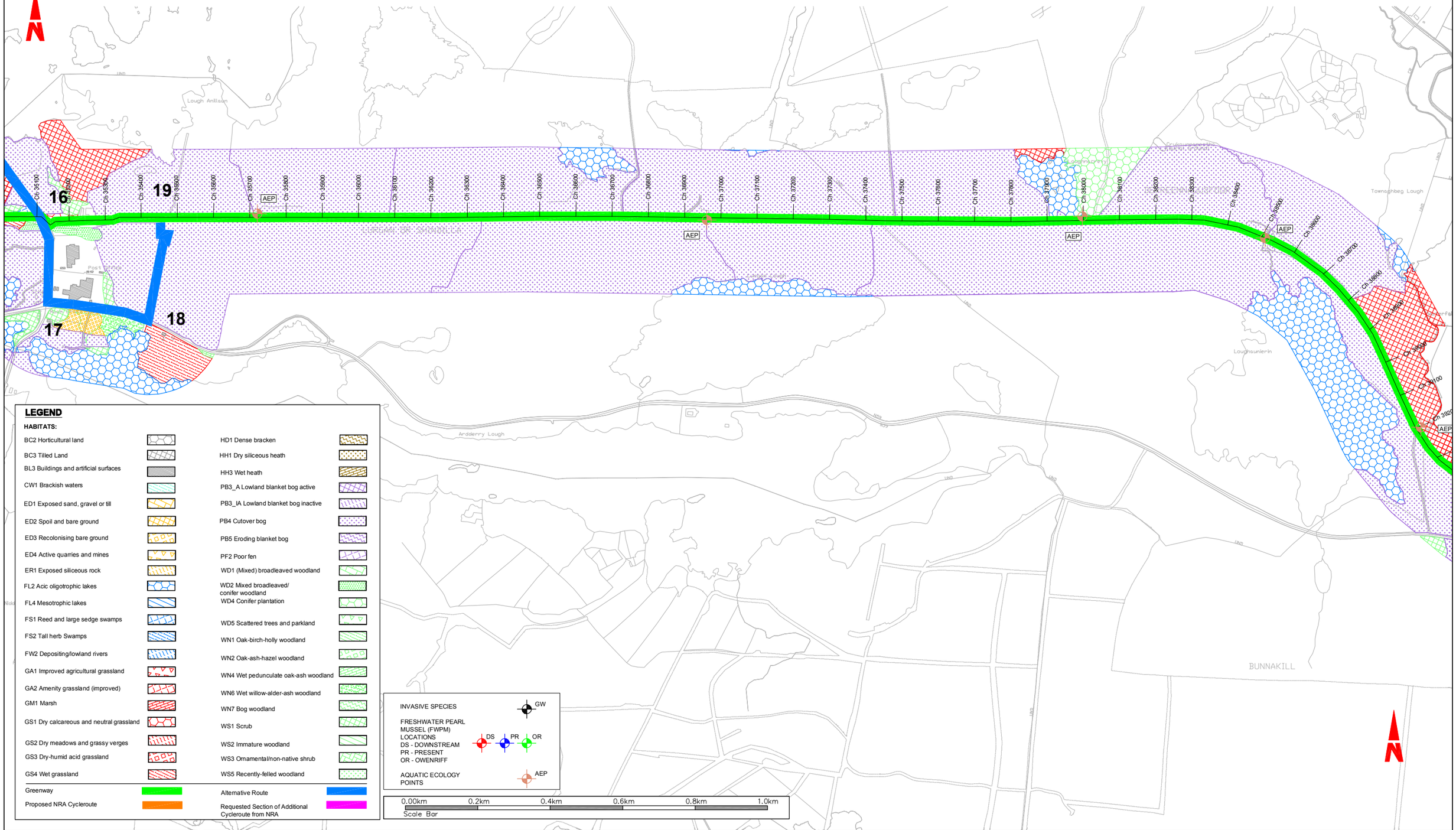
Rev
F01

Title
FIGURE 4.1
HABITAT MAP

Sheet 10 of 15

Scale	Drawn By	Checked By	Approved By	Date
1:10,000 @ A3	MC	PK	WM	April 2012

MGE0269DG0007 NIS Habitat Maps.dwg



LEGEND

HABITATS:

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- WN4 Wet pedunculate oak-ash woodland
- WN6 Wet willow-alder-ash woodland
- WN7 Bog woodland
- WS1 Scrub
- WS2 Immature woodland
- WS3 Ornamental/non-native shrub
- WS5 Recently-felled woodland

- Greenway
- Proposed NRA Cycleroute
- Alternative Route
- Requested Section of Additional Cycleroute from NRA

INVASIVE SPECIES

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF

AQUATIC ECOLOGY POINTS

GW DS PR OR AEP

0.00km 0.2km 0.4km 0.6km 0.8km 1.0km
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Project
CONNEMARA GREENWAY PROJECT

Drawing Number
MGE0269/DG0003-11

Rev
F01

Title
FIGURE 4.1
HABITAT MAP

Sheet 11 of 15

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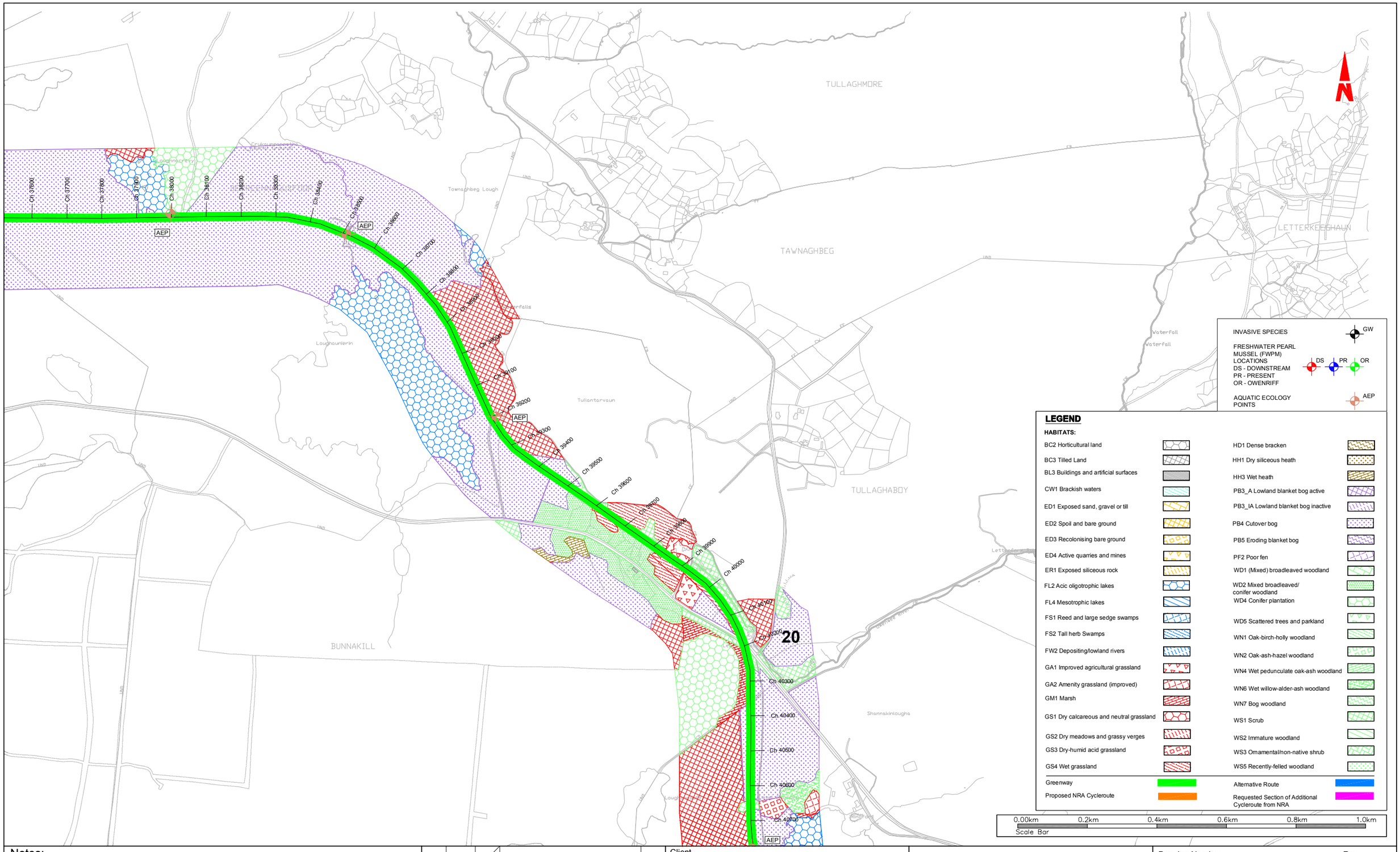

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Project
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Title
FIGURE 4.1
HABITAT MAP

Sheet 12 of 15

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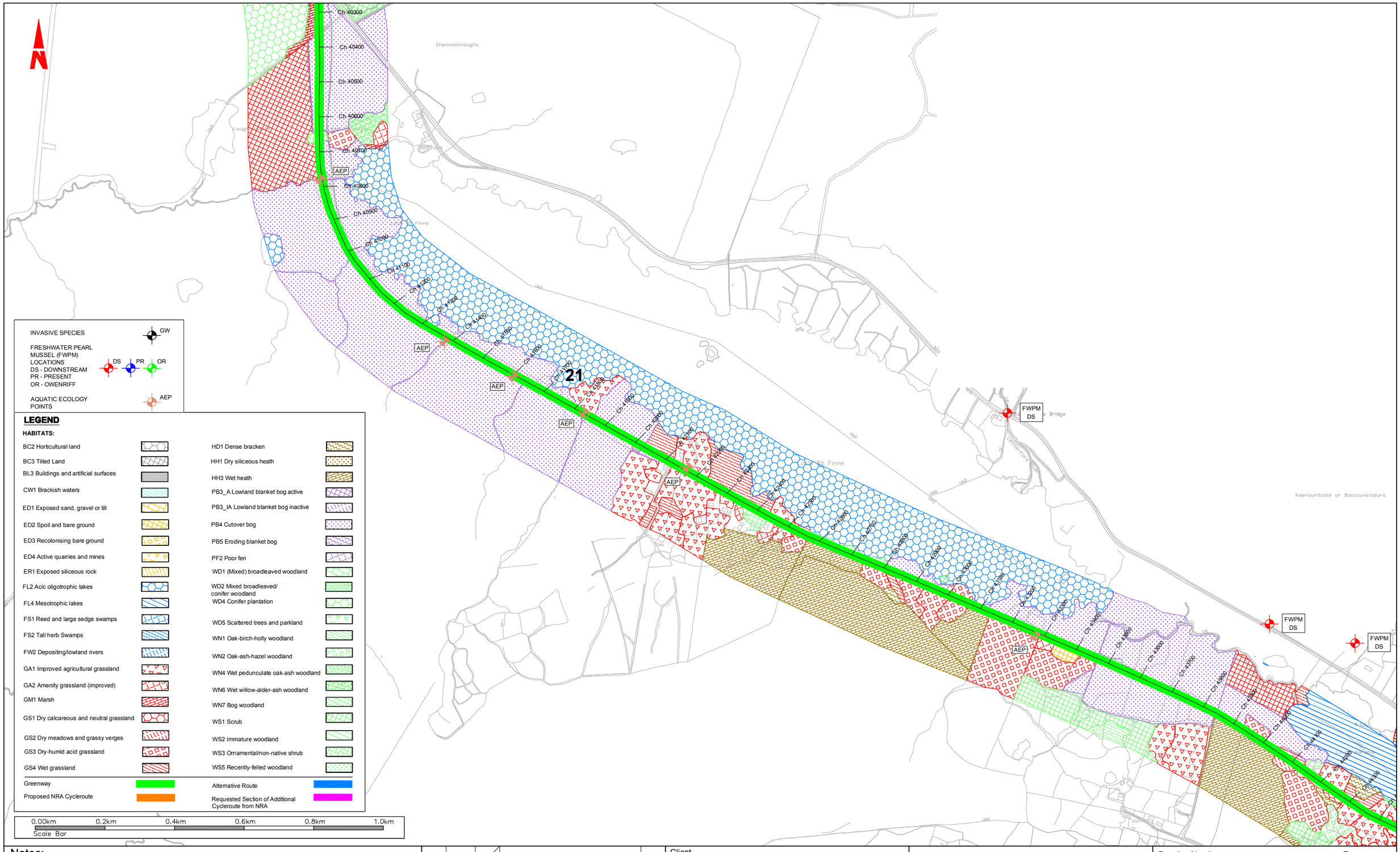

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
OR - OWENRIFF — DS PR OR

AQUATIC ECOLOGY POINTS — AEP

LEGEND

HABITATS:

BC2 Horticultural land		HD1 Dense bracken	
BC3 Tilled Land		HH1 Dry siliceous heath	
BL3 Buildings and artificial surfaces		HH3 Wet heath	
CW1 Brackish waters		PB3_A Lowland blanket bog active	
ED1 Exposed sand, gravel or till		PB3_IA Lowland blanket bog inactive	
ED2 Spoil and bare ground		PB4 Cutover bog	
ED3 Recolonising bare ground		PB5 Eroding blanket bog	
ED4 Active quarries and mines		PF2 Poor fen	
ER1 Exposed siliceous rock		WD1 (Mixed) broadleaved woodland	
FL2 Acic oligotrophic lakes		WD2 Mixed broadleaved/ conifer woodland	
FL4 Mesotrophic lakes		WD4 Conifer plantation	
FS1 Reed and large sedge swamps		WD5 Scattered trees and parkland	
FS2 Tall herb Swamps		WN1 Oak-birch-holly woodland	
FW2 Depositing/lowland rivers		WN2 Oak-ash-hazel woodland	
GA1 Improved agricultural grassland		WN4 Wet pedunculate oak-ash woodland	
GA2 Amenity grassland (improved)		WN6 Wet willow-alder-ash woodland	
GM1 Marsh		WN7 Bog woodland	
GS1 Dry calcareous and neutral grassland		WS1 Scrub	
GS2 Dry meadows and grassy verges		WS2 Immature woodland	
GS3 Dry-humid acid grassland		WS3 Ornamental/non-native shrub	
GS4 Wet grassland		WS5 Recently-felled woodland	
Greenway		Alternative Route	
Proposed NRA Cycleroute		Requested Section of Additional Cycleroute from NRA	

0.00km 0.2km 0.4km 0.6km 0.8km 1.0km
Scale Bar

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Title: **FIGURE 4.1 HABITAT MAP**

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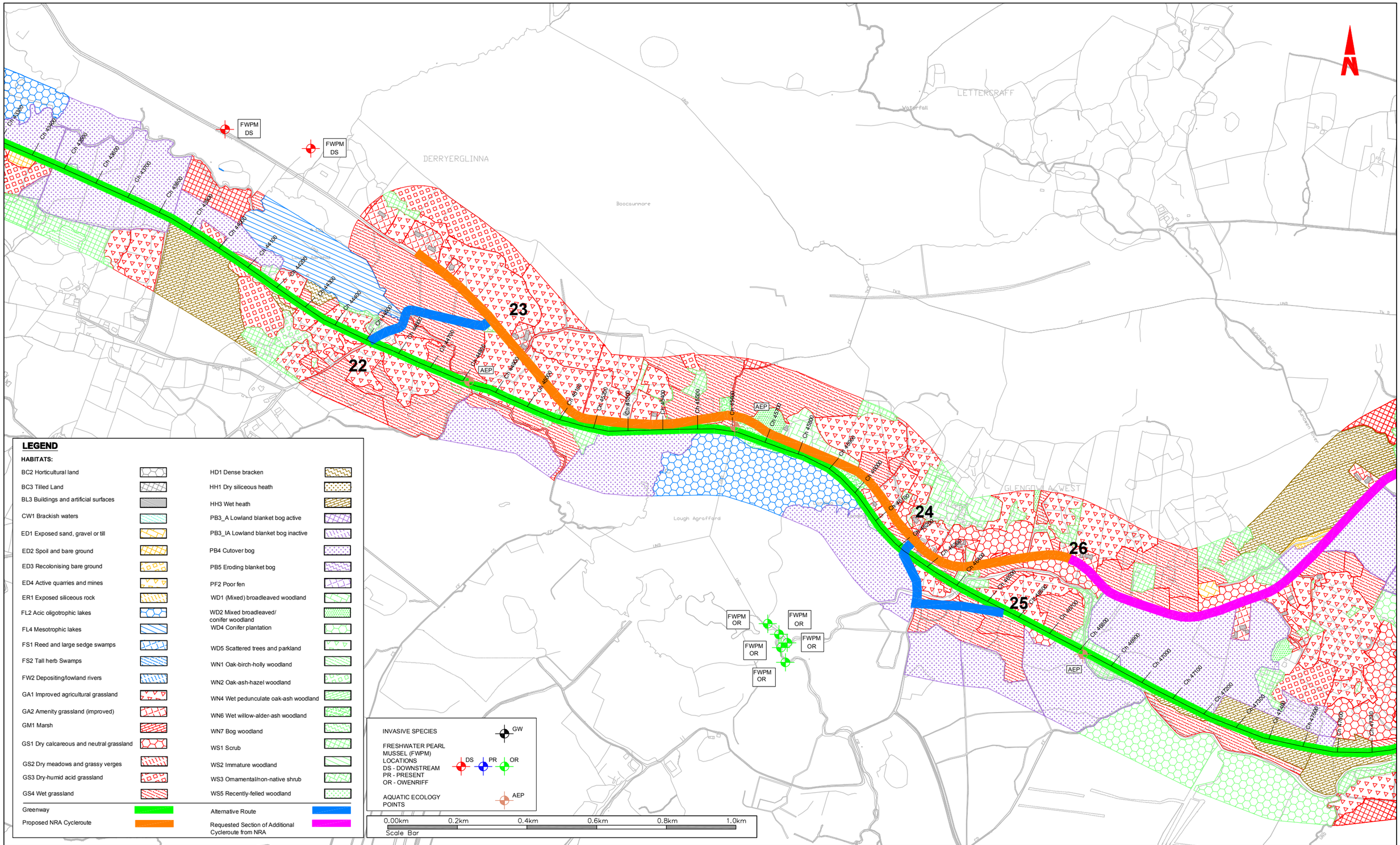

LEGEND

HABITATS:

- BC2 Horticultural land
- BC3 Tilled Land
- BL3 Buildings and artificial surfaces
- CW1 Brackish waters
- ED1 Exposed sand, gravel or till
- ED2 Spoil and bare ground
- ED3 Recolonising bare ground
- ED4 Active quarries and mines
- ER1 Exposed siliceous rock
- FL2 Acic oligotrophic lakes
- FL4 Mesotrophic lakes
- FS1 Reed and large sedge swamps
- FS2 Tall herb Swamps
- FW2 Depositing/lowland rivers
- GA1 Improved agricultural grassland
- GA2 Amenity grassland (improved)
- GM1 Marsh
- GS1 Dry calcareous and neutral grassland
- GS2 Dry meadows and grassy verges
- GS3 Dry-humid acid grassland
- GS4 Wet grassland
- HD1 Dense bracken
- HH1 Dry siliceous heath
- HH3 Wet heath
- PB3_A Lowland blanket bog active
- PB3_IA Lowland blanket bog inactive
- PB4 Cutover bog
- PB5 Eroding blanket bog
- PF2 Poor fen
- WD1 (Mixed) broadleaved woodland
- WD2 Mixed broadleaved/ conifer woodland
- WD4 Conifer plantation
- WD5 Scattered trees and parkland
- WN1 Oak-birch-holly woodland
- WN2 Oak-ash-hazel woodland
- WN4 Wet pedunculate oak-ash woodland
- WN6 Wet willow-alder-ash woodland
- WN7 Bog woodland
- WS1 Scrub
- WS2 Immature woodland
- WS3 Ornamental/non-native shrub
- WS5 Recently-felled woodland

- Greenway
- Proposed NRA Cycleroute
- Alternative Route
- Requested Section of Additional Cycleroute from NRA

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Rev: **F01**

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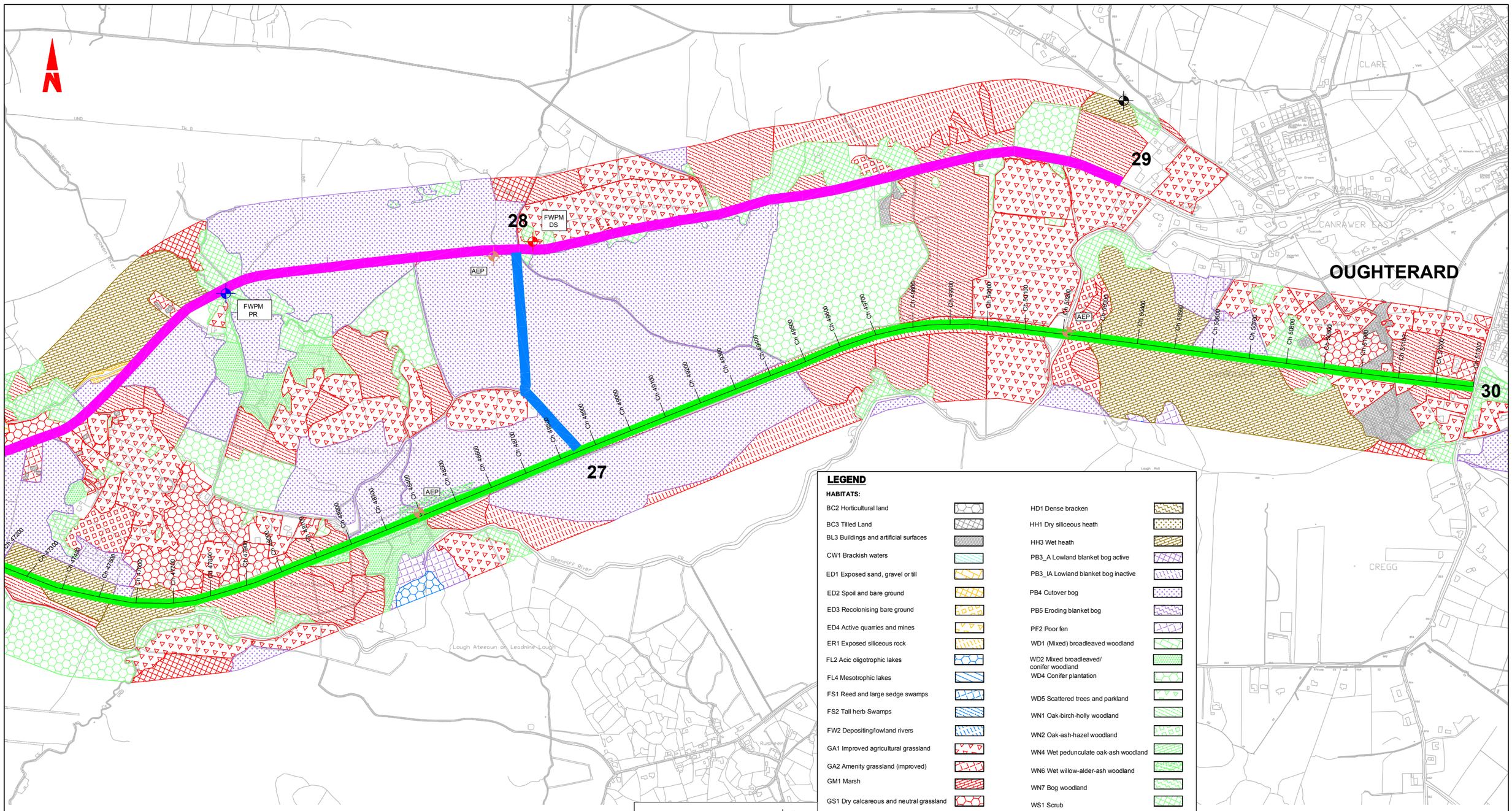

LEGEND

HABITATS:

BC2 Horticultural land	HD1 Dense bracken
BC3 Tilled Land	HH1 Dry siliceous heath
BL3 Buildings and artificial surfaces	HH3 Wet heath
CW1 Brackish waters	PB3_A Lowland blanket bog active
ED1 Exposed sand, gravel or till	PB3_IA Lowland blanket bog inactive
ED2 Spoil and bare ground	PB4 Cutover bog
ED3 Recolonising bare ground	PB5 Eroding blanket bog
ED4 Active quarries and mines	PF2 Poor fen
ER1 Exposed siliceous rock	WD1 (Mixed) broadleaved woodland
FL2 Acic oligotrophic lakes	WD2 Mixed broadleaved/ conifer woodland
FL4 Mesotrophic lakes	WD4 Conifer plantation
FS1 Reed and large sedge swamps	WD5 Scattered trees and parkland
FS2 Tall herb Swamps	WN1 Oak-birch-holly woodland
FW2 Depositing/lowland rivers	WN2 Oak-ash-hazel woodland
GA1 Improved agricultural grassland	WN4 Wet pedunculate oak-ash woodland
GA2 Amenity grassland (improved)	WN6 Wet willow-alder-ash woodland
GM1 Marsh	WN7 Bog woodland
GS1 Dry calcareous and neutral grassland	WS1 Scrub
GS2 Dry meadows and grassy verges	WS2 Immature woodland
GS3 Dry-humid acid grassland	WS3 Ornamental/non-native shrub
GS4 Wet grassland	WS5 Recently-felled woodland
Greenway	Alternative Route
Proposed NRA Cycleroute	Requested Section of Additional Cycleroute from NRA

INVASIVE SPECIES — GW

FRESHWATER PEARL MUSSEL (FWPM) LOCATIONS
DS - DOWNSTREAM
PR - PRESENT
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AQUATIC ECOLOGY POINTS — AEP

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Sheet 15 of 15

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Table 4.1 Habitats found in the Study Area of the Proposed Greenway.

Habitat Type	Reference Code	Potential Links to qualifying interest Annex I Habitats or Annex II Species in Study Area	Located within Study Area
Acid Oligotrophic Lakes	***FL2***	Habitats: 'Oligotrophic waters containing very few minerals of the sandy plains (3110)' Species: Otter, FWPM, Slender Naiad	Lough Bofin, Lough Shindilla, Oorid Lough, Glendollagh (Garroman) Lough, Athry Lough, Ballynahinch Lake.
Mesotrophic Lakes	***FL4***	Habitats:None Species: Otter, FWPM, Slender Naiad, Salmon	Lough Tawnagh (Park Lough), Lough Adrehid and Derryneen Lough
Eroding/Upland Rivers	***FW1***	Habitats:None Species: Otter, FWPM, Salmon	Bunowen River (a tributary of the Owenriff), Letterfore River, Owentooey River, and the Owenglinn River.
Depositing Lowland River	***FW2***	Habitats:None Species: Otter, FWPM, Slender Naiad, Salmon	Channel connecting Derryclare Lough to Glendollagh Lough.
Drainage Ditches	***FW4***	Habitats: None, Species: Otter	Throughout the study area.
Reed and Large Sedge Swamps	FS1	Habitats: None, Species: None	Derryvickrune
Improved Agricultural Grassland	GA1	Habitats: None, Species: None	Throughout the study area.
Amenity Grassland	GA2	Habitats: None, Species: None	Claremount
Dry Calcareous & Neutral Grassland	GS1	Habitats: None, Species: None	Knockcallíagh, Derryneen, Glengowla
Dry Meadows & Grassy Verges	GS2	Habitats: None, Species: None	Cloonoppeen, Derryeyglinna, Glengowla
Dry Humid Acid Grassland	GS3	Habitats: None, Species: None	Leam West, Derryeyglinna, Knockmoyle, Claremount, Claremount, Canrawer
Wet Grassland	***GS4***	Habitats: None Species: Marsh Fritillary	Derryneen, Knockmoyle, Canrawer
Marsh	***GM1***	Habitats: None Species: Marsh Fritillary	Aird Bhéarra, Derryeyglinna
Dry Siliceous Heath	***HH1***	Habitats: 'European Dry Heath (4030)' Species: None	Derryvickrune
Wet Heath	***HH3***	Habitats: 'Northern Atlantic wet heath with Erica tetralix (4010)' Species: Marsh Fritillary	Leam West, Derryeyglinna, Glengowla, Canrawer, Canrawer

Habitat Type	Reference Code	Potential Links to qualifying interest Annex I Habitats or Annex II Species in Study Area	Located within Study Area
Lowland Blanket Bog	***PB3***	Habitats: 'Blanket bogs (7130)', priority if active Species: Marsh Fritillary	Emlaghmore (Moyrus ph), Bunscanniff, Maam Cross, Shannakinlougha, Leam West, Knockmoyle, Claremount, Canrawer
Cutover Bog	***PB4***	Habitats: 'Depressions on peat substrates of the Rhyncosporion (7150)', Species: Marsh Fritillary	Derryvickrune, Athry, Emlaghmore (Moyrus ph), Maam Cross, Bunscanniff, Shannakinlougha, Claremount, Canrawer
Eroding Blanket Bog	***PB5***	Habitats: None Species: Marsh Fritillary	Recess
Rich Fen and Flush	***PF1***	Habitats: '*calcareous fens with Cladium mariscus and species of the Caricion davallianae (7210)'. Species: None	Maam Cross
Poor Fen and Flush	PF2	Habitats: None, Species: None	North shore of Lough Ateeann and Lough Mall
Oak-Birch-Holly Woodland	***WN1***	Habitats: 'Old sessile oak woods with Ilex and Blechnum in British Isles (91A0)'	Ballinafad, Lios Uachtair
Oak-Ash-Hazel Woodland	***WN2***	Habitats: None, Species: Potential habitat or migration routes for Bat	Athry, Canrawer
Wet Willow Alder Ash Woodland	***WN6***		Cloonoppeen, Knockbaun, Glengowla
Mixed Broadleaved Woodland	***WD2***		Derryvickrune
Mixed Broadleaved/Conifer Woodland	***WD2***		Cloon Beg
Conifer Plantation	***WD4***		Derryvickrune
Scrub	***WS1***		Derryvickrune, Derryvickrune, Maam Cross, Claremount
Hedgerows	***WL1***		Throughout the study area.
Treelines	***WL2***		Throughout the study area.
Stone Walls and Other Stone Work	***BL1***		Throughout the study area.
Buildings and Artificial Surfaces	***BL3***		Claremount
Exposed Siliceous Rock	ER1	Habitats: None, Species: None	Maam Cross, Derryeyglinna

4.2 CONSERVATION STATUS OF HABITATS FOUND WITHIN THE STUDY AREA

This section addresses the habitats and species of conservation interest, which may be affected by the proposed works. The conservation status of habitats found within the study area with links to Annex I habitats particularly those linked to the qualifying habitats of the Natura 2000 site are discussed individually in the following sections.

4.2.1 Aquatic Habitats

A total of forty seven watercourses are crossed by the proposed Greenway. These watercrossings were assessed in terms of habitat, aquatic ecology, Q-Rating, Annex II species including otter, salmon and evidence of bat species in bridge structures. A summary of the findings are provided in **Table 4.3**.

- **Acid Oligotrophic Lakes FL2**

The proposed Connemara Greenway Project runs adjacent to numerous lakes which have been classified as Acid Oligotrophic Lakes FL2, including Lough Bofin, Lough Shindilla, Oorid Lough, Glendollagh (Garroman) Lough, Athry Lough and Ballynahinch Lake with an example shown in **Image 4.1**.

These lakes are host to several species of conservation interest including Arctic Charr (*Salvelinus alpinus*) which represents an arctic-alpine element in the Irish fauna. In Ireland the Arctic Charr occurs only in a few cold, stony, oligotrophic lakes. Arctic Charr have been recorded in a number of lakes within the zone of influence of the greenway, including Ballynahinch Lake, Arderry Lake and Lough Shindilla (IFI and NPWS records). The species has also been reported from Lough Oorid and Lough Glendollagh in the past, but has not been recorded from these lakes in recent years. Lough Bofin also has Arctic Charr potential. Arctic Charr are listed in the Irish Red Data Book as being threatened in Ireland.

Several of the lakes in the area are part of catchments for Freshwater Pearl Mussel (*Margaritifera margaritifera*), including Lough Bofin, which is part of the Owenriff Catchment. There is also a record for this species from Ballynahinch Lake (NPWS records); however this was not confirmed during recent surveys for the species (Moorkens, 2010). The Freshwater Pearl Mussel is protected under Annex II of the EU Habitats Directive.

The NPWS Rare and Protected Species Database has records for two species of conservation importance at Oorid Lough, an acid oligotrophic lake in the study area, including Bog Hair-grass (*Deschampsia setacea*) and Marsh Clubmoss (*Lycopodiella inundata*). Slender Naiad (*Najas flexilis*), an EU Annex II species, has also been recorded from Lough Bofin.

Very little aquatic vegetation was noted at the lakes. White Water Lily (*Nymphaea alba*) was noted at several of the lakes, and many had fringing vegetation of reed and sedge swamp, with such species as Common Reed (*Phragmites australis*), Bulrush (*Schoenoplectus lacustris*) and Great Fen-sedge (*Cladium mariscus*). Some of the lakes, including Shindilla Lough, have wooded islands comprising Scot's Pine, Willow, Alder and Ash.

Acid Oligotrophic FL2 Waters are linked to the following Annex I habitats under the EU Habitats Directive: 'oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) (3110)' and 'oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* (3130)'. No examples of '3130' habitat have been listed as

qualifying interests of any of the Natura 2000 sites in proximity to the proposed Greenway. The oligotrophic lakes within the study area correspond to the former. This Annex I habitat is described below and is a qualifying interest of the four relevant cSACs through which or adjacent to which the Greenway is proposed. An extract from the 'Interpretation Manual of EU Habitats' is provided in **Appendix D** which details scientific definitions of this habitat, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations.

The interpretation manual of EU habitats describes this habitat as shallow oligotrophic waters with few minerals and base poor, with an aquatic to amphibious low perennial vegetation belonging to the *Littorelletalia uniflorae* order, on oligotrophic soils of lake and pond banks (sometimes on peaty soils). This vegetation consists of one or more zones, dominated by *Littorella*, *Lobelia dortmana* or *Isoetes*, although not all zones may not be found at a given site. It is noted that a number of characteristic plants from the same phytosociological order are also found in Habitat type 3130.

The Annex I habitat 'oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) (3110)' is a qualifying interest of all cSAC within the study area, and that the majority of lakes within proximity to the proposed Greenway correspond to this Annex I habitat.

Image 4.1 View from south of Lough Oorid an Acidic Oligotrophic Lake FL2

Table 4.2 Comparison of Acidic Oligotrophic Lake with Annex I Habitat

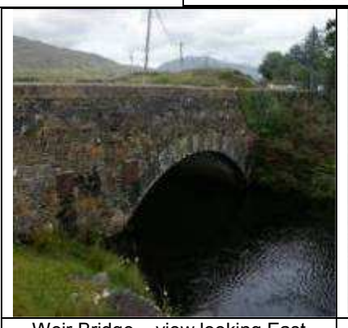
The Status of EU Protected Habitats and Species in Ireland (NPWS 2008) - Typical species
Typical species : *Isoetes lacustris*, *I. echinospora*, *Littorella uniflora*, *Lobelia dortmanna*, *Deschampsia setacea*, *Subularia aquatica*, *Juncus bulbosus*, *Pilularia globulifera*, *Luronium natans*, *Potamogeton polygonifolius*

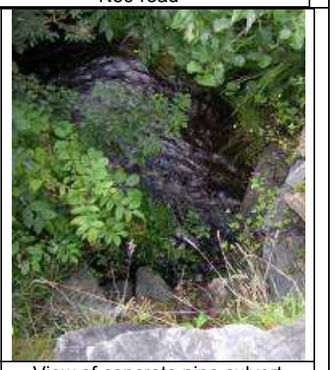
Table 4.3 Summary of the Ecological Features at Each of the Watercrossings

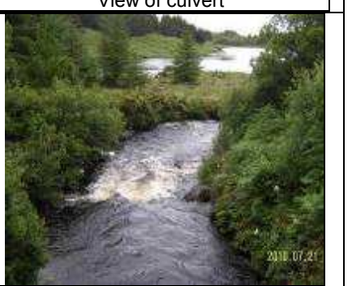
Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC00.0	Greenway commences just beyond Ardbear Old Bridge Chainage CH00	Owenglin River	Twelve Bens/Garraun Complex cSAC	N/A	Otter, Atlantic Salmon (A very sensitive receptor as all areas of the main channel comprise of potential angling water for salmon and sea trout. The entire stretch is also utilised to some degree as a salmonid spawning and nursery area)	Limited bat roost potential some crevices present. There is a record from Bat Conservation Ireland of a night hibernation roost at this bridge, one unidentified bat recorded.	Q4-Unpolluted Good Status	A diverse aquatic macroinvertebrate assemblage was recorded comprising 15 groups. The sensitive mayfly species *Ecdyonurus dispar* and *Rhithrogena semicolorata* along with the Class A stonefly larvae *Isoperla grammatica*. Habitats include improved agricultural grassland, wet grassland and Wet Willow Alder Ash Woodland. The invasive species Giant Rhubarb (*Gunnera tinctoria*), Japanese Knotweed (*Fallopia japonica*), Giant Hogweed (*Heracleum mantegazzianum*) and Himalayan Balsam (*Impatiens glandulifera*) were recorded on the banks of the River near this location. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View Upstream
WC01.0	Culvert **Chainage:** Ch2200	Tributary of Derryehorraun River Drains Lough Natawna	Connemara Bog Complex	N/A	not suitable fisheries habitat	No bat roost potential	The site was not suitable for Q monitoring as it lacked adequate riffle habitat.	Habitats on the banks of stream include cutover bog, eroding bog, and conifer woodland. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View downstream of road
WC02.0	Culvert **Chainage:** Ch2500	Tributary of Derryehorraun River Drains Lough Gowlanlanaglanna	Connemara Bog Complex	N/A	Otter, Atlantic Salmon	No bat roost potential	The site was not suitable for Q monitoring as it lacked adequate riffle habitat.	Habitats on the banks of stream include improved agricultural grassland, cutover bog, Reed and Large Sedge, and conifer woodland. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View downstream of road
WC03.0	Culvert **Chainage:** Ch4300	Tributary of Derryehorraun River	Connemara Bog Complex	N/A	Limited potential to support Annex II species.	No bat roosts potential	The site was not suitable for Q monitoring as it lacked adequate riffle habitat.	Habitats on the banks of stream include conifer woodland and cutover bog. The invasive species Rhubarb (*Gunnera tinctoria*) was found on the banks of the stream. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View East upstream of crossing

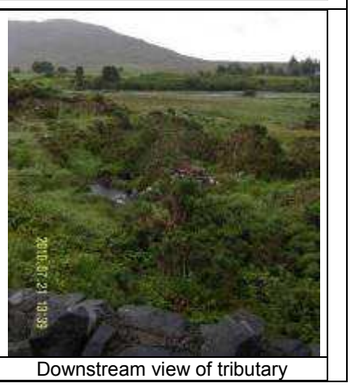
Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC04.0	Culvert **Chainage:** Ch4800	Tributary of Derryehorraun River, drains Lough Fadda	Connemara Bog Complex	N/A	Limited potential to support Annex II species.	No bat roosts potential	Q3-4 slightly polluted	Habitats on the banks of stream include conifer woodland and cutover bog. Private peat extraction activities have resulted in alternation of hydrology and there is currently no stream or river crossing anymore at this point. Site Evaluation: D Local Importance (Higher Value).	 View East upstream of crossing
WC05.0	Culvert **Chainage:** Ch5600	Tributary of Derryehorraun River, drains Croaght Lough and Lough Fadda	Connemara Bog Complex	Northern Atlantic wet heaths with Erica tetralix (4010)	Limited potential to support Annex II species.	No bat roosts found. No crevices	Dry, no flow under route.	Habitats on the banks of stream include Dry Humid Acid Grassland, Wet Heath, Cutover Bog and Conifer Woodland. Extensive peat cutting on both sides of route at this location. Substrate gravelly indicating drainage in the past. Local hydrology seems to have been altered. Site Evaluation: A International Importance	 Eastern elevation of bridge, facing WNW
WC06.0	Culvert **Chainage:** Ch6450	Tributary of Derryehorraun River, drains Knocknacalliagh Lough	Connemara Bog Complex	Blanket bogs (*if active bog) (7130)	Limited potential to support Annex II species.	No bat roosts potential	The site was not suitable for Q monitoring as it lacked adequate riffle habitat.	Habitats on the banks of stream include Lowland Blanket Bog downstream and cutover bog upstream, stream substrate peaty. Site Evaluation: A International Importance	 View of North side of Culvert  View of overgrown culvert
WC07.0	Culvert **Chainage:** Ch8420	Tributary of Derryehorraun River, drains Knocknafarderg Lough	Connemara Bog Complex	Blanket bogs (*if active bog) (7130)	Limited potential to support Annex II species.	No bat roosts found	Q4-5 Unpolluted High Status	Habitats on the banks of stream include Lowland Blanket Bog downstream and cutover bog upstream. No submerged macrophytes or macroalgae were noted. Substrate gravely. Site Evaluation: A International Importance	 View of south side of Culvert

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC08.0	Recess Cloonbeg Bridge **Chainage:** Ch11700	Owenmore River	Connemara Bog Complex	N/A	Otter, Atlantic Salmon	Potential bat roosts	Q4-5 Unpolluted High Status	Habitats on the banks of stream include mixed broadleaved woodland and conifer woodland. Good Salmonids, Brown Trout habitat. The Owenmore River is part of the Ballynahinch fishery and is one of the most prestigious fisheries in Ireland and is well known internationally. Site Evaluation: A International Importance	 View of Cloobeg River Bridge and view from bridge
WC09.0	Culvert Ch15150	Small tributary of Killeen Lough	Connemara Bog Complex cSAC	Northern Atlantic wet heaths with Erica tetralix (4010)	Limited potential to support Annex II species.	No bat roosts found	The site was not suitable for Q monitoring as it lacked adequate riffle habitat	Habitats on the banks of stream include Dry Calcareous & Neutral Grassland, Wet Heath and, Mixed Broadleaved/Conifer Woodland. Lough Nabrucka is part of the Ballynahinch fishery and is one of the most prestigious fisheries in Ireland. It iss a major salmonid fishery with Arctic Char, Sea Trout, Brown Trout and Salmon. Site Evaluation: A International Importance	 Small culvert under forestry track
WC10.0	Culvert **Chainage:** Ch16220	Small tributary of Lough Nabrucka (Ballynahinch Lake)	Connemara Bog Complex cSAC	Northern Atlantic wet heaths with Erica tetralix (4010) Blanket bogs (*if active bog) (7130) Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* (91E0).	Otter, limited potential to support Annex II species, not suitable fisheries habitat	No bat roosts found	The site was not suitable for Q monitoring as it lacked adequate riffle habitat	Habitats on the banks of stream include Wet Heath, Lowland Blanket Bog and Wet Pedunculate Oak Ash Woodland. Lough Nabrucka is part of the Ballynahinch fishery and is one of the most prestigious fisheries in Ireland and is well known internationally. Site Evaluation: A International Importance	 Small culvert
WC11.0	Culvert **Chainage:** Ch16620	Tributary between Athry Lough and Lough Nabrucka	Connemara Bog Complex cSAC	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) Blanket bogs (*if active bog) (7130)	Otter, Atlantic Salmon	No bat roosts found, cracks and crevices sealed	Q4-5 Unpolluted High Status	Habitats on the banks of stream include Exposed Siliceous Rock Lowland Blanket Bog, Cutover Bog and borders Athry Lough, an Acid Oligotrophic Lake. Lough Nabrucka is part of the Ballynahinch fishery and is one of the most prestigious fisheries in Ireland and is well known internationally. Site Evaluation: A International Importance	 View of dismantled railway bridge

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC12.0	Culvert **Chainage:** Ch17100	Small tributary between Lough Nabluckan and Athry Lake	Connemara Bog Complex cSAC	Blanket bogs (*if active bog) (7130)	Otter, limited potential to support Annex II species, not suitable fisheries habitat	No bat roosts found	The site was not suitable for Q monitoring as it lacked adequate riffle habitat	Habitats on the banks of stream include Wet Grassland and Lowland Blanket Bog. Athry Lough is part of the Ballynahinch fishery and is one of the most prestigious fisheries in Ireland and is well known internationally. Site Evaluation: A International Importance	 Small culvert under track
WC13.0	Culvert **Chainage:** Ch17530	Tributary at south western end of Derryclare not illustrated on OS map.	Connemara Bog Complex cSAC		Otter, limited potential to support Annex II species, not suitable fisheries habitat	No bat roosts found	The site was not suitable for Q monitoring as it lacked adequate riffle habitat	Habitats on the banks of stream include Bog Woodland, Wet Grassland and Cutover Bog. Derryclare Lough is part of the Ballynahinch fishery and is one of the most prestigious fisheries in Ireland and is well known internationally. Site Evaluation: A International Importance	 Iron pan visible on stream bed
WC14.0	Culverts Ch18500	Tributary of Derryclare Lough	Connemara Bog Complex cSAC	N/A	Otter, limited potential to support Annex II species, not suitable fisheries habitat	No bat roosts found	The site was not suitable for Q monitoring due to its small nature and lack of suitable habitat for Q sampling	Habitats on the banks of stream include Lowland Blanket Bog and Cutover Bog. Derryclare Lough is part of the Ballynahinch fishery and is one of the most prestigious fisheries in Ireland and is well known internationally. Site Evaluation: A International Importance	 View of Culvert
WC15.0	GC-N59-027.00 Weir Bridge **Chainage:** Ch20150	Recess River	Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon	No bat roost potential, no suitable bat access, crevices sealed	EPA Q4-Unpolluted Good Status (Unsuitable for Q monitoring due to safety reason)	Recess River is a major salmon fishery with extensive salmonid spawning and nursery grounds. Habitats on the banks of stream include wet grassland, cut over bog, lowland blanket bog (upstream) and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 Weir Bridge – view looking East  Weir Bridge – view South from Bridge to railway bridge

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC16.0	GC-N59-028.00 Recess Bridge **Chainage:** Ch22000	Tributary north of Glendollagh Lough	Connemara Bog Complex cSAC	N/A	Otter	No suitable bat access – heavily vegetated	The site was unsuitable for Q assessment due to the bedrock dominated substrate upstream and was obscured by vegetation downstream.	This stream is too small to be of any significance in terms of aquatic ecology and fisheries, but drains into a very important lake. Habitats on banks of stream include, Oak Ash Hazel Woodland, Wet Woodland and improved grasslands. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 Upstream view of stream – not bedrock falls  View of stone bridge downstream & N59 road
WC17	Culvert **Chainage:** Ch22250	Tributary at eastern end of Glendollagh Lough	Connemara Bog Complex cSAC	N/A	Limited potential to support Annex I species	N/A	The site was not suitable for Q monitoring due to its small nature and lack of suitable habitat for Q sampling.	This stream is too small to be of any significance in terms of aquatic ecology and fisheries, but drains into a very important lake. Habitats on banks of stream include, Oak Ash Hazel Woodland, Wet Woodland and improved grasslands. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View of stream downstream of the N59  View of concrete pipe culvert
WC18	Culvert **Chainage:** Ch22900	Tributary east of Recess near primary school, flows into Loughaun-doonan on the Recess River	Connemara Bog Complex cSAC	N/A	Limited potential to support Annex I species	No Bat roost potential, no suitable bat access	The site was not suitable for Q monitoring due to its small nature and lack of suitable habitat for Q sampling.	This stream is too small to be of any significance in terms of aquatic ecology and fisheries, but drains into a very important River. The Recess River is a major salmon fishery with extensive salmonid spawning and nursery grounds. Habitats on the banks of stream include wet grassland and wet willow alder ash woodland. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View of stream through undergrowth

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC19	GC-N59-029.00 Tullywee bridge **Chainage:** Ch24000	Owentooey River	Maumturk Mountains cSAC Connemara Bog Complex cSAC	Blanket bogs (*if active bog) (7130)	Otter, Atlantic Salmon, Freshwater Pearl Mussel (130m upstream and 300m downstream of bridge)	No suitable bat access – all crevices sealed. No bat roost found	Q4-5: Unpolluted High Status	Good habitat for Freshwater Pearl Mussel upstream and downstream of the road crossing. Good salmonid spawning and nursery area. Habitats on the banks of stream include wet grassland, lowland blanket bog (upstream), Wet Woodland, mixed deciduous/ conifer woodland and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View downstream  View upstream
WC20	Culvert **Chainage:** Ch24650	Tributary N of Lough Tawnagh at western end	Maumturk Mountains cSAC	N/A	Otter, Atlantic Salmon	No suitable bat access – all crevices sealed. No bat roost found	The site was unsuitable for Q assessment, as it lacked adequate riffle habitat	The small stream flows into Lough Tawnagh. Freshwater Pearl Mussel can be found in the out flowing stream of the Lough. The habitats on the bank of the stream comprise cutover bog. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View upstream  View of culvert
WC21	GC-N59-030.00 Derryneen Bridge **Chainage:** Ch2562	Caher River between Loughs Tawnagh and Derryneen	Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel (60m upstream and ~1km downstream of bridge)	No suitable bat access. No bat roost found	Q4-Unpolluted Good Status	Caher River is a major salmon and sea trout fishery with extensive salmonid spawning and nursery grounds. It is also a very important migratory corridor for Atlantic Salmon, Sea Trout and Eels accessing this headwater area of the Ballynahinch catchment. Habitats on the banks of stream include conifer plantation and scrub. No submerged macrophytes or macroalgae were noted Site Evaluation: A International Importance	 Upstream view from bridge  View downstream towards Lough Tawnagh
WC22.1	Old Derryneen Bridge **Chainage:** Ch26200	Sruffaun River	Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel 800m downstream of bridge	Some crevices on outside of bridge. No bat roost found. Potential for predation	Q4-Unpolluted Good Status	The Sruffaun River is a tributary of the Caher River is a major salmon and sea trout fishery with extensive salmonid spawning and nursery grounds. It is also a very important migratory corridor for Atlantic Salmon, Sea Trout and Eels accessing this headwater area of the Ballynahinch catchment. No submerged macrophytes or macroalgae were noted Site Evaluation: A International Importance	 Downstream view at bridge

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC22.2	GC-N59-030.00 Derryneen Bridge **Chainage:** Ch26600	Caher River between Loughs Tawnagh and Derryneen	Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel ~1km downstream of bridge	No suitable bat access. No bat roost found	Q4-Unpolluted Good Status	Tributary of Caher River is a major salmon and sea trout fishery with extensive salmonid spawning and nursery grounds. It is also a very important migratory corridor for Atlantic Salmon, Sea Trout and Eels accessing this headwater area of the Ballynahinch catchment. Habitats include conifer plantation and scrub. No submerged macrophytes or macroalgae were noted Site Evaluation: A International Importance	 Downstream view of bridge
WC23	GC-N59-031.00 Cloonopeen Bridge **Chainage:** Ch26900	Caher River	Maumturk Mountains cSAC Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel (10m upstream)	Unsuitable bat roosting habitat low bridge, prone to predation and flooding. No bat roost found	Q4-Unpolluted Good Status (Q rating undertaken 200m downstream of Freshwater Pearl Mussel habitat)	Caher River is a major salmon and sea trout fishery with extensive salmonid spawning and nursery grounds. This location site was suitable for Q assessment. It is noted that Freshwater Pearl Mussels are located near the bridge itself, therefore sampling was undertaken in an area approximately 200 meters downstream of the population as per good practice in order to avoid disturbance of the pearl mussel or its habitat. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 Upstream of bridge  Downstream of bridge
WC24	GC-N59-032.00/ GC-N59-033.00 **Chainage:** Ch28800	Tributary West of Lough Oorid	Maumturk Mountains cSAC Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel (500m downstream)	Unsuitable bat roosting habitat low bridges, prone to predation and flooding. No bat roost found	Q3 – Q4 Slightly Polluted. Moderate Status.	This stream drains into the main Loch Chluain Toipin inflow and Oorid Lough, part of the headwaters of this important salmonid catchment. Arctic Char may also be present. Habitats on the banks of stream include wet grassland, cutover bog, Wet Woodland and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 Upstream view  Downstream view
WC25	GC-N59-034.00 **Chainage:** Ch29300	Tributary West of Lough Oorid	Maumturk Mountains cSAC Connemara Bog Complex cSAC	Blanket bogs (*if active bog) (7130)	Otter, Atlantic Salmon, Freshwater Pearl Mussel (240m downstream)	Unsuitable bat roosting habitat low bridges, prone to predation and flooding. No bat roost found	The site was un-suitable for Q assessment it did not contain sufficient riffle habitat.	Oorid Lough is an internationally important salmonid catchment. Important as a Sea Trout fishery. Arctic Char may also be present. Habitats on the banks of stream include wet grassland, lowland blanket bog, cutover bog and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 Upstream view of tributary  Downstream view of tributary

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC26	Culvert **Chainage:** Ch30050	Tributary west of Bunskannive bridge, north of Lough Oorid	Maumturk Mountains cSAC Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel (500m downstream)	Unsuitable bat roosting habitat	The site was un-suitable for Q assessment as upstream did not contain sufficient riffle habitat and downstream was significantly influenced by Lough Oorid.	Oorid Lough is an internationally important salmonid catchment. Important as a Sea Trout fishery. Arctic Char may also be present. Habitats on the banks of stream include cutover bog and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 Upstream view  Downstream view
WC27	GC-N59-035.00 Bunskannive Bridge **Chainage:** Ch30950	Owenanookera River	Maumturk Mountains cSAC Connemara Bog Complex cSAC	Blanket bogs (*if active bog) (7130)	Otter, Atlantic Salmon Freshwater Pearl Mussel (100m downstream)	Bat Tubes present in N59 bridge, no bats found within tubes. No bat roost found in railway bridge.	Q4-Unpolluted Good Status	Oorid Lough is an internationally important salmonid catchment. Important as a Sea Trout fishery. Arctic Char may also be present. Habitats on the banks of stream include wet grassland, lowland blanket bog, cutover bog and scrub. In-stream vegetation comprised Macrophytes - Mosses <5%. Macroalgae/diatom biofilm - Filamentous green algae <5%. Site Evaluation: A International Importance	 View upstream  View downstream to railway masonry bridge and Lough Oorid
WC28	Culvert **Chainage:** Ch31800	Tributary of Shindilla	Maumturk Mountains cSAC	N/A	Otter Moderate Salmonids habitat	Limited bat use potential but some crevices present. No bat roost found.	Q4-5: Unpolluted High Status	Lough Shindilla is an important lake for Salmon, Brown/Sea Trout and Arctic Char which require passage under the crossing with the proposed greenway at this location. Habitats include cutover bog and scrub on the bank of the watercourse. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View of railway bridge
WC29	Culvert **Chainage:** Ch33200	Tributary of Shindilla	Maumturk Mountains cSAC	N/A	Otter Moderate Salmonids habitat	Unsuitable bat roosting habitat	Q2-3: Polluted	Lough Shindilla is an important lake for Salmon, Brown/Sea Trout and Arctic Char which require passage under the crossing with the proposed greenway development at this location. Habitats include cutover bog and scrub on the bank of the watercourse. In-stream vegetation comprised Macrophytes - Mosses <5%. Macroalgae/diatom biofilm - Filamentous green algae <5%. Site Evaluation: A International Importance	 View of old railway bridge

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC30	Culvert **Chainage:** Ch34500	Tributary of Shindilla	Maumturk Mountains cSAC	N/A	Limited potential to support Annex I species	Unsuitable bat roosting habitat	The site was un-suitable for Q assessment as upstream did not contain sufficient riffle habitat	Lough Shindilla is an important lake for Salmon, Brown/Sea Trout and Arctic Char which require passage under the crossing with the proposed greenway development at this location. Habitats include cutover bog and scrub on the bank of the watercourse. Site Evaluation: A International Importance	 View of culvert , scrub and lake
WC31	Culvert **Chainage:** Ch35700	Tributary of Loughanillaun	Maumturk Mountains cSAC	N/A	Limited potential to support Annex I species	Unsuitable bat roosting habitat	The site was un-suitable for Q assessment as upstream did not contain sufficient riffle habitat	Lough Loughanillaun is an important lake for Salmon and trout. Habitats include cutover bog on the bank of the watercourse. No submerged macrophytes or macroalgae were noted, very peaty substrate. Site Evaluation: D Local Importance (Higher Value).	 View of culvert and cutover bog to lake
WC32	Culvert **Chainage:** Ch37000	Tributary of Lurgan Lough	N/A	N/A	Limited potential to support Annex I species	Unsuitable bat roosting habitat	The site was unsuitable for Q assessment as upstream did not contain sufficient riffle habitat.	The small stream flows into Lurgan Lough which is stocked with Rainbow Trout with some wild brown trout. Lurgan Lough flows into Lough Ardderry which is an important salmon fishery and Arctic charr populations. Habitats include cutover bog on the bank of the watercourse. No submerged macrophytes or macroalgae were noted. Site Evaluation: D Local Importance (Higher Value).	 View of Lurgan Lough and small stream
WC33	Culvert **Chainage:** Ch38000	Trib of Loughnacrevy	N/A	N/A	Limited potential to support Annex I species	Unsuitable bat roosting habitat	The site was unsuitable for Q assessment as upstream did not contain sufficient riffle habitat.	The small stream flows into Lough Loughnacrevy. Habitats include cutover bog on the bank of the watercourse. No submerged macrophytes or macroalgae were noted. Site Evaluation: D Local Importance (Higher Value).	 View of culvert
WC34	Culvert **Chainage:** Ch38500	Tributary of Loughaunierin	N/A	N/A	Limited potential to support Annex I species	No evidence of bat roosting	The site was unsuitable for Q monitoring.	Stream is a tributary of Loughaunierin. This minor stream has little potential to support fish. Habitats include wet grassland, cutover bog and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: D Local Importance (Higher Value).	 View of Loughaunierin and bridge

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC35	Culvert **Chainage:** Ch39200	Owenwee River	Connemara Bog Complex cSAC	N/A	Limited potential to support Annex I species	Unsuitable bat roosting habitat	Q3 – 4 Slightly Polluted. Moderate Status.	The Owenwee River which runs along the north of the proposed Greenway route in this section. This is an important salmonid spawning and nursery area. All the main channels of the Owenriff River and its lakes are key ecological receptors in the study area. Habitats include cutover bog and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: B National Importance	 View upstream from side-road in the direction of Tullaghaboy House  View downstream standing on side-road to Tullaghaboy house
WC36	Glashanasmearany River Bridge **Chainage:** Ch40800	Glashanasmearany River	Connemara Bog Complex cSAC	Blanket bogs (*if active bog) (7130)	Otter, Atlantic Salmon, Freshwater Pearl Mussel (~2.5km downstream)	Limited bat use potential but some crevices present. No bat roost found.	Q3 – 4 Slightly Polluted. Moderate Status.	The Glashanasmearany River flows into Lough Bofin, which is an important salmonid lake with Arctic Char potential. The Glashanasmearany River Owenriff Freshwater Pearl Mussel catchment. All the main channels of the Owenriff River and its lakes are key ecological receptors in the study area. Habitats include lowland blanket bog, cutover bog and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: B National Importance	 View toward Lough Bofin  View of Bridge
WC37-41	Culverts **Chainage:** Ch41400 **Chainage:** Ch41500 **Chainage:** Ch41600 **Chainage:** Ch41800 **Chainage:** Ch41500 **Chainage:** Ch41600 **Chainage:** Ch42200 **Chainage:** Ch43300	Small Tributary flowing into the south of Lough Bofin	Connemara Bog Complex cSAC	N/A	Limited potential to support Otter, Atlantic Salmon, Pearl Mussel (~2.5-1.5km downstream)	Unsuitable bat roosting habitat	The site was unsuitable for Q monitoring.	These are minor tributaries of Lough Bofin, a salmonid lake with Arctic Charr potential. Lough Bofin is located within the Owenriff Freshwater Pearl Mussel catchment. Habitats include wet grassland, cutover bog and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View southwards to stream  View south towards Lough Bofin

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC42	Leam Railway Bridge **Chainage:** Ch44800	Owenriff River between Lough Adrehid and Lough Agraffard	Connemara Bog Complex cSAC	N/A	Otter, Atlantic Salmon, Pearl Mussel (~1km downstream)	Limited bat use potential but some crevices present. No bat roost found.	Q4- Unpolluted. Good Status.	All the main channels of the Owenriff River and its lakes are key ecological receptors in the study area. Freshwater pearl mussels can be found at the outlet of Lough Agraffard. The Owenriff is also an important salmon fishery. Habitats include wet grassland and scrub. No submerged macrophytes or macroalgae were noted. Site Evaluation: A International Importance	 View southwards
WC43	Culvert **Chainage:** Ch45600	Tributary North of Lough Agraffard	Connemara Bog Complex cSAC	N/A	Limited potential to support Annex I species, however Freshwater Pearl Mussel downstream	Unsuitable bat roosting habitat	The site was unsuitable for Q monitoring.	Lough Agraffard is located within the Owenriff Freshwater Pearl Mussel catchment. Habitats include wet grassland, cutover bog and scrub. Submerged vegetation including *Potamogeton* sp. Site Evaluation: A International Importance	 Small channel
WC44	Bridge **Chainage:** Ch46800	Owenriff River	Lough Corrib cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel (down-stream in Owenriff)	Unsuitable bat roosting habitat	Q4- Unpolluted. Good Status.	This site is located within the Owenriff Freshwater Pearl Mussel catchment which holds an internationally important population of the Freshwater Pearl Mussel. This River is a very important salmonid spawning and nursery area in the Owenriff catchment. Habitats include wet grassland and scrub. *Potamogeton* sp. observed submerged in the River. Site Evaluation: A International Importance	 Railway bridge dismantled, abutments remain

Crossing No.	Bridge No. NRA Ref. & Chainage	River	Designation	Annex I Habitat	Annex II Species	Bat Roosts	Q Rating	Notes & Site Evaluation	Photographs
WC46	Glengowla Bridge **Chainage:** Ch48400	Bunowen River (Tributary of the Owenriff River)	Lough Corrib cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel (down-stream in Owenriff)	No suitable bat access. No bat roost found.	Q4- Unpolluted. Good Status.	This site is located within the Owenriff Freshwater Pearl Mussel catchment. This River is a very important salmonid spawning and nursery area in the Owenriff catchment Habitats include wet grassland, cutover bog and scrub. In-stream vegetation comprised, Macroalgae/ diatom biofilm - Filamentous green algae <5% Site Evaluation: A International Importance	 Glengowla Bridge upstream view,  Glengowla Bridge downstream view
WC47	Oughterard River Bridge **Chainage:** Ch50200	Owenriff River East of Glengowla	Lough Corrib cSAC	N/A	Otter, Atlantic Salmon, Freshwater Pearl Mussel (down-stream in Owenriff)	No suitable bat access. No bat roost found.	Q4- Unpolluted. Good Status.	This site is located within the Owenriff Freshwater Pearl Mussel catchment. This River is a very important salmonid spawning and nursery area in the Owenriff catchment Habitats include wet grassland, cutover bog and scrub. Site Evaluation: A International Importance	 

4.2.2 Terrestrial Habitats

- **HH3 Wet Heath**

Areas of Wet Heath habitat are common throughout the study area, particularly on Cutover and Degraded Bog. An example of this habitat in the townland of Derryerglinna is shown in **Image 4.2**. Some extensive areas of this habitat type occur in the townland of Emlaghdauroe. This habitat type is dominated by Ling (*Calluna vulgaris*) and Cross-leaved Heath (*Erica tetralix*). Other common species are Purple Moor-grass (*Molinia caerulea*), Deergrass (*Trichophorum cespitosum*) and Crowberry (*Empetrum nigrum*). Areas of this habitat type were found in Leam West, Derryeyglinna, Glengowla and Canrawer.

The Wet Heath habitat found within the study area comprises botanical species and vegetation communities which correspond to the Annex I Habitat 'Northern Atlantic wet heath with Erica tetralix (4010)' as per the Interpretation Manual of European Union Habitats - EUR27. An extract from the 'Interpretation Manual of EU Habitats' is provided in **Appendix D** which details scientific definitions of this habitat, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations. This Annex I habitat is described below and is a qualifying interest of Maumturk Mountains cSAC and Connemara Bog Complex cSAC through which or adjacent to which the Greenway is proposed.

Image 4.2 Wet Heath HH3 habitat in the townland of Derryerglinna

Table 4.4 Comparison of Wet Heath with Annex I Habitat

Typical species for Wet Heath HH3 found within the Study Area	The Status of EU Protected Habitats and Species in Ireland (NPWS 2008) - Typical species
Species Recorded: *Molinia caerulea, Agrostis stolonifera, Anthoxanthum odoratum, Holcus lanatus, Juncus effusus, Calluna vulgaris, Potentilla erecta, Succisa pratensis, Erica tetralix, Eriophorum angustifolium, Carex panicea, Ranunculus flammula, Narthecium ossifragum, Drosera rotundifolia. Sphagnum subnitens, S. capillifolium, S. papillosum.*	**Typical species :** *Molinia caerulea, Trichophorum cespitosum, Calluna vulgaris, Erica tetralix, Narthecium ossifragum, Potentilla erecta, Carex panicea Eriophorum angustifolium, Sphagnum capillifolium, Hypnum cupressiforme, Cladonia portentosa, Sphagnum tenellum.*

The Annex I habitat 'Northern Atlantic wet heath with Erica tetralix (4010)' is a qualifying interest of Maumturk Mountains cSAC and Connemara Bog Complex cSAC through which, or adjacent to which, sections of the proposed Greenway route will pass. All Wet Heath (HH3) habitat as classified in Fossitt (2000) corresponds to the aforementioned Annex I habitat therefore all Wet Heath habitat identified in the study area corresponds to The Annex I habitat 'Northern Atlantic wet heath with Erica tetralix (4010)'.

- **HH1 Dry Siliceous Heath**

This habitat type occurs is numerous locations within the study area, often in areas with shallow peat on steep slopes. An example is shown in **Image 4.3**. This habitat type has also recolonised some areas of Cutover Bog. The dominant species are Ling (*Calluna vulgaris*), Bell Heather (*Erica cinerea*) and occasional low-growing Western Gorse (*Ulex gallii*). This habitat supports the botanical species and vegetation communities which correspond to the Annex I Habitat 'European Dry Heath (4030)' as per the Interpretation Manual of European Union Habitats - EUR27. An extract from the 'Interpretation Manual of EU Habitats' is provided in **Appendix D** which details scientific definitions of this habitat, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations. This Annex I habitat is described below and is a qualifying interest of Connemara Bog Complex cSAC through which and adjacent to which the Greenway is proposed.

Image 4.3 Example of Dry Siliceous Heath HH1 habitat with Western Gorse (*Ulex gallii*) at the side of the proposed Greenway Route

Table 4.5 Comparison of Dry Siliceous Heath with Annex I Habitat

Typical species for Dry Siliceous Heath HH1 found within the Study Area	The Status of EU Protected Habitats and Species in Ireland (NPWS 2008) - Typical species
Species Recorded: *Calluna vulgaris, Erica cinerea, Daboecia cantabrica, Molinia caerulea, Juncus effusus, Vaccinium myrtillus, Ulex gallii, Nardus stricta, Festuca spp,* and *Galium saxatile*.	**Typical species :** Dwarf shrubs species: *Calluna vulgaris, Vaccinium myrtillus, Ulex gallii, Erica cinerea, Empetrum nigrum, Arctostaphylos uva-ursi, Vaccinium vitis-idaea, and Daboecia cantabrica.* Grasses and sedges: *Agrostis spp., Deschampsia flexuosa, Nardus stricta, Festuca spp. and Carex binervis* Broad-leaved plants: *Galium saxatile, Potentilla erecta and Rumex acetosella, with additional species Scilla verna, Jasione montana, Armeria maritima and Plantago maritima in coastal areas and Helianthemum spp., Thymus spp., Galium verum, Anthyllis vulneraria, Antennaria dioica, Sanguisorba minor, and Carlina vulgaris in limestone heaths.*

All Dry Siliceous Heath (HH1), as classified by Fossitt (2000), corresponds to the Annex I habitat 'European Dry Heath (4030)' except for areas with scattered Juniper, which are classified as the Annex I habitat '*Juniperus communis* formations on heaths or calcareous grassland (5130)'. No *J. communis* was recorded in these dry heath habitat areas therefore all Dry Siliceous Heath (HH1) recorded in the study area is classified as 'European Dry Heath (4030)'. This Annex I habitat is a qualifying interest of Connemara Bog Complex cSAC. A typical species of an area of Dry Siliceous Heath which corresponds to the aforementioned Annex I habitat is provided in Table 4.5.

- **PB3 Lowland Blanket Bog**

Lowland Blanket Bog is widespread in Connemara. This habitat is a qualifying feature of Connemara Bog Complex cSAC, The Twelve Pins/Garraun Complex cSAC and the Maumturk Mountains Complex cSAC, all of which contain extensive areas of Lowland Blanket Bog.

Lowland Blanket Bog corresponds to the EU Habitats Directive Annex 1 'Blanket bogs (7130)' and Active Blanket bogs that are still capable of peat formation, which are considered a Priority Habitat. 'Active' bog is defined in the directive as still supporting a significant area of vegetation that is normally peat forming. To determine whether a bog is 'Active', the British Ecological Society Uplands Conference in 1997, agreed that the presence of bog mosses (*Sphagnum* spp.) is the most reliable indication that a bog is currently accumulating peat. Mosses lack roots, being adapted to source atmospheric and surface nutrients, so they are particularly susceptible to hydrological and chemical changes[4]. An extract from the 'Interpretation Manual of EU Habitats' is provided in **Appendix D** which details scientific definitions of this habitat, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations.

Lowland Blanket Bog has a characteristic 'grassy' appearance and an abundance of species typical to this habitat type, including Black Bog-rush (*Schoenus nigricans*), Purple Moor-grass (*Molinia caerulea*), Deergrass (*Trichophorum cespitosum*) and Cottongrasses (*Eriophorum* spp.). Heathers

[4] Burt-Smith, G. and O'Reilly, C. (2007) Building on Bog? Some Issues for Ecologists Evaluating Development Proposals Impacting on a European Protected Habitat. Entec UK

such as Ling (*Calluna vulgaris*) and Cross-leaved Heath (*Erica tetralix*) are frequent but are not as extensive as in Upland Blanket Bog PB2.

There are a number of areas of lowland blanket bog adjacent to the proposed Greenway, outlined in the townlands mentioned below with an example from the townland of Bunscanniff shown in **Image 4.4**.

All intact Lowland Blanket Bog (PB3), as classified by Fossitt (2000), corresponds to the Annex I habitat 'Blanket bogs (7130)', except for Lowland Blanket Bog (PB3) which is actively forming. Actively forming Lowland Blanket Bog (PB3) corresponds to a priority Annex I habitat.

Therefore all Lowland Blanket Bog (PB3) recorded in the study area was classified as the Annex I habitat 'Blanket bogs (7130)' except where there was abundant *Sphagnum* and this habitat was classified as active Lowland Blanket Bog (PB3) and thereby corresponding to the Annex I priority habitat '*Blanket bogs (7130)'. 'Blanket bogs (7130)' are a qualifying interest of Maumturk Mountains cSAC, The Twelve Bens/Garraun Complex cSAC and Connemara Bog Complex cSAC. A typical species for areas of blanket bog that correspond to both priority and non-priorty aforementioned Annex I habitat is provided in Table 4.6.

Image 4.4 Dismantled Railway Track running through degraded Lowland Blanket Bog in the townland of Bunscanniff

Table 4.6 Comparison of Lowland Blanket Bog with Annex I Habitat

Typical species for Lowland Blanket Bog PB3, found within the Study Area	The Status of EU Protected Habitats and Species in Ireland (NPWS 2008) - Typical species
Species Recorded : **Intact Blanket Bog** *Calluna vulgaris* *Erica tetralix* *Eriophorum spp.* *Molinia caerulea*	**Typical species :** Lowland Blanket Bog Vascular plants: *Schoenus nigricans, Molinia caerulea, Calluna vulgaris, Drosera anglica, D. intermedia, D. rotundifolia, Erica tetralix, Eriophorum angustifolium, E. vaginatum, Lobelia*

Rhynchospora alba *Schoenus nigricans* *Sphagnum spp.* *Trichophorum cespitosum* **Intact Active Blanket Bog** *Calluna vulgaris* *Drossera rotundifolia* *Erica tetralix* *Eriophorum spp.* *Molinia caerulea* *Myrica gale* *Narthecium ossifragum* *Phragmites australis* *Rhynchospora alba* *Schoenus nigricans* *Sphagnum spp.* *Trichophorum cespitosum* Main difference between priority and non-priority habitat is the abundance of Sphagnum. In priority habitat Sphagnum was abundant and in non-priority habitat Sphagnum was occasional or absent.	*dortmanna, Menyanthes trifoliata, Myrica gale, Narthecium ossifragum, Pedicularis sylvatica, Polygala serpyllifolia, Pinguicula vulgaris, Dactylorhiza maculata, Potentilla erecta, Rhynchospora alba, Trichophorum caespitosum, Potamogeton polygonifolius. Eleocharis multicaulis, Eriocaulon aquaticum.* Mucilaginous algae. Mosses, Liverworts and Lichens: *Campylopus atrovirens, Pleurozia purpurea, Sphagnum papillosum, S. capillifolium, S. auriculatum, S. cuspidatum, S. imbricatum, S. fuscum, S. magellanicum, S. subnitens, S. tenellum, S. pulchrum,* (Connemara), *Cladonia ciliata var tenuis, C. portentosa, C. uncialis* subsp. *biuncialis, Odontoschisma sphagnii, Racomitrium lanuginosum, Kurzia pauciflora, Hypnum jutlandicum.*

Image 4.5 Dismantled Railway Track running through degraded Lowland Blanket Bog in the townland of Bunscanniff

- **PB4 Cutover Bog**

The blanket bog in the area has been subject to extensive turbary cutting. Areas of active or abandoned cutover are classified as Cutover Bog (PB4). An example of Cutover Bog in the townland

of Claremount is shown in **Image 4.6**. In some areas the cutover has become recolonised with other vegetation types such as Acid Grassland GS3, Wet Grassland GS4, and Wet Heath HH3 vegetation. In areas where the successive habitat covers a large area and easily fits in to another habitat type, it is categorised as such. Where peat cutting has ceased and where the hydrological conditions are suitable some areas of Cutover Bog PB4 have recolonised with generally the same species as intact Lowland Blanket Bog PB3 but linear pool features and old peat banks gives this habitat type a greater diversity of species and micro-habitats.

There is often a greater abundance of *Sphagnum* mosses and White Beak-sedge (*Rhynchospora alba*) in the cut drains depressions. Oblong-leaved Sundew (*Drosera intermedia*) is also quite common in areas of cutover. Where this vegetation assemblage occurs, for example in the townland of Claremount, it corresponds to the Annex 1 habitat 'Depressions on peat substrates of the Rhyncosporion (7150)', **Image 4.6**. An extract from the 'Interpretation Manual of EU Habitats' is provided in **Appendix D** which details scientific definitions of this habitat, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations. This species assemblage within Cutover Bog PB4 indicates permanent saturation of the surface of the bog and is therefore sensitive to hydrological changes. This Annex I habitat is described below and is a qualifying interest of Maumturk Mountains cSAC and Connemara Bog Complex cSAC through which or adjacent to which the Greenway is proposed.

Slender Cottongrass (*Eriophorum gracile*) was found on an area of cutover bog on the shores of a small lake in Maam Cross. This plant is listed as 'Rare' in the Irish Red Data Book, and is afforded legal protection in Ireland under the Flora Protection Order, 1999. Cutover bog is widespread within the study area.

The Annex I habitat 'Depressions on peat substrates of the *Rhyncosporion* (7150)' is a qualifying interest of all cSAC sites through which, or adjacent to which, the proposed Greenway route will pass and can occur in all types of bog, therefore it is assumed that this habitat may occur within all bog habitats encountered within the study area including Cutover Bog (PB4). A typical species of an area of cutover bog which corresponds to the aforementioned Annex I habitat is provided in Table 4.7.

Table 4.7 Comparison of Cutover Bog with Annex I Habitat

Typical species for Cutover Bog PB4 found within the Study Area	The Status of EU Protected Habitats and Species in Ireland (NPWS 2008) - Typical species
Species Recorded : *Carex echinata* *Erica tetralix* *Menyanthes trifoliata* *Molinia caerulea* *Rhynchospora alba* *Schoenus nigricans* *Sphagnum spp.*	**Typical species:** Vascular plants: *Rhynchospora alba, R. fusca, Drosera intermedia, D. rotundifolia, Drosera anglica, Eriophorum angustifolium, Narthecium ossifragum.* Mosses, Liverworts and Lichens: *Sphagnum cuspidatum, S. auriculatum, S. magellanicum, S. papillosum, S. pulchrum* (local), *Lycopodium inundatum* (very rare).

Image 4.6 Area of Cutover bog in Claremount, with depression in between peat banks with *Sphagnum* 'lawns' and frequent White beak sedge, Sundew and Purple moor-grass.

- **PF1 Rich Fen and Flush**

There is one lake within the study area are under transition to Rich Fen and Flush PF1 habitat, see **Image 4.7**. It is situated approximately 130m west of Maam Cross south of the proposed greenway and north of the existing N59 road. The underlying bedrock at this location is the Lakes Marble Formation, which is a metamorphosed limestone, and contributes a calcareous influence. This site had dense stands of Great Fen Sedge (*Cladium mariscus*). Other common species were Common Reed (*Phragmites australis*), Bulrush (*Schoenoplectus lacustris*), Bogbean (*Menyanthes trifoliata*), White Water Lily (*Nymphaea alba*) and Pondweeds (*Potamogeton* spp.). This habitat type corresponds to the Annex I habitat 'Alkaline fens (7230)' and is one of the qualifying habitats of Connemara Bog Complex cSAC and Lough Corrib cSAC. An extract from the 'Interpretation Manual of EU Habitats' is provided in **Appendix D** which details scientific definitions of this habitat, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations. Where this habitat is found in Maam Cross, it is included in the Maumturk Mountains cSAC.

Slender Cottongrass (*Eriophorum gracile*) was recorded on the shores of the small lake in Maam Cross. This confirmed the NPWS Rare and Protected Species Database record for the species at this location.

Rich Fen and Flush PF1 habitat can correspond to two annexed habitats, 'alkaline fens (7230)' and '*calcareous fens with *Cladium mariscus* and species of the Caricion davallianae (7210)'. 'Alkaline fens (7230)' is a qualifying interest of Connemara Bog Complex cSAC and Lough Corrib cSAC. '*Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae (7120)' is a qualifying interest of Lough Corrib cSAC. This area of fen is very wet appearing to be in transition and containing stands of *Cladium mariscus* thus indicating that it corresponds to the 7210 Annex I habitat as outlined in Table 4.8 (although it is acknowledged that the species richness is low).

This area of Rich Fen and Flush PF1 found within the study area is located within Maumturk Mountains cSAC which is a Natura 2000 site that does not contain any Fen habitat as a qualifying interest. It is however an Annex I habitat.

Table 4.8 Comparison of Rich Fen and Flush with Annex I Habitat

Typical species for Rich Fen and Flush PF1 found within the Study Area	The Status of EU Protected Habitats and Species in Ireland (NPWS 2008) - Typical species Type 7210
Typical species : *Cladium mariscus* *Menyanthes trifoliata* *Nymphaea alba* *Phragmites australis* *Potamogeton sp.* *Schoenoplectus lacustris*	**Typical species :** Vascular plants: *Cladium mariscus, Schoenus nigricans, Eriophorum latifolium, Carex dioica, C. viridula ssp. brachyrrhyncha, C. pulicaris, C. viridula ssp. oedocarpa, Juncus subnodulosus, Eleocharis quinqueflora, Dactylorhiza traunsteineri, Selaginella selaginoides, Epipactis palustris, Parnassia palustris, Pinguicula vulgaris* Mosses, Liverworts and Lichens: *Scorpidium scorpioides, Campylium stellatum, Drepanocladus revolvens, Palustriella commutata, Ctenidium molluscum, Fissidens adianthoides, Bryum pseudotriquetrum*

Image 4.7 Mesotrophic Lake under transition to Rich Fen and Flush PF1 Habitat at Maam Cross

- **WN1 Oak-Birch-Holly Woodland**

Small examples of this woodland type can be found throughout the study area, mainly on the islands and shores of Killeen Lough, Ballinafad Lough, Recess and Killymongaun, see **Image 4.8**. This semi-natural woodland comprises native woodland dominated by Rowan (*Sorbus aucuparia*), Ash (*Fraxinus excelsior*), Alder (*Alnus glutinosa*), Birch (*Betula* sp.) and Oak (*Quercus petraea*). The field layer is rich in ferns, bryophytes, grasses and broad-leaved herbs. This habitat type corresponds to the Annex I habitat 'Old sessile oak woods with Ilex and Blechnum in British Isles (91A0)'. An extract from the 'Interpretation Manual of EU Habitats' is provided in **Appendix D** which details scientific definitions of this habitat, using pragmatic descriptive elements (e.g. characteristic plants) and taking into consideration regional variations. This habitat is a qualifying feature of Connemara Bog Complex cSAC, The Twelve Bens/Garraun Complex and Lough Corrib cSAC.

Oak-Birch-Holly Woodland WN1, as classified according to Fossitt (2000), can correspond to the Annex I habitat 'Old sessile oak woods with Ilex and Blechnum in British Isles (91A0)'. This habitat is a qualifying feature of Connemara Bog Complex cSAC, The Twelve Bens/Garraun Complex and Lough Corrib cSAC. Oak-Birch-Holly Woodland WN1 has recolonised some areas of the dismantled railway and it is dominated by Birch (Betula pubescens). A typical species list for Oak-Birch-Holly Woodland WN1 as outlined in Table 4.9 indicates that this habitat does not correspond to Annex I habitat 'Old sessile oak woods with Ilex and Blechnum in British Isles (91A0)'. Examples of the Annex I habitat was found within the study are but will not be impacted by the project.

Table 4.9 Comparison of Oak-Birch-Holly Woodland with Annex I Habitat

Typical species for Oak-Birch-Holly Woodland WN1 found within the Study Area	The Status of EU Protected Habitats and Species in Ireland (NPWS 2008) - Typical species
Typical species : Strip of woodland along old track. Woodland is dominated by *Betula pubescens,* with occasional *Salix sp., Fraxinus excelsior, Sorbus aucuparia* and *Quercus robur;* and an understory of occasional *Corylus avellana, Crataegus monogyna* and *Ilex aquifolium.* The ground flora comprises abundant *Poa trivialis,* frequent to locally abundant *Carex remota,* frequent *Pteridium aquilinum* and occasional *Dryopteris affinis, Sanicula europaea* and *Viola sp;* with bryophytes including *Kindbergia praelonga, Rhytidiadelphus triquestris* and *Plagiomnium undulatum.*	**Typical species :** Vascular plants: *Betula pubescens, Blechnum spicant, Dryopteris dilatata, Hedera helix, Ilex aquifolium, Lonicera periclymenum, Luzula sylvatica, Pteridium aquilinum, Quercus petraea, Rubus fruticosus, Sorbus aucuparia , Vaccinium myrtillus.* Bryophytes: *Calypogeia muellerana, Dicranum scoparium, Diplophyllum albicans, Hylocomium brevirostre, Hypnum andoi, Hypnum cupressiforme, Hypnum jutlandicum, Isothecium myosuroides, Kindbergia praelongum, Mnium hornum, Plagiothecium undulatum, Polytrichastrum formosum, Pseudotaxiphyllum elegans, Rhytidiadelphus loreus, Saccogyna viticulosa, Scapania gracilis, Thuidium tamariscinum.*

Image 4.8 Oak-Birch-Holly Woodland WN1 in the townland of Ballinafad

4.3 CONSERVATION STATUS OF PROTECTED OR VULNERABLE SPECIES WITHIN STUDY AREA

The Status of EU Protected Habitats and Species in Ireland is a report which was prepared by the NPWS in 2008 to establish the conservation status of protected habitats and species. Excerpts from this report are provided for each of the Annex II species mentioned in the site synopses for the Natura 2000 site in the study area.

The conservation status of a protected species may be taken as favourable when:

- Through monitoring, the population has been shown to be self-maintaining in the long term within its natural habitat,
- The natural range and habitat of the species is currently favourable, i.e. not in decline or in threat of decline, and
- Favourable habitat for the species is assessed as being available in terms of area, over the long-term.

4.3.1 Freshwater Pearl Mussel (*Margaritifera margaritifera*)

The Freshwater Pearl-mussel (*Margaritifera margaritifera*) is listed as a qualifying interest for Lough Corrib cSAC and the Twelve Bens/Garraun Complex cSAC. The species is listed on Annex II of the EU Habitats Directive and also protected under the 1976 Wildlife Act. Freshwater Pearl Mussels live in nutrient-poor, acid to neutral waters of rivers flowing over granite or sandstone rock (rivers with soft waters and low levels of calcium).

Several of the lakes in the area are part of catchments for Freshwater Pearl Mussel (*Margaritifera margaritifera*), including Lough Bofin, which is part of the Owenriff Catchment. There is also a record for this species from Ballynahinch Lake (NPWS records); however this was not confirmed during recent surveys for the species (Moorkens, 2010). The Owenriff River has a very large population of Freshwater Pearl Mussels which is considered to be one of the top populations of this species in the world. The Bunowen River, which is crossed by the proposed Connemara Greenway approximately 4km west of Oughterard and 70m north of Lough Ateeann, is upstream of a known population of Freshwater Pearl Mussel (*Margaritifera margaritifera*). The Owentooey River is also upstream of a Freshwater Pearl Mussel population.

From freshwater pearl mussel surveys carried out by Dr Evelyn Moorkens on 32 No. watercourses in the area, 6 No. were found to have pearl mussels present, and 11 No. were found to have pearl mussels downstream. There is therefore, very high potential for impacts on populations of this species as a result of the proposed development works. Impacts and mitigation measures are discussed in detail in **Section 6.3** and **7.2**. The report on the Freshwater Pearl Mussel survey carried out by Dr. Moorkens is included in full as **Appendix E.** The populations of this species within the study area are shown in **Figure 4.1 (Sheets 1-15).** A summary of the Freshwater Pearl Mussel locations within the study area is provided in **Table 4.3.**

The conservation status of *Margaritifera margaritifera* in Ireland is provided in *The Status of EU Protected Habitats and Species in Ireland* (NPWS 2008), a summary is provided in **Table 4.10**.

Table 4.10 Conservation Status of Freshwater Pearl Mussel (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008))

Parameter	Findings
Range	Good
Population	Bad
Habitat for the species	Bad
Future prospects	Bad
Overall assessment of CS	Bad

4.3.2 Atlantic Salmon (*Salmo salar)*

The Atlantic salmon is listed under Annexes II and V of the EU Habitats Directive and Appendix III of the Bern Convention. Atlantic Salmon is listed as a qualifying interest for Lough Corrib cSAC, Maumturk Mountains cSAC, Twelve Bens/Garraun Complex cSAC and Connemara Bog Complex cSAC. The salmon population in Ireland has declined by 75% in recent decades, with salmon now occurring in 148 rivers but only 43 of these rivers have healthy populations.

Atlantic Salmon (*Salmo salar*), a species listed on Annex II of the EU Habitat Directive, is known to occur within Derryneen Lough and the Owenglin River. All areas of the main channel of the Owenglin River within the study area comprise of potential angling water for Atlantic Salmon and Sea Trout. The entire stretch is also all utilised to some degree as a salmonid spawning and nursery area.

Potential salmonid habitat was identified as part of aquatic habitat surveys carried out by RPS at all locations where the proposed Greenway is to cross a watercourse. There were a total of 23 watercrossings where potential salmonid habitat was identified. However although there were watercrossings where salmonid habitat was not identified they may serve as a potential conduit for pollutants to other water bodies where Atlantic Salmon may be present. There is therefore, very high potential for impacts on populations of this species as a result of the proposed development works. Impacts and mitigation measures are discussed in detail in **Section 6.3** and **7.2**. A summary of suitable salmonid habitat locations within the study area is provided in **Table 4.3.**

The conservation status of *Salmo salar* in Ireland is provided in *The Status of EU Protected Habitats and Species in Ireland* (NPWS 2008), a summary of which is provided in **Table 4.11**.

Table 4.11 Conservation Status of Atlantic Salmon (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008))

Parameter	Findings
Range	Favourable
Population	Bad
Habitat for the species	Inadequate
Future prospects	Inadequate
Overall assessment of CS	Bad

4.3.3 Otter (*Lutra lutra*)

Otter are listed on Annex II and Annex IV of the EU Habitats Directive and also on the Wildlife Act (1976, amendment 2000). Annex II species require the designation of protected areas by Member States (Special Areas of Conservation) as set out in Articles 3, 4 and 6 of the Directive. Annex IV

species require strict protection measures by Member States in accordance with Article 12 of the Directive, the Eurasian Otter is also listed on Appendix 1 of CITES and Appendix II of the Bern Convention. The Irish population is also listed in the '*Irish Red Data Book 2: Vertebrates*' (Whilde, 1993) as being of international importance.

Otters are largely solitary, territorial and nocturnal animals and in many areas their distribution is scarce. They are rarely found far from water and tend to occupy linear home ranges along watercourses and coasts. They require suitable bankside vegetation as cover for their burrows or rest sites which are termed 'holts'. Otters mark their home ranges by depositing their droppings termed 'spraints', at distinct landmarks such as grassy mounds, large rocks or ledges under bridges. These favoured sites are known as seats and are usually found at important locations i.e. access points to the water, good fishing grounds etc.

This species is listed as a qualifying interest of Lough Corrib cSAC, Twelve Bens/Garraun Complex cSAC and Connemara Bog Complex cSAC and the NPWS online database contains several records for otters within the 10km grid squares L65, L75, L74, L84, M04 and M14, including records from Arderry Lough, the Owenglin River, the Owenriff River, and Cloonbeg Bridge and the Bridge downstream of the Owentooey confluence in Recess.

Although there are no seasonal requirements for otter surveying, dense vegetation in areas along the riverbanks may reduce success in the identification of otter holts and couches. However, due care was taken to thoroughly investigate all areas to ensure that this seasonal constraint did not impact on the completeness of the findings of the surveys.

During the multidisciplinary surveys during the spring/summer months otter signs were actively searched for in areas of potential importance i.e. in proximity to watercourses. Signs were recorded on the banks of rivers and streams during terrestrial habitat surveys. Holts and signs were searched for in the banks of all watercourses, watercourse banks and islands within the watercourses during terrestrial and aquatic surveys. Signs of otter activity were noted at many of the watercourses in the study area during the site surveys. Any point where the proposed Greenway crosses a watercourse and which may provide potential otter habitat is provided in the **Table 4.3**

The conservation status of *Lutra lutra* in Ireland is provided in **Table 4.12**.

Table 4.12 Conservation Status of Otter (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Favourable
Population	Inadequate
Habitat for the species	Favourable
Future prospects	Favourable
Overall assessment of CS	Inadequate

4.3.4 Slender Naiad (*Najas flexilis*)

Slender Naiad is included on Annex II of the EU Habitats Directive, and is listed as a qualifying interest for Lough Corrib cSAC, Maumturk Mountains cSAC and Connemara Bog Complex cSAC. This species is a submerged aquatic herb which occurs in lakes of acid to slightly base-rich water. The species was recorded in Grid Squares L75 and M04 during the 1987-1999 Flora Atlas Survey. The NPWS Rare and Protected Species database has a record for this species from Lough Bofin, which borders the study area. This species was not recorded during the botanical surveys for the project.

The conservation status of *Najas flexilis* in Ireland is provided in **Table 4.13**.

Table 4.13 Conservation Status of *Najas flexilis* (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Good
Population	Poor
Habitat for the species	Poor
Future prospects	Good
Overall assessment of CS	Poor

4.3.5 Sea Lamprey (*Petromyzon marinus*)

Sea lamprey is listed as one of the qualifying interests of Lough Corrib cSAC. They live as external parasites on other fish species. There is, currently, no firm evidence that Sea Lamprey, *Petromyzon marinus,* is present in Lough Corrib and its tributaries. Sea lampreys seem to be confined to below the Galway Regulating Weir and whilst there are historical records of sea lampreys in some of the tributaries of Lough Corrib, these pre-date the construction of the existing weir (O'Connor, 2007). The current distribution map for Sea Lamprey does not include any of the Grid squares within which the proposed Greenway will traverse (NPWS, 2008). The conservation status of *Petromyzon marinus* in Ireland is provided in **Table 4.14**.

Table 4.14 Conservation Status of Petromyzon marinus (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Poor
Population	Poor
Habitat for the species	Poor
Future prospects	Poor
Overall assessment of CS	Poor

4.3.6 Brook Lamprey *(Lampetra planeri)*

Brook Lamprey is listed as one of the qualifying interests of Lough Corrib cSAC. It is listed on Annex II of the EU Habitats Directive. The brook lamprey is the smallest of the three lampreys native to Ireland, at 15 to 20cm, and it is the only one of the three which is non-parasitic and spends all its life in freshwater.

There are no records from the NPWS website of Brook Lamprey within the relevant 10km grid squares

The current distribution map for Sea Lamprey does not include any of the Grid squares within which the proposed Greenway will traverse (NPWS, 2008). The conservation status of *Lampetra planeri* in Ireland is provided in **Table 4.15**.

Table 4.15 Conservation Status of *Lampetra planeri* (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Good
Population	Good
Habitat for the species	Good
Future prospects	Good
Overall assessment of CS	Good

4.3.7 Lesser Horseshoe Bat (*Rhinolophus hipposideros)*

The Lesser Horseshoe Bat is listed as a qualifying interest of Lough Corrib cSAC. This species is confined to the western counties of Ireland. The Irish population of this species is estimated at 9,500 individuals and is considered of International Importance, as its numbers have declined dramatically and the species has become extinct in many other parts of Europe. The Lesser Horseshoe Bat usually forages in woodland and scrub and it roosts mainly in roofs of old houses or in stables, outhouses, or old cottages. In winter this species hibernates in places that maintain a constant low temperature throughout the winter, such as caves, mines, disused cellars and souterrains.

The Gatehouse and Ice House in Ross Demesne, located 9km southeast of the proposed development, supports an internationally important breeding colony of Lesser Horseshoe Bats. The bats forage predominantly in deciduous woodland and riparian vegetation within c. 3km of the maternity roost (Bontadina et al. 2002, and Biggane, 2003). They rely on linear landscape features such as treelines, stonewalls and hedgerows to navigate and commute from roosts to feeding sites as unlike other bat species they do not fly out in the open. The Lesser Horseshoe bat was not observed but it is known to occur at the east of the route near Oughterard where the habitat is more favourable for the species. The distribution range of this species is restricted to the west of Ireland and it is only known from Counties Mayo, Galway, Clare, Limerick, Kerry and Cork (Kelleher, 2004). The species is difficult to detect because of its highly directional and weak echolocation so its presence may go unnoticed.

No signs of this species were noted in the study area, and there are no suitable roosting/hibernation sites in the vicinity of the proposed works. The nearest recorded roost locations are detailed in **Table 4.16**. A bat survey has recently been carried out in close proximity to the proposed route the report of which is attached in **Appendix F**.

Table 4.16 Known Bat Roosts in the Area and Distance from Proposed Works

Bat species	Roost description	Roost category	Numbers	Distance
Lesser horseshoe	Gatehouse, Ross	Maternity	49	9km southeast
Lesser horseshoe	Ice house, Ross	Hibernation	30	9km southeast
Lesser horseshoe	House, Knockbane	Satellite/ Maternity	10	6km east
Lesser horseshoe	House, Oughterard	Maternity	32	3km east
Lesser horseshoe	Cave/mine, Moycullen	Night/ Hibernation	1	10km southeast

The conservation status of *Rhinolophus hipposideros* in Ireland is provided in **Table 4.17**.

Table 4.17 Conservation Status of *Rhinolophus hipposideros* (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Good
Population	Good
Habitat for the species	Good
Future prospects	Good
Overall assessment of CS	Good

4.3.8 White-clawed Crayfish (*Austropotamobius pallipes)*

White-clawed Crayfish is listed as a qualifying interest of Lough Corrib cSAC. In Ireland, this species most commonly occurs in small and medium-sized lakes, large rivers, streams and sometimes in

drains. The species prefers relatively cool temperatures and adequate dissolved oxygen and lime, although it is capable of tolerating significant fluctuations in these parameters. Juveniles live among gravel, submerged tree-roots or aquatic plants, while larger crayfish must have stones to hide under, or earthen banks in which to burrow. Females carrying eggs require undisturbed shelter over a prolonged winter-spring period.

The National Biodiversity Data Centre (NBDC) holds the Irish National Crayfish Database which consists of Central Fisheries Board (now IFI), EPA and Reynolds datasets for White-clawed Crayfish. NBDC online maps[5] show there are no reported records found for crayfish in close downstream proximity to the proposed Greenway.

Given the lack of suitable aquatic habitat, i.e. waters rich in lime, their presence is highly unlikely.

The conservation status of *Austropotamobius pallipes* in Ireland is provided in **Table 4.18**.

Table 4.18 Conservation Status of *Austropotamobius pallipes* (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Poor
Population	Poor
Habitat for the species	Poor
Future prospects	Poor
Overall assessment of CS	Poor

4.3.9 Shining Sickle Moss (*Drepanocladus vernicosus*)

Shining Sickle Moss (*Drepanocladus vernicosus*), an Annex II species and one of the qualifying species of the Lough Corrib cSAC, is also protected under the Flora Protection Order (1999). The Lough Corrib cSAC complex contains only one known location for this species, confined to small flushes within areas of lowland blanket bog, habitat which is not located within the study area. There is a historical record from Maam Cross, Bunscanniff, recorded in 1987. The site was re-visited recently, but the bogs in the area have deteriorated due to overstocking and suitable habitat no longer remains. Therefore, this species will not be impacted by the proposed works. The conservation status of *Drepanocladus vernicosus* in Ireland is provided in **Table 4.19**.

Table 4.19 Conservation Status of *Drepanocladus vernicosus* (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Favourable
Population	Favourable
Habitat for the species	Favourable
Future prospects	Favourable
Overall assessment of CS	Favourable

[5] http://maps.biodiversityireland.ie/#/SpeciesGroup/44/Species/17487?FullDictionary=false&UseCommonNames=false

4.3.10 Marsh Fritillary (*Euphydryas aurinia*)

Marsh Fritillary (*Euphydryas aurinia*) is the only species which is afforded legal protection, as part of Annex II of the EU Habitats Directive and is listed as one of the qualifying interests of Connemara Bog Complex cSAC. There is a record of 2-9 individuals of Marsh Fritillary from M14 from a 2000-2009 survey as detailed on the Butterfly Ireland website. The NPWS have no records in the area although there has been a recent sighting of this species from a location near Maam Cross (NPWS pers. comm.). This species, whose food plant is Devil's Bit Scabious (*Succisa pratensis*), has become endangered due to the destruction of its boggy habitat. No evidence of Marsh Fritillary was found during surveys.

The conservation status of *Euphydryas aurinia* in Ireland is provided in **Table 4.20**.

Table 4.20 Conservation Status of *Euphydryas aurinia* (from The Status of EU Protected Habitats and Species in Ireland (NPWS 2008)

Parameter	Findings
Range	Favourable
Population	Unfavourable-Bad
Habitat for the species	Unfavourable-Bad
Future prospects	Unfavourable-Bad
Overall assessment of CS	Unfavourable-Bad

5 IN-COMBINATION EFFECTS

5.1 POTENTIAL IN-COMBINATION EFFECTS

As part of the Natura Impact Statement, other relevant projects and plans in the region must also be considered at this stage, together with the proposed Greenway. This step aims to identify any possible significant in-combination or cumulative effects/impacts of the proposed development with other such plans and projects on any of the Natura 2000 sites. Plans and Projects specific to the Natura 2000 sites are discussed. The potential 'In-Combination Effects' of other plans and projects are described in **Table 5.1.**

Table 5.1 Potential In-Combination Effects of Other Plans and Projects

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO LOUGH CORRIB cSAC	Impact on the qualifying interests of Lough Corrib cSAC
	LAND USE AND SPATIAL PLANS	
Galway County Development Plan 2009-2015	**Policy HL31:** It is the policy of the Council to implement Article 6(3) of the EU Habitats Directive, and to subject any plan (including County Development Plan, Local Area Plans) or project likely to impact Natura 2000 or European Sites (cSACs, SPAs), whether directly (in situ), indirectly (ex-situ) or in combination with other plans or projects, to an Appropriate Assessment in order to inform decision making. A plan or project may only be authorised after the competent authority has made certain, based on scientific knowledge, that it will not adversely affect the integrity of the site; in the case of derogations, authorisation must be pursued under Article 6(4). **Policy HL32:** It shall be the policy of Galway County Council to ensure that development in Galway and the provision of services take into account the relevant Management Plans (if any) for cSACs and SPAs in the county. **Policy HL33:** Have regard to any impacts developments may have on or near existing and proposed, Natural Heritage Areas, Special Protection Areas and Special Areas of Conservation, Nature Reserves, Ramsar Sites, Wildfowl Sanctuaries, Connemara National Park and any other designated sites including any future designations. **Policy HL34:** Consult the Department of the Environment, Heritage and Local Government in relation to proposed developments adjoining designated conservation sites. **Policy HL35:** Protect and conserve habitats and species designated under the Habitats Directive, Birds Directive, Wildlife Act, Flora Protection Order, National Nature Reserves, Connemara National Park, Ramsar Sites and any other Directives, Acts or Policies which may be issued during the lifetime of this Plan. **Designated Sites, Habitats and Species Objectives** **ObjectiveHL22:** Promote the conservation of biodiversity outside of designated areas, while allowing for appropriate development, access and recreational activity. **Objective HL23:** It is an objective of the Council to conduct a study to see if any areas would be suitable for designation as Local Nature Reserves. **Objective HL24:** It is an objective to provide protection to all natural heritage sites designated or proposed for designation in accordance with National and European legislation. This includes Special Areas of Conservation, Special Protection Areas, Natural Heritage Areas, Statutory Nature Reserves and Ramsar sites. **Natural Heritage and Biodiversity Policies** **Policy HL36:** Promote education, knowledge and pride in the natural heritage of the County. **Policy HL37:** Facilitate the identification and protection of the main elements of the ecological network in the County and provide for its appropriate and sustainable use. **Policy HL38:** Seek to maintain and enhance, as far as it is practical and prudent, the natural heritage and amenity of the County by seeking to encourage the preservation and retention of woodlands, hedgerows, stonewalls and wetlands. Where their removal or interference with same cannot be avoided, appropriate measures to replace like with like should be considered, subject to considerations of safety and practicality. **Policy HL41:** Support national agencies, local and community groups in protection, conservation and enhancement of the landscape and wildlife habitats **Policy HL43:** The Local Authority shall seek comply with the Habitats Directive and Natura 2000 recommendations, including the protection of fisheries habitats. **Policy HL44:** The local authority shall seek to protect fisheries habitats, in particular those listed in the Annexes of the Habitats Directive and specifically for the Freshwater Pearl Mussel and the White Clawed Crayfish. The avoidance of development in areas where flood risk has been identified shall be the primary response of the Planning Authority. Development proposals which include proposals for mitigation and management of flood risk will only be considered where avoidance is not possible and where development can be clearly justified with the Guidelines Justification Test. **Policy HL45:** No projects giving rise to significant adverse direct, indirect or secondary impacts on Natura 2000 sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Plan (either individually or in combination with other plans or projects **Policy HL46:** All subsequent plan-making and adoption of plans under the control of Galway County Council arising from this plan will be screened for the need to undertake Appropriate Assessment under Article 6 of the Habitats Directive. **Policy HL47:** Galway County Council will set up procedures to ensure that any plan, project, etc would take cognisance of the existing impacts on Natura 2000 sites and assess the cumulative and "in combination" effects that said plans and projects may have on any Natura 2000 site and to ensure compliance with the requirements of Article 6 of the Habitats Directive. **Policy HL48:** No ecological networks or parts thereof which provide significant connectivity between areas of local biodiversity are to be lost without remediation as a result of implementation of the County Development Plan. **Policy HL49:** Galway County Council shall protect wetlands, and associated surface and groundwater systems within the Plan area. **Policy HL50:** Galway County Council shall ensure that, in the supply of services and in zoning of lands and authorisation of development, the threatened habitats and species* which occur within and adjoining the Plan area are not placed under further risk of deterioration (habitats) or reduction in population size (species). *As identified in the National Parks and Wildlife "The Status of EU Protected Habitats and Species in Ireland", (NPWS, Department of the Environment, Heritage and Local Government, 2008). Galway County Council shall ensure that plan formulation and development control shall take into account the relevant "Major Pressures reported in the assessment of Habitats and Species" and the "Main Objectives Over The Coming Five Years and Beyond" contained in the above publication. **Natural Heritage and Biodiversity Objectives** **Objective HL25:** Prepare an inventory of the geological geo-morphological heritage sites in County Galway and protect them from inappropriate development. **Objective HL26:** No ecological networks or parts thereof which provide significant connectivity between areas of local biodiversity are to be lost as a result of implementation of the County Development Plan without appropriate and reasonable remediation and/or compensatory measures. **Objective HL27:** The Council will avail of opportunities that may arise to create or promote new features of biodiversity in the context of new developments.	Positive Impact Positive Impact Positive Impact Positive Impact

PLANS AND PROJECTS	KEY POLICIES/ISSUES/OBJECTIVES DIRECTLY RELATED TO LOUGH CORRIB cSAC	Impact on the qualifying interests of Lough Corrib cSAC
	LAND USE AND SPATIAL PLANS	
	Coastal Zone and Inland Waterways Policies **Policy HL54:** Seek to have protected rivers, streams and other watercourses and, wherever possible, maintain them in an open state capable of providing suitable habitat for fauna and flora. **Policy HL55:** Seek to have protected and to enhance the natural heritage and landscape character of river and stream corridors (together with immediate floodplains and valleys of streams and smaller rivers) to maintain them free from inappropriate development, and to provide for public access where feasible and appropriate. **Policy HL56:** Seek to have protected and conserve their quality character and features by controlling developments close to navigable and non-navigable waterways. **Policy HL57:** Seek to have protected and seek to provide access to inland waterways. **Policy HL64:** Support the implementation of appropriate measures to manage surface water drainage and prevent/minimise flooding impacts on natural systems, human settlements and infrastructural elements. **Designated Sites, Habitats and Species Policies** **Natural Water Systems Policies** **Policy HL71:** Implement water protection measures to prevent any deterioration of "good status" waters, and to restore substandard waters to "good status". **Policy HL72:** Adopt and implement the provisions of the Western River Basin Management Plan and Shannon International River Basin Management Plan. Have regard to recommendations that may result from the applicable River Basin Management Plan. **Policy HL73:** Introduce a comprehensive and integrated approach to the management of our natural water resources. **Policy HL74:** Intensify public awareness of water quality issues and the measures required to protect natural water bodies. **Policy HL75:** Ensure that substandard public wastewater treatment plans are upgraded. In the interim prevent an increase in the nutrient load discharged from these plants and the urgent provision of modern sewerage treatment systems in those towns and villages that have insufficient capacity to meet current demands, do not meet modern standards or currently represent a pollution risk to local water courses. **Policy HL76:** Ensure that industrial facilities and commercial premises discharging wastewater are operating within the parameters of an IPPC licence or a wastewater discharge licence. **Policy HL77:** Ensure that all dwellings outside town sewerage systems have an appropriate wastewater treatment system, correctly installed and maintained. **Policy HL78:** Ensure that agricultural waste is returned to the land in accordance with the provisions of scientifically prepared nutrient management plans. **Policy HL79:** Ensure that all new treatment systems, including single house systems, comply with the relevant EPA wastewater manuals. **Policy HL80:** Protect and maintain the quality of bathing waters and bring back to good status any substandard bathing waters. **Policy HL81:** The Local Authority will investigate other "quality mark" schemes for beaches and work to achieve such awards such as the Green Coast award which will increase the number of recognised beaches with a high standard of environmental quality and tourism potential. **Policy HL82:** Support the relevant agencies and statutory bodies in the control and elimination of invasive species in water bodies. **Policy HL83:** Ensure that all new development which is reliant on private waste water treatment and disposal systems is assessed with regard to the impact on ground waters, having regard to the relevant EPA wastewater treatment manuals. **Policy HL84:** Adopt the Galway Groundwater Protection Scheme and have regard to the need to protect water sources through the identification of source protection zones in the scheme. **Policy HL85:** Have regard to the programme of measures set out in the Western River Basin Management Plan and Shannon International River Basin Management Plan to bring water up to a good standard, as defined in the EU Water Framework Directive, by 2015. **Policy HL86:** Ensure that the ongoing development of Towns and their Environs are undertaken in such a way so as not to compromise the quality of surface water (and associated habitats and species) and groundwater within the zone of influence of the Development Plan or Local Area Plan area. **Policy HL87:** The Planning Authority shall consider the use of temporary proprietary effluent treatment units to service new developments as an interim measure until such time as the planned infrastructural investment as set out in the Water Services Investment programme is delivered and commissioned. **Policy HL88:** Galway County Council shall address the significant water management issues identified in the Water Matters Consultation publications for the relevant RBDs. **Policy HL89:** When published, the relevant policies and objectives of the Western and Shannon River Basin Management Plans and associated Programmes of Measures shall be integrated into the Plan through amendment or otherwise. **Policy HL90:** Galway County Council shall ensure that the ongoing development of Towns and their Environs are undertaken in such a way so as not to compromise the quality of surface water (and associated habitats and species) and groundwater within the zone of influence of the Development Plan area. **Policy HL91:** Land uses shall not give rise to the pollution of ground or surface waters during the construction or operation of developments. This shall be achieved through the adherence to best practice in the design, installation and management of systems for the interception, collection and appropriate disposal or treatment of all surface waters and effluents. **Invasive Species Policies** **Policy HL92:** The local authority will have regard to best practice with respect to minimising the spread of invasive species in the carrying out of its own development in the county and shall encourage private developers to have regard to same. **Policy HL93:** It is a policy of the Council to support measures for the prevention and eradication of invasive species. This will include the dissemination of information to raise public awareness, consultation with relevant stakeholders, the promotion of the use of native species in amenity planting and landscaping and the recording of invasive/native species as the need arises and resources permit. **Invasive Species Objectives** **Objective HL43:** Support initiatives that reduce the risks of invasions, by non-native species, help control and manage new and established invasive species, monitor impacts, raise public awareness, improve legislations and address international obligations.	Positive Impact Positive Impact

CONSERVATION AND MANAGEMENT PLANS		
NPWS Conservation Management Plans	Conservation Management Plans have not been prepared yet by the NPWS for any of the relevant Natura 2000 sites.	No Impact
Western River Basin Management Plan 2009-2015	The Western River Basin Management Plan, issued in July 2010, sets out a number of objectives and measures for all water bodies in the Western River Basin. The following applies to the proposed Greenway where it is hydrologically connected to any of the relevant Natura 2000 sites: **Objectives**: Ensure that the status of waters supporting protected areas is protected and (where necessary) improved by 2015. **Measures**: Implement 11 EU Directives. **The West Galway Water Management Unit (WMU) Action Plan**, which was prepared as part of the Western River Basin District Management Plan, contains information on water body status, objectives and measures for the WMU. **The Owenriff Freshwater Pearl Mussel Sub-basin Management Plan**: is a sub plan of the Western RBMP.	Positive Impact
POLLUTION REDUCTION PLANS		
- IPPC Programme	There are no IPPC Licence holders discharging to the **West Galway** Water Management Unit.	No Impact
- Other Point Sources	As the existing WWTP in Clifden has insufficient capacity to cater for the current and projected populations and the current level of treatment is inadequate, Galway County Council have proposed a two stage upgrade to the Clifden sewerage scheme. A Stage 1 WWTP, which will be designed for a population equivalent of 4,975 P.E., is currently proposed.	Positive Impact
	A Ground Water Protection Plan for the County in conjunction with the Geological Survey of Ireland has not yet been prepared.	Moderate Negative Impact
- Local Authority Discharge	There are 39 **Section 4** licensed facilities within **West Galway** WMU - Fish Factories, Industry, Factories, Holiday Homes, Golf Club, Laboratory, Caravan Parks, Abbey, Guest Houses, Fisheries, Hotels.	No Impact
- Shellfish Pollution Reduction Programmes	Based on the shellfish water quality requirements in Clifden Bay and hydrographic modelling, a Faecal Coliform (FC) limit of 10,000 No./100ml is also likely to be required in the final effluent released from the newly proposed Clifden WWTP.	Positive Impact
FOREST MANAGEMENT PLANS		
Indicative Forestry Statement	Department of Agriculture, Fisheries and Food, Dec 2008 - Sets out Environmental Protection and Consultation Process when Proposing Afforestation Schemes.	Positive Impact
Coillte Draft Strategic Plan 2011-2015 Connemara/Mayo (W3)	The long-term vision for the District is of forestry management at an intensity that is appropriate to the environmental sensitivity and productivity of its land resource. By adopting policies that ensure our efforts are concentrated on timber production in some areas and on habitat restoration in other areas we will maximise the benefits to the environment, local communities and the timber processing industry. This vision includes: 1. Forestry will be a vibrant industry in the area, integrated into the local economy, providing employment opportunities in the forest, the timber industry and in many down stream activities 2. Broadleaves will account for 25% of the gross area of the District 3. Natural and semi-natural habitats are protected and enhanced through appropriate management; 4. There is continuity of forest habitat for rare and threatened species; 5. Forest recreational sites will be a part of the tourism infrastructure and will be an important contributor to the tourism economy; 6. There will be a shared vision between the District and local communities on expectations from the forests and how they are managed.	Positive Impact
FISHERIES PLANS		
Inland Fisheries Ireland (IFI) Corporate Plan 2011-2015	Goals: To improve the protection and conservation of the resource. To develop and improve wild fish populations. To increase the number of anglers. To generate a better return for Ireland from the resource	Positive
ROAD SCHEMES		
N59 Clifden to Oughterard road (planning phase)	A 42.2km route has been chosen which is mainly online with the existing N59 with some offline sections where the alignment is particularly poor. It is intended to combine the proposed greenway with some of this realignment where land access is an issue on the scheme.	Potentially Negative Impact
N59 Clifden to Oughterard Road Bridge Refurbishment	Bridge rehabilitation works are underway on six bridges as advance works as part of the N59 Clifden to Oughterard proposed upgrading works and are advanced ahead of the main project. There are potential in-combination effects with this scheme.	Potentially Negative Impact
Galway City Outer Bypass (GCOB)	The GCOB crosses the Lough Corrib cSAC on the southern side of Lough Corrib. This project is currently awaiting a preliminary court ruling by the Court of Justice of the European Union.	Potentially Negative Impact
N59 Moycullen Bypass	The N59 Moycullen Bypass Project is at pre-planning stage. The road cross-section for the proposed N59 Moycullen Bypass is Type 1 Single Carriageway. The total length of the N59 Mainline is 4.3km comprising 3.8km off-line and 0.5 km on-line tie-in to the existing N59. The proposed road crosses the Lough Kip River and runs adjacent to Ballyquirke Lough, both of which are designated un Lough	Potentially Negative Impact

	Corrib cSAC.	
LOCAL DEVELOPMENT		
Local Planning Applications	Galway County Council's Planning website was consulted to review planning applications granted or pending from 1st of January, 2010 to present (21/03/12) in townlands in the vicinity of the proposed works. **Glengowla West** 101798 Michael Joyce to construct an extension to the front of an existing dwelling house and raise part of the existing roofline to accommodate an attic conversion (gross floor space 131sqm) **Leam West** 111710 Michael Flood extension of duration to reconstruct and extend existing derelict/semi ruinous building as a dwelling house with a private wastewater treatment system, previous planning reference no. 07/3693(Gross floor area 147.4sqm) 111474 Kevin Joyce for a change of house plan from that previously granted under Planning Ref. No. 07/478 on revised site boundaries (gross floor space 429.5sqm) **Shannakeela** 101487Sinead Seoighe chun teach nua le dabhach searachas, bealach isteach nua agus garaiste (gross floor space 256sqm) **Lissoughter** 101501 T Curley chun coras searachais do teach conaithe a thogail **Athry** 10324 Ross Tobin for alterations and extensions (71.4smq) to existing dwellinghouse, a garage/shed (25.9sqm) and to replace existing septic tank with new private wastewater treatment system. 11339 Ross Tobin for garage/shed as constructed (gross floor space 43.6sqm) **Killymongaun** 11729 Claire Griffin for a dwelling house, garage and private wastewater treatment system (gross floor space house 245sqm garage 40sqm) 10917 Laura Griffin for a dwelling house, garage and private wastewater treatment system (gross floor space dwelling 225.7sqm garage 30.4sqm) **Ardbear** 101444 Michael King to construct a single storey extension to the side of existing dwelling along with new site entrance and new waste treatment plant and septic tank (gross floor space 110sqm) 11290 Grainne Hyland & Eugene Casey for the constuction of ground floor and first floor extensions to the rear, dormer extension to the front and rear, alterations to elevations, and all ancillary works, at existing detached dwelling house (gross floor space 74.6sqm) 10717 Tommy & Lee Flaherty for extension and alterations of existing house to include conversion of the existing garage into living space for the main house and associated site works (gross floor space 27sqm) 111292 Tommy & Lee Flaherty for alterations to existing house, conversion of the existing garage into living space and installation of on-site wastewater treatment system. (Gross Floor Space 27 sqm)	Potentially negative, particularly with regard to the eminence of septic tanks.

5.2 IN-COMBINATION IMPACTS WITH OTHER PLANS / PROJECTS

The Appropriate Assessment requires consideration of the proposal in combination with other plans or projects, which may give rise to cumulative impacts affecting the cSAC. Plans and projects in place or proposed for the study area are identified in **Section 5** and **Table 5.1**. A number of plans and projects may result in in-combination effects on the Natura 2000 sites in the study area.

5.2.1 Waste Water Treatment Plants

The **Oughterard Waste Water Treatment Plant** (WWTP) discharges to the Owenriff River which forms part of the Lough Corrib cSAC. The works has been in place since the early 1950's and was upgraded to its present state in 1978. Plans are in place to construct a new WWTP. A Report commissioned by Galway County Council on the status of the Owenriff River for the Freshwater Pearl Mussel, and implications for upgrading of the Oughterard Sewerage Scheme, was prepared by Dr Evelyn Moorkens in 2004. This report concluded that the main source of pollution into the Owenriff River was from diffuse sources such as that from and forestry and agriculture. The only direct point source discharge is from the WWTP effluent outfall pipe; there are no storm water overflows on the existing waste water collection system. The point of this discharge is downstream of recorded Freshwater Pearl Mussel populations. No Freshwater Pearl Mussels were found from the existing discharge point on the Owenriff River to its confluence with Lough Corrib.

Galway County Council has applied to the EPA for a discharge licence for **Oughterard** and **Moycullen WWTPs** to discharge to the Owenriff River which is within Lough Corrib cSAC and the Ballyquirke Canal which is upstream of Lough Corrib cSAC. If the WWTPs are operating within the conditions of the discharge licence then there will be no potential for cumulative impacts arising in combination with the current proposals which would be of significance in respect of impacts affecting the conservation objectives or integrity of the Lough Corrib cSAC.

No WWTPs are currently discharging to any of the other Natura 2000 sites in the study area.

5.2.2 Local Planning Applications

A search of the Galway County Council Planning website was conducted. Several applications were made to construct new dwelling houses, septic tanks, etc in the area. If the septic tanks are maintained and operating in accordance with EPA guidelines then there will be no potential for cumulative impacts arising in combination with the current proposals which would be of significance in respect of impacts affecting the conservation objectives or integrity of the Natura 2000 sites in the study area.

5.2.3 N59 Clifden to Oughterard Road Improvement Scheme

It is proposed to upgrade approximately 45km of the N59 road between Clifden and Oughterard in Co. Galway. These upgrading works involve widening and improvement of the existing road, for the most part, with some off-line sections.

The proposed bridge rehabilitation works are part of the overall Road Improvement Scheme planned for the N59 Clifden to Oughterard. Having regard to the road safety hazard posed by these bridges and to the probable time from for the proposed Road Project, it is proposed to advance the rehabilitation of these bridges ahead of the road project under Part 8 Planning of the Planning and Development Regulations, 2001.

5.2.4 Galway County Council Bridge Rehabilitation Works - Recess Area

Galway County Council (GCC) are proposing bridge rehabilitation works on the Derryvoreada and Tawnaghmore Bridges, both located on the Owentooey River, 4km and 2km north of the N59 respectively.

5.2.4.1 Tawnaghmore Bridge

Figure 5.1 Location Map of Tawnaghmore Birdge

Image 5.1 Tawnaghmore Bridge

Works to be carried out at Tawnaghmore Bridge will include the removal of the existing deteriorating concrete deck and abutments. Construct a new precast concrete portal culvert structure 5m wide on in situ concrete strip footings. Construct new steel parapets. Provide anti scour protection to abutments and piers. Line existing abutments and piers with a 75mm thick layer of shotcrete. The proposed rehabilitation of Tawnaghmore Bridge will not take place this year as rehabilitation is now scheduled for 2012.

5.2.4.2 Derryvoreada Bridge

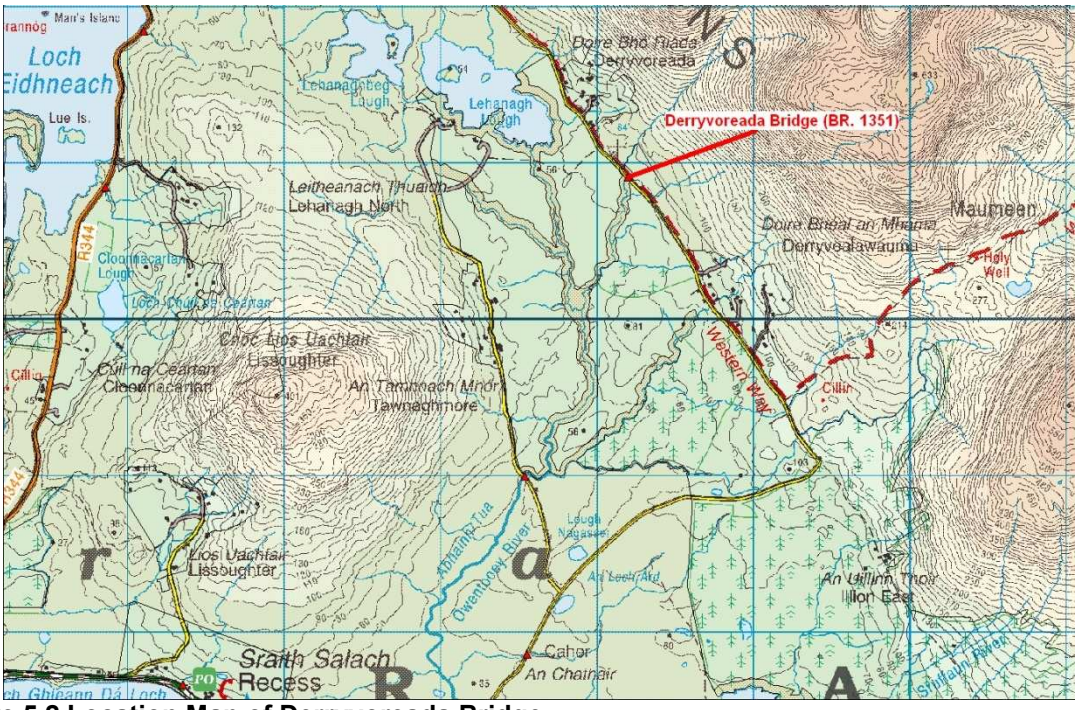


Figure 5.2 Location Map of Derryvoreada Bridge

Image 5.2 Derryvoreada Bridge

Works to be carried out at Derryvoreada Bridge include, Deck Replacement, Anti Scour protection and new parapets. The removal of any debris in the stream channel under and adjacent to the bridge structure and masonry repair works on the existing abutments. The proposed rehabilitation of Derryvoreada Bridge will be undertaken this year and the relevant ecological surveys are being carried out by GCC.

Freshwater Pearl Mussel was recorded in the Owentooey River 150m north of the N59 and in the Recess River downstream of the confluence of the Owentooey and Caher Rivers.

In this respect, there may be in-combination effects with the proposed works on the N59 bridges specifically the Derryneen Bridge GC-N59-030 and the Cloonoppeen Bridge GC-N59-031 which may impact on the Caher River in combination with the proposed bridges on the Owentooey River.

5.2.5 Conclusion of In-Combination Effects

It is considered that the scale of the works and implementation of effective mitigations to avoid impacts affecting the cSACs, there will be no potential for further cumulative impacts arising in combination with any other plans or proposals which would be of significance in respect of impacts affecting the conservation objectives or integrity of these Natura 2000 sites.

6 IMPACT ASSESSMENT

6.1 CHARACTERISING IMPACTS

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

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

6.2 INTEGRATION OF IMPACT CHARACTERISTICS

An informed integration, for each potentially significant impact, of each of these impact characteristics is necessary in order to underpin the determination of impact significance set out below. In each case, it is important to assess the likelihood that the change will occur as anticipated and that the impact on ecological structure and function will manifest as predicted. The following scale should be applied (adapted from IEEM 2006):

- Near-certain: >95% chance of occurring as predicted;
- Probable: 50-95% chance of occurring as predicted;
- Unlikely: 5-50% chance of occurring as predicted, or
- Extremely unlikely: <5% chance of occurring as predicted.

6.2.1 Assessment of Significance of Effect on Natura 2000 Sites

A likely change in conservation status should be used as a measure to determine whether an impact on a habitat or species is likely to be significant. As a guide, any element of a plan or project that has the potential to affect the conservation objectives of a Natura 2000 site, including its structure and function, should be considered significant (EC, 2006).

Examples of significance indicators from Commission guidance (EC, 2002) are listed in **Figure 6.1**.

Impact type	Significance indicator
Loss of habitat area	Percentage of loss
Fragmentation	Duration or permanence, level in relation to original extent
Disturbance	Duration or permanence, distance from site
Species population density	Timescale for replacement
Water resource	Relative change
Water quality	Relative change in key indicative chemicals and other elements

Figure 6.1 Examples of Significance Indicators (from EC (2002), Box 4)

For those species or habitats for which conservation objectives or targets have been set, then any impact which would inhibit the achievement of those targets would also be considered significant, at the geographic scale at which the target has been set.

Some examples of effects that are likely to be significant are:

- Any impact on an Annex I habitat,
- Causing reduction in the area of the habitat or Natura 2000 site,
- Causing direct or indirect damage to the physical quality of the environment (e.g. water quality and supply, soil compaction) in the Natura 2000 site,
- Causing serious or ongoing disturbance to species or habitats for which the Natura 2000 site is selected (e.g. increased noise, illumination and human activity),
- Causing direct or indirect damage to the size, characteristics or reproductive ability of populations on the Natura 2000 site, and
- Interfering with mitigation measures put in place for other plans or projects.

6.2.2 Meaning of 'Adversely affect the integrity of the site'

The concept of the 'integrity of the site' is explained in the EU publication Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, as follows;

'It is clear from the context and from the purpose of the directive that the 'integrity of the site' relates to the site's conservation objectives. For example, it is possible that a plan or project will adversely affect the integrity of a site only in a visual sense or only habitat types or species other than those listed in Annex I or Annex II. In such cases, the effects do not amount to an adverse effect for purposes of Article 6(3), provided that the coherence of the network is not affected. On the other hand, the expression 'integrity of the site' shows that focus is here on the specific site. Thus, it is not allowed to destroy a site

or part of it on the basis that the conservation status of the habitat types and species it hosts will anyway remain favourable within the European territory of the Member State.

As regards the connotation or meaning of 'integrity', this can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation. The 'integrity of the site' has been usefully defined as 'the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified' [6]

A site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required. When looking at the 'integrity of the site', it is therefore important to take into account a range of factors, including the possibility of effects manifesting themselves in the short, medium and long-term.'

The integrity of the site involves its ecological functions. The decision as to whether it is adversely affected should focus on and be limited to the site's conservation objectives.

6.2.3 Precautionary Principle

The precautionary principle is a principle of EU Environmental Policy and is mentioned now in Article 193 (2) of the Treaty on the functioning of the European Union[7] and has been interpreted by the European Court of Justice in the Waddenzee Judgement (Case C- 127/02) where there was scientific uncertainty about the effect on bird feeding and resting sites of a consent to mechanical cockle fishing in a Dutch SPA. The ECJ stated[8]:

'It is therefore apparent that the plan or project in question may be granted authorisation only on the condition that the competent national authorities are convinced that it will not adversely affect the integrity of the site concerned [...] So, where a doubt remains as to the absence of adverse effects on the integrity of the site linked to the plan or project being considered, the competent authority will have to refuse authorisation.'

6.3 IMPACTS TO THE QUALIFYING INTERESTS OF NATURA 2000 SITES

The qualifying interests of each relevant Natura 2000 site are the habitats and species for which the sites have been designated (as described in **Section 3**). When determining the impacts on the qualifying interests of these cSACs and the SPAs, the main threats and pressures on these habitats and species as detailed in **Section 3, Table 3.17, Table 3.18** and **Table 3.19**, are taken into account.

Impacts have been assessed according to the methodology outlined above. The study area of the proposed Greenway Project comprises a mosaic of terrestrial and aquatic habitats, including rivers, streams and drains, lowland bog, cutover bog, wet and dry heath, semi-natural grassland communities, marsh, woodlands, and improved agricultural grassland. Areas of lake, bog, wet and dry heath, alkaline fen and oak woodland have been identified which correspond to Annex I habitats.

[6] PPG 9, UK Department of the Environment, October 1994.
[7] OJ C 83/132, 30.3.2010.
[8] C-127/02, [2004] ECR I-7405.

In addition, Article 10 of the Habitats Directive refers to features of the landscape which are of major importance for wild flora and fauna, by virtue of their linear and continuous structures (such as rivers with their banks or the traditional systems for marking field boundaries), or their function as stepping stones (such as ponds or small woods). These features are essential for the migration, dispersal and genetic exchange of wild species. Member States are required to endeavour, where they consider it necessary, in their land use planning and development policies, to encourage the management of these features of the landscape, with a view to improving the ecological coherence of the Natura 2000 network.

The majority of the proposed works will be carried out along the existing disused rail route and therefore direct impacts on species diversity and loss of feeding habitat for local animal populations will be minimal. However, the Zone of Influence in ecological terms may extend beyond the works proposed, particularly where works are to be carried out in or adjacent to watercourses and in relation to water dependant habitats. The proposed project has the potential to pollute watercourses which may impact on Annex II species. The proposed project also has the potential to disrupt the hydrological regime of wetlands and peat bogs, such as drying out the peat which affects the vegetation composition, primarily the peat forming *Sphagnum* moss species. If soil conditions are not adequate this may lead to the eventual loss of vegetation cover, change in floristic habitat and even loss of floristic habitat.

A number of terrestrial non-native invasive species were recorded within the study area, including Japanese Knotweed, Giant Rhubarb and Rhododendron. These species are considered to be amongst the most unwanted invasive terrestrial species in Ireland and control of their spread during construction is required under the Birds and Habitats Regulations, 2011. Non-native invasive species are identified as threats to the Annex I habitats which are qualifying interests of all relevant Natura 2000 sites. General construction impacts are provided in **Table 6.1**.

Table 6.1 Key Construction Activities and Potential Ecological Impacts

Construction Activity	Potential Ecological Impacts
Vegetation and soil stripping	Loss of habitat; loss of rare or protected species; destruction of bird's nests, bat roosts, badger setts, otter holts, etc. containing live animals, spread of invasive and noxious weeds species. Loss of residential seed banks within the soil supporting semi-natural habitats. Loss of soil mycorrhizae, soil profile layers and structure. During periods of heavy rainfall silt laden surface waters from exposed soils can enter watercourses.
Other earthworks	Loss of habitat (e.g. Blanket Bog); potential pollution or loss of habitats/species as a result of deposition of materials. Drainage of habitats. Spread of invasive species. Disturbance of local hydrological regimes.
Blasting and other excavations causing high levels of noise and vibration	Disturbance of animals, especially significant during breeding season; destruction of Badger setts or Otter holts in the extended area due to the high level of vibration.
Construction of structures and hard surfaces	Loss of habitat; creation of an impermeable layer which will alter drainage patterns in the immediate vicinity and may lead to flooding.
Construction of barriers to wildlife movements such as berms, fences and median barriers	Impede access to or movement within wildlife territories.
Construction site drainage	Run-off of pollutants may have an indirect impact on habitats and species, especially those which are water-dependent.
Demolition operations	Loss of bat roosts or birds nests within buildings.
Air pollution and dust deposition	May have a negative effect on any habitats or species of conservation value in the area.
Work associated with site compounds and storage	Site compounds and storage areas used during construction operations may lead to loss of or damage to habitats outside the

Construction Activity	Potential Ecological Impacts
areas	land-take which may not have been accounted for within the Environmental Impact Assessment.
Temporary access routes and crossings	Access routes used during construction works may lead to loss of or damage to habitats inside and outside the land-take which may not have been accounted for within the Environmental Impact Assessment. The installation of undersized temporary crossings may cause flooding and impede fish passage.
Lighting	Lighting used during night working at the construction stage may cause disturbance to bats in the area. Lighting installed for the operation of the road scheme may permanently affect the bat population in the area.
Movement of plant and vehicles	May cause disturbance to wildlife through noise and vibration pollution, may destroy habitats or species of conservation value especially where plant machinery is utilised to traverse watercourses.
Disturbance associated with the presence of construction staff	A general increase in human activity in the area may cause disturbance to wildlife.
New planting	Poor choice of species or locations for planting as part of landscape design and execution of landscaping works, e.g. planting of non-native, foreign provenance and or/invasive species or planting of trees/shrubs etc in an environmentally sensitive area may lead to habitat damage or destruction.
Environmental incidents and accidents	A major environmental accident e.g. a large scale spillage of a contaminant such as diesel or cement which would have major negative and far-reaching impacts, especially on the aquatic environment.

6.3.1 Impacts During the Construction Phase

6.3.1.1 Watercourses

Many of the watercourses crossed by the proposed Greenway are either designated as part of the Natura 2000 sites in the area or are hydrologically linked to these Natura 2000 sites or may contain Annex species which are qualifying interests of the relevant Natura 2000 sites. Therefore any run-off or release of contaminants will have a direct effect on one or more these Natura 2000 sites or their qualifying interests.

The current threats to the water-dependent habitats within the Natura 2000 sites (as outlined in **Table 3.17**) include fertilisation, grazing, forestry, leisure fishing, hunting, human induced hydraulic changes, eutrophication, invasive species, burning, peat extraction, dispersed habitation, discharges, pollution, drainage, erosion, land reclamation and infilling of ditches, dykes, ponds, marshes and pits, .

Potential impacts from suspended sediment due to runoff of soil from construction areas can have severe negative impacts on invertebrate and plant life and on all life stages of fish. The common impacts on watercourses as a result of the construction activities include:

- Suspended sediment can settle on spawning areas, infill the intragravel voids and smother the eggs and alevins (newly hatched fish) in the gravel,

- Bed Load (coarse material transported along the bottom of the stream) and settled sediments can infill pools and riffles, reducing the availability and quality of rearing habitat for fish,

- Suspended sediment can reduce water clarity and visibility in the stream, impairing the ability of fish to find food items,

- Settled sediments can smother and displace aquatic organisms such as macroinvertebrates, reducing the amount of food items available to fish, and

- Increased levels of sediment can displace fish out of prime habitat into less suitable areas (Chilibeck *et al.* 1992). Suspended solids can abrade or clog the gills of salmonid fish. It takes a high concentration of solid wastes to clog a fish gill and cause asphyxiation, but only a little to cause abrasions and thus permit the possibility of infections (Solbe 1988).

The potential exists for a range of serious pollutants to enter watercourses during the construction phase, if appropriate pollution control measures are not implemented. For example, any of the following will have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses, as follows;

- Raw or uncured concrete and grouts,

- Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks,

- Fuels, lubricants and hydraulic fluids for equipment used on the development site,

- Bitumen and silanes used for waterproofing concrete surfaces, and

- Wastewater from on site toilet and wash facilities.

A number of migratory fish associated with the cSACs are sensitive to indirect effects such as turbidity, noise and vibration, habitat exclusion and changes in hydrodynamics in areas that they are required to pass from or to the sites with which they are associated. Barrier effects may also prevent them from reaching the rivers where they breed.

Increased runoff from the excavated site has the potential to change the water quality and trophic status of a waterbody.

6.3.1.2 Annex I Habitats

Qualifying Annex I habitats which have been identified, either through survey or desktop study, from the four relevant cSACs through which or adjacent to which the proposed Greenway will traverse are; Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae), Northern Atlantic wet heath with Erica tetralix, European Dry Heath, Blanket bogs (*if active bog), Old sessile oak woods with Ilex and Blechnum in British Isles, Alkaline fens, Depressions on peat substrates of the Rhynchosporion.

Potential impacts to the identified Annex I habitats for which the four relevant cSACs have been designated are discussed **Table 6.2** below.

Table 6.2 Potential Impacts to Annex I Habitats During Construction of the Greenway

Annex I Habitats	Construction Impacts
3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	The proposed Greenway runs adjacent to numerous lakes which have been classified as 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), including Lough Bofin, Lough Shindilla, Oorid Lough, Glendollagh (Garroman) Lough, Athry Lough and Ballynahinch Lake. The proposed Greenway will cross a number of watercourses which feed into these lakes. The main pressures or threats as outlined in **Table 3.17** considered relevant during construction of the Greenway are pollution and invasive species. Potential run-off of pollutants and introduction of invasive species to these waterbodies during the construction phase of the proposed Greenway may impact the water quality of these lakes and may subsequently have a negative effect on the lakes and their associated aquatic species, if pollution and invasive species control measures are not implemented.
4010 Northern Atlantic wet heath with *Erica tetralix*	Areas of this habitat type were found in the townlands of Leam West, Derryerglinna, Glengowla, Canrawer and Emlaghdauroe. There will be no direct impacts as a result of construction of the proposed Greenway on 4010 Northern Atlantic wet heath with *Erica tetralix* as it not proposed to directly remove any of this habitat. The main pressure or threat as outlined in **Table 3.17** considered relevant during construction of the Greenway is drainage. There may however be indirect effects through the alteration of the hydrological regime. A change in the hydrological regime could produce varying changes in the vegetation. Any increased water-level drawdown through opening up of surface drainage channels adjacent to this habitat may lead to a drying out of this habitat.
4030 European Dry Heath	This habitat type occurs is numerous locations within the study area, often in areas with shallow peat on steep slopes. There will be no direct impacts as a result of construction of the proposed Greenway on 4030 European Dry Heath as it not proposed to directly remove any of this habitat type. There may be indirect effects on this habitat due to the spread of invasive species during the construction phase of this project.
7130 Blanket bog (*if active bog)	Lowland Blanket Bog is widespread in Connemara and adjacent to the proposed Greenway for much of the route. There will be no direct impacts as a result of construction of the proposed Greenway on 7130 Blanket bog (either active or inactive), as it not proposed to directly remove any of this habitat. The main pressures or threats as outlined in **Table 3.17** considered relevant during construction of the Greenway are drainage and invasion by a species. There may however be indirect effects through the alteration of the hydrological regime. A change in the hydrological regime could produce varying changes in the vegetation. Any increased water-level drawdown through opening up of surface drainage channels adjacent to this habitat may lead to a drying out of this habitat. There may be indirect effects on this habitat due to the spread of invasive species during the construction phase of this project.
7150 Depressions on peat substrates of the Rhyncosporion	Cutover bog is widespread within the study area. There is often a greater abundance of *Sphagnum* mosses and White Beak-sedge (*Rhynchospora alba*) in the cut drains depressions within cutover bog and where this vegetation assemblage occurs, for example in the townland of Claremount, it corresponds to the Annex 1 habitat 7150 Depressions on peat substrates of the

Annex I Habitats	Construction Impacts
	Rhyncosporion. There will be no direct impacts as a result of construction of the proposed Greenway on 7150 Depressions on peat substrates of the Rhyncosporion, as it not proposed to directly remove any of this habitat. The main pressures or threats as outlined in Table **3.17** considered relevant during construction of the Greenway are drainage and invasion by a species. There may be indirect effects through the alteration of the hydrological regime. A change in the hydrological regime could produce varying changes in the vegetation. Any increased water-level drawdown through opening up of surface drainage channels adjacent to this habitat may lead to a drying out of this habitat. There may be indirect effects on this habitat due to the spread of invasive species during the construction phase of this project.
7230 Alkaline fens	There will be no direct impacts as a result of construction of the proposed Greenway on 7230 Alkaline fens, as it not proposed to directly remove any of this habitat. The main pressures or threats as outlined in **Table 3.17** considered relevant during construction of the Greenway are drainage and invasion by a species. There may be indirect effects through altered drainage of the hydrological regime. Drainage activities seriously disrupt the hydrological conditions needed to maintain these water dependent habitats, leading to desiccation of the fen and loss of the characteristic micro-topographical features and eventually change in flora and fauna, through the loss of fen character species and/or the invasion of species that thrive in drier conditions There may also be indirect effects on this habitat due to the spread of invasive species during the construction phase of this project.
91A0 Old sessile oak woods with Ilex and Blechnum in British Isles	There will be no direct impacts as a result of construction of the proposed Greenway on 91A0 Old sessile oak woods with Ilex and Blechnum in British Isles, as it not proposed to directly remove any of this habitat. The main pressures or threats as outlined in Table **3.17** considered relevant during construction of the Greenway are drainage and invasion by a species.

6.3.1.3 Annex II Species

The proposed Greenway is located within or adjacent to four cSACs. Potential impacts to those Annex II species which are qualifying interests of the four cSACs are discussed in **Table 6.3** below.

Table 6.3 Potential Impacts to Annex II Species during construction of the Greenway

Annex II Species	Construction Impacts
Freshwater Pearl Mussel (*Margaritifera margaritifera*)	The Freshwater Pearl-mussel (*Margaritifera margaritifera*) is a qualifying interest for Lough Corrib cSAC and the Twelve Bens/Garraun Complex cSAC. Specific locations of known Freshwater Pearl Mussel populations are outlined in **Table 4.3** above. The proposed Greenway crosses 47 no. watercourses, 16 of which are known to be upstream of Freshwater Pearl Mussel populations. If the construction of the proposed Greenway was to result in the release of silt or pollutants such as concrete or hydrocarbons into the pearl mussel population area of river, through the pathway of drainage ditches, smaller streams or rivers, there would be a '**Temporary** to **Permanent Significant Negative'** impact on the pearl mussel population. There is a near certain chance of this impact occurring. The worst case scenario would be a large scale spillage of a contaminant such as diesel or cement which would have an '**Indirect, Short-term Significant Negative**' impact on the aquatic environment of this species. There is a probable chance of this impact occurring.
Atlantic Salmon (*Salmo salar*)	Atlantic Salmon is listed as a qualifying interest for Lough Corrib cSAC, Maumturk Mountains cSAC, Twelve Bens/Garraun Complex cSAC and Connemara Bog Complex cSAC. Atlantic Salmon is known to occur within Derryneen Lough and the Owenglin River. The latter has been confirmed as a salmonid spawning and nursery area. Release of contaminants in the form of hydrocarbon contamination and siltation from upgrading works into these waterbodies either directly or via connecting watercourses or drains which would result in a **'Temporary Major Negative**' impact on this species. There is a near certain chance of these impacts occurring. The worst case scenario would be a large scale spillage of a contaminant such as diesel or cement which would have an '**Indirect, Short-term Significant Negative**' impact on the aquatic environment of the river and this species. There is a probable chance of these impacts occurring.
Otter (*Lutra lutra*)	Otter is listed as a qualifying interest of Lough Corrib cSAC, Twelve Bens/Garraun Complex cSAC and Connemara Bog Complex cSAC. No Otter holts were found within the land-take of the proposed scheme, and so there will be no direct impacts to this species – '**No impact**'. However, a release of contaminants to watercourses in the area would have an '**Indirect Temporary Significant Negative**' impact on this species, as it would reduce the quality of its foraging habitat. There is a probable chance of this impact occurring.
Slender Naiad (*Najas flexilis*)	Slender Naiad is listed as a qualifying interest for Lough Corrib cSAC, Maumturk Mountains cSAC and Connemara Bog Complex cSAC. This species is a submerged aquatic herb which occurs in lakes of acid to slightly base-rich water. There are records from Grid Squares L75 and M04 and specifically from Lough Bofin but this species was not identified during site surveys. Potential run-off of pollutants to the Clare River during the construction phase of the proposed flood relief works will likely not impact the Slender Naiad, given it's location above the confluence of the Clare River with Lough Corrib.
Sea Lamprey (*Petromyzon marinus*)	Sea Lamprey is one of the qualifying species of Lough Corrib cSAC. There is, currently, no firm evidence that Sea Lamprey, *Petromyzon marinus,* is present in Lough Corrib and its tributaries, including the Owenriff

Annex II Species	Construction Impacts
	River. Therefore it is unlikely that there would negative impacts on Sea Lamprey as a result of construction of the proposed Greenway.
Brook Lamprey (*Lampetra planeri*)	Brook Lamprey is one of the qualifying interests of Lough Corrib cSAC. There are no records for Brook Lamprey form any of the relevant grid squares and thus impacts to this species are considered highly unlikely.
Lesser Horseshoe Bat (*Rhinolophus hipposideros*)	The Lesser Horseshoe Bat is one of the qualifying interests of Lough Corrib cSAC. The Lesser Horseshoe bat was not observed but it is known to occur approximately 1km to the east of the route near Oughterard where the habitat is more favourable for the species. There will be minimal loss of woodland, hedgerows and tree lines along the route corridor of the proposed Greenway which are widely used by these animals. Large deciduous trees on or adjacent to the proposed Greenway may harbour bats occasionally, especially if ivy covered. Felling of these trees may result in loss of potential bat roosts and a '**Permanent Significant Negative**' impact. There is a near certain chance of these impacts occurring. Potential damage to or destruction of bat roosts during upgrading of the bridges within the study area may also result in a '**Permanent Significant Negative**' impact. Bridges throughout the Greenway route were deemed unsuitable as bat roosts. There is an extremely unlikely chance of these impacts occurring. Lighting during night-works may cause some temporary disruption of local bat populations' flight paths and lead to a '**Temporary Slight Negative**' impact.
White-clawed Crayfish (*Austropotamobius pallipes*)	White-clawed Crayfish is one of the qualifying interests of Lough Corrib cSAC. However it has not been recorded from the study area and habitat is not considered suitable along the route of the proposed Greenway thus impacts to this species are considered highly unlikely.
Shining Sickle Moss (*Drepanocladus vernicosus*)	Shining Sickle Moss is one of the qualifying species of the Lough Corrib cSAC. This species was not found within Lough Corrib cSAC during site surveys and the only record within the cSAC is 11km to the southeast of the Greenway therefore it is highly unlikely to be impacted by the proposed Greenway construction.
Marsh Fritillary (*Euphydryas aurinia*)	Marsh Fritillary is one of the qualifying species of Connemara Bog Complex cSAC. There will be no loss of Wet Grassland GS4 therefore there will be no loss of habitat for this species – '**No impact**'.

6.3.1.4 Annex I and Migratory Bird Species

The proposed Greenway is located within or adjacent to two SPAs. Potential impacts to those Annex I and migratory bird species which are qualifying interests of the four cSACs are discussed in **Table 6.4** below.

Table 6.4 Potential Impacts to Annex I and Migratory Bird Species Bird Species During Construction of the Greenway

Annex I and Migratory Bird Species	Construction Impacts
Common Scoter *(Melanitta nigra)*	All of these species are qualifying interests of Lough Corrib SPA. When considering potential impacts all the qualifying bird species for Lough Corrib SPA are assessed together. Given the scale of the construction works and that construction will be carried out linearly with one work crew it considered highly unlikely that any noise, vibration or air quality impacts will be sufficient to impact populations of these species.
Black-headed Gull *(Larus ridibundus)*	
Common Gull *(Larus canus)*	
Lesser Black-backed Gull *(Larus fuscus)*	
Widgeon *(Anas penelope)*	
Gadwall *(Anas strepera)*	
Teal *(Anas crecca)*	
Mallard (*Anas platyrhynchos)*	
Shoveler *(Anas clypeata)*	
Pochard *(Aythya ferina)*	
Tufted duck *(Aythya fuligula)*	
Goldeneye *(Bucephala clangula)*	
Coot *(Fulica atra)*	
Lapwing*(Vanellus vanellus)*	
Curlew *(Numenius arquata)*	
Cormorant *(Phalacrocorax carbo)*	
Merlin (*Falco columbarius*)	All of these species are qualifying interests of Connemara Bog Complex SPA. When considering potential impacts all the qualifying bird species for Connemara Bog Complex SPA are assessed together. Given the scale of the construction works and that construction will be carried out linearly with one work crew it considered highly unlikely that any noise, vibration or air quality impacts will be sufficient to impact populations of these species.
Golden Plover *(Pluvialis apricaria)*	
Greenland White-fronted Goose *(Anser albifrons flavirostris)*	
Cormorant *(Phalacrocorax carbo)*	
Common Gull (*Larus canus*)	

6.3.2 Impacts During the Operation Phase

6.3.2.1 Watercourses

The main potential impact on water quality and fisheries associated with the operational phase of the proposed Greenway would be the pollution caused by maintenance of surface drains associated with the Greenway and regular control of weeds along the route with herbicide spray. There is also potential for maintenance vehicles which are used along the Greenway causing water pollution through fuel or oil spills.

No further operational phase impacts are foreseen.

6.3.2.2 Habitats

Aquatic

- 3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

Operational impacts may include release to this habitat, of sediment through drain maintenance, of herbicide when weeds are being controlled on the route and of fuel or oil when maintenance vehicles use the route.

Terrestrial

- 4010 Northern Atlantic wet heath with Erica tetralix, 4030 European Dry Heath, 7130 Blanket bog (*if active bog), 7150 Depressions on peat substrates of the Rhyncosporion, 7230 Alkaline fens and 91A0 Old sessile oak woods with Ilex and Blechnum in British Isles.

Operational impacts may include alteration of hydrological regime and introduction of additional visitors to the area bringing increased numbers of people traversing these habitats.

6.3.2.3 Annex II Species

This project is considered to be of minimal impact in its operational phase. The proposed Greenway will be used by cyclists and walkers and therefore will not be used by motorised traffic. The Annex II species which are qualifying interests of all SACs combined and the potential operational impacts are outlined in **Table 6.5**.

Table 6.5 Potential Impacts to Annex II Species during operation of the Greenway

Annex II Species	Operation Impacts
Freshwater Pearl Mussel (*Margaritifera margaritifera*)	No operational impacts are expected for these Annex II species which are the combined qualifying interests of all Natura 2000 sites.
Atlantic Salmon (*Salmo salar*)	
Otter (*Lutra lutra*)	
Slender Naiad (*Najas flexilis*)	
Sea Lamprey (*Petromyzon marinus*)	
Brook Lamprey (*Lampetra planeri*)	
Lesser Horseshoe Bat (*Rhinolophus hipposideros*)	
White-clawed Crayfish (*Austropotamobius pallipes*)	
Shining Sickle Moss (*Drepanocladus vernicosus*)	
Marsh Fritillary (*Euphydryas aurinia*)	

6.3.2.4 Annex I and Migratory Bird Species

This project is considered to be of minimal impact in its operational phase. The proposed Greenway will be used by cyclists and walkers and therefore will not be used by motorised traffic. The Annex I bird species and migratory bird species which are qualifying interests of both SPAs and the potential operational impacts are outlined in **Table 6.6**.

Table 6.6 Potential Impacts to Annex I and Migratory Bird Species Bird Species during operation of the Greenway

Annex I and Migratory Bird Species	Operational Impacts
Common Scoter *(Melanitta nigra)*	All of these species are qualifying interests of Lough Corrib SPA. When considering potential impacts all the qualifying bird species for Lough Corrib SPA are assessed together. Given the scale and type of usage of the proposed Greenway it is considered highly unlikely that any noise, vibration or air quality impacts will be sufficient to impact populations of these species.
Black-headed Gull *(Larus ridibundus)*	
Common Gull *(Larus canus)*	
Lesser Black-backed Gull *(Larus fuscus)*	
Widgeon *(Anas penelope)*	
Gadwall *(Anas strepera)*	
Teal *(Anas crecca)*	
Mallard (*Anas platyrhynchos)*	
Shoveler *(Anas clypeata)*	
Pochard *(Aythya ferina)*	
Tufted duck *(Aythya fuligula)*	
Goldeneye *(Bucephala clangula)*	
Coot *(Fulica atra)*	
Lapwing*(Vanellus vanellus)*	
Curlew *(Numenius arquata)*	
Cormorant *(Phalacrocorax carbo)*	
Merlin (*Falco columbarius*)	All of these species are qualifying interests of Connemara Bog Complex SPA. When considering potential impacts all the qualifying bird species for Connemara Bog Complex SPA are assessed together. Given the scale and type of usage of the proposed Greenway it is considered highly unlikely that any noise, vibration or air quality impacts will be sufficient to impact populations of these species.
Golden Plover *(Pluvialis apricaria)*	
Greenland White-fronted Goose *(Anser albifrons flavirostris)*	
Cormorant *(Phalacrocorax carbo)*	
Common Gull (*Larus canus*)	

7 MITIGATION MEASURES

7.1 GENERAL

Mitigation measures are proposed in this section to address any potential adverse effect on the qualifying habitats and species all six relevant Natura 2000 sites through which or adjacent to which the proposed Greenway route will traverse. These measures will allow any potential impacts affecting the conservation status all relevant Natura 2000 sites to be avoided.

An over-arching mitigation measure will be for the Galway County Council to draw up a **Method Statement** that includes detailed mitigation measures as outlined below in relation to the implementation of all measures proposed. This method statement will be strictly adhered to by Galway County Council staff and contractors involved in the works and will be overseen by the Galway County Council's site representative/foreman. The NRA documents - '*Guidelines For The Crossing Of Watercourses During The Construction Of National Road Schemes'*, '*Guidelines for the Management of Noxious Weeds and Non- Native Invasive Plant Species on National Roads (Revision December 2010)*', '*Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, during and Post Construction of National Road Schemes*', and '*Environmental Impact Assessment of National Road Schemes, A Practical Guide*' and the CIRIA documents - will form the backbone of the method statement supplemented by specific additional measures proposed below. The method statement will detail how these mitigation measures will be monitored for effectiveness by both Galway County Council themselves and independently by NPWS and IFI. There will be ongoing consultation by Galway County Council with NPWS and IFI throughout all phases of the works which will include attendance at progress meetings at stages agreed in advance by Galway County Council and designated NPWS and IFI representatives. A mechanism for reporting of pollution incidents will be agreed in advance between the contractor(s) and NPWS IFI.

7.2 SPECIFIC MITIGATION MEASURES FOR ANNEX I HABITATS

The potential impacts to Annex I habitats of all six relevant Natura 2000 sites would be indirect effects, i.e. contamination via the release of water- or air-borne pollutants to the aquatic and atmospheric environment during construction activities. Mitigation measures for these possible indirect impacts are described in the section below.

In order to minimise indirect impacts on water dependent habitats drains which are opened up during construction will be either be lined and/or blocked. This will minimise drying effects on habitats adjacent to the Greenway such as bog, heath and fen. The installation of check dams, as outlined in **Table 7.1** below, along drainage ditches adjacent to the proposed Greenway will provide for a reduction in flow velocity within the drainage ditches. A reduction in flow velocity will help to minimise drying out effects of drainage ditches. These measures will have a 'probable' likelihood of success in protecting water dependent Annex I habitats adjacent to the proposed Greenway.

7.2.1 Mitigation Measures for the control of Airborne Pollutants during Construction Activities

To protect sensitive receptors in the vicinity of the proposed Greenway construction works the following measures are proposed. Measures to mitigate the emission of dust due to construction activities include;

i. control of vehicle access,

ii. vehicle speed restrictions,

iii. bed of gravel at site exit points to remove caked on dirt from tyres and tracks,

iv. washing of equipment at the end of each work day, if they are to be moved off site,

v. prevention of on-site burning,

vi. hard surface roads should be wet swept to remove any deposited materials,

vii. unsurfaced roads should be restricted to essential site traffic only, and

viii. wheel-washing facilities should be located at all exits from the construction site.

7.2.2 Mitigation Measures for the control of Waterborne Pollutants during Construction Activities

The proposed project has been identified as potentially giving rise to adverse effects on water quality within all Natura 2000 sites considered in this report. This has further potential for indirect impacts on the water-dependant Annex I habitats or Annex II species (salmon and otter) adjacent to, or downstream of, the works. The effective protection of water quality within the proposed project during construction and operation phases will minimise the risk to the qualifying interests of this site. Water quality mitigation measures for avoidance, reduction and remediation of impacts are prescribed below.

Standard pollution prevention control measures, as outlined in **Table 7.1** below, will be employed where relevant when working in and near the watercourse affected by the proposed works to prevent the transport of deleterious substances to any Natura 2000 sites and their associated water-dependent habitats and species. The method statement will detail how these mitigation measures will be monitored for effectiveness by both Galway County Council themselves and independently by NPWS (IFI). The NPWS or IFI will undertake a programme of water quality monitoring, for suspended solids and colour, as agreed with Galway County Council.

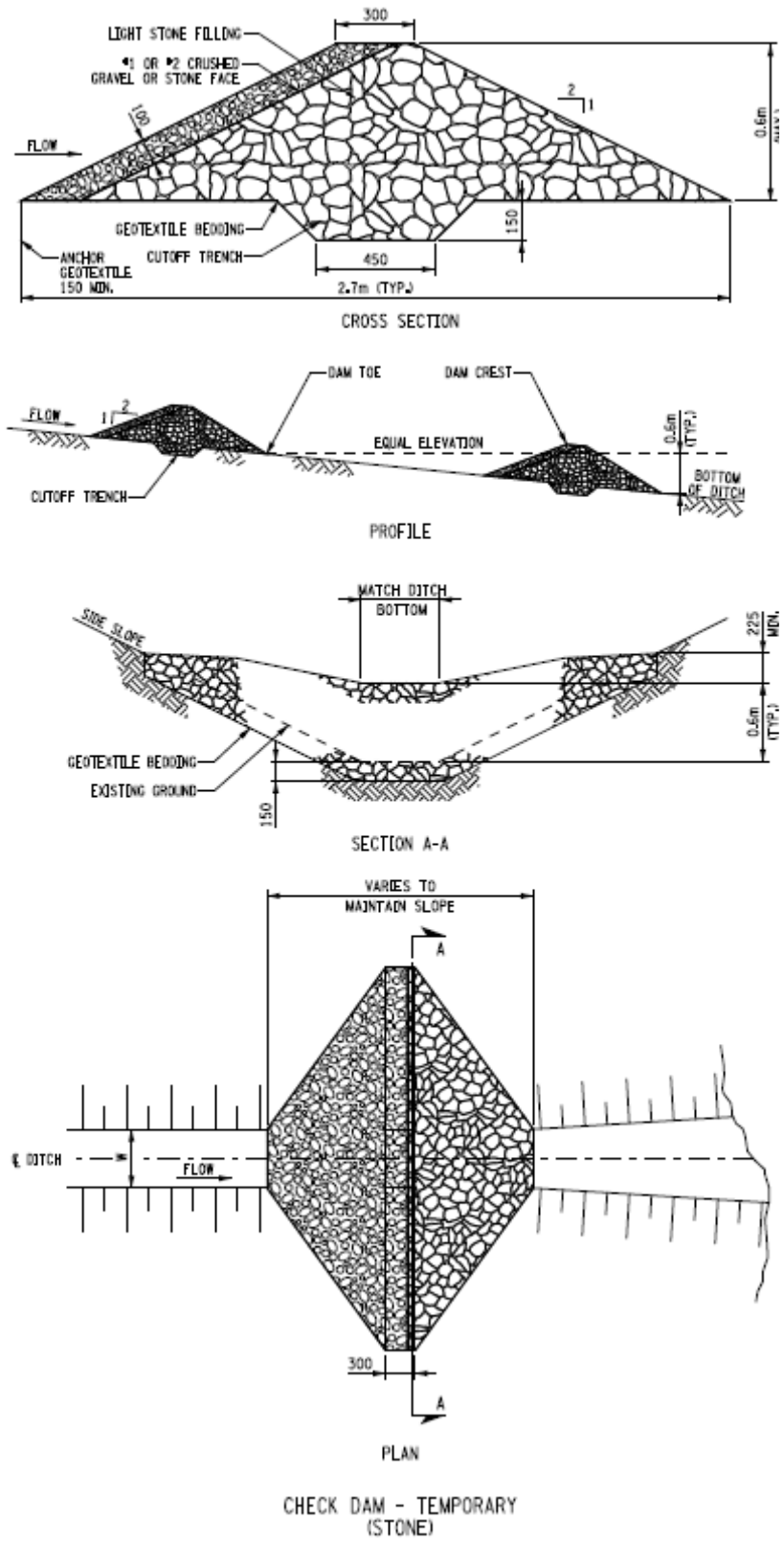
Table 7.1 Standard Pollution Prevention Control Measures

Potential Impact	Mitigation Measure
General	Prior to any works, all personnel involved with the Greenway will receive an on-site induction relating to operations within and adjacent to watercourses and the environmentally sensitive nature of the proximity of the Natura 2000 sites and re-emphasise the precautions that are required as well as the mitigation to be implemented. Galway County Council will ensure that the engineer setting out the works is fully aware of the ecological constraints and mitigation requirements. All matters relating to the Greenway construction works within the vicinity of the Natura 2000 sites or the vicinity of watercourses connected to Natura 2000 sites will be reported on a regular basis to Galway County Council for ongoing review. Any incident or observation of anything that may be considered as causing or likely to cause disturbance or damage to the cSAC will be reported to the Galway County Council immediately.

Potential Impact	Mitigation Measure
	Galway County Council will take immediate action to prevent or limit the impact and will notify the Client contact of the incident and the actions taken. The amount of bare ground created by excavation and vegetation removal will be minimised. In-stream works will be carried out outside of the salmonid spawning season and the times that early life stages of salmonid fish will be present. In-stream work within the period 1st October to 1st May (inclusive) will only be undertaken with advanced approval of Inland Fisheries Ireland and the NPWS.
Pollution of watercourses	Drainage Channels & Minor Streams Generally, the works area either side of the drainage channels will be fenced with Terram or equivalent geo-textile fencing, secured to the ground to prevent the wash-out of suspended solids from the site to the watercourse. Where possible, this will be set back from the riparian corridor of the watercourse to allow the retention of a buffer-zone of riparian vegetation along the drainage channels. Where works are to be carried out at the stream edge, in stream and riparian works will incorporate a silt-trap placed within the watercourse directly downstream of the works. Furthermore, *sedi-mats* will be placed on the bed of the stream, downstream of the silt trap to provide additional reduction of suspended solids and silt load which may occur during instream/bankside works. Any silt release within the water channel will be contained by silt traps. It is proposed to use a sediment entrapment mat, such as *Sedimat* (www.hy-tex.co.uk). This product is a biodegradable layered mat material with an open weave mesh and an inner layer of fibrous material, which traps sediment within the water flow. The mats are fixed to the channel bed immediately downstream of the proposed work with stones or wooden stakes. As the mats are perpendicular to the water flow across the river channel, sediment within the water flow will pass over the mat and the fine material will become trapped within the fibrous material. This product would not disrupt water flow as such other techniques that would dam the water flow (e.g. hay bales). The mats can be removed from the channel when they become filled with material. A series of the mat will be used to control the release of silt downstream and prevent the release of sediment during their removal. **General** The Contractor shall prevent any silting/erosion of water courses and pollution of the water that may adversely affect the quality or appearance of the water or cause obstruction or interference with the flow. Establish site boundary markings to safeguard features of interest/value. Tools and equipment are not to be cleaned in watercourses. Chemicals used shall be stored in sealed containers in the site lockup prior to use. The chemicals shall be applied in such a way as to avoid any spillage or leakage. Any and all excavated material is **NOT** to be temporarily stored adjacent to watercourses. Temporary gangways should be erected if required between river banks and working platforms to avoid the need for walking through watercourses. Temporary check dams should be placed within drainage ditches adjacent to the proposed Greenway at frequencies which will depend on ditch slope (as per **Table 7.2**) e.g. a ditch with a slope of 1% will have a check dam every 60m.
Fuel/Lubricant spillage from equipment	Fuelling and lubrication will not be conducted within 50m of any watercourse. Storage areas, machinery depots and site offices will be located at least 50m from any watercourse. Foul drainage from the site offices and facilities will be properly treated and removed to a suitable treatment facility.

Potential Impact	Mitigation Measure
	Spill kits will be made available close to streams and all staff will be properly trained on correct use. All fuels, lubricants and hydraulic fluids will be kept in secure bunded areas at a minimum of 50m from all watercourses. The bunded area will accommodate 110% of the total capacity of the containers within it. Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place with all staff properly briefed. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner. All plant shall be well maintained with any fuel or oil drips attended to on an ongoing basis. Any minor spillage during this process will be cleaned up immediately. Should any incident occur, the situation will be dealt with and coordinated by the nearest supervisor who will be responsible for instructions by Galway County Council.
Concrete	Wet concrete and cement are very alkaline and corrosive and can cause serious pollution to watercourses. Disposal of raw or uncured waste concrete will be controlled to ensure that the watercourse or karst features will not be impacted. Best practice in bulk-liquid concrete management addressing pouring and handling, secure shuttering / form-work, adequate curing times. Where shuttering is used, measures should be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils. Wash water from cleaning ready mix concrete lorries and mixers may be contaminated with cement and is therefore highly alkaline. Due to the size of the site and the proximity of sensitive watercourses, it is recommended that lorries and mixers are washed out of off site. Cement dust must be controlled as it is alkaline and harmful to the surrounding ecology. Activities which result in the creation of cement dust will be controlled by dampening down areas. The timing of the works must be specified and agreed with the IFI in relation to fish migration and spawning periods
Culvert Installation (if required)	The pollution prevention controls to be adopted during the installation of culverts for the Greenway, are critical. If temporary or permanent diversions of any watercourses are required, this should be carried out prior to the removal of bankside vegetation. Temporary stream diversions should be made on geotextile surfaces with a surface layer of coarse aggregate to hold it in place. Operation of machinery instream should be kept to an absolute minimum. All construction machinery operating instream should be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery should be steam-cleaned and checked prior to commencement of instream works. Such works would preferentially be done during the dry period of the year when flows are low and the risk of suspended solids release is minimal. All dewatering flow should be passed through settlement ponds as detailed above, to remove sediments.
Noise and vibration from use of equipment	All works at any watercourse should make a 'short-start' to activities to allow salmon and other fish to move away before the full intensity of works begins. Work will be undertaken during daylight hours, starting no earlier than two hours after dawn and finishing no later than two hours before dusk, between March and October; and to start no earlier than one hour after dawn and finish one hour before dusk from November to February; and shall not continue for periods of more than 12 hours, to prevent disturbance to nocturnal species. Specific measures in relation to protected species or habitats where they occur within the proposed works are detailed below.
Exhaust emissions	Vehicles and plant shall be properly maintained and shall not be left idling

Potential Impact	Mitigation Measure
from equipment	when not in use.
Contaminated surface and/or groundwater	Excess surface water runoff will be treated prior to entering any drains or watercourses adjacent to Greenway works. See **Pollution of watercourses** above.
Vegetation and soil protection measures	These measures are discussed in greater detail below
Invasive Species	Zebra Mussel has been recorded in the Lough Corrib catchment, therefore all necessary measures and precautions should be undertaken to prevent further spread, the following measure must be implemented; All access scaffolding used within watercourses and all footwear/ waders, etc used within watercourses must be steam cleaned prior to arrival on site to prevent the spread of invasive aquatic species such as Zebra Mussel. A sign off sheet must be maintained to confirm cleaning, - The use of machinery and equipment that has been used in waters infested with Zebra Mussel should be avoided in order to prevent the further spread of this alien species. Should vehicles that have previously been used in Zebra Mussel infested waters be used on-site, they will be steam-cleaned according to Inland Fisheries Ireland guidelines and steam cleaned after use.



Notes

- Maximum drainage area contributing to temporary stone check dam shall be 0.8 ha.
- Measures shall be inspected every (7) calendar days or after each rainfall of 12mm or more within a 24 hour period. Measures shall be cleaned and repaired as required.
- Sediment shall be removed when accumulation reaches one-half of the measure height. Sediment shall be disposed of as unsuitable material
- Coarse aggregate facing material for the stone check dam shall meet the requirement of coarse aggregate filling, and
- Stone filling core material for the stone check dam shall meet the gradation requirements of light stone filling.

Figure 7.1 Structural Measures for Erosion and Sediment Control - Temporary Check Dams in Interceptor Ditches

Table 7.2 Placement of Checkdam within Interceptor Ditch

Stone Check Dam Placement Interval	
Ditch Slope	Temporary Check Dam Placement Interval (Based on 0.6m Height)
1%	60m
2%	30m
3%	20m
4%	15m
5%	12m
6%	10m
8%	7.5m
10%	6m

***I =H/S**
Where
I = Check Dam Spacing Interval
H= Check Dam Height
S= Channel Slope

TEMPORARY CHECK DAM VOLUMES	
DITCH SIDE SLOPE	VOLUME (m^3)
1:2	1.0 m^3 ±
1:3	1.5 m^3 ±
1:4	2.0 m^3 ±
1:6	3.0 m^3 ±

BASED ON V SHAPED DITCH SECTION
FOR TRAPEZOIDAL DITCH, ADD
1 CUBIC METER / METER OF DITCH WIDTH

7.2.3 Mitigation Measures for the control of Invasive Species

Mitigation measures are also required for invasive species management which occur along the proposed Greenway. The following National Roads Authority (NRA) guidelines will be followed in relation to all non-native invasive plant species along the route and in particular the locations outlined in **Figure 4.1**:

- Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2008).

A method statement in relation to biosecurity measures for non-native invasive species within the site will also be agreed in advance with NPWS and IFI.

A summary of the Physical and Chemical Control Measures for Japanese Knotweed is provided below:

Physical Control Measures for Japanese Knotweed (Source: NRA, 2008).

Method	Season	Follow-up
Mowing or cutting (only in conjunction with herbicide treatment)	Four cuts required within a single season. Last cut by **mid-September**.	Requires follow-up in following year.
Excavation	**Any season** but soil must be suitably dry.	Requires monitoring to ensure complete control.

Chemical Control Measures for Japanese Knotweed (Source: NRA, 2008).

Chemical	Season	Follow-up
Glyphosate	**May-June** or **October to November**.	Foliar spray or stem injection.
2,4-D	**May-June** with follow-up in **October to November**.	Wiper applicator or spot treatment.
Picloram	As for 2-4,D	

A summary of the Physical and Chemical Control Measures for Giant Rhubarb is provided below:

Physical Control Measures for Giant Rhubarb (Source: NRA, 2008).

Method	Season	Follow-up
Grubbing	Pre-flowering following recent rain. Only suitable for recently established infestations.	Regular follow-up to deal with seedlings or re-sprouting.
Removal of flower heads	**Before flowering in June.**	Only effective in preventing seed dispersal.

Chemical Control Measures for Giant Rhubarb (Source: NRA, 2008).

Chemical	Season	Follow-up
Glyphosate	During active growth late in the growing season – **late August / early September.**	Foliar spray, wiper applicator or spot treatment.
2,4-D amine	During active growth late in the growing season – **late August / early September.**	Foliar spray, wiper applicator or spot treatment.
Triclopyr	Late in the growing season – **late August / early September.** Not when hot or during drought.	Foliar spray or spot treatment.

A summary of the Physical and Chemical Control Measures for Rhododendron is provided below:

Physical Control Measures for Rhododendron (Source: NRA, 2008).

Method	Season	Follow-up
Cutting	**Anytime of the year.**	Very labour intensive and does not kill plant. Regular follow-up to deal with re-growth required.
Uprooting	**Anytime of the year.**	Small plants can be pulled by hand. Large stems cut and roots grubbed out by winch or machine.
Mulch matting	**Anytime of the year.**	Labour intensive. Requires maintenance and follow up treatment.
Bud-rubbing	**Spring to autumn.**	Labour intensive. Requires regular follow-up.

Chemical Control Measures for Rhododendron (Source: NRA, 2008).

Chemical	Season	Follow-up
Glyphosate	During active growth in **late spring or summer (June to September)**. May require follow-up for 2–3 years.	Foliar spray, wiper applicator or spot treatment. Also as stem injection or cut-stump.
Triclopyr	During active growth in **late spring or summer (June to September)**. May require follow-up for 2–3 years.	As for glyphosate. Do not apply if very hot or during drought.

A summary of the Physical and Chemical Control Measures for Himalayan Balsam is provided below:

Physical Control Measures for Himalayan Balsam (Source: NRA, 2008).

Method	Season	Follow-up
Hand pulling	Pre-flowering following recent rain.	Regular follow-up to deal with seedlings.
Mowing or cutting	Before flowering in **June**. Mowing required regularly for control.	Regular follow-up to deal with seedlings.

Chemical Control Measures for Himalayan Balsam (Source: NRA, 2008).

Chemical	Season	Follow-up
Glyphosate	During active growth in late spring **(Late April to May)**.	Foliar spray, wiper applicator or spot treatment.
2,4-D amine	During active growth in late spring **(Late April to May)**.	Foliar spray, wiper applicator or spot treatment.

Note: where Non-Native Invasive Plant Species are found within designated sites only physical methods of eradication are to be applied.

7.2.4 Mitigation Measures for Annex I Habitats

Specific pollution control and mitigation measures for each Annex I habitat which might be impacted by the proposed Greenway are outlined below in **Table 7.3**. These will be employed where relevant when working in and near the Annex I habitats affected by the proposed works in order to minimise these impacts.

Table 7.3 Summary of Mitigation Measures for each Annex I Habitat

Annex I Habitat	Mitigation Measures
3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	General good practise in road building with particular respect to silt control, especially at small land drain crossing points. Apply measures detailed in **Table 7.1** and **Section 7.2.2**. Protection of watercrossings with the provision of silt fencing on either side of the road works. Site runoff to be intercepted and attenuated prior to discharge to watercourse. Guidance and design of Sustainable Urban Drainage Systems (SuDS) or other proven silt control measures should be incorporated upstream of outfalls to the watercourses to help reduce sediment and pollutant loading to those watercourses which discharge to 'Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) 3110' habitat that may arise during more frequent small run-off events. Surface water shall be attenuated through the construction of temporary check dams as per **Table 7.1**. In the event that culvert replacement is needed and in order to limit the escape of silt, it is recommended that short, temporary by-pass channels are excavated around the culverts being replaced and that these bypasses are lined with geotextile before the flow is diverted into them. This will allow the new culvert to be inserted in the dry in the existing channel, thereby reducing the quantities of silt generated by the construction. The base of each culvert in accordance with standard OPW Section 50 requirements will be placed below the current bed level. Where appropriate, as directed by IFI, any coarse material present under and around the existing channel will be removed, set aside and then replaced over the base of the new culvert after they have been inserted. This will help preserve the existing habitats as much as possible.
4010 Northern Atlantic wet heath with *Erica tetralix*	Works in or near the area of the EU Annex I habitat 'Northern Atlantic wet heath with *Erica tetralix* (4010)' should be minimised. This area should be fenced off and no machinery be allowed to enter. Works in or near this area should be supervised by a suitably qualified ecologist. The Zone of (ecological) Influence will be minimised through the lining and blocking of drains to prevent drying of wet heath adjacent to the Greenway. • Protective barriers will be put in place prior to route construction, in order to avoid damage to adjoining wet heath habitat outside the land-take. • In order to mitigate against hydrological (draw-down) effects, a clay seal will be installed along the edge of the land-take parallel to the areas of wet heath.

Annex I Habitat	Mitigation Measures
	The above mitigation measures will be carried out in accordance with NRA Guidelines.* These measures will avoid indirect damage to the bog outside the landtake of the proposed Greenway.
4030 European Dry Heath	Works in or near the area of the EU Annex I habitat 'European Dry Heath (4030)' should be minimised. This area should be fenced off and no machinery be allowed to enter. Works in or near this area should be supervised by a suitably qualified ecologist. • Protective barriers will be put in place prior to route construction, in order to avoid damage to adjoining wet heath habitat outside the land-take. The above mitigation measures will be carried out in accordance with NRA Guidelines.* These measures will avoid indirect damage to the bog outside the landtake of the proposed Greenway.
7130 Blanket bog (*if active bog)	Works in or near the area of the EU Annex I habitat 'Blanket bog (*if active bog) (7130)' should be minimised. This area should be fenced off and no machinery be allowed to enter. Works in or near this area should be supervised by a suitably qualified ecologist. The Zone of (ecological) Influence will be minimised through the lining and blocking of drains to prevent drying of bog adjacent to the Greenway. • Protective barriers will be put in place prior to route construction, in order to avoid damage to adjoining wet heath habitat outside the land-take. • In order to mitigate against hydrological (draw-down) effects, a clay seal will be installed along the edge of the land-take parallel to the areas of bog. The above mitigation measures will be carried out in accordance with NRA Guidelines.* These measures will avoid indirect damage to the bog outside the landtake of the proposed Greenway.
7150 Depressions on peat substrates of the Rhyncosporion	Works in or near the area of the EU Annex I habitat 'Depressions on peat substrates of the Rhyncosporion (7150)' should be minimised. This area should be fenced off and no machinery be allowed to enter. Works in or near this area should be supervised by a suitably qualified ecologist. The Zone of (ecological) Influence will be minimised through the lining and blocking of drains to prevent drying of bog adjacent to the Greenway. • Protective barriers will be put in place prior to route construction, in order to avoid damage to adjoining wet heath habitat outside the land-take.

Annex I Habitat	Mitigation Measures
	• In order to mitigate against hydrological (draw-down) effects, a clay seal will be installed along the edge of the land-take parallel to the areas of bog. The above mitigation measures will be carried out in accordance with NRA Guidelines.* These measures will avoid indirect damage to the bog outside the landtake of the proposed Greenway.
7230 Alkaline fens	Apply measures detailed in **Table 7.1** and **Section 7.2.2** Works in or near the area of the EU Annex I habitat 'Depressions on peat substrates of the Rhyncosporion (7150)' should be minimised. This area should be fenced off and no machinery be allowed to enter. Works in or near this area should be supervised by a suitably qualified ecologist. The Zone of (ecological) Influence will be minimised through the lining and blocking of drains to prevent drying of fen adjacent to the Greenway. • Protective barriers will be put in place prior to route construction, in order to avoid damage to adjoining wet heath habitat outside the land-take. • In order to mitigate against hydrological (draw-down) effects, a clay seal will be installed along the edge of the land-take parallel to the areas of fen. The above mitigation measures will be carried out in accordance with NRA Guidelines.* These measures will avoid indirect damage to the bog outside the landtake of the proposed Greenway.
91A0 Old sessile oak woods with Ilex and Blechnum in British Isles	Felling of trees will be carried out outside the bird nesting season (1st of March to the 31st of August, in order to avoid the risk of mortalities). This measure has a 'high' likelihood of success.

*These mitigation measures should be conducted in line with the NRA Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During the Construction of National Road Schemes.

7.2.5 Mitigation Measures at Bridge Replacement Sites

Area	Locations	Mitigation Measures
All 7 Bridges along the proposed route	It is proposed to construct 7 bridges throughout the route. These are located at Chainages 11+700, 16+620, 30+920, 44+800, 46+800, 48+400, and 50+200 as specified in **Table 2.1**.	None of the seven bridges will have footings within the river channel; therefore no in-stream works will be required. No further mitigation measures are required other than good practice when working adjacent to a watercourse as outlined in **Table 7.1**. The main aspects are: best practice in bulk-liquid concrete management addressing batching on site (if that is proposed), pouring and handling, secure shuttering / form-work, adequate curing times. Works should occur during dry weather in a low flow period when there is little chance of flood waters impacting bridge works and such timing of works must take into account adequate curing time for concrete. The timing of the works must be specified and agreed with the IFI in relation to fish migration and spawning periods. Ecological supervision is required for the propseod works at bridges 30+920, 44+800, 46+800, 48+400, and 50+200, due to the presence of Freshwater Pearl Mussel in the receiving watercourses.

7.2.6 Specific Mitigation Measures for Annex II Species

All works will be carried out in accordance with all NRA Guidelines mentioned in **Section 7.1** together with the mitigation measures presented in this document.

Galway County Council and their Contractor are required to comply with the Mitigation Measures as outlined in this document and including specific measures in **Table 7.4**. Sign off sheets will be prepared to include site specific Mitigation Measures, which will be signed by the Galway County Council Site Supervisor to ensure that all measures have been implemented satisfactorily. The expected construction period will be for a period of 24 months with a contract start date anticipated in 2012. The NPWS will be notified of commencement of works and contact details of the relevant site staff will be provided in advance of commencement. The works will be undertaken subject to appropriate weather conditions permitting; with adjacent to watercourses to cease at times when heavy rainfall is predicted, and when river levels are high or in flood.

Table 7.4 Summary of Mitigation Measures for each Annex II Species potentially impacted

Annex II Species	Construction Impacts
Otter (*Lutra lutra*)	All works in proximity to watercourse will be carried out as specified in **Section 7.2.2** and **Table 7.1.** It is not proposed to provide mammal underpasses as the species will be able to continue commuting throughout the study are unimpeded by the proposed works. No direct impacts to otter holts or resting places will result form the proposed works.
Freshwater Pearl Mussel (*Margaritifera margaritifera*) Atlantic Salmon (*Salmo salar*) Slender Naiad (*Najas flexilis*)	In order mitigate for impacts to Freshwater Pearl Mussel, Atlantic Salmon, and Slender Naiad, all works in proximity to watercourse will be carried out as specified in **Section 7.2.2** and **Table 7.1.** All works at water crossings where Freshwater Pearl Mussel is present or is downstream of the works will be supervised by a suitably qualified ecologist, to ensure the protection of the species.
Lesser Horseshoe Bat (*Rhinolophus hipposideros*)	**Avoidance:** Construction of the proposed Greenway shall be carried out on the least ecologically sensitive side of the road i.e. woodlands and mature trees adjacent to the carriageway shall be avoided where possible. **Buildings:** Should any buildings on or adjacent to the route require removal, they shall first be surveyed for bat presence. If bats are found, the following measures will be implemented: • Any work or demolition of buildings or structures identified as bat roosts or having the greatest potential for bat use shall preferably be undertaken within the winter months - November to March – as bat numbers are then known to be fewer in buildings. This would reduce impact to bats present on-site. • A sufficient number of *Schwegler* bat boxes shall be erected at a suitable nearby location one month prior to demolition to provide an alternative roosting site for the bats. • Demolition of structures where bat signs are observed shall be done carefully with the expectation that bats may be found. The roof of such structures shall be carefully removed by hand to protect any animals which may be beneath. If discovered, bats shall be retained in a box until dusk then released on site. **Bridges:**

Annex II Species	Construction Impacts
	• Any re-pointing or pressure grouting of existing bridges identified as having potential for bat use shall only proceed after a further inspection of the structure for bats and measures taken to protect any animals found to be present. • Some crevices beneath existing bridges shall be retained for bat use during such works according to best practice bat mitigation measures for bridge works **Potential bat roosts in trees:** Avoidance: • Where possible, tree lines and mature trees that are located immediately adjacent to the line of the proposed route or are not directly impacted shall be avoided and retained intact. • Any existing mature trees adjacent to the corridor and any construction sites to be retained shall be protected from root damage by machinery by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees shall be fenced off by adequate temporary fencing prior to other works commencing. Mitigation: • Mature trees, which are to be removed, shall ideally be felled in the period late August to late October, or early November, in order to avoid the disturbance of any roosting bats as per NRA guidelines and also to avoid the bird nesting seasons.* • Tree felling shall be completed by Mid-November at the latest because bats roosting in trees are very vulnerable to disturbance during their hibernation period (November – April).* • Ivy covered trees, once felled, shall be left intact on-site for 24 hours to allow any bats beneath the foliage to escape prior to disposal.* **Lighting restrictions:** • Lighting shall be minimised along the proposed Greenway especially at areas of interest for bat species. Lighting shall especially be avoided at bridges as this would impact on foraging and commuting Daubenton's bats and may also prevent use of installed bat tubes. • Where lighting is required, directional lighting (i.e. lighting which only shines on the Greenway and not nearby countryside) shall be used to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only. **Compensation for loss of commuting routes:** Linear features such as hedgerows and tree lines shall be retained and/or replaced where possible. Any bank side vegetation along watercourses requiring removal shall be replaced with native shrubs/trees after works. Native plant species attract more insects then non-native species. This is especially important adjacent to bridges identified as having bat roosting potential. This has a 'high' likelihood of success.

8 CONCLUSIONS

8.1 INTEGRITY OF THE SITE

From the *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (EC, 2002), the meaning of integrity is described as follows;

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

A Conservation Management Plan has not been prepared for the Lough Corrib cSAC, Connemara Bog Complex cSAC, Twelve Bens/Garraun Complex cSAC and Maumturk Mountains cSAC. The following conservation objective has been provided by the NPWS for these cSAC sites:

Objective: To maintain or restore the favourable conservation condition of the Annex I habitat(s) and/or the Annex II species for which the cSAC has been selected (see **Table 3.5-3.6** and **Table 3.9-3.14**).

A Conservation Management Plan has not yet been prepared for the Lough Corrib SPA and Connemara Bog Complex SPA. The following conservation objectives have been provided by the NPWS for these SPA sites:

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA (see **Tables 3.7, 3.8, 3.15 and 3.16**).

From the information gathered and the predictions made about the changes that are likely to result from the construction and operation stages of the project, the integrity of site checklist is completed in **Table 8.1**.

Table 8.1 Integrity of Site Checklist

Conservation objectives		
Does the project have the potential to:	**Yes or No**	**Comment**
Cause delays in progress towards achieving the conservation objectives of the site?	No	Annex I Habitats: The potential for loss and/or disturbance to habitats will be minimised and will not cause delays in achieving the conservation objectives of the site. Required mitigation measures are outlined in Section 7. Annex II Species and SPA Bird species: The potential for loss and/or disturbance of key species will be avoided and will not cause delays in achieving the conservation objectives of the site. Required mitigation measures are outlined in Section 7.
Interrupt progress towards achieving the conservation objectives of the site?	No	Annex I Habitats: The potential for loss and/or disturbance to habitats will be minimised and will not cause delays in achieving the conservation objectives of the site. Required mitigation measures are outlined in Section 7. Annex II Species and SPA Bird species: The

Conservation objectives		
Does the project have the potential to:	**Yes or No**	**Comment**
		potential for loss and/or disturbance of key species will be minimised and will not cause delays in achieving the conservation objectives of the site. Required mitigation measures are outlined in Section 7.
Disrupt those factors that help to maintain the favourable conditions of the site?	No	Potential impacts affecting water quality (a key indicator of conservation value) within the localised area of the proposed development will be mitigated against. Likewise, the risk of introduction and/or dispersion of non-native invasive species will be minimised by following the guidelines provided on the Invasive Species Ireland website and best practice. Required mitigation measures are outlined in Section 7.
Interfere with the balance, distribution and density of key species that are the indicators of the favourable condition of the site?	No	Potential impacts affecting water quality (a key indicator of conservation value) within the localised area of the proposed development will be mitigated against. Likewise the risk of introduction and/or dispersion of non-native invasive species will be minimised by following the guidelines provided on the Invasive Species Ireland website and best practice. Required mitigation measures are outlined in Section 7.
Other objectives: does the project or plan have the potential to:		
Cause changes to the vital defining aspects (e.g. nutrient balance) that determine how the site functions as a habitat or ecosystem?	No	Potential impacts may occur through pollution of watercourses during the construction phase. However these impacts can be effectively mitigated. Required mitigation measures are outlined in Section 7.
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?	No	Potential impacts may occur through pollution of watercourses during the construction phase. This could impact on protected habitats and species downstream of the proposed development. Required mitigation measures are outlined in Section 7.
Interfere with predicted or expected natural changes to the site (such as water dynamics or chemical composition)?	No	Potential impacts may occur through pollution of watercourses during the construction phase. This could impact on protected habitats and species downstream of the proposed development. Required mitigation measures are outlined in Section 7.
Reduce the area of key habitats?	No	There will be no direct loss of key habitats within the Natura 2000 sites. However, potential indirect impacts may occur through pollution of watercourses during the construction phase and trampling of habitats to gain access to the sites. These could impact on protected habitats downstream of the proposed development. Required mitigation measures are outlined in Section 7.
Reduce the population of key species?	No	There are potential short term impacts to Annex II species such as Otter, Atlantic Salmon, Brook Lamprey and White-clawed Crayfish during the construction period only, from potential run-off of pollutants. Mitigation measures to minimise these short term local impacts are proposed to avoid impacts to the integrity of the site, these measures are outlined in Section 7.
Change the balance between key	No	Otter preys on trout and other fish. Therefore any

Conservation objectives		
Does the project have the potential to:	**Yes or No**	**Comment**
species?		impacts to fish species may impact on the balance of the key species within the effected catchments. There is also potential for impacts to Atlantic Salmon and White-clawed Crayfish during the construction period only, from potential run-off of pollutants. These impacts can be effectively mitigated and measures are outlined in Section 7.
Reduce diversity of the site?	No	There is potential for loss of Otter, Atlantic Salmon, Brook Lamprey and White-clawed Crayfish, during the construction period only, from potential run-off of pollutants. Required mitigation measures are outlined in Section 7.
Result in disturbance that could affect population size or density or the balance between key species?	No	There is potential for loss of Otter, Atlantic Salmon, Brook Lamprey and White-clawed Crayfish, during the construction period only, from potential run-off of pollutants. Required mitigation measures are outlined in Section 7.
Result in fragmentation?	No	No impacts have been identified that would result in fragmentation of species or habitats for which the Natura 2000 site has been designated.
Result in loss or reduction of key features (e.g. tree cover, tidal exposure, annual flooding, etc.)?	No	No key features of the Natura 2000 sites will be lost as a result of construction or operation of the proposed development.

Source: *"Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*"

This Natura Impact Statement for the proposed Connemara Greenway – Clifden to Oughterard has been carried out in accordance with Article 6 (3) of the 'Habitats' Directive 92/43/EEC. This Statement provides a professional scientific examination of the project and the relevant Natura 2000 sites, identifying and characterising any possible implications for the Natura 2000 site in view of the conservation objectives, taking account of in-combination effects.

Robust and effective mitigation measures have been proposed for the avoidance of any impacts affecting water quality within all six relevant Natura 2000 sites. Specific mitigation measures have been proposed for the prevention of impacts to all relevant Annex II species. Likewise, precautions will be taken in relation to non-native invasive species during the construction phase.

The NRA guidelines outlined in **Section 7.1** will form the backbone of the method statement, supplemented by mitigation measures provided in Section 7. The method statement will detail how these mitigation measures will be monitored for effectiveness by both Galway County Council themselves and independently through water quality monitoring proposed. There will be ongoing consultation by Galway County Council with IFI and NPWS throughout all phases of the works which will include attendance at progress meetings at stages agreed in advance by Galway County Council and designated IFI and NPWS representatives. A mechanism for reporting of pollution incidents will be agreed in advance between the contractor(s) and the IFI and NPWS.

The conclusion of this Natura Impact Statement is that, with the implementation of best practice and the recommended mitigation measures, it is considered that the proposed Greenway will not have a significant effect either individually or in combination with other plans or projects on the conservation objectives of Lough Corrib cSAC and SPA, Maumturk Mountains cSAC, and the Twelve Bens/Garraun Complex cSAC and SPA.

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APPENDIX A

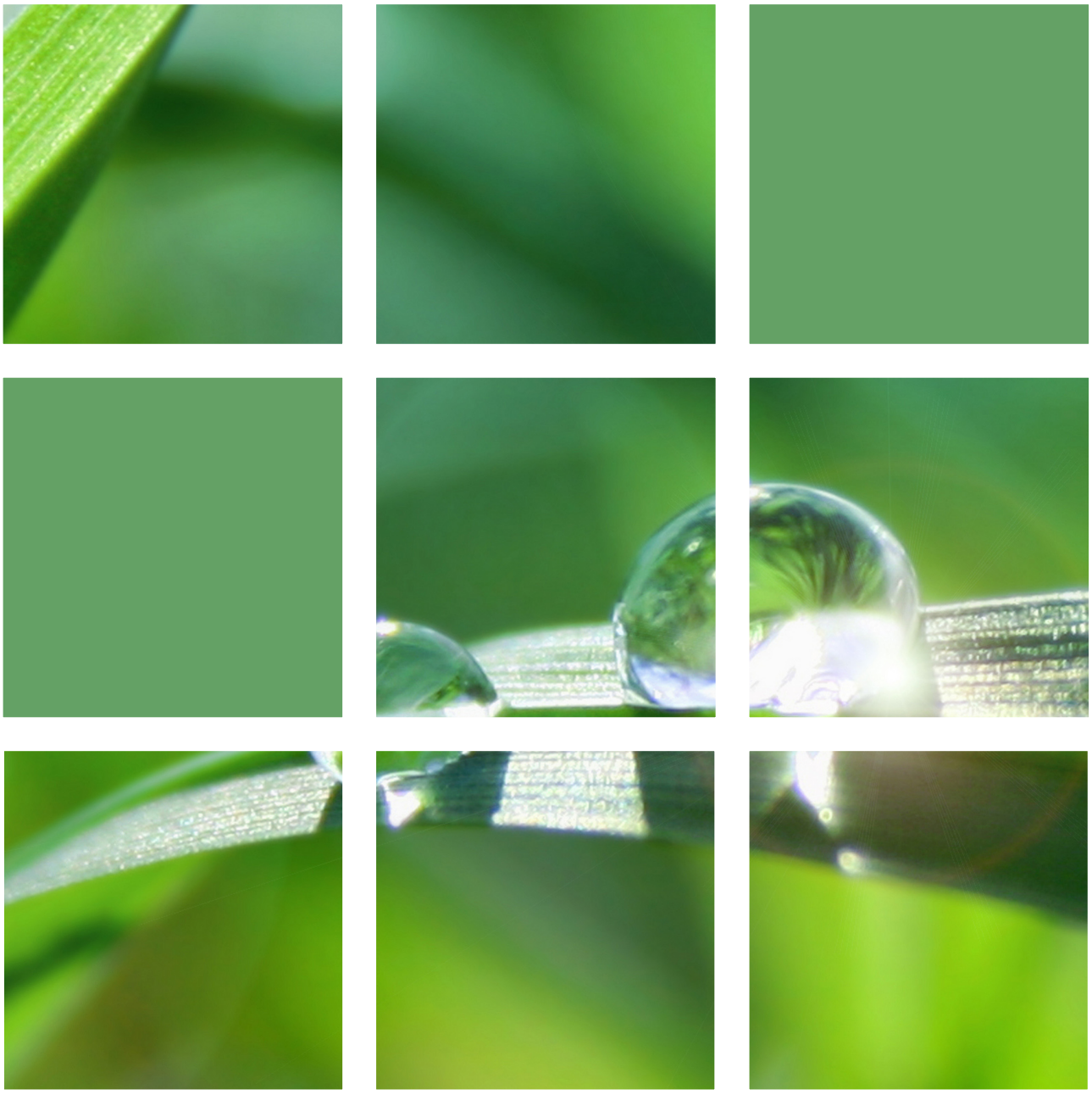
AA Screening Report

RPS

Connemara Greenway Project

Appropriate Assessment Screening Report

November 2011



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Connemara Greenway Project

Appropriate Assessment Screening Report

DOCUMENT CONTROL SHEET

Client:	**Galway County Council**					
Project Title:	**Connemara Greenway Project**					
Document Title:	**Appropriate Assessment Screening Report**					
Document No:	**MGE0269RP0002**					
This Document Comprises:	**DCS**	**TOC**	**Text**	**List of Tables**	**List of Figures**	**No. of Appendices**
	1	**1**	**30**	**1**	**1**	**2**

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1 INTRODUCTION

1.1 BACKGROUND

In May 2011 Galway County Council appointed RPS as environmental consultants for the Connemara Greenway Project. The Project will consist of developing a walking/cycle track (Greenway) along the dismantled Galway to Clifden railway line from Oughterard to Clifden. The purpose of the project is to provide all members of the local community and visitors alike, with a safe and accessible way of using the dismantled railway line for walking and cycling. The Project will also benefit the local economy.

The Project is being developed by local community groups in Clifden, Recess and Oughterard with support from Fáilte Ireland, Galway County Council, Forum Connemara and Meitheal Forbartha na Gaeltachta Teoranta.

Galway County Council is now progressing the Connemara Greenway Project to planning and design stage and the required environmental outputs associated with the Project can be set out in four distinct stages as follows:

Stage 1

- Environmental Constraints Study
- Screening for Appropriate Assessment
- Public Consultation

Stage 2

- Environmental Assessment of the Project
- Appropriate Assessment (if deemed necessary as a result of the Appropriate Assessment Screening).

Stage 3

- Environmental Impact Statement (EIS)
- Public Consultation

Stage 4

- Statutory Planning Process

This report fulfils one required element of Stage 1, to complete Screening for Appropriate Assessment of the proposed Project.

The design of the greenway has been progressed by the completion of an "*Environmental Constraints Study*" in parallel with this Appropriate Assessment Screening Report. Details of the construction and operation of the proposed Greenway set out in this report form the scope of this AA Screening exercise.

The Appropriate Assessment (AA) process is being conducted for the proposed Greenway in order to comply with the requirements of the Habitats Directive 92/43/EEC, Article 6(3) and (4), Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites. Such assessments are required where it is identified that a proposed plan or project could have significant impact on a Natura 2000 site (i.e. Special Area of Conservation (SAC) or Special Protection Area (SPA)). Articles 6(3) and (4) of the Directive, state the following;

6.3 '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... the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned….'

6.4 'If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest… the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected...'

This AA Screening has been completed in order to determine whether a Stage 2 AA is required.

1.2 STUDY AREA

The Connemara Greenway Project proposes to develop the dismantled Galway to Clifden railway line into a walking/cycling track (Greenway) between Oughterard and Clifden a distance of over 42km. **Figure 1.1** shows the proposed route.

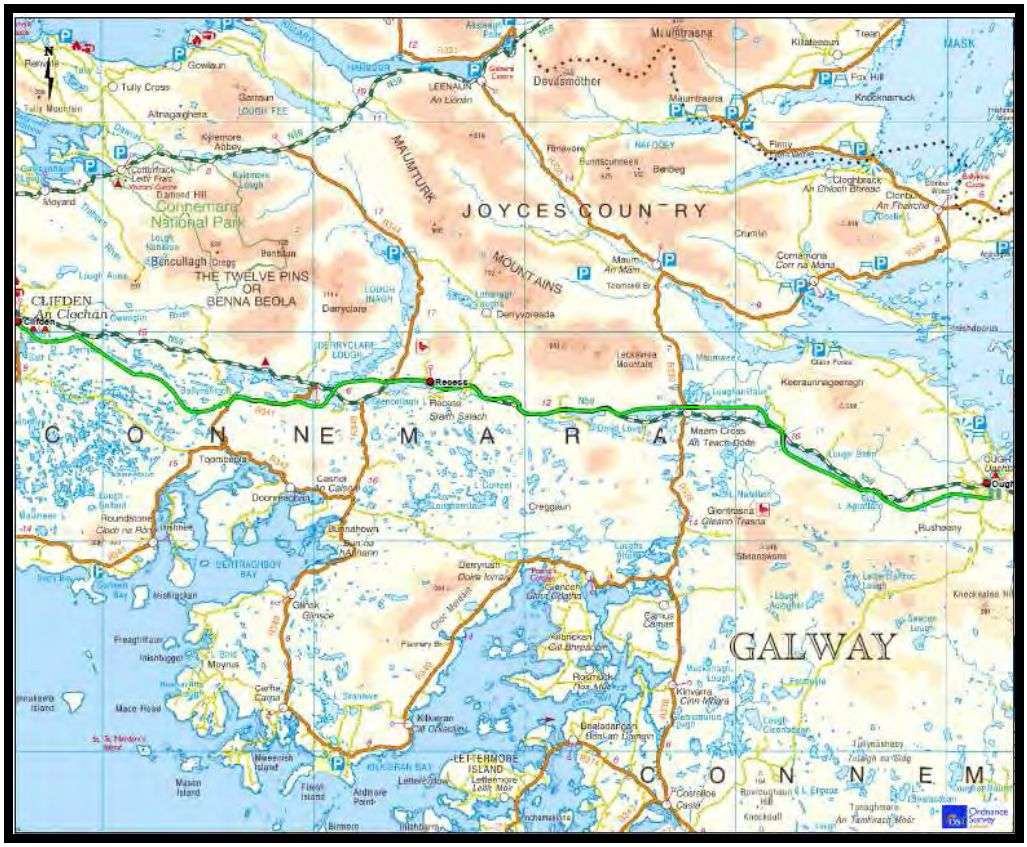

Figure 1.1 Proposed Route of the Connemara Greenway

The Galway to Clifden railway line ceased operations in 1935 and was subsequently dismantled. The remnants of the railway line between Oughterard and Clifden are the focus of this Project. There is a well defined corridor for much of the length of the dismantled railway line, with some of the original rail bridges still intact. At a number of locations along its corridor, the dismantled railway line merges and crosses over existing local roads and the main Galway to Clifden road (N59).

The landscape across which the dismantled railway corridor crosses, varies along its length with extensive areas of bog, scrub, forestry, bog woodland, mountains, rivers, numerous small and some large lakes, improved grassland and farmland being encountered.

The study area contains several environmental designations (Natura 2000 Sites) and the route of the proposed Greenway runs through or lies adjacent (within 1km) to four candidate Special Areas of Conservation (cSACs) and two Special Protection Areas (SPAs) as follows:

- Lough Corrib cSAC (Site Code: 000297),
- Lough Corrib SPA (Site Code: 004042),
- Maumturk Mountains cSAC (Site Code: 002008),
- Twelve Bens/Garraun Complex cSAC (Site Code: 002031),
- Connemara Bog Complex cSAC (Site Code: 002034), and
- Connemara Bog Complex SPA (Site Code: 004181).

The locations of these cSACs and SPAs relative to the route of the proposed Greenway are shown in **Figure 1.2**.

Due to their proximity to the proposed Greenway these six sites are considered further in this Appropriate Assessment Screening Report.

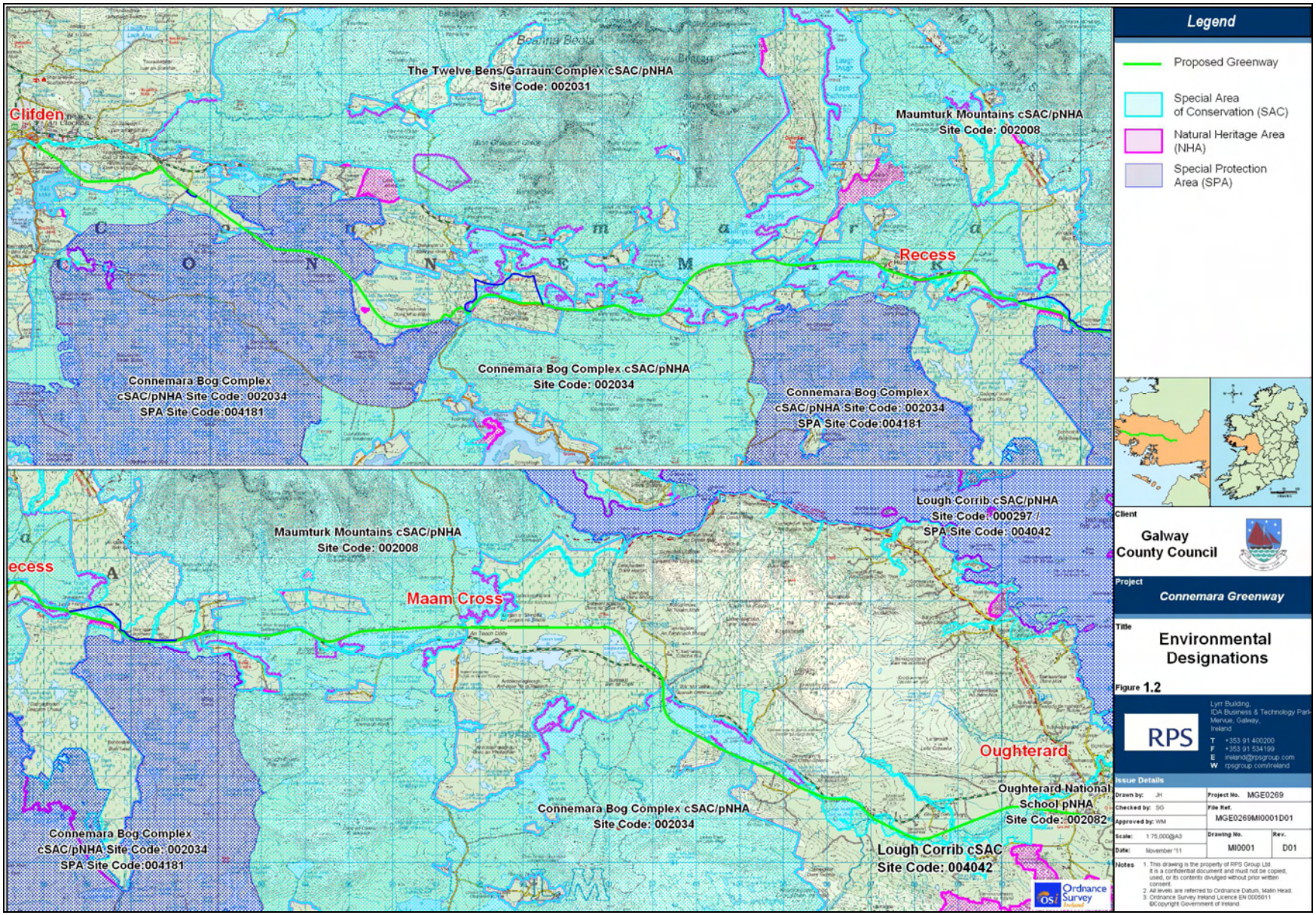

Figure 1.2 Location of Natura 2000 Sites Relative to the Proposed Connemara Greenway Project.

2 METHODOLOGY

The Department of the Environment Heritage and Local Government guidelines (DELHG, 2009) outlines the European Commission's methodological guidance (EC, 2002) promoting a four-stage process to complete the Appropriate Assessment (AA), and outlines the issues and tests at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required.

The four stages are summarised diagrammatically in **Figure 2.1**. Stages 1-2 deal with the main requirements for assessment under Article 6(3). Stage 3 may be part of the Article 6(3) Assessment or may be a necessary precursor to Stage 4. Stage 4 is the main derogation step of Article 6(4).

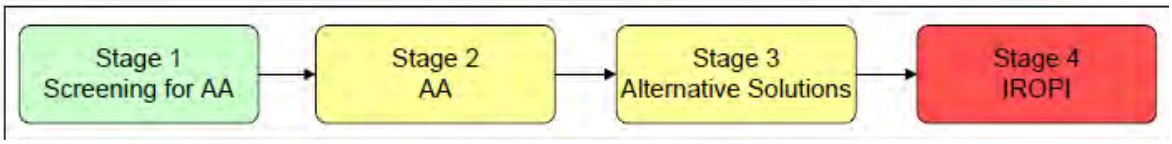

Figure 2.1 Four Stages of Appropriate Assessment

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

(i) whether a plan or project (in this instance the proposed Greenway) is directly connected to or necessary for the management of the Natura 2000 Sites, and

(ii) whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on the Natura 2000 Sites in view of their conservation objectives.

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

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

- Management of the Natura 2000 Sites listed in Section 1,
- Description of the proposed Greenway Project,
- Characteristics of the Natura 2000 Sites, and
- Assessment of Significance of the proposed Greenway on the Natura 2000 Sites in question.

This report has been prepared having regard to the following;

- Schedule 6(3) of the Habitats Directive 92/43/EEC (Assessment of Plans and projects Significantly Affecting Natura 2000 Sites),
- Guidance from the EU Commission and DEHLG (2009, Rev Feb. 2010) Appropriate Assessment of Plans & Projects, Guidance for Planning Authorities. [1]
- Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities (DOEHLG 2009, rev 2010),

[1] (a) European Communities, 2000. Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC
(b) European Communities, 2002. Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance in the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
(c) European Communities, 2007. Guidance document on Article 6(4) of the 'Habitat Directive' 92/43/EEC.
(d) DEHLG 2009 (Feb 2010). Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities.

- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC, 2000),
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- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission; (EC, 2007),
- Interpretation Manual of European Union Habitats. Version EUR 27. European Commission 2007,
- The European Union (Environmental Impact Assessment and Habitats) Regulations 2011,
- The European Communities (Birds and Natural Habitats) Regulations 2011, and
- The Planning and Development Act 2000-2010.

3 STAGE 1 – SCREENING FOR APPROPRIATE ASSESSMENT

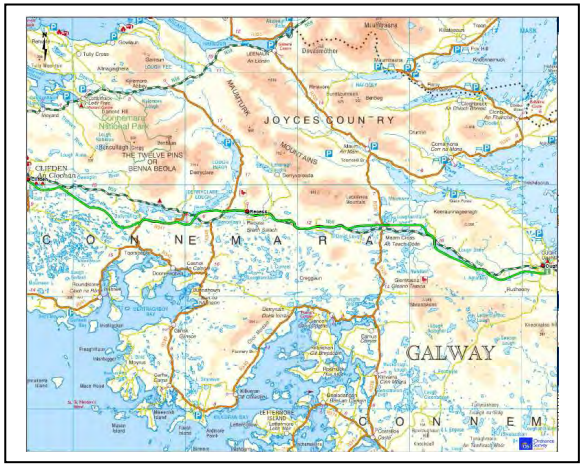
3.1 MANAGEMENT OF THE NATURA 2000 SITES

The proposed Connemara Greenway is not considered necessary to the successful management of the following Natura 2000 Sites:

- Lough Corrib cSAC (Site Code: 000297).
- Lough Corrib SPA (Site Code: 004042)
- Maumturk Mountains cSAC(Site Code: 002008);
- Twelve Bens/Garraun Complex cSAC (Site Code: 002031);
- Connemara Bog Complex cSAC (Site Code: 002034); and
- Connemara Bog Complex SPA (Site Code: 004181).

3.2 DESCRIPTION OF THE PROJECT OR PLAN

The characteristics of the proposed Connemara Greenway Project are outlined here.

Description of the Proposed Works	
Location of Proposed Greenway	The Connemara Greenway Project proposes to develop the dismantled Galway to Clifden railway line into a walking/cycling track (Greenway) between Oughterard and Clifden, a distance of over 42km. There is a well defined corridor for much of the length of the dismantled railway line, with some of the original rail bridges still intact. At a number of locations along its corridor, the dismantled railway line merges and crosses over existing local roads and the main Galway to Clifden road (N59). The landscape across which the dismantled railway corridor crosses, varies along its length with extensive areas of bog, scrub, forestry, bog woodland, mountains, rivers, numerous small and some large lakes, improved grassland and farmland being encountered. **Figure 3.1** shows the proposed Greenway Route. The proposed Greenway Route is in detail in **Appendix A** Drawings 1-18.  **Figure 3.1 Location of Proposed Greenway**
Description of the key components of the project	It is proposed to upgrade the existing disused railway corridor to accommodate walkers and cyclists along its length. There are locations along the route where due to landowner issues, presence of structures etc that an alternative route for the Greenway is required. The works will require the upgrading of the existing surface to provide safe and secure walking and cycling, appropriate fencing and access points, and upgrading of water crossings and bridges as deemed necessary. **Figure 3.2** shows a typical section through the proposed Greenway and **Figures 3.3** and **3.4** show typical fencing that will be erected as part of the proposal. **Images 3.1- 3.6** show a similar type Greenway developed in County Mayo.

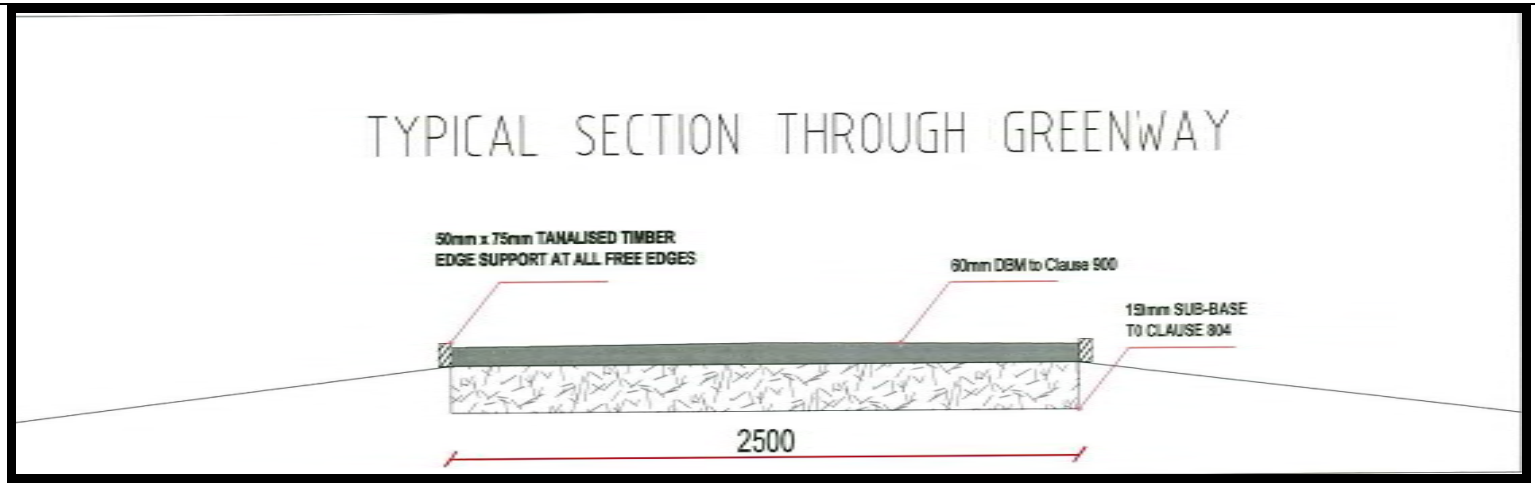


Figure 3.2 Typical Greenway Section

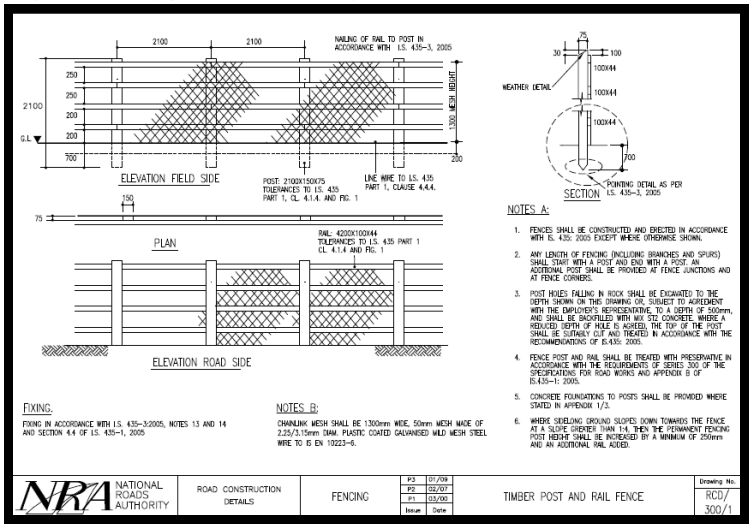


Figure 3.3 Typical Fencing Detail 1

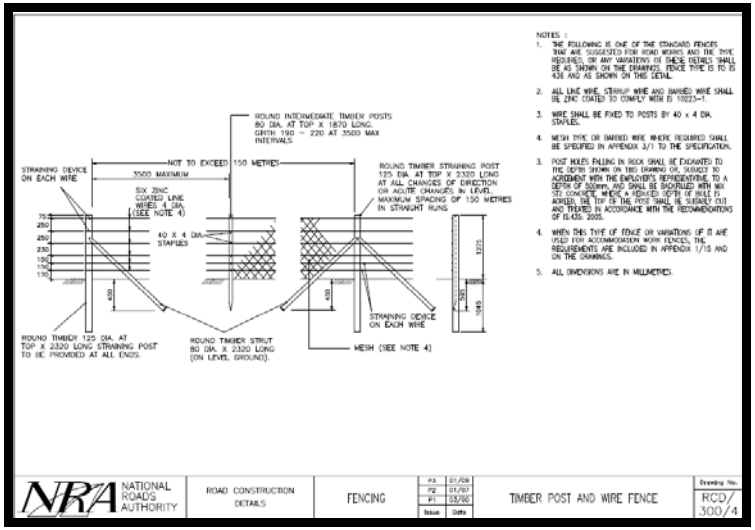


Figure 3.4 Typical Fencing Detail 2

Images 3.1-3.6 Selection of Images from the Mulranny to Westport Greenway

3.3 CHARACTERISTICS OF THE NATURA 2000 SITES

Six Natura 2000 Sites have been considered within the scope of this Stage 1 - Screening Report. Details for these sites are set out here.

- Lough Corrib cSAC (Site Code: 000297).
- Lough Corrib SPA (Site Code: 004042)
- Maumturk Mountains cSAC(Site Code: 002008);
- Twelve Bens/Garraun Complex cSAC (Site Code: 002031);
- Connemara Bog Complex cSAC (Site Code: 002034); and
- Connemara Bog Complex SPA (Site Code: 004181).

Site Name and Code	**Lough Corrib cSAC (Site Code: 000297)**
Site Description	Lough Corrib cSAC is of major conservation importance due to the presence of fourteen habitats listed on Annex I of the EU Habitats Directive, six of which are given priority status. The lake is host to internationally important populations of wildfowl listed on Annex I of the EU Birds Directive and so is designated as a Special Protection Area under the same directive. The NPWS site synopsis for this designated site is included in full as **Appendix B** to this report.

Qualifying Features of the Site

The qualifying habitats and species found within Lough Corrib cSAC are set out below (habitats highlighted in bold are priority habitats):

Habitat name (cSAC Qualifying Feature)	Habitat code	Main Threats and Impacts
Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	3140	Fertilisation, grazing, forestry, leisure fishing, hunting, human induced hydraulic changes, eutrophication and Invasive species.
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	3110	Fertilisation, grazing, forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
Molinia meadows on calcareous, peaty or clavey-silt-laden soils (Molinion caeruleae)	7110	Drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Active raised bogs	91A0	**Peat Cutting, grazing, burning.**
Old sessile oak woods with Ilex and Blechnum in British Isles	6410	Internal effects include inappropriate grazing levels and invasive species, whereas external threats include clearance for agriculture or felling for timber.
Alkaline fens	7230	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
Calcareous fens with Cladium mariscus and species of the Caricion davallianae	7210	**Overgrazing, Restructuring agricultural land holding, Peat Extraction, Mechanical removal of peat, Water pollution. Landfill, land reclamation and drying out, general. Infilling ditches, dykes, ponds, marshes and pits.**
Limestone pavements	8240	**Removal of limestone pavement, removal of scrub, dispersed habitation, stock feeding, agricultural improvement, quarry, disposal inert material, electricity lines, infilling wetlands, routes, abandonment of grazing, agricultural structure, burning, discharges, disposal household waste, dumping dredgings, forestry, grazing, improved access, landfill, nautical sports, paths and restructuring agric land holding.**
Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)	6210	**Invasion by a species, Undergrazing, Fertilisation, Agricultural improvement, Abandonment of pastoral systems, Sand & gravel extraction.**
Bog woodland	91D0	**Burning, Mechanical removal of peat, Drainage.**
Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	3260	Fertilisation, grazing, forestry, peat extraction, pollution, drainage, invasive species.

Petrifying springs with tufa formation (Cratoneurion)	7220	**Peat cutting, arterial drainage, local drainage, water abstraction, agricultural reclamation.**
Degraded raised bogs still capable of natural regeneration	7120	Peat cutting, arterial drainage, local drainage, water abstraction, agricultural reclamation.
Depressions on peat substrates of the Rhynchosporion	7150	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.

Species Type	Species Code	Main Threats and Impacts
Otter (*Lutra lutra*)	1355	Use of pesticides, fertilization, hunting, trapping, poisoning, water pollution, infilling of ditches, dykes, ponds, pools, marshes or pits, management of aquatic and bank vegetation for drainage purposes, removal of sediments, canalization of inland water course.
Slender Naiad (*Najas flexilis*)	1833	Water pollution, water abstraction, invasive species, forestry and farming.
Atlantic Salmon (*Salmo salar*)	1106	Water pollution, invasive species, forestry, farming and fishing.
Freshwater Pearl-mussel (*Margaritifera margaritifera*)	1029	Water pollution, water abstraction, invasive species, forestry and farming.
Sea Lamprey *(Petromyzon marinus)*	1095	Fish passages, water pollution (including discharges), commercial fishing, invasive species, forestry and farming.
Brook Lamprey *(Lampetra planeri)*	1096	Fish passages, water pollution (including discharges), commercial fishing, invasive species, forestry and farming.
Lesser Horseshoe Bat (*Rhinolophus hipposideros)*	1303	Loss of suitable summer and winter roosting sites due to the demolition or renovation of derelict buildings for human occupation, loss of commuting routes linking roosts to foraging sites, and loss of suitable foraging sites are the major threats to this species. The use of insecticides, habitat destruction such as felling of trees and scrub clearance and deterioration of old buildings.
White-clawed Crayfish (*Austropotamobius pallipes)*	1092	Water pollution, invasive species, forestry and farming.
Shining Sickle-moss (*Drepanocladus vernicosus*)	1393	Fertilisation, Abandonment of pastoral systems, Undergrazing, Forestry planting, Water pollution, Drainage

<table>
<tr><th>Site Name and Code</th><th>Lough Corrib SPA (Site Code: 004042)</th></tr>
<tr><td>Site Description</td><td>Lough Corrib is one of the most important ornithological sites in the country, with two wintering species having populations of international importance and a further sixteen species having populations of national importance. The breeding colonies of Common Tern, Sandwich Tern and Cormorant are also of national importance. Also of note is that seven of the species which regularly visit the site are listed on Annex I of the E.U. Birds Directive, i.e. Black-throated Diver, Red-throated Diver, Golden Plover, Great Northern Diver, Bar-tailed Godwit, Common Tern and Sandwich Tern.

The NPWS site synopsis for this designated site is included in full as Appendix B to this report.</td></tr>
<tr><td>Qualifying Features of the Site</td><td>The qualifying habitats and species found within Lough Corrib SPA are set out below.

<table>
<tr><th>Species Type (Annex I of the Birds Directive and Special Conservation Interests)</th><th>Species Code</th><th>Main Threats and Impacts</th></tr>
<tr><td>Common Tern (Sterna hirundo)</td><td>A193</td><td rowspan="5">Leisure Fishing, Water Pollution, Hunting, Fertilisation, Grazing.</td></tr>
<tr><td>Arctic Tern (Sterna paradisaea)</td><td>A194</td></tr>
<tr><td>Greenland White-fronted Goose(Anser albifrons flavirostris)</td><td>A395</td></tr>
<tr><td>Golden Plover (Pluvialis apricaria)</td><td>A140</td></tr>
<tr><td>Whooper Swan (Cygnus Cygnus)</td><td>A038</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Site Name and Code</th><th>Maumturk Mountains cSAC(Site Code: 002008)</th></tr>
<tr><td>Site Description</td><td>The Maumturk Mountains cSAC is one of the largest and most diverse sites of conservation importance in Ireland, with a wide range of habitats and species. The main feature of conservation value within the Maumturk Mountains cSAC is the blanket bog habitat and associated oligotrophic waters. The blanket bog is present across the cSAC area. The active blanket bog extends over much of the area.

The NPWS site synopsis for this designated site is included in full as Appendix B to this report.</td></tr>
<tr><td>Qualifying Features of the Site</td><td>The qualifying habitats and species found within Maumturk Mountains cSAC are set out below:

<table>
<tr><th>Habitat Type (Annex I of the Habitats Directive)</th><th>Habitat Code</th><th>Main Threats and Impacts</th></tr>
<tr><td>Alpine and Boreal heaths</td><td>4060</td><td>Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.</td></tr>
</table>
</td></tr>
</table>

	Siliceous rocky slopes with chasmophytic vegetation	8220	Drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
	Blanket bog (*active only)	7130	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	3110	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
	Northern Atlantic wet heaths with Erica tetralix	4010	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
	Depressions on peat substrates of the Rhynchosporion	7150	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.

Species Type	Species Code	Main Threats and Impacts
Atlantic Salmon (*Salmo salar*)	1106	Water pollution, invasive species, forestry, farming and fishing.
Slender Naiad (*Najas flexilis*)	1833	Water pollution, water abstraction, invasive species, forestry and farming.

Site Name and Code	Twelve Bens/Garraun Complex cSAC (Site Code: 002031)
Site Description	The Twelve Bens/Garraun Complex cSAC is one of the largest and most diverse sites of conservation importance in Ireland, with a wide range of habitats and species. The main feature of conservation value within the Twelve Bens/Garraun Complex is the blanket bog habitat and associated oligotrophic waters, between them these make up 50% of the cSAC. The blanket bog is present across the cSAC area. The active blanket bog extends over much of the area. Machair, an Annex I habitat which is also classified as a priority habitat in Ireland, is mentioned in the site synopsis for The Twelve Bens/Garraun Complex cSAC. The NPWS site synopsis for this designated site is included in full as **Appendix B** to this report.

Qualifying Features of the Site

The qualifying habitats and species found within Twelve Bens/Garraun Complex cSAC are set out below:

Habitat Type (Annex I of the Habitats Directive)	Habitat Code	Main Threats and Impacts
Blanket bog (*active only)	7130	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction
Siliceous rocky slopes with chasmophytic vegetation	8220	Drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Calcareous rocky slopes with chasmophytic vegetation	8210	Drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	8110	Drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Alpine and Boreal heaths	4060	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	3110	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
Old sessile oak woods with Ilex and Blechnum in British Isles	91A0	Internal effects include inappropriate grazing levels and invasive species, whereas external threats include clearance for agriculture or felling for timber
Depressions on peat substrates of the Rhynchosporion	7150	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.

Species Type	Species Code	Main Threats and Impacts
Atlantic Salmon (*Salmo salar*)	1106	Water pollution, invasive species, forestry, farming and fishing.
Otter (*Lutra lutra*)	1355	Use of pesticides, fertilization, hunting, trapping, poisoning, water pollution, infilling of ditches, dykes, ponds, pools, marshes or pits, management of aquatic and bank vegetation for drainage purposes, removal of sediments, canalization of inland water course.
Freshwater Pearl Mussel (*Margaritifera margaritifera*)	1029	Water pollution, water abstraction, invasive species, forestry and farming.
Slender Naiad (*Najas flexilis*)	1833	Water pollution, water abstraction, invasive species, forestry and farming.

Site Name and Code	**Connemara Bog Complex cSAC (Site Code: 002034)**
Site Description	The main feature of conservation value within the Connemara Bog complex is the blanket bog habitat and associated oligotrophic waters, between them these make up 79% of the cSAC. The blanket bog is present across the cSAC area. The active blanket bog extends over much of the area. The NPWS site synopsis for this designated site is included in full as **Appendix B** to this report.
Qualifying Features of the Site	The qualifying habitats and species found within Connemara Bog Complex cSAC are set out below:

Habitat Type (Annex I of the Habitats Directive)	Habitat Code	Main Threats and Impacts
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	3110	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures,

			pollution, drainage, erosion , invasive species.
	Natural dystrophic lakes and ponds	3160	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	3260	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
	Northern Atlantic wet heaths with Erica tetralix	4010	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
	European dry heaths	4030	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
	Molinia meadows on calcareous, peaty or clavey-silt-laden soils (*Molinion caeruleae*)	6410	Drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
	Blanket bog (*active only)	**7130**	**Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.**
	Old sessile oak woods with Ilex and Blechnum in British Isles	91A0	Internal effects include inappropriate grazing levels and invasive species, whereas external threats include clearance for agriculture or felling for timber.
	Alkaline fens	7230	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
	Coastal lagoons	1150	Fertilisation, grazing , forestry, burning, leisure fishing, hunting, peat extraction, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion , invasive species.
	Transition mires and quaking bogs	7140	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand

		and gravel extraction.
Depressions on peat substrates of the *Rhynchosporion*	7150	Peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Reefs	1170	Leisure fishing, hunting, dispersed habitation, discharges, sport and leisure structures, pollution, drainage, erosion, invasive species.

Species Type	Species Code	Main Threats and Impacts
Atlantic Salmon (*Salmo salar*)	1106	Water pollution, invasive species, forestry, farming and fishing.
Otter (*Lutra lutra*)	1355	Use of pesticides, fertilization, hunting, trapping, poisoning, water pollution, infilling of ditches, dykes, ponds, pools, marshes or pits, management of aquatic and bank vegetation for drainage purposes, removal of sediments, canalization of inland water course.
Marsh Fritillary (*Euphydryas aurinia*)	1065	Alteration of habitat, specifically: peat cutting; drainage and burning; afforestation; invasive species; grazing; dumping; fertilisation; restructuring agricultural land; communication routes; cultivation; mowing/cutting; modification of inland water structures; sand and gravel extraction.
Slender Naiad (*Najas flexilis*)	1833	Water pollution, water abstraction, invasive species, forestry and farming.

Site Name and Code	**Connemara Bog Complex SPA (Site Code: 004181)**
Site Description	**Note:** A site synopsis has not yet been published by the NPWS for this site.
Qualifying Features of the Site	The qualifying habitats and species found within Connemara Bog Complex SPA are set out below:

	Species Type (Annex I of the Birds Directive and Special Conservation Interests)	Species Code	Main Threats and Impacts
	Merlin *(Falco columbarius)*	A098	General forestry management, mechanical removal of peat, dispersed habitation, routes, autoroutes, walking, horse riding and non-motorised vehicles, invasion by a species.
	Golden Plover *(Pluvialis apricaria)*	A140	
	White-fronted Goose (*Anser albifrons flavirostris)*	A395	
	Cormorant *(Phalacrocorax carbo)*	A017	
	Common Gull *(Larus canus)*	A182	

3.4 EXISTING ENVIRONMENT

Habitats and Species in the Study Area

A site walkover was carried out in order to identify the habitats present within the study area. The habitats found within the study area are listed in the tables below and illustrated in **Images 3.7 to 3.18 (**Terrestrial Habitats**) Images 3.19-3.21 (**Aquatic Habitats**)**.

Terrestrial Habitats Recorded within the Study Area

Habitat Type and Reference Code	Located within Study Area
Improved Agricultural Grassland (GA1)	Throughout the study area.
Amenity Grassland (GA2)	Claremount
Dry Calcareous & Neutral Grassland (GS1)	Knockcallíagh, Derryneen, Glengowla
Dry Meadows & Grassy Verges (GS2)	Cloonoppeen, Derryeyglinna, Glengowla
Dry Humid Acid Grassland (GS3)	Leam West, Derryeyglinna, Knockmoyle, Claremount, Claremount, Canrawer
Wet Grassland (GS4)	Derryneen, Knockmoyle, Canrawer
Marsh (GM1)	Aird Bhéarra, Derryeyglinna
Dry Siliceous Heath (HH1)	Derryvickrune
Wet Heath (HH3)	Leam West, Derryeyglinna, Glengowla, Canrawer, Canrawer
Lowland Blanket Bog (PB3)	Emlaghmore (Moyrus ph), Bunscanniff, Maam Cross, Shannakinlougha, Leam West, Knockmoyle, Claremount, Canrawer
Cutover Bog (PB4)	Derryvickrune, Athry, Emlaghmore (Moyrus ph), Maam Cross, Bunscanniff, Shannakinlougha, Claremount, Canrawer
Eroding Blanket Bog (PB5)	Recess
Rich Fen and Flush (PF1)	Maam Cross
Oak-Birch-Holly Woodland (WN1)	Ballinafad, Lios Uachtair

Oak-Ash-Hazel Woodland (WN2)	Athry, Canrawer
Wet Willow Alder Ash Woodland (WN6)	Cloonoppeen, Knockbaun, Glengowla
Mixed Broadleaved Woodland (WD2)	Derryvickrune
Mixed Broadleaved/Conifer Woodland (WD2)	Cloon Beg
Conifer Plantation (WD4)	Derryvickrune
Scrub (WS1)	Derryvickrune, Derryvickrune, Maam Cross, Claremount
Hedgerows (WL1)	Throughout the study area.
Treelines (WL2)	Throughout the study area.
Exposed Siliceous Rock (ER1)	Maam Cross, Derryeyglinna
Stone Walls and Other Stone Work (BL1)	Throughout the study area.
Buildings and Artificial Surfaces (BL3)	Claremount

Image 3.7 Dry Neutral and Calcareous Grassland (GS1) vegetation on track in Knockcallíagh

Image 3.8 Dry Meadow & Grassy Verge (GS2) vegetation in Glengowla

Image 3.9 Dry-humid acid grassland (GS3) In Claremount

Image 3.10 Wet Grassland (GS4)– *Molinia* Meadow in Knockmoyle

Image 3.11 Species-rich Marsh (GM1) in the townland of Aird Bhearra

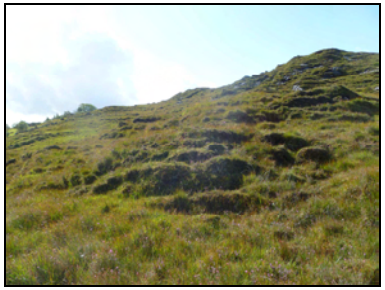


Image 3.12 Wet Heath (HH3) in the townland of Derryerglinna

Image 3.13 Cutover Bog (PB4) in the townland of Athry

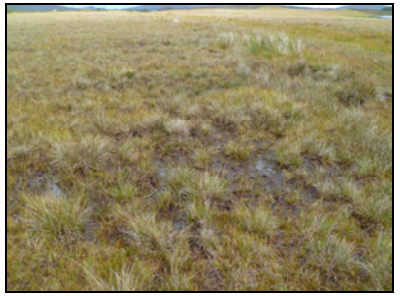


Image 3.14 Eroding Blanket Bog (PB5) in the townland of Bunscanniff

Image 3.15 Oak-Birch-Holly Woodland in Ballinafad

Image 3.16 Oak-Ash-Hazel Woodland habitat either side of the proposed route in Canrawer

Image 3.17 Wet willow-alder-ash woodland habitat in Cloonoppeen

Image 3.18 Exposed siliceous rock either side of the track in Maam Cross

Images 3.7 to 3.18 Terrestrial Habitats found within the study area

Aquatic Habitats Recorded in the Existing Environment

Habitat Type and Reference Code	Located within Study Area
Acid Oligotrophic Lakes (FL2)	**Lough Bofin, Lough Shindilla, Oorid Lough, Glendollagh (Garroman) Lough, Athry Lough, Ballynahinch Lake.**
Mesotrophic Lakes (FL4)	**Lough Adrehid and Derryneen Lough**
Eroding/Upland Rivers (FW1)	**Bunowen River (a tributary of the Owenriff), Letterfore River, Owentooey River, and the Owenglinn River.**
Depositing/Lowland Rivers (FW2)	**Athry**
Drainage Ditches (FW4)	**Throughout the study area.**
Reed and Large Sedge Swamps (FS1)	**Derryvickrune**

Image 3.19 The Bunowen River in the townland of Claremount, classified as a Eroding/Upland Rivers (FW1)

Image 3.22 Owentooey River classified as a Eroding/Upland Rivers (FWI), View from Derryneen Bridge

Image 3.21 Lough Adrehid, Mesotrophic Lake (FL4)

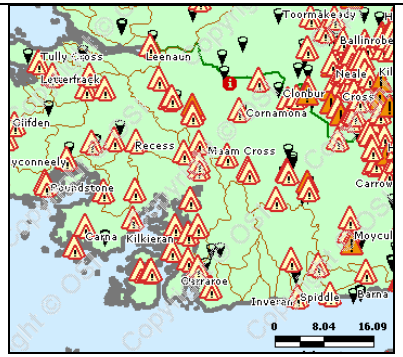
Images 3.19 to 3.21 Aquatic Habitats found within the study area

Water Quality in the Study Area

- The study area transects a number of river water bodies, within **4 no. catchments**. Within these catchments Water Framework Directive (WFD) monitoring is undertaken at a number of locations by the EPA and Galway County Council. The table below illustrates the WFD ecological classification for the water bodies in the study area.

Code	Name	Status	Objective
WE_30_1096	Corrib_Owenwee	Good	Protect
WE_30_1531	Corrib_Letterfore	Moderate	Restore_2021
WE_30_296	Corrib_Glashanasmearany	High	Protect
WE_31_1483	Coastalr4_Screeb_Ardderrynagleragh	Moderate	Restore_2015
WE_31_1600	Ballynahinch_Caher_DerryaddEast	Moderate	Restore_2015
WE_31_1617	Ballynahinch_Owenmore	High	Protect
WE_31_1978	Ballynahinch_Caher_Boheeshal	Good	Protect
WE_31_2091	Ballynahinch__AthryLough	Moderate	Restore_2015
WE_31_2139	Ballynahinch_Owenanookera	High	Protect

		WE_31_2291	Coastalr4_Screeb_Shannaunnafeola	High	Protect
		WE_31_268	Ballynahinch_Owentooey_Caher(BallynahinchyBy)	High	Protect
		WE_31_302	Ballynahinch_Recess_DerryclareLough	Good	Protect
		WE_32_3028	Owenglin_Owenglin_Cregg(BallynahinchBy)	Poor	Restore_2021
		WE_31_343	Ballynahinch__Derryvickrune	High	Protect
		WE_32_3035	Coastalt4_32_Derryehorraun	High	Protect
Geology and Hydrogeology in the Study Area	• **Soils**: Based on information contained in the Teagasc Subsoils Map (Western RBD Region), subsoils within the study area are comprised predominantly of thin blanket peat deposits. Made Ground is present along the route associated with the N59 road between Oughterard and Clifden. Made ground is most apparent in the more inhabited parts of the study area but also close to the dismantled railway line and other areas where materials have been sourced for abstraction or moved for construction (residential/civil). There are significant areas of made ground in both Oughterard and Clifden. There is a varying presence of till derived chiefly from granite along the proposed route between the village of Oughterard and Lough Bofin. Sporadic areas of till, derived chiefly from metamorphic rock, are evident within the study area between Lough Shindilla and Ballynahinch Lake, where it begins to become more prevalent. Bedrock outcrops and subcrops are evident at various points along the study area and are mostly apparent along the proposed route between Recess and Clifden. • **Bedrock Geology:** The main rock types encountered along the route are Precambrian Marbles and Precambrian Quartzite's, Gneisses and Schist's. Late-Silurian, Mid-Devonian Granites are also present along the route. The study area between Clifden to Maam Cross is underlain predominantly by the Marbles with Quartzite's, Gneisses and Schist also underlying the area. From Maam Cross to Oughterard the route passes over the metamorphic rocks described above, but the predominant rock type is Oughterard granite. The granite is present in two distinct areas, east of Maam Cross and around Lough Bofin as well as from Lough Agraffard to just west of Oughterard. • **Karst Feature**: There no karst features located within the study area • **Hydrogeology:** The rock underlying the majority of the area is classified by the Geological Survey of Ireland (GSI) as a 'Poor Aquifer'. Outside the village of Oughterard the proposed route is underlain by small segments of rock which are classified by the GSI as 'Regionally Important Aquifer – Karstified', 'Locally Important Aquifer (bedrock which is moderately productive only in local zones)' and 'Locally Important Aquifer (bedrock which is generally moderately productive)'.				

Flooding in the Study Area		There are records of a number of flooding incidents adjacent to the study area. **Figure 3.5** shows the numerous flooding events that have been recorded by the OPW in the study area. **Figure 3.5 Extract from OPW Flood Hazard Map within the Study Area (www.opw.ie)**

3.5 ASSESSMENT OF SIGNIFICANCE

ASSESSMENT CRITERIA – SCREENING MATRIX	
Describe the individual elements of the project (either alone or in combination with other plans or projects) likely to give rise to impacts on the Natura 2000 Sites	• Clearance for construction of the greenway and follow up maintenance may have an impact on vegetation and resulting qualifying habitats and species in and around the Natura 2000 sites. • Transport of material required to construct the greenway on to the site through Natura 2000 sites may have an impact on the qualifying habitats and species vegetation and water course in and around the Natura 2000 sites. • Upgrade works required for bridges on the proposed greenway route may have an impact on the water quality and resulting qualifying habitats and species of Natura 2000 sites • The siting of construction facilities/installations in or close to Natura 200 sites and their associated activities may have an impact on the qualifying habitats and species of the Natura 2000 sites. • Where the proposed works are in close proximity to the Natura 2000 sites, have the potential to cause in combination affects on the qualifying habitats and species of the Natura 2000 when considering the above potential impacts.
Describe any likely direct, indirect or secondary impacts of the project on the	**Size and Scale** The area of each of the Natura 2000 sites is large when compared to the area of the proposed project. However given the nature of

Natura 2000 Sites	the project and proximity to Natura 2000 sites and crossing a number of surface waters, it is accurate to state that the following impacts associated with size and scale may result: - Loss of habitat directly under greenway footprint, - Increased footfall in area, and - Loss of habitat due to construction activities. **Land Take** The majority of the proposed greenway will use the existing dismantled railway line and therefore additional land take will only be required in sections where land access is an issue. Where this is an issue, alternative existing forest tracks, roads etc will be used. Given the extent of the Natura 2000 sites relative to the proposed route, it is not likely that the proposed greenway will have a significant land requirement. **Distance from Natura 2000 site or key features of the site** The proposed greenway project lies adjacent to or runs through one or more of the six Natura 2000 sites and so could have significant impacts on the sites in this respect. **Resource Requirements** The proposed greenway will require importation of material for construction including aggregate for the greenway itself, steel for bridge improvements and timber for fencing. Fuel will be consumed by construction equipment. It is not anticipated that water will be required in the construction or operation of the road. it is not likely that the proposed greenway will have a significant impact on resource requirements. **Emissions** There is potential for emissions associated with the proposed project affecting two main sources- water and air. Emissions going to water could include sediment, silt, hydrocarbons from plant, etc. As stated in earlier sections, such emissions have the potential to impact negatively on the qualifying features of the Natura 2000 sites (aquatic environment). The construction and operational stages of the project will also cause the emission of normal vehicle emissions (carbon dioxide etc.). It is not anticipated that the extent of such emissions to air will have a negative effect on the qualifying features of the Natura 2000 sites. **Excavation Requirements** It is not proposed to carry out any significant excavation works as part of the Greenway project. Therefore it is not likely that the project will have a significant effect on the Natura 2000 site in this respect. **Transport Requirements** During construction there will be transport within the lands take boundary of the proposed project. This will involve transport of

material onto the site. It will be necessary at some access points to cross through and/or into Natura 2000 sites. The extent to which this will occur is unclear at this stage.

Duration of construction, operation, decommissioning
The proposed greenway will be constructed over a time period of several months and any resulting effects will be temporary in nature. The proposed operational phase is long-term in nature, however it is not anticipated that effects resulting from the use of the greenway on the Natura 2000 sites will be significant.

Cumulative Impacts with Other Plans and Projects in the Area
As part of the screening for an AA, in addition to the proposed works, other relevant projects and plans in the region must also be considered at this stage. These plans and projects are considered further in this respect in the table below.

Potential In-Combination Effects of Other Plans and Projects

Name of Plan or Project	Key policies/issues/objectives directly related to the relevant Natura 2000 sites	Potential cumulative or in-combination effects on the relevant Natura 2000 sites
Galway County Development Plan 2009-2015	Designated Sites, Habitats and Species Policies and Objectives Natural Heritage and Biodiversity Polices and Objectives Natural Water Systems Polices	Positive Impact
Western River Basin Management Plan 2009-2015	The Western RBD Management Plan, issued in December 2009, sets out a number of objectives and measures for all water bodies in the Western Region. **Objectives**: Ensure that the status of waters supporting protected areas is protected and (where necessary) improved by 2015. **Measures**: Implement 11 EU Directives, 9 other basic requirements.	Positive impact
NPWS Conservation Management Plans	Conservation Management Plans for the six Natura 2000 sites have not yet been published by the NPWS. However the general conservation objectives have been established.	Positive impacts
N59 Road Improvement Scheme	This project is currently at planning stage. The proposed improvements are online for the majority of the project. It is intended to combine the proposed greenway with some of this realignment where land access is an issue on the scheme.	Potentially Negative Impact
Coillte - Connemara/Mayo District Strategic Plan 2011-2015	**5 Year Priority Objectives** • Produce 220,000 cubic metres of wood from its forests in 2011 rising to 271,000 cubic metres in 2015. • Construct 38 km of forest roads • Produce 50 hectares of its new planting through farm partnerships • Produce 550 hectares of its new planting through private planting initiatives • Plant 100 hectares of forest and to replant 3440 ha by 2015.	Potentially Negative Impact

		• Construct 13 masts by 2015. • Continue the development of 2 wind farms in the period to 2015. • Develop a District Recreation Plan. • Maintain and enhance the percentage of broadleaves in the District managed for biodiversity • Increase the percentage of the forests in the District managed for biodiversity to 31.6% from 28%	
	Inland Fisheries Ireland (IFI) Corporate Plan 2011-2015	Goals: To improve the protection and conservation of the resource. To develop and improve wild fish populations. To increase the number of anglers. To generate a better return for Ireland from the resource	Positive
Describe any likely changes to the site arising as a result of the following:			

Reduction Habitat
The construction of the proposed greenway may cause some habitat loss in the Natura 2000 sites. This may result from removal of vegetation within the Natura 2000 sites. Where culverting or bridge construction is required as part of the proposal, this may also result in temporary reduction in the aquatic habitat area.

Disturbance to Key Species
The proposed greenway route will be in close proximity to and possibly within the boundary of the six Natura 2000 sites. As a result there is potential for disturbance to any one of the key species noted within the designated sites.

Habitat or Species Fragmentation
The fact that the proposed greenway will follow the exiting dismantled railway line will reduce substantially the possibility of fragmentation. In areas where the proposed route must deviate from the railway line it follows, where possible, other existing tracks and roads. This reduces the likelihood of fragmentation occurring within the Natura 2000 sites.

Reduction in species density
It is unlikely that there will be a significant direct loss of species density within the Natura 2000 sites as a result of the proposed project. However highly localised species reduction may occur. This is possible given the nature of the proposed work - modification of existing bridges over streams and rivers possibly affecting specific species of fish and bat roosts.

Changes in key indicators of conservation value
There may be a loss of qualifying habitats and species as a result of the proposal. Clearance of vegetation and working over water courses has the potential to interfere with the structure and function of specific habitats and impact the species dependant on such habitats. This would have the impact of causing a reduction in the key indicators of conservation value within the Natura 2000 sites.

Climate Change

	It is not anticipated that the proposal will have any significant effects on the Natura 2000 sites or their qualifying features in this respect.
Describe any likely impacts on the Natura 2000 sites as a whole in terms of: Interference with key relationships that define the structure and function of the site	**Interference with key relationships that define the structure and function of the sites** It is not considered likely that there will be any long term impacts on the key relationships that define the structure or function of the Natura 2000 sites resulting from the proposed project. The chief risk is a temporary reduction in water quality, alteration of stream morphology and some possible disturbance to habitats listed in Annex I during construction.
Provide Indicators of significance as a result of the identification of effects set out above in terms of:	**Loss** It is likely that the magnitude, intensity and integrity of loss in this respect will be low. Where loss does occur the duration of loss will however be permanent and the impact will be significant. **Fragmentation** It is likely that the magnitude, intensity and integrity of fragmentation in this respect will be low. Where fragmentation does occur it will however be permanent and the impact will be significant. **Disruption** It is likely that the magnitude, intensity and integrity of disruption in this respect will be low. Where disruption does occur it will however be temporary in nature and the impact will be significant. **Disturbance** It is likely that the magnitude, intensity and integrity of disturbance in this respect will be low. Where disturbance does occur it will however be temporary and the impact will be significant. **Change to key elements of the site** It is likely that the magnitude, intensity and integrity of changes to key elements of the Natura 2000 sites in this respect will be low. Examples of key elements are water resources, water quality and species population density. Where changes do occur it will however be temporary and the impact will be significant for the duration of the impact if appropriate measures are not put in place.
Describe from the above those elements	**The impacts of all aspects of the project are not known at this stage. It is evident that there may be impacts resulting from**

of the project or plan, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known.	**the proposed greenway project on the qualifying habitats and species of six identified Natura 2000 sites. The significance of these potential impacts needs to be investigated further to quantify and qualify such potential impacts. Therefore, due to this uncertainty, a Stage 2 'Appropriate Assessment' is considered necessary. A Natura Impact Statement will therefore be prepared, to facilitate the Appropriate Assessment of the project by the Competent Authority.**

APPENDIX B

NPWS Natura 2000 Site Synopses

SITE SYNOPSIS

SITE NAME: CONNEMARA BOG COMPLEX

SITE CODE: 002034

The Connemara Bog Complex is a large site encompassing the majority of the south Connemara lowlands, Co. Galway. The site is bounded to the north by the Galway-Clifden road and stretches as far east as the Moycullen-Spiddal road. Because of its large size the site contains a wide range of habitats. Extensive tracts of western blanket bog form the core interest, but there are also areas of heath, woodland, lakes, rivers and streams.

The Connemara Bog Complex is underlain predominantly by various Galway granites, with small areas along the northern boundary of Lakes Marble, schist and gneiss. The Roundstone bog area has a diverse bedrock geology composed mainly of the basic intrusive rock, gabbro. An area of rock, possibly Cambrian in age, called the Delaney Dome Formation occurs in the north-west of this area. Gabbro also occurs in the Kilkieran peninsula and near Cashel. The whole area was glaciated in the last Ice Age which scoured the lowlands of Connemara.

The site is a candidate SAC selected for active blanket bog and lagoons, both priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for floating river vegetation, wet and dry heath, alkaline fen, transition mires, lowland oligotrophic lakes, dystrophic lakes, Rhynchosporion, old Oak woodlands, *Molinia* meadows and reefs, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Atlantic Salmon, Otter, the plant Slender Naiad and the Marsh Fritillary butterfly.

The main habitat within this site is lowland Atlantic blanket bog. Most of the area is covered by blanket peat greater than one metre in depth. The Connemara Bog Complex is characterized by areas of deeper peat surrounded by rocky granite outcrops, covered by heath vegetation. The deeper peat areas are often covered by lakes and river systems. A mosaic of different communities therefore exists. These include, hummock/hollow systems, inter-connecting pools, Atlantic blanket bog pools, flushes, transition and quaking mires, freshwater marshes, lakeshore, lake and river systems. The key plant species of lowland blanket bog are Black Bog-rush (*Schoenus nigricans*), Purple Moor-grass (*Molinia caerulea*), Cross-leaved Heath (*Erica tetralix*), Deergrass (*Scirpus cespitosus*), Common Cottongrass (*Eriophorum angustifolium*), Bog Asphodel (*Narthecium ossifragum*), White Beak-sedge (*Rhynchospora alba*) and Bog Moss (*Sphagnum*) species.

Small patches of deciduous woodland and a large number of oligotrophic lakes add to the habitat diversity of the site. Also occurring within the site are several lagoons (a type of brackish lake) which display considerable variations in size, depth and salinity, resulting in a diverse assemblage of floral and faunal communities.

Nine legally protected plant species occur within this site (Flora (Protection) Order, 1999): Forked Spleenwort (*Asplenium septentrionale*), Parsley Fern (*Cryptogramma crispa*), Bog Hair-grass (*Deschampsia setacea*), Slender Cottongrass (*Eriophorum gracile*), Bog Orchid (*Hammarbya paludosa*), Slender Naiad (*Najas flexilis*), Heath Cudweed (*Omalotheca sylvatica*), Pillwort (*Pilularia globulifera*) and Pale Dog-violet (*Viola lactea*). The rare and threatened species, Dorset Heath (*Erica ciliaris*), Mackay's Heath (*Erica mackaiana*) and Green-winged Orchid (*Orchis morio*) also occur within this site. All the above species are listed in the Irish Red Data Book and Slender Naiad is listed on Annex II of the EU Habitats Directive.

The site is of national importance for wintering populations of Greenland White-fronted Geese. Small flocks (up to 30) are nowadays found on Roundstone Bog and also use the bogs between Recess and Maam Cross. In April 1989 a synchronised ground and air census of the Connemara bogs located 7 flocks of White-fronts, totalling 134-137 birds. In 1991/93 wintering numbers were considered to be not much more than 60 birds.

There is an internationally important breeding area for Cormorants at Lough Scannive with 218 pairs present in 1985 in a colony which is known to have existed pre-1968. Golden Plover, a species listed on Annex I of the EU Birds Directive, nests at up to four locations in the site, with a maximum of two pairs noted at any one location. Another Annex I species known to be present in the site is Merlin. Lough Naskanniva is an important inland breeding site for Common Terns (up to 60 pairs in 1977 and 1992) and Choughs, both of which are also Annex I species under the EU Birds Directive.

Atlantic Salmon, listed under Annex II of the E.U. Habitats Directive occurs in many of the rivers within the site. The Cashla and Ballynahinch systems are good examples of western acidic spate rivers which support the species. Good spawning and nursery grounds for the species occur in these systems. Arctic Charr occurs in a number of lakes within the site: Ballynahinch Lake, Glenicmurrin Lough and Lough Shindilla. The species has also been reported from Lough Oorid and Lough Glendollagh in the past, but has not been recorded from these lakes in recent years. Arctic Charr is listed in the Irish Red Data Book as being threatened.

Otter has been recorded as occurring in the Connemara Bog Complex. Irish Hare, another mammal listed in the Red Data Book, occurs on the site. Common Frog breeds on the site. It is listed in the Irish Red Data Book as internationally important and on Annex V of the EU Habitats Directive.

The main damaging operations and threats in the Connemara Bog Complex are peat-cutting, overgrazing and afforestation. Extensive peat extraction using 'Difco' machines has become common in the region in recent years and cutting by excavator and hopper is also increasing. The handcutting of peat is less threatening as it is usually on a much smaller scale but it still needs to be controlled within the site. Afforestation also threatens the site. Forestry affects habitat uniformity, lake and river catchments, nesting and feeding habitats for animals, and landscape integrity. Overgrazing and poaching by sheep and cattle is a widespread problem within the site,

with erosion of peat ensuing. The above operations are the most extensive but other threats and potentially damaging operations include land drainage and reclamation, fertilization, quarrying and dumping.

In summary, the Connemara Bog Complex encompasses a large area of relatively undamaged lowland Atlantic blanket bog of high conservation significance to Ireland as well as Europe. The site has nine protected and threatened Irish Red Data Book plant species. The site is internationally important for Cormorants and nationally important for Greenland White-fronted Geese and contains nesting sites for Golden Plover. The site supports several bird species listed on Annex I of the EU Birds Directive and a range of plant and animal species listed on Annex II of the EU Habitats Directive.

SITE SYNOPSIS

SITE NAME: CONNEMARA BOG COMPLEX SPA

SITE CODE: 004181

The Connemara Bog Complex SPA is a large site encompassing much of the south Connemara lowlands of Co. Galway. The site consists of three separate areas - north of Roundstone, south of Recess and north-west of Spiddal. It is underlain predominantly by a variety of igneous and metamorphic rocks including granite, schist, gneiss and gabbro. The whole area was glaciated during the last Ice Age which scoured the lowlands of Connemara.

The Connemara Bog Complex SPA is characterized by areas of deep peat surrounded by heath-covered rocky outcrops. The deeper peat areas are often bordered by river systems and the many oligotrophic lakes that occur, resulting in an intricate mosaic of various peatland/wetland habitats and vegetation communities; these include Atlantic blanket bog with hummock/hollow systems, inter-connecting pools, Atlantic blanket bog pools, flushes, transition and quaking mires, as well as freshwater marshes, lakeshore, lake and river systems.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Merlin, Golden Plover and Common Gull.

Lough Scannive, located within Roundstone Bog, supports a nationally important breeding population of Cormorant (160 breeding pairs in 2001). Other breeding birds using the site include Merlin and Golden Plover. A partial survey in 2009 recorded 8 pairs of Merlin at various locations throughout the site; 15 breeding locations for this species were recorded at the site in an earlier survey undertaken in 1985/86. A survey of upland birds in 2004 recorded 27 pairs of Golden Plover within the site. The numerous lakes scattered throughout the site provide suitable breeding locations for Common Gull (45 pairs in 2000); a survey in 2010 recorded 40 pairs of this species at the site.

The site is also utilised by a wintering population of Greenland White-fronted Goose; small flocks of up to 30 birds have been recorded at various locations within the site.

Connemara Bog Complex SPA is of high ornithological importance, in particular for its nationally important breeding populations of Cormorant, Merlin, Golden Plover and Common Gull. It is of note that three of the regularly occurring species, Greenland White-fronted Goose, Merlin and Golden Plover, are listed on Annex I of the E.U. Birds Directive.

30.11.2010

SITE SYNOPSIS

SITE NAME : LOUGH CORRIB

SITE CODE : 000297

Lough Corrib is situated to the north of Galway city and is the second largest lake in Ireland with an area of approximately 18,240 ha (the entire site is 20,556 ha). The lake can be divided into two parts: a relatively shallow basin, underlain by Carboniferous limestone, in the south and a larger, deeper basin, underlain by more acidic granite, schists, shales and sandstones, to the north. The surrounding lands are mostly pastoral farmland, to the south and east, and bog and heath, to the west and north. Rivers, mainly to the east of the site are included within the cSAC as they are important for Atlantic Salmon. These rivers include the Clare, Grange, Abbert, Sinking, Dalgan and Black to the east, as well as the Cong, Bealanabrack, Failmore, Cornamona, Drimneen and Owenriff to the west. In addition to the rivers and lake basin, adjoining areas of conservation interest, including raised bog, woodland, grassland and limestone pavement, have been incorporated into the site.

This site is of major conservation importance and includes 14 habitats listed on Annex I of the E.U. Habitats Directive. Six of these are priority habitats - petrifying springs, *Cladium* fen, active raised bog, limestone pavement, bog woodland and orchid-rich calcareous grassland. The other annexed habitats present include hard water lakes, lowland oligotrophic lakes, floating river vegetation, alkaline fens, degraded raised bogs, Rhynchosporion vegetation, *Molinia* meadows and old Oak woodlands. Species present on the site that are listed on Annex II of this directive are Sea Lamprey, Brook Lamprey, Atlantic Salmon, White-clawed Crayfish, Freshwater Pearl Mussel, Otter, Lesser Horseshoe Bat, Slender Naiad and the moss *Drepanocladus vernicosus*.

The shallow, lime-rich waters of the southern basin the of lake support one of the most extensive beds of Stoneworts (Charophytes) in Ireland, with species such as *Chara aspera*, *C. hispida*, *C. delicatula*, *C. contraria* and *C. desmacantha* mixed with submerged Pondweeds (*Potamogeton perfoliatus*, *P. gramineus* and *P. lucens*), Shoreweed (*Littorella uniflora*) and Water Lobelia (*Lobelia dortmanna*). These *Chara* beds are an important source of food for waterfowl. In contrast, the northern basin contains more oligotrophic and acidic waters, without *Chara* species, but with Shoreweed, Water Lobelia, Pipewort (*Eriocaulon septangulare*), Quillwort (*Isoetes lacustris*), Alternate Water-milfoil (*Myriophyllum alternifolium*) and Slender Naiad (*Najas flexilis*). The last-named is listed under the Flora (Protection) Order, 1999 and is an Annex II species under the EU Habitats Directive.

Large areas of reedswamp vegetation, dominated by varying mixtures of Common Reed (*Phragmites australis*) and Common Club-rush (*Scirpus lacustris*), occur around the

margins of the lake. Reedswamp usually grades into species-rich marsh vegetation characterised by Slender Sedge (*Carex lasiocarpa*), Water Mint (*Mentha aquatica*), Water Horsetail (*Equisetum fluviatile*) and Bog Bean (*Menyanthes trifoliata*). Of particular note are the extensive beds of Great Fen-sedge (*Cladium mariscus*) that have developed over the marly peat deposits in sheltered bays, particularly in the south-east corner of the lake. Alkaline fen vegetation is more widespread around the lake margins and includes, amongst the typically diverse range of plants, the Slender Cottongrass (*Eriophorum gracile*), a species protected under the Flora (Protection) Order, 1999. Wet meadows dominated by Purple Moor-grass (*Molinia caerulea*) occur in seasonally flooded areas close to the lake shore. These support species such as Sharp-flowered Rush (*Juncus acutiflorus*), Jointed Rush (*J. articulatus*), Carnation Sedge (*Carex panicea*), Devil's-bit Scabious (*Succisa pratensis*), Creeping Bent (*Agrostis stolonifera*) and Tormentil (*Potentilla erecta*), amongst others.

This large site contains four discrete raised bog areas and is selected for active raised bog, degraded raised bog, Rhynchosporion and bog woodland. Active raised bog comprises areas of high bog that are wet and actively peat-forming, where the percentage cover of bog mosses (*Sphagnum* spp.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, *Sphagnum* lawns, flushes and soaks. Degraded raised bog corresponds to those areas of high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration. The Rhynchosporion habitat occurs in wet depressions, pool edges and erosion channels where the vegetation includes White Beak-sedge (*Rhynchospora alba*) and/or Brown Beak-sedge (*R. fusca*), and at least some of the following associated species, Bog Asphodel (*Narthecium ossifragum*), Sundews (*Drosera* spp.), Deergrass (*Scirpus cespitosus*) and Carnation Sedge (*Carex panicea*).

At Addergoole, on the eastern shores of Lough Corrib, there is an important area of western raised bog. This bog area is one of the most westerly, relatively intact raised bogs in the country. There are also other substantial areas of raised bog along various tributaries of the Corrib in east Co. Galway, namely Slieve Bog, Lough Tee Bog and Killaclogher bog. The active parts of these bogs mostly correspond to the wettest areas, where there are well developed surface features with hummocks, lawns and pools. It is in such areas that Rhynchosporian vegetation is best represented. The dominant species is the aquatic bog moss *Sphagnum cuspidatum,* which is usually accompanied by Bogbean (*Menyanthes trifoliata),* White Beak-sedge, Bog Asphodel, Bog Cotton *(Eriophorum angustifolium)*, Bog Sedge (*Carex limosa)* and Great Sundew (*Drosera anglica)*. Brown Beak-sedge, a locally rare plant of wet bog pools, has been recorded from a number of the bog areas within the site. At Addergoole a substantial bog lake or soak occurs and this is infilling with large rafts of Rhynchosporion vegetation at present. This area is associated with an important area of wet bog woodland dominated by Downy Birch (*Betula pubescens*).

The largest part of the uncut high bog comprises degraded raised bog. Degraded bog is dominated by a raised bog flora which tends to be rather species-poor because of

disturbance and/or drying-out. The most conspicuous vascular plant species are usually Carnation Sedge (*Carex panicea*), Heather (*Calluna vulgaris*), Bog Cotton, Cross-leaved Heath (*Erica tetralix*), Bog Asphodel and Deergrass. Bog Rosemary (*Andromeda polifolia*) and Cranberry (*Vaccinium oxycoccos*), two species indicative of raised bog habitat, are frequent on both degraded and active areas of raised bog. *Sphagnum* cover is generally low within degraded areas due to a combination of drying-out and frequent burning.

Limestone pavement occurs along much of the shoreline in the lower Corrib basin and supports a rich and diverse flora, including Herb-robert (*Geranium robertianum*), Bloody Crane's-bill (*G. sanguineum*), Carline Thistle (*Carlina vulgaris*), Spring Gentian (*Gentiana verna*), Wild Thyme (*Thymus praecox*), Rustyback (*Ceterach officinarum*), Wood Sage (*Teucrium scorodonia*), Slender St. John's-wort (*Hypericum pulchrum*), Quaking-grass (*Briza media*) and Blue Moor-grass (*Sesleria albicans*). Areas of Hazel (*Corylus avellana*) scrub occur in association with exposed limestone pavement and these include species such as Hawthorn (*Crataegus monogyna*), Buckthorn (*Rhamnus catharticus*), Spindle (*Euonymus europaeus*) with occasional Juniper (*Juniperus communis*). Three Red Data Book species are also found in association with limestone scrub - Alder Buckthorn (*Frangula alnus*), Shrubby Cinquefoil (*Potentilla fruticosa*) and Wood Bitter-vetch (*Vicia orobus*), the latter is also protected under the Flora (Protection) Order, 1999.

Open areas of orchid-rich calcareous grassland are also found in association with the limestone exposures. These can support a typically rich vegetation, including many orchids such as Pyramidal Orchid (*Anacamptis pyramidalis*), Common Spotted-orchid (*Dactylorhiza fuchsii*), Early-purple Orchid (*Orchis mascula*), Frog Orchid (*Coeloglossum viride*), Fragrant Orchid (*Gymnadenia conopsea*), Marsh Helleborine (*Epipactis palustris*), Greater Butterfly-orchid (*Platanthera chlorantha*) and Irish Lady's-tresses (*Spiranthes romanzoffiana*). The latter is protected under the Flora (Protection) Order, 1999.

The Hill of Doon, located in the north-western corner of the lake, is a fine example of a Sessile Oak (*Quercus petraea*) woodland. The understorey is dominated by Sessile Oak, Holly (*Ilex aquifolium*) and occasional Juniper. There are occasional Yew (*Taxus baccata*) and Ash (*Fraxinus excelsior*) and a well developed ground layer dominated by Bilberry (*Vaccinium myrtillus*), Hard Fern (*Blechnum spicant*) and Wood Rush (*Luzula sylvatica*). Woodland also occurs on some of the islands in the lake.

The lake is rated as an internationally important site for waterfowl. Counts from 1984 to 1987 revealed a mean annual peak total of 19,994 birds. In the past a maximum peak of 38,281 birds was recorded. The lake supports internationally important numbers of Pochard (average peak 8,600) and nationally important numbers of the following species: Coot (average peak 6,756), Mute Swan (average peak 176), Tufted Duck (average peak 1,317), Cormorant (average peak 110) and Greenland White-fronted Goose (average peak 83). The latter species is listed on Annex I of Birds Directive. The Coot population is the

largest in the country and populations of Tufted Duck and Pochard are second only to Lough Neagh. 30-41 breeding pairs of Common Scoter occur on the lake (1995 data) as well as breeding populations of Arctic Tern and Common Tern. Other bird species of note recorded from or close to the lake recently include Hen Harrier, Whooper Swan, Golden Plover and Kingfisher. All of these species are listed on Annex I of the E.U. Birds Directive.

Otter and Irish Hare have been recorded regularly within this site. Both of these species are listed in the Red Data Book and are legally protected by the Wildlife Act 1976. Otter is also listed on Annex II of the E.U. Habitats Directive. Lough Corrib is considered one of the best sites in the country for otter, due to the sheer size of the lake and associated rivers and streams and also the generally high quality of the habitats. Atlantic Salmon (*Salmo salar*) use the lake and rivers as spawning grounds. Although this species is still fished commercially in Ireland, it is considered to be endangered or locally threatened elsewhere in Europe and is listed on Annex II of the E.U. Habitats Directive. Lough Corrib is also a well known fishing lake with a very good Trout (*Salmo trutta*) fishery. The lake has a population of Sea Lamprey (*Petromyzon marinus*), a scarce, though probably under-recorded species listed on Annex II of the E.U. Habitats Directive.

A population of Freshwater Pearl-mussel (*Margaritifera margaritifera*), a species listed on Annex II of the E.U. Habitats Directive, occurs within the site. White-clawed Crayfish (*Austropotamobius pallipes*), also listed on Annex II, is well distributed throughout Lough Corrib and its in-flowing rivers over limestone. A summer roost of Lesser Horseshoe Bat (*Rhinolophus hipposideros*), another Annex II species, occurs within the site - approximately 100 animals were recorded here in 1999.

The main threats to the quality of this site are from water polluting activities resulting from intensification of agricultural activities on the eastern side of the lake, uncontrolled discharge of sewage which is causing localised eutrophication of the lake, and housing and boating development, which is causing the loss of native lakeshore vegetation. The raised bog habitats are susceptible to further degradation and drying out due to drainage and peat cutting and, on occasions, burning. Peat cutting threatens Addergoole Bog and already a substantial area of it has been cut away. Fishing and shooting occur in and around the lake. Introduction of exotic crayfish species or the crayfish fungal plague (*Aphanomyces astaci*) could have a serious impact on the native crayfish population. The bat roost is susceptible to disturbance or development.

Despite this ongoing interference however, Lough Corrib is one the best examples of a large lacustrine catchment system in Ireland, with a range of habitats and species still well represented. The lake itself is internationally important for birds and is designated as a Special Protection Area.

SITE SYNOPSIS

SITE NAME: MAUMTURK MOUNTAINS

SITE CODE: 002008

The Maumturk Mountains are situated east of The Twelve Bens and west of the Maumtrasnas, between the Inagh Valley and the Leenaun/Maam road. The site is bounded to the north by Killary Harbour and to the south by the Galway/ Clifden road. Most of the mountains exceed 600 m in height and about half of the land within the site lies above an altitude of 250 m. In addition many rivers criss-cross the site. The main bedrock is quartzite in the south, which forms impressive cliffs but little mineral soil, and shales and slates in the northern area, which weather more easily. Bands of metamorphosed limestone (Lakes Marble Formation) occur at Lissoughter, Maumeen Gap at Knocknagur and Maamturkmore.

The site is a candidate SAC selected for blanket bog, a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for lowland oligotrophic lakes, alpine heath, siliceous rocky and Rhynchosporion, all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive – Slender Naiad and Atlantic Salmon.

Wet heath is widespread within the site on the margins of areas of blanket bog and on the lower slopes of mountains where peat depth is less than about 1 metre. The vegetation is typically dominated by Purple Moor-grass (*Molinia caerulea*), with Cross-leaved Heath *(Erica tetralix)* and Heather (*Calluna vulgaris*) locally subdominant. Other frequent species include Tormentil (*Potentilla erecta*), Heath Milkwort (*Polygala serpyllifolia*), Many-stalked Spike-rush (*Eleocharis multicaulis*), Bog Asphodel (*Narthecium ossifragum*) and the sedges *Carex echinata* and *C. panicea*. On drier, more steep slopes, dry heath is present with Bell Heather (*Erica cinerea*) a typical species. Overgrazing by sheep has greatly modified the structure and composition of the heath communities, with a reduction in Heather cover and in places the initiation of soil erosion.

Blanket bog also occurs within this site, some of which is intact and of good quality, with a particularly good example at Caher. Typical bog species are found, including Heather, Purple Moor-grass, Black Bog-rush *(Schoenus nigricans),* Bog Asphodel, Cross-leaved Heath, Bog Cotton *(Eriophorum angustifolium*), Carnation Sedge *(Carex panicea),* the moss *Racomitrium lanuginosum* and locally frequent hummocks of the bog mosses *Sphagnum fuscum* and *S. imbricatum*. In addition, the lichen flora is locally luxuriant and includes the rare *Cladonia rangiferina.* Flushes occur in some areas of the bog, such as on the south slope of Knocknagur. Here, species such as Pondweed (*Potamogeton polygonifolius),* Bulbous Rush *(Juncus bulbosus),* Jointed Rush *(Juncus articulatus),* Spike Rush *(Eleocharis multicaulis)* and various sedges *(Carex panicea, C. demissa, C. hostiana)* are found. At this location, the scarce Brown Beak-sedge (*Rhynchospora fusca)* is common in the surrounding bog.

Rhynchosporion vegetation is associated with the blanket bog in a few areas of the site. It is characterised by well devoloped inter-connecting pool systems with quaking carpets of *Sphagnum*. The pool areas are typically dominated by *Sphagnum cuspidatum* and *S. auriculatum*, with Bog Cotton, Bogbean (*Menyanthes trifoliata*), and Sundews (*Drosera anglica* and *D. intermedia*). The quaking flat areas are dominated by White-beaked Sedge (*Rhynchospora alba*), Bog Asphodel and Bog Cotton.

Oligotrophic lakes are well represented in this site, occurring mainly to the south-eastern sector of site near Maam Cross. The principal lakes are Lough Shindilla, Loughanillaun, Lough Nambrackboy, Lough Shannagrena, Maumwee Lough and Lehanagh Lough. Most of these are small to medium sized systems and are of good quality. Typical oligotrophic aquatic species occur, including Quillwort (*Isoetes lacustris),* Pipewort *(Eriocaulon aquaticum),* Water Lobelia *(Lobelia dortmanna),* Shoreweed *(Littorella uniflora)* and Water Milfoil *(Myriophyllum alterniflorum).* Spawning salmon and trout occur in at least Maumwee Lough.

Other habitats present include lowland blanket bog, siliceous quartzite scree, exposed rock, upland grassland on peaty and mineral substrates, river valleys and streams, lakes, and woodland on lake islands.

In areas where base-rich rocks occur at altitude, e.g. Maumeen Gap and Lissoughter, scarce plant species such as Mountain Avens (*Dryas octopetala*) and Alpine Meadow-rue (*Thalictrum alpinum*) and the Red Data Book species, Purple Saxifrage (*Saxifraga oppositifolia*), are found. The site supports a range of other scarce arctic-alpine/mountain plants, including Green Spleenwort (*Asplenium viride*), Brittle Bladder-fern (*Cystopteris fragilis*), Holly Fern (*Polystichum lonchitis*), Beech Fern (*Phegopteris connectilis*), Starry Saxifrage (*Saxifraga stellaris*), Roseroot (*Rhodiola rosea*), Cowberry (*Vaccinium vitis- idaea*), Mountain Sorrel (*Oxyria digyna*), Dwarf Willow (*Salix herbacea*), Lesser Twayblade (*Listera cordata*), Stiff Sedge (*Carex bigelowii*) and Juniper (*Juniperus communis*).

Several other Red Data Book plant species are also found on the site: Slender Cottongrass (*Eriophorum gracile*) and Slender Naiad (*Najas flexilis*) occur in single locations. There is an old record from near Maam Cross for Wood Bitter-vetch (*Vicia orobus*), but this has not been seen on the site in recent years. All of these species are legally protected (Flora Protection Order, 1999) and Slender Naiad is also listed on Annex II of the EU Habitats Directive. The threatened, Marsh Clubmoss (*Lycopodiella inundata*) also occurs within the site.

The site is very important for salmon, a species listed on Annex II of the EU Habitats Directive. The rivers and lakes, and especially the Bealnabrack system, provide high quality spawning and nursery rivers.

Arctic Charr has been recorded in Derryneen Lough and Lough Shindilla. However, only in Lough Shindilla are there recent records for this species. This fish species is listed in the Irish Red Data Book as being threatened in Ireland. The Irish Hare has been recorded from the site and is probably widespread; this endemic subspecies is

also listed in the Red Data Book as being threatened. Common Frog, also a Red Data Book species, breeds on the site. Birdlife on the site includes Dipper, Heron, Kestrel, Meadow Pipit, Raven, Snipe, Stonechat, Wheatear and Woodcock. Peregrine, a species listed on Annex I of the EU Birds Directive, occurs within the site.

The main damaging activities and threats to the Maumturk Mountains are overgrazing, peat-cutting and afforestation. Grazing, in particular by sheep, is widespread and quite severe within the site. This has resulted in the erosion of both lowland and mountain blanket bog and in the modification and destruction of heath communities, particularly in the southern half of the site. Peat- cutting, both by hand and by machine, has become more of a problem in recent years but is largely confined to areas of deep, lowland blanket bog. The above activities are the most extensive but other threats and potentially damaging activities include land drainage and reclamation, fertilization, quarrying and dumping.

This site is of interest as it is a good example of an extensive mountain landscape, containing blanket bog, large areas of heath, siliceous rocky vegetation, oligotrophic lakes and upland grassland. The areas of blanket bog at Teernakill and Caher are largely unaffected by overgrazing and are in very good condition. The presence of rare and protected plant species and of the scarce Arctic Charr adds to the interest of the site.

SITE SYNOPSIS

SITE NAME: THE TWELVE BENS/GARRAUN COMPLEX

SITE CODE: 002031

This is an extensive site situated in the north-west of Connemara, dominated by mountaineous terrain. The site is bounded to the south by the Connemara Bog Complex, to the east by the Maumturk Mountains and to the north by Killary Harbour. Included within the site are the Twelve Bens mountain range, the mountains to the north of Kylemore (Doughruagh, Garraun and Benchoona), rivers including the Ballynahinch and Owenglin systems and an area of coastal heath and machair near Glassilaun. The site also includes some extensive tracts of lowland blanket bog which are continuous with the mountains. Most of the mountain summits reach a height in excess of 500 m, the highest being Ben Baun in the Twelve Bens which reaches 730 m. The site includes a large portion of the Connemara National Park and a Statutory Nature Reserve at Derryclare Wood.

Geologically, the site can be divided into two distinct parts. The Twelve Bens are composed of resistant quartzite with schists in the valleys while the mountains north of Kylemore are composed of gneiss and various types of sandstones and mudstones. There are also areas of gabbro (Doughruagh and Currywongaun), mica schist (Muckanaght) and marble outcrops (south of Kylemore Lough). The main soil type within the site is peat.

The site is a candidate SAC selected for active blanket bog a priority habitat on Annex I of the E.U. Habitats Directive. The site is also selected as a candidate SAC for, alpine heath, calcareous rocky, siliceous rocky and siliceous scree vegetation, lowland oligotrophic lakes, Rhynchosporion and old Oak woodlands all habitats listed on Annex I of the E.U. Habitats Directive. The site is also selected for the following species listed on Annex II of the same directive - Freshwater Pearl Mussel, Atlantic Salmon, Otter and the plant Slender Naiad.

The predominant vegetation type on the site is upland blanket bog/heath dominated by Heather (*Calluna vulgaris*), Deergrass (*Scirpus cespitosus*), Cross-leaved Heath (*Erica cinerea*) and the mosses *Racomitrium lanuginosum* and *Sphagnum capillifolium*). In places this vegetation can be rich in liverwort speces such as *Adelanthus lindenbergianus* and *Bazzania pearsonii*. This unusual type of species-rich dwarf shrub heath is almost confined to the mountains of the west of Ireland and Scotland and is particularly well developed in the Twelve Bens. Close to the mountain summits this blanket bog/heath is often very thin with a high proportion of outcropping bedrock.

Another important and widespread habitat is lowland blanket bog dominated by Purple Moor-grass (*Molinia caerulea*), Black Bog-rush (*Schoenus nigricans*), Cross-leaved Heath and the liverwort *Pleurozia purpurea*. These areas of lowland blanket

bog usually occur in the valleys between the mountains, e.g. the Gleninagh Valley. Rhynchosporion vegetation is well represented around pools, in wet hollows and in quaking and flush areas associated with the lowland blanket bog. White Beak-sedge (*Rhynchospora alba)* occurs in association with such species as Bog Cotton (*Eriophorum angustifolium),* Bogbean *(*M*enyanthes trifoliata),* Black Bog-rush *(Schoenus nigricans),* and a range of bog mosses, including *Sphagnum auriculatum* and *S. cuspidatum*.

The site contains a large range of others habitats, including upland grassland dominated by Sheep's Fescue (*Festuca ovina*) and Mat-grass (*Nardus stricta*), Sessile Oak (*Quercus petraea*) woodland, scree, oligotrophic (nutrient-poor) lakes, rivers, reedbeds, freshwater marshes, coastal heath, machair, sand dune and salt marsh.

A number of rare, Red Data Book plant species are found within the site: Alpine Saw-wort (*Saussurea alpina*), Holly Fern (*Polystichum lonchitis*), Purple Saxifrage (*Saxifraga oppositifolia*), and the legally protected (Flora Protection Order, 1999) Parsley Fern (*Cryptogramma crispa*). These are generally confined to mountains cliffs above 400 m, where a number of other scarce plant species, for example, Alpine Meadow-rue (*Thalictrum alpinum*), are also found. Other Red Data Book species have also been recorded from the site: Marsh Clubmoss (*Lycopodiella inundata*), Corncockle (*Agrostemma githago*) and the legally protected Heath Cudweed (*Omalotheca sylvatica*). The latter two species have not been recorded from the site in recent years. St. Dabeoc's Heath (*Daboecia cantabrica*), a species which in Ireland is restricted to Connemara and south Mayo, occurs commonly within the site.

The suite of lowland lakes that encircle the mountains represent some of the finest oligotrophic lakes in the country and two rare, Red Data Book plant species, Slender Naiad (*Najas flexilis*) and Pillwort (*Pilularia globulifera*) occur. Slender Naiad is rare in Europe and is listed on Annex II of the EU Habitats Directive.

The site contains several small areas of Sessile Oak woodland, a habitat which is particularly rare in Connemara. The best examples on the site of this habitat are found at Kylemore and on the north shore of Derryclare Lough. Derryclare Wood, a Statutory Nature Reserve, has been particularly well studied. It is composed mostly of Sessile Oak, with some Rowan (*Sorbus aucuparia*), Downy Birch (*Betula pubescens*) and occasional Ash (*Fraxinus excelsior*) forming the canopy layer. There is a well-developed lichen and fungus flora present. The fungal parasite, *Hemigrapha astericus*, a native of Australia and South America, was first recorded in the northern hemisphere from this wood. The Kylemore woods, though heavily infested by Rhododendron (*Rhododendron ponticum*), still retain a diverse flora and support interesting communities of mosses and liverworts, including such species as *Radula voluta, Lejeunea holtii, L. hibernica, L. flava* subsp. *moorei, Cephalozia hibernica, Teleranea nematodes, Campylopus setifolius, Oxystegus hibernicus, Grimmia hartmanii* and *G. funalis*.

Irish Hare, Otter, Freshwater Pearl-mussel and Common Frog have been recorded from the site. These species are protected under the 1976 Wildlife Act. The Owenglin River and Ballynahinch system supports an important population of Salmon and salmon nursery grounds. Arctic Charr, a species listed in the Irish Red Data Book

as threatened in Ireland, has been recorded from Lough Inagh, Kylemore Lough, Lough Muck and Lough Fee.

Birdlife reported from the site includes Raven, Wheatear, Stonechat, Meadow Pipit, Red Grouse, a declining species of Heather moorland, Snipe, Curlew, Woodcock, Hooded Crow, Twite, Ring Ouzel (the latter two both Irish Red Data Book species) and the EU Birds Directive Annex I species, Peregrine, Merlin, Golden Plover and Chough. The site provides excellent habitat for Peregrine and this species has traditionally bred at several locations within it.

The upland vegetation of the site is most threatened by overstocking with sheep and by afforestation with coniferous species.

The Twelve Bens/Garraun Complex includes a wide variety of habitat types, eight of which are listed on Annex I of the EU Habitats Directive, and populations of many rare or scarce plant and animal species. It is one of the largest and most varied sites of conservation interest in Ireland.

APPENDIX C

Arup Bridge Report

Galway County Council

Bridge Assessment for Galway County Council

Structural Review of 2 No. Bridges on disused Galway/Clifden Railway Line

Rep/219233/S001

issue1 | 16 March 2012

Job number 219233-00

Ove Arup & Partners Ireland

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Document Verification

ARUP

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Contents

Appendices

1 Introduction

1.1 Galway County Council engaged Arup to prepare a Structural Review Report on 2 No. Bridges (Cloonbeg Bridge and Athry River Bridge) on the disused Galway/Clifden Railway line. Specifically the brief includes (Ref Email Mr K Lydon 30 June 2011).

- A Structural Report on abutments of both bridges
- An assessment on the deck and beams of the Cloonbeg Bridge
- A plan for both bridges for new spans

1.2 A visual inspection of both bridge locations was carried out in December 2011 jointly by Mr Hugh Griffin (Arup) and Mr Kurt Lydon (Galway Co Co). The brief was further clarified as follows:

- The re-development of the bridges will form part of a greenway/cycleway suitable for pedestrians/cyclists
- The Cloonbeg existing bridge deck is to be retained
- The Athry bridge is to be rendered suitable for traffic by tractors and other small vehicles

2 Assessment of Cloonbeg Bridge

2.1 Abutments

2.1.1 A visual inspection of both abutments was carried out from the river bank. The river was in spate at the date of the inspection. The central pier could not be inspected (except from the bridge deck) at close range.

2.1.2 Both abutments and the central pier are constructed in masonry. There are no obvious cracks or bulges in any of the structures.

2.1.3 There was no obvious evidence of structural impairment due to scouring or other cause.

2.2 Bridge Deck and Beams

2.2.1 The bridge consists of two spans each of approximately 15.5m (based on information provided by Galway Co Co). As noted above each span is supported on a central masonry pier and on a masonry abutment at the rivers edge.

2.2.2 The existing bridge deck consists of two main steel beams (spaced approximately 4.3m apart) supporting steel transverse beams (at 1.25m centres) which in turn support a steel decking. The decking carries a concrete/granular filling. There is a significant build up of rubble debris and plant growth on the bridge decking. The existing arrangement is shown in Sketch 01.

2.2.3 The main steel beams are plate girders with stiffeners at 1.25m c/c (i.e. at each transverse beam). There is significant corrosion on the girders themselves and many of the stiffeners have rusted away. Rivets are also missing at plate connections. We do not consider that the girders are suitable as structural members although they are to be retained for historical reasons.

2.2.4 The transfer beams are similarly corroded in some locations particularly at connections to the girders. The steel decking has corroded through in some locations. We believe that the new pedestrian bridge should not rely on either the transverse beams or the existing decking although they will be retained.

3 Proposed New Structure for Cloonbeg Bridge

3.1 As noted earlier, the existing structure is not to be relied on. We propose to erect a new lightweight steel and timber structure over the existing. Details are shown in Sketch 02.

3.2 The design takes account of live loading from pedestrians and cyclists ($5Kn/m^2$) and no vehicular access is to be allowed onto the bridge.

3.3 The existing bridge structure is to be retained and maintained. Apart from the historical significance of the bridge, the dead weight is necessary to limit pedestrian generated vibrations to acceptable levels.

3.4 All debris must be removed from the existing deck. The existing bridge will act as a temporary platform for the construction of the new structure. Because of the restricted access to the bridge, it is likely that the main beams will arrive in sections and be spliced together insitu.

3.5 The details shown are for the purpose of illustrating the feasibility of construction. They are not to be used for construction.

4 Assessment of Athry Bridge

4.1 Abutments

4.1.1 A visual inspection of both abutments was carried out from the river bank. The river was in spate at the date of the inspection.

4.1.2 The abutments are constructed in masonry (measured at 520mm at top) and are currently acting as cantilevers as the bridge deck has been removed. There are no obvious cracks, bulges or lack of verticality in the abutment walls.

4.1.3 There was no obvious evidence of structural impairment due to scouring or other cause.

4.2 Bridge Deck

4.2.1 The original bridge deck has been removed and the bridge is not currently spanned.

5 Proposed New Structure for Athry Bridge

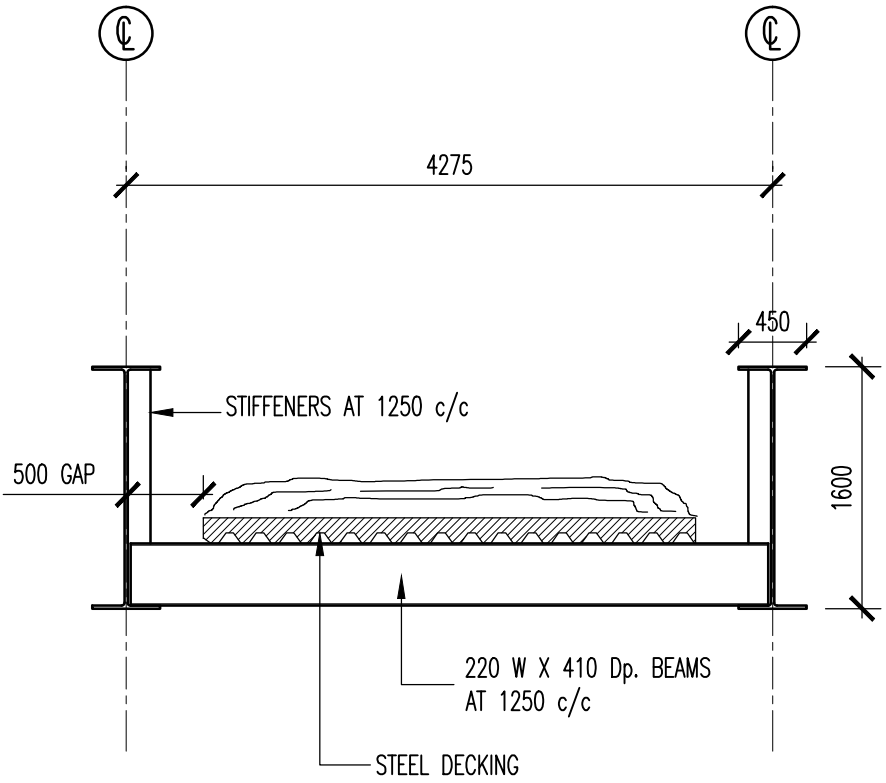
5.1 The bridge span is short (6m approx). We consider that the optimum design solution would involve the erection of a steel structure (3 no beams and metal decking) to act as a permanent shutter for an insitu concrete deck. Details are shown in Sketch 03.

5.2 The outline design is based on a single Gross Weight Vehicle of 7.5 tonnes giving rise to axel loads as set out in Annex D of BD21/01 (Assessment of Highway Bridges and Structures Vol 3 Section 4). If a heavier vehicle is considered appropriate then the design will need to be altered.

5.3 The details shown are for the purpose of illustrating the feasibility of construction. They are not to be used for construction.

Appendix A

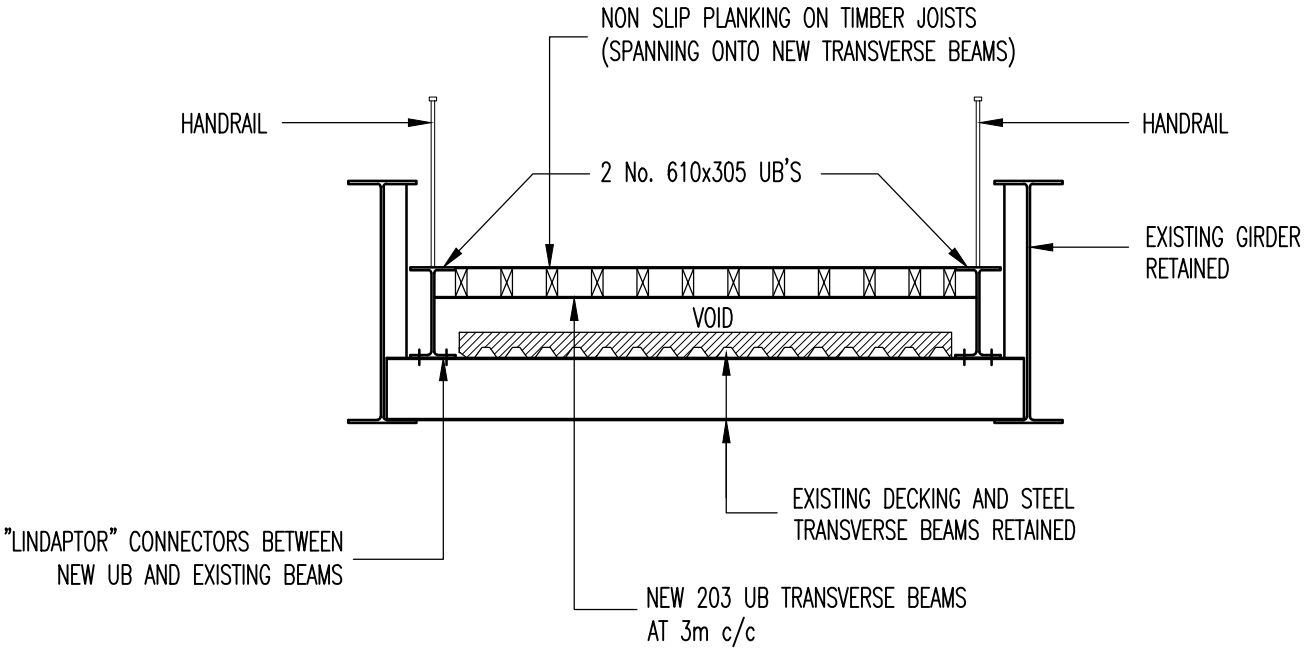
Sketches 1- 3



BRIDGE SECTION – EXISTING
(SCALE 1:50)

ARUP

Job Title: CLOONBEG BRIDGE		
Job No.: 219233-00	Sketch No.: 01	Rev.
Made By: HG	Date: JAN 2012	Chd.



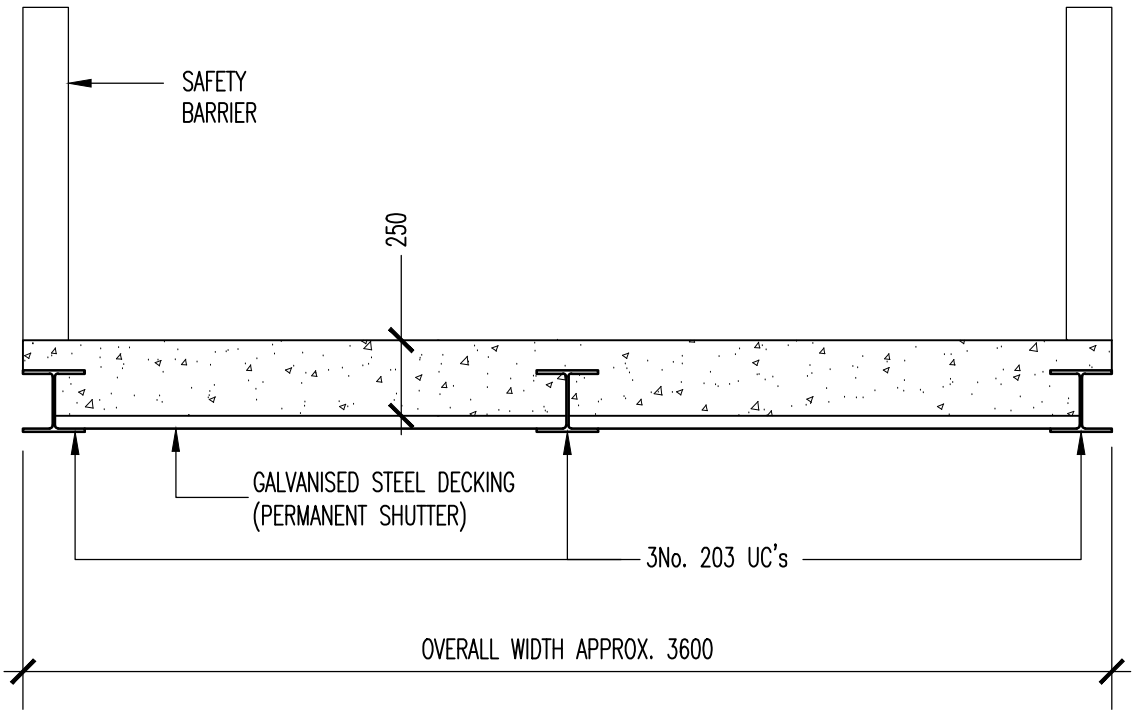
ALL EXISTING STEEL TO BE WIRE BRUSHED AND RECOATED
ALL NEW STEEL TO BE GALVANISED
ALL DEBRIS TO BE REMOVED FROM EXISTING BRIDGE

BRIDGE SECTION - PROPOSED
(SCALE 1:50)

NOT TO BE USED FOR CONSTRUCTION

ARUP

Job Title	CLOONBEG BRIDGE	
Job No. 219233-00	Sketch No. 02	Rev.
Made By HG	Date JAN 2012	Chd.



ALL STEEL TO BE GALVANISED

PROPOSED SECTION
(SCALE 1:25)

NOT TO BE USED FOR CONSTRUCTION

ARUP

Job Title	ATHRY BRIDGE	
Job No.	Sketch No.	Rev.
219233-00	03	
Made By	Date	Chd.
HG	JAN 2012	

Appendix B

Photographs Cloonbeg Bridge

Appendix C

Photographs Athry River Bridge

APPENDIX D

Extracts from the Interpretation Manual of EU Habitats

Extracts from Interpretation Manual of European Union Habitats

Interpretation Manual of European Union Habitats – 3110 'Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)'
1) Shallow oligotrophic waters with few minerals and base poor, with an aquatic to amphibious low perennial vegetation belonging to the Littorelletalia uniflorae order, on oligotrophic soils of lake and pond banks (sometimes on peaty soils). This vegetation consists of one or more zones, dominated by *Littorella*, *Lobelia dortmana* or *Isoetes*, although not all zones may not be found at a given site. **2)** Plants: *Isoetes lacustris*, *I. echinospora*, *Littorella uniflora*, *Lobelia dortmanna*, *Deschampsia setacea*, *Subularia aquatica*, *Juncus bulbosus*, *Pilularia globulifera*, *Luronium natans*, *Potamogeton polygonifolius*; in the Boreal region also *Myriophyllum alterniflorum*, *Drepanocladus* spp., *Warnstorfia* spp. and *Fontinalis* spp.
3) Corresponding Categories German classification : "24020201 kalkarmer, oligotropher See des Tief- und Hügellands", "24020301 kalkarmes, oligotrophes, sich selbst überlassenes Abbaugewässer". Nordic classification: "6413 *Lobelia dortmanna-Isoetes* spp.typ", "6414 *Littorella uniflora-Lobelia dortmanna*-typ". In the Boreal region this habitat is particularly found on glacio fluvial soil and with usually dense isoetid vegetation, sparse reedbeds, helophytic vegetation and carpets of submerged bryophytes.
4) This habitat is found in association with heath (31.1) and *Nanocyperion* (22.32) communities. In France and Ireland this habitat occurs, in particular, in heathland of sandy plains on podzols, where the water table occurs at the surface
5) Mäkirinta, U. (1978). *Die Pflanzensoziologische Gliederung der Wasservegetation im See Kukkia, Südfinnland*. Acta Univ. Ouluensis Ser. A. Scientiae Rerum Naturalium Nr. 75, biologica Nr.5. **Thunmark, S. (1931).** Der See Fiolen und seine Vegetation. *Acta Phytogeogr. Suecica*. II:1-198.

Interpretation Manual of European Union Habitats – 4010 Northern Atlantic Wet Heaths with Erica tetralix
1) Humid, peaty or semi-peaty heaths, other than blanket bogs, of the Atlantic and sub-Atlantic domains. **2)** Plants: *Erica tetralix*.
3) Corresponding Categories United Kingdom classification: "M14 *Schoenus nigricans-Narthecium ossifragum* heath p.p.", "M15 *Scirpus cespitosus-Narthecium ossifragum* mire", "M16 *Erica tetralix-Sphagnum compactum* wet heath" and "H5 *Erica vagans-Schoenus nigricans* heath". Nordic classification: "5121 *Erica tetralix*-typ".

Interpretation Manual of European Union Habitats – 4030 European dry heaths
1) Mesophile or xerophile heaths on siliceous, podsolic soils in moist Atlantic and sub-Atlantic climates of plains and low mountains of Western, Central and Northern Europe. Sub-types: 31.21 - Sub-montane *Vaccinium-Calluna* heaths. *Calluno-Genistion pilosae p.(Vaccinion vitisidaeae p.):Vaccinio myrtilli-Callunetum s.l. i.a.* Heaths rich in *Vaccinium* spp., usually with *Calluna vulgaris*, of the northern and western British Isles, the Hercynian ranges and the lower levels of the Alps, the Carpathians, the Pyrenees and the Cordillera Cantabrica. Interpretation Manual - EUR27 Page 49 31.22 - Sub-Atlantic *Calluna-Genista* heaths. *Calluno-Genistion pilosae* p. Low *Calluna* heaths often rich in *Genista*, mostly of the Germano-Baltic lowlands. Similar formations occurring in British upland areas, montane zones of high mountains of the western

Mediterranean basin and high rainfall Adriatic influenced areas are most conveniently listed here.
31.23 - Atlantic *Erica-Ulex* heaths. *Ulicenion minoris*; *Daboecenion cantabricae* p.; *Ulicion maritimae* p.
Heaths rich in gorse (*Ulex*) of the Atlantic margins.
31.24 - Ibero-Atlantic *Erica-Ulex-Cistus* heaths. *Daboecenion cantabricae* p.; *Ericenion umbellatae* p., *Ericenion aragonensis*; *Ulicion maritimae* p.; *Genistion micrantho-anglicae* p.
Aquitanian heaths with rock-roses. Iberian heaths with numerous species of heathers (notably *Erica umbellata*, *E. aragonensis*) and brooms, rock-roses and often *Daboecia*. When the rockroses and other Mediterranean shrubs become dominant they should be classified under sclerophyllous scrubs (32).
31.25 - Boreo-Atlantic *Erica cinerea* heaths.
2) Plants:
31.21 - *Vaccinium* spp., *Calluna vulgaris*;
31.22 - *Calluna vulgaris*, *Genista anglica*, *G. germanica*, *G. pilosa*, accompanied by *Empetrum nigrum* or *Vaccinium* spp.;
31.23 – *Ulex maritimus, U. gallii, Erica cinerea, E. mackaiana, E. vagans*;
31.24 - *Erica umbellata*, *E. aragonensis, E. cinerea, E. andevalensis, Cistus salvifolius, Calluna vulgaris*;
31.25 – *Erica cinerea*.

3) Corresponding Categories
United Kingdom classification: "H1 *Calluna vulgaris-Festuca ovina* heath", "H2 *Calluna vulgaris- Ulex minor* heath", "H3 *Ulex minor-Agrostis curtisii* heath", "H4 *Ulex gallii-Agrostis curtisii* heath", "H7 *Calluna vulgaris-Scilla verna* heath", "H8 *Calluna vulgaris-Ulex gallii* heath", "H9 *Calluna vulgaris-Deschampsia flexuosa* heath", "H10 *Calluna vulgaris-Erica cinerea* heath", "H12 *Calluna vulgaris-Vaccinium myrtillus* heaths", "H16 *Calluna vulgaris-Arctostaphylos uva-ursi* heath", " H18 *Vaccinium myrtillus- Deschampsia flexuosa* heath" and "H21 *Calluna vulgaris- Vaccinium myrtillus-Sphagnum capillifolium* heath".
Nordic classification : "5111 *Rhacomitrium lanuginosum-Empetrum hermaphroditum*-typ", "5113 *Calluna vulgaris-Empetrum nigrum-Vaccinium vitis-idea*-typ", "5115 *Calluna vulgaris*typ", "5116 *Vaccinium myrtillus- Calluna vulgaris*-typ", "5117 *Calluna vulgaris- Hieracium pilosella*-typ", "5131 *Deschampsia flexuosa-Galium saxatile*-typ", "5132 *Agrostis capillaris-Galium saxatile*-typ".

Interpretation Manual of European Union Habitats – 7130 Blanket Bogs (*if active bog)

1) Extensive bog communities or landscapes on flat or sloping ground with poor surface drainage, in oceanic climates with heavy rainfall, characteristic of western and northern Britain and Ireland. In spite of some lateral water flow, blanket bogs are mostly ombrotrophic. They often cover extensive areas with local topographic features supporting distinct communities [*Erico-Sphagnetalia magellanici*: *Pleurozio purpureae-Ericetum tetralicis, Vaccinio-Ericetum tetralicis* p.; *Scheuchzerietalia palustris* p., *Utricularietalia intermedio-minoris* p., *Caricetalia fuscae* p.]. Sphagna play an important role in all of them but the cyperaceous component is greater than in raised bogs. The term "active" must be taken to mean still supporting a significant area of vegetation that is normally peat forming.
Sub-types in the British Isles
52.1 – HyperAtlantic blanket bogs of the western coastlands of Ireland, western Scotland and its islands, Cumbria, Northern Wales ; bogs locally dominated by sphagna (*Sphagnum auriculatum*, *S. magellanicum*, *S. compactum*, *S. papillosum*, *S. nemoreum*, *S. rubellum*, *S.*

tenellum, *S. subnitens*), or, particularly in parts of western Ireland, mucilaginous algal deposits (*Zygogonium*).
52.2 – Blanket bogs of high ground, hills and mountains in Scotland, Ireland, Western England and Wales.

2) Plants: 52.1- *Calluna vulgaris, Campylopus atrovirens, Carex panicea, Drosera rotundifolia, Erica tetralix, Eriophorum vaginatum, Molinia caerulea, Myrica gale, Narthecium ossifragum, Pedicularis sylvatica, Pinguicula lusitanica, Pleurozia purpurea, Polygala serpyllifolia, Potentilla erecta, Racomitrium languginosum, Rhynchospora alba, Schoenus nigricans, Scirpus cespitosus, Sphagnum pulchrum, S. strictum, S. compactum, S. auriculatum*. 52.2 - *Calluna vulgaris, Diplophyllum albicans, Drosera rotundifolia, Empetrum nigrum, Erica tetralix, Eriophorum vaginatum, Mylia taylorii, Narthecium ossifragum, Rubus chamaemorus, Scirpus cespitosus, Vaccinium myrtillis*.

Animals: birds - *Pluvialis apricaria, Calidris alpina*.

3) Corresponding categories
United Kingdom classification: "M1 *Sphagnum auriculatum* bog pool community", "M15 *Scirpus cespitosus-Erica tetralix* wet heath", "M17 *Scirpus cespitosus-Eriophorum vaginatum* blanket mire", "M18 *Erica tetralix-Sphagnum papillosum* raised and blanket mire", "M19 *Calluna vulgaris-Eriophorum vaginatum* blanket mire", "M20 *Eriophorum vaginatum* blanket mire".

4) In the United Kingdom discrete areas of raised bog and blanket bog may occur in some districts, showing their characteristic differences. In many other areas, however, peatlands which may have begun as raised bog have became merged in a general expanse of blanket bog, losing their distinctive marginal features. Within these blanket bogs, there are other peat-forming systems which, strictly speaking, form part of various biotopes of aquatic and amphibious zones, fens and moorland.

5) Doyle, G.J. & Moore,J.J. (1980). Western blanket bog (Pleurozio purpureae-Ericetum tetralicis) in Ireland and Great Britain. *Colloques Phytosociologiques*. VII: 213 - 223.
Moore, J.J. (1968). A classification of the bogs and wet heaths of northern Europe (Oxycocco-Sphagnetea Br.-Bl. et Tx. 1943). In: *Pflanzensoziologische Systematik. Bericht über das internationale Symposium in Stolzenau/Weser 1964 der Internationale Vereinigung für Vegetationskunde* (R.Tuxen, Ed.). Junk, Den Haag. 306 - 320.
Nature Conservation Council (1989). *Guidelines for the selection of biological SSSI's.* Nature Conservation Council , Peterborough.
Tuxen, R., Miyawaki, A. & Fujiwara, K. (1972). Eine erweiterte Gliederung der Oxycocco-Sphagnetea. In: *Grundfragen und Methoden in der Pflanzensoziologie*. (R.Tuxen, Ed.). Junk, Den Haag. 500 - 520.

Interpretation Manual of European Union Habitats – 7150 Depressions on peat substrates of the Rhyncosporion

1) Highly constant pioneer communities of humid exposed peat or, sometimes, sand, with *Rhynchospora alba*, *R. fusca*, *Drosera intermedia*, *D. rotundifolia*, *Lycopodiella inundata*, forming on stripped areas of blanket bogs or raised bogs, but also on naturally seep- or frost-eroded areas of wet heaths and bogs, in flushes and in the fluctuation zone of oligotrophic pools with sandy, slightly peaty substratum. These communities are similar, and closely related, to those of shallow bog hollows (51.122) and of transition mires (54.57).

2) Plants: *Rhynchospora alba*, *R. fusca*, *Drosera intermedia*, *D. rotundifolia*, *Lycopodiella inundata*.

Interpretation Manual of European Union Habitats – 7230 Alkaline Fens

1) Wetlands mostly or largely occupied by peat- or tufa-producing small sedge and brown moss communities developed on soils permanently waterlogged, with a soligenous or topogenous baserich, often calcareous water supply, and with the water table at, or slightly above or below, the substratum. Peat formation, when it occurs, is infra-aquatic. Calciphile small sedges and other Cyperaceae usually dominate the mire communities, which belong to the *Caricion davallianae*, characterised by a usually prominent "brown moss" carpet formed by *Campylium stellatum*, Interpretation Manual - EUR27 Page 88
Drepanocladus intermedius, *D. revolvens*, *Cratoneuron commutatum*, *Acrocladium cuspidatum*, *Ctenidium molluscum*, *Fissidens adianthoides*, *Bryum pseudotriquetrum* and others, a grasslike growth of *Schoenus nigricans*, *S. ferrugineus*, *Eriophorum latifolium*, *Carex davalliana*, *C. flava*, *C. lepidocarpa*, *C. hostiana*, *C. panicea*, *Juncus subnodulosus*, *Scirpus cespitosus*, *Eleocharis quinqueflora*, and a very rich herbaceous flora including *Tofieldia calyculata*, *Dactylorhiza incarnata*, *D. traunsteineri*, *D. traunsteinerioides*, *D. russowii*, *D. majalis* ssp.*brevifolia*, *D. cruenta*, #*Liparis loeselii*, *Herminium monorchis*, *Epipactis palustris*, *Pinguicula vulgaris*, *Pedicularis sceptrum-carolinum*, *Primula farinosa*, *Swertia perennis*. Wet grasslands (*Molinietalia caerulaea*, *e.g*. *Juncetum subnodulosi* & *Cirsietum rivularis*, 37), tall sedge beds (*Magnocaricion*, 53.2), reed formations (*Phragmition*, 53.1), fen sedge beds (*Cladietum mariscae*, 53.3), may form part of the fen system, with communities related to transition mires (54.5, 54.6) and amphibious or aquatic vegetation (22.3, 22.4) or spring communities (54.1) developing in depressions. The subunits

below, which can, alone or in combination, and together with codes selected from the categories just mentioned, describe the composition of the fen, are understood to include the mire communities *sensu stricto* (*Caricion davallianae*), their transition to the *Molinion*, and assemblages that, although they may be phytosociologically referable to alkaline *Molinion* associations, contain a large representation of the *Caricion davallianae* species listed, in addition to being integrated in the fen system; this somewhat parallels the definition of an integrated class *Molinio-Caricetalia davallianae* in Rameau *et al*., 1989. Outside of rich fen systems, fen communities can occur as small areas in dune slack systems (16.3), in transition mires (54.5), in wet grasslands (37), on tufa cones (54.121) and in a few other situations. The codes below can be used, in conjunction with the relevant principal code, to signal their presence. Rich fens are exceptionally endowed with spectacular, specialised, strictly restricted species. They are among the habitats that have undergone the most serious decline. They are essentially extinct in several regions and gravely endangered in most.

2) Plants: *Schoenus nigricans, S. ferrugineus, Carex* spp*., Eriophorum latifolium, Cinclidium stygium, Tomentypnum nitens*.

3) Corresponding categories
Nordic classification : 34 Rikkärrvegetation-typ", "352 Rik källkärrvegetation".

5) Sjörs, H. (1948). Myrvegetation i Bergslagen. *Acta Phytogeogr. Suec*. 21:1-299.

Interpretation Manual of European Union Habitats – 91A0 Old sessile oak woods with Ilex and Blechnum in British Isles

1) Acidophilous *Quercus petraea* woods, with low, low-branched, trees, with many ferns, mosses, lichens and evergreen bushes.
Sub-types :
41.531 - Irish sessile oak woods
Quercus petraea woods of Ireland, particulary rich in evergreen bushes, including *Arbutus unedo*.
41.532 - British sessile oak woods
Acidophilous *Quercus petraea* woods of western Britain, mostly found in Scotland, Wales, Northern England and South Western England.

2) Plants: *Quercus petraea, Ilex aquifolium, Blechnum* ssp.

3) Corresponding categories
Interpretation Manual - EUR27 Page 111
United Kingdom classification: "W10 *Quercus* spp.-*Pteridium aquilinum-Rubus fruticosus* woodland p.p.", "W11 *Quercus petraea-Betula pubescens-Oxalis acetosella* woodland p.p." and "W17 *Quercus petraea-Betula pubescens-Dicranum majus* woodland p.p.".

APPENDIX E

Freshwater Pearl Mussel Survey

A SURVEY FOR THE FRESHWATER PEARL MUSSEL *MARGARITIFERA MARGARITIFERA* (L., 1758) IN THE RIVERS THAT COULD POTENTIALLY BE IMPACTED BY THE IMPROVEMENTS TO THE N59 CLIFDEN TO OUGHTERARD ROAD, COUNTY GALWAY

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September 2010

1.0 Background

1.1 The European Union Directive on the Conservation of Natural and Semi-Natural Habitats and of Wild Fauna and Flora (Habitats Directive) lists the freshwater pearl mussel *Margaritifera margaritifera* under Annex II (species whose conservation requires the designation of special conservation areas) and Annex V (species whose taking in the wild and exploitation may be subject to management measures).

1.2 The freshwater pearl mussel has declined throughout its European range. It has been estimated that there was been a decline of more than 90% of individuals in European populations during the 20th Century and whilst large populations still occur, in most countries the mussel has declined dramatically or has become extinct. The freshwater pearl mussel is an endangered species (Pyle *et al.,* 1996; Byrne *et al*., 2009; Moorkens, 2006a).

1.3 As part of proposals for the upgrading of the Clifden to Oughterard road system in County Galway, a survey of the river and stream systems that could potentially be affected by the construction and operation of the road for the pearl mussel *Margaritifera margaritifera* was undertaken.

1.4 This study has been carried out on behalf of RPS as part of a wider ecological assessment to determine where freshwater pearl mussels are present in the area of any proposed works and what mitigation measures will be necessary to be undertaken to protect any mussels from damage.

2.0 Methodology

2.1 This survey followed NPWS guidelines for the survey of this species (Anon., 2004). There is no standard survey method for finding every pearl mussel in a stretch of river, but the law of diminishing returns operates, where the more effort is put into surveying a small area of mussel habitat, the more mussels will be found (if they are present). Different techniques were applied according to the size of the watercourse surveyed.

2.2 Sections of rivers and streams were surveyed for distances ranging from 50m to 200m depending on the size of the watercourse, at locations in the immediate vicinity of proposed crossing points and at locations downstream.

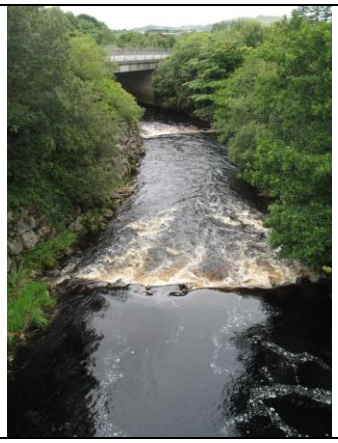
2.3 For all watercourses, the survey was carried out by two experienced surveyors using standard perspex-bottomed viewing equipment within safe water depths (1.2 metre maximum) and with due regard to health and safety issues. The surveyors worked in parallel approximately 2-3 metres apart, thus allowing the entire river width to be surveyed. For smaller streams, only one surveyor was in the watercourse at any one time.

2.4 The work was carried out from 5th to 7th August 2010, in a bright dry period, when conditions were suitable for survey work to proceed.

3.0 Results

3.1 Descriptions, photographs and locations of survey sections are shown below.

Site 1: Owenglin River, Near Clifden L67668 50508

	
Photo 1.1: View upstream of bridge	Photo 1.2: View downstream of bridge
This was a tumbling, peaty river with cascades and series of weirs. There was very little potential pearl mussel habitat.	There were no live mussels or dead shells found.

Site 2: Owenglin River, East of Clifden L68042 50368

	
Photo 2.1: View downstream of bridge	Photo 2.2: View upstream of bridge
This section had a bedrock dominated substrate. There was very little potential pearl mussel habitat.	There were no live mussels or dead shells found.

Site 3: Owenglin River, East of Clifden L68165 50293

<table>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Photo 3.1: View upstream</td><td>Photo 3.2: View downstream</td><td>Photo 3.3: Substrate</td></tr>
<tr><td colspan="2">This section had a riffle run with a good mix of substrate with cobble, gravel and sand (and very little silt). There was a good bankside vegetation structure with overhanging trees and gorse scrub. This was considered to be potential pearl mussel habitat, but none were seen. Note: there is a waste water treatment unit for the nearby hotel at the bend in the river.</td><td>There were no live mussels or dead shells found.</td></tr>
</table>

Site 4: Owenglin River, near Heritage Centre L73127 49386

<table>
<tr><td>At this point the Owenglin is a shallow stream with pools and cascades, manipulated with revetted and ornamental banks. This is not suitable pearl mussel habitat.</td><td>  </td></tr>
<tr><td>There were no live mussels or dead shells found.</td><td>Photo 4.1: Downstream of centre</td></tr>
</table>

Site 5: Bridge GC-N59-022.00 at L74814 49038

This consisted of cascades with bedrock, a waterfall upstream of the road and a deep pool below. There was lots of rubbish in the river. The habitat is unsuitable for pearl mussels.

Site 6: Emlaghdauroe Bridge at L75781 48622

This was a mountain stream with no potential pearl mussel habitat.

Site 7: Lettery Bridge at L77817 48240

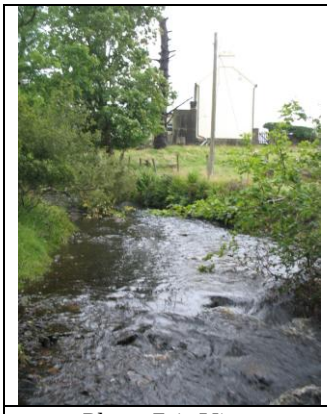


Photo 7.1: View downstream towards bridge	Photo 7.2: View upstream	Photo 7.3: further upstream
This stream had a relatively steep gradient and good riffle runs. Good black cobble and gravel substrate was found in places. There was unimproved grassland with flushes adjacent to the stream. This had good potential for pearl mussels but none were seen.		There were no live mussels or dead shells found.

Site 8: Glencoaghan River at Glencoaghan Bridge (GC-N59-025.00), just above Ballynahinch Lake at L79681 47609

		
Photo 81: Ponded section	Photo 8.2: Ponded section	Photo 8.3: Swift flowing section
Deep peaty ponded river upstream of the road, with riffle section downstream of the road, shallow with fontinalis-covered boulders. Scoured with small areas of gravels, and then becomes ponded again downstream.		There were no live mussels or dead shells found.

Site 9: Canal Bridge at L80263 47485

	
Photo 9.1: View upstream of bridge	Photo 9.2: View downstream of bridge
Scoured riffle sections with small areas of gravels, ponded in others.	There were no live mussels or dead shells found.

Site 10: Stream at Athry Lough at L81555 46611

		
Photo 10.1: View upstream of bridge	Photo 10.2: View downstream of bridge	Photo 10.3: Calcareous flush
Highly silted river, with *Myriophyllum* and filamentous algae common. Shallow, with pebble and sand substrate.		There were no live mussels or dead shells found.

Site 11: Weir Bridge at L83459 47587

Ponded and silty with *Phragmites* and *Nuphar* in places. Bridge works in progress (see Photo 11.1). No suitable mussel habitat.	
There were no live mussels or dead shells found.	Photo 11.1: Downstream of bridge

Site 12: Recess River at L86051 47168

	
Photo 12.1: View upstream of bridge	Photo 12.2: View downstream of bridge
Riffle runs with suitable habitat interspersed with ponded areas with *Potamogeton, Nuphar, Phragmites, Menyanthes,* silted with filamentous algae	There were no live mussels or dead shells found.

Site 13: Recess River just below confluence of Owentooey River and Caher River at L86939 47283
Freshwater pearl mussels : Present and Downstream

	
Photo 13.1: View upstream of bridge	Photo 13.2: View downstream of bridge
Mixed habitats with areas of high water, strong flow, *Potamageton* growth. Coniferous forestry on the south bank, rough sheep grazing on the north bank, areas of black cobble with stable sandy gravel.	A population of live pearl mussels was found in areas of suitable stable habitat.

Site 14: Owentooey River at L87115 47589
Freshwater pearl mussels : Present and Downstream

Good habitat of boulders, black cobble with stable sandy gravel. Good habitat upstream and downstream of the road.	
A good population of live pearl mussels was found both upstream and downstream of the road.	Photo 14.1: Owentooey River

Site 15: Caher River at L87471 47034
Freshwater pearl mussels : Downstream

	
Photo 15.1: View downstream of bridge	Photo 15.2: View upstream of bridge
Riffle runs with suitable pearl mussel habitat interspersed with ponded areas with *Potamogeton, Nuphar,Phragmites, Menyanthes*, silted with filamentous Algae.	There were no live mussels or dead shells found within the surveyed stretch, but live pearl mussels are found downstream.

Site 16: Derryneen Stream at L88633 46818
Freshwater pearl mussels : Present and Downstream

		
Photo 16.1: View towards bridge	Photo 16.2: View upstream	Photo 16.3: Run with mussels
Generally good riffles with stable cobble & gravel substrate, some filamentous algae.		A good population of live pearl mussels was found downstream of the road.

Site 17: Derryneen Stream upstream of lake at L89189 46908
Freshwater pearl mussels : Present and Downstream

	
Photo 17.1: Upstream of bridge	Photo 17.2: Downstream towards lake
Good riffle runs with stable cobble & gravel substrate.	A population of live pearl mussels was found upstream of the lake and downstream of the road.

Site 18: Stream between side road and N59 at L89599 46650
Freshwater pearl mussels : Present and Downstream

	
Photo 18.1: Downstream to bridge	Photo 18.2: Upstream
Good riffle runs with stable cobble & gravel substrate.	A population of live pearl mussels was found in riffles close to the footbridge.

Site 19: Small tributary of the Owenriff system E of Glengowla at M09203 42498
Freshwater pearl mussels : Downstream

This tributary was too small to provide constant stable habitat for pearl mussels. There were no live mussels or dead shells found within the surveyed stretch, but live pearl mussels are found downstream in the Owenriff River.

Site 20: Bunowen River (GC-N59-039) at M08387 42358
Freshwater pearl mussels : Downstream

This was found to be a fast flowing shallow river with brightly coloured unstable cobbles that are unlikely to support a sustainable pearl mussel population.	
There were no live mussels or dead shells found within the surveyed stretch, but live pearl mussels are found downstream in the Owenriff River.	Photo 20.1: Bunowen River u/s of bridge

Site 21: M05201 43266
Freshwater pearl mussels : Downstream

This small tributary of the Owenriff system was found to be too minor and unstable for pearl mussels.
There were no live mussels or dead shells found within the surveyed stretch, but live pearl mussels are found downstream in the Owenriff River.

Site 22: M04956 43322
Freshwater pearl mussels : Downstream

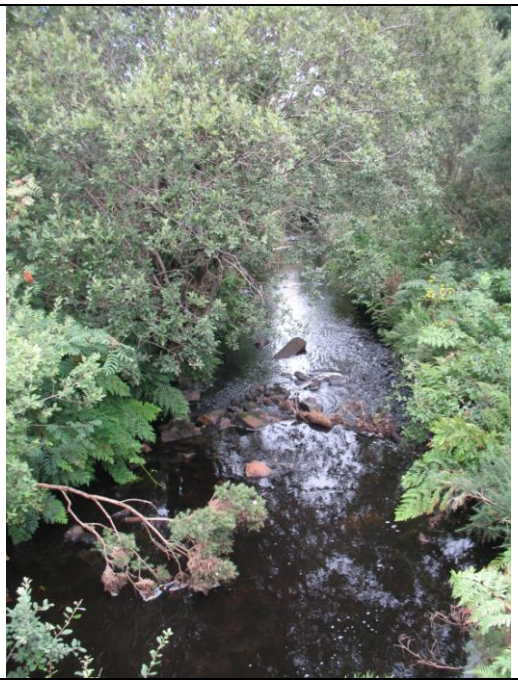
This small tributary of the Owenriff system was found to be too steep and unstable for pearl mussels upstream, and ponded and boggy downstream. There was high quality acid flushing habitat in the surrounding land.	
There were no live mussels or dead shells found within the surveyed stretch, but live pearl mussels are found downstream in the Owenriff River.	Photo 22.1 Small Owenriff catchment tributary

Site 23: Letterfore River M04202 43927
Freshwater pearl mussels : Downstream

At Letterfore Bridge. This shallow river flows over a series of cascades followed by a steadier regime of shallow black pebble substrate. The river is unlikely to have enough water to support pearl mussels during drought periods.	
	Photo 23.1 Letterfore River

There were no live mussels or dead shells found within the surveyed stretch, but live pearl mussels are found downstream in the Owenriff River.	
	Photo 23.2 Letterfore River below cascades.

Site 24: Owenree River M02250 45164

This river was shallow and silted at the time of survey. The substrate was a combination of boulders, cobbles and gravel. The river is unlikely to have enough water to support pearl mussels during drought periods. Some filamentous algae was present.	
There were no live mussels or dead shells found within the surveyed stretch.	Photo 24.1 Owenree River

Site 25: Owenwee River M02346 45079

This river flows down a rather steep gradient with some cascades, pools and dark substrate of boulders, cobbles and gravel. Some filamentous algae was present.	
There were no live mussels or dead shells found within the surveyed stretch.	Photo 25.1 Owenwee River

Site 26: Stream flowing east into Lough Shindilla L94489 46009

This shallow river flows down from coniferous forestry. It is an upland turbulent stream with cascades.
There were no live mussels or dead shells found within the surveyed stretch.

Site 27: Owenanookera River L93588 46343
Freshwater pearl mussels : Downstream

This shallow river flows into Lough Oorid. It is shallow and laminar downstream of the road, and is very scoured with bright brown sandy substrate with some cobble and pebble. There are also *Schoenus nigricans* flushes downstream of the road with a good mix of brown mosses, *Carex viridula* and *Pinguicula vulgaris*.	
There were no live mussels or dead shells found within the surveyed stretch, however *Margaritifera* is present downstream.	Photo 27.1 Owenanookera River

Site 28: Stream at L92770 46247
Freshwater pearl mussels : Downstream

This shallow river of 1.5m wide is ponded with emergent weed. This is not suitable pearl mussel habitat.	
There were no live mussels or dead shells found within the surveyed stretch, however *Margaritifera* is present downstream.	Photo 28.1 Ponded stream

Site 29: Stream at L91680 46274
Freshwater pearl mussels : Downstream

This was a very minor gully and was unsuitable habitat for pearl mussels.

Site 30: Stream at L91652 45983
Freshwater pearl mussels : Downstream

This river is deep and ponded with emergent *Phragmites* reeds and aquatic growths of *Nuphar*. This is currently not suitable pearl mussel habitat, although a record of live pearl mussels has been found in the vicinity in the past (Ross, 1988). The river may have been deepened or otherwise altered since that record in 1983.	
	Photo 30.1 Ponded stream upstream
There were no live mussels or dead shells found within the surveyed stretch, however *Margaritifera* is present downstream.	
	Photo 30.2 Ponded stream downstream

Site 31: Stream at L91527 46262
Freshwater pearl mussels : Downstream

This river is shallow with low flows at the time of the survey. The substrate was even and highly compacted.	
	Photo 31.1 Compacted stream
There were no live mussels or dead shells found within the surveyed stretch, however *Margaritifera* is present downstream.	
	Photo 31.2 Shallow, compacted substrate

Site 32: Streams at Cloonoppeen Bridge at L90360 46091

Freshwater pearl mussels : Present and Downstream

This is a complex of two streams which join together to flow towards Derryneen Lough. The south limb has very stable cobble and gravel substrate and flows in a north westerly direction. The bridge over this stream has been improved with a widened pavement.	
	Photo 32.1 South limb stream
The south limb stream meets the northern limb stream and both streams are somewhat ponded with *Potemogeton* common.	
	Photo 32.2 South limb meets north limb with ponded conditions

Further upstream, the north limb is shallower, with compacted cobble and gravel and highly silted conditions. There is a major coniferous forest in its upper catchment	
	Photo 32.3. North limb habitat
Below the confluence of the two streams the river flows faster and the habitat becomes more suitable for mussels. There is some growth of *Myriophyllum*, and some filamentous algae, but the physical substrate is good, although not in ideal condition. A population of living pearl mussels was found to occur within the survey area in the 150m below the confluence.	
	Photo 32.4. Habitat below confluence

Additional Note: Owenriff River
Freshwater pearl mussels : Present and Downstream

A survey was not undertaken in the Owenriff River, as this river has had very substantial recent surveys. The river has a very large, reproducing population of freshwater pearl mussels which is considered to be one of the top populations for this species in the world (Moorkens *et al*., 2007; Moorkens, 2004, 2005, 2006b, 2007, 2008, 2009).

4.0 DISCUSSION

4.1 Of the 32 watercourses surveyed for this project, 6 were found to have pearl mussels present, and 11 were found to have pearl mussels downstream. Thus, over half of the road improvements in the smaller streams will require the utmost mitigation to prevent siltation. In addition, the road is close the Owenriff River during its final 6 kilometres to Oughterard, and mitigation to prevent damage by siltation or pollutants will be of extreme importance in order not to negatively affect this world renowned SAC.

Increases in sediment movement through rivers and its settlement onto the river bed cause formerly clean gravels to become clogged with fine sediment. This prevents oxygen movement into the waters in the river bed that feed the juvenile mussels, and they quickly die. Each time siltation of gravels occurs, all juvenile mussels below five years of age are killed, and therefore a very low level of silt entering the river is essential on an ongoing basis (Moorkens, 1999; Moorkens *et al.*, 2007).

As with siltation, nutrient enrichment can have serious and ongoing impacts on juvenile mussels. Increased inputs of dissolved nutrients to pearl mussel rivers tend to lead to filamentous algal and macrophyte growth, which can decay to form organic silt.

The key issue with assessment of potential risks to the streams and rivers that support *Margaritifera*, or have *Margaritifera* downstream from any road improvements is management of silt and pollutants. If the construction of the proposed improvements was to result in the release of silt or pollutants such as concrete into the pearl mussel population area of river, through the pathway of smaller streams or rivers, there would be a negative impact on the pearl mussel population. A sub-basin management plan for the Owenriff River has been prepared under the auspices of the wider Water Framework Directive plans. This plan is proposing measures to reduce the current siltation and nutrient levels to improve the population's function, reproduction and juvenile survival levels. Therefore new sources of siltation would be contrary to the improvements that would be conferred by measures taken in the sub-basin plan.

However, if measures could be taken during construction to remove the risk of siltation to the river, then the road improvements would not pose a threat to the mussel population. A full method statement should be prepared showing how the construction of any significant road improvements could be undertaken with no release of silt. This would probably involve multiple silt fence/curtains at the **source** of the siltation (at road works areas), with a methodology that would allow for accumulated silt removal without silt entering the streams leading to the pearl mussel populations, by staged removal of silt fencing.

In addition, it is important to ensure that direct drainage to streams and rivers with pearl mussel populations does not occur, as it would remain a risk of pollution and siltation throughout the operational phase. A methodology of how this is to be achieved along with the construction mitigation should also be presented in the Appropriate Assessment that will be required for the works within the Owenriff Catchment.

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APPENDIX F

Bat Survey

PROPOSED N59 CLIFDEN TO OUGHTERARD ON-LINE UPGRADE PROJECT, CO. GALWAY

BAT FAUNA STUDY

Prepared for

RPS Consulting Engineers

By

Conor Kelleher AIEEM, AMCQI

2nd November 2010

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SUMMARY

Upgrading of the existing N59 road between Clifden and Oughterard towns in west Co. Galway is proposed. The proposed carriageway is *c*. 46km in extent and runs through a low-lying landscape of blanket bog, heath and agricultural grasslands.

This report details the findings and recommendations of a bat study carried out along the route in October 2010. The study was accompanied by an evaluation of habitats in relation to bat distribution and abundance as well as a desk study of known bat presence and activity in the area.

At the west, the area is comprised mainly of low-lying bog and heath habitats with improved or wet grasslands with associated hedgerows and tree lines at the east. Scrub areas are not common, but do occur, along with coniferous plantations. Deciduous woodlands are uncommon but do occur as isolated pockets and these, along with the many local watercourses and water bodies, are the most favourable habitats for bats in the area.

Bat activity in the area was widespread and mainly associated with watercourses, water bodies, hedgerows, tree lines and wooded areas and five bat species were encountered (all bats are protected species) in the area of the proposed route and two others are known to occur locally and others can be expected.

Structures along the route, including 20 bridges and a derelict dwelling were surveyed for bats or signs of their presence. Although some showed potential for bat use, no roosts were found.

Bat species within the survey area will be affected by both the construction phase and subsequent existence of new corridors across the landscape and loss of foraging sites and commuting habitat may displace certain species. Loss of areas of improved agricultural grassland within the route will have a negligible or minor impact on bats. Watercourses should not be significantly impacted by the proposed development and thus bats are likely to continue using them. The main impact on bats arises through the loss of woodlands, hedgerows and trees along the route which are widely used by these animals. Habitat creation will ameliorate certain impacts.

Mitigation measures to safeguard these protected animals are given as part of this report. These include both general and specific measures for protection of bat species, such as limiting season of disturbance, habitat retention and/or replacement where appropriate, provision of alternative roosting sites, work methodologies for bridge upgrading and structure removal, prevention of pollution incidents and limiting run-off from the site during construction.

As the proposed realignment is mainly along the carriageway of the existing N59, the impacts on bats are expected to be negligible to minor if the given mitigation measures are fully implemented and all bat species recorded locally are expected to persist.

TERRESTRIAL FAUNA

1. RECEIVING ENVIRONMENT

1.1 Introduction

1.1.1 Background

Aardwolf Wildlife Surveys was commissioned by *RPS Consulting Engineers,* of the Lyrr Building, IDA Business and Technology Park, Mervue, Galway to carry out a specific study of the bat fauna along the 46km route of the proposed on-line upgrade of the existing N59 Clifden to Oughterard road in Connemara, Co. Galway. Approximately 20% of the planned upgrade will be off-line.

It is well known that these protected animals utilise road verges and associated tree lines and hedgerows as feeding areas and commuting zones between roosts and between roosts and feeding areas. All species of Irish bat have been noted to feed along roads and lanes, field boundaries and woodland edge habitats.

The construction of a new road may adversely affect bats in a number of ways. For instance, construction often entails the removal of vegetation that was previously used by bats. This may impact bats through the creation of open space barriers that bats may be unwilling to cross eventually resulting in a local population decline as bats are prevented from reaching preferred foraging areas. Vehicles using new corridors may also kill bats. Bat roosts in trees or buildings within or immediately adjacent to the road route corridor may have to be removed. The removal of hedgerows and tree lines and the loss of mature trees, draining of wet areas and provision of artificial lighting all affect the availability of invertebrate prey and feeding areas. It is essential therefore that study of bat activity at sites of such development be undertaken to identify any conflict zones and hence to avoid or reduce impacts through mitigation to safeguard these animals.

To comprehensively research and so understand the existing behaviour of bats along the chosen route of the proposed N59 realignment, the approach detailed in the *National Roads Authority's Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* (NRA 2006a) is being followed.

This report details the results of an on-site study undertaken during the autumn season in October 2010. Reference is made to previous existing records of bat activity and known roosts in the local area sourced from *Bat Conservation Ireland's* (BCIreland) National Bat Records Database and the *National Parks and Wildlife Service's* (NPWS) National Lesser Horseshoe Bat Database. Recommendations for mitigation and enhancement measures in relation to bats are given.

1.1.2 Route location

The area is covered by Ordnance Survey Discovery Series Map numbers 37, 44 and 45.

The section of the existing N59 route proposed for upgrading is within Connemara beginning just east of Clifden town at National Grid Reference L671 505 and runs east through lowlands at the foot of the Twelve Pins Mountains, passing through the village of Recess, to end at the western

boundary of Oughterard town at National Grid Reference M107 427. Elevation along the route varies from 20m to 70m above sea level with the road rising slowly from west to east.

1.2 Bat assessment

This report presents the results of a bat survey and assessment undertaken along the proposed route. The bat fauna occurring within the study area is described and the likely impacts of the development on bat species discussed. Recommendations for mitigation measures are given where necessary and on-line habitats are assessed in relation to bat survey.

The general format of this report is in accordance with guidelines recommended by the EPA (2002) - *Guidelines on the Information to be contained in Environmental Impact Statements*.

The NRA has recently produced a series of guidelines for bats, which have been referred to:

> National Roads Authority (2006a) *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. National Roads Authority: www.nra.ie
>
> National Roads Authority (2006b) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. National Roads Authority: www.nra.ie

1.2.1 Survey methodology

The present survey and assessment was carried out by Conor Kelleher of *Aardwolf Wildlife Surveys* on the 10th, 11th and 12th of October 2010.

Areas likely to be of interest for bats along the route and in the wider landscape were identified and selected from mapping and aerial photography and assessed, in daylight, on the ground. The nature and type of habitats present are indicative of the species likely to be present. These areas were again visited during the hours of darkness and bat activity was recorded using a heterodyne (*Pettersson D200*) and heterodyne/Frequency Division bat detector (*BATBOX Duet*). Areas of suitable habitat were walked on foot listening for bats with detector, while the wider area of the proposed road was surveyed from a vehicle driven at 20 kph with a detector mounted on the hedge side of the vehicle. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations.

Nocturnal bat activity is mainly bi-modal taking advantage of increased insect numbers on the wing in the periods after dusk and before dawn, with a lull in activity in the middle of the night. This is particularly true of 'hawking' species – i.e. bats which capture prey in the open air. However, 'gleaning' species remain active throughout the night as prey is available on foliage for longer periods. The prime periods for detecting bat activity, therefore, are two hours after dusk and again for a shorter period before dawn.

The field survey was supplemented by evaluation of relevant literature and reviews of the *National Parks and Wildlife Service* (NPWS) National Lesser Horseshoe Bat Roost Database and *Bat Conservation Ireland's* (BCIreland) National Bat Records Database.

1.2.2 Survey constraints

There were no climatic or seasonal constraints on survey assessment as fieldwork was undertaken during a period of high day temperatures of 17° to 20° Celsius. These fell to 11° and 13° Celsius after nightfall and, although survey was in October, bat activity was high due to the mild conditions.

1.3 General description of area

The study area is located in west Co. Galway between the towns of Clifden and Oughterard in Connemara. Most of the route corridor is in flat or gently undulating lowland immediately south of the Twelve Pins Mountains. The principal agricultural land use in the area is for permanent grassland pasture, grazed by cattle, sheep and horses. Coniferous plantations are widespread in the area and water bodies are numerous.

1.4 Brief description of habitats present

1.4.1 Heath and blanket bog

Heath (Plate 2) and blanket bog are dominant in the area especially at the west of the route and the low vegetation associated with these habitats provide the broad and open landscape of Connemara.

1.4.2 Agricultural grasslands

Grasslands in the immediate area include improved pastures used for grazing with field size varying along the route. Wet grasslands also occur in poorly drained areas. These too are mainly used for grazing livestock.

1.4.3 Hedgerows and tree lines

Hedgerows are absent over much of the route and their quality varies considerably where they do occur. Tree lines and hedgerows are best in areas of improved grasslands at the eastern end of the route near Oughterard.

1.4.4 Coniferous woodland

Much of the wet heath and bog areas adjacent to the route have been planted with coniferous forestry. These woodlands are composed of immature or semi-mature stands forming dense areas with little or no ground flora and are often scrubby at the edges (Plates 4 & 7).

1.4.5 Deciduous woodland

Deciduous woodland is rare along the route but does occur in isolated pockets as at the townland of Lettershea and in the central area near the village of Recess (Plate 14). Individual mature trees are also present such as oak *Quercus* spp. at Lettershea (Plate 8).

1.4.6 Watercourses and water bodies

The proposed route is within the catchment of innumerable Loughs, mountain streams and rivers of various sizes which flow toward Lough Corrib to the east and various bays to the west and south where they enter the sea.

1.4.7 Built land and roads

Apart from the existing N59 carriageway, there are many minor roads on-site and tracks that serve as access to farms and houses within the survey area. Disused cottages and houses are also adjacent to the proposed route such as that at Recess (Plate 16).

1.5 Bat fauna – desk study results

The review of existing records of bat species in the area of the proposed route realignment reveals that seven of the ten known Irish species have been observed on or immediately adjacent to the study site. These include common *Pipistrellus pipistrellus* and soprano *P. pygmaeus* pipistrelle, Leisler's *Nyctalus leisleri*, brown long-eared *Plecotus auritus*, Daubenton's *Myotis daubentonii*, Natterer's *M. Nattereri* and lesser horseshoe *Rhinolophus hipposideros* bats as shown in Table 1 below. Further information on the Irish bat species is given in Appendix 1 and 2.

Table 1: Adjudged status of Irish bat species within the study area

Common name	Scientific name	Occurrence	Known roosts	Source
Common pipistrelle	*Pipistrellus pipistrellus*	Present	No	BCIreland
Soprano pipistrelle	*Pipistrellus pygmaeus*	Present	No	BCIreland
Nathusius' pipistrelle	*Pipistrellus nathusii*	Potential – rare	No	BCIreland
Leisler's	*Nyctalus leisleri*	Present	No	BCIreland
Brown long-eared	*Plecotus auritus*	Present	Yes	BCIreland
Lesser horseshoe	*Rhinolophus hipposideros*	Present	Yes	BCIreland
Daubenton's	*Myotis daubentonii*	Present	Yes	BCIreland
Natterer's	*Myotis nattereri*	Present	No	BCIreland
Whiskered	*Myotis mystacinus*	Potential	No	BCIreland
Brandt's	*Myotis brandtii*	Potential – rare	No	BCIreland

Roosts of some of these species have also been identified in the area and these are shown in Table 2 below. These were sourced from both the NPWS National Lesser Horseshoe Bat Roost Database and BCIreland's National Bat Records Database. A description of the various roost categories is given in Appendix 3. No roosts are currently known within the proposed route corridor.

Table 2: Known bat roosts adjacent to the study area

Bat species	Roost description	Roost category	Numbers	Distance
Lesser horseshoe	Gatehouse, Ross	Maternity	49	9km southeast
Lesser horseshoe	Ice house, Ross	Hibernation	30	9km southeast
Lesser horseshoe	House, Knockbane	Satellite/Maternity	10	6km east
Lesser horseshoe	House, Oughterard	Maternity	32	3km east
Lesser horseshoe	Cave/mine, Moycullen	Night/Hibernation	1	10km southeast
Daubenton's	Eamonn King's Bridge, Clifden	Night/Hibernation	1	3km south
Unidentified	Riverside Bridge, Clifden	Night/Hibernation	1	1km west
Unidentified	Tonwee Bridge, Oughterard	Night/Hibernation	1	1km northeast

1.6 Bat fauna – field study results

The key locations of importance for bats for commuting and foraging along the proposed route include water bodies, watercourses, woodlands, tree lines and hedgerows. Additional habitats include areas of scrub and scattered trees. Older, mature trees in the area also offer roosting opportunities for bats. Some of these and indeed younger trees also have ivy cover that may be used for roosting by bats on occasion. Older buildings and structures such as bridges offer potential for summer and winter roosting and underground structures have potential as hibernation roosts.

1.6.1 **Bat activity findings**

The detector surveys within the study area recorded five bat species including common and soprano pipistrelle, Leisler's, Daubenton's and brown long-eared bats.

The pipistrelles were widespread throughout the study area especially along rivers and within the deciduous woodland areas although they also occurred along the edges of coniferous plantations. They were especially active in wooded areas adjacent to water bodies.

Brown long-eared bat was noted hunting to the east of Recess village near the Owentooey River and at Lettershea within the wooded area south of the existing N59 road. This species roosts in trees and buildings; it is a very quiet bat which produces very weak echolocation pulses and sometimes hunts without emitting sounds and so can be missed by detector. It is a common species throughout Ireland and is expected to be widespread in the local area even where undetected.

Leisler's bat, which forages over agricultural landscapes, scrub and woodland as well as urban areas, was detected flying over Clifden, Ballynahinch Lake, Recess, Maam Cross and Oughterard.

Daubenton's bat, which forages over open water, was present over the Owenglin, Owentooey and Owenriff Rivers and Derryclare, Glendollagh and Ardderry Loughs. This species travels over considerable distances along watercourses and, given the expanse of watercourses and water bodies in the local area, it is expected to be widespread.

Although not observed during the present surveys, Natterer's bat is known to occur locally and whiskered/Brandt's *M. mystacinus/M.brandtii* bats are expected to occur occasionally but there are no extant records for these two species. The whiskered bat is an uncommon but widespread species in Ireland. Brandt's bat is the most recent bat species to be found in Ireland being only discovered in 2003 (Mullen, 2007). Records of the species are few to date and, since it cannot be distinguished from the whiskered bat by detector, it is probably often misidentified or overlooked.

The lesser horseshoe bat was not observed but it is known to occur at the east of the route where the habitat is more favourable for the species. The distribution range of this species is restricted to the west of Ireland and it is only known from Counties Mayo, Galway, Clare, Limerick, Kerry and Cork (Kelleher, 2004). However, single specimens have recently been discovered in Lough Key, near Boyle, Co. Roscommon in 2004 (B. Keeley, pers. comm.) and in Tobercurry, Co. Sligo in 2008 (C. Kelleher, pers. obs.), two counties where their low numbers may have caused their presence to be overlooked until now. The species is difficult to detect because of its highly directional and weak echolocation so its presence may go unnoticed. The nearest known roosts of the species to the proposed route are included in Table 2 above.

The remaining Irish bat species, Nathusius' pipistrelle, may occur in the area occasionally, however, to date, its known roosts are restricted to north-east Ireland but it is being recorded more often, probably as a result of climate change, with more animals of this highly migratory species arriving from the continent, and with increased use of bat detectors in Ireland. The species has yet to be recorded in the area of the proposed road realignment but potential exists for its occasional occurrence.

Bat species observed during the present survey along with location and activity noted are given in Table 3 below.

Table 3: Observations of bat species within the study area

Bat species	Location	Activity	Habitat
Common pipistrelle	Throughout area	Foraging & commuting	Hedgerows, tree lines, woodland, scrub, rivers, vegetated lake edges
Soprano pipistrelle	Throughout area	Foraging & commuting	Hedgerows, tree lines, woodland, scrub, rivers, vegetated lake edges
Brown long-eared	Recess, Lettershea	Foraging	Woodland
Leisler's	Clifden, Ballynahinch Lake, Recess, Maam Cross, Oughterard	Foraging & commuting	Built-up areas, fields, water body
Daubenton's	Owenglin River, Owentooey River, Owenriff River, Derryclare Lough, Glendollagh Lough, Ardderry Lough	Foraging & commuting	Water courses and water bodies

1.6.2 Structure survey results

Several structures along the proposed route realignment were inspected for their potential to harbour bat roosts including 20 bridges and a derelict two-storey dwelling. Each of these is listed in Table 4 below along with its location, Chainage and adjudged potential to be used by bats. Plate numbers of photographs in Appendix 5 are also given.

The structures varied in their favourability for use by bats. Some of the bridges have been completely sealed with concrete beneath their arches which prevents bat use while others have many very deep crevices between stonework in which bats can secrete themselves. Some bridges are very low and are therefore prone to flooding and this, coupled with the higher risk of predation for bats roosting at low levels, ensures that these structures are avoided by these animals. At least one structure (GC-N59-028-00) is unfavourable for bat use as both sides are completely vegetated which prevents their access. Bat tubes (artificial roost units) are present in two structures: unnamed bridge GC-N59-022-00 (Plates 5 & 6) and Bunskannive Bridge GC-N59-035-00 (Plate 18) but no bats were present within these units at time of survey.

A derelict, two-storey property immediately adjacent to the existing N59 road at Recess was also inspected but no evidence of bat presence was found. Although no bats or their signs were observed, the building has potential to be used by bats on occasion.

None of the structures inspected showed evidence of bat presence at time of survey but this is understandable as bat use of such structures is mainly confined to the summer and winter seasons.

Table 4: Structures investigated for potential as bat roosting locations

Structure	Plate	Townland	Chainage	Bat roost potential
Bridge GC-N59-020-00	1	Killymongaun	223650.000	Limited but some crevices present

Structure	Plate	Townland	Chainage	Bat roost potential
Bridge GC-N59-021-00	3	Lettershea	230750.000	Nil – low, prone to predation and flooding
Bridge GC-N59-022-00	5 & 6	Lettershea	231200.000	Bat tubes present
Emlaghdauroe Bridge GC-N59-023-00	9	Emlaghdauroe	232380.000	High potential – many crevices
Lettery Bridge GC-N59-024-00	10	Lettery	234420.000	Nil – sealed
Glencoaghan Bridge GC-N59-025-00	11	Derrynavglaun	236530.000	Nil – no suitable bat access
Canal Bridge GC-N59-026-00	12	Derrynavglaun	237120.000	Nil – sealed
Weir Bridge GC-N59-027-00	13	Lissoughter	241070.000	Nil – sealed
Bridge GC-N59-028-00		Lissoughter	242900.000	Nil – no suitable bat access - vegetated
Bridge GC-N59-029-00	15	Caher	244900.000	Nil – sealed
Derelict dwelling	16	Recess	244740.000	No evidence of bat presence
Bridge GC-N59-030-00	17	Derryneen	246440.000	Nil – no suitable bat access
Cloonoppeen Bridge GC-N59-031-00		Derryneen	248490.000	Nil – low, prone to predation and flooding
Bridge GC-N59-032-00		Shannakeela	249400.000	Nil – low, prone to predation and flooding
Bridge GC-N59-033-00		Shannakeela	249490.000	Nil – low, prone to predation and flooding
Bridge GC-N59-034-00		Shannakeela	250130.000	Nil – low, prone to predation and flooding
Bunskannive Bridge GC-N59-035-00	18	Bunskannive	251770.000	Bat tube present
Lurgan Bridge GC-N59-036-00	19	Derroogh North	254810.000	Limited but some crevices present
Bridge GC-N59-037-00		Tullaghaboy	261500.000	Limited but some crevices present
Letterfore Bridge GC-N59-038-00		Letterfore	263300.000	Limited but some crevices present
Glengowla Bridge GC-N59-039-00		Glengowla	268340.000	Nil – no suitable bat access

1.7 Overall assessment of scientific interest of area for bats

The principal areas of ecological interest in relation to bats present on or near the route include:

1. Rivers and Loughs: these large watercourses and water bodies provide foraging habitat and commuting routes across the area for bats. Such watercourses and water bodies are considered as of high local or national value.

2. Deciduous woodlands: although uncommon within the study area especially at the west, broadleaved woodlands provide roosting, foraging and commuting opportunities for bats. Considered as of high local value.

3. Coniferous woodlands and associated scrub: although dense, these habitats provide foraging and commuting areas for bats along their edges. Considered as of moderate local value.

1.7.1 Heath and bog

The lack of shelter within heath and bog habitats due to their low vegetation is unfavourable for bats but, in calm summer weather, the flowering plants may attract night-flying insects for bat consumption. Therefore, these may be considered as of moderate local value in relation to bats.

1.7.2 Agricultural areas and associated hedgerows and tree lines

Most of the agricultural areas may be considered as of low or negligible interest from a bat perspective. The habitats on site are low-grade and widespread. However, a few of the hedgerows on site at the east are relatively diverse and therefore of low local value being used for both commuting and foraging.

1.7.3 Coniferous woodland and scrub

Scrub and coniferous woodland habitats at the west of the route provide areas where insect prey can accumulate for bat foraging. However, because of the presence of deciduous woodland and the connectivity of hedgerows and tree lines at the east of the route these are less important in this area. Therefore, these may be considered as of moderate local value in relation to bats.

1.7.4 Deciduous woodland

Stands of deciduous trees only occur in small, isolated pockets within the study area but, where these are present, bat diversity and activity is heightened. Therefore, these may be considered as of high local value in relation to bats.

1.7.5 Watercourses and water bodies

Rivers and streams, and their associated riparian habitat provide important wildlife corridors for a number of mammalian (including bats), avian, and invertebrate species of conservation interest, and their quality should be maintained. The watercourses form part of the Lough Corrib catchment, portions of which are included in SAC designations.

1.8 Legal status - bats

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Act (2000). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat is further listed under Annex II.

The current status and legal protection of the known bat species occurring in Ireland is given in Table 5 below.

Table 5: Legal status and protection of the Irish bat fauna

Common and scientific name	Wildlife Act 1976 & Wildlife (Amendment) Act 2000	Irish Red List status	Habitats Directive	Bern & Bonn Conventions
Common pipistrelle *Pipistrellus pipistrellus*	Yes	Least Concern	Annex IV	Appendix II
Soprano pipistrelle *P. pygmaeus*	Yes	Least Concern	Annex IV	Appendix II
Nathusius pipistrelle *P. nathusii*	Yes	Least Concern	Annex IV	Appendix II
Leisler's bat *Nyctalus leisleri*	Yes	Near Threatened	Annex IV	Appendix II
Brown long-eared bat *Plecotus auritus*	Yes	Least Concern	Annex IV	Appendix II
Lesser horseshoe bat *Rhinolophus hipposideros*	Yes	Least Concern	Annex II Annex IV	Appendix II
Daubenton's bat *Myotis daubentonii*	Yes	Least Concern	Annex IV	Appendix II
Natterer's bat *M. nattereri*	Yes	Least Concern	Annex IV	Appendix II
Whiskered bat *M. mystacinus*	Yes	Least Concern	Annex IV	Appendix II
Brandt's bat *M. brandtii*	Yes	Data Deficient	Annex IV	Appendix II

NB: Destruction, alteration or evacuation of a known bat roost is a notifiable action under current legislation and a derogation licence **has** *to be obtained from the* National Parks and Wildlife Service **before** *works can commence.*

Furthermore, it should be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "*Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences*" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007 - reproduced in Appendix 4.

2. Potential impacts of proposed development on bats

Bat species within the survey area will be affected by both the construction phase and subsequent existence of the upgraded and realigned road corridor across the landscape. Loss of foraging sites and commuting habitat may displace certain species apart from Leisler's bat which is a high flying species so will not be impacted unduly by the road scheme.

2.1 Impacts on bat fauna

The results of the present study indicate that a diverse range of bat species use the landscape surrounding the proposed route and the key impacts on these animals arise through loss of potential roosts, loss of feeding areas and disruption of commuting routes.

A variety of habitats occur along the route, which vary in their importance for bats. The loss of areas of improved agricultural grassland will have a negligible or minor impact on bats. Watercourses should not be significantly impacted by the proposed development and thus bats are likely to continue using them. The main impact on bats arises through loss of woodland, hedgerows and tree lines along the route which are widely used by these animals.

Bats are often faithful to a particular roost site from year to year. Structures occupied by bats are typically maternity roosts where females congregate to give birth. The loss of such sites can have serious implications for a colony as there may be no other suitable sites in the area. The loss of roosts is believed to be one of the major factors contributing to declines in bat populations throughout Europe. Due to the large number of watercourses and water bodies in the area, the section of N59 proposed for realignment includes several bridges. The upgrading of these structures needs to be undertaken with sensitivity as the potential of these structures to harbour bats is high in some cases and mitigation measures are required to safeguard and animals present at time of construction.

No extant bat roosts were identified in any of the on-site structures but several of these show potential for bat use also, large deciduous trees on or adjacent to the scheme may harbour bats occasionally especially if ivy covered. Mitigation measures are given to safeguard any bats present in such sites.

2.2 Potential impacts on surrounding areas

2.2.1 Adjoining areas

In general, the proposed development is expected to have negligible impact on bats in surrounding areas through habitat loss.

2.2.2 Water bodies and watercourses

The development is within the catchment of several large water bodies and there could be downstream impacts on these via on-site watercourses however, providing that measures are taken to minimise sedimentation and pollution of watercourses during construction and operation phases, there should be no long-term significant impacts.

3. Mitigation measures

Standard mitigation measures, as would apply to any large-scale development, will need to be adopted in the upgrading of the existing carriageway and construction of off-line sections. These include limiting season of disturbance to trees and vegetation so as to reduce impacts on breeding species, to provide for habitat replacement and measures to reduce pollution and sedimentation into watercourses during construction and operation phases. Specific measures are required to protect bats on-site.

The following mitigation measures are in line with the NRA Guidelines on provisions for the conservation of bats during the planning and construction of roads (2006). Reference is made to the NRA Guidelines (*Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes* and the *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*).

Buildings
Should any buildings on or adjacent to the route require removal, they shall first be surveyed for bat presence. If bats are found, the following measures will be implemented:

Any work or demolition of buildings or structures identified as bat roosts or having the greatest potential for bat use shall preferably be undertaken within the winter months - November to March – as bat numbers are then known to be fewer in buildings. This would reduce impact to bats present on-site.

A sufficient number of *Schwegler* bat boxes shall be erected at a suitable nearby location one month prior to demolition to provide an alternative roosting site for the bats.

Demolition of structures where bat signs are observed shall be done carefully with the expectation that bats may be found. The roof of such structures shall be carefully removed by hand to protect any animals which may be beneath. If discovered, bats shall be retained in a box until dusk then released on site.

Bridges
Any re-pointing or pressure grouting of existing bridges identified as having potential for bat use shall only proceed after a further inspection of the structure for bats and measures taken to protect any animals found to be present. Some crevices beneath existing bridges shall be retained for bat use during such works according to best practice bat mitigation measures for bridge works (see *Billington, G. E. & Norman, G. M. 1997, Highways Agency 2001* and *Joint Nature Conservation Committee 2004* and *Shiel, C. 1999*). This can be easily done at no extra cost and without affecting the integrity of structures. Studies have shown that bats use a variety of crevice sizes in bridges from 13mm to 70mm in width to 350mm to 1m in depth for summer roosts and deeper for winter hibernation sites.

Widening of the existing N59 carriageway
Widening of the existing carriageway shall be carried out on the least ecologically sensitive side of the road i.e. woodlands and mature trees adjacent to the carriageway shall be avoided.

Potential bat roosts in trees
Several species of bats roost in trees. Where possible, tree lines and mature trees that are located immediately adjacent to the line of the proposed route or are not directly impacted shall be avoided and retained intact. Overall impacts on these sites shall be reduced through modified design and sensitivity during construction. Any existing mature trees adjacent to the corridor and any construction sites to be retained shall be protected from root damage by machinery by an exclusion zone of at least 7 metres or equivalent to canopy height. Such protected trees shall be fenced off by adequate temporary fencing prior to other works commencing.

Mature trees, which are to be removed, shall ideally be felled in the period late August to late October, or early November, in order to avoid the disturbance of any roosting bats as per NRA guidelines and also to avoid the bird nesting seasons. Tree felling shall be completed by Mid-November at the latest because bats roosting in trees are very vulnerable to disturbance during their hibernation period (November – April). Ivy covered trees, once felled, shall be left intact on-site for 24 hours to allow any bats beneath the foliage to escape prior to disposal.

Lighting restrictions
In general, artificial light creates a barrier to commuting bats so lighting shall be minimised along the proposed realignment especially at areas of interest for bat species. Lighting shall especially be avoided at bridges as this would impact on foraging and commuting Daubenton's bats and may also prevent use of installed bat tubes. Where lighting is required, directional lighting (i.e. lighting which only shines on the road and not nearby countryside) shall be used to prevent overspill. This shall be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

Compensation for loss of commuting routes
Linear features such as hedgerows and tree lines serve as commuting corridors for bats (and other wildlife) and these shall be retained and/or replaced where possible. Any bank side vegetation along watercourses requiring removal shall be replaced with native shrubs/trees after works. Native plant species attract more insects then non-native species. This is especially important adjacent to bridges identified as having bat roosting potential.

4. Conclusions

As the proposed realignment is mainly along the carriageway of the existing N59, the impacts on bats are expected to be negligible to minor if the given mitigation measures are fully implemented and all bat species recorded locally are expected to persist.

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6. APPENDICES

6.1 APPENDIX 1: bat ecology

Introduction

The bat is the only mammal that is capable of true flight using modified hands and arms which are covered by a supple membrane of skin. This ability has allowed bats to exploit aerial insect prey and avoid predation. As the largest mammalian group after the rodents (to which they are not related), bats are very successful and have diversified into over 1,200 species worldwide, representing almost a quarter of all mammal species. Within such diversification, they have evolved a range of hunting strategies, means of reproduction, roosting behaviours and social interactions (Kunz, 1982). They are found throughout the world and in every continent apart from Antarctica.

Bats are classified within the Order Chiroptera (meaning 'Hand-wing') and this is further divided into two Superfamilies: the Megachiroptera and Microchiroptera. The former are mainly fruit-eaters while the latter are predominantly insectivorous. Of these, 49 bat species are currently known in Europe.

Irish bat species

In Ireland, ten species of bat are currently known to be resident. These are classified into two Families: the Rhinolophidae (Horseshoe bats) and the Vespertilionidae (Common bats). The lesser horseshoe bat *Rhinolophus hipposideros* is the only representative of the former Family in Ireland. All the other Irish bat species are of the latter Family and these include three pipistrelle species: common *Pipistrellus pipistrellus*, soprano *P. pygmaeus* and Nathusius' *P. nathusii*, four *Myotids*: Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, whiskered *M. mystacinus*, Brandt's *M. brandtii*, the brown long-eared *Plecotus auritus* and Leisler's *Nyctalus leisleri* bats.

Individual species accounts with distribution maps are given in Appendix 2.

Hunting with sound

The microbats are unique as they use a type of sonar, called echolocation, by which they hunt their prey. This is a stream of sound produced at high frequencies which allows the animal to build-up a complete 'sound picture' of their surroundings. These sounds are produced well beyond the range of human hearing. Using these sounds, the bats are able to detect the clutter of nearby leaves, hear an insect, know how fast it is travelling, how fast its wings are beating, whether it is hard or soft bodied etc. before closing in for the catch. Although bats use this method to find their way around, they also use their eyes to see in low light levels.

All the European bat species feed exclusively on insects and/or spiders and a pipistrelle, weighing only 4 to 8 grams, will eat up to 3,500 insects every night. This allows the bat to increase its body weight by 50% each night but this is immediately burned off through calorie consumption while flying. Such feeding ensures a build up of fat in the form of brown adipose tissue between the shoulder blades of the bat which acts as a winter fuel store to keep the animal alive while in hibernation.

Roosting behaviour

Bats naturally roost in caves and trees but some species have recently adapted to using man-made structures for roosting. Being social animals, these roosts can reach substantial numbers in the peak period of bat activity in mid-summer and especially if the roost has been selected as a maternity site. These nursery roosts are mainly composed of breeding females but often they include some non-breeding females and males that may be the previous season's young still with their mother. Males are more solitary and form smaller roosts apart from the females.

For summer roosts, bats seek warm temperatures but, for hibernation in winter, they require constant temperatures of only 5° or 6℃ and humid s urroundings to keep from dehydrating. In mild winters, bats will emerge from such sites to hunt should insects be on the wing.

Breeding and longevity

In autumn, male bats attract females by song flights and form harems with up to 20 females being defended by a male. After mating, the males take no further part in the rearing of the young.

Irish bats can produce one young per year but, more usually, only one young is born in spring every two years (Boyd & Stebbings, 1989). There is no fixed pregnancy period and gestation is governed by ambient temperature. The slow rate of reproduction by bats inhibits repopulation in areas of rapid decline. Although bats have been known to live for twenty or more years, this is rare as most die in their first and the average lifespan, in the wild, is four years. The survival of the young is closely linked to climate and poor weather in spring and summer can result in high infant mortality.

Threats

All bat species are in decline as they face many threats to their highly developed and specialised lifestyles. Many bats succumb to poisons used as woodworm treatments within their roosting sites (Racey, P. A. & Swift, S. 1986). Agricultural intensification, with the loss of hedgerows, tree lines, woodlands and species-rich grasslands have impacted bat species also. Habitual roosting or hibernation sites in caves, mines, trees and disused buildings are also often lost to development. Summer roosts are prone to disturbance from vandals. Agricultural pesticides accumulate in their prey, reaching lethal doses (Jefferies, D. J. 1972). Chemical treatments in cattle production sterilise dung thus ensuring that no insects can breed within it to be fed upon by bats. Likewise, river pollution, from agricultural runoff, reduces the abundance of aquatic insects. Road building, with the resultant loss of foraging and roosting sites is a significant cause in the reduction of bat populations across Europe.

Extinction

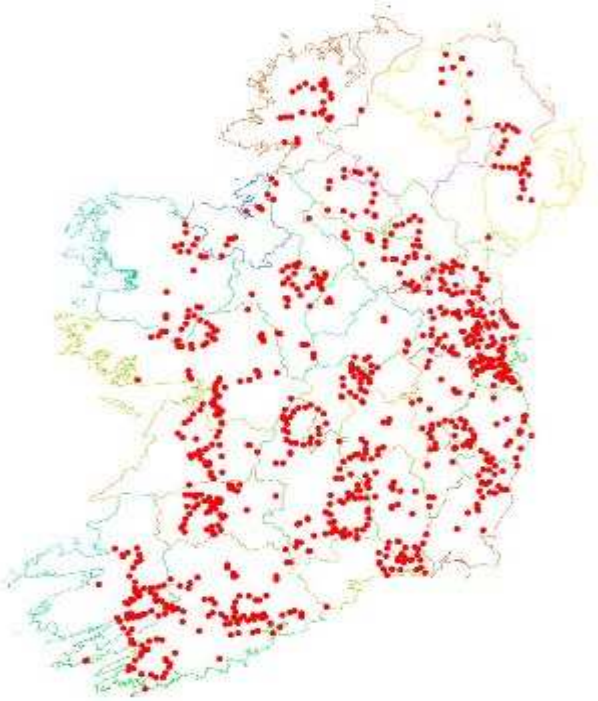
As recently as 1992, the greater mouse-eared bat *Myotis myotis* became the first mammal to become extinct in Britain since the wolf in the 18th century.

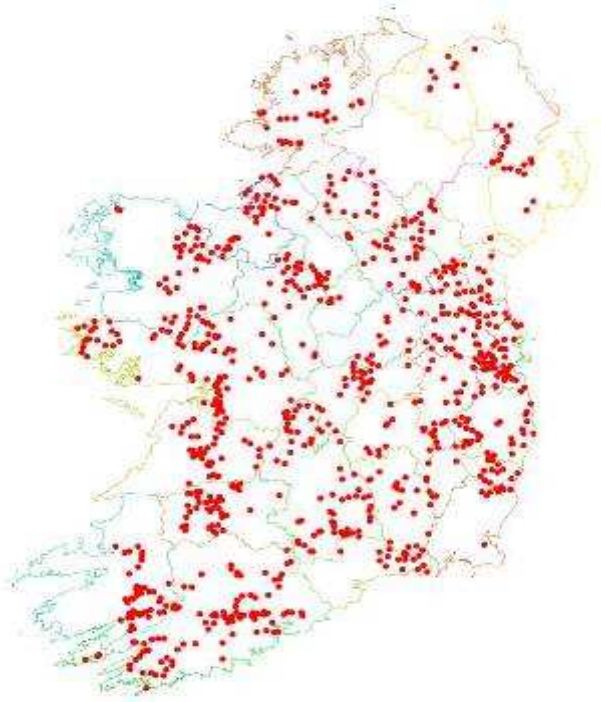
6.2 APPENDIX 2: description of bat species known or expected on-site

Brief species accounts and current known distribution (maps from *Bat Conservation Ireland*)

Common pipistrelle *Pipistrellus pipistrellus*

This species was only recently separated from its sibling, the soprano or brown pipistrelle *Pipistrellus pygmaeus*, which is detailed below (Barratt, E. M. et al, 1997). The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.



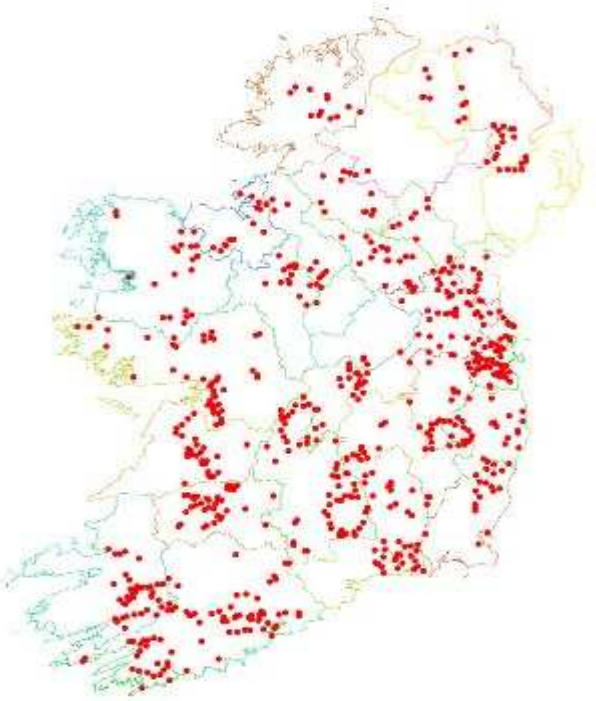


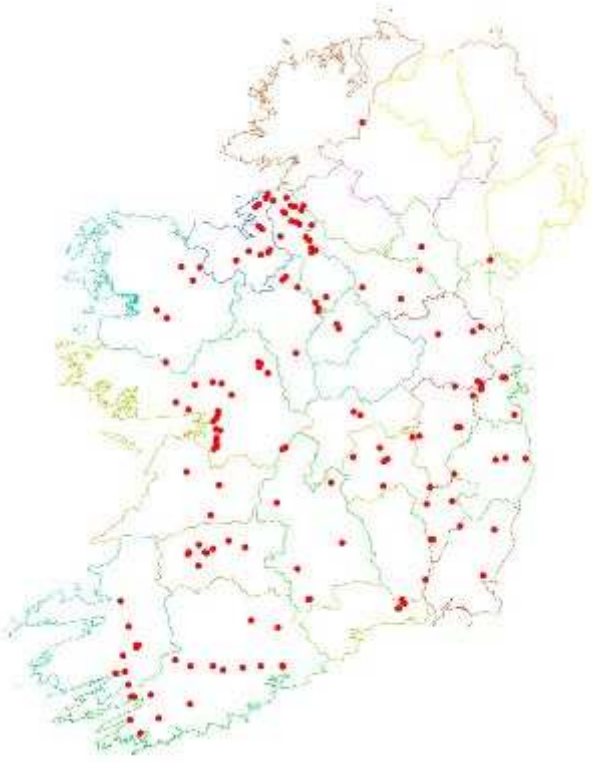
Soprano pipistrelle *Pipistrellus pygmaeus*

The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings but tree holes and heavy ivy are also used. Roost numbers can exceed 1500 animals in mid-summer.

Leisler's bat *Nyctalus leisleri*

This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddis-flies, and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and Ireland holds the largest national population. The species is considered as *Internationally Important*.



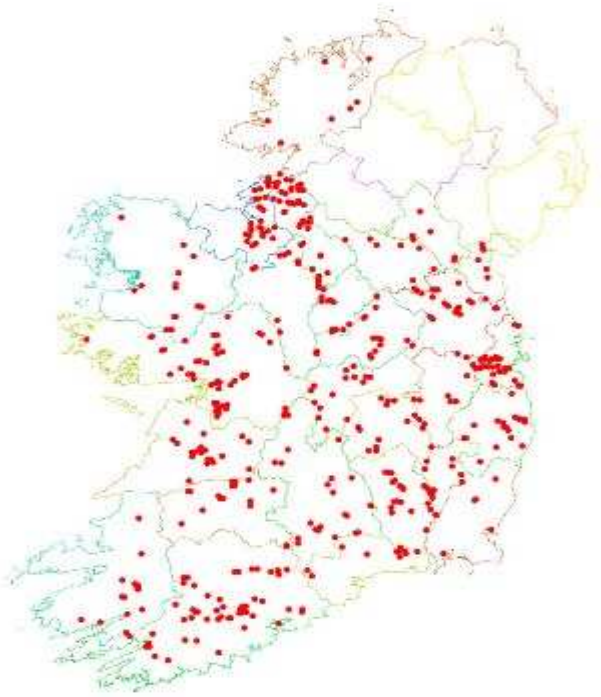


Natterer's bat *Myotis nattereri*

This species has a slow to medium flight, usually over trees but sometimes over water. They follow hedges and tree lines to their feeding sites, consuming flies, moths and caddis-flies. Natterer's bats are frequently recorded in hibernation sites in winter but there are few records of summer roosts. Those that are known are usually in old stone buildings but they have been found in trees and bat boxes. The status of the Natterer's bat has not been determined but it is classed as *Threatened* and is listed in the *Irish Red Data Book* (Whilde, A 1993).

Daubenton's bat *Myotis daubentonii*

This bat species feeds close to the surface of water, either over rivers, canals, ponds, lakes or reservoirs, but can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees.

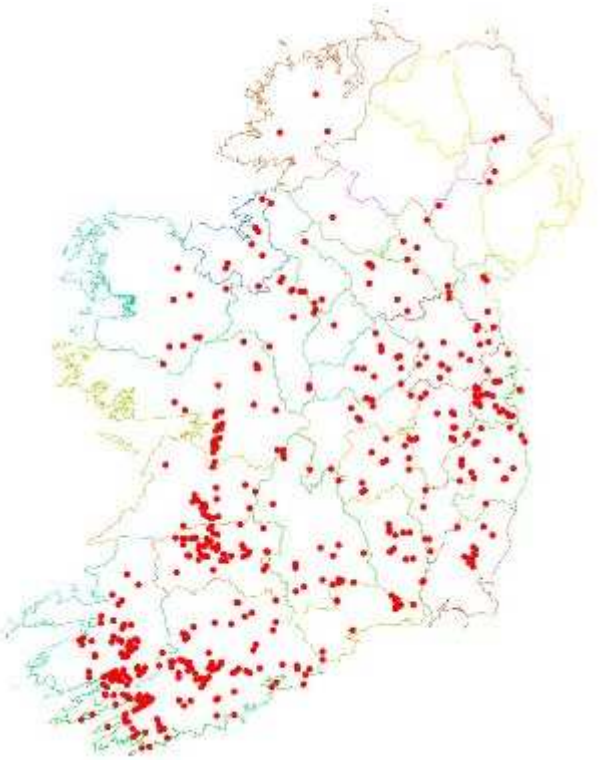


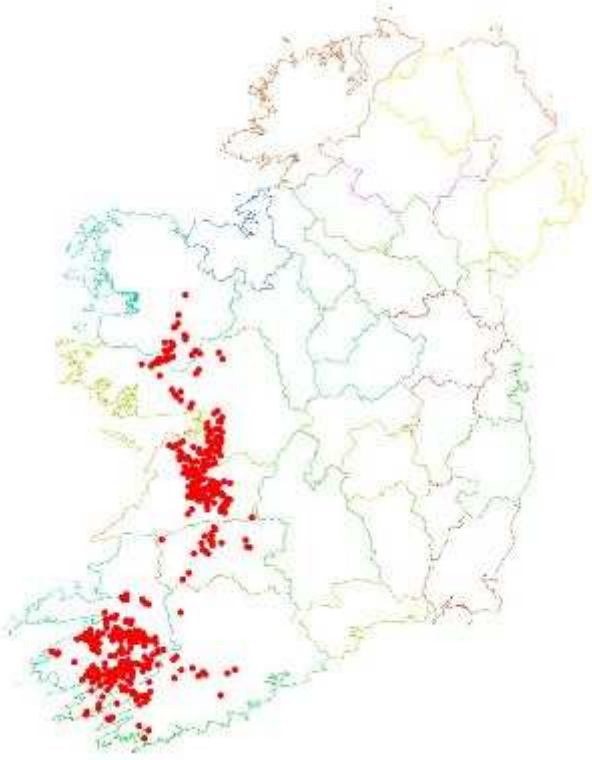
Whiskered bat *Myotis mystacinus*

This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The status of the species has not been determined but it is classed as *Threatened* and is listed in the *Irish Red Data Book* (Whilde, A 1993).

Brown long-eared bat *Plecotus auritus*

This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked.





Lesser horseshoe bat *Rhinolophus hipposideros*

This species is the only representative of the Rhinolophidae family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. They often carry their prey to a perch to consume, leaving the remains beneath as an indication of their presence. The echolocation call of this species is of constant frequency and, on a bat detector, sounds like a melodious warble. Its distribution is restricted to the western Atlantic seaboard counties of Mayo, Galway, Clare, Limerick, Kerry and Cork (Kelleher, C. 2004). However, single specimens have recently been discovered in Lough Key, near Boyle, Co. Roscommon in 2004 (B. Keeley, pers. comm.) and in Tobercurry, Co. Sligo in 2008 (C. Kelleher, pers. obs.), two counties where their low numbers may have caused their presence to be overlooked in the past. This species is considered as *Internationally Important* and it is an Annex II species under the *EC Habitats Directive 1992*.

Nathusius' pipistrelle *Pipistrellus nathusii*

Nathusius' pipistrelle is a recent addition to the Irish fauna and, so far, has only been recorded from the north of the island in Cos. Antrim, Down and Longford (Richardson, P. 2000) but is assumed to be spreading as the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. There is a likelihood, therefore, that this species may occur in the area as a vagrant especially in the autumn months. However, it was not observed during the present survey. The status of the species has not been determined.

Brandt's bat *Myotis brandtii* (No map)

This sibling species to the whiskered bat is known from four specimens found to date in Cos. Wicklow (Mullen, 2007), Cavan, Clare (B. Keeley pers. comm.) and Tipperary (Kelleher, 2006b). A fifth specimen was identified in Killarney National Park, Co. Kerry in August 2005 (Kelleher, C. 2005 & 2006a). Its status is unknown.

6.3 APPENDIX 3: bat roost definitions (as defined by Schofield 1996)

Maternity roost
Where 20 or more bats reside between May and August and where the young are born and suckled.

Satellite roost
Generally less than 20 adults and in close proximity to maternity roosts.

Transitional roost
Used by bats prior to and after leaving maternity roosts in April and October.

Night roost
Where bats are found between the months of March and November. These can also harbour a few individuals during the day but usually less than 5.

Hibernation roost
Used by bats between October and March.

6.4 APPENDIX 4: NPWS Circular Letter 2/07

AN ROINN COMHSHAOIL, OIDHREACHTA AGUS RIALTAIS ÁITIÚIL
DEPARTMENT OF THE ENVIRONMENT, HERITAGE AND LOCAL GOVERNMENT

AN ROINN COMHSHAOIL,
OIDHREACHTA AGUS
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Circular Letter NPWS 2/07

16 May, 2007

Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 – strict protection of certain species/ applications for derogation licences.

A chara,

I am directed by the Minister for the Environment, Heritage and Local Government to refer to the EU Habitats Directive, to the Habitats Regulations 1997-2005 which transpose that directive into Irish law,[1] and to Ireland's obligations under that Directive.

The Directive, and the implementing Regulations, require that certain species listed in Annex IV of the Habitats Directive are strictly protected. A list of these species is appended.

These species are not necessarily associated with areas subject to a specific nature designation: in the case of bat species and otters they may be found anywhere throughout the country.

Under Regulation 23 of the Habitats Regulations 1997, any person who, in regard to the animal species listed in Annex IV of the Habitats Directive-

"(a) deliberately captures or kills any specimen of these species in the wild,
(b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,
(c) deliberately takes or destroys the eggs from the wild, or
(d) damages or destroys a breeding site or resting place of such an animal,

shall be guilty of an offence."

[1] Council Directive 92/43/EEC of 21 May 1992, on the conservation of natural habitats and of wild flora and fauna, the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997), the European Communities (Natural Habitats) (Amendment) Regulations, 1998, (S.I. No. 233 of 1998), and the European Communities (Natural Habitats) (Amendment) Regulations, 2005, (S.I. No. 378 of 2005),

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Regulation 21 provides corresponding protection for Annex IV plant species.

The carrying out of any work that has the potential to disturb these species, and for which a derogation licence has not been granted, may constitute an offence under Regulation 21 or 23 of the Habitats Regulations.

It should be noted that in the case of Regulation 23 (d), it is not necessary that the action should be deliberate for an offence to occur. This places an onus of due diligence on anyone proposing to carry out an action or project that might result in such damage or destruction.

A particular concern arises regarding works carried out by or on behalf of local authorities themselves, including works of maintenance or repair.

Examples of cases that are likely to require assessment are the removal of trees and other habitat during the construction of roads or other infrastructure, the modification of the courses of rivers, drainage and discharge of water, and even the re-pointing or replacement of masonry in bridges, walls and other structures where bats are likely to roost, etc.

Procedure to be followed

Local authorities must ensure that they, their staff and their agents comply fully with the requirements of the Directive and the Regulations as follows:

1. In advance of any works, an appropriate initial assessment should be carried out by a person competent to identify where a risk of damage or disturbance to an Annex IV species may exist (e.g. by an appropriately qualified ecologist). The fact that such an assessment has been carried out should be recorded and kept with the papers associated with the project.

2. Projects where a risk is identified should be subject to an appropriate scientific assessment. It will be necessary to identify alternatives or modifications that will avoid that risk.

3. Where it is not possible to identify a means of avoiding the risk completely, the question of seeking a derogation licence from the Minister under Regulation 23 of the Habitats Regulations should be considered if it is desired, notwithstanding, to proceed with the action or project.

4. The Minister is empowered, within strict parameters, to grant a license for derogation from complying with the requirements of the provisions of section 21 of the Wildlife Act 1976 and Regulations 23 and 24 of the Habitats Regulations. The scope of the Minister's powers to grant derogation licences is set out in Regulation 23, as follows:

Where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range, the Minister may, in respect of those species, grant a licence to one or more persons permitting a

derogation from complying with the requirements of the provisions of section 21 of the Principal Act and Regulations 23 and 24 where it is—

(a) in the interests of protecting wild fauna and flora and conserving natural habitats, or

(b) to prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property, or

(c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment, or

(d) for the purpose of research and education, of repopulating and re-introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants,

(e) to allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent (if any) specified therein, which are set out in the First Schedule.

6. Any application for a derogation licence (to be submitted to Mr Jamie Mulleady of this Department at: Species and Regulations Unit, National Parks and Wildlife Service, 7 Ely Place, Dublin 2 email: Jamie.mulleady@environ.ie) should address the criteria referred to in the above paragraph as well as proposed scientifically-based mitigation measures to address any potential impact on the identified Annex IV species. A decision on an application will be made on the basis of the information and proposals submitted and best scientific knowledge.

7. An application for such a derogation licence should be made in advance of seeking approval under Part 8 or 10 of the Planning and Development Regulations, 2001, as amended, or seeking planning permission for works. This will ensure that full consideration can be given to the impacts of the proposed project on the species and to avoid the possibility of delay to the proposed project or of a refusal of a derogation licence which would prevent the works being carried out as planned.

8. The obligation to obtain a derogation licence is additional to the requirement to notify the Minister of a proposed development which may have an impact on nature conservation to the Minister under article 82(3)(n) and others of the Planning and Development Regulations, 2001 (as amended). Local authorities should notify the Minister (Development Applications Unit) in any case where it appears that a proposed development may pose a risk to Annex IV species.

9. Should a problem be identified regarding Annex IV species in the course of works, this should be reported immediately to the National Parks and Wildlife Service. No further work that might impact on such species should take place unless a derogation licence has been obtained.

Applications for planning permission
Issues concerning damage or disturbance to Annex IV species also arise in the context of applications for planning permission for proposed development, e.g. proposals to renovate older houses. The responsibility of avoiding disturbance or damage to Annex IV species, or of obtaining an appropriate derogation licence, rests with the developer.

However, planning authorities should note that in any case where it appears that a proposal may pose a risk to Annex IV species, the planning application should be referred to the Minister under article 27(1)(n) of the Planning and Development Regulations 2001 (as amended). This referral should be done in the appropriate manner for applications having impacts on nature conservation sites. Planning authorities could also take the opportunity afforded by any pre-application discussions to alert prospective applicants to the requirements in relation to Annex IV species.

Further information
Species Action Plans, which set out specific measures for the monitoring and protection of these species, have been or are being prepared. They are published on www.npsw.ie or can be obtained from Species Unit (Tel: 01 888 3212). Guidelines in regard to bats are available at www.npsw.ie.

General questions in relation to the protection of Annex IV species or require any further information on an application for a derogation licence should be referred to Species Unit (01 8883214). Specific queries regarding a proposed project, location or species should be referred to the appropriate National Parks and Wildlife Service Divisional Ecologist or to the Regional Manager (contact details http://www.npws.ie/media/Media,4976,en.pdf).

If you have any questions in relation to the referral of a planning application, please contact Development Applications Unit (Tel: 01 8883181)

Is mise le meas,

Peter Carvill,
Assistant Principal Officer.

To: all County and City Managers, Directors of Services for Planning, Town Clerks

6.5 APPENDIX 5: photographic record

Plate 1: View east along existing N59 at Chainage 223650 over bridge GC-N59-020-00

Plate 2: View of planned off-line area across wet heath north of existing N59 at Chainage 229600

Plate 3: Low bridge GC-N59-021-00 at Chainage 230750

Plate 4: Immature coniferous plantation to south of existing N59 at Chainage 231100

Plate 5: One of two bat tubes installed on bridge GC-N59-022-00 at Chainage 231200

Plate 6: View beneath bridge GC-N59-022-00 at Chainage 231200 showing second bat tube

Plate 7: View of coniferous plantation with deciduous edge along existing road at Chainage 230400

Plate 8: Mature oak tree to north of existing N59 at Chainage 232500

Plate 9: View beneath Emlaghdauroe Bridge GC-N59-023-00 at Chainage 232380

Plate 10: View beneath Lettery Bridge GC-N59-024-00 at Chainage 234420

Plate 11: View beneath Glencoaghan Bridge GC-N59-025-00 at Chainage 236530

Plate 12: Canal Bridge GC-N59-026-00 at Chainage 237120

Plate 13: Weir Bridge GC-N59-027-00 at Chainage 241070

Plate 14: Mature deciduous woodland at Chainage 243200

Plate 15: Bridge GC-N59-029-00 over the Owentooey River east of Recess village at Chainage 244900

Plate 16: Derelict two-storey dwelling immediately south of existing road at Chainage 244740

Plate 17: Bridge GC-N59-030-00 at Chainage 246440

Plate 18: View beneath Bunskannive Bridge GC-N59-035-00 at Chainage 251770 - bat tube at right

Plate 19: View beneath Lurgan Bridge GC-N59-036-00 at Chainage 254820