

# Westland Horticulture Ltd.

Peat Harvesting Operations at Lower Coole, Mayne,  
Ballinealoe & Clonsura, near Coole and Finnea,  
County Westmeath



## Volume II

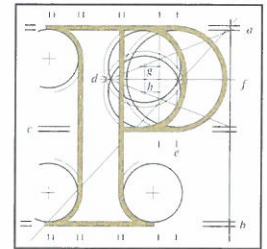
### ATTACHMENTS

## Environmental Impact Statement of Westland Peat Harvesting Operations

July 2013



# Attachment 3 - Consultation Responses



Siobhán Maher  
 OES Consulting  
 FBD House  
 Fels Point  
 Tralee  
 Co. Kerry

<b>OES CONSULTING</b>			
Project No.:- _____			
RECEIVED			
28 MAY 2013			
Initials:-			
Action By:-		Completed:-	

27<sup>th</sup> May, 2013

**Re: Scoping for Environmental Impact Assessment for Peat Harvesting Operations at Coole and Clonsura, Co. Westmeath.**

Dear Madam,

I have been asked by An Bord Pleanála to refer to your letter dated 23<sup>rd</sup> May, 2013 in which you invite the Board to submit any comments it may have in relation to the environmental impact assessment process for peat harvesting operations.

Please be advised that the Board will not be making any comments / observations in relation to the matter.

Yours faithfully,

Kieran Doherty  
 Executive Officer  
 Direct Line: 01 - 8737248

**From:** Orla Harrington [<mailto:O.Kingston@epa.ie>]  
**Sent:** 21 May 2013 11:46  
**To:** Siobhan Maher  
**Subject:** RE: P0914-01 Westland Horticulture

Siobhan,

I refer to your request for comments from the Agency on the information to be contained in the Environmental Report for the above development. The Agency has no comment to make on this scoping document.

It is important to draw your attention to the Agency's guidance documents: *Guidelines on the Information to be Contained in Environmental Impact Statements (2002)* and *Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements) (2003)* which are available on the EPA website at the following link: <http://www.epa.ie/downloads/advice/ea/guidelines> in the preparation of the EIS.

If you have any further questions please do not hesitate to ask,

Kind Regards,

Orla Harrington  
Inspector  
Office of climate, licensing & resource use  
Environmental protection agency  
Inniscarra  
Co.Cork  
[o.harrington@epa.ie](mailto:o.harrington@epa.ie)  
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The opinions contained within are personal to the sender and do not necessarily reflect the policy of the Environmental Protection Agency.

## Oes Contractor

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**From:** OES Admin on behalf of Info  
**Sent:** 13 June 2013 14:49  
**To:** Siobhan Maher  
**Subject:** FW: Scoping for EIA re peat extraction by Westland at Coole and Clonsura, Co. Westmeath

**Importance:** High

**From:** Andrew Jackson [<mailto:andrew.jackson@antaisce.org>]  
**Sent:** 13 June 2013 14:48  
**To:** Info  
**Subject:** Scoping for EIA re peat extraction by Westland at Coole and Clonsura, Co. Westmeath

Dear Siobhan,

Thank you for consulting An Taisce regarding this scoping exercise. Three brief comments/requests for now:

1. I think the list of consultees on p.1 should be expanded to include Friends of the Irish Environment (<http://www.friendsoftheirishenvironment.net/>), since it was largely the work of FIE which led to the IPPC applications by Westland and Bulrush in respect of their operations near Lough Derravaragh.
2. From p.5: "As part of the IPPC license application an Appropriate Assessment has already been undertaken in accordance with Articles 6(3) and 6(4) of the Habitats Directive to prevent significant adverse effects on European sites... A stand-alone Natura Impact Statement has been prepared." I would be very grateful if you could e-mail me a copy of the Natura Impact Statement and the Appropriate Assessment.
3. The cumulative impacts of all of the large and smaller scale peat extraction operations near Lough Derravaragh SPA should be taken into account.

All the best,

Andrew Jackson  
Natural Environment Officer



**Comhshaol, Oidhreacht agus Rialtas Áitiúil**  
Environment, Heritage and Local Government

OES CONSULTING	
Project No.:- 1182-01	
RECEIVED 04 JAN 2010	
To: _____	
By: _____	Completed:-

Ms Emily McCarthy,  
OES,  
FBD House,  
Fels Point,  
Tralee,  
Co. Kerry,

Gov Buildings  
Bellview  
Mullingar  
Co Westmeath

December 22nd 2010 .

Appropriate Assessment on behalf of Westland Horticulture Ltd , in regard to peat extraction works at Lower Coole, Mayne, Ballinealoe, Clonsura in Co. Westmeath.

Dear Emily ,

Further to your contacting Ms Triona Finnen, NPWS, Conservation Ranger for N. Westmeath . NPWS wish to assist you with your request and understand that you are in the process of drawing up an AA in relation to an EPA licence for this development . We welcome that the AA and EPA licence will assist in insuring protection for sites and species of nature conservation interest . We welcome also that the AA will assist in compliance to legislation and reduce any likely harmful emissions .

At the outset please note that NPWS are aware of peat extraction ongoing in this general location for many years . Due to a number of complaints and high level of concern reported to us and due to discussions on the possibility of seeking a ministerial order , NPWS Research Section (Mr D Tierney, Birds Unit ) completed a water bird analyses regarding peat siltation impacts on L Derravaragh and concluded that

*' In response to Species Protection Unit's request there is no firm evidence in the waterbird dataset that can directly link the adjacent peat extraction activities with waterbird declines. However significant declines have been identified for several of the species of special conservation interest for Lough Derravaragh SPA.'*

A copy of this analysis may be made available, on written application or request to NPWS .

In relation to the proposed AA under consideration here NPWS wish to highlight likely impacts on habitats and species of conservation concern ;  
-including but not exclusively Otter ,Kingfisher ,Lamprey species and White- clawed crayfish -all of which may occur along the River Inny and in its associated tributary streams etc ,  
-qualifying interests in the Lough Derravaragh Natura 2000 site ( Special Protected Area for Birds)  
-water quality impacts (in so far as these are likely to impact on habitats and species of conservation concern) .

We recommend that:

- the A.A. accurately describe the operation in terms of its scale, nature and location. Adequate descriptive information on the surrounding environment (should include natural heritage features and attributes, maps of habitats and some information on species using the site and adjacent area ) .
- that the overall all finding of the AA be unambiguous and state with a high degree of certainty the extent of any likely impacts related to the works (and in particular impacts, if any, on Natuara 2000 sites , their habitats and species ) .

In order to inform your position we request that you consider

- a review of any available information (OPW , Fisheries Board ) on extent of peat siltation in Lough Derravaragh SPA (site code: 004043) .
- screening for including /exclusion -re likely impacts or otherwise - on any other downstream Natuara 2000 site or site of ecological concern (i.e. may need to consider distance from the development site , buffering capacity of L Derravaragh etc )

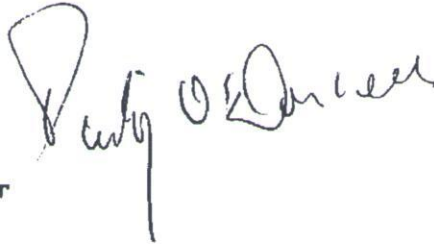
If any negative impacts are likely then the AA should include robust and proportionate mitigating measures to include .

1. Measures to reduce the risk of siltation along streams which run into the Inny River . Provision of sediment traps and outflow weirs of appropriate design (based on appropriately calculated surface water runoff ) . Contingency measures to account for periods of torrential rainfall/ flash flooding.
- 2 . In relation to any waste /water treatment a secondary treatment /filtering system should be described and appropriately sited .
3. A monitoring plan should include: an inspections sampling and analysis regime and also include a detailed maintenance programme (to insure that weirs etc are functioning correctly and that silt traps maintenance is ongoing).
4. Include proposals for dust suppression and measures to prevent, where possible , peat participle from becoming airborne. In particular consider duration and location of peat mound storage - eg no storage in proximity to riparian zones/natural water courses etc .
- 5 The provision of a buffer zone along the River Inny /riparian zone
- 6 General guidance for on site operatives to help prevent impact on water quality of Inny River including recommendations regarding use of herbicides near watercourses.
- 7 In order to reduce the potential impact on the designated sites from negative impacts

on water quality and habitat during the decommissioning of the site- we request that the AA considers recommending a restoration plan .

Additional information regarding designated sites is available on the NPWS website. Irish Wetland Bird data (IWeBS) and Whooper Swan data is collected by NPWS staff and collated by Birdwatch Ireland. Bird Usage Mapping data (available for SPAs ) is held by the Divisional Ecologist (William Cormacan- 071 9666703) at NPWS, Ballinafad, Near Boyle, Co. Sligo.

Yours sincerely



Padraig O'Donnell  
Deputy Regional Manager  
NPWS  
North Midlands Region

0449342661

Cc i ) to William Cormacan Divisional Ecologist NPWS  
ii) WESTLAND HORTICULTURE  
UNIT 14/GRANVILLE INDUSTRIAL ESTATE, GRANVILLE ROAD  
BT70 1NJ DUNGANNON , COUNTY TYRONE



## Oes Contractor

---

**From:** Eoin McDonnell <Eoin.McDonnell@failteireland.ie>  
**Sent:** 28 May 2013 14:28  
**To:** Siobhan Maher  
**Subject:** Scoping EIA for Peat Harvesting Operations at Coole and Clonsura, Co.Westmeath  
**Attachments:** EIS and Tourism Guidelines 2011.doc; ATT00001.txt; ATT00002.htm

Dear Ms Maher,

I wish to acknowledge receipt of your recent letter to Fáilte Ireland in relation to carrying out an Environment Impact Statement for Peat Harvesting Operations at Coole and Clonsura, Co.Westmeath.

I attach a copy of the Fáilte Ireland Guidelines for the treatment of tourism in an EIS, which we recommend should be taken into account in preparing the EIS.

Yours sincerely,

**Eoin McDonnell**

Projects Officer | Fáilte Ireland | Áras Fáilte | 88-95 Amiens Street | Dublin 1 | Ireland

T: +353 (01) 884 7203 | M: 086 825 4413

W: [www.failteireland.ie](http://www.failteireland.ie)



**The Gathering 2013 - be part of it**

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## Guidelines on the treatment of tourism in an Environmental Impact Statement

### **1. Introduction**

Tourism is a significant component of the Irish Economy – estimated to employ approximately 190,000 people – and contributing over €5.3 billion in spending to the economy in 2009. The environment is one of the main resources upon which this activity depends – so it is important that the EIS evaluates whether and how the interacting impacts of a project are likely to affect tourism resources.

The purpose of this short note is to provide guidance on how these impacts can be assessed through the existing EIA process. Undertaking an EIA is governed by the EIA Advice Notes published by the EPA. These Advice Notes contain detailed guidance on how to describe and evaluate the effects arising from a range of projects, including tourism projects.

These guidelines were written with the assistance of Conor Skehan, Head of Department of Environment and Planning, Dublin Institute of Technology.

## 2. Tourism and the Environment

There are two interactions between tourism and the environment.

1. Impacts caused by Tourism Projects
2. Impacts affecting Tourism (e.g. the quality of a destination or a tourism activity)

### Impacts caused by Tourism Projects

Tourism projects can give rise to effects on the environment. These are specifically dealt with under a number of Project Types in the Advice Notes, specifically:

#### 12 TOURISM AND LEISURE

- a. Ski-runs, ski-lifts and cable-cars where the length would exceed 500 metres and associated developments. Project Type 20
- b. Sea water marinas where the number of berths would exceed 300 and fresh water marinas where the number of berths would exceed 100. Project Type 10
- c. Holiday villages which would consist of more than 100 holiday homes outside built-up areas; hotel complexes outside built-up areas which would have an area of 20 hectares or more or an accommodation capacity exceeding 300 bedrooms. Project Type 28
- d. Permanent camp sites and caravan sites where the number of pitches would be greater than 100. Project Type 28
- e. Theme parks occupying an area greater than 5 hectares. Project Type 29

**Figure 1 The Advice Notes contain detailed descriptions on how to describe and evaluate the effects arising from a range of tourism projects.**

### Impacts affecting Tourism

Environmental effects of other projects on tourism are not specifically addressed in the Advice Notes. Taking account of the significance of tourism to the Irish economy a specialist topic of 'Tourism' has been prepared to facilitate a systematic evaluation of effects on this sector within the format laid down for other parts of the Environmental Impact Statement.

It is not intended that the assessment of effects on tourism should become a separate section of the Impact Statement, instead it is intended to become a specialist sub-section of the topic 'Human Beings' which is currently described in Section 2 of the Advice Notes

### **3. Tourism in the Existing Environment**

#### **Introduction**

Visitor attitude surveys reveal that the following factors – in order of priority – are the reasons that tourists visit and enjoy Ireland:

- Beautiful scenery
- Friendly & hospitable people
- Safe & Secure
- Easy, relaxed pace of life
- Unspoilt environment
- Nature, wildlife, flora
- Interesting history & culture
- Plenty of things to see and do
- Good range of natural attractions

It is noteworthy that over half of the factors listed are environmental and that all others are related to the way of life of the people. The following describes how these factors are considered within an EIS, set out under EIA topic headings, and how they interact with tourism.

#### *Beautiful scenery*

This is covered in the '*Landscape*' Section. Particular attention needs to be paid to effects on views from existing purpose-built tourism facilities, especially hotels, as well as views from touring routes and walking trails. It is important to note that there appears to be evidence that the visitor's expectations of 'beautiful' scenery does not exclude an admiration of new modern developments – such as windfarms – which appear to be seen as indicative of an modern, informed and responsible attitude to the environment.

#### *Friendly & hospitable people*

This is not an environmental factor though it is indirectly covered under the '*Human Beings*' section of the EIS. The principal factor is the ratio of visitors to residents. This is of less significance in areas with long-established patterns of tourism.

#### *Safe & Secure*

This is not an environmental issue – though some of the factors that are sometimes covered under the heading of '*Human Beings*' – such as social inclusion or poverty – can point to likely effects and interactions.

#### *Easy, relaxed pace of life*

This is not an environmental issue though it is partially covered under '*Human Beings*' – see comments above.

#### *Unspoilt environment*

This is covered under the sections dealing with '*Landscape*', '*Flora*' and '*Fauna*' and to a lesser extent under emissions to '*Water*' and '*Air*'. In some instances traffic congestion, especially in rural areas, can be an issue, this is usually covered within '*Material Assets*'.

#### *Nature, wildlife, flora*

This is principally covered under the headings of '*Flora*' and '*Fauna*' and to a lesser extent by '*Landscape*', '*Water*' and '*Air*'. The principal issues being to avoid any effects that might reduce the health or extent of the habitats. This can occur either directly, by impinging on the site, or indirectly, through emission, that can affect the natural resources, like clean water, which the habitat depends on. It also considers effect on physical access to and visibility of these sites. Occasionally there are concerns about the disturbance or wear and tear of visitor numbers to such sites.

#### *Interesting history & culture*

This is principally covered under '*Cultural Heritage*' and, to a lesser extent, under '*Human Beings*'. The principal issues being to avoid damage to sites and structures of cultural, historical, archaeological or architectural significance – and to their contexts or settings. It also considers effect on physical access to and visibility of these sites. Occasionally there are concerns about the wear and tear of visitor numbers to such sites.

#### *Plenty of things to see and do.*

This is not an environmental issue though it is partially covered by the '*Human Beings*' section, where the tourism resources of an area are described and assessed.

#### *Good range of natural attractions*

This is covered by the '*Landscape*', '*Flora*', '*Fauna*', and '*Cultural Heritage*' sections of the EIS.

## 4. Project factors affecting Tourism

### Introduction

Tourism can be affected both by the structures or emissions of new developments as well as by interactions between new activities and tourism activities – for example the effects of high volumes of heavy goods vehicles passing through hitherto quiet, scenic, rural areas. Tourism can be affected by a number of the characteristics of the new project such as:

- New Developments
  - Social Considerations
  - Land-uses and Activities
- 
- *New Developments* - will the development stimulate or suppress demand for additional tourism development in the area? If so, what type, how much and where? Marinas, golf courses, other major sporting facilities as well as theme parks and larger conference facilities can all stimulate the emergence of new accommodation, catering and leisure facilities often within an extensive area around a new primary visitor facility. Extensive urbanisation and large scale infrastructure as well as certain processing and extractive industries all have the potential to suppress demand for additional tourism – but usually only in the immediate locality of the new development. It should be noted however, that some types of new or improved large scale infrastructure – such as roads – can improve the visitor experience – by increasing safety and comfort or can convey a sense of environmental responsibility – such as wind turbines.
  - *Social Consideration* - will the development change patterns and types of activity and land use? Will it affect the demographics, economy or social dynamics of the locality?
  - *Land-use* - will there be severance, loss of rights of way or amenities, conflicts, or other changes likely to ultimately alter the character and use of the tourism resources in the surrounding area?

### Existing Tourism

In the area likely to be affected by the proposed development, the following attributes of tourism, or the resources that sustain tourism, should be described under the following headings.

Note that the detailed description and analysis will usually be covered in the section dealing with the relevant environmental topic – such as '*Landscape*'. Only the relevant finding as to the likely significance to, or effect on, tourism needs to be summarised in this section.

### Context

Indicate the location of sensitive neighbouring tourism resources that are likely to be directly affected, and other premises which although located elsewhere, may be the subject of secondary impacts such as alteration of traffic flows or increased urban development. The following should be noted in particular:

- Hotels, conference centres, holiday accommodation – including holiday villages, holiday homes, and caravan parks.
- Visitor centres, Interpretive centres and theme parks
- Golf courses, adventure sport centres and other visitor sporting facilities
- Marinas and boating facilities
- Angling facilities
- Equestrian facilities
- Tourism-related specialist retailers and visitor facilities
- Historic and Cultural Sites
- Pedestrian, cycling, equestrian, vehicular and coach touring routes

Indicate the numbers of premises and visitors likely to be directly affected directly and indirectly.

Identify and quantify, where possible, their potential receptors of impacts, noting in particular transient populations, such as drivers, walkers, seasonal and other non-resident groups.

Describe any significant trends evident in the overall growth or decline of these numbers, or of any changes in the proportion of one type of activity relative to any other.

Indicate any commercial tourism activity which likely to be directly affected, with resultant environmental impacts.

### **Character**

Indicate the occupations, activities or interests of principal types of tourism in the area. – Where relevant, describe the specific environmental resources or attributes in the existing environment which each group uses or values; where relevant, indicate the time, duration or seasonality of any of those activities. For example describe the number of guides, boats and anglers who use a salmon fishery and the duration of the salmon season as well as the quantity and type of local accommodation that is believed to be used by the anglers.

### **Significance**

Indicate the significance of the principal tourism assets or activities likely to be affected. Refer to any existing formal or published designation or recognition of such significance. Where possible provide an estimate of the contribution of such tourism activities to the local economy. For instance refer to the number of annual visitors to a tourism attraction or to the grading of a hotel.

### **Sensitivity**

Describe any significant concerns, fears or opposition to the development known to exist among tourism interests. Identify, where possible, the particular aspect of the development which is of concern, together with the part of the existing tourism resource which may be threatened. For instance describe the extent of a potential visual intrusion onto a site of historic significance which is the main local tourist attraction.

## **5. Impacts on Tourism**

### **"Do Nothing" Impact;**

Describe how trends evident in the existing environment will continue and how these trends will affect tourism.

### **Predicted impact;**

- Describe the location, type, significance, magnitude/extent of the tourism activities or assets that are likely to be affected.
  
- Describe how the new development will affect the balance between long-established and new dwellers in an area and its affect on the cultural or linguistic distinctiveness of an area. For example describe the effect of a new multi-national population required for an international call-centre located in a Gaeltacht area.
  
- Describe how changes in patterns of employment, land use and economic activity arising from the proposed development will affect tourism, for example, illustrating how a new industrial development will diversify local employment opportunities thereby reducing the area's unsustainable over-reliance on seasonal tourism.
  
- Describe the consequences of change, referring to indirect, secondary and cumulative impacts on tourism; Examples can include describing how the new development may lead to a reduced assimilative capacity for traffic or water during the peak of the tourism season or how new urbanism combined with existing patterns of tourism may lead to unsustainable levels of pedestrian traffic through a sensitive habitat.
  
- Describe the potential for interaction between changes induced in tourism and other uses that may affect the environment – for instance increasing new tourism-related housing affecting water resources or structures
  
- Describe the worst case for tourism if all mitigation measures fail.



## 6. Mitigating adverse impact on Tourism

Describe the mitigation measures proposed to:

- *avoid* sensitive tourism resources – such as views, access, and amenity areas including habitats as well as historical or cultural sites and structures.
- *reduce* the exposure of sensitive resources to excessive environmental burdens arising from the development's emissions or volumes of traffic [pedestrian and vehicular], and/or losses of amenity arising from visually conspicuous elements of the development – for example by prioritizing visual screening of views from a hotel towards a quarry.
- *reduce* the adverse effects to tourism land uses and patterns of activities – especially through interactions arising from significant changes in the intensity of use or contrasts of character or appearance – for example by separating traffic routes for industrial and tourism traffic.
- *remedy* any unavoidable significant residual adverse effects on tourism resources or activities, for example by providing alternative access to tourism amenities – such as waterways or monuments.



Feidhmeannacht na Seirbhíse Sláinte  
Health Service Executive

Environmental Health Department  
Health Service Executive,  
Dublin Mid-Leinster, Unit 7C,  
Lough Sheever Corporate Park,  
Robinstown, Mullingar,  
Co. Westmeath.  
Phone 044 9384890 Fax 044 9384889

19/06/2013

Siobhan Maher,  
Scotia Technology Ltd.,  
t/a OES Consulting,  
FBD House,  
Fels Point,  
Tralee,  
Co. Kerry.

<b>OES CONSULTING</b>	
Project No.:-	RECEIVED
20 JUN 2013	
Initials:-	
Action By:-	Completed:-

**Re: Scoping for Environmental Impact Assessment for peat harvesting operations at Coole and Clonsura, Co. Westmeath.**

Dear Ms. Maher,

Thank you for your recent invitation to submit comments on the scoping document for the above named peat harvesting facility.

This office has no comments or observations regarding the scoping document.

We look forward to viewing the Environmental Impact Statement in due course.

Yours Sincerely,

Mari Greene

Principal Environmental Health Officer

OES CONSULTING  
1182-01  
06 JAN



Inland Fisheries Ireland  
Drumsna  
Carrick on Shannon  
Co. Leitrim

Ms Emily McCarthy  
OES Consulting Ltd  
FBD House  
Fels Point  
Tralee  
Co. Kerry

31<sup>st</sup> December 2011

**RE: 1182\_01 Appropriate Assessment of Peat Extraction Operations, Westland Horticulture.**

Dear Emily

In response to your query regarding scoping for an Appropriate Assessment for Westland Horticulture's Peat Harvesting Activities on the River Inny.

Inland Fisheries Ireland (formerly Shannon Regional Fisheries Board) is a statutory agency with responsibility under the provisions of the Fisheries Acts for the protection, management and conservation of Ireland's inland fisheries resource.

Westland Horticulture is sited in close proximity to the River Inny and the silt ponds discharge to the River Inny. The River Inny holds good stocks of brown trout and has good salmonid habitat, it also supports coarse fish populations. The Shannon Salmon Restoration Project is committed to the restoration of sustainable stocks of salmon throughout the Shannon Catchment, the River Inny would be included within this plan. It in interests of sustainability it is imperative that all assessments carried out are cognisant of the River Inny's ability to support salmon in the future and do not impact on this plan in any negative way.

The River Inny and its tributaries holds crayfish and lamprey were found in a survey at Coolnagun Bridge. Lamprey and Crayfish are protected under Annex II of the EU Habitats Directive, you should consult with National Parks and Wildlife Services in this regard.

The assessment must consider the aquatic habitat in terms of spawning, river morphology, riparian and instream habitat and impacts on the fish species and water quality and invertebrates.

An assessment of the available dilution should be carried out, considering the cumulative impacts of discharges along the Inny and the large volumes of waters discharged to determine if there is sufficient assimilative capacity to discharge at a rate of 35 mg/l suspended solids. The impacts of peat siltation on watercourses and aquatic life are well documented.

It is important that the potential damage of pollutants and suspended solids can cause to the aquatic life is noted and measures are introduced to reduce risks to the aquatic environment. Increased levels of suspended solids will have negative effects on invertebrates (and an important source of food for trout). High levels of suspended solids can also cause fish habitat displacement, increased incidences of disease in fish, damage to the gills of fish and increased fish mortality rates and be detrimental to coarse fish spawning.

Impacts of elements of the operation, such as fuel storage, pump operations, peat stockpiles and silt from peat harvesting operations must be assessed and appropriate mitigation and control measures incorporated into the EMP and any EIS.

There is evidence of peat siltation within the River Inny over the years. The diffuse nature of the catchment and the increased run-off due to drainage of the working areas means that in periods of heavy precipitation plug flows can be significant in terms of run-off into the ponds and overflow across the outflow weirs, in these conditions retention time is more than likely reduced.

IFI has concerns about the frequency, accuracy and suitability of visual inspections (detailed within the Environmental Management plan) in relation to a fast response to unfavourable water quality as these inspections are subjective and not quantifiable. The potential impact of a once off large scale discharge or a number of smaller scale episodes lasting for up to 6 days is unacceptable in terms of an effect on the aquatic environment, peat siltation and water quality. I would therefore suggest the following:

The use of a wiped turbidity probe on a daily basis (or permanently deployed with regular maintenance checks) would provide meaningful data and information to allow for a fast response to any detrimental changes to water quality at pond discharges.

The pond retention times are not quantified within the EMP. In relation to the proposals (within the EMP dated 09/09) to investigate the use of wetland plants, Inland Fisheries Ireland requests that an update be provided in relation to works in this regard. Also consideration could be given to the use of cutaway bog area to facilitate extensive settlement with a view to increasing retention times. The optimum retention time would be 24 hours, but this will ultimately depend on the volumes of water and the peat silt concentrations within the water. Pond retention times should be quantified over a range of conditions.

Inland Fisheries Ireland requires that you consult further with the undersigned at the EIS stage in relation to this project.

Please do not hesitate to contact me should you have any queries.

Yours sincerely

A handwritten signature in cursive script that reads "Catherine E Kerins".

Catherine Kerins  
Fisheries Environmental Officer



# IRISH PEATLAND CONSERVATION COUNCIL

COMHAIRLE CHAOMHNAITHE PHORTAIGH NA HÉIREANN

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**Ms Siobhan Maher**  
**OES Consulting**  
**Bulding 1000**  
**City Gate**  
**Mahon**  
**Cork**  
**(by email:info@oes.ie)**

**21st June 2013**

**Re: Environmental Impact Assessment of Peat Harvesting Operations**  
**Scoping Document**  
**Peat Harvesting Operations at Lower Coole, Mayne, Ballinealoe & Clonsure, Near**  
**Coole & Fineagh,**  
**Co Westmeath**

Dear Ms Maher,

I wish to acknowledge receipt of your consultation letter to the Irish Peatland Conservation Council (IPCC) regarding scoping for the above proposed development.

### **Peatlands Generally**

I would initially point out that the IPCC cannot support any proposed development that would result in the destruction of intact peatland habitat. Peatlands originally cover 16% (1,346,882ha) of the land surface of Ireland (Hammond 1979). Today peatlands of conservation worth cover only 269,267ha in the Republic of Ireland and 27,000ha in Northern Ireland.

For raised bogs specifically, as these are the sites dealt with under this application, of the original area of 308,742ha in the Republic of Ireland only 10% remains relatively intact and worthy of conservation. We have both a European and an International obligation to protect this rare and threatened habitat for future generations under the EU Habitats Directive and under the Ramsar Convention.

In this regard the forthcoming EIS must provide substantial evidence that this will not occur as a result of the large scale development of these sites. If this is not achievable the IPCC would be strongly opposed to any such development.

### **Protected sites & Species**

IPCC would have serious concerns about the above proposed development given the proximity to a number of protected sites and the potential impact that such a development may have on these sites. While the scoping document does acknowledge the presence of both the SPA and pNHA sites I would be concerned that there is a understating of the fact that the Clonsura Harvesting Area appears to be in fact directly adjacent to and bordering Lough Bane pNHA. I would also highlight that in addition to the SPA designation at Lough Derravaragh the site is also designated an NHA and the boundary of this intact extends

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further north towards the development site. The NHA designation would also promote additional varied conservation objectives.

I would also like to point out that the National Parks and Wildlife mapviewer indicates that historically there are 3 species of conservation concern found in the immediate area surrounding the proposed development site. These are *Dama dama* (Fallow Deer), *Mustela erminea* (Stoat) and *Lutra lutra* (Otter). All of these need to be considered as part of and throughout the process of the EIS.

### **Ecohydrology study**

I would urge that in all parts of the EIA the latest methods of study be carried out. For peatlands this involves the undertaking of what is being widely referred to as an EcoHydrological study. This has been done for a number of raised bog sites across the country and is being widely applied across the raised bog SAC network this year. It involves detailed mapping of the hydrological functioning of the bog in the acrotelm, catotelm and groundwater systems, and relating this to the ecology and topography that are seen above ground. I would push for such a study to be carried out as part of the EIS.

Thank you for consulting with IPCC on this matter and I look forward to hearing from you on completion of the EIA. I would appreciate if you could forward a copy of the EIS for review.

Is mise le meas,



---

Tadhg O Corcora MSc  
Conservation Officer, IPCC.

Hammond, R.F. 1979. The Peatlands of Ireland. Soil Survey Bulletin No. 35, Teagasc, Dublin



<b>OES CONSULTING</b>			
Project No.:- _____			
RECEIVED			
29 MAY 2013			
Initials:-			
Action By:-		Completed:-	

Ms. Siobhán Maher  
OES Consulting  
FBD House  
Fels Point  
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St. Martin's House / Waterloo Road / Dublin 4  
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Dáta | Date  
28 May 2013

Ár dTag. | Our Ref.  
NRA13 87855

Bhur dTag. | Your Ref.  
L1\_NRA\_23052013

**Re: Scoping for Environmental Impact Assessment for Peat Harvesting Operations at Coole and Clonsura, Co. Westmeath**

Dear Ms. Maher

With reference to your correspondence of 23 May 2013 regarding the above the Authority wishes to advise that it is not in a position to engage directly with planning applicants in respect to proposed developments. The Authority will endeavour to consider and respond to planning applications referred to it given its status and duties as a statutory consultee under the Planning Acts. The approach to be adopted by the Authority in making such submissions or comments will seek to uphold official policy and guidelines as outlined in the Spatial Planning and National Roads Guidelines for Planning Authorities (Department of the Environment, Community & Local Government, 2012). Regard should also be had to other relevant guidance and circulars available at [www.nra.ie](http://www.nra.ie).

The issuing of this correspondence is provided as best practice guidance only and does not prejudice the NRA's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid planning application referred.

With respect to EIS scoping issues, the recommendations indicated below provide only general guidance for the preparation of EIS, which may affect the National Roads Network.

The developer should have regard, *inter alia*, to the following;

- Consultations should be had with the relevant Local Authority/National Roads Design Office with regard to locations of existing and future national road schemes,
- The Authority would be specifically concerned as to potential significant impacts the development would have on any national roads (and associated junctions) in the proximity of the proposed development,
- The developer should assess visual impacts from existing national roads,
- The developer should have regard to any Environmental Impact Statement and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard to any potential cumulative impacts,



- The developer, in conducting Environmental Impact Assessment, should have regard to the NRA DMRB (Design Manual for Roads & Bridges) and the NRA Manual of Contract Documents for Road Works,
- The developer, in conducting Environmental Impact Assessment, should have regard to the NRA's Environmental Assessment and Construction Guidelines, including the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (National Roads Authority, 2006),
- The EIS should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see *Guidelines for the Treatment of Noise and Vibration in National Road Schemes* (1<sup>st</sup> Rev., National Roads Authority, 2004)),
- It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. The Authority's Traffic and Transport Assessment Guidelines (2007) should be referred to in this regard. The scheme promoter is also advised to have regard to Section 2.2 of the NRA TTA Guidelines which addresses requirements for sub-threshold TTA.
- The designers are asked to consult the National Roads Authority's DMRB *Road Safety Audit* (NRA HD 19/12) to determine whether a Road Safety Audit is required,
- In the interests of maintaining the safety and standard of the national road network, the EIS should identify the methods/techniques proposed for any works traversing/in proximity to the national road network.

Notwithstanding, any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practise.

I hope that the above comments are of use in your scoping process.

**Yours sincerely**

*p.p. Olivia Morgan*  
 p.p. **Michael McCormack**  
**Policy Adviser (Planning)**

9<sup>th</sup> July, 2013

Ms. Siobhan Maher

OES Consulting

FBD House

Fels Point

Tralee

Co. Kerry

Your Ref: L1\_AFM\_23052013

**Re: Scoping for Environmental Impact Assessment for Peat Harvesting Operations at Coole and Clonsura, Co. Westmeath.**

Dear Ms. Maher,

I refer to your recent correspondence concerning the above. In the first instance, I wish to apologise for not replying to you within the timeframe specified.

The Department of Agriculture, Food and the Marine has no relevant information to offer that would be of assistance in the preparation of the Environmental Impact Statement. I would however suggest that your firm consider the likely impact, if any, of the proposed peat harvesting operations on agriculture/agricultural activities in the locality as part of the Environmental Impact Assessment.

Yours sincerely,

---

Noel O'Connor

Climate Change Section

## Oes Contractor

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**From:** OES Admin on behalf of Info  
**Sent:** 10 June 2013 08:53  
**To:** Siobhan Maher  
**Subject:** FW: Ms Siobhan Maher REF LI\_PC\_23052013

---

**From:** peatlandscouncil [<mailto:peatlandscouncil@ahg.gov.ie>]  
**Sent:** 07 June 2013 17:19  
**To:** Info  
**Subject:** FAO: Ms Siobhan Maher REF LI\_PC\_23052013

Dear Ms Maher

I wish to acknowledge receipt of your correspondence regarding the Scoping for Environmental Impact Assessment for Peat Harvesting Operations at Coole and Clonsura, Co. Westmeath. Your correspondence and the Scoping Document have been circulated to council members, who may wish to make observations either in a personal capacity or on behalf of their respective organisations.

The Peatlands Council itself will not be making any observations.

Le dea-mhéin  
Dualta Ó Broin

**Secretary**

The Peatlands Council

PO Box 12070,  
Dublin 2.

**Tel.** (01) 888 3207  
**Fax.** (01) 888 3272

**email.** [peatlandscouncil@ahg.gov.ie](mailto:peatlandscouncil@ahg.gov.ie)

\*\*\*\*\*

Is faoi rún agus chun úsáide an té nó an aonán atá luaite leis, a sheoltar an ríomhphost seo agus aon comhad atá nasctha leis. Má bhfuair tú an ríomhphost seo trí earráid, déan teagmháil le bhainisteoir an chórais.

Deimhnítear leis an bhfo-nóta seo freisin go bhfuil an teachtaireacht ríomhphoist seo scuabtha le bogearraí frithvíorais chun víorais ríomhaire a aimsiú.

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## Oes Contractor

---

**From:** Terence McCague <TMcCague@westmeathcoco.ie>  
**Sent:** 20 June 2013 13:00  
**To:** Siobhan Maher  
**Subject:** EIA Scoping (5).docx

siobhain -

regarding your letter of 23rd masy in relation to scoping for eia for peat harvesting at cole and clonsura i set out hereunder comments in relation to same.in relation to matter of raods impacts consultation with mullingar area engineering is advised.

terence mccague sp

---

The EIA should consider any impacts direct and indirect (past ,ongoing and future) of the development on:

- Human Beings,
- Fauna and Flora,
- Soil,
- Water,
- Air,
- Climatic Factors,
- Landscape,
- Material Assets, including the Architectural and Archaeological Heritage and Cultural Heritage
- The inter-relationship between the above factors.

Take account of the all ecological sensitivities and of the likely environmental effects of the proposed project on the receiving environment.

status of development under planning acts and legal implications of same.

relevant cdp policies(including draft cdp for Westmeath) and objectives in relation to biodiversity , peatlands,economy, tourism and the protection of environmental assetts

Review all In combination and cumulative affects of development within zone of influence of the development including :

- Direct habitat loss
- Raised bogs are European priority habitats listed under Annex I of the Habitats Directive 92/43/EEC European Commission's Interpretation Manual of European Union Habitats. Blanket bogs and raised bogs are European priority habitats if they are 'active'. The manual defines active as to mean "still supporting a significant area of vegetation that is normally peat forming". habitat type, under the spirit of the habitats directive it should not be destroyed.
- impacts on water quality and the river Inny including impact on Lough Derravaragh SPA, NHA and Garriskil Bog SPA, SAC, and designated wetland sites infrastructure (e.g. roads, power supply or waste water disposal)
  - Impacts of development (including existing and future operations) on roads network in area-routes ,loading ,frequency .
  - Impacts of long-term dewatering operations, and consequences for water-dependent habitats within zone of influence of peat extraction.
    - Impacts on archaeological heritage
    - Socio economic impacts
    - Impacts on tourism and tourism potential
    - Impacts on water quality including construction impacts Water quality is one of the factors influencing vegetation; and input of nutrients,
    - Impacts on hydrological processes
    - Impacts on Habitats

- Impacts on / Disturbance to Protected species
  - Review and consider the sites conservation restoration potential
  - Impacts on /potential effects on bird populations in the wider area.
  - Impacts in relation to Air & Climate Emissions
- Impacts resulting from emissions connected with construction traffic and dust generated from disturbed ground during dry periods.

References:

EIA Guidelines –declg(2013)

Westmeath county development plan 2008-2014 and draft cdp2014-2020

River basin management Plans in relation to catchment.

Epa data on water quality



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# Attachment 4 - Wetland Surveys Ireland Report

**PEAT HARVESTING ACTIVITIES AT COOLE AND CLONSURA, CO  
WESTMEATH**

**ECOLOGICAL IMPACT ASSESSMENT**

**(Terrestrial Flora and Fauna)**

**Prepared for:**

**OES Consulting Ltd.**

**July 2013**

**By**



**Dr. Patrick Crushell, MIEEM  
Wetland Surveys Ireland Ltd.**

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## Document Control Sheet

Client	OES Consulting Ltd.
Project Title	Peat harvesting Activities at Coole and Clonsura, Co Westmeath
Document Title	Ecological Impact Assessment (Terrestrial Flora and Fauna)
Project Number	WS0295
Document No.	CooleClonsuraEclA_Final270713

Revision	Status	Author	Review	Approved	Date
001	DRAFT Report	BOL	PC		15/07/2013
002	Final Report	BOL	PC	PC	26/07/2013
<b>Wetland Surveys Ireland</b>					



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- Appendix 2 – Plant, Moss and Lichen Species List recorded during survey of Coole, Clonsura and Lough Bane pNHA
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## 1 EXECUTIVE SUMMARY

1. An ecological impact assessment was undertaken of peat harvesting activities being undertaken at two sites at Coole and Clonsura, Co. Westmeath. The project comprises the continued milling of peat from the two sites to supply the horticulture industry. The total area of the peat harvesting activities is 252 ha.
2. A combination of desktop studies and field surveys were undertaken to determine the existing ecological environment at the site. Baseline ecological surveys undertaken included: winter and breeding bird surveys; a habitat and vegetation survey; and a mammal survey.
3. Results of survey work indicate that the overall ecological interest of the site is low with heavily modified and disturbed habitat (industrially cutover bog comprising bare peat) dominating both sites. The sites are not located within any site designated for nature conservation.
4. The main ecological constraints that occur in proximity to the site include the Lough Bane proposed Natural Heritage Area and the Inny River which flows adjacent to both sites and discharges into Lough Derravaragh SPA to the South. Lough Bane comprises a mesotrophic lake surrounded by an extensive area of transition mire. Other habitats of ecological interest identified within the peat harvesting sites include Remnant Raised Bog, Dystrophic Lake and Poor Fen.
5. Three birds of high conservation concern (Hen Harrier, Merlin and Golden Plover) were recorded at Clonsura during winter months. However, none of the birds were found to be dependent on the habitats present on site.
6. Based on the assessment prepared by Hydro Environmental, there appears to be no drainage connection to Lough Bane from the Clonsura harvesting site and no potential impacts for ongoing operations are predicted. There is little or no groundwater input into the lake.
7. There is no proposed harvesting of remnant raised bog at the Coole or Clonsura sites. The future proposed milling operations are to be confined within the footprint of the area currently in development, however the presence of existing boundary drains running adjacent to the remnant raised bog means the hydrology of the remnant bog in close proximity to the drain is already likely to be impacted on. The boundary drain now also acts as a hydraulic (*i.e.* no flow) boundary separating the remnant raised bog and the harvesting area and therefore further removal/draining of peat within the harvesting area will have negligible to no impact on the adjacent remnant raised bog.
8. Potential ecological impacts on terrestrial flora and fauna due to the continued operation of peat milling activities are assessed. The predicted adverse impacts are deemed to range from none to minor in significance. A range of mitigation measures including those currently being implemented by Westland Horticulture are proposed to minimise the predicted impacts.
9. It is concluded that following the implementation of mitigation measures, the residual ecological impacts are deemed to range from none to minor in significance at the local level.

## **2 INTRODUCTION AND BACKGROUND**

*Wetland Surveys Ireland Ltd.* were commissioned by *OES Consulting Ltd.* to undertake an Ecological Impact Assessment (EclA) of continued peat extraction activities at two discrete sites located in Coole and Clonsura, County Westmeath. The existing and potential impacts (direct, indirect and cumulative) of the existing and future activities on terrestrial flora and fauna present within the site and surroundings are qualitatively assessed in this report.

### **2.1 STATEMENT OF AUTHORITY**

This assessment was undertaken by Dr Patrick Crushell and Mr. Barry O'Loughlin, Ecologists with Wetland Surveys Ireland Ltd. Dr Crushell (BSc Applied Ecology; MSc Environmental Resource Management, PhD Environmental Sciences, MIEEM) received an honors degree in Applied Ecology from UCC, a Masters degree in Environmental Resource Management from UCD and defended his PhD at Wageningen University, the Netherlands. He is a Full Member of the Institute of Ecology and Environmental Management (IEEM). Dr Crushell has been working in the area of nature conservation and ecological impact assessment for the past thirteen years. Projects that he has been involved in include wetland inventory surveys; evaluation of proposed designated sites; restoration and management of peatland habitats; baseline ecological surveys and impact assessments of various development proposals including road, quarries, wind-farms, waste facilities, arterial drainage schemes and residential developments; during and post-construction ecological monitoring.

Barry O'Loughlin (BSc Environmental Science, MSc Ecological Assessment, AIEEM) received an honors degree in Environmental Science from NUI Galway and a Masters degree in Ecological Assessment from UCC. He is an Associate Member of the Institute of Ecology and Environmental Management (AIEEM). He has work experience in the field of ecological assessment and environmental management since graduating in 2008. Projects that he has been involved in include wetland inventory surveys, regional invasive species surveys and over-head power line developments. He has undertaken ecological baseline surveys and ornithological surveys as part of impact assessments of various development proposals.

### **2.2 OBJECTIVES**

The objectives of the assessment included:

- To carry out a desktop study in order to determine the previously recorded ecology of the area;
- To carry out a baseline flora and fauna survey of the peat harvesting sites and surroundings;
- Evaluate the ecology of the peat harvesting sites and surroundings and describe the impact of existing operations on existing habitats of interest;
- To identify and predict the potential direct, indirect and cumulative impacts of the continued use of the sites for peat harvesting;
- To identify existing and propose further mitigation measures to be potentially included in the on-going operation and decommissioning of the peat harvesting activities so as to minimise potential impacts on flora and fauna in the future.

#### **2.2.1 Statutory Context**

The assessment has regard to the following documents and legislation:

- EPA (2003). Advice notes on current practice (in the preparation of Environmental Impact Statements).

- EPA (2002). Guidelines on the information to be contained in Environmental Impact Statements.
- The European Communities (Birds and Natural Habitats) Regulations 2011 (SI 411/11)
- EIA Directive 85/337/EEC (as amended by 97/11/EC)
- The Wildlife Act 1976 and (amendment) Act 2000
- The Habitats Directive 92/43/EEC (under SI 94/97)
- The Birds Directive 79/409/EEC
- Flora (Protection) Order 1999

### 2.2.2 Study Area

The study area comprises two existing operational peat harvesting sites located at Clonsura and Coole, County Westmeath.

The site at Coole is approximately 164 hectares in extent and located ca 6 km West of Castlepollard, Co. Westmeath (see **Figure 1**). The site is divided into a Northern and Southern section by a public road (the R395). The main habitat present within the site comprises cutover bog (PB4) with bare peat dominant together with a series of drainage channels traversing the site. Within this site, two parcels of former high bog are currently used for peat extraction. Two small remnant raised bog areas, with intact surface vegetation occur in the north-east and south-east of the Coole site. A buffer zone, where peat is not being extracted, occurs to the west of the two main peat extraction areas and separates the works from the Inny River. The Inny River occurs to the west of the existing peat harvesting sites. For the most part the various bogland areas within the wider study area have been developed as commercial peat extraction works or planted with commercial conifer woodlands. The nearest designated site of international importance is Lough Derravarragh SPA (NPWS Site Code: 4043), located ca 1.2 km to the south. The boundary of Lough Derravarragh NHA is located approx.. 0.5km south.

The site at Clonsura is approximately 89 hectares in extent and located ca 8 km North-west of Castlepollard, Co. Westmeath (see **Figure 1**). As with the Coole site, the main habitat present comprises cutover bog (PB4) with bare peat dominant together with a series of drainage channels traversing the site. A buffer zone of high bog, where peat is not being extracted, occurs to the West of the main peat extraction areas and separates the existing peat harvesting sites from the Inny River. Conifer plantation occurs to the east and north. Lough Bane proposed Natural Heritage Area (NPWS site code: 1721) is located adjacent to the north of the Clonsura peat harvesting site (see **Figure 1**).

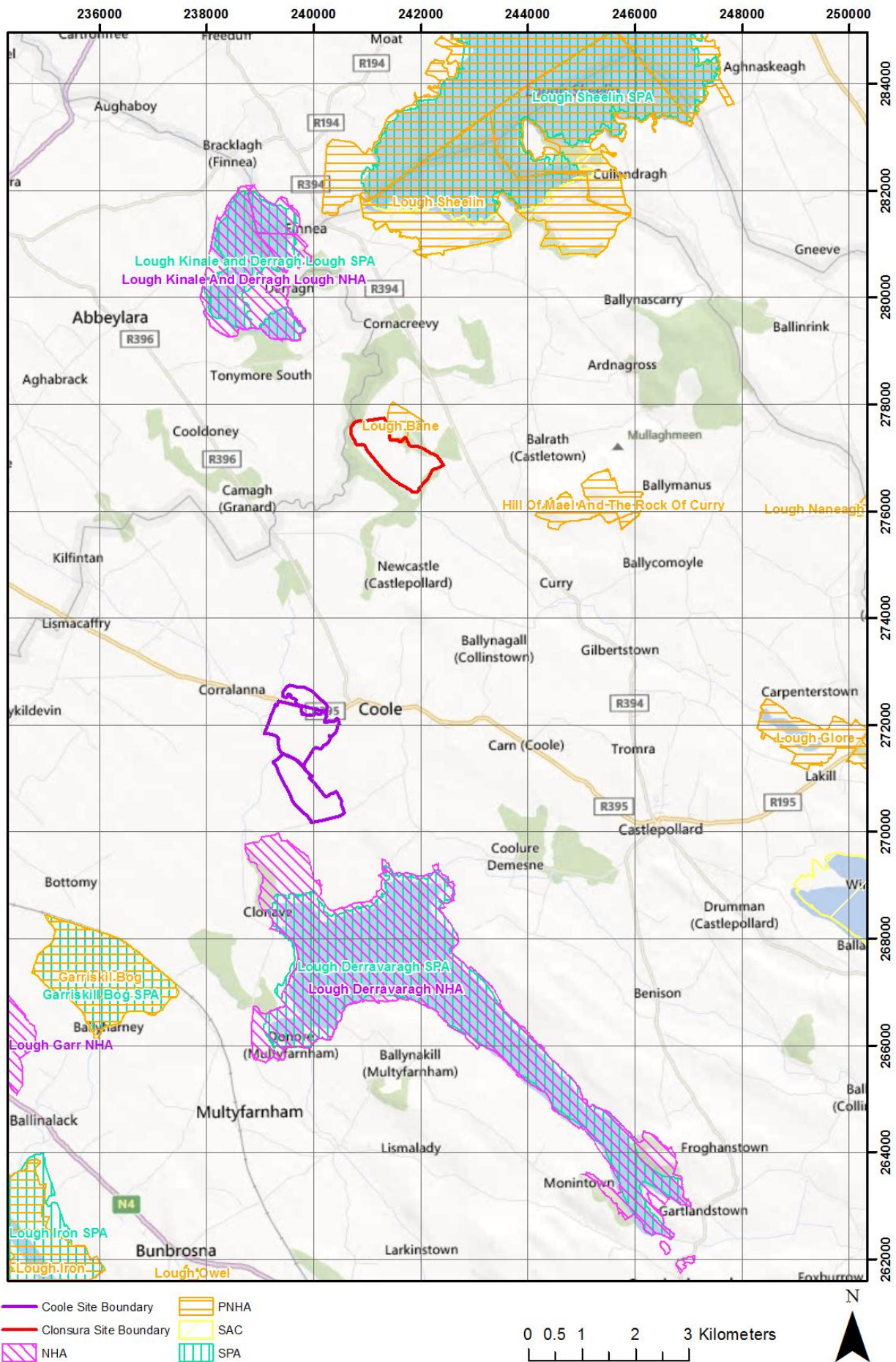


Figure 1: Site locations in relation to designated sites. (Basemap © Bing).

### 3 METHODOLOGY

#### 3.1 DESKTOP REVIEW AND CONSULTATION

A desktop review was carried out to identify features of ecological importance within the existing peat harvesting sites and surrounding region. Literature sources consulted are included in the text and listed at the rear of the document. A review of designated sites was carried out as part of the desktop study.

To assist in gathering information about the site, a scoping exercise was undertaken with various consultees (see **Table 19: List of organisations consulted as part of the environmental impact assessment.**

). This consultation included written correspondence from OES Consulting to consultees in May 2013. Comments that were received are summarised below. Comments from IFI and the NPWS were received in 2011 as part of the consultation undertaken for the Natura Impact Statement prepared by OES Consulting and submitted to the EPA in February 2011.

**Table 19:** List of organisations consulted as part of the environmental impact assessment.

Organisation	Response
Irish Peatland Conservation Council (IPCC)	Yes
Westmeath County Council	Yes
National Parks and Wildlife Service (NPWS)	Yes
Inland Fisheries Ireland (IFI)	Yes

The following is a summary of the main issues raised by the various consultees that responded to the scoping request:

##### Irish Peatland Conservation Council

- Highlighted the location of the existing peat harvesting sites in relation to designated areas in the surroundings including Lough Derravaragh SPA and NHA and Lough Bane pNHA.
- Highlighted the presence of Otter (*Lutra lutra*), Stoat (*Mustela erminea*) and Fallow Deer (*Dama dama*) within the 10 km square (N37 & N47) in which the existing peat harvesting sites occur.
- Recommended undertaking an Eco-hydrological study of the sites.

##### Westmeath County Council

- Highlighted the ecological sensitivities of the receiving environment and potential impacts of the activity on flora and fauna.
- Highlighted the importance of priority Annex I habitats including raised bogs, issues regarding water quality and associated impacts on designated sites in the surroundings (Lough Derravaragh SPA, Garriskil Bog SPA & SAC), potential for impacts on bird populations in the wider study area and biodiversity.

##### National Parks and Wildlife Service (NPWS)

- Highlighted the presence of natural watercourses in proximity to the existing peat harvesting sites particularly the Inny River and the potential impacts of the activity on species of high conservation concern including Otter, Kingfisher, Lamprey species and White-clawed crayfish, all of which may occur along this watercourse.

- Highlighted the qualifying interests of Lough Derravaragh SPA and potential for impacts of the existing peat harvesting on water quality.
- Recommended reviewing information from available data sources on the extent of peat siltation in Lough Derravaragh SPA.

#### Inland Fisheries Ireland

- Highlighted the importance of the Inny River for brown trout and salmon and the sustainable management of these species under the Shannon Salmon Restoration Project.
- Highlighted the presence of two species (Lamprey and Crayfish) listed on Annex II of the EU Habitats Directive along the Inny River.
- Expressed concerns over the discharge of peat siltation to the Inny River and the impacts of this on aquatic species (invertebrates, fish, Annex II species etc). Recommended implementing mitigation and control measures with regard to fuel storage, pump operations, peat stockpiles etc.
- Recommended carrying out routine maintenance inspections during the operation phase of the proposed project.

### **3.2 FIELD SURVEY**

#### **3.2.1 Habitat and flora survey**

A habitat survey of the site was undertaken during a single site visit on the 12<sup>th</sup> of June 2013. Target notes were made on all semi-natural habitats encountered during the survey including notes on dominant vegetation, qualitative assessment of plant species diversity, vegetation structure, topography, drainage, disturbance and management. The habitats encountered on site were classified in accordance with Fossitt (2000). Methods used during the habitat survey followed best practice guidance for habitat survey and mapping as outlined in Smith et al. (2011).

In addition to the habitat survey, a fauna survey was conducted to assess usage of the site by birds and mammals (see below). Based on the characteristics of the habitats present it was considered unnecessary to carry out assessments of more specialised groups such as invertebrate species.

#### **3.2.2 Avifauna surveys**

##### *Winter season*

Bird surveys were undertaken on two occasions during the winter season 2013 (February - March) to assess species composition and determine the presence of birds of conservation concern within and surrounding the existing peat harvesting sites. Surveys were undertaken from the 25<sup>th</sup> - 27<sup>th</sup> of February and 19<sup>th</sup> - 21<sup>st</sup> of March 2013. Methodology used included walkover transect surveys of the sites together with vantage point watches. Counts of waterbirds were also undertaken at known water bird sites in the surroundings. **Table 20** lists all waterbird sites in the surroundings (within 5 km) identified during a desktop review and field surveys undertaken during February and March 2013. Counts were conducted during daylight hours from suitable vantage points using binoculars and / or telescope as required. Records were made of numbers of wildfowl or wader species, presence of marked birds (leg-ringed or neck-collared), weather conditions and habitat types. During the course of the study no marked birds were recorded. Lough Sheelin was not visited during the current study.



**Table 20:** Known water bird sites that occur within 5 km of the study area.

Site Name (Main Site)	Conservation Status	National Grid Reference
Lough Bane	pNHA	N 415 770
Lough Derravaragh	SPA	N 410 680
Lough Kinale	SPA	N 390 811
Derragh Lough	SPA	N 390 710
Lough Sheelin	SPA	N 450 840

#### *Breeding season*

Bird surveys were undertaken on two occasions during the breeding season. Methodology used included walkover transect surveys together with vantage point watches (ca 1 hour duration) with reference to Brown and Shepherd (1993) and Bibby et al. (2000). The aim of the vantage point watch was to determine whether birds of high conservation concern or especially sensitive species (in particular raptors and waterbirds) utilise the site during summer months. In addition to vantage point surveys, a walkover survey of the site to determine the species composition throughout the habitats across the site was undertaken.

The prevailing weather conditions during each survey visit are summarised in **Table 21**. When required, binoculars were used to identify various bird species; bird identification follows Mullarney et al. (1999). All aural and visual registrations were recorded. Surveys were carried out under suitable weather conditions.

**Table 21:** Dates and summary of bird surveys undertaken at existing peat harvesting sites at Clonsura and Coole, County Westmeath.

Date	Weather
25 Feb 2013	Bright; Dry; Calm; Sunny; 0-33% Cloud Cover, Good Visibility
26 Feb 2013	Bright; Dry; Calm; Sunny; 33-66% Cloud Cover, Good Visibility
27 Feb 2013	Bright, Dry, Wind (F2), 66-100% Cloud Cover, Good Visibility
19 Mar 2013	Bright, Dry, Wind (F2), 66-100% Cloud Cover, Good Visibility
20 Mar 2013	Bright; Dry; Calm; Sunny; 33-66% Cloud Cover, Good Visibility
21 Mar 2013	Bright; Showers; Wind (F4-5); Sunny; 66-100% Cloud Cover, Moderate - Good Visibility
05 Jun 2013	Bright; Dry; Calm; Sunny; 0-33% Cloud Cover, Good Visibility
12 Jun 2013	Bright; Dry; Calm; Sunny; 33-66% Cloud Cover, Good Visibility

### **3.2.3 Mammal survey**

The site was assessed for any evidence of mammal activity. All mammals recorded during site visits were noted (MacDonald & Barrett 1993). Signs and tracks of mammals are the best way of assessing a site without conducting night surveys. All signs and tracks (Bang and Dahlstrom 2004) were assessed as they were encountered in the field. Suitable mammal habitat within and surrounding the site was also noted.

### **3.3 EVALUATION OF ECOLOGICAL SIGNIFICANCE**

The impact significance is a combined function of the value of the affected feature (its ecological importance), the type of impact and the magnitude of the impact. It is necessary to identify the value of ecological features within the study area in order to evaluate the significance and magnitude of possible impacts.

The method of evaluating ecological significance used in this study is broadly based on guidelines issued by IEEM (2006) and the NRA (2009). The results of the habitat survey and fauna survey were evaluated to determine the significance of identified ecological features located in the study area on an importance scale ranging from international → national → county → local. The local scale is approximately equivalent to one 10 km square. Because most sites will fall within the local scale, this is sub-divided into high local importance and low local importance. The criteria shown in **Table 22** have been used in assessing ecological value within the study area. In addition to the criteria listed in **Table 22** the evaluation of habitats and species also considers other factors such as potential ecological value, secondary supporting values where habitats may perform a secondary ecological function and social values of an ecological feature such as educational, recreational and economic value.

In the case of birds, the scheme presented by Percival (2003) to assess the sensitivity of bird species on a scale from 'very high → high → medium → low' as shown in **Table 23** is used.

**Table 22:** Criteria used in assessing the ecological importance of sites

[Source: Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009)]

<b>Ecological Valuation Scheme(NRA 2009)</b>
<p><b>International Importance:</b></p> <p>'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. Proposed Special Protection Area (pSPA). Site that fulfills the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network. Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural &amp; Natural Heritage, 1972). Biosphere Reserve (UNESCO Man &amp; The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).</p>
<p><b>National Importance:</b></p> <p>Site designated or proposed as a Natural Heritage Area (NHA). Statutory Nature Reserve. Refuge for Fauna and Flora protected under the Wildlife Acts. National Park. Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.</p>
<p><b>County Importance:</b></p>

<b>Ecological Valuation Scheme(NRA 2009)</b>	
<p>Area of Special Amenity.            Area subject to a Tree Preservation Order.            Area of High Amenity, or equivalent, designated under the County Development Plan.            Resident or regularly occurring populations (assessed to be important at the County level) of the following:            Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;            Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;            Species protected under the Wildlife Acts; and/or            Species listed on the relevant Red Data list.            Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfill the criteria for valuation as of International or National importance.            County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared.            Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.            Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</p>	
<p><b>Local Importance (higher value):</b>            Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;            Resident or regularly occurring populations (assessed to be important at the Local level) of the following:            Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;            Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;            Species protected under the Wildlife Acts; and/or            Species listed on the relevant Red Data list.            Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;            Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.</p>	
<p><b>Local Importance (lower value):</b>            Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;            Sites or features containing non-native species that are of some importance in maintaining habitat links.</p>	

SAC = *Special Area of Conservation*; SPA = *Special Protection Area*; NHA = *Natural Heritage Area*  
 BAP = *Biodiversity Action Plan* (these have been published for many local authority areas)

**Table 23:** Criteria used in assessing the sensitivity of bird species as presented by Percival (2003)

<b>Sensitivity</b>	<b>Determining Factor</b>
Very High	Species that form the cited interest of SPAs and other statutorily protected nature conservation areas. Cited means mentioned in the citation text for the site as a species for which the site is designated.
High	Species that contribute to the integrity of an SPA but which are not cited as species or which the site is designated. Ecologically sensitive species including the following: divers, common scoter, hen harrier, golden eagle, red necked phalarope, roseate tern and cough. Species present in nationally important numbers (>1% Irish population).
Medium	Species on Annex I of the EC Birds Directive Species present in regionally important numbers (>1% regional (county) population) Other species on BirdWatch Ireland's red list of Birds of Conservation Concern
Low	Any other species of conservation interest, including species on BirdWatch Ireland's amber list of Birds of Conservation Concern not covered above.

### 3.4 ASSESSMENT OF IMPACTS AND IMPACT SIGNIFICANCE

The assessment of impacts is broadly based on guidance offered by the Institute of Environmental and Ecological Management (IEEM) in the published Guidelines for Ecological Impact Assessment (2006) with reference to national guidance given in Eirgrid (2012), NRA (2009), Gittings (1998) and EPA (2002). Impacts are discussed and assessed in relation to impact type (positive, neutral or negative), character and sensitivity of the affected feature, magnitude, duration, timing and frequency.

Criteria for assessing impact type and magnitude are presented in **Table 24** and **Table 25** respectively. In assessing the magnitude and significance of impacts it is important to consider the value of the affected feature as shown in **Table 22** and **Table 23**.

**Table 24:** Criteria for assessing impact type

Impact type	Criteria
Positive impact:	A change is likely to improve the ecological feature in terms of its ecological value.
Neutral	No effect.
Negative impact:	The change is likely to adversely affect the ecological value of the feature.

**Table 25:** Criteria for assessing impact magnitude

Impact magnitude	Definition
No change:	No discernible change in the ecology of the affected feature.
Imperceptible Impact:	A change in the ecology of the affected site, the consequences of which are strictly limited to within the activity site boundaries.
Minor Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the activity site boundary, but these consequences are not considered to significantly affect the distribution or abundance of species or habitats of conservation importance.
Moderate Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the activity site boundary. These consequences are considered to significantly affect the distribution and/or abundance of species or habitats of conservation importance.
Substantial Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the activity site boundary. These consequences are considered to significantly affect species or habitats of high conservation importance and to potentially affect the overall viability of those species or habitats in the wider area.
Major Impact:	A change in the ecology of the affected site which has noticeable ecological consequences outside the activity site boundary. These consequences are considered to be such that the overall viability of species or habitats of high conservation importance in the wider area is under a very high degree of threat (negative impact) or is likely to increase markedly (positive impact).

## 4 EXISTING ENVIRONMENT

### 4.1 DESIGNATED SITES

The existing peat harvesting sites do not lie within any sites designated or under consideration for designation for nature conservation. **Table 26** presents details of the designated sites that occur within 5 km of the existing peat harvesting sites while **Figure 1** shows their location in relation to the existing peat harvesting sites.

Natural Heritage Areas (NHAs) are sites of national importance due of the presence of listed species and habitats that have been recognised as being important on a national level. The nearest site being considered for designation is Lough Bane pNHA (NPWS site code: 1721) and occurs adjacent to the North of the Clonsura site. The proposed NHA is of national conservation importance due to the

presence of a mesotrophic lake and surrounding transition mire habitat (see **Appendix 1** for NPWS description). Only a small number of sites (raised bogs and blanket bogs) have been formally designated as NHAs. Once formally designated they are afforded legal protection under the Wildlife (amendment) Act 2000.

Special Areas of Conservation (SACs) are sites of international importance due to the presence of listed habitats or species that are of European importance. The nearest designated SAC to the existing peat harvesting sites is Moneybeg and Clareisland Bogs SAC (site code: 2340), located ca 3.1 km North of Clonsura at its nearest point. The site is of conservation value for active raised bog, degraded raised bog and *Rhynchosporion* habitats that are listed on Annex I of the EU Habitats Directive.

Special Protection Areas (SPAs) for Birds are designated based on the presence of internationally significant populations of listed bird species. The nearest SPA to the existing peat harvesting sites is Lough Derravaragh (site code: 4043) located ca 1.2 km South of the existing peat harvesting site at Coole. The SPA is of ornithological importance for a number of bird species whose wintering populations are recognised as nationally and internationally important (see **Appendix 1** for NPWS description). Part of the site is also designated as a Natural Heritage Area for raised bog; the NHA boundary is approx.. 0.5km from the Coole site..

Legal backing for the protection of SPAs and SACs in Ireland is provided by the EU Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna (92/43/EEC; commonly known as the 'Habitats Directive') which has been transposed into Irish Law through the recently enacted European Communities (Birds and Natural Habitats) Regulations 2011 (SI 411/11).

**Table 26:** Designated sites within 5 km of the study area (Source: [www.npws.ie](http://www.npws.ie) 2013)

Name	Site Code	Site Description	Distance and direction from site
Lough Bane pNHA	1721	The site comprises a mesotrophic lake surrounded by bogland and conifer plantation. The lake is surrounded by a number of bog plants and an area of transition mire surrounds the site. Records of Whooper Swan, Teal, Wigeon and Curlew have previously been recorded at this site.	Adjacent to the North (Clonsura)
Lough Derravaragh SPA / NHA	4043 / 0684	Lough Derravaragh comprises a limestone mesotrophic lake that is of ornithological importance for wintering waterfowl. It supports nationally important numbers of Little Grebe, Mute Swan, Pochard, Tufted Duck, and Coot. The Pochard population accounts for 6% of the national total population in the country. The SPA also supports regionally important populations of Whooper Swan. Other species of high conservation interest include Lapwing, Golden Plover, Shoveler and Greenland White-fronted Geese. The Inny River enters and exits this site. Lough Derravaragh is designated as a NHA as it supports active raised bog.	1.2 km/0.5km South (Coole)

Name	Site Code	Site Description	Distance and direction from site
Lough Kinale and Derragh Lough SPA / NHA	4061 / 0985	The site comprises a small limestone lake located downstream of Lough Sheelin. Both lakes occur at the top of the catchment of the Inny River. The site is surrounded by reed swamp and is of ornithological importance for diving duck. The site supports nationally important populations of Pochard and Tufted Duck. Regionally important populations of Mute Swan and Coot also occur within the site. Site is designated as NHA due to presence of intact raised bog habitat.	1.8 km North-west (Clonsura)
Hill of Mael and the Rock of Curry pNHA	0681	The site comprises hills of bare limestone outcrop. The main habitats present within the site include areas of scrub with mature trees of Hazel, Hawthorn, Ash and Spindle. The area is unique in County Westmeath with few limestone exposures of importance in the midlands.	1.9 km to the East (Clonsura)
Moneybeg and Clareisland Bogs SAC	2340	The site is a candidate Special Area of Conservation selected for active raised bog, degraded raised bog and <i>Rhynchosporion</i> habitats that are listed on Annex I of the E.U. Habitats Directive. The site comprises two raised bogs with semi-natural lake margins and the transition from high bog to open water is intact.	3.1 km North (Clonsura)
Lough Sheelin SPA / pNHA	4065 / 0987	The bog areas surrounding Lough Sheelin are of interest comprising raised bogs dominated by Ling Heather ( <i>Calluna vulgaris</i> ) and Cotton grass ( <i>Eriophorum</i> spp.). The site supports the rare plant species Marsh Pea ( <i>Lathyrus palustris</i> ), listed on the Flora Protection Order (FPO). The Red Data Charophyte, <i>Chare denudate</i> has been recorded from the lake site. The site is of ornithological importance for wintering waterbirds including nationally important populations of Great Crested Grebe, Pochard, Tufted Duck and Goldeneye.	3.1 km North (Clonsura)
Garriskill Bog SAC / SPA	0679 / 4102	Garriskill Bog is bounded to the South-east and South-west by the rivers Inny and Riffey. The site is a good example of intact raised bog with a well developed system of pools and hummocks. The site is of ornithological importance for breeding Merlin, an Annex I listed Bird species of high conservation concern. Other breeding bird species of conservation importance include Curlew and Redshank.	4 km South-west (Coole)

#### Evaluation:

The existing peat harvesting sites at Clonsura and Coole do not lie within any sites designated or under consideration for designation for nature conservation. The nearest designated site is Lough Bane pNHA which occurs adjacent to the North of the Clonsura works. This site is deemed to be of national importance.

There are a number of important waterbird sites in the wider landscape surrounding the existing peat harvesting sites including Lough Derravaragh SPA (1.2 km to South, Lough Kinale and Derragh Lough SPA ca 1.8 km to the North-west and Lough Sheelin SPA ca 3.5 km to the North). The habitats present within the peat extraction sites are considered unsuitable for those bird species listed as qualifying interests of the SPAs. Although wintering waterfowl are known to commute between lakes and feeding sites in the surroundings, it is not considered likely that flocks utilise the existing peat harvesting sites

when commuting between these sites. The potential impacts of the existing and ongoing peat harvesting on European sites (SACs and SPAs) in the surroundings are addressed in the Appropriate Assessment Screening Report and Natura Impact Statement prepared by OES consulting dated February 2011.

## 4.2 HABITATS AND VEGETATION

Following the habitat survey of the site, the different habitat types (as classified according to Fossitt (2000)) were identified and mapped. For the purposes of this section, habitat descriptions for the existing peat harvesting sites and immediate surrounding areas at Coole and Clonsura are described separately in the following sections. The habitat maps for Coole and Clonsura are presented in **Figure 2 & 3** respectively.

### 4.2.1 COOLE PEAT HARVESTING SITE

A description of the various habitats recorded at Coole is presented below. The habitat code according to Fossitt (2000) is in brackets after the habitat name. A list of all plant species recorded on site is presented in **Appendix 2**.

The habitats present within the site include cutover bog (PB4), raised bog (PB1), drainage ditches (FW4), recolonising bare ground (ED3), dry meadows and grassy verges (GS2), improved agricultural grassland (GA1) and Scrub (WS1). Conifer plantation (WD4), and bog woodland (WN7) occur within the immediate surroundings of the existing peat harvesting site. **Table 27** summarises the total area of each habitat recorded within and immediately adjoining the existing peat harvesting site and the ecological evaluation of each habitat.

**Table 27:** Extent and ecological evaluation of each habitat type recorded within and adjoining the existing peat harvesting site at Coole as shown on Figure 2.

Habitat Type	Area (ha) / Length (m)	Evaluation
Cutover Bog (PB4)	163	Low ecological value
Raised Bog (PB1)	19.6	High local value
Drainage Ditches (FW4)	Unknown	Low ecological value
Recolonising bare ground (ED3)	5.2	Low ecological value
Dry meadows and grassy verges (GS2)	0.9	Low ecological value
Improved agricultural grassland (GA1)	4	Low ecological value

#### 4.2.1.1 Cutover Bog (PB4)

Cutover bog is the main habitat that occurs within the existing peat harvesting site at Coole. The habitat is almost completely dominated by bare peat and comprises high bog being milled for peat (see **Plate 1; Appendix 3**). Well maintained drains run at regular intervals throughout this habitat. A few scattered plants were recorded growing along the margins of the site.

Evaluation: This habitat is highly modified and in its current condition is of low ecological value.

#### 4.2.1.2 Raised Bog (PB1)

The site comprises an area of remnant raised bog with a poor quality hummock/hollow and pool system at the Eastern (see **Plate 2**) and South-eastern parts of the site. Most of the pools are dominated by algal deposits, and an absence of aquatic *Sphagnum* species. Intact bog vegetation still present mainly composed of mostly marginal ecotope vegetation as indicated by an abundance of Bog Asphodel (*Narthecium ossifragum*) and frequent occurrence of Carnation Sedge (*Carex panacea*). Other species

include Ling Heather (*Calluna vulgaris*), Common Cottongrass (*Eriophorum vaginatum*) and *Cladonia portentosa*.

The section of bog present on the southern part of the site shows disturbance with drains inserted at regular intervals and peat from drains piled into mounds.

Evaluation: Raised bog is listed on Annex I of the EU Habitats Directive. The habitat present on site does not however qualify as an Annex I listed habitat as it no longer supports active raised bog vegetation and considering its restricted extent is not considered capable of natural regeneration. The habitat is deemed to be of **high local importance** due to the occurrence of an intact surface and the presence of species typical of raised bog vegetation.

#### **4.2.1.3 Drainage Ditches (FW4)**

A series of artificial drainage channels occur regular intervals throughout the existing peat harvesting site. The drains are approximately 1.5 - 2 m in depth with water ingress recorded in some of these drains. Surface water generally drains to the west although detailed evaluation is provided in the hydrology assessment conducted by Hydro Environmental.

Evaluation: The habitat serves to drain the high bog component of the site and is deemed to be of low ecological value with limited potential to support biodiversity.

#### **4.2.1.4 Recolonising bare ground (ED3)**

A number of bog plants have recolonised in the northern part of the site (North of main public road) at Coole. Species recorded included Hare's Tail Cottongrass (*Eriophorum angustifolium*), Common Cottongrass (*Eriophorum vaginatum*) and Soft Rush (*Juncus effusus*). The substrate remains firm and bare peat is a major component of the habitat.

Evaluation: The habitat is of low ecological value.

#### **4.2.1.5 Dry meadows and grassy verges (GS2)**

Grassy verges are most notable along the margins of drainage ditches and along the periphery of cutover bog near access roads.

Evaluation: The habitat is considered to be of low ecological value.

#### **4.2.1.6 Improved agricultural grassland (GA1)**

A section of improved grassland occurs in the South-eastern part of the existing peat harvesting site.

Evaluation: Improved agricultural grassland is deemed to be of low ecological value.

### **4.2.2 Other habitats in the surroundings**

#### **4.2.2.1 Artificial lakes and ponds (FL8)**

An artificial lake occurs to the west of the existing peat harvesting site boundary. The lake is associated with peat extraction operations with standing water present on the cutaway margins of the high bog. This habitat serves as an area of value to breeding waders including Lapwing, Snipe and Ringed Plover.



Evaluation: The habitat is of high local importance for breeding waders.

#### **4.2.2.2 Conifer Woodland (WD4)**

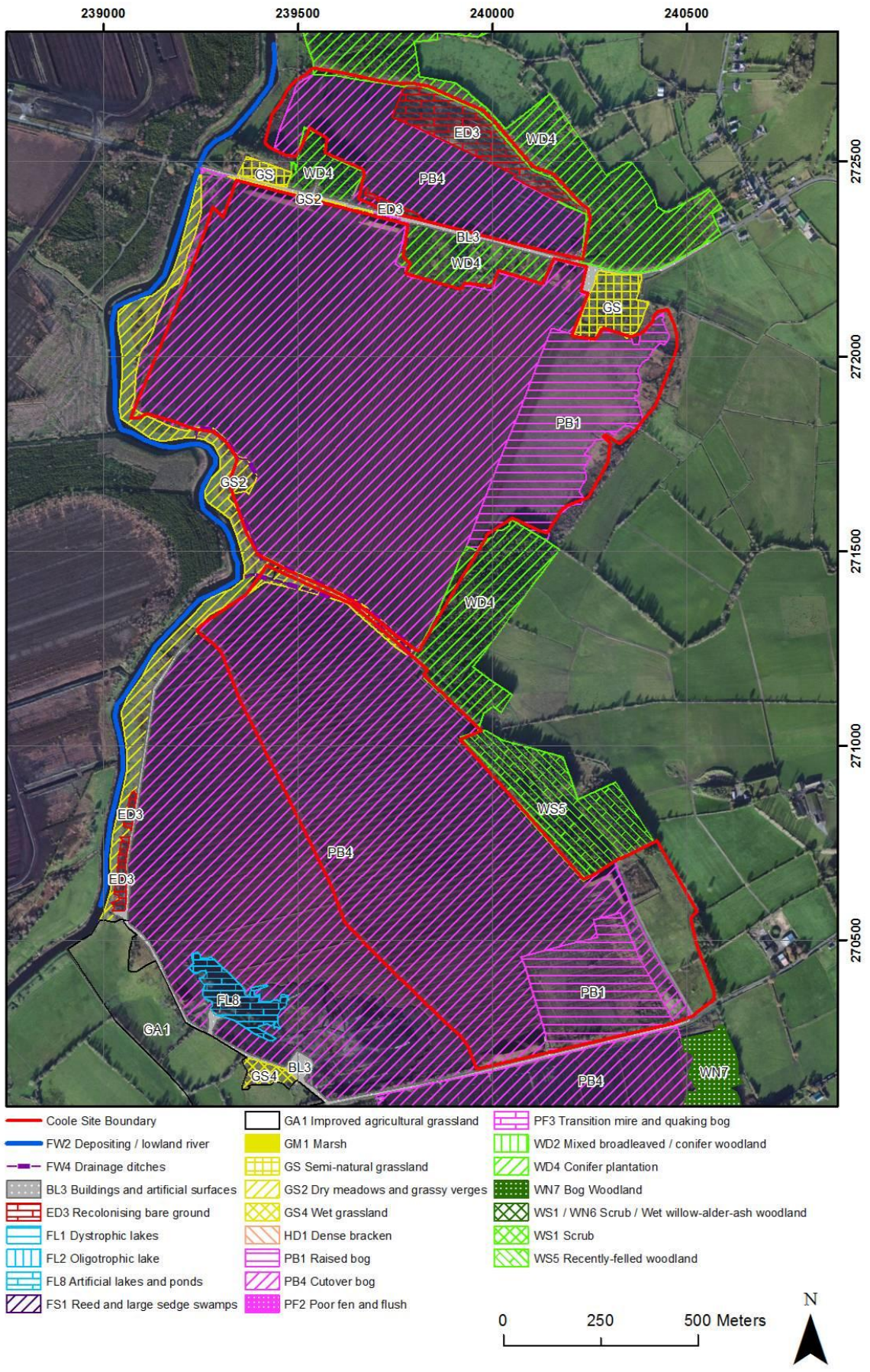
A section of conifer woodland occurs outside the eastern boundary of the site. There have been some felling operations of Sitka Spruce (post thicket stage) trees undertaken at this part of the site.

Evaluation: The habitat is deemed to be of low ecological importance.

#### **4.2.2.3 Depositing lowland rivers (FW2)**

The western edge of this site is bounded by the Inny River (FW2) (see **Plate 3**). A partially vegetated area separates the river from the peat works. This comprises re-colonising bare peat areas with grassy vegetation. Peat sedimentation basins (FL8) occur at the North-western part of the site.

Evaluation: This habitat is of high ecological importance and likely to support species listed on Annex II of the EU Habitats Directive (including Otter; Salmon and White-clawed crayfish). The river also feeds into Lough Derravaragh SPA downstream. The existing and potential impacts of the peat harvesting sites on aquatic ecology are addressed separately in the Aquatic Ecology report that was prepared by Conservation Services Ltd.



**Figure 2:** Habitat map of the peat harvesting site at Coole, County Westmeath. (Aerial Photograph © ESRI).

### 4.2.3 CLONSURA PEAT HARVESTING SITE

A description of the various habitats recorded at Clonsura is presented below. The habitat code according to Fossitt is in brackets after the habitat name. A brief description of the habitats recorded at Lough Bane pNHA are also presented below. A list of all plant species recorded on site is presented in **Appendix 2**.

The main habitats present within the site include cutover bog (PB4), raised bog (PB1), dystrophic lake (FL1) and poor fen (PF2) mosaic, drainage ditches (FW4) and dry meadows and grassy verges (GS2). **Table 28** summarises the total area of each habitat recorded within and immediately adjoining the existing peat harvesting site boundary and immediate surrounding areas and the ecological evaluation of each habitat.

**Table 28:** Extent and ecological evaluation of each habitat type recorded within and adjoining the existing peat harvesting site at Clonsura as shown in Figure 3.

Habitat Type	Area (ha)	Evaluation
Cutover Bog (PB4)	97	Low ecological value
Raised Bog (PB1)	5.6	High local importance
Dystrophic lakes (FL1) and Poor fen and flush (PF2) mosaic	0.5	High local importance
Drainage Ditches (FW4)	NA	Low ecological value
Dry meadows and grassy verges (GS2)	3.6	Low ecological value
Buildings and artificial surfaces (BL3)	0.8	Low ecological value

#### 4.2.3.1 Cutover Bog

Cutover bog is the main habitat that occurs within the site at Clonsura (see **Plate 4**). The habitat is almost completely dominated by bare peat and comprises high bog being milled for peat. Two meter deep drains run at regular intervals throughout the former high bog dome. A number of small sedimentation basins (FL8) occur along the eastern margin of this area. Plant species are confined to some drain margins and to the Southern part of the site near the periphery of the bog with vegetation recolonising or persisting locally in these areas. Plant species recorded in these parts include Ling Heather (*Calluna vulgaris*), Common Cottongrass (*Eriophorum angustifolium*), Devil's-bit Scabious (*Succisa pratensis*), Hard Rush (*Juncus inflexus*), Tormentil (*Potentilla erecta*), Heath Milkwort (*Polygala serpyllifolia*), Sweet Vernal-grass (*Anthoxanthum odoratum*) and *Sphagnum* mosses including *Sphagnum papillosum* and *Sphagnum tenellum*.

Evaluation: The habitat has been highly modified and is considered to be of low ecological importance and in its current condition has limited potential to support biodiversity.

#### 4.2.3.2 Raised Bog (PB1)

An area of remnant raised bog with surface vegetation intact and typical raised bog species occurs in the western and north-western part of the site (see **Plate 5 & 6**). Pools are absent as are the more commonly associated aquatic bog species. The peat is firm underfoot. The surface of the bog is dominated by an almost continuous cover of *Cladonia portentosa*. Other species recorded include Ling Heather (*Calluna vulgaris*), Cross leaved Heath (*Erica tetralix*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Purple Moor-grass (*Molinia caerulea*) and occasional stands of Birch (*Betula pubescens*). The bog is continuous with a small dystrophic lake (see below).

Evaluation: Raised bog (Active and Degraded) is listed on Annex I of the EU Habitats Directive. The habitat present on site does not however qualify as it no longer supports active raised bog vegetation and based on its isolated and small extent is not considered to be capable of natural regeneration. As an area of remnant high bog with typical raised bog vegetation it is deemed to be of high local importance.

#### **4.2.3.3 Dystrophic lake (FL1) and Poor fen and flush (PF2)**

A dystrophic lake occurs at the North-western part of the site surrounded by a margin of quaking poor fen (PF2) dominated by Bottle Sedge (*Carex rostrata*), Common Cottongrass (*Eriophorum angustifolium*) and mosses including *Sphagnum palustre* (see **Plate 5**). The habitat comprises extensive floating mats with Cranberry (*Vaccinium oxycoccos*) occurring on low hummocks. The site retains significant ecological interest. A diverse dragonfly population was noted.

Evaluation: The habitat present on site is small in extent but is offered protection by the remnant bog which surrounds it. The bog lake and poor fen habitats are deemed to be of high local importance.

#### **4.2.3.4 Drainage ditches (FW4)**

A series of artificial drainage channels occur at regular intervals throughout the peat harvesting site. The drains are approximately 2 m in depth with water ingress was recorded in some of these drains. Surface water drains mainly to the West and South-west. A large central drain occurs in the central part of the site flowing to the west towards the Inny River. The drain is 5 m deep, with exposed lake marl at the base and is dominated by scattered Willow (*Salix* spp.), Birch (*Betula pubescens*) and Alder (*Alnus glutinosa*). The drain separates the two main peat extraction areas.

Evaluation: The habitat serves to drain the high bog component of the site and is deemed to be of low ecological value with limited potential to support biodiversity.

#### **4.2.3.5 Dry meadows and grassy verges (GS2)**

Grassy verges are most notable along the margins of drainage ditches and along the periphery of cutover bog adjacent to access roads.

Evaluation: The habitat is considered to be of low ecological importance with limited potential to support biodiversity.

#### **4.2.3.6 Buildings and artificial surfaces (BL3)**

A road provides access along the eastern part of the site.

Evaluation: The habitat is deemed to be of low ecological value.

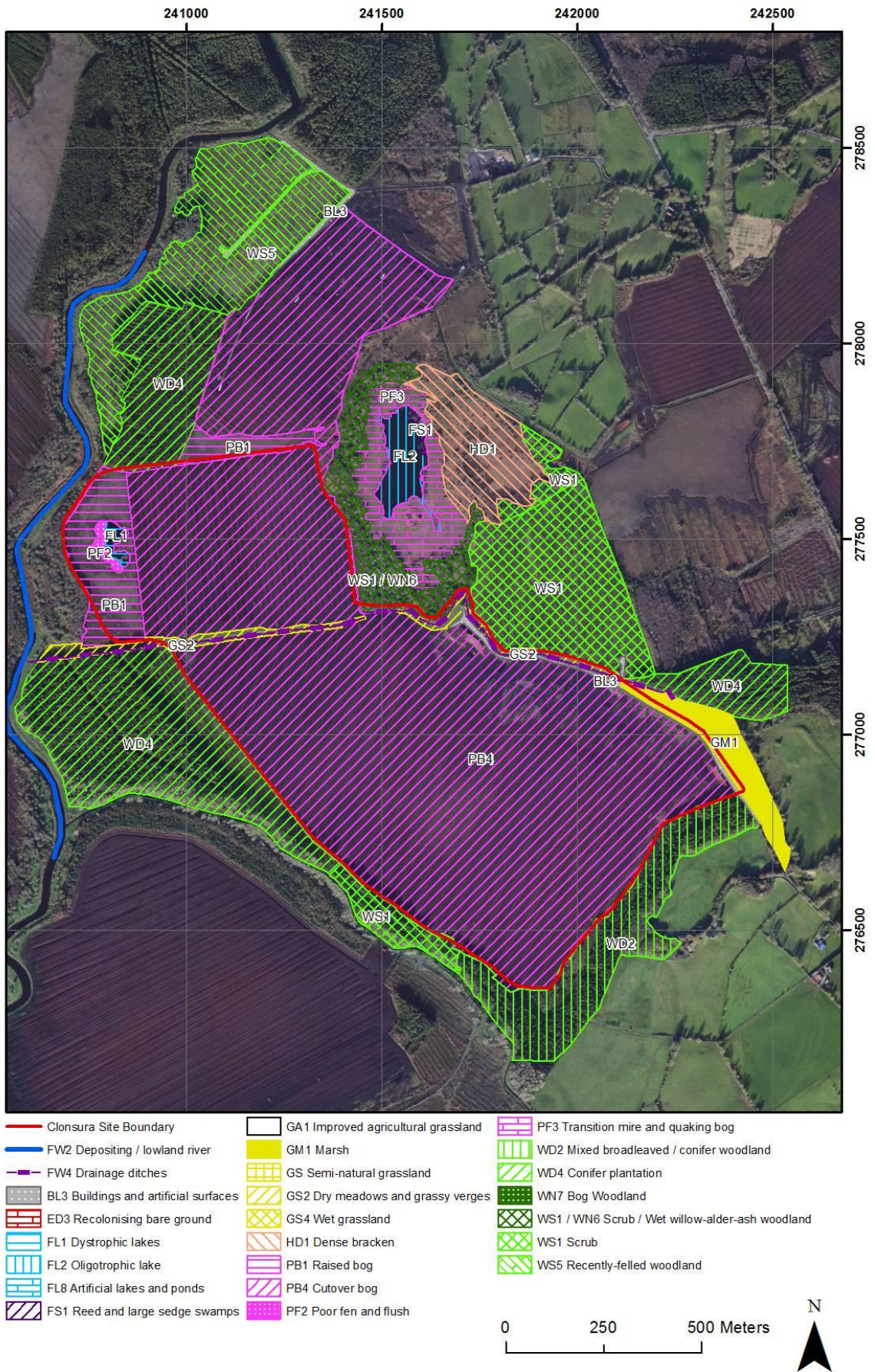
### **4.2.4 Other habitats of conservation interest in the surroundings**

#### **4.2.4.1 Lough Bane pNHA**

Lough Bane proposed Natural Heritage Area (NPWS site code: 001721) is a mesotrophic lake (FL2) surrounded by an extensive zone of transition mire (PF3) grading into birch scrub woodland (WS1) (see **Plate 7**). The transition mire is most extensive on the eastern side of the lake with quaking conditions. Lough Bane lies adjacent to the North (outside) of the existing peat harvesting site at Clonsura. Small pockets of *Phragmites australis* reed bed (FS1) occur in the southern part of the site. Plant species recorded in the transition mire component include a number of sedges including Brown Sedge (*Carex*

*disticha*), *Bottle Sedge* (*Carex rostrata*), *Black Sedge* (*Carex nigra*), *Greater Tussock Sedge* (*Carex paniculata*) and *Lesser Tussock Sedge* (*Carex diandra*). Other plant species include *Marsh cinquefoil* (*Potentilla palustris*), *Ragged Robin* (*Lythrum salicaria*), *Water Horsetail* (*Equisetum fluviatile*), *Bogbean* (*Menyanthes trifoliata*), *Devil's Bit Scabious* (*Succisa pratensis*) and mosses *Sphagnum papillosum* and *Sphagnum cuspidatum*. The site is of significant ecological interest. There are examples of wet willow woodland and birch scrub bordering the lake.

Evaluation: Transition mire is listed on Annex I of the EU Habitats Directive. The habitat present on site conforms as an Annex I listed habitat under the EU Habitats Directive. The lake (FL2) and transition mire habitat (PF3) habitat are deemed to be of National importance.



**Figure 3:** Habitat map of the peat harvesting site at Clonsura, County Westmeath. (Aerial Photograph © ESRI).

### 4.3 PLANTS SPECIES

Common plant species recorded during the field survey are included in the habitat descriptions above and listed in **Appendix 2**. During the field survey, habitats were also assessed as to their potential suitability for rare or protected plant species with reference to Preston et al (2002); the Flora Protection Order 1999, Annex II of the EU Habitats Directive, NPWS rare plant database and the Irish Red Data Book (Curtis and McGough 1988).

Searches of the NPWS Rare Plant Database, The New Atlas of the British & Irish Flora (Preston et al. 2002) and the National Biodiversity Data Centre Biodiversity Maps were conducted for previous records of rare and protected plant species (with reference to Red Data Book, Annex II, IV & V listed species of the EU Habitats Directive and the Flora Protection Order 1999) within the 10 km squares (V98) of the study area. The results of this search are presented in **Table 29**.

A total of five rare and protected plant species have been reported from the 10 km square (N37 & N47) in which the existing peat harvesting sites occur. Based on the habitat preferences of the species listed in **Table 29** and the characteristics of the existing peat harvesting sites it is considered unlikely that any rare or threatened species occur within the sites.

**Table 29:** Rare and protected plant species recorded from the 10 km squares (N37 & N47) within which the sites occur (Source: NPWS, rare plant database; Preston et. al 2002; NBDC 2013).

Common Name	Latin Name	Date of record	Conservation status	Red Book	Data	Potential to occur onsite
Green Winged Orchid	<i>Orchis morio</i>	1987 - 1999		Vulnerable		No – absence of suitable habitat onsite. Mainly confined to grassland and sand dunes habitat.
Smooth Brome	<i>Bromus racemosus</i>	1987 - 1999		Rare		No – absence of suitable habitat onsite. Grows in damp, unimproved hay and water meadows.
Bats-in-the-belfry	<i>Campanula trachelium</i>	1987 - 1999		Vulnerable		No – absence of suitable habitat onsite. Found mainly in base rich woods and hedge banks.
Cornflower	<i>Centaurea cyanus</i>	1987 - 1999		Extinct		No – absence of suitable habitat onsite. Mainly found growing in arable lands.
Fir Clubmoss	<i>Huperzia selago</i>	1987 - 1999	Habitats Directive; Annex V			No – absence of suitable habitat onsite. Found on heath, moors, grasslands and rocky slopes on mountains.

**Evaluation:** No red rare or protected plant species were recorded within the study area during the course of field surveys. Based on the condition of the habitats within the existing peat harvesting sites, it is concluded that rare or protected plant species are most unlikely to occur within the sites.

### 4.4 BIRDS

#### 4.4.1 Desktop Review

A review of species distribution based on winter and summer atlas records for the 10 km square (N37 & N47) that the existing peat harvesting sites at Clonsura and Coole occur within was undertaken. In addition, an assessment of whether species are likely to occur within or interact with the development

site was carried out taking into consideration the habitat preferences of individual species and those habitats present within and surrounding the site.

#### 4.4.1.1 Winter Birds

A review of potential winter bird interest of the site was undertaken by reviewing the likely occurrence of species listed on both BoCCI Red list (Lynas et al. 2007) and on Annex I of the EU Birds Directive with reference to the winter bird atlas of Britain and Ireland (Lack 1986). It is important however to note that these atlas records were not based on complete systematic surveys of the entire country and therefore a number of species may be absent despite their known occurrence within the 10 km square. The results of this review are presented in **Table 30**.

**Table 30:** Winter bird species of high conservation concern (BoCCI red list; Annex I EU Birds Directive) that occur within the 10 km grid square (N37 & N47) of the study area (National Biodiversity Data Centre, 2013) and assessment of their likely occurrence on site.

Common Species	Latin Name	Conservation Status	Reference	Potential to occur on site
Common Kingfisher	<i>Alcedo atthis</i>	Red List	(Lack 1986)	No – absence of suitable foraging habitat onsite. Favours slow moving rivers. Suitable habitat occurs along the Inny River to the West of Clonsura and Coole peat harvesting sites.
Whooper Swan	<i>Cygnus cygnus</i>	Annex I	(Lack 1986)	No – absence of suitable habitat on-site. Favours grasslands and lakes. Historical records exist for Lough Bane pNHA adjacent to the North at Clonsura.
Black-headed Gull	<i>Larus ridibundus</i>	Red	Irish Wetland Birds Survey (I-WeBS) 1994 – 2001.	Possible – likely to occur within the immediate surroundings of the existing peat harvesting sites.
Curllew	<i>Numenius arquata</i>	Red	Irish Wetland Birds Survey (I-WeBS) 1994 – 2001.	No – absence of suitable foraging habitat. Likely to occur within the immediate surroundings of the existing peat harvesting sites.
Golden Plover	<i>Pluvialis apricaria</i>	Annex I; Red	Irish Wetland Birds Survey (I-WeBS) 1994 – 2001.	Confirmed – numbers were confirmed resting and calling from an area of bare peat at Clonsura during February 2013.
Lapwing	<i>Vanellus vanellus</i>	Red List	Irish Wetland Birds Survey (I-WeBS) 1994 – 2001.	Confirmed – observed commuting across the site during March 2013 at Coole.

#### 4.4.1.2 Breeding Birds

A review of the breeding range and habitat preferences of species listed on Birdwatch Ireland's Red list (Lynas et al. 2007) and on Annex I of the EU Birds Directive and their potential to breed on-site was undertaken with reference to published atlas records (Sharrock 1976; Gibbons et al. 1993). The results of the review are presented in **Table 31**.



**Table 31:** Breeding species of high conservation concern (BoCCI red list; Annex I EU Birds Directive) that have been recorded from the 10 km (N37 & N47) grid square of the study area (National Biodiversity Data Centre 2013).

Common Species	Latin Name	Conservation Status	Reference	Potential for breeding on-site
Northern Pintail	<i>Anas acuta</i>	Red List	Sharrock (1972)	No – nests in freshwater marshes and small lakes and rivers with dense vegetation.
Hen Harrier	<i>Circus cyaneus</i>	Annex I	Sharrock (1972)	No – absence of suitable breeding habitat onsite. Favours upland moors and wet heath.
Corn Crane	<i>Crex crex</i>	Annex I; Red List	Sharrock (1972)	No – confined to the West and North where it favours traditional hay meadows.
Yellowhammer	<i>Emberiza citrinella</i>	Red	Sharrock (1972)	No – absence of suitable breeding habitat. Confined to areas of mixed agricultural farmland.
Red Grouse	<i>Lagopus lagopus</i>	Red	Sharrock (1972)	No – absence of suitable breeding habitat occurs on-site. Favours wet heath and on vegetated bogs with <i>Calluna vulgaris</i> .
Redshank	<i>Tringa totanus</i>	Red	Sharrock (1972); Gibbons et al. (1993)	No – nests in wet marsh areas in amongst grass tussocks. Largely confined to the Shannon Callows.
Black-headed Gull	<i>Larus ridibundus</i>	Red	Gibbons et al. (1993)	No – a single individual was observed commuting across the site at Coole. This site is largely disturbed due to machinery crossings.
Curlew	<i>Numenius arquata</i>	Red	Gibbons et al. (1993)	No – Restricted to vegetated bogs, moorlands, damp meadows and farmland. Recent decline in breeding pairs across the country.
Lapwing	<i>Vanellus vanellus</i>	Red List	Gibbons et al. (1993)	No – species have been confirmed breeding off-site West of the existing peat harvesting site at Coole. Suitable breeding habitat in the form of bare peat occurs at both Clonsura and Coole.

#### 4.4.2 Field Surveys

Field surveys were undertaken at Coole and Clonsura on two occasions during the winter season (February and March) and on two occasions during the breeding season (June). The results of these surveys are presented in separate sections for the existing peat harvesting sites at Coole and Clonsura below.

##### 4.4.2.1 Coole

###### Winter season

The results of the surveys undertaken at the site in February and March are presented in **Table 32** below. In all, only 13 species were observed with a peak abundance of 14 individuals recorded during March 2013. The species poor assemblage recorded is typical of the bare peat habitat that prevails across the site. Waterbirds including Teal, Grey Heron and Mallard were observed commuting across the existing peat harvesting site. There were no flocks of waterbirds observed utilising the habitats

present within the existing peat harvesting site. Snipe and Teal were the only amber listed bird species (BoCCI) recorded during the transect surveys. Both species are amber listed due to declines in the breeding population (Lynas et al. 2007). Buzzard was recorded flying over the southern part of the site during March 2013.

Following three hours of vantage point watches conducted during the winter season, the only records of species of conservation concern were Lapwing and Black headed Gull, both of which were recorded West of the site in proximity to the Inny River.

**Table 32:** Abundance of each species recorded from the existing peat harvesting site during the winter season 2013 (February and March) at Coole.

Species	Habitat	Conservation Status	Feb 2013	Mar 2013
Snipe	Bare Peat	Amber	3	
Wren	Conifer Plantation		1	1
Coal Tit	Conifer Plantation		1	
Rook*	Cutover Bog; Bare Peat		2	1
Mallard*	Bare Peat		2	
Buzzard*	Bare Peat			3
Robin	Conifer Plantation			2
Hooded Crow*	Bare peat; Drainage ditches			1
Blackbird	Drainage ditches			2
Teal*	Depositing lowland rivers	Amber		1
Grey Heron*	Depositing lowland rivers; Conifer plantation			1
Songthrush	Immature woodland			2
Black-headed Gull*	Cutover Bog			1
<b>Species Number</b>			<b>5</b>	<b>10</b>
<b>Total abundance</b>			<b>9</b>	<b>15</b>

\* Indicates where birds were observed flying over.

Evaluation: No bird species of high conservation concern were observed utilising the existing peat harvesting site at Coole during February and March 2013. It is concluded that the site is of low importance to birds during winter.

#### *Breeding Season*

A summary table of results of the breeding bird survey is presented in **Table 33** below. In all, only 7 species were observed with an abundance of 13 individuals. The species poor assemblage recorded is typical of the bare peat habitat that prevails across the site. With the exception of Meadow Pipit and Hooded Crow, none of the other bird species were recorded within the site boundary and are representative of other habitats (birch scrub, conifer plantation, cutover bog) surrounding the site.

Sand Martin and Swallow were the only amber listed bird species (BoCCI) recorded. Raptors including Buzzard were observed soaring and calling over the southern part of the site.

Summer migrants including Sand Martin, Swallow, Willow Warbler and Blackcap were recorded amongst conifer forestry and cutover bog in the surroundings. None of the species recorded during the walkover survey were identified as breeding within the existing peat harvesting site.

Incidental records of Lapwing, Ringed Plover, Sand Martin and Snipe were recorded in an area of cutover bog heavily modified for commercial peat harvesting located west of the existing peat harvesting site. A sand martin colony with 90 nest entrances (active and inactive) was recorded in this area along a turf bank. Furthermore, Lapwing and Snipe were confirmed breeding amongst recolonising bare ground surrounded by artificial ponds west of the existing peat harvesting site. Ringed Plover was identified as 'probably breeding' in this area. All species of conservation interest were recorded breeding off-site. Following two hours of vantage point watches, no waders and wildfowl or raptor species were observed utilising or flying within the existing peat harvesting site.

**Table 33:** Abundance of each species recorded from the existing peat harvesting site during the breeding season at Coole.

Species	Habitat	Conservation Status	On-site	Surroundings	Evidence of breeding on-site
Sand Marten*	Bare Peat	Amber	5	20	Confirmed breeding (off-site)
Willow Warbler	Birch scrub; Bog Woodland		2		Possible breeder
Chaffinch	Birch scrub		1		Possible breeder
Blackcap	Birch scrub		1		Possible breeder
Hooded Crow	Bare peat		2		Non-breeding
Meadow Pipit	Bare peat		1		Non-breeding
Swallow*	Bog Woodland	Amber	1		Non-breeding
Lapwing		Red		3	Confirmed breeding (off-site)
Ringed Plover		Amber		2	Probable breeder (off-site)
Black headed Gull *		Red		1	Non-breeding
Snipe		Amber		1	Possible breeder (off-site)
<b>Species number</b>			<b>7</b>	<b>5</b>	
<b>Total abundance</b>			<b>13</b>	<b>27</b>	

\* Indicates where birds were observed flying over.

Evaluation: No bird species of high conservation concern were observed utilising the existing peat harvesting site during the surveys. The low abundance and poor species assemblage recorded suggests that the area of the existing peat harvesting site is of low value to birds during the breeding season.

#### 4.4.2.2 Clonsura

##### Winter Season

A summary of results of the surveys undertaken at the site during February and March 2013 is presented in **Table 34** below. In all, only 8 species were observed during the survey at Clonsura, with a peak abundance of 48 individuals recorded during February 2013. The species poor assemblage recorded is typical of the bare peat habitat that prevails across the site. Waterbirds including Golden Plover, Snipe, Grey Heron and Mallard were observed commuting and utilising the habitats within the existing peat harvesting site. Golden Plover was the only bird species of high conservation concern (Annex I and Red list) recorded during the walkover surveys. A flock of approximately 40 individuals were recorded resting and calling from an area of bare peat in the central part of the site during February 2013. Snipe was the only amber listed bird species (BoCCI) recorded during the transect surveys. The species is amber listed due to declines in the European breeding population (Lynas et al. 2007).

Following a combined total of 4 Hrs and 30 minutes of vantage point watches conducted during the winter season, two raptor species of high conservation concern (Hen Harrier and Merlin) were observed commuting within the existing peat harvesting site.

An individual Hen Harrier (ringtail) was recorded during a dusk and dawn watch in February commuting and hunting over the transition mire at associated with Lough Bane. It is likely that the individual used Lough Bane as a winter roost. The individual was recorded briefly flying over the Clonsura site. No further records of Hen Harrier were made during the March visits.

A single Merlin was recorded commuting across a section of bare peat in the southern part of the site during a February visit. On the same date, the individual was also observed foraging in an area of mixed scrub and immature woodland East and North of the site. No records of Merlin were made during the March visits.

Evaluation: Based on observations recorded, it is considered that the habitats present within the existing peat harvesting site are of low value to birds during winter. Both Hen Harrier (EU Annex I species, Amber listed BoCCI) and Merlin (EU Annex I species, Red listed BoCCI) use habitats in the surroundings, however based on the habitats present are unlikely to frequently use the existing peat harvesting site. Golden Plover (EU Annex I species, Red listed BoCCI) were recorded resting in an area of bare peat within the existing peat harvesting site and it is concluded that flocks may regularly use the area during winter.

**Table 34:** Abundance of each species recorded from the existing peat harvesting site during the winter season 2013 (February and March) at Clonsura.

Species	Habitat	Conservation Status	Feb 2013	Mar 2013
Snipe	Bare peat	Amber	3	
Wren	Conifer Plantation		1	
Hooded Crow*	Bare peat		2	1
Golden Plover	Bare peat	Annex I; Red List	40	
Buzzard	Bare peat		1	
Raven*	Bare peat		1	
Grey Heron*	Wet heath; Dystrophic lakes; Bare Peat			2
Mallard*	Bare peat; Dystrophic lakes			4

Species	Habitat	Conservation Status	Feb 2013	Mar 2013
Merlin*	Bare peat; Scrub	Annex I; Red List	1	
Hen Harrier*	Lough Bane and associated habitats	Annex I; Amber List	1	
<b>Species Number</b>			<b>8</b>	<b>3</b>
<b>Total abundance</b>			<b>50</b>	<b>7</b>

\* Indicates where birds were observed flying over site.

### *Breeding Season*

The results of the surveys undertaken during June 2013 are presented in **Table 35** below. In all, 10 species were observed during the walkover survey at Clonsura, with an abundance of 19 individuals. With the exception of Meadow Pipit, none of the other bird species were recorded utilising the habitats within the site boundary and are mostly representative of the woodland habitats that occur in the surroundings of the existing peat harvesting site.

Teal and Swallow were the only amber listed bird species (BoCCI) recorded on-site during the walkover survey. Both species were observed commuting over the site. Incidental records of Buzzard and Sparrowhawk were recorded from an area of woodland to the South of the site. Summer migrants including Willow Warbler, Blackcap, White-throat and Chiffchaff were recorded amongst woodland in the immediate surroundings. None of these species were identified as breeding within the existing peat harvesting site. Waterbirds including Grey Heron, Teal and Mallard were observed commuting through and surrounding the site at the time surveys were conducted. None of these birds were recorded utilising the habitats present on-site.

No birds of conservation concern were observed during Vantage Point Watches conducted during the breeding season.

Evaluation: The low species abundance and composition of birds recorded suggests that the habitats present within the existing peat harvesting site boundary are of low value to birds during the breeding season.

**Table 35:** Abundance of each species recorded from the existing peat harvesting site and surroundings during the breeding season at Clonsura.

Species	Habitat	Conservation Status	June 2013	Incidental records	Evidence of breeding on-site
Willow Warbler	Conifer Plantation		2	2	Possible Breeder
Chaffinch	Conifer Plantation		2		Possible Breeder
Wren	Bog Woodland; Scrub		4		Possible Breeder
Blackbird	Bog Woodland		1	1	Possible Breeder
Pheasant	Bog Woodland		1		Probable breeder
Meadow Pipit	Bare Peat		3		Possible breeder
Blackcap	Bog Woodland; Wet Willow Woodland		3	1	Possible breeder
Grey Heron*	Bare peat / wet willow woodland		1		Non-breeding
Teal*	Birch Scrub	Amber		4	Non-breeding
White Throat	Birch Scrub		1		Possible breeder
Swallow	Mesotrophic lake	Amber		4	Non-breeding

Species	Habitat	Conservation Status	June 2013	Incidental records	Evidence of breeding on-site
Mallard*	Mesotrophic lake			1	Non-breeding
Redpoll	Birch Scrub		1		Possible breeder
Buzzard*	Bog Woodland			1	Non-breeding
Sparrowhawk*	Bog Woodland			1	Non-breeding
Chiffchaff	Bog Woodland			1	Possible breeder
<b>Species Number</b>			<b>10</b>	<b>9</b>	
<b>Total abundance</b>			<b>19</b>	<b>16</b>	

\* Indicates where birds were observed flying over.

#### 4.4.2.3 Counts at potential waterbird sites in surroundings

Data from counts at waterbird sites in the surroundings undertaken during the late winter season are presented in **Table 36**. The most important waterbird site in proximity to the existing peat harvesting site is Lough Derravaragh SPA located 1.2km South of Coole.

Analysis of I-WeBS data for the 5 year mean peak during the 2003/04 to 2007/08 period conducted at this site previously recorded 47 Whooper Swan, 931 Pochard, 207 Tufted Duck and 1277 Coot. All four species are known to have undergone declines over the past ten years within the SPA. The current survey had peak counts of 17 Whooper Swans, 100 Pochard, 170 Tufted Duck and 85 Coot.

The survey was conducted during the latter part of the winter season (late February and March) and this may explain the relatively low numbers of waterbirds recorded. The optimal month for conducting waterbird surveys would be earlier in the winter season when waterbird numbers are often at their peak.

**Table 36:** Results of counts at waterbird sites within wider study area during February and March 2013.

Site	February 2013	March 2013
Lough Bane pNHA	Teal (10), Mallard (2)	Mute Swan (2), Mallard (8), Coot (2), Shoveler (2)
Lough Derravaragh SPA	Lapwing (90), Great Crested Grebe (17), Tufted Duck (170), Mute Swan (14), Coot (85), Whooper Swan (17), Pochard (100), Little Grebe (2)	Tufted Duck (95), Coot (62), Mute Swan (36), Moorhen (2), Black-headed Gull (24), Whooper Swan (7), Cormorant (25), Pochard (10), Shelduck (18), Common Gull (3), Grey Heron (1), Mallard (1), Golden eye (4), Little Grebe (2), Great Crested Grebe (3)
Lough Kinale SPA	Mute Swan (30)	Coot (12), Tufted duck (22), Mute swan (33).
Derragh Lough SPA	Mute Swans (24), Coot (28), Little Grebe (5), Tufted Duck (12).	Mute Swan (17), Coot (35), Tufted Duck (46), Mallard duck (4), Little grebe (2).
Bracklagh Lough	No waterbirds observed	Mallard (1), Great Crested Grebe (2), Tufted Duck (2), Pochard (2).

#### 4.4.3 Status of birds of conservation concern

The most significant impact arising from the existing peat harvesting activities would be the loss of rare or sensitive species. The sensitivity of a species can be defined as its ecological importance and nature conservation interest at the site being assessed. Sensitivity of a species is defined by whether the species is listed on Annex I of the EU Birds Directive or the BirdWatch Ireland's (Newton et al. 1999;

Lynas et al. 2007) list of Birds of Conservation Concern (BoCCI) and whether the site contains species at nationally or regionally important numbers.

The existing peat harvesting site is not included within any sites designated for nature conservation. Lough Derravaragh SPA occurs approximately 1.2 km south of the existing peat harvesting site. The movement of migratory waterfowl and other waterbirds from Lough Derravaragh SPA into the surroundings and the potential presence of raptors in proximity to the study were identified as the main avifaunal issues requiring investigation.

Following field surveys undertaken during both the winter and summer seasons, it was found that waders and waterfowl were not dependent on the habitats present within the existing peat harvesting sites. No movement of flocks of migratory bird species were recorded during field surveys. Hen Harrier, Merlin and Golden Plover were recorded at Clonsura during late winter. However, none of the species were found to utilise the study area on a regular basis and only during winter when minimal works are undertaken at the sites. It has been determined that the habitats that occur within Lough Bane pNHA serve as a likely winter roost site for Hen Harrier. Taking into consideration the results of the avifauna surveys conducted at Clonsura and Coole, no birds of high conservation interest or those qualifying bird species of designated SPA sites in the surroundings, are dependent on the habitats present within the study area.

#### 4.5 MAMMALS

**Table 37** lists the mammal species that have been recorded from the 10 km grid square (N37 & N47) of the study area (National Biodiversity Data Centre (NBDC) 2013). These species are likely to be found in suitable habitat within the 10 km square of the study area.

Fox prints and droppings were recorded during the field survey. Hare droppings were also recorded at both sites.

The NBDC database (2013) lists four species of bat (Soprano Pipistrelle, Common Pipistrelle, Brown long-eared bat and Daubentons bat) as having been recorded within the 10km squares (N37 & N47) of the study area. The sites are mostly un-vegetated and there is an absence of potential bat roosts or bat foraging or commuting habitat. Suitable bat habitat does occur in the form of woodland habitats in the surroundings.

Other incidental records of fauna observed during site visits included Common Frog (*Rana temporaria*), Green tiger beetle (*Cicindela campestris*), Large Red Damselfly (*Pyrrhosoma nymphula*).

**Table 37:** Terrestrial mammals present in the 10 km square (N37 & N47) of the study area. (Source: National Biodiversity Data Centre 2013)

Species	Protected Status	Occurrence on site
Mountain (Irish) Hare	Habitats Directive Annex V & Wildlife Act	Likely to occur onsite
Badger	Wildlife Act	No – absence of suitable habitat
Eurasian Otter	Habitats Directive Annex II & Wildlife Act	No – absence of suitable habitat within the site. Likely to occur along watercourses such as the Inny River to the West.
Red Squirrel	Irish Wildlife Act	No – absence of suitable habitat within the site

Species	Protected Status	Occurrence on site
Pine Marten	Habitats Directive Annex V; Wildlife Act	No – absence of suitable habitat within the site
Red Fox	None	Confirmed – prints and droppings were confirmed on areas of bare peat.
European Hedgehog	Irish Wildlife Act	No – likely to occur in woodland to the South
Irish Stoat	None	No – likely to occur in the immediate surroundings.
Soprano Pipistrelle	Habitats Directive Annex IV; Wildlife Act	No – absence of suitable habitat
Common Pipistrelle	Habitats Directive Annex IV; Wildlife Act	No – absence of suitable habitat
Brown Long eared bat	Habitats Directive Annex IV; Wildlife Act	No – absence of suitable habitat
Daubenton's bat	Habitats Directive Annex IV; Wildlife Act	No – absence of suitable habitat

Evaluation: No rare or threatened mammal species have been confirmed on site. Species that are protected under national and international legislation that are likely to occur include Irish Hare. Based on the habitats present it is concluded that the sites are likely to be of relatively low value to mammals.



## 5 IMPACTS

Ecological impacts can occur by several different mechanisms, the means of assessing impacts is outlined in Section 3.1.4 above. The potential impacts of existing and on-going peat harvesting activities at both sites are discussed below.

### 5.1 ACTUAL AND POTENTIAL FUTURE IMPACTS OF THE ACTIVITY

Direct ecological impacts are those that result in physical loss or degradation of a habitat. Indirect or secondary impacts are those, which contribute to the long-term decline in the quality of the habitat or feature. The potential for cumulative impacts, where relevant, is addressed by taking into account other peat harvesting facilities within the vicinity of the existing peat harvesting sites at Clonsura and Coole.

#### 5.1.1 Direct Habitat Loss

The existing peat harvesting sites occur on habitats as described in 4.2 above. The footprint of the existing peat harvesting occurs in an area of bare peat where the surface vegetation has already been removed. The project will involve the continued milling of peat production in these areas. Areas outside of the footprint of the development will not suffer direct habitat loss.

As the existing milling activities are to be confined within the footprint of the area currently in development there no additional direct habitat loss foreseen and no impact expected on birds and mammals that utilise the affected habitat.

#### 5.1.2 Secondary /Indirect Impacts

The operation of a peat harvesting site may have a number of secondary ecological impacts. If these impacts significantly alter the type and/or quality of the habitat, then such changes represent additional habitat losses. In the case of the existing peat harvesting sites at Clonsura and Coole, secondary / indirect impacts could include:

- Disturbance (Birds and Mammals)
- Impacts to designated sites

Secondary impacts to ecology may arise from hydrological impacts. These were examined as part of the overall EIS by Hydro Environmental Services and impacts to watercourses e.g. sedimentation and pollution, are examined by Conservation Services Ltd. These are discussed briefly below.

#### Hydrological impacts on Habitats of Conservation Importance

Hydrological impacts on habitats could result from changes to patterns of surface water and/or ground water drainage. While it may be relatively straightforward to prevent changes to surface water drainage patterns, changes to ground water hydrology may be much more difficult to predict at a scale relevant to potential ecological impacts. Habitats such as bog, fen, lakes and marshy grassland are potentially susceptible to hydrological impacts, and even quite subtle and localised hydrological changes may have significant habitat impacts.

The cutover bog that is currently being harvested would not be overly sensitive to hydrological changes due to an established drainage network on site. However, ongoing drainage and peat harvesting works

in these areas could potentially impact on wetland habitats surrounding and within the existing peat harvesting footprint.

#### Remnant raised bog habitat at Coole

The areas of remnant raised bog at Coole have been impacted by past drainage activities as indicated by the absence of good quality bog vegetation. It is probable that the habitats will continue to deteriorate due to the drainage effects of the milling operations throughout the adjacent works area. This is expected to cause a further loss of typical bog communities and the likely expansion of species indicative of dry conditions such as Heather (*Calluna vulgaris*).

This impact is deemed to be a long term negative impact of minor significance.

#### Remnant raised bog and dystrophic lake at Clonsura

The dystrophic lake and surrounding raised bog habitats could potentially be impacted by ongoing drainage effects associated with the nearby milling operations at Clonsura. The habitats in this area are dependent on the water table being retained at or near the surface throughout the year. Furthermore, any future changes in topography and surface slopes could affect the ecological integrity of the area.

Hydrological assessment at the site indicates that the lake is approximately the same elevation to that of the adjacent harvesting area. In terms of drainage connections between the harvesting area and the dystrophic lake, the presence of a perimeter boundary drain means that there is no runoff from the harvesting area into the dystrophic lake. According to the report prepared by Hydro Environmental, the dystrophic lake appears to be an isolated feature with a localized surface water catchment.

It is concluded that the habitats are unlikely to be further impacted by the adjacent works due to the presence of the boundary drain.

#### Wetland habitats associated with Lough Bane pNHA

Lough Bane pNHA comprises a Mesotrophic lake (NPWS Site synopsis, Appendix 1) surrounded by an area of intact transition mire.

Based on the ecological survey undertaken at Lough Bane there is no indication that the works at Clonsura are currently impacting on the ecology of Lough Bane pNHA. In addition, hydrological assessments, by Hydro Environmental Services, indicate that Lough Bane is approximately 3-4m lower than the ground level of the adjacent harvesting area and the presence of a perimeter boundary drain means that there is no runoff from the harvesting area into Lough Bane. There are no predicted changes to water levels in this area (Hydro Environmental Services Report).

#### Sedimentation / Pollution of watercourses

The Inny River occurs to the west of the existing peat harvesting sites at Coole and Clonsura. This natural watercourse flows into Lough Derravaragh SPA ca 1.2 km downstream to the South. The Inny River is noted for the presence of crayfish, brown trout and lamprey. Any alterations to the water chemistry (turbidity, pH, etc.) or deterioration in water quality as a result of sediment discharge would have direct impacts on riverine species (fish, aquatic invertebrates, etc.) and consequently birds and mammals (e.g. Otter) feeding in these areas.

Further details on the actual and potential impacts on water quality and hence riverine species are addressed in the reports prepared by Hydro Environmental and Conservation Services Ltd.

### Disturbance (Birds and Mammals)

Disturbance from noise, human activity, traffic, and artificial light could potentially impact on bird and mammal populations during peat harvesting. Westland Horticulture Limited site operations involve the milling of peat typically through the months of April through to September and are largely weather dependent.

Taking into consideration the results of bird surveys undertaken at the site to date, there is no evidence to suggest that bird species of conservation concern utilise the habitats of the sites at Coole and Clonsura. The number of birds utilising the existing peat harvesting sites are low, especially during the months that most works are being undertaken (summer season). Disturbance arising as a result of operation works is therefore not considered likely to impact on the avifauna interest of the site. As the peat harvesting activities has been ongoing for some time, the avifauna populations are also likely to have become habituated to the level of disturbance associated with the works and therefore no additional disturbance impact is foreseen.

Similarly, few mammal species have been confirmed using the site and based on the habitats present it is deemed to be largely of low interest to mammals. Irish hare have been confirmed from both sites and are likely to have a preference for the remnant bog areas in the vicinity of each site. The level of hare activity suggests that they are not impacted by the on-going activities at the site and would be expected to continue to utilize the area.

Overall it is expected that the continued harvesting activities at Coole and Clonsura are unlikely to cause any additional disturbance to bird and mammal populations resident in the area.

### Designated Sites

Potential impacts of the existing peat harvesting on Natura 200 sites in the surroundings were assessed in detail in an Appropriate Assessment Screening Report and Natura Impact statement prepared by OES Consulting (OES Consulting 2011). The screening assessment identified Lough Derravaragh as the only site that could potentially be adversely impacted by the works and therefore that a Natura Impact Statement (NIS) was required to assess the potential impacts. The NIS focused on water quality, and disturbance associated with dust and noise emissions. The NIS concluded that given the scale and nature of the peat harvesting operations, they will not have any significant negative impacts on their own, or in combination with other plans and projects on the conservation objectives of Natura 2000 sites, or annexed species, if the proposed control measures are implemented.

### Decommissioning Phase

It is foreseen that decommissioning will involve the removal of any site compounds used during the operation phase of the existing peat harvesting activities. Once peat harvesting activities ceases on site, a site rehabilitation plan will be implemented. A key aim of any site rehabilitation plan will include biodiversity enhancement measures which could include the restoration of wetland habitats wherever possible and where compatible with potential future uses. A key aim of the plan will be to ensure that the ecological and hydrological functioning of important habitats in the area is unaffected. Full details of the rehabilitation plan will be fully determined if and when an IPPC licence is granted and a closure plan is submitted in accordance with the IPPC process.

### **5.1.3 Cumulative Impacts**

As there are none or no significant impacts predicted from the ongoing peat harvesting at the Coole and Clonsura sites, there will be no significant cumulative impacts with other peat harvesting sites in the surroundings. For example there is no apparent hydrological connection between Lough Bane and the site and therefore there cannot be a cumulative impact with other activities. The sites account for 0.2% of the overall Inny River catchment.

## **6 EXISTING AND PROPOSED MITIGATION**

Although the preceding section demonstrates that the existing and ongoing peat harvesting activities do not have a significant impact in the context of the scope of this assessment, nonetheless this section provides recommendations for measures, which can mitigate some of the ecological impacts of the existing peat harvesting activities at the Coole and Clonsura sites. It is acknowledged that some of these measures are already in operation.

### **6.1 MITIGATION BY AVOIDANCE**

Ongoing peat harvesting should be restricted to the current footprint. Sensitive habitats that have been identified in the surroundings including dystrophic ponds, poor fen and flush, remnant raised bogs, natural watercourses and the habitats associated with Lough Bane pNHA should continue to be avoided as is largely the case at present. Machinery and contract personnel should avoid entry and works within these sites. The site is hydrologically sensitive and drainage works that could impact these areas should be avoided.

Stock-piling of peat takes place in designated areas within the site, away from sensitive habitats or drainage features. Other wastes are removed for disposal at an appropriate licensed waste disposal facility. These measures should be continued.

Sedimentation basins are used to prevent peat siltation of watercourses in or surrounding the study area. Mitigation for impacts to watercourses are dealt with in more detail by Conservation Services Ltd. and Hydro Environmental.

### **6.2 MITIGATION BY REDUCTION**

As a means of reducing impacts on habitats of ecological interest within the site, a Habitat Enhancement and Management Plan for the sites will be drawn up and implemented. This plan will include management measures aimed at conserving and enhancing the ecology of the remnant raised bog areas, the dystrophic lake and poor fen habitats within the site. Detailed ecological and hydrological baseline data will be used to inform the contents of the plan. The plan will also include a detailed eco-hydrological monitoring programme to monitor its success or otherwise throughout the lifetime of the peat harvesting activities. The results of this monitoring will be used to update the plan as required.

Potential impacts caused by spillages etc. are reduced by keeping spill kits and other appropriate equipment on-site. Further detail in this regard is included in the assessments prepared by Conservation Services Ltd and Hydro Environmental Ltd.

### **6.3 MITIGATION BY REMEDY**

Following decommissioning, a site rehabilitation plan will be implemented. This plan will include specific measures aimed at enhancing the biodiversity of the site.

The type of habitat that will be established will depend on a number of factors including the hydrology of the site coupled with and the physical characteristics of the substrate (depth, topography and chemistry) that dominate the site when peat harvesting ceases.

A key objective of the rehabilitation plan for the site should aim to restore the ecosystem services of the site (such as carbon sequestration, biodiversity value and flood attenuation if relevant).

## **7 CONCLUSION / RESIDUAL IMPACTS**

There are no expected indirect hydrological impacts on the ecology of habitats within the sites and surrounding areas that have been deemed to be of High Local and National importance e.g. Lough Derravaragh, Lough Bane, the remnant wetland (raised bog and dystrophic lake).

The continued peat harvesting is unlikely to cause any additional disturbance to bird and mammal populations resident in the area and therefore no impacts are expected.

The potential impacts assessed (direct, indirect and cumulative) are imperceptible to minor in significance.

## 8 REFERENCES

- Bang, P and Dahlstrom, P. (2004). *Animal tracks and signs*. Oxford University press.
- Bibby, C.J., Burgess, N.D., Hill, D.A., and Mustoe, S. (2000). *Bird Census Techniques*. Academic Press, London.
- Crowe, O. (2005). *Ireland's Wetlands and their Waterbirds: Status and Distribution*. Birdwatch Ireland, Newcastle Co. Wicklow.
- Curtis, T.G.F. and McGough, H.N. (1988). *The Irish Red Data Book. 1 Vascular Plants*. The Stationery Office, Dublin.
- Department of the Environment, Heritage and Local Government (2009). *Appropriate Assessment of Plans and Projects in Ireland*.
- Eirgrid (2012). *Ecology guidelines for electricity transmission projects*. Eirgrid, Dublin.
- EPA (2002). *Guidelines on the information to be contained in Environmental Impact Statements*.
- EPA (2003). *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*. Environmental Protection Agency, Wexford.
- European Commission (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites*.
- Fossitt, J.A. (2000). *A Guide to Habitats in Ireland*. The Heritage Council. Ireland.
- Gibbons, D.W., Reid, J.B. and R.A. Chapman (1993). *The New Atlas of Breeding Birds in Britain and Ireland: 1988-91*. T & A.D. Poyser, London.
- Gittings, T. (1998). *Assessing the significance of ecological impacts: a proposed framework and terminology*. 8th Environmental Researchers Colloquium, RTC Sligo, 30th January to 1st February 1998, Book of Abstracts, p. 26.
- IEEM (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom*. Institute of Ecological and Environmental Management.
- Lack, P. (1986) *The Atlas of Wintering Birds in Britain and Ireland*. T. & A.D. Poyser, Calton
- Lynas P., Newton S.F. and J.A. Robinson (2007). *The status of birds in Ireland: an analysis of conservation concern 2008-2013*. *Irish Birds* 8: 149-166
- MacDonald, D. and Barrett, P. (1993). *Field guide to mammals of Britain and Europe*. Harper Collins Publishers.
- Mullarney, K., Svensson, L., Zetterström, D. and Grant, P. J. (1999). *Collins Bird Guide*. Harper Collins, London.
- NBDC (2013). [www.biodiversityireland.ie](http://www.biodiversityireland.ie). National Biodiversity Data Centre.
- Newton S., Donaghy, A., Allen, D. and D. Gibbons (1999). *Birds of Conservation Concern in Ireland*. *Irish Birds* 6: 333-344.
- NPWS (2013). [www.npws.ie](http://www.npws.ie). National Parks and Wildlife Service
- NRA (2009). *Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2)*.
- OES (2011) *Appropriate Assessment Screening Report and Natura Impact Statement of Peat Harvesting Operations at Lower Coole, Mayne, Ballinealoe and Clonsura, Near Coole and Fineagh, County Westmeath*.
- Preston, C.D., Pearman, D.A. & Dines, T.D. (Eds) (2002). *New Atlas of the British and Irish Flora: An Atlas of the Vascular Plants of Britain, Ireland, Isle of Man and the Channel Islands - New Atlas CD-ROM*. Oxford University Press, Oxford.
- Sharrock, J.T.R. (ed.) (1976) *The Atlas of Breeding Birds in Britain and Ireland*. T. & A.D. Poyser
- Smith G.F., O'Donoghue, P., O'Hora, K. and E. Delaney (2011). *Best practice guidance for habitat survey and mapping*. The Heritage Council, Kilkenny.
- Webb, D.A., Parnell, J. and Doogue, D. (1996). *An Irish Flora (7th edn)*. Dundalgan Press, Dundalk.
- Welty, D (1987). *The life of birds*. Oxford University Press, pp 160-200.



## APPENDIX 1

### NPWS Site Synopses for Lough Bane and Lough Derravaragh

**SITE NAME: LOUGH BANE.**

**SITE CODE: 001721.**

Lough Bane lies about 3km to the southeast of Lough Kinale and Derragh Lough. For the most part it is surrounded by bogland, which to the west stretches to the Inny River and is otherwise mainly surrounded by Coillte plantation. The lake and surrounding bogs has been proposed as a Natural Heritage Area (NHA).

The bogs encircle the lough to the north, west and south. Between Lough Bane and the small lough to the east there is some attempt at drainage, but most of the bog is intact and in places shows good pool development.

The Lough itself is now less extensive than it was in 1908 when it was mapped by the Ordnance Survey, possibly as a result of natural accretion, or possibly the water level was lowered as a result of drainage. Now, in places the level area fringing the lake which was formerly open water, has been colonised by Bog Mosses (*Sphagnum* spp.) and Common Cottongrass (*Eriophorum angustifolium*), and a large island has appeared in the south of the lough. The contemporary edge of the open water is marked by swamps of Common Reed (*Phragmites australis*) and Bottle Sedge (*Carex rostrata*), and behind this there are areas of freshwater marshes with species such as Water Horsetail (*Equisetum fluviatile*), Wild Angelica (*Angelica sylvestris*), Marsh Bedstraw (*Galium palustre*) and Marsh Arrowgrass (*Triglochin palustris*) which grades into grassland dominated by Purple Moor-grass (*Molinia caerulea*), in which there is now considerable establishment of Birch (*Betula pubescens*). At the edge of the NHA area to the west, Purple Moor-grass grassland grades into bog a heath vegetation dominated by Ling Heather (*Calluna vulgaris*)

There is little information on the use of the lake by waterbirds, but in 1971 a count included 53 Whooper swan, 16 Teal, 7 Widgeon and 14 Curlew, suggesting that it is of some local importance for these species, and that it may act as a refuge for swans disturbed from some of the larger Westmeath lakes.

Although the bogs in which Lough Bane is situated, have been damaged, the Lough itself appears less disturbed and has retained its interest as one of the only lakes in the area with a low calcium nutrient regime. The surrounding vegetation is a well developed ecological gradient from developing birch carr through to the open water.

There is already a conifer plantation to the southwest, now some 25 years old, further plantation within the NHA area would be very deleterious, not only to the area in which the plantation was established, but over the whole site.

The bogs were overlooked when lowland raised bogs were surveyed in the 1980s and consequently their value was not realised until recently. Here their ecological position in relation to Lough Bane adds to their interest. Active raised bogs once characteristic of central Ireland, are now rare and vulnerable, and have been recognised by the European Union as a habitat of international importance, Ireland has a special responsibility to conserve the best of its remaining bogs. Afforestation or further drainage work within this NHA is not consistent with this responsibility.



**SITE NAME: LOUGH DERRAVARAGH SPA**

**SITE CODE: 0004043**

Lough Derravaragh is located approximately 12 km north of Mullingar town. It is a medium- to large-sized lake of relatively shallow water (maximum depth 23 m). The lake extends along a south-east/north-west axis for approximately 8 km. The Inny River, a tributary of the River Shannon, is the main inflowing and outflowing river. It is a typical limestone lake with water of high hardness and alkaline pH, and is classified as a mesotrophic system.

A notable feature is the range of charophytes that occur in the lake (eight species have been recorded, including the rare, Red Data Book species *Chara denudata* and *C. tomentosa*). It has a good diversity of marginal habitats. At the western end of the lake are extensive areas of swamp dominated by Common Reed (*Phragmites australis*). Elsewhere along the shore there is freshwater marsh vegetation dominated by sedges (*Carex* spp.) and tussock-forming grasses such as Tufted Hair-grass (*Deschampsia cespitosa*) and fescues (*Festuca* spp.), with a range of flowering herbs including Nodding Bur-Marigold (*Bidens cernua*) and Trifid Bur-Marigold (*Bidens tripartita*). The lakeshore is a mineral-rich substrate and several plant species of poor fen habitats occur in abundance, such as Black Bog-rush (*Schoenus nigricans*) and Long-stalked Yellow-sedge (*Carex lepidocarpa*). Deciduous woodland fringes the lake in some areas.

Lough Derravaragh is one of the most important midland lakes for wintering waterfowl. It supports nationally important populations of Little Grebe (42), Mute Swan (159), Pochard (3,129), Tufted Duck (1,073) and Coot (1,358) - all counts are average maxima over the five winters 1995/96 to 1999/00. The Pochard population is of particular note as it represents over 6% of the national total, and at times has exceeded the threshold for International Importance (i.e. 3,500). The lake is a traditional haunt for the internationally important Midland lakes Greenland White-fronted Goose flock (which also uses Loughs Iron, Owel and Ennell). This flock, whose numbers usually range between 300 and 400 birds, use the lake mainly for roosting purposes. A regionally important population of Whooper Swan (102) occurs, along with a range of other species including Great Crested Grebe (34), Cormorant (34), Wigeon (207), Teal (52), Mallard (195), Pintail (6), Shoveler (12), Goldeneye (46), Golden Plover (158) and Lapwing (1,079).

Enrichment of the lake, mainly by agricultural run-off, is a threat and could affect the bird populations and especially the diving ducks. An increase in recreational and wildfowling activities could cause disturbance to the birds though this is not considered to be a major threat.

Lough Derravaragh is of major ornithological importance as it regularly supports nationally important populations of five species, and at times is used by the internationally important population of Greenland White-fronted Goose which is based in the region. Also of note is that three of the species which occur at the site (Greenland White-fronted Goose, Whooper Swan, Golden Plover) are listed on Annex I of the E.U. Birds Directive.

## APPENDIX 2

### Plant, Moss and Lichen Species list recorded during survey of Coole, Clonsura and Lough Bane pNHA

#### Coole

Latin Species name	English Species name
<i>Andromeda polifolia</i>	Bog-rosemary
<i>Calluna vulgaris</i>	Ling Heather
<i>Campylopus sp</i>	Moss
<i>Carex panicea</i>	Carnation Sedge
<i>Cladonia floerkeana</i>	Matchstick Lichen
<i>Cladonia portentosa</i>	Branching Lichen
<i>Cladonia pyxidata</i>	Cup Lichen
<i>Cladonia uncialis</i>	Antler Lichen
<i>Cladopodiella fluitans</i>	Water Liverwort
<i>Drosera rotundifolia</i>	Round-leaved Sundew
<i>Erica tetralix</i>	Cross-leaved Heath
<i>Eriophorum angustifolium</i>	Common Cottongrass
<i>Eriophorum vaginatum</i>	Hare's-tail Cottongrass
<i>Hypnum jutlandicum</i>	Moss
<i>Leucobryum glaucum</i>	Cushion Moss
<i>Narthecium ossifragum</i>	Bog Asphodel
<i>Odontoschisma sphagni</i>	Bog-moss flapwort
<i>Pool algae</i>	Algae
<i>Rhynchospora alba</i>	White Beak-sedge
<i>Sorbus aucuparia</i>	Rowan
<i>Sphagnum capillifolium</i>	Acute-leaved Bog Moss
<i>Sphagnum cuspidatum</i>	Feathery Bog Moss
<i>Sphagnum fuscum</i>	Rusty Bog Moss
<i>Sphagnum magellanicum</i>	Magellan's Bog Moss
<i>Sphagnum papillosum</i>	Papillose Bog Moss
<i>Sphagnum subnitens</i>	Lustrous Bog Moss
<i>Sphagnum tenellum</i>	Soft Bog Moss
<i>Trichophorum cespitosum</i>	Deergrass
<i>Vaccinium myrtillus</i>	Bilberry
<i>Vaccinium oxycoccus</i>	Cranberry

### Clonsura

Latin Species name	English Species name
<i>Alnus glutinosa</i>	Alder
<i>Andromeda polifolia</i>	Bog-rosemary
<i>Angelica sylvestris</i>	Wild Angelica
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Arrhenatherum elatius</i>	False Oat-grass
<i>Aulacomnium palustre</i>	Moss
<i>Betula pubescens</i>	Downy Birch
<i>Calliergonella cuspidata</i>	Pointed Spear Moss
<i>Calluna vulgaris</i>	Ling Heather
<i>Calystegia sp.</i>	Bindweed
<i>Cardamine pratensis</i>	Cuckooflower
<i>Carex canescens</i>	White Sedge
<i>Carex demissa</i>	Common Yellow-sedge
<i>Carex paniculata</i>	Greater Tussock-sedge
<i>Carex rostrata</i>	Bottle Sedge
<i>Centaurea nigra</i>	Common Knapweed
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Calliergonella cuspidata</i>	Pointed Spear Moss
<i>Cirsium arvense</i>	Creeping Thistle
<i>Cirsium palustre</i>	Marsh Thistle
<i>Cladonia portentosa</i>	Branching Lichen
<i>Comarum palustre</i>	Marsh Cinquefoil
<i>Crataegus monogyna</i>	Hawthorn
<i>Dactylis glomerata</i>	Cock's-foot
<i>Drosera rotundifolia</i>	Round-leaved Sundew
<i>Equisetum arvense</i>	Field Horsetail
<i>Erica tetralix</i>	Cross-leaved Heath
<i>Eriophorum angustifolium</i>	Common Cottongrass
<i>Eriophorum vaginatum</i>	Hare's-tail Cottongrass
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Galium palustre</i>	Marsh-bedstraw
<i>Galium saxatile</i>	Heath Bedstraw
<i>Glyceria fluitans</i>	Floating Sweet-grass

Latin Species name	English Species name
<i>Hieracium sp.</i>	Hawkbit
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort
<i>Hypnum jutlandicum</i>	Moss
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bulbosus</i>	Bulbous Rush
<i>Juncus effusus</i>	Soft-rush
<i>Lemna minor</i>	Common Duckweed
<i>Leucanthemum vulgare</i>	Oxeye Daisy
<i>Leucobryum glaucum</i>	Cushion Moss
<i>Luzula campestris</i>	Field Wood-rush
<i>Menyanthes trifoliata</i>	Bogbean
<i>Molinia caerulea</i>	Purple Moor-grass
<i>Myrica gale</i>	Bog-myrtle
<i>Narthecium ossifragum</i>	Bog Asphodel
<i>Nuphar lutea</i>	Yellow Water-lily
<i>Osmunda regalis</i>	Royal Fern
<i>Pedicularis palustris</i>	Marsh Lousewort
<i>Persicaria amphibian</i>	Amphibious Bistort
<i>Phalaris arundinacea</i>	Reed Canary-grass
<i>Phragmites australis</i>	Common Reed
<i>Picea sitchensis</i>	Sitka Spruce
<i>Pinus contorta</i>	Lodgepole Pine
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Polygala serpyllifolia</i>	Heath Milkwort
<i>Polytrichum commune</i>	Common Haircap Moss
<i>Potamogeton natans</i>	Broad-leaved Pondweed
<i>Potentilla anserina</i>	Silverweed
<i>Potentilla erecta</i>	Tormentil
<i>Potentilla reptans</i>	Creeping Cinquefoil
<i>Prunella vulgaris</i>	Selfheal
<i>Pteridium aquilinum</i>	Bracken
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rhinanthus minor</i>	Yellow-rattle
<i>Rubus fruticosus agg.</i>	Bramble
<i>Rumex acetosella</i>	Sheep's Sorrel
<i>Salix aurita</i>	Eared Willow

Latin Species name	English Species name
<i>Sphagnum capillifolium</i>	Acute-leaved Bog Moss
<i>Sphagnum magellanicum</i>	Magellan's Bog Moss
<i>Sphagnum palustre</i>	Blunt-leaved Bog Moss
<i>Sphagnum papillosum</i>	Papillose Bog Moss
<i>Sphagnum subnitens</i>	Lustrous Bog Moss
<i>Sphagnum tenellum</i>	Soft Bog Moss
<i>Taraxacum agg.</i>	Dandelion
<i>Trifolium pratense</i>	Red Clover
<i>Trichophorum cespitosum</i>	Deergrass
<i>Tussilago farfara</i>	Colt's-foot
<i>Ulex europaeus</i>	Gorse
<i>Urtica dioica</i>	Common Nettle
<i>Utricularia minor</i>	Lesser Bladderwort
<i>Vaccinium myrtillus</i>	Bilberry
<i>Vaccinium oxycoccus</i>	Cranberry
<i>Valeriana officinalis</i>	Common Valerian
<i>Vicia cracca</i>	Tufted Vetch

**Lough Bane pNHA**

Latin species name	English species name
<i>Angelica sylvestris</i>	Wild Angelica
<i>Aulacomnium palustre</i>	Moss
<i>Betula pubescens</i>	Downy Birch
<i>Calliergon giganteum</i>	Moss
<i>Calliergonella cuspidata</i>	Pointed Spear Moss
<i>Caltha palustris</i>	Marsh-marigold
<i>Cardamine pratensis</i>	Cuckooflower
<i>Carex canescens</i>	White Sedge
<i>Carex diandra</i>	Lesser Tussock-sedge
<i>Carex disticha</i>	Brown Sedge
<i>Carex lepidocarpa</i>	Long-stalked Yellow-sedge
<i>Carex nigra</i>	Common Sedge
<i>Carex paniculata</i>	Greater Tussock-sedge
<i>Carex rostrata</i>	Bottle Sedge
<i>Cicuta virosa</i>	Cowbane
<i>Cirsium palustre</i>	Marsh Thistle
<i>Comarum palustre</i>	Marsh Cinquefoil
<i>Epilobium obscurum</i>	Short-fruited Willowherb
<i>Equisetum fluviatile</i>	Water Horsetail
<i>Eriophorum angustifolium</i>	Common Cottongrass
<i>Galium palustre</i>	Marsh-bedstraw
<i>Hippuris vulgaris</i>	Mare's-tail
<i>Hirundo rustica</i>	Swallow
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Juncus effusus</i>	Soft-rush
<i>Lemna minor</i>	Common Duckweed
<i>Lychnis flos-cuculi</i>	Ragged-Robin
<i>Menyanthes trifoliata</i>	Bogbean
<i>Molinia caerulea</i>	Purple Moor-grass
<i>Myosotis sp.</i>	Forget-me-not
<i>Phragmites australis</i>	Common Reed
<i>Rumex acetosa</i>	Common Sorrel
<i>Salix aurita</i>	Eared Willow
<i>Sphagnum squarrosum</i>	Spiky Bog Moss
<i>Succisa pratensis</i>	Devil's-bit Scabious

**APPENDIX 3**  
**Plates 1-7**



**Plate 1:** The existing peat harvesting site at Coole has been heavily modified and a series of drainage channels traverse the site and drain West towards the Inny River. The area of bare peat is of low ecological importance.



**Plate 2:** Raised bog remnant showing the appearance of the raised bog vegetation adjoining the peat harvesting site at Coole.



**Plate 3:** The Inny River occurs west of the existing peat harvesting sites at Clonsura and Coole. The river flows enters Lough Derravaragh SPA further downstream. The sites at Clonsura and Coole drain into this natural watercourse.



**Plate 4:** The site at Clonsura has been heavily modified and the surface vegetation has been removed. A series of drainage channels traverse the site and drain to the west towards the Inny River.





**Plate 5:** A dystrophic pond together with poor fen and remnant raised bog were recorded at the North-western part of the site at Clonsura. The habitats are considered to be of high ecological importance.



**Plate 6:** Raised bog remnant showing the appearance of the raised bog vegetation adjoining the peat harvesting site at Clonsura.



**Plate 7:** Lough Bane pNHA bounds the Eastern edge of the existing peat harvesting site at Clonsura. The site comprises a mesotrophic lake surrounded by an intact margin of transition mire and birch scrub. Lough Bane pNHA corresponds as a site of national ecological importance.

# Attachment 5 - Conservation Services Report

**EIS FOR PEAT HARVESTING BY WESTLAND  
HORTICULTURE LTD AT LOWER COOLE, MAYNE,  
BALLINEALOE & CLONSURA, NEAR COOLE & FINNEA,  
COUNTY WESTMEATH**

**AQUATIC ECOLOGY**

**FINAL REPORT**

**26 July 2013**



Conservation Services, Tullaha, Glenflesk, Killarney, Co. Kerry  
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# 1. INTRODUCTION

OES Consulting has commissioned Conservation Services - Ecological & Environmental Consultants to carry out a freshwater ecological assessment for the peat harvesting operations being carried out by Westland Horticulture Ltd at Lower Coole, Mayne, Ballinealoe & Clonsura, near Coole & Finnea, County Westmeath.

It is understood that peat harvesting operations on site commenced in the late 1950s. The site was commercially drained and developed in 1982 with state funded aid during a time of energy crisis. Westland took over occupation of the site in the mid 1990s with the aim of producing milled peat for use in the horticultural industry. The peat lands in County Westmeath comprise of 4 separate holdings situated in the town lands of Mayne, Ballinealoe & Lower Coole near the village of Coole and at Clonsura near Finnea in County Westmeath. These bogs are all managed by the same Peat Harvesting Manager and are operated by the same plant and the same Peat Harvesting operatives.

The aims of the assessment are:

- To assess the present fishery value, invertebrate fauna, aquatic flora, water quality, habitat value and general ecological condition of streams and rivers in the vicinity of the peat harvesting operation to provide baseline data against which any future changes can be assessed where relevant.
- To assess the general status of the streams and rivers from an ecological and fisheries perspective in the context of their wider catchment based on survey data, published sources, EPA data, and on consultation with Inland Fisheries Ireland and NPWS.
- To assess any existing and/or potential impacts of the activity on water quality and aquatic flora and fauna.

- To recommend mitigation measures where existing or potential negative impacts are identified and/or predicted.

Assessments of existing or potential impacts on mammalian and avian fauna, and terrestrial and wetland habitats other than streams and rivers are included in other EIS sections and do not fall within the remit of this report.

The following were invited by OES Consulting to submit information and comments in May 2013:

National Parks & Wildlife Service (Development Applications Unit)

Inland Fisheries Ireland

No comments were received although account is taken in this report of the comments received by OES from the above bodies as part of the consultation by OES during the preparation of the Natura Impact Statement submitted to the EPA in February 2011.

The main legal constraints on peat harvesting operation in relation to aquatic flora, fauna, habitats and fisheries are:

The Local Government (Water Pollution) Act, 1977, its Amendments (and associated regulations)	Prohibits the entry of unlicensed polluting matter into waters
European Communities Environmental Objectives (Surface Waters) Regulations 2009	The Regulations give legal status to the criteria and standards to be used for classifying surface waters in accordance with the ecological objectives approach of the Water Framework Directive. The classification of waters is a key step in the river basin management planning process and is central to the setting of objectives and the development of programmes of measures. Waters classified as 'high' or 'good' must not be allowed deteriorate. Waters classified as less than good must be



	restored to at least good status within a prescribed timeframe. The environmental targets or goals and the programmes of measures to be included in river basin management plans must therefore reflect these requirements.
The Fisheries (Consolidation) Act, 1959 as amended by the Fisheries (Amendment) Act, 1962	Prohibits: <ol style="list-style-type: none"> <li>1. The entry of deleterious matter into waters. (Deleterious matter is defined as any substance that is liable to injure fish, their spawning grounds or their food, or to injure fish in their value as human food.)</li> <li>2. Obstructing the passage of salmon, trout or eels or their smolts and fry</li> <li>3. Injury or disturbance of the spawn or fry of salmon, trout or eels or to their spawning or nursery areas</li> </ol>
Fisheries (Amendment) Act 1999	Requires the regional fisheries board to have regard for the need for the conservation of fish and other species of fauna & flora habitat and biodiversity of inland fisheries and ecosystems. Under this Act the Regional Fisheries Board has the responsibility to protect and conserve all freshwater fisheries within its area of jurisdiction. It is the stated policy of the Regional Fisheries Boards that <i>“every river, stream, canal, lake, pond and reservoir must be regarded as constituting and/or supporting a Fishery under the meaning of the Fisheries Acts unless otherwise regarded by the Boards.”</i>
The Freshwater Fish Directive 78/659/EEC as transposed into Irish law under E.C. (Quality of Salmonid Waters) Regulations 1988 (S.I. No. 293 of 1988)	Lays down standards for the quality of designated waters and requirements for monitoring.
The Wildlife Act 1976 and Amendment Act, 2000	Prohibits damage to protected species which includes certain freshwater

	aquatic species.
The Habitats Directive (92/43/EEC) as transposed into Irish law under the E.C. (Natural Habitats Regulations 1997 (S.I. No. 94 of 1997)	Lists certain species (Annex II) and habitats (Annex I) which require to be protected within SACs. Annex II species include crayfish, salmon, and all three Irish species of Lamprey.
Water Framework Directive (2000/60/EC)	The Water Framework Directive requires the achievement of at least good ecological status and the maintenance of existing status in all surface waters, which in the Irish context is generally taken to mean achieving salmonid water quality standards regardless of whether the watercourse is designated under the Salmonid Regulations.
Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage	The Environmental Liability Directive specifies that Member States should, inter alia, establish a civil liability regime whereby operators of specified activities which cause environmental damage are financially liable for remedying this damage. The Directive also aims to hold those responsible for certain activities which have caused an imminent threat of environmental damage liable for taking preventive actions.

## **2. METHODOLOGY**

### **2.1. SELECTION OF WATERBODIES AND SITES FOR ASSESSMENT**

All watercourses were assessed which are marked on the 1:50,000 *Discovery Series* Ordnance Survey Sheet 41 and EPA mapping of streams (<http://maps.epa.ie/internetmapviewer/mapviewer.aspx>) and which are within 0.5km down gradient from any part of the peat harvesting operation. As O.S. 1:50,000 maps generally include streams/drains which are too small to be useful salmonid habitat, and as general guidelines are presented for procedures at any watercourse crossing, the survey is adequate to ensure that all measures necessary to prevent significant impacts are identified. Potentially affected watercourses are shown on Map 1.

The potentially affected watercourses are:

1. The Inny River
2. The Glore River – Tributary of the Inny River
3. The Mayne Stream - Tributary of the Inny River
4. The small watercourse flowing to the south of Lough Bane and traversing the Clonsura site. Referred to in this report as the Clonsura Stream.

### **2.2. HABITAT ASSESSMENT**

Habitat assessment was carried out between 31<sup>st</sup> May and 3<sup>rd</sup> of June 2013.

Stream habitat assessment was carried out on c.14km of stream/river habitat i.e. adjacent to and for at least 1km downstream of all of the peat abstraction areas. Each watercourse section assessed was examined from a boat or by walking and/or wading the channel.

Each section was assessed in terms of:

1. Stream width and depth using a hand held Hawk Eye Sonar
2. Substrate type
3. Flow type
4. Dominant bank-side vegetation
5. In-stream vegetation
6. Estimated degree of shade

Salmonid, lamprey, crayfish and coarse fish habitat quality was assessed, taking into account the environmental features 1-6 listed above. Based on these observations and more detailed criteria outlined in Sections 2.2.1 – 2.2.4 below, the value of each river section for the different life stages of salmonids and lamprey, crayfish and coarse fish was estimated. Locations for identification of habitat assessment locations were recorded as Irish Grid References using a GPS. Photographs were taken to illustrate the habitat quality in each section.

### **2.2.1. CRITERIA USED FOR ASSESSMENT OF SALMONID HABITAT QUALITY**

Habitat quality for in-stream invertebrate and plant communities, and for fish, and riparian birds and mammals, is primarily a function of 'naturalness' and

diversity. The more diverse the stream habitat in terms of substrate, flow rate, depth, riparian vegetation, light conditions etc., the richer the biological community is likely to be, and the more suitable it is likely to be for salmonid fish (trout and salmon).

Assessment of the quality of salmonid spawning habitat, nursery habitat and adult habitat is based on personal expertise developed over a period of 16 years of electrofishing and on published information such as the following:

- i. Favourable locations for salmon spawning are likely to occur where the gradient of a river is 3% or less (Mills 1989).
- ii. Preferred current velocity for spawning is within the range 25–90 cm s<sup>-1</sup>, with a water depth in the range 17–76 cm (Hendry & Cragg-Hine 1997).
- iii. Typical spawning sites are the transitional areas between pool and riffle where flow is accelerating and depth decreasing, where gravel of suitable coarseness is present and interstices are kept clean by up-welling flow (Peterson 1978, Bjorn & Reiser 1991).
- iv. Salmon fry and parr occupy shallow, fast-flowing water with a moderately coarse substrate with cover (Symons & Heland 1978, Baglinière & Champigneulle 1986).
- v. Deep or slow-moving water, particularly when associated with a sand or silt substrate, does not support resident juvenile salmonids (Wankowski & Thorpe 1979, Baglinière & Champigneulle 1986).
- vi. Suitable cover for juveniles includes areas of deep water, surface turbulence, loose substrate, large rocks and other submerged obstructions, undercut banks, overhanging vegetation, woody debris lodged in the channel, and aquatic vegetation (Heggenes 1990; Bjorn & Reiser 1991; Haury *et al.* 1995).

- vii. The juxtaposition of habitat types is also important. The proximity of juvenile habitat to spawning gravels may be significant to their utilisation. In addition, adults require holding pools immediately downstream of spawning gravels in which they can congregate prior to spawning. Cover for adult salmon waiting to migrate or spawn can be provided by overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water and surface turbulence (Bjorn & Reiser 1991).
  
- viii. Bjorn & Reiser (1991) suggest that proximity of cover to spawning areas may be a factor in the selection of spawning sites by some salmonid species.

#### **2.2.2. CRITERIA USED FOR ASSESSMENT OF LAMPREY HABITAT QUALITY**

Lamprey habitat preferences change with the stages of their life cycle. They show a preference for gravel-dominated substratum for spawning. After hatching the larvae swim or are washed downstream by the current to areas of sandy silt in still or slow flowing water where they burrow and spend the next few years in tunnels. Lampreys therefore require mainly silt and sand dominated substratum for nursery habitat. Other important environmental characteristics for optimal ammocoete habitat are shallow waters with low water velocity, and the presence of organic detritus and/or plant material. Sub-optimal habitat supporting only a few individuals may consist of a few square centimetres of suitable silt in an open, comparatively high-velocity, boulder-strewn streambed. Spate rivers, with high flow velocities, tend to support fewer ammocoetes because they contain smaller areas of stable sediment (Maitland 2003).

### **2.2.3. CRITERIA USED FOR ASSESSMENT OF CRAYFISH HABITAT QUALITY**

White-clawed crayfish are typically found in watercourses of 0.75 m to 1.25 m deep, but the species may occur in very shallow streams (about 5 cm of water) and in deeper, slow-flowing rivers (2.5 m). The white-clawed crayfish typically occupies cryptic habitats under rocks and submerged logs, among tree roots, algae and macrophytes, although it usually emerges to forage for food. Juveniles in particular may also be found among cobbles and detritus such as leaf litter. Adults may burrow into suitable substrates, particularly in the winter months. In habitats with flowing water the white-clawed crayfish may be found associated with:

- Undermined, overhanging banks.
- Sections exhibiting heterogeneous flow patterns with refuges.
- Under cobbles (juveniles) and rocks in riffles, and under larger rocks in pools.
- Among roots of woody vegetation, accumulations of fallen leaves and boulder weirs.
- Under water-saturated logs (Holdich 2003).

Peay (2000) lists the following habitat features as favoured by crayfish:

- Slow-flowing glides and pools (provided there are refuges), localised velocity of 0.1m/s or less.
- Loose boulders (>25cm) or other similarly sized material.
- Boulders or large cobbles in groups with crevices between them.

- Deep crevices in bedrock.
- Underlying substrate of fine gravel/sand with some pebbles.
- Submerged refuges in stable banks (e.g. natural crevices, stone block reinforcement or stable, slightly undercut banks with overhanging vegetation, large tree roots, etc).
- Un-mortared stone revetting which protects banks from erosion.
- Stands of submerged and emergent aquatic plants.

Recent Irish studies undertaken by the Central Fisheries Board (CFB) for the Office of Public Works (OPW) have shown that crayfish also use clay and silt dominated channels particularly with heavy instream growth of aquatic plants such as *Sparganium erectum* (Lordan *et al.* 2008).

#### **2.2.4. CRITERIA USED FOR ASSESSMENT OF COARSE FISH HABITAT QUALITY**

Habitat requirements and preferences differ considerably between different coarse fish species. There are two main groups of fish “spawners”: those that deposit eggs on gravel, and those that prefer to deposit them on aquatic weed. For example, dace (*Leuciscus leuciscus*) and chub (*Leuciscus cephalus*) will mainly spawn on gravel, while bream (*Abramis brama*), carp (*Carassius carassius*), tench (*Tinca tinca*), perch (*Perca fluviatilis*) and pike (*Esox lucius*) prefer weed. Roach (*Rutilus rutilus*) will spawn on many different surfaces, which explains in part why they are relatively successful in many different types of habitat. Coarse fish generally spawn in shallow water less than 1m deep. Shallow, slow-flowing, slightly weeded marginal shelves (0.25-0.75m deep) are the most important nursery areas for small fish in rivers, canals and still waters.



Algae grow well in these areas, providing an important food source for fry of many species. Zooplankton feed on algae and “bloom” in a similar way, becoming food essential for the developing fry. To avoid displacement downstream during floods, small fish need refuge areas. These are often backwaters, side bays, ditches and flooded fields. Adult coarse fish are generally more tolerant of different living conditions than juveniles and may occupy multiple habitat types on a daily basis throughout the year. Roach are typically found in slow water at variable depth and in dense weed; however Roach are highly versatile and will readily colonise most water habitats offering a good supply of food, as will perch and eels. The preferred habitat of bream is enriched slack water with muddy/silty bottoms, and they spawn in dense weed. The preferred habitat of perch is dense weeds, both as adult habitat and for spawning. Dense submerged weeds are the most favourable nursery habitat for juvenile pike, whereas adult pike prefer more open water conditions. (Environment Agency 2007)

### **2.3. STREAM INVERTEBRATE SAMPLING AND BIOLOGICAL WATER QUALITY ASSESSMENT**

The following sampling sites located at the upstream and downstream extremities of the main peat harvesting areas were established for biological water quality assessment, See Map 2.

<b>Sampling Site No.</b>	<b>Grid Reference</b>
IN1	N40730 77666
IN2	N40643 76634
IN3	N39429 72882
IN4	N39160 71285
G1	N41860 76215
G2	N40780 76819

M1	N40435 70742
M2	N39408 71433

At each of the 8 sites invertebrates were sampled on a cross channel transect. Invertebrates were sampled using long handled sweep net sampling or by kick sampling depending on the depth and substrate conditions encountered. Each sample was retained in a large plastic bag at the sampling site. Sample processing and preservation was carried out under laboratory conditions within 24 hours of sampling. Mud was removed from each sample by sieving under running water through a 500 $\mu$  sieve. Sieved samples were then live sorted for 30 minutes in a white plastic sorting tray under a bench lamp (ISO 5667-3:1994) and if necessary using a magnifying lens. Macroinvertebrates were stored in 70% alcohol. Preserved invertebrates were identified to the level required for the EPA Q-rating method (Clabby *et al*, 2006) using high-power and low-power binocular microscopes when necessary. The preserved samples were archived for future examination or verification. Based on the relative abundance of indicator species, a biotic index (Q-rating) was determined for each site in accordance with the biological assessment procedure used by the Environmental Protection Agency (Clabby *et al* 2006) and more detailed unpublished methodology (McGarrigle, Clabby and Lucey pers. comm.)

## **2.4. ASSESSMENT OF AQUATIC FLORA**

Submerged and floating aquatic vegetation was assessed at each of the eight cross channel transects established for invertebrate assessment (See Map 2).

Plant species presence and approximate % cover was established on each transect using direct observation in shallow water, a bathyscope in deeper water, and a double sided rake grapnel deployed from a boat where direct observation was impeded by depth or turbidity.

## 2.5. ASSESSMENT OF SIGNIFICANCE OF EXISTING AND POTENTIAL IMPACTS

Impacts are defined on the basis of severity of impact on aquatic species and/or habitats. Species protected under national and European legislation are given special consideration. Because of their amenity, commercial and legal status, salmonid fish (trout and salmon) are given special consideration. Assessment of the importance of an actual or potential impact takes into account not only the ecological considerations in the immediate vicinity of the impact, but also geographical and wider catchment considerations. If spawning and nursery habitat of a species are limiting factors in short supply in a particular river system, then impacts on them will have an importance out of proportion with their apparent 'face value'.

If an aspect of an activity or proposed activity is judged to have or likely to have a measurable negative effect on salmonid fish populations or any rare or protected species, it would be classified as a significant potential impact. The criteria for assessing the significance of impacts on flora, fauna and fisheries are as follows. (For details of water-body categories see section 2.6.)

### A Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	MAJOR	SEVERE	SEVERE	SEVERE
Localised	MAJOR	MAJOR	SEVERE	SEVERE

### B Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	MAJOR	MAJOR	SEVERE	SEVERE
Localised	MODERATE	MODERATE	MAJOR	MAJOR

### C Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	MODERATE	MODERATE	MAJOR	MAJOR
Localised	MINOR	MODERATE	MODERATE	MODERATE

### D Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	MINOR	MINOR	MODERATE	MODERATE
Localised	NOT SIGNIFICANT	MINOR	MINOR	MINOR

### E Sites

	Temporary	Short-term	Medium-term	Long-term
Extensive	NOT SIGNIFICANT	NOT SIGNIFICANT	MINOR	MINOR
Localised	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT	NOT SIGNIFICANT

NRA (2006)

In line with the EPA guidelines (EPA 2002) the following terms are defined when quantifying duration:

Temporary: Up to 1 year

Short-term: From 1 to 7 years

Medium-term: 7 to 15 years

Long-term: 15 – 60 years

Permanent: over 60 years

For the purposes of this report 'localised' impacts on rivers are loosely defined as impacts measurable no more than 250 metres from the impact source. 'Extensive' impacts on rivers are defined as impacts measurable more than 250m from the impact source. Any impact on salmonid spawning habitat or nursery habitat where it is in short supply, would be regarded as an extensive impact as it is likely to have an impact on the salmonid population beyond the immediate vicinity of the impact source.

## 2.6. GUIDELINES USED FOR CLASSIFICATION OF IMPORTANCE OF FRESHWATERS

### Rating

#### **A Internationally Important**

Habitats designated as SACs for Annex II species under the EU Habitats Directive. Major Salmon river fisheries. Major salmonid lake fisheries.

#### **B Nationally or Regionally Important**

Other major salmonid waters and waters with major amenity fishery value. Commercially important coarse fisheries. Waters with important populations of species protected under the Wildlife Act and/or important populations of Annex II species under the EU Habitats Directive. Waters designated or proposed as Natural Heritage Areas by NPWS.

#### **C High Value, locally important**

Small water bodies with known salmonid populations or with good potential salmonid habitat, or any population of species protected under the Wildlife Act and/or listed Annex II species under the EU Habitats Directive. Large water bodies with some fisheries value.

#### **D Moderate value, locally important**

Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any stream with an unpolluted Q-value rating.

#### **E Low value**

Water bodies with no current fisheries value and no significant potential fisheries value. Habitat diversity low and degraded.

NRA (2006)

## **2.7. LIMITATIONS ENCOUNTERED**

No significant limitations were encountered.

## **3. EXISTING ENVIRONMENT**

### **3.1. GENERAL CATCHMENT INFORMATION**

The Inny River is part of the Shannon River system which rises in County Meath near the town of Oldcastle and in total drains a catchment area of 1197Km<sup>2</sup>. The river flows from the north-east in a south-west direction from Lough Sheelin into Lough Kinale, into Lough Derravaragh and also into Lough Iron, and finally into Lough Ree and the River Shannon, North of Athlone town. The river is described as being fast flowing and shallow between Oldcastle and Lough Sheelin. From Lough Sheelin, the Inny flows the short distance to Lough Kinale and then meanders slowly through a deep wide channel to Lough Derravaragh. The Inny River was subject to an arterial drainage scheme in the 1960s and the channel has been maintained for drainage purposes by OPW since then.

The Glore River is a small tributary of the Inny River which rises north east of Castlepollard, County Westmeath, and flows for a distance of c.14km through Lough Glore and then in a north westerly direction to the Inny River c.3km upstream of Camagh Bridge.

#### **3.1.1. FISHERY VALUE**

*“An arterial drainage scheme in the 1960s left the banks very high. At present it is best described as a mixed fishery. It holds trout, has a big head of coarse fish and presently holds large stocks of roach. Some areas hold pike. There is a small stock of trout above and below Ballynacarrow Bridge on the R393 Ballynacarrigy-Ardagh road ...The next stretch worth fishing is the streamy water extending for about amile above above and below Abbeyshrule Bridge. This stock holds a fair stock of 12oz trout. ...Downstream of Abbeyshrule there is a mile of trout fishing above Clynan (Tenalick) Bridge and about two miles below it at Taghshinny. ...There are reported to be some large trout below Newcastle Bridge and a fair stock of 12oz trout from Newcastle Bridge*

downstream through Ballymahon to the confluence of the Tang River. Finally, there is a nice stretch at Derragh, downstream of a lough of the same name that hold a good stock of trout.” (O’Reilly 2002)

Inland Fisheries Ireland states: “*The Inny River holds good stocks of brown trout and has good salmonid habitat, it also supports coarse fish populations. The Shannon Salmon Restoration Project is committed to the restoration of sustainable stocks of salmon throughout the Shannon Catchment, the Inny River would be included within this plan. In the interests of sustainability it is imperative that all assessments carried out are cognisant of the Inny River’s ability to support salmon in the future and do not impact on this plan in any negative way.*” (IFI letter of 31/12/11 refer to Attachment 3 of the main EIS document for copy. Letter may have typo in date and should be 31/12/10)

The website [www.ireland.com/en-ar/what-is-available/angling-and-fishing/all/1-9832?view=0](http://www.ireland.com/en-ar/what-is-available/angling-and-fishing/all/1-9832?view=0) describes the Inny River as “*a magnificent pike fishery*” and states: “*The Inny River is a top class coarse fishery and can be fished in numerous locations along its length. Principal species include roach, bream, perch and tench. Several angling competitions are fished here particularly on its lower stretches. From Ballymahon to Abbeyshrule the river can be a productive wet and dry fly trout fishery. The Inny is over 50km in length and when taking both banks into account the river provides in excess of 60km of good bank pike fishing. The river varies in depth from approximately 1.5 metres to over three metres but much depends on weather and water levels. A boat is not necessary with the exception of Lough Kinale, Lough Iron and Lough Derravaragh. Angling access is provided at the bridges and in most cases extensive bank access is available up-stream and down-stream from the bridges. There are large stocks of pike in many locations throughout the length of the river with numerous “hot spots”. Pike of over 10kg are caught each season but the norm would be under 4kg.*” (<http://www.ireland.com/en-ar/what-is-available/angling-and-fishing/all/1-9832?view=0>)



The fish community in the Inny River varies markedly along its length. Kelly *et al* (2012) surveyed two sites in the upper reaches of the river, one at Oldcastle and one at Tubride Bridge. A total of only three fish species were recorded at both sites; brown trout was the most abundant species, followed by three-spined stickleback and lamprey. By contrast at the lower end of the river downstream of Ballymahon the Central & Regional Fisheries Boards (2009) recorded nine fish species; brown trout (*Salmo trutta*), minnow (*Phoxinus phoxinus*), - gudgeon (*Gobio gobio*), roach (*Rutilus rutilus*), perch (*Perca fluviatilis*), pike (*Esox Lucius*), eel (*Anguilla Anguilla*), stone loach (*Barbatula barbatula*), chub (*Leuciscus cephalus*) & roachxbream hybrid. The most abundant species was brown trout followed by minnow.

Maguire *et al* (2011) recorded a total of 13 fish species in the Inny; these were bream (*Abramis brama*), roach (*Rutilus rutilus*), perch (*Perca fluviatilis*), pike (*Esox lucius*), brown trout (*Salmo trutta*), Atlantic salmon (*Salmo salar*), European eel (*Anguilla anguilla*), roach x bream hybrids, gudgeon (*Gobio gobio*), minnow (*Phoxinus phoxinus*), stoneloach (*Barbatula barbatula*), brook lamprey (*Lampetra planeri*) and chub (*Leuciscus cephalus*). Roach was the most abundant species recorded, followed by brown trout and pike.

O'Reilly (1998) describes Lough Derravaragh as "*a high pH limestone lough that has suffered greatly as the result of arterial drainage and eutrophication. Trout stocks have decreased dramatically in recent years. ...It now holds a small stock of big trout and most of these are taken by trolling.*" The website [www.midlandangling.com/map](http://www.midlandangling.com/map) states: "*Lough Derravaragh was a very noted trout lake from the 1950's to the 1970's, particularly renowned for its mayfly fishing and wet fly fishing from August to September. Sadly due to drainage, water quality and the introduction of roach, trout stocks have suffered consequently. Today the lake is as well known for its pike angling as it was for its trout. Trout angling is still practiced but sadly only by a few anglers. The lake has seen an increase in its mayfly catches and the September fishing with wetfly has gained more popularity over recent years. Pike angling has been the main attraction to the lake over the past ten years and holds a very impressive*

*record of sizeable pike. It has been a venue for many competitions. The lake also holds a good stock of coarse fish which include roach, bream, bream hybrids and tench.”*

### **3.1.2. WATER QUALITY**

#### **Inny River**

EPA biological water quality monitoring data 1971 – 2011 for the Inny River, and Glore River are presented in Appendix 1. Good ecological condition was found at six out of ten sites surveyed by EPA on the Inny in 2011, a major improvement on the 2008 survey results. EPA stated: *“The two uppermost sites, upstream of Lough Sheelin, are not reaching their ecological potential, with sensitive macroinvertebrate taxa noticeably absent. A welcome improvement in quality at 0300 (Ballinrink Br) was followed by unsatisfactory conditions at both Finnea and Camagh Bridges respectively (0500 and 0600). The lower reaches, and downstream of Lough Derravaragh to Shrule Br (1350), exhibited high macroinvertebrate diversity and a range of sensitive taxa.”*

([www.epa.ie/qvalue/webusers/](http://www.epa.ie/qvalue/webusers/)).

#### **River Glore**

With regard to the River Glore, the EPA stated: *“The Glore (Westmeath) was once again found to be slightly polluted/eutrophic below Glore lake (0100), as characterised by excessive siltation and a paucity of sensitive macroinvertebrate fauna. By contrast, the lower reaches (0200) showed a welcome return to highly satisfactory ecological condition in 2011.”*

([www.epa.ie/qvalue/webusers/](http://www.epa.ie/qvalue/webusers/)).

#### **Lough Derravaragh**

EPA monitoring indicates that there has been a steady improvement in the water quality of Lough Derravaragh over the last 13 years.

	<b>Average annual maximum chlorophyll a</b>	<b>Trophic Status</b>
2001 - 2003	11 µg/l	Mesotrophic
2004 - 2006	6 µg/l	Oligotrophic
2007 - 2009	4 µg/l	Oligotrophic

(McGarrigle *et al* 2010)

The current WFD status of Lough Derravaragh is as follows:

Overall Status	Good
Macrophyte Status	Good
Chlorophyll Status	High
Nutrient Enrichment Status	Good
Physico-chemical status	Good
Ecological Status	Good

[http://watermaps.wfdireland.ie/NsShare\\_Web/ReportViewer.aspx?reportName=rwb\\_all&layer=lake&eu\\_cd=IE\\_SH\\_26\\_708](http://watermaps.wfdireland.ie/NsShare_Web/ReportViewer.aspx?reportName=rwb_all&layer=lake&eu_cd=IE_SH_26_708)

### 3.1.3. ECOLOGICAL IMPORTANCE

Three Habitats Directive aquatic Annex II species are found in the Inny River system:

1. Brook Lamprey (*Lampetra planeri*)
2. Atlantic Salmon (*Salmo salar*)
3. Crayfish (*Austropotamobius pallipes*)

#### LAMPREY

Available evidence indicates that Brook Lamprey are widespread in the Inny River. The species was recorded by Kelly *et al* (2012) in the upper reaches of the river, and Maguire *et al* (2011) recorded the species both as direct survey catch and in gut contents of fish such as pike and perch throughout the section of the river between Lough Derravaragh and Lough Ree. Inland Fisheries Ireland states that lamprey were recorded in a survey at Coolnagun Bridge (i.e.

the Bridge at Shrubby Wood downstream of the Westland peat harvesting area).

## **SALMON**

Maguire *et al* (2011) recorded salmon in two survey stretches between Lough Iron and Lough Ree (See Section 3.1.1.1 above). Inland Fisheries Ireland states: “*The Shannon Salmon Restoration Project is committed to the restoration of sustainable stocks of salmon throughout the Shannon Catchment, the Inny River would be included within this plan.*” (IFI letter of 31/12/11 refer to Attachment 3 of main EIS document).

## **CRAYFISH**

Crayfish are Listed in Annex II of the Habitats Directive and protected under the Wildlife Act. Lucey & McGarrigle (1987) mention records of crayfish from the Inny River and River Glore. However Demers *et al* (2005) stated that “*Crayfish populations in lakes and rivers of the Boyne and Inny catchments are thought to have been decimated by aphanomycosis (Reynolds 1988; Demers and Reynolds 2002; 2003)*”. A comprehensive survey of crayfish distribution in OPW-managed channels of the Inny catchment was undertaken by Lordan *et al* (2008). This survey reported in King *et al* (2008) indicated “*a frequently-disparate distribution with a wide dispersal of both presence and of population size, where present, both within channels and between channels. This dispersal is commonly unrelated to presence of suitable or, indeed, optimum habitat. Thus the occurrence of substantial areas of crayfish habitat may not signify the presence of such populations.*”

The National Biodiversity Data Centre website has no records for crayfish in the main channel of the Inny from Lough Kinale to Lough Ree in the last 25 years. On the main channel of the Inny upstream of Lough Kinale and on most of the tributary streams joining this section of the Inny (i.e. The Rath Stream, the Lenamore Stream, the River Gaine and the River Glore, crayfish were recorded as recently as 2008. In the case of the Glore River crayfish have been recorded throughout the period 1977 to 2008. The apparent absence of crayfish from this

section of the main channel when the species has retained its presence in adjacent tributary stream over the last 35 years is notable.

As a significant mixed fishery with populations of three Annex II species, the Inny River is classified as of regional importance for the purposes of the present study. Being an SPA, Lough Derravaragh is classified as of international importance.

## 3.2. POTENTIALLY AFFECTED WATERS

### 3.2.1. INNY RIVER MAIN CHANNEL

#### 3.2.1.1. Habitat Assessment

Location of habitat sections and habitat ratings for each section are presented in Maps 3 - 9.

#### Section IN-A

<b>Location</b>	N40730 77666 to N40690 76802		
<b>Length</b>	c.1.2km		
<b>Description</b>	River 15 – 20m wide and 50 – 120cm deep consisting of 100% glide flow over mud and marginal loose peaty silt. In-stream macrophytes well developed with most abundant species being <i>Sparganium emersum</i> , <i>Nuphar lutea</i> and filamentous algae. Other species present are <i>Elodea canadensis</i> , <i>Myriophyllum</i> sp., <i>Callitriche</i> sp., <i>Potamogeton praelongus</i> , <i>Potamogeton natans</i> , <i>Polygonum amphibium</i> , <i>Hippopus vulgaris</i> , <i>Phragmites</i> sp. and <i>Phalaris arundinacea</i> . Just downstream of drain at N40575 77148 marginal peaty silt to a depth of >1m was observed. Bankside dominated by <i>Phalaris arundinacea</i> and <i>Phragmites australis</i> sp.		
<b>Salmonid Adult Habitat</b>	Fair	<b>Crayfish Habitat</b>	Fair
<b>Salmonid Nursery Habitat</b>	None	<b>Lamprey Nursery Habitat</b>	Good
<b>Salmonid/Lamprey Spawning Habitat</b>	None	<b>Coarse Fish Habitat</b>	Good



Dense submerged *Sparganium emersum*



Dense submerged *Nuphar lutea* coated with recently deposited silt



Dense marginal *Polygonum amphibium*



Dense submerged and floating *Nuphar lutea* with silt deposits on river bank visible



Marginal deposit of soft peaty silt



Deep deposits of soft marginal peaty silt



Patches of dense *Hippurus vulgaris*



Broad slow glide



**Section IN-B**

**Location** N40690 76802 to N39175 75629

**Length** c.3km

**Description** River 30m wide and 50 – 130cm deep consisting of 100% glide flow over mud and marginal loose peaty silt. In-stream macrophytes well developed with most abundant species being *Sparganium ermersum*, *Nuphar lutea* and *Oenanthe* sp. Other species present are *Elodea canadensis*, *Callitriche* sp., *Potamogeton lucens*, *Potamogeton natans*, *Hippopus vulgaris*, *Phragmites australis*, *Alisma plantago aquatica*, *Myosotus scorpiodes* and *Phalaris arundinacea*. Just downstream of drain at N40575 77148 marginal peaty silt to a depth of >1m was observed. Low level of bankside shade cast by *Phragmites australis* and alder.

<b>Salmonid Adult Habitat</b>	Fair - Good	<b>Crayfish Habitat</b>	Fair
<b>Salmonid Nursery Habitat</b>	None - Poor	<b>Lamprey Nursery Habitat</b>	Good
<b>Salmonid/Lamprey Spawning Habitat</b>	None	<b>Coarse Fish Habitat</b>	Good



Dense submerged and emergent *Oenanthe* sp.



Dense sections of *Hippurus vulgaris*



Deep deposits of soft mobile peaty silt



Recently excavated river bank

**Section IN-C**

**Location** N39429 72882 to N39358 71431

**Length** c.2km

**Description** Broad slow flowing glide on substrate of deep soft mud. Depth 0.5 – 1.2 m. Dense in-stream vegetation dominated by *Sparganium emersum* and *Oenanthe* sp. Other species present are *Nuphar lutea*, *Callitriche* sp., *Potamogeton lucens*, *Phragmites australis*, *Sparganium erectum* and *Phalaris arundinacea*. Low level of shade by bankside willow and *Phalaris arundinacea*.

<b>Salmonid Adult Habitat</b>	Fair	<b>Crayfish Habitat</b>	Fair
<b>Salmonid Nursery Habitat</b>	None	<b>Lamprey Nursery Habitat</b>	Fair - Good
<b>Salmonid/Lamprey Spawning Habitat</b>	None	<b>Coarse Fish Habitat</b>	Good



Shallow water with substrate of deep soft peaty silt



Marginal *Nuphar lutea*, *Sparganium erectum* & *Phalaris arundinacea*



Dense submerged *Sparganium emersum*



Excavated mud bank

**Section IN - D**

**Location** N39358 71431 to N39676 68324

**Length** c.3.8km

**Description** Wide slow flowing glide. Sections of moderate bankside shade by mature willow. Some sections of bank and marginal vegetation poorly developed due to channel maintenance. Depths ranging from 1m close to the river's edge to 2 – 2.8m in the middle of the channel. *Sparganium emersum* well developed in the mid channel. *Nuphar lutea*, *Sparganium erectum*, *Schoenoplectus lacustris*, *Phalaris arundinacea*, *Rorippa nasturtium-aquaticum*, *Myosotis scorpiodes*, *Callitriche* sp. & *Mentha* sp well developed in margins.

<b>Salmonid Adult Habitat</b>	Fair	<b>Crayfish Habitat</b>	Fair
<b>Salmonid Nursery Habitat</b>	None	<b>Lamprey Nursery Habitat</b>	Good
<b>Salmonid/Lamprey Spawning Habitat</b>	None	<b>Coarse Fish Habitat</b>	Good



Wide shallow marginal zone with well-developed *Nuphar lutea*, *Sparganium erectum* and *Schoenoplectus lacustris*



Moderate shade by mature bankside willow



Well-developed marginal vegetation with *Nuphar lutea*, *Rorippa nasturtium-aquaticum*, *Myosotis scorpiodes*, *Mentha* sp. & *Phalaris arundinacea*



Section of bank with poor bankside and marginal vegetation



Wide river with slow flowing glide

## Section D-A

<b>Location</b>	Lough Derravarragh close to Inny River Inflow at N39676 68324		
<b>Length</b>	c.200m radius from river mouth		
<b>Description</b>	Extensive shallow area with substrate of silty sand and extensive stands of <i>Nuphar lutea</i> and emergent <i>Schoenoplectus lacustris</i> <i>Phragmites australis</i> and <i>Sparganium erectum</i> .		
<b>Salmonid Adult Habitat</b>	Fair	<b>Crayfish Habitat</b>	Fair
<b>Salmonid Nursery Habitat</b>	None	<b>Lamprey Nursery Habitat</b>	Poor
<b>Salmonid/Lamprey Spawning Habitat</b>	None	<b>Coarse Fish Habitat</b>	Good



Dense *Nuphar lutea* in foreground, bed of *Phragmites australis* and *Schoenoplectus lacustris* in background



Shallow littoral zone with *Sparganium erectum*



Extensive stands of *Schoenoplectus lacustris*

### 3.2.1.2. Water Quality

Biological water quality ratings are illustrated on Map 10.

Biological water quality assessment was carried out at four sites on the Inny. These are Sites IN-1 and IN-2 upstream and downstream of the Clonsura peat harvesting area and Sites IN-3 and IN-4 upstream and downstream of the Coole peat harvesting area sites. Taking into account the depositing substrate, the invertebrate community at all four sites merits a Q-rating of Q3-4 indicating slightly polluted conditions. There is therefore no indication from the invertebrate assessment of a significant impact from the Westland operations on biological water quality in the main channel of the Inny River at present. That having been said the presence of deep, soft, highly mobile peaty silt throughout the entire section of the Inny River assessed (i.e. from upstream of the Clonsura peat harvesting area as far downstream as Lough Derravaragh) seems likely to be due to a significant extent to anthropogenic factors. The well-developed aquatic flora is clearly adapted to these conditions; however without historical biological data it is not possible to determine the degree to which the aquatic flora has been changed from its original condition by anthropogenic factors such as siltation. Likewise this is the case with the macroinvertebrate fauna. The fauna recorded are adapted to the environment of soft silt substrates and abundant aquatic plants and are indicative of slight organic/nutrient pollution. However it is possible that the invertebrate fauna is significantly influenced by anthropogenic influences on the physical habitat. If the Westland operations have contributed to the peat/silt in this section of the Inny, (which cannot be concluded from the results of the present survey), it is clear that this contribution is insufficient to cause perceptible additional impact on biological water quality over and above the impact already caused by activities in the catchment upstream.

**SITE IN-1 (Upstream Clonsura)**

The invertebrate community at this site tabulated below merits a Q-rating of Q3-4 indicating slightly polluted conditions.

<b>INDICATOR GROUP</b>	<b>TAXON</b>	<b>Numbers</b>
<b>Group A</b> - Very Pollution Sensitive	None recorded	
<b>Group B</b> - Moderately Pollution Sensitive	Leptoceridae	5
	Limnephilidae	3
	<i>Phryganea sp.</i>	1
<b>Group C</b> - Moderately Pollution Tolerant	<i>Bithynia tentaculata</i>	27
	<i>Gammarus sp.</i>	6
	<i>Holocentropus sp.</i>	5
	<i>Polycentropus sp.</i>	14
	Dytiscidae	7
	Chironomidae (exc. <i>Chironomus</i> )	46
<b>Group D</b> - Very Pollution Tolerant	<i>Erpobdella sp.</i>	5
	<i>Hemiclepsis marginata</i>	1
	Sphaeriidae	13
	<i>Asellus aquaticus</i>	3
	<i>Crangonyx pseudogracilis</i>	2
	<i>Sialis sp.</i>	13
<b>Group E</b> - Most Pollution Tolerant	Tubificidae	1



## SITE IN-2 (Downstream Clonsura)

The invertebrate community at this site merits a Q-rating of Q3-4 indicating slightly polluted conditions.

INDICATOR GROUP	TAXON	Numbers
<b>Group A</b> - Very Pollution Sensitive	<i>Ephemera danica</i>	4
<b>Group B</b> - Moderately Pollution Sensitive	<i>Lepidostoma sp.</i>	3
	Leptoceridae	1
	Limnephilidae	5
<b>Group C</b> - Moderately Pollution Tolerant	<i>Bithynia tentaculata</i>	3
	<i>Potamopyrgus antipodarum</i>	1
	<i>Gammarus sp.</i>	14
	Hydracarina	3
	<i>Hydropsyche sp.</i>	4
	<i>Holocentropus sp.</i>	29
	<i>Polycentropus sp.</i>	3
	Dytiscidae	1
	Halplidae	2
	Chironomidae (exc. <i>Chironomus</i> )	57
	Simuliidae	3
<b>Group D</b> - Very Pollution Tolerant	<i>Erpobdella sp.</i>	1
	Sphaeriidae	25
	<i>Asellus aquaticus</i>	3
	<i>Crangonyx pseudogracilis</i>	1
	<i>Sialis sp.</i>	17
<b>Group E</b> - Most Pollution Tolerant	Tubificidae	4
Not assigned to an indicator group	Nematoda	2
	Lumbricidae	1

**SITE IN-3 (Upstream Coole)**

The invertebrate community at this site merits a Q-rating of Q3-4 indicating slightly polluted conditions.

INDICATOR GROUP	TAXON	Numbers
<b>Group A</b> - Very Pollution Sensitive	None recorded	
<b>Group B</b> - Moderately Pollution Sensitive	Leptoceridae	7
	Limnephilidae	3
<b>Group C</b> - Moderately Pollution Tolerant	<i>Bithynia tentaculata</i>	29
	<i>Physa sp.</i>	2
	<i>Planorbis sp.</i>	2
	<i>Valvata sp.</i>	1
	<i>Gammarus sp.</i>	5
	Hydracarina	3
	<i>Caenis sp.</i>	2
	<i>Hydropsyche sp.</i>	2
	Corixidae	6
	<i>Notonecta sp.</i>	2
	Dytiscidae	4
	Haliplidae	1
	Chironomidae (exc. <i>Chironomus</i> )	24
<b>Group D</b> - Very Pollution Tolerant	Sphaeriidae	6
	<i>Asellus aquaticus</i>	12
	<i>Crangonyx pseudogracilis</i>	6
	<i>Sialis sp.</i>	4
<b>Group E</b> - Most Pollution Tolerant	Tubificidae	5
	<i>Chironomus sp.</i>	1

### SITE IN-4 (Downstream Coole)

The invertebrate community at this site merits a Q-rating of Q3-4 indicating slightly polluted conditions.

INDICATOR GROUP	TAXON	Numbers
<b>Group A</b> - Very Pollution Sensitive	None recorded	
<b>Group B</b> - Moderately Pollution Sensitive	Leptoceridae	5
	Limnephilidae	6
<b>Group C</b> - Moderately Pollution Tolerant	<i>Bithynia tentaculata</i>	4
	Hydracarina	1
	<i>Holocentropus sp.</i>	1
	Dytiscidae	1
	Halipidae	1
	Chironomidae (exc. <i>Chironomus</i> )	120
<b>Group D</b> - Very Pollution Tolerant	<i>Erpobdella sp.</i>	1
	<i>Glossiphonia complanata</i>	1
	<i>Helobdella stagnalis</i>	1
	<i>Lymnaea stagnalis</i>	1
	Sphaeriidae	2
	<i>Asellus aquaticus</i>	5
	<i>Crangonyx pseudogracilis</i>	12
	<i>Sialis sp.</i>	12
<b>Group E</b> - Most Pollution Tolerant	Tubificidae	1

#### 3.2.1.3. Fishery Value

On the basis of the biological water quality and habitat assessments, the entire surveyed section of the Inny River constitutes good coarse fishing waters and fair adult trout habitat. Habitat suitable for trout spawning or as trout nursery areas was almost non-existent in the c.10 km of the Inny channel surveyed.

#### 3.2.1.4. Ecological Value

The section of the Inny River surveyed has fair habitat quality for crayfish. However, whereas crayfish are known to be present in some sections of the

Inny there appear to be no records for the species in the main channel of the river from Lough Kinale to Lough Ree in the last 25 years (see Section 3.1.3 above). No crayfish were recorded in the cross channel invertebrate sampling carried out for the present report. Whether the apparent absence of crayfish from much of the main channel, while present in the tributaries, is due to anthropogenic factors such as siltation or to natural factors such as crayfish disease, cannot be determined on the basis of existing scientific data.

Brook lamprey are known to be present in this section of the Inny River and good lamprey nursery habitat was found to be widespread in the present survey. As suitable lamprey spawning habitat was not recorded in the Inny River in the present survey it seems likely that the juvenile lamprey recorded were spawned in suitable habitat in tributary streams or in the Inny upstream of the area surveyed.

The surveyed section of the Inny River is classified as of high local importance.

### 3.2.2. GLORE RIVER

#### 3.2.2.1. Habitat Assessment

Location of habitat sections and habitat ratings for each section are presented in Maps 3 - 9.

#### Section G-A

<b>Location</b>	N41860 76215 to N41739 76333		
<b>Length</b>	c.200m		
<b>Description</b>	Stream 7-9m wide and 25-60cm deep. Consisting of predominantly of rapid run (c.50%) with riffle (25%) and glide (25%) over substrates of sand, mud, gravel and cobble. Well developed in stream vegetation of <i>Apium nodiflorum</i> (c.45% cover), <i>Oenanthe</i> sp. (c.10%), Bryophytes (c.10%), filamentous algae (c.8%) & <i>Potamogeton natans</i> & <i>Callitriche</i> sp. at low density. Bankside cover of Alder, Willow and <i>Phalaris arundinacea</i> casting low level of shade.		
<b>Salmonid Adult Habitat</b>	Fair - Good	<b>Crayfish Habitat</b>	Fair - Good
<b>Salmonid Nursery Habitat</b>	Fair	<b>Lamprey Nursery Habitat</b>	Fair
<b>Salmonid/Lamprey Spawning Habitat</b>	Poor - Fair	<b>Coarse Fish Habitat</b>	Fair



Riffle & fast run over sand, mud, gravel & cobble



Run and glide with bankside *Phalaris arundinacea*



Uniform glide with *Potamogeton natans* & dense bankside *Phalaris*



Riffle & run with submerged and emergent *Oenanthe* sp.

## Section G-B

**Location** N41739 76333 to N40694 76759

**Length** c.1.4km

**Description** Canalised steep sided stream consisting mostly of uniform glide over mud substrate. Moderate bankside cover of conifers and aspen. In-stream *Sparganium emersum* and *Oenanthe* sp.at moderate density.

**Salmonid Adult Habitat** Fair

**Crayfish Habitat** Fair

**Salmonid Nursery Habitat** Poor

**Lamprey Nursery Habitat** Poor - Fair

**Salmonid/Lamprey Spawning Habitat** None

**Coarse Fish Habitat** Fair



Uniform glide on mud substrate



River canalised and dredged

### 3.2.2.2. Water Quality

Biological water quality ratings are illustrated on Map 10.

Biological water quality assessment sites were established on the Glore River upstream and downstream of the Coole peat harvesting area at Sites G-1 and G-2. The invertebrates at both sites merited a Q-rating of Q3-4 indicating slightly polluted conditions. There is therefore no indication from the invertebrate assessment of a significant impact from the Westland operations on biological water quality of the River Glore.

#### SITE G-1

The invertebrate community at this site merits a Q-rating of Q3-4 indicating slightly polluted conditions.

INDICATOR GROUP	TAXON	Numbers
<b>Group A</b> - Very Pollution Sensitive	Heptageniidae	2
<b>Group B</b> - Moderately Pollution Sensitive	<i>Calopteryx sp.</i>	3
	Limnephilidae	9
	<i>Sericostoma sp.</i>	1
<b>Group C</b> - Moderately Pollution Tolerant	<i>Ancyclus fluviatilis</i>	1
	<i>Potamopyrgus antipodarum</i>	1
	<i>Theodoxus fluviatilis</i>	6
	<i>Gammarus sp.</i>	110
	Hydracarina	1
	<i>Baetis rhodani</i>	2
	<i>Hydropsyche sp.</i>	16
	<i>Rhyacophila sp.</i>	2
	<i>Aphelocheirus aestivalis</i>	7
	Elmidae	13
	Chironomidae (exc. <i>Chironomus</i> )	35
	Simuliidae	6
	Tipulidae (Pediciidae)	1
<b>Group D</b> - Very Pollution Tolerant	<i>Glossiphonia complanata</i>	1
	Sphaeriidae	1
	<i>Asellus aquaticus</i>	2
<b>Group E</b> - Most Pollution Tolerant	None recorded	
Not assigned to an indicator group	Lumbricidae	1
	<i>Stylodrilus sp.</i>	2



## SITE G-2

The invertebrate community at this site merits a Q-rating of Q3-4 indicating slightly polluted conditions.

INDICATOR GROUP	TAXON	Numbers
<b>Group A</b> - Very Pollution Sensitive	<i>Ephemera danica</i>	1
<b>Group B</b> - Moderately Pollution Sensitive	<i>Calopteryx sp.</i>	1
	Limnephilidae	10
	<i>Sericostoma sp.</i>	5
<b>Group C</b> - Moderately Pollution Tolerant	<i>Gammarus sp.</i>	128
	<i>Hydropsyche sp.</i>	1
	<i>Notonecta sp.</i>	1
	Dytiscidae	4
	Haliplidae	1
	Chironomidae (exc. <i>Chironomus</i> )	6
<b>Group D</b> - Very Pollution Tolerant	Sphaeriidae	3
	<i>Asellus aquaticus</i>	15
<b>Group E</b> - Most Pollution Tolerant	None recorded	
Not assigned to an indicator group	Lumbricidae	1

### 3.2.2.3. Fishery Value

The upstream end of the potentially affected section of the Glore River constitutes significant trout habitat with fair–good habitat for adult fish, fair nursery habitat and poor–fair spawning habitat. Further downstream trout nursery and spawning habitat is poor. On the basis of the water quality and habitat quality data it is concluded that the Glore River is likely to constitute a significant trout nursery stream for the adjacent section of the Inny River. It is also possible that the Glore River serves as a trout spawning and nursery area

for Loughs Sheelin and Derravaragh, as following genetic studies of the trout in Lough Sheelin IFI stated: “*There is some historical information to suggest that the Glore River system, a sub catchment discharging to the Inny downstream of Sheelin, may also contribute to the L. Sheelin stock. A genetic study of trout stocks in this system would clarify the aforementioned issues.*” ([www.fisheriesireland.ie/EREP/the-implications-of-the-genetic-studies-to-the-erep-project.html](http://www.fisheriesireland.ie/EREP/the-implications-of-the-genetic-studies-to-the-erep-project.html))

#### **3.2.2.4. Ecological Value**

No crayfish were recorded at the two invertebrate assessment sites on the Glore River in the present study. However, Lucey & McGarrigle (1987) list crayfish as occurring in the River Glore, and King *et al* (2008) indicate a substantial population of crayfish in the River Glore. Data on the National Biodiversity Data Centre website show that crayfish have been recorded in the Glore River throughout the period 1977 to 2008 (albeit upstream of the area assessed for the present report).

Fair lamprey nursery habitat was recorded in the potentially affected section of the River Glore. As the species is known to be present in the adjacent section of the Inny River, the precautionary principle is applied and it is assumed that they are also present in the River Glore.

The surveyed section of the Glore River is classified as of high local importance.

### 3.2.3. MAYNE STREAM

#### 3.2.3.1. Habitat Assessment

Location of habitat sections and habitat ratings for each section are presented in Maps 3 - 9.

##### Section M-A

**Location** N40435 70742 to N39679 71333

**Length** c.1.1km

**Description** Stream consists of a slow flowing drain (some recently excavated) with mud and peat substrate. Heavy growth of filamentous algae in parts and moderate growths of *Apium nodiflorum* and *Callitriche* sp.

**Salmonid Adult Habitat** None                      **Crayfish Habitat** Poor

**Salmonid Nursery Habitat** None                      **Lamprey Nursery Habitat** Poor

**Salmonid/Lamprey Spawning Habitat** None                      **Coarse Fish Habitat** Poor



Watercourse with no visible flow



Recently excavated channel



Uniform slow glide on peat and mud substrate

### Section M - B

**Location** N39679 71333 to N39646 71364

**Length** c.40m

**Description** Short section of stream with poor riffle on silty cobble with some gravel. Filamentous algae covering c.20% of the substrate

**Salmonid Adult Habitat** Poor

**Crayfish Habitat** Poor

**Salmonid Nursery Habitat** Fair

**Lamprey Nursery Habitat** None – Poor

**Salmonid/Lamprey Spawning Habitat** Fair

**Coarse Fish Habitat** None



Poor riffle on silty cobble with some gravel

## Section M-C

<b>Location</b>	N39646 71364 to N39364 71432		
<b>Length</b>	c.300m		
<b>Description</b>	Canalised slow flowing drain on peat substrate. Width 2m depth 10-15cm.		
<b>Salmonid Adult Habitat</b>	None	<b>Crayfish Habitat</b>	Poor
<b>Salmonid Nursery Habitat</b>	None	<b>Lamprey Nursery Habitat</b>	Poor
<b>Salmonid/Lamprey Spawning Habitat</b>	None	<b>Coarse Fish Habitat</b>	Poor



Slow flowing watercourse on peat

### 3.2.3.2. Water Quality

Biological water quality ratings are illustrated on Map 10.

Biological water quality assessment sites were established on the Mayne Stream upstream and downstream of the Coole peat harvesting area at Sites B-1 and B-2. The invertebrates at both sites merited a Q-rating of Q3 indicating moderately polluted conditions. There is therefore no indication from the invertebrate assessment of a significant impact from the Westland operations on the biological water quality of the Mayne Stream.

#### SITE M-1

The invertebrate community at this site merits a Q-rating of Q3 indicating slightly polluted conditions.

INDICATOR GROUP	TAXON	Numbers
<b>Group A</b> - Very Pollution Sensitive	None recorded	
<b>Group B</b> - Moderately Pollution Sensitive	Limnephilidae	12
<b>Group C</b> - Moderately Pollution Tolerant	<i>Gammarus sp.</i>	1
	Hydracarina	15
	Corixidae	1
	Dytiscidae	3
	Gyrinidae	2
	Chironomidae (exc. <i>Chironomus</i> )	35
<b>Group D</b> - Very Pollution Tolerant	<i>Lymnaea peregra</i>	5
	<i>Asellus aquaticus</i>	5
<b>Group E</b> - Most Pollution Tolerant	<i>Chironomus sp.</i>	18

## SITE M-2

The invertebrate community at this site merits a Q-rating of Q3 indicating slightly polluted conditions.

INDICATOR GROUP	TAXON	Numbers
<b>Group A</b> - Very Pollution Sensitive	None recorded	
<b>Group B</b> - Moderately Pollution Sensitive	Limnephilidae	13
<b>Group C</b> - Moderately Pollution Tolerant	<i>Gammarus sp.</i>	4
	Corixidae	2
	<i>Nepa cinerea</i>	1
	Dytiscidae	4
	Chironomidae (exc. <i>Chironomus</i> )	81
<b>Group D</b> - Very Pollution Tolerant	<i>Asellus aquaticus</i>	23
	<i>Sialis</i>	1
<b>Group E</b> - Most Pollution Tolerant	Tubificidae	2
	<i>Chironomus sp.</i>	39

### 3.2.3.3. Fishery Value

Apart from a very short section of fair trout nursery and spawning habitat, the Mayne stream has no significant fish habitat.

### 3.2.3.4. Ecological Value

The stream is classified as of moderate local value.

### 3.2.4. CLONSURA STREAM

#### 3.2.4.1. Habitat Assessment

Location of habitat sections and habitat ratings for each section are presented in Maps 3 - 9.

#### Section C-A

**Location** N42140 77135 to N41725 77340

**Length** c.600m

**Description** Recently excavated channel on peat with some short sections of gravel on peat. Mostly uniform glide. Historic O.S. 6 inch mapping indicates that this stream originally flowed into Lough Bane which at that time was considerably larger than now. The southern boundary of the lake is now c.200m further north than at the time of the 6 inch mapping. The stream now flows via a drain though what was once within the footprint on Lough Bane and continues via a channel flowing west to the Inny River

<b>Salmonid Adult Habitat</b>	None	<b>Crayfish Habitat</b>	Poor
<b>Salmonid Nursery Habitat</b>	Poor	<b>Lamprey Nursery Habitat</b>	Poor
<b>Salmonid/Lamprey Spawning Habitat</b>	None - Poor	<b>Coarse Fish Habitat</b>	Poor



Recently excavated channel on peat with some silty sand and gravel



Excavated channel through peat underlain by marl





Excavated channel through peat

#### **3.2.4.2. Water Quality**

As this channel was recently excavated it is not suitable for biological water quality assessment.

#### **3.2.4.3. Fishery Value**

The surveyed section of stream has no significant fishery value.

#### **3.2.4.4. Ecological Value**

The surveyed section of stream has low ecological value.

## **4. POTENTIAL IMPACTS OF PEAT HARVESTING ON AQUATIC FLORA, FAUNA AND HABITATS IN THE ABSENCE OF MITIGATION**

Full details of the peat harvesting activities carried out at the Westland operated sites are presented in Section 2 of the EIS.

From the perspective of potential aquatic ecological impacts the main activities are:

- WHL's site operations involve milling of peat typically from April through to September. The operation is largely weather dependent and therefore peat milling operations are only undertaken when the weather is warm and dry.
- The operations of milling, harrowing, ridging and harvesting are repeated for each crop and are collectively described as a cycle.
- Milling is undertaken at the start of the season by a tractor and harrow to cut and loosen up the fresh layer of peat from the surface. Production of milled peat is carried out on the drained bogs intermittently during the months of April to September and in periods of good drying weather.
- The milled peat is then left to air dry over a period of a few days.
- The crop is rotated mechanically during the drying stage to facilitate even drying. The number of rotations is dependent on the climatic conditions and moisture in the crop. This is achieved with a harrow which loosens up the pore structure and exposes a fresh layer of peat to the air.
- Once the peat has reached the target water content, it is collected into ridges or drills.

- The dried fresh peat is lifted from the worked areas of the bog by a harvester, placed in trailers and moved using the tractors to the designated stockpiling areas onsite, where it is compacted into layers to prevent dust emissions, and is stored for transportation off the site.
- There are 7 designated stockpile locations at Coole and a further three at Clonsura. Peat mounds are approx. 6 – 7m in height.
- The stockpiled peat is transported off site to Dungannon Co. Tyrone by contracted hauliers. This activity generally occurs within the early months of the year but can continue into May.
- There are no permanent structures on site. Container units are placed on hardcore areas just off the main access to each site providing a temporary office and kitchen area. Temporary portable toilets are provided on site.
- Generators are used to provide electricity and water is drawn to the sites and stored in containers for use in the toilets and for handwashing.
- Diesel is used for the generators and the refuelling of tractors. It is stored in double skinned tanks on site.
- At the Coole site, there are a number of concrete staging areas adjacent to the road network where trucks can be loaded up with peat.
- During the harvesting period, tractors are brought to site and remain for the duration (April to September) and are then removed off site. Up to 6 tractors will be stationed at each site. Other traffic generated during this period arises from up to 6 seasonal workers and 3 permanent employees working on the sites.

- Each year harvesting operations remove a thin layer of peat thereby slowly lowering the level of the surface. To maintain an effective drainage network the drains have to be ditched. This is normally undertaken after production in the autumn and again prior to production in the spring and sides of the drain.
- WHL maintains surface water drainage ditches every 12 meters (approximately) to provide adequate conditions for peat harvesting. Surface and soil pore water collected from the peat fields by gravity is treated prior to discharge to adjacent watercourses.
- Water collected in each of the drainage ditches is conveyed to a headland drain, from where it flows into a large perimeter drain and onto the sedimentation basins for further treatment. The sedimentation basins removes large particles by damming water up into the drainage ditches causing suspended particles to settle to the bottom of the ditches.
- WHL has 4 No. sedimentation basins installed at the harvesting site at Clonsura. Two of the sedimentation basins at Clonsura discharge directly into the Glore, a tributary of the Inny at Clonsura. A further two sedimentation basins to the east or near the access road in the bog discharge into the Clonsura Stream which then discharges into the Inny.
- There are 7 No. sedimentation basins at Coole, four of which discharge directly to the Inny River and three of which discharge to the Mayne Stream which flows to the Inny River.
- The discharges from the sedimentation basins are controlled by an adjustable weir on the outlet from each basin. This allows WHL to limit or stop all discharges from the sites. Once the sedimentation basins reach capacity, water will start to back up in the perimeter drains, drainage ditches and peat harvesting land banks and in effect this gives WHL the potential to retain water within the sites for long periods if required.

The potential significant impacts of the peat harvesting works in the absence of mitigation measures (including mitigation measures in place) on aquatic ecology are:

1. Pollution of watercourses with suspended solids.
2. Pollution of watercourses with nutrients associated with suspended solids and in water draining from the peat harvesting area.
3. Pollution of watercourses with other substances such as fuels, lubricants, waste water from site toilet and wash facilities, etc.
4. Hydrological impact due to changes in the flow rates of streams/ivers.

#### **4.1. POLLUTION OF RIVERS & STREAMS WITH SUSPENDED SOLIDS**

In the absence of adequate mitigation peat harvesting has potential for suspended solids contamination of surface waters. Peat soils have high erodability (Forest Service 2008) and may be less amenable to removal by conventional sedimentation basins unless properly sized to allow for peat particles.

- 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.
- Siltation can make lengthy sections of watercourse unsuitable for crayfish (Peay 2000).
- 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)
- Deposition of silt will also promote the development of extra rooted plant productivity. This will give rise to the waterways being clogged, thus reducing the swim area for fish and their ability to feed and thrive reducing stock density. In addition there will also be a greater tendency for river drainage to occur which will have an extremely destructive impact on the river and in particular its biology. (Shannon International River Basin District Project 2008)

In the absence of adequate mitigation measures, contamination of water courses with suspended solids is one of the most significant potential impacts of peat harvesting. Concerns regarding the aquatic impact of large scale peat exploitation in Ireland have been raised in the scientific literature for over 20 years e.g. Bowman *et al* (1993), Reynolds (1998), Fitzsimons & Igoe (2004) & Shannon International River Basin District Project (2008). Fitzsimons & Igoe (2004) stated that “*The deposition of peat silt is particularly acute in parts of the River Shannon, e.g. in the River Suck, the Little Brosna and the Inny.*”

## 4.2. NUTRIENT ENRICHMENT OF WATERCOURSES

Two forms of phosphorus are usually found in the surface water runoff from harvested bogs; these are the dissolved soluble phosphorus, and the phosphorus removed with sediments, particularly the lighter and finer-sized particles such as humic materials in peat. Surface waters draining peat catchments are coloured due to the presence of high concentrations of dissolved organic matter. Natural decomposition of peat releases dissolved organic matter into the surface waters. Dissolved humic materials (DHM's) are naturally occurring biogenic chemicals which can impart colour to water. Research has shown that DHM may absorb phosphate in the presence of iron. Once DHM-iron phosphate complexes absorb phosphate they reduce its bioavailability to algae (McGarrigle & Kilmartin 1992). It has also been shown that UV light in sunlight can release the phosphorus bound to dissolved humic substances released from bogs. Therefore, a combination of dissolved humic substances from bogs and natural UV-sunlight could increase phosphate levels in freshwaters.

Whereas the proportion of phosphorus that is likely to be available from DHM is uncertain, empirical evidence indicates that most phosphorus enrichment of surface waters from peat harvesting is associated with particulate matter which can be removed using standard suspended solids removal methods. Based on the results obtained in their study, Bowman *et al.* (1993) estimated that the annual phosphorus load from worked bogs in the Lough Derg catchment at 2.8 to 5.6 tonnes TP was relatively low, contributing approximately 2% of the total phosphorus load to Lough Derg from an area of worked bog of about 20,000 ha. Treatment of surface water from cutaway bogs via peat silt lagoons as a practice commenced in the late 1990s. Data in Shannon International River Basin District Project (2008) indicate that the more recent annual phosphorus loading from the worked bogs in the Lough Derg catchment is in the order of 1.6 tonnes TP. The data indicate that a significant nutrient load reduction is most likely due to the installation of settlement ponds as part of the IPPC licensing process.

The Shannon International River Basin District Project (2008) analysis of BNM peatland study results states: *“The concentration of Ammonium in the discharges from the peat silt lagoons are generally high compared to comparatively lower levels of phosphorus and suspended solids which settle in the lagoons. However, peatland surface water runoff appears to have naturally high Ammonium levels and this is evident in the receiving waters. Assessment of the monitoring data indicates that the EQS proposed under the Water Framework Directive for MRP will be met in most of the peatland catchments. However, the results indicate that the EQS for Ammonium is unlikely to be achieved in catchments with actively worked peatlands. Again, this must be attributed to naturally high Ammonium concentrations in peatland waters.”* However it should be noted that EPA water quality data do not indicate an issue with ammonia at stations close to the peat harvesting areas which are the subject of this report (See EIS Section 4.4)

### **4.3. CONTAMINATION OF STREAMS/RIVERS WITH OTHER SUBSTANCES**

The potential exists for a range of pollutants to enter watercourses from peat harvesting operations. For example any of the following will have deleterious effects on fish, plants and invertebrates if allowed to enter watercourses.

- Fuels, lubricants and hydraulic fluids for equipment used on the site.
- Waste from on-site toilet and wash facilities.

### **4.4. HYDROLOGICAL IMPACTS**

The Inny River and the Glore River have been subjected to arterial drainage with the associated regular maintenance dredging of channels. The main



aquifer associated with the marl and bedrock under the Westland sites is unaffected by the peat harvesting operations although the marl is visible in the perimeter drains where seepage of groundwater into the drains does occur. As the bogs were drained in the 1980s, the main changes to the hydrogeological regime and inputs to the rivers would have occurred then (OES pers. comm.). It is therefore not likely that the on-going peat harvesting at the Westland sites will cause significant changes in the hydrological regime of the Inny River or River Glore. Further detail is provided in Chapter 4.4 of the EIS.

## **5. EXISTING AND PROPOSED MITIGATION MEASURES**

### **5.1. PREVENTION OF SUSPENDED SOLIDS POLLUTION**

The potential exists for suspended solids pollution to surface waters adjacent to any peat harvesting sites via direct runoff from the sites and also via airborne peat dust being blown from the peat harvesting areas during the peat milling, drying, ridging, transport and stockpiling processes.

The detailed assessment of silt reduction measures and sedimentation basin maintenance procedures are beyond the scope of this report and are included in Chapter 4.4 of the EIS. However measures will include the following (most of which are currently implemented):

- There are existing sedimentation basins serving the sites and further measures will be put in place where required to ensure that runoff from the bog surface to surface streams/rivers does not occur at any location other than through sedimentation basins.
- Where necessary outlets from field drains shall be blocked during stock pile loading.
- Ditching processes will occur in dry weather and while ditching outfalls from sedimentation basins will be blocked and ditching will be towards the outfall.
- Stock piles are kept away from field drains where possible but any field drains that are adjacent to stockpile loading will be cleaned out immediately after stock pile loading.
- If practicable existing natural reed beds at outfalls will be promoted to act as a final polish as part of a continuous improvement programme for the

management of the site. Although this is not deemed necessary on the basis of existing discharge monitoring data.

- An existing 30 metre buffer zone of non-peat harvesting will be maintained adjacent to all land adjacent to the Inny River. This Buffer zone will be planted with a species of native vegetation suited to the peat environment.

25mg/l is the maximum limit set for suspended solids in receiving waters in the Salmonid Regulations (1988) and applying this limit to discharges will ensure that they will have no detrimental impact on the existing aquatic flora and fauna of the receiving waters. In its submission as part of the preparation of the Natura Impact Statement, Inland Fisheries Ireland has stated: "*The Shannon Salmon Restoration Project is committed to the restoration of sustainable stocks of salmon throughout the Shannon Catchment, the Inny River would be included within this plan. In the interests of sustainability it is imperative that all assessments carried out are cognisant of the Inny River's ability to support salmon in the future and do not impact on this plan in any negative way.*" (IFI Letter 31 Dec 2011 refer to Attachment 3 in the EIS). Applying a 25mg/l limit will ensure that the discharges from the Westland peat harvesting sites will not compromise the objectives of the Shannon Salmon Restoration Project. However it is acknowledged that the EPA BATNEEC Emission Limit Value is 35mg/l and this has been applied to other peat harvesting sites.

The following measures for reduction of airborne peat dust are and will be implemented:

- All headlands and travel areas are and will continue to be kept free of loose peat at all times by regular ridging & harvesting.
- There will be no harvesting equipment transportation in the designated 30 metre buffer zone adjacent to the Inny River.

- The 30 metre buffer zone adjacent to the Inny River will be maintained with natural vegetation species planted.
- Traffic along headlands will be kept to a minimum and slow speeds maintained.
- At the end of season all milled peat remaining on fields will be ridged or compacted to prevent airborne dust generation or silt deposition in waterways.
- There will be no stock piling of loose peat within 100 metres of the Inny River.
- Production operations will be suspended in very windy weather.
- When harvesting the jib will be maintained low to the stockpile collection trailers.
- Road transported peat will be suitably covered (sheeted or enclosed).

It is further recommended that wind breaks of trees should be planted along sensitive stretches of the Inny River and should be of sufficient width, height and density to prevent significant quantities of peat dust reaching the rivers as recommended by Holdwright (2008).

## **5.2. PREVENTION OF POLLUTION BY NUTRIENTS AND OTHER POTENTIAL CONTAMINANTS FROM PEAT DRAINAGE**

The following BATNEEC limit values for peat extraction should apply to all discharges:

<b>Parameter</b>	<b>Emission Limit Value</b>
pH	6-9
BOD	25mg/l
Total Nitrogen(as N)	>80% Removal or 15 mg/l
Total Phosphorus (as P)	>80% Removal or 2 mg/l

These limits will be subject to all discharges being compatible with estimated assimilation capacity of the receiving waters which is understood to be currently the case (See Chapter 4.4 of the main EIS document.)

## **5.3. REDUCTION OR ELIMINATION OF POTENTIAL CONTAMINATION OF THE STREAMS WITH OTHER SUBSTANCES ASSOCIATED WITH THE PEAT HARVESTING PROCESS**

- i. Fuels, lubricants and hydraulic fluids for equipment used on the peat harvesting sites are and will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
- ii. Fuelling and lubrication of equipment are and will be carried out in specially bunded areas.

- iii. An adequate supply of containment booms and or suitable absorbent material (spill kits) are and will be maintained in storage on site at all times.
- iv. Absorbent materials (spill kits) are and will to be held on standby in all instances of refuelling.
- v. A visual inspection is and will be completed every week to ensure that there is no evidence of fuel contamination in silt ponds or outlets.
- vi. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and properly disposed of.
- vii. Waste oils and hydraulic fluids are and will be collected in leak-proof containers and removed from the site for disposal or re-cycling.
- viii. A bi-annual inspection are and will be carried out of all transported fuelling systems to record any damages leaks or flaws that could result in an accidental spillage.
- ix. All pumps using fuel or containing oil will be locally and securely banded when situated within 25m of waters or when sited such that taking account of gradient and ground conditions there is the possibility of discharge to waters.
- x. Foul drainage from site offices etc. is and will continue to be removed to a suitable treatment facility.
- xi. Waste sent off site for recovery or disposal is and will only be conveyed to a licensed waste contractor, and only transported from the site of the activity to the site of disposal in a manner which will not adversely affect the environment.

## 5.4. PROPOSED MONITORING

Proposed monitoring will be as stipulated by the EPA. Parameters analysed should include Total Phosphorus, Ammonia, COD and pH.

Suspended solids pose the most potentially serious threat to aquatic flora and fauna from peat harvesting operations. As most of the potential suspended solids in runoff is likely to be concentrated in brief episodes of unusually heavy rain during the peat harvesting season, standard quarterly or even monthly sampling is unlikely to detect the main episodes of potential suspended solids pollution in an average year. A monitoring system for suspended solids should therefore be put in place which will demonstrate the efficacy of the silt removal measures in episodes of high suspended solids risk.

In this regard Inland Fisheries Ireland in its submission to OES Consulting states: *“The diffuse nature of the catchment and the increased run-off due to drainage of the working areas means that in periods of heavy precipitation plug flows can be significant in terms of run-off into the ponds and overflow across the outflow weirs, in the conditions retention time is more than likely reduced. The potential impact of a once off large scale discharge or a number of smaller scale episodes for up to 67 days is unacceptable in terms of an effect on the aquatic environment, peat siltation and water quality. I would therefore suggest the following: The use of wiped turbidity probe on a daily basis (or permanently deployed with regular maintenance checks) would provide meaning full data and allow for a fast response to any detrimental changes to water quality at pond discharges.”*

It is recommended that in consultation with IFI, a comprehensive monitoring programme will be developed and implemented to ensure that all seasonal factors are accounted for.

A dust monitoring system will be placed on the banks of the Inny River as the area of greatest environmental risk identified on site. Operations on site will be

controlled to meet the dust emission discharge limits of 350mg/m<sup>2</sup>/day which are likely to be stipulated by EPA. Once measurement of dust emissions has commenced a detailed report of monitoring analysis shall be reported to local government agencies on an annual basis.



## **6. CONCLUSIONS /RESIDUAL IMPACTS**

If all existing mitigation measures continue to be fully implemented and new measures as proposed are implemented, the residual impact on aquatic flora, fauna, and fish life will be insignificant.

## **7. NON TECHNICAL SUMMARY**

### **7.1. EXISTING ENVIRONMENT**

In the absence of any mitigation measures (existing or proposed) the water courses which could be potentially affected by the peat harvesting operations which are the subject of this EIS are:

1. The Inny River
2. The Glore River - Tributary of the Inny River
3. The Mayne Stream - Tributary of the Inny River
4. The small watercourse flowing to the south of Lough Bane and traversing the Clonsura site. Referred to in this report as the Clonsura Stream.

The Inny River is part of the Shannon River system and rises in County Meath near the town of Oldcastle and in total drains a catchment area of 1197Km<sup>2</sup>. The river flows from the north-east in a south-west direction from Lough Sheelin into Lough Kinale, into Lough Derravaragh and also into Lough Iron, and finally into Lough Ree and the River Shannon, North of Athlone town. The river is described as being fast flowing and shallow between Oldcastle and Lough Sheelin. From Lough Sheelin, the Inny flows the short distance to Lough Kinale and then meanders slowly through a deep wide channel to Lough Derravaragh. The Inny River was subject to an arterial drainage scheme in the 1960s and the channel has been maintained for drainage purposes by OPW since then.

The Glore River is a small tributary of the Inny River which rises north east of Castlepollard, County Westmeath, and flows for a distance of c.14km through Lough Glore and then in a north westerly direction to the Inny River c.3km upstream of Camagh Bridge.

### 7.1.1. FISHERY VALUE

Inland Fisheries Ireland states: “*The Inny River holds good stocks of brown trout and has good salmonid habitat, it also supports coarse fish populations. The Shannon Salmon Restoration Project is committed to the restoration of sustainable stocks of salmon throughout the Shannon Catchment, the Inny River would be included within this plan.*” The Inny River is also a significant coarse fishery. At least 13 species of fish have been recorded in the Inny River: these are bream (*Abramis brama*), roach (*Rutilus rutilus*), perch (*Perca fluviatilis*), pike (*Esox lucius*), brown trout (*Salmo trutta*), Atlantic salmon (*Salmo salar*), European eel (*Anguilla anguilla*), roach x bream hybrids, gudgeon (*Gobio gobio*), minnow (*Phoxinus phoxinus*), stoneloach (*Barbatula barbatula*), brook lamprey (*Lampetra planeri*) and chub (*Leuciscus cephalus*).

On the basis of the biological water quality and habitat assessments carried out for this EIS adjacent to and downstream of the peat harvesting areas, the entire surveyed section of the Inny River constitutes good coarse fishing waters and fair adult trout habitat. Habitat suitable for trout spawning or as trout nursery areas was almost non-existent in the c.10 km of the Inny channel surveyed. By contrast, the upstream end of the potentially affected section of the Glore River constitutes significant trout habitat with fair–good habitat for adult fish, fair nursery habitat and poor–fair spawning habitat. Further downstream trout nursery and spawning habitat is poor. On the basis of the water quality and habitat quality data it is concluded that the Glore River is likely to constitute a significant trout nursery stream for the adjacent section of the Inny River. It is also possible that the Glore River serves as a trout spawning and nursery area for Loughs Sheelin and Derravaragh. Apart from a very short section of fair trout nursery and spawning habitat, the Mayne stream was found to have no significant fish habitat. Likewise the surveyed section of the Clonsura Stream has no significant fish habitat.

Lough Derravaragh, into which the Inny River flows is described in [www.midlandangling.com/map](http://www.midlandangling.com/map) as having been “*a very noted trout lake from the*

1950's to the 1970's, particularly renowned for its mayfly fishing and wet fly fishing from August to September. Sadly due to drainage, water quality and the introduction of roach, trout stocks have suffered consequently. Today the lake is as well known for its pike angling as it was for its trout. Trout angling is still practiced but sadly only by a few anglers. The lake has seen an increase in its mayfly catches and the September fishing with wetfly has gained more popularity over recent years. Pike angling has been the main attraction to the lake over the past ten years and holds a very impressive record of sizeable pike. It has been a venue for many competitions. The lake also holds a good stock of coarse fish which include roach, bream, bream hybrids and tench." EPA monitoring indicates that there has been a steady improvement in the water quality of Lough Derravaragh over the last 13 years, and the lake is now classified as Oligotrophic with good ecological and physico-chemical status.

#### **7.1.2. ECOLOGICAL VALUE**

Three Habitats Directive aquatic Annex II species are found in the Inny River system:

1. Brook Lamprey (*Lampetra planeri*) which are widespread in the Inny River system.
2. Atlantic Salmon (*Salmo salar*) which were recorded in two survey stretches between Lough Iron and Lough Ree by Maguire *et al* (2011) but are likely to be scarce and localised in the Inny River system.
3. Crayfish (*Austropotamobius pallipes*) which appear to have been absent from the main channel of the Inny River from Lough Kinale to Lough Ree in the last 25 years. On the main channel of the Inny River upstream of Lough Kinale and on many of the tributary streams, crayfish were recorded as recently as 2008. In the case of the Glore River crayfish have been recorded throughout the period 1977 to 2008.

As a significant mixed fishery with populations of three Annex II species, the Inny River is classified as of regional importance for the purposes of the present study. Being an SPA, Lough Derravaragh is classified as of international importance.

The section of the Inny River surveyed for the present EIS has fair habitat quality for crayfish; however no crayfish were recorded in the invertebrate samples, and as stated above there appear to be no records of crayfish from Lough Kinale to Lough Ree (including this section) for the last 25 years. Brook lamprey are known to be present in this section of the Inny River, and good lamprey nursery habitat was found to be widespread in the present survey. As suitable lamprey spawning habitat was not recorded in the Inny River in the present survey, it seems likely that the juvenile lamprey recorded were spawned in suitable habitat in tributary streams or in the Inny upstream of the area surveyed.

The surveyed section of the Inny River is classified as of high local importance.

### **7.1.3. WATER QUALITY**

There is no indication from the biological water quality assessment carried out for the present EIS of a significant impact from the Westland operations on biological water quality in the main channel of the Inny. Nevertheless the presence of deep, soft, highly mobile peaty silt throughout the entire section of the Inny River assessed (i.e. from upstream of the Clonsura peat harvesting area as far downstream as Lough Derravaragh) seems likely to be due to a significant extent to anthropogenic factors. Taking into account the depositing substrate, the invertebrate fauna at all sites assessed (both upstream and downstream of the peat harvesting areas which are the subject of this EIS) merit a Q-rating of Q3-4 indicating slightly polluted conditions. If the Westland operations have contributed at all to the peat/silt in this section of the Inny,

(which cannot be concluded from the results of the present survey), it is clear that this contribution is insufficient to cause perceptible additional impact on biological water quality over and above the impact already caused by activities in the catchment upstream. Likewise biological water quality assessment of the Glore River and the Mayne and Clonsura Streams indicates no difference in biological water quality upstream and downstream of the peat harvesting areas.

## **7.2. POTENTIAL IMPACTS IN THE ABSENCE OF MITIGATION**

In the absence of mitigation measures (including mitigation measures in place), the potential aquatic ecological impacts of the peat harvesting works on aquatic ecology are:

1. Pollution of watercourses with suspended solids. The potential exists for suspended solids pollution to surface waters adjacent to peat harvesting sites via direct runoff from the sites and also via airborne peat dust being blown from the peat harvesting areas during the peat milling, drying, ridging, transport and stockpiling processes.
2. Pollution of watercourses with nutrients associated with suspended solids and in water draining from the peat harvesting area.
3. Pollution of watercourses with other substances such as fuels, lubricants, waste water from site toilet and wash facilities, etc.
4. Hydrological impact due to changes in the flow rates of streams/rivers.

## **7.3. EXISTING AND PROPOSED MITIGATION MEASURES**

To prevent any ecologically significant concentrations of suspended solids, nutrients or other substances associated with the peat harvesting entering

watercourses, a comprehensive suite of measures (most of which are already in place) are presented in this report and in Chapter 4.4 of the EIS.

#### **7.4. PROPOSED MONITORING**

Proposed monitoring will be as stipulated by the EPA. Parameters analysed should include Suspended Solids, Total Phosphorus, Ammonia, COD and pH.

Suspended solids pose the most potentially serious threat to aquatic flora and fauna from peat harvesting operations. As most of the potential suspended solids in runoff is likely to be concentrated in brief episodes of unusually heavy rain during the peat harvesting season, a monitoring system for suspended solids will therefore be put in place which will demonstrate the efficacy of the silt removal measures in episodes of high suspended solids risk.

A dust monitoring system will be placed on the banks of the Inny River. Operations on site will be controlled to meet the dust emission discharge limits of 350mg/m<sup>2</sup>/day which is likely to be stipulated by EPA.

#### **7.5. CONCLUSIONS /RESIDUAL IMPACTS**

If all existing mitigation measures continue to be fully implemented and new measures as proposed are implemented, the residual impact of on-going peat harvesting operations on aquatic flora, fauna, and fish life will be insignificant.

## 8. REFERENCES

**Bagliniere J.L. & Champigneulle A. (1986)** Population estimates of juvenile Atlantic salmon (*Salmo salar*,) as indices of smolt production in the Scorff River, Brittany, France. *Journal of Fish Biology* 29, 4, 467–482.

**Bjorn T.C. & Reiser D.W. (1991)** Habitat requirements of salmonids in streams. In: Meehan WR (ed). *Influences of forest management on salmonid fishes & their habitats*. American Fisheries Society, Bethesda.

**Bowman, J.J., McGarrigle, M.L. and Clabby, K.J. (1993)** Lough Derg - An investigation of eutrophication and its causes. Part 1 Water quality assessment, nutrient sources, conclusions and recommendations. A report to the Lough Derg Working Party, Environmental Research Unit.

**Chilibeck, B., G. Chislett, and G. Norris (1992)** Land development guidelines for the protection of aquatic habitat. Department of Fisheries and Oceans, Canada. Habitat management division. Ministry of Environment Lands and Parks. Integrated Management Branch.

**Clabby, K.J, L. Lucey & M.L. McGarrigle (2006)** Interim Report on the Biological Survey of River Quality - Results of the 2005 Investigations. Environmental Protection Agency.

**Demers, A., J. Lucey, M. L. McGarrigle & J. D. Reynolds (2005)** The Distribution of the White-clawed Crayfish, *Austropotamobius pallipes*, in Ireland. *Biology & Environment: Proceedings of the Royal Irish Academy*, Vol. 105B, No. 2, 65-69

**Demers, A. and Reynolds, J.D. (2002)** A survey of the white-clawed crayfish, *Austropotamobius pallipes* (Lereboullet), and of water quality in two catchments of eastern Ireland. *Bulletin Francais de la Peche et de la Pisciculture* 367, 720-740.



**Demers, A. and Reynolds, J.D. (2003)** The distribution of the white-clawed crayfish, *Austropotamobius pallipes*, in eight catchments in Ireland in relation to water quality. In D.M. Holdich and P.J. Sibley. (eds), Management and Conservation of Crayfish, 94-103. Proceedings of a conference held on 7<sup>th</sup> November, 2002. Bristol. Environment Agency.

**Environment Agency (2007)** Coarse Fish Biology and Management. National Coarse Fisheries Centre. Environment Agency

**EPA (2002)** *Guidelines on the information to be contained in environmental impact statements*. Environmental Protection Agency Wexford.

**Fitzsimons, M. & Igoe, F. (2004)** Freshwater Fish Conservation in the Irish Republic: A review of pressures and legislation impacting on conservation efforts. *Biology & Environment: Proceedings of the Royal Irish Academy*, Vol. 104B, No. 3, 17-32

**Forest Service (2008)** Forestry and Freshwater Pearl Mussel Requirements Site Assessment and Mitigation Measures. Department of Agriculture, Fisheries and Food

**Haury J., Baglinière J.L. & Maisse G. (1995)** Analysis of spatial and temporal organisation in a salmonid brook in relation to physical factors and macrophytic vegetation. *Hydrobiologia* 300/301, 269–277.

**Heggenes J. (1990)** Habitat utilisation and preferences in juvenile Atlantic salmon (*Salmo salar*) in streams. *Regulated Rivers Research & Management* 5, 341–354.

**Hendry K. & Cragg-Hine D. (1997)** *Restoration of riverine salmon habitats*. Fisheries Technical Manual 4 Environment Agency, Bristol.

**Holdich, D. (2003)** Ecology of the White-clawed crayfish. Conserving Natura 2000 rivers. Ecology Series No. 1. English Nature.

**Holdwright, C. (2008)** Preliminary Report on Peat Siltation in the Inny River. Shannon Regional Fisheries Board.

**The Central & Regional Fisheries Boards (2009)** Sampling Fish for the Water Framework Directive – Rivers 2008. The Central and Regional Fisheries Boards.

**Kelly, F.L., Matson, R., Connor, L., Feeney, R., Morrissey, E., Wogerbauer, C. and Rocks, K. (2012)** Water Framework Directive Fish Stock Survey of Rivers in the Shannon International River Basin District. Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin, Ireland.

**King J.J., Lordan M., & Wightman G.D. (2008)** Ecological Impact Assessment (EclA) of The Effects of Statutory Arterial Drainage Maintenance Activities on Whiteclawed Crayfish (*Austropotamobius pallipes*). Series of Ecological Assessments on Arterial Drainage Maintenance No 10 Environment Section, Office of Public Works, Headford, Co. Galway.

**Lordan, M., Wightman G.D. and King J.J. (2008)** Impacts of OPW's Channel Maintenance Programme on the status and distribution of crayfish (2005-2007): Technical Report to OPW Environment Unit.

**Lucey, J. & McGarrigle, M. (1987)** The distribution of the crayfish *Austropotamobius pallipes* (Lereboullet) in Ireland Irish Fisheries Investigations Series A (Freshwater) No. 29 Roinn na Mara (Department of the Marine).

**Maguire, C., K. Gallagher, C. Maggs, J. Dick, J. Caffrey, C. O'Flynn, U. Fitzpatrick, John. Kelly & C. Harrod (2011)** Ecological implications of the invasion of chub (*Leuciscus cephalus*) in the Inny River. STRIVE End of Project Report Prepared for the Environmental Protection Agency by School of

Biological Sciences, Queen's University, Belfast, Inland Fisheries Ireland, National Biodiversity Data Centre & Envirocentre. Environmental Protection Agency

**Maitland P.S. (2003)** Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

**McGarrigle M. & Kilmartin, L. (1992)** UV-Sensitive Phosphate in Irish Peaty Waters. A Study of Potential Effects on Freshwater Ecosystems. Environmental Research Unit.

**McGarrigle M., Lucey, J. and Ó Cinnéide, M. (2010)** Water Quality in Ireland 2007-2009. Aquatic Environment Office of Environmental Assessment Environmental Protection Agency.

**Mills D. (1989)** *Ecology and Management of Atlantic Salmon*. Chapman and Hall, London.

**NRA (2006)** Guidelines for assessment of ecological impacts of national road schemes. National Roads Authority.

**O'Reilly, P. (2002)** Rivers of Ireland – A Flyfisher's Guide. Merlin Unwin Books. 5<sup>th</sup> edition.

**Peay, S. (2000)** Guidance on works affecting white-clawed crayfish. Report prepared for English Nature and the Environment Agency.

**Peterson R.H. (1978)** Physical characteristics of Atlantic spawning salmon gravel in some New Brunswick streams. Fisheries and Marine Service Technical Report 785, Fisheries and Environment St Andrews, New Brunswick, Canada.

**Reynolds, J.D. (1988)** Crayfish extinctions and crayfish plague in central Ireland. *Biological Conservation* 45, 279- 285.

**Reynolds J.D. (1998)** Ireland's Freshwaters. Marine Institute

**Shannon International River Basin District Project (2008)** Peatlands Report. Shannon International River Basin District.

<http://www.shannonrbd.com/pdf/peatlandsreportjul08.pdf>

**Solbe, J. (1988)** Water quality for Salmon and Trout. Atlantic Salmon Trust.

**Symons P.E.K. & Heland M (1978)** Stream habitats and behavioural interactions of underyearling and yearling Atlantic salmon. *Journal of the Fisheries Research Board of Canada* 35, 175–183.

**Wankowski J.W.J. & Thorpe J.E. (1979)** Spatial distribution and feeding in Atlantic salmon (*Salmo salar*) juveniles. *Journal of Fish Biology* 14, 3, 239–242.

## **APPENDIX 1**

### **EPA MONITORING DATA**

River and Code: **INNY**

**26101**

Tributary of:

OS Catchment No: 157

OS Grid Ref of confluence: N 115 554

Date(s) Surveyed: 31/12/1971, 31/12/1973, 31/12/1977, 31/12/1981, 31/12/1984, 31/12/1987, 31/12/1992, 31/12/1996, 21/6/1999, 22/6/1999, 23/6/1999, 25/6/1999, 6/7/1999, 7/7/1999, 1/8/2002, 24/7/2002, 25/7/2002, 26/7/2002, 19/7/2005, 20/7/2005, 21/7/2005, 3/8/2005, 30/7/2008, 5/8/2008, 6/8/2008, 7/8/2008, 19/10/2009,

Station Nos.	<i>Biological Quality Ratings (Q Values)</i>														
	1971	1973	1977	1981	1984	1987	1992	1996	1999	2002	2005	2008	2009	2011	
0060	-	-	-	-	-	4	3	3	3	3	3	-	-	-	
0100	-	-	-	3-4	3-4	4	4	3-4	3-4	-	-	3-4	-	3-4	
0200	4	4	4	4	4	3-4	3-4	3-4	3	3	3	3-4*	-	3-4	
0300	-	-	-	4	4-5	4	3-4	4	3	3	3-4	3-4	-	4	
0400	-	-	-	4	4	4	-	-	-	-	-	-	-	-	
0500	3-4	3-4	4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	-	3	
0550	-	-	-	-	4	4	-	-	-	-	-	-	-	-	
0600	-	-	4-5	4-5	4-5	4	3-4	3-4	-	3-4*	3-4	-	-	3-4	
0650	4	4	-	5	4-5	4-5	-	-	-	-	-	-	-	-	
0700	-	-	-	-	-	-	3	3-4	3-4	4	3-4	3	-	4	
0750	-	-	-	-	-	-	3-4	3-4	3-4	4	3-4	-	-	-	
0800	4	4-5	4	4	4-5	4	3-4	4	4	3-4	4	4	-	4	
0900	-	5	4	4	5	4	4	4-5	4	4	3-4	-	-	-	
1000	5	4	4-5	5	4-5	5	3-4	4	4	3-4	4	4	-	4	
1080	-	-	-	-	-	5	4	-	-	-	-	-	-	-	
1120	-	-	-	-	4-5	5	-	-	-	-	-	-	-	-	
1150	-	-	-	-	-	5	3-4	4	3-4	3-4	3-4	3-4	-	4	
1200	4	4-5	4-5	4-5	4-5	5	3-4	4	4	4	4	-	-	-	
1300	-	-	-	4	4-5	4-5	4	-	-	-	-	-	-	-	
1320	-	-	-	-	4-5	4-5	-	3-4	-	-	-	-	-	-	
1350	4-5	4-5	4-5	4-5	4-5	4-5	4-5	3-4	4	4	4	-	4	4-5	
1400	-	-	-	4-5	4-5	5	4	3-4	4	4	4	-	-	-	

**Assessment:** Good ecological condition was found at six out of ten sites surveyed on the Inny in 2011, a major improvement on the 2008 survey results. The two uppermost sites, upstream of Lough Sheelin, are not reaching their ecological potential, with sensitive macroinvertebrate taxa noticeably absent. A welcome improvement in quality at 0300 (Ballinrink Br) was followed by unsatisfactory conditions at both Finnea and Camagh Bridges respectively (0500 and 0600). The lower reaches, and downstream of Lough Derravaragh to Shrule Br (1350), exhibited high macroinvertebrate diversity and a range of sensitive taxa . . .

<b>Station No.</b>	<b>Station Location</b>	<b>National X</b>	<b>Grid Ref. Y</b>	<b>Discovery Series No.</b>	<b>County Code</b>
0060	Br NW of Ballinvally	257704	279699	42	MH
0100	Tubride Br	255313	278913	42	MH
0200	Castlecor: 1st Br d/s St 0100	253085	280590	35	MH
0300	Ballinrink Br	249453	280948	34	MH
0400	Ross Br	247288	283030	34	MH
0500	Finnea Br	240186	281418	34	MH
0550	2 km d/s Lough Kinale	0	0	34	MH
0600	Camagh Br	239178	275596	41	MH
0650	Float Br	0	0	41	MH
0700	Br nr Shrubbywood	238727	270002	41	MH
0750	Inny Br d/s L Derravaragh	238967	266647	41	MH
0800	Ballinalack Br	234778	264602	41	MH
0900	Ballycorkey Br	231186	263939	41	MH
1000	Ballynacarrow Br	225822	260253	41	MH
1080	300 m u/s Abbeyshrle Br	0	0	41	LD

1120	500 m d/s Abbeyshrule Br	0	0	41	LD
1150	Clynan or New Br	221488	258628	41	LD
1200	Newcastle Br	218321	256960	41	LD
1300	Ballymahon Br	0	0	41	LD
1320	500 m d/s Ballymahon Br	215218	256464	41	LD
1350	Shrule Br	213497	255897	41	LD
1400	Red Br	211880	255083	40	MH

River and Code: **GLORE (WESTMEATH)**

**26G02**

Tributary of: 26I01 INNY

OS Catchment No: 157

OS Grid Ref of confluence: N 483 722

Date(s) Surveyed: 31/12/1977, 31/12/1981, 31/12/1984, 31/12/1987, 31/12/1992, 31/12/1996, 7/7/1999, 9/7/2002, 20/7/2005, 31/7/2008, 6/8/2008, 21/6/2011

Station Nos.	<i>Biological Quality Ratings (Q Values)</i>										
	1977	1981	1984	1987	1992	1996	1999	2002	2005	2008	2011
0100	-	5	3-4	4	3-4	4	3-4	3-4	3	3	3
0200	4	4-5	4-5	4	4	4-5	4-5	4-5	4	3-4	4-5

**Assessment:** The Glore (Westmeath) was once again found to be slightly polluted/eutrophic below Glore lake (0100), as characterised by excessive siltation and a paucity of sensitive macroinvertebrate fauna. By contrast, the lower reaches (0200) showed a welcome return to highly satisfactory ecological condition in 2011 . -

<b>Station No.</b>	<b>Station Location</b>	<b>National X</b>	<b>Grid Ref. Y</b>	<b>Discovery Series No.</b>	<b>County Code</b>
0100	Stonestown Br	247404	272797	41	MH
0200	Br at Rockbrook	244407	274188	41	MH

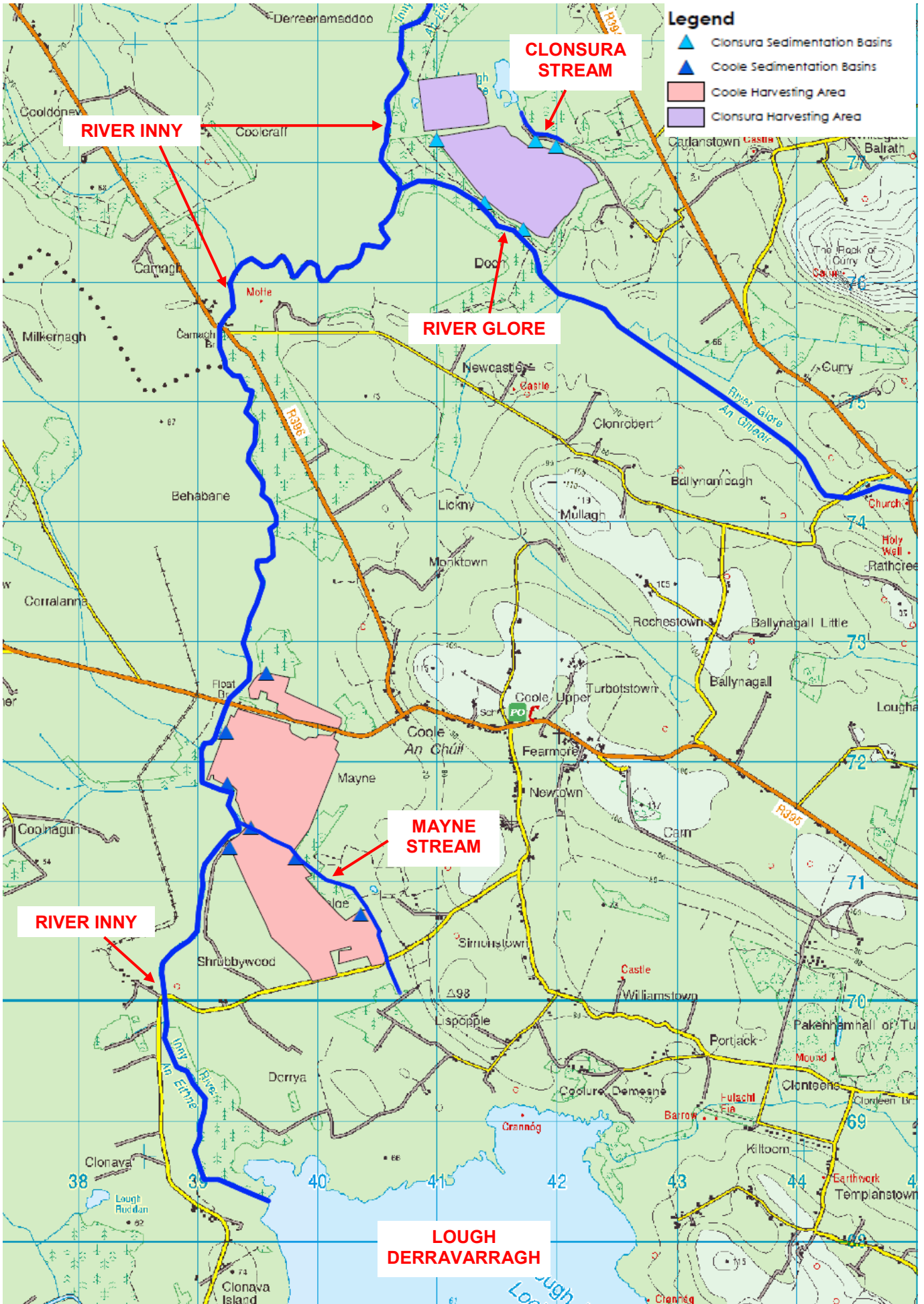
<b>Station No.</b>	<i>Site Altitude and Upstream Catchment Characteristics (where available):</i>										
	<b>Alt</b>	<b>Area</b>	<b>Sil</b>	<b>Cal</b>	<b>Pasture</b>	<b>Forestry</b>	<b>Bogs</b>	<b>Urban</b>	<b>Misc Ag.</b>	<b>Water</b>	<b>Other</b>
0100	78	20	0	100	84	2	0	0	5	1	8
0200	69	37	0	100	91	1	0	0	3	1	4

## **APPENDIX 2**

### **MAPS**

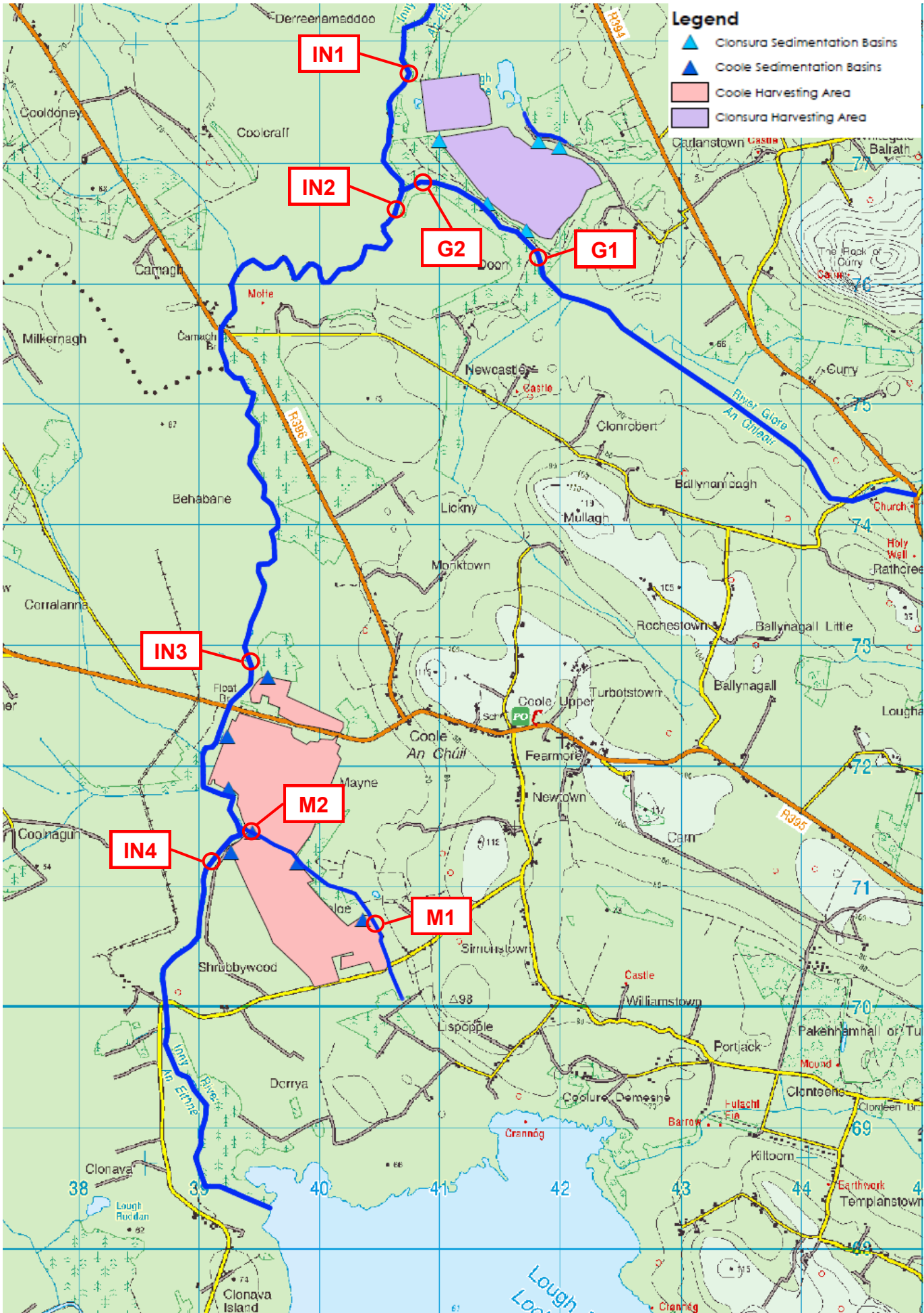


# MAP 1 POTENTIALLY AFFECTED STREAMS/RIVERS



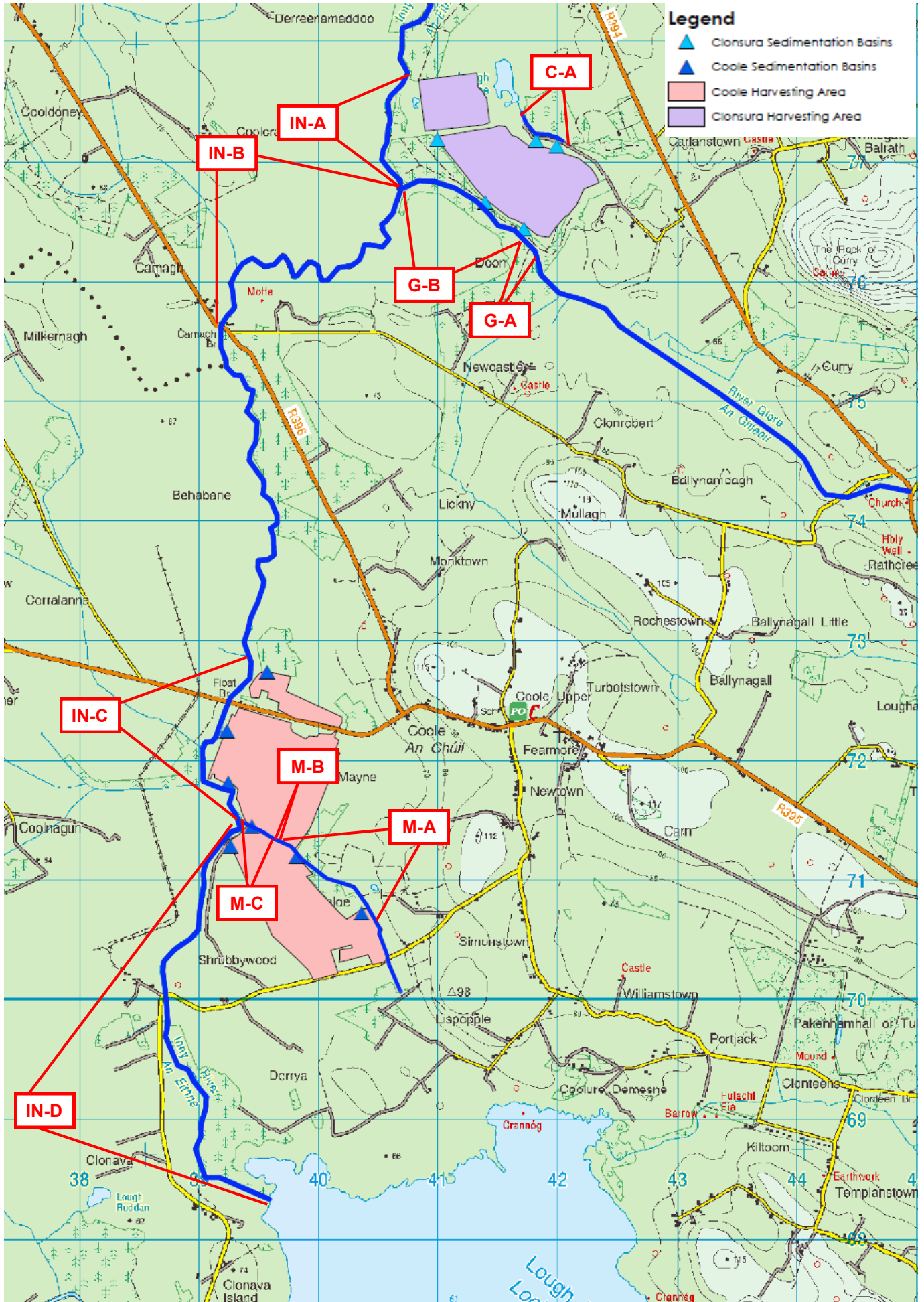
# MAP 2 LOCATION OF BIOLOGICAL ASSESSMENT SITES

Locations shown are approximate; for exact locations, see Grid References in text



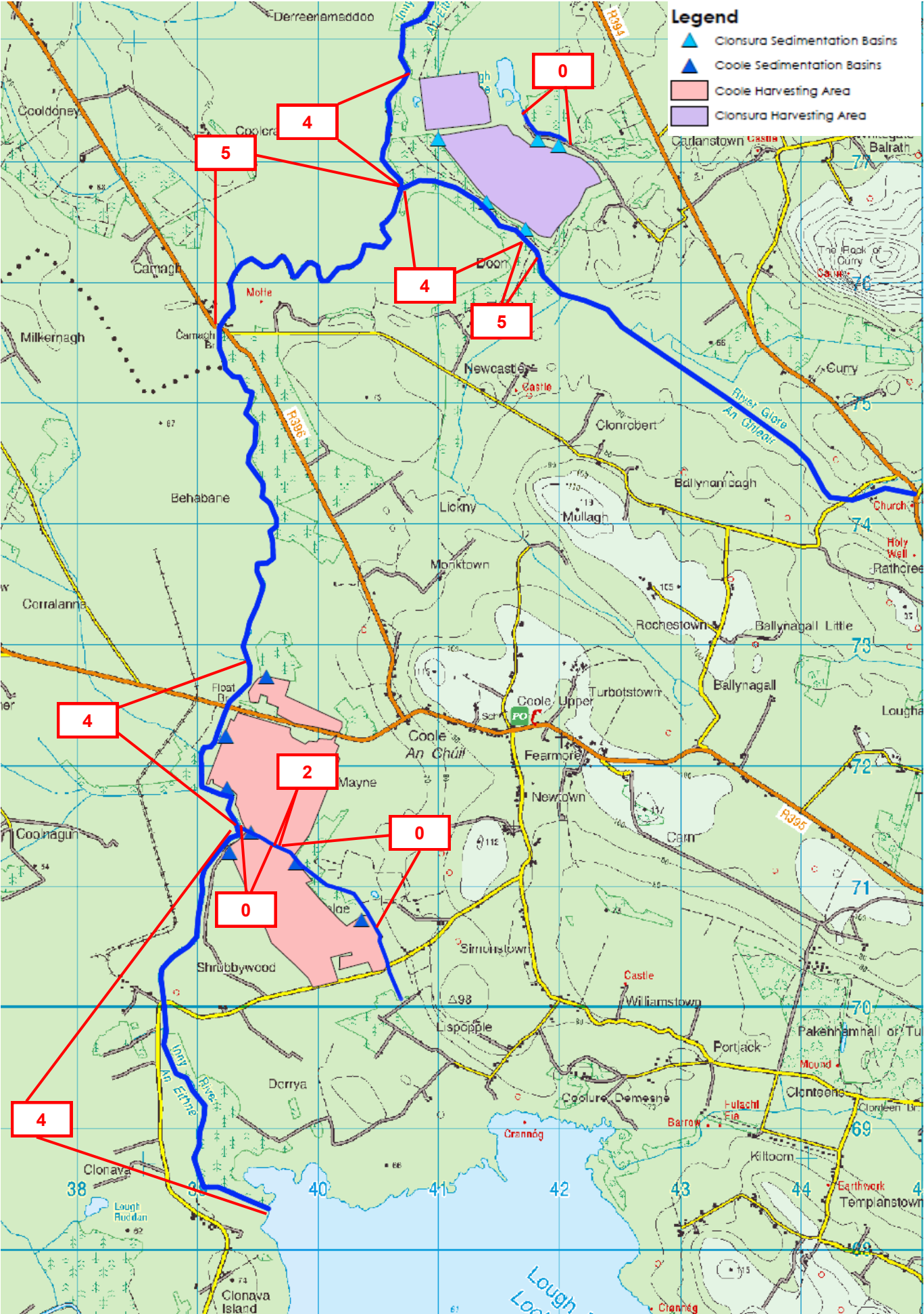
### MAP 3 LOCATION OF HABITAT SECTIONS

Locations shown are approximate; for exact locations, see Grid References in text



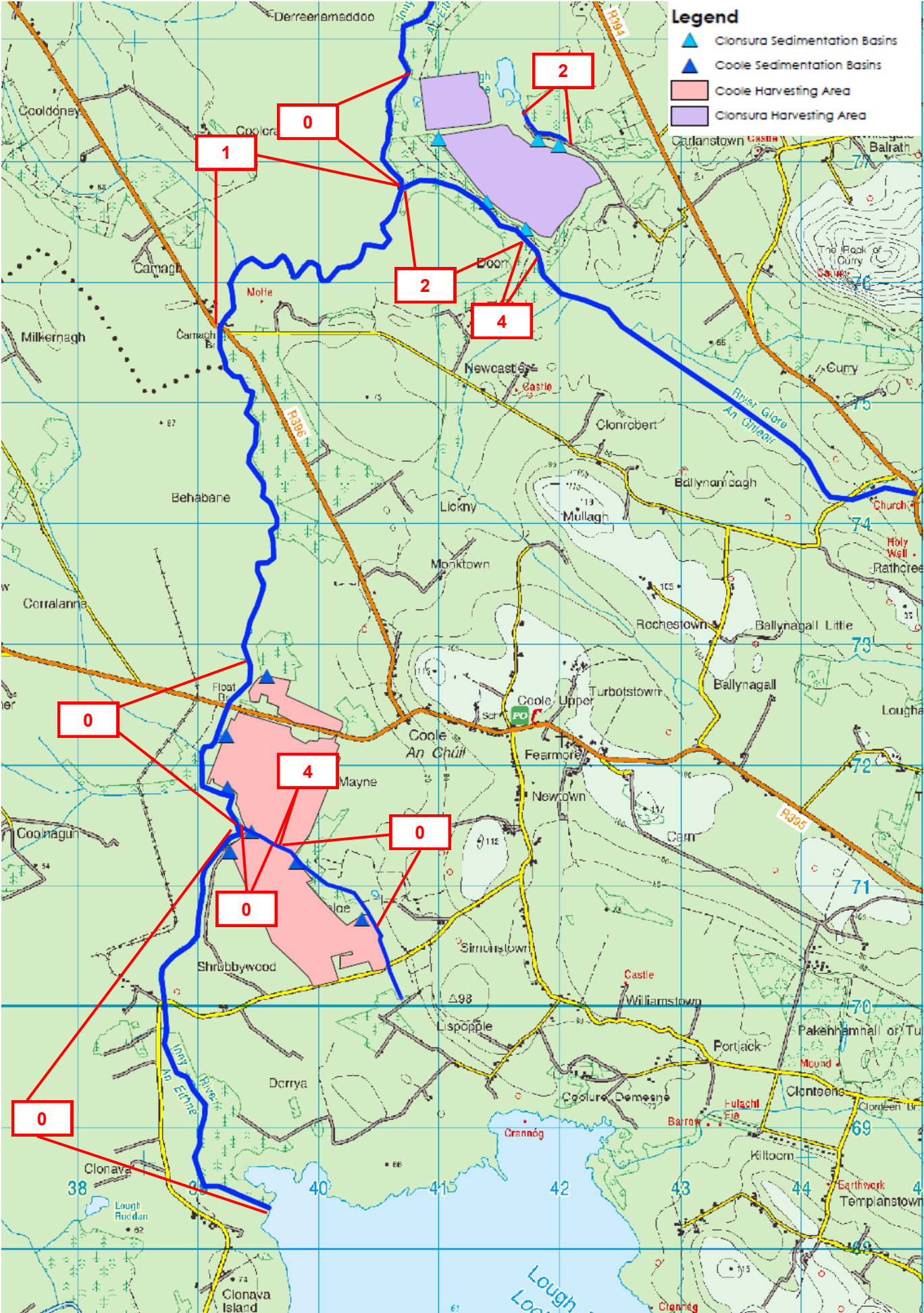
# MAP 4 SALMONID ADULT HABITAT

Rated on a scale of 0=None 2=Poor 4=Fair 6=Good 8=V.Good 10=Excellent



# MAP 5 SALMONID NURSERY HABITAT

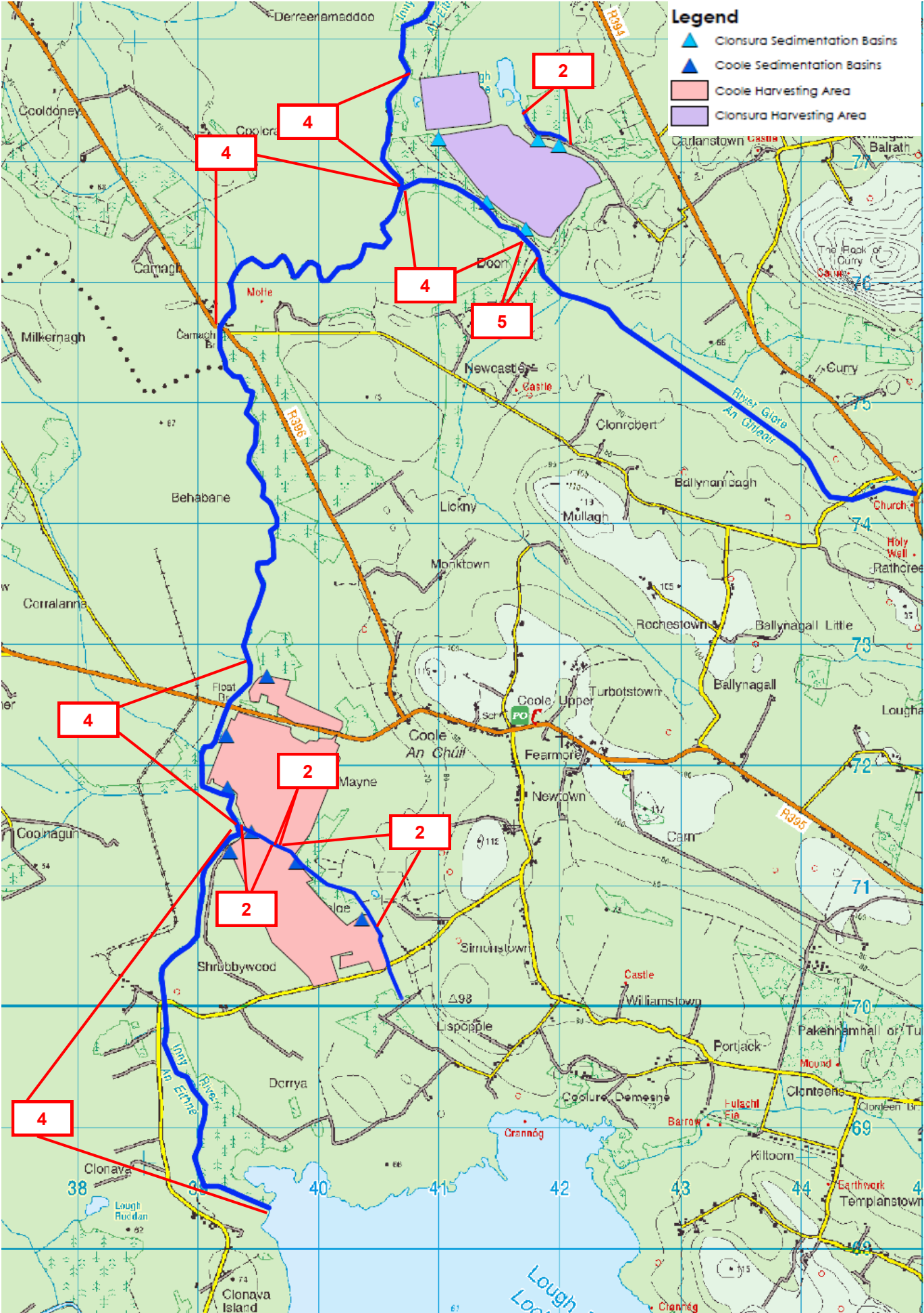
Rated on a scale of 0=None 2=Poor 4=Fair 6=Good 8=V.Good 10=Excellent





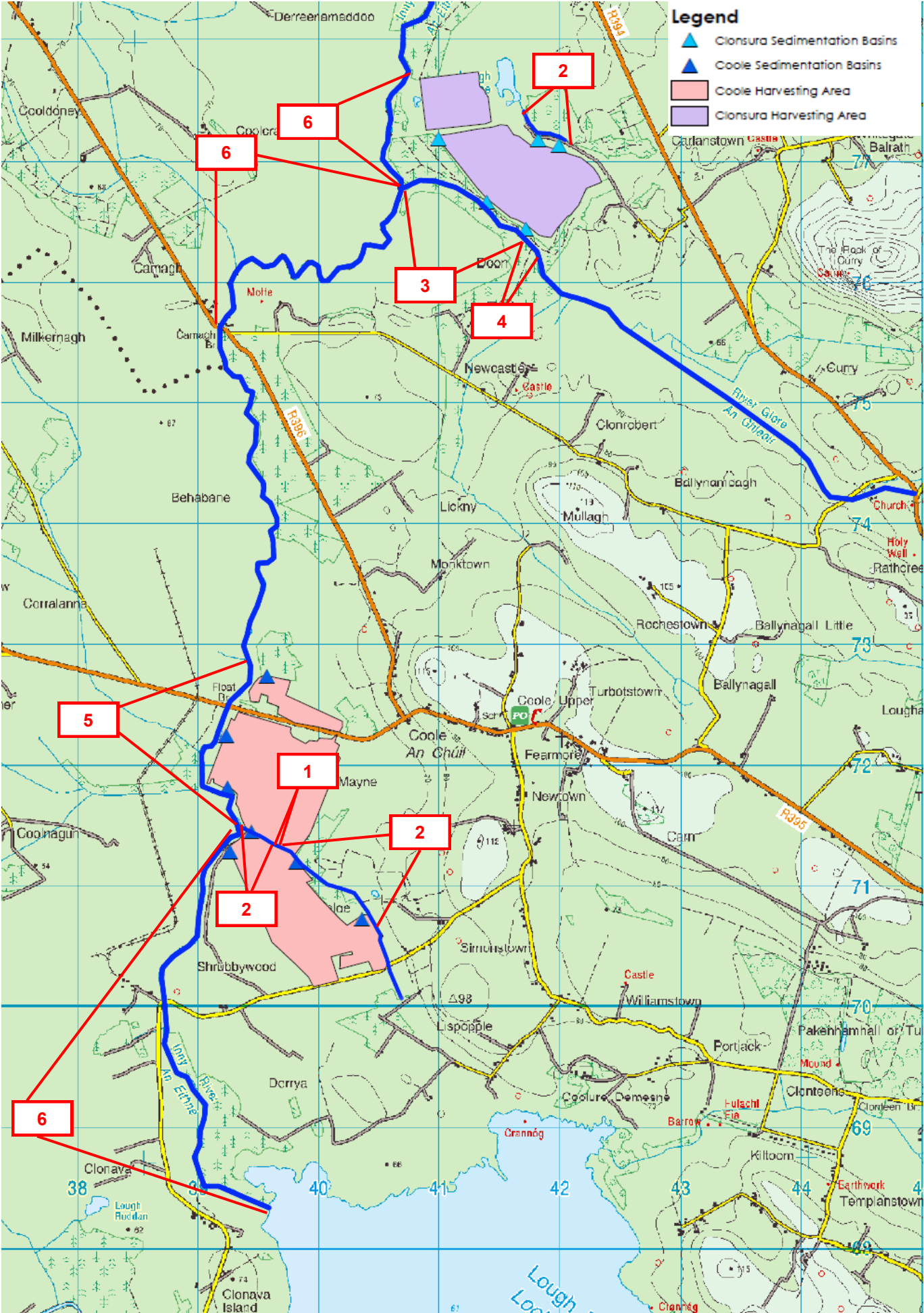
# MAP 7 CRAYFISH HABITAT

Rated on a scale of 0=None 2=Poor 4=Fair 6=Good 8=V.Good 10=Excellent



# MAP 8 LAMPREY NURSERY HABITAT

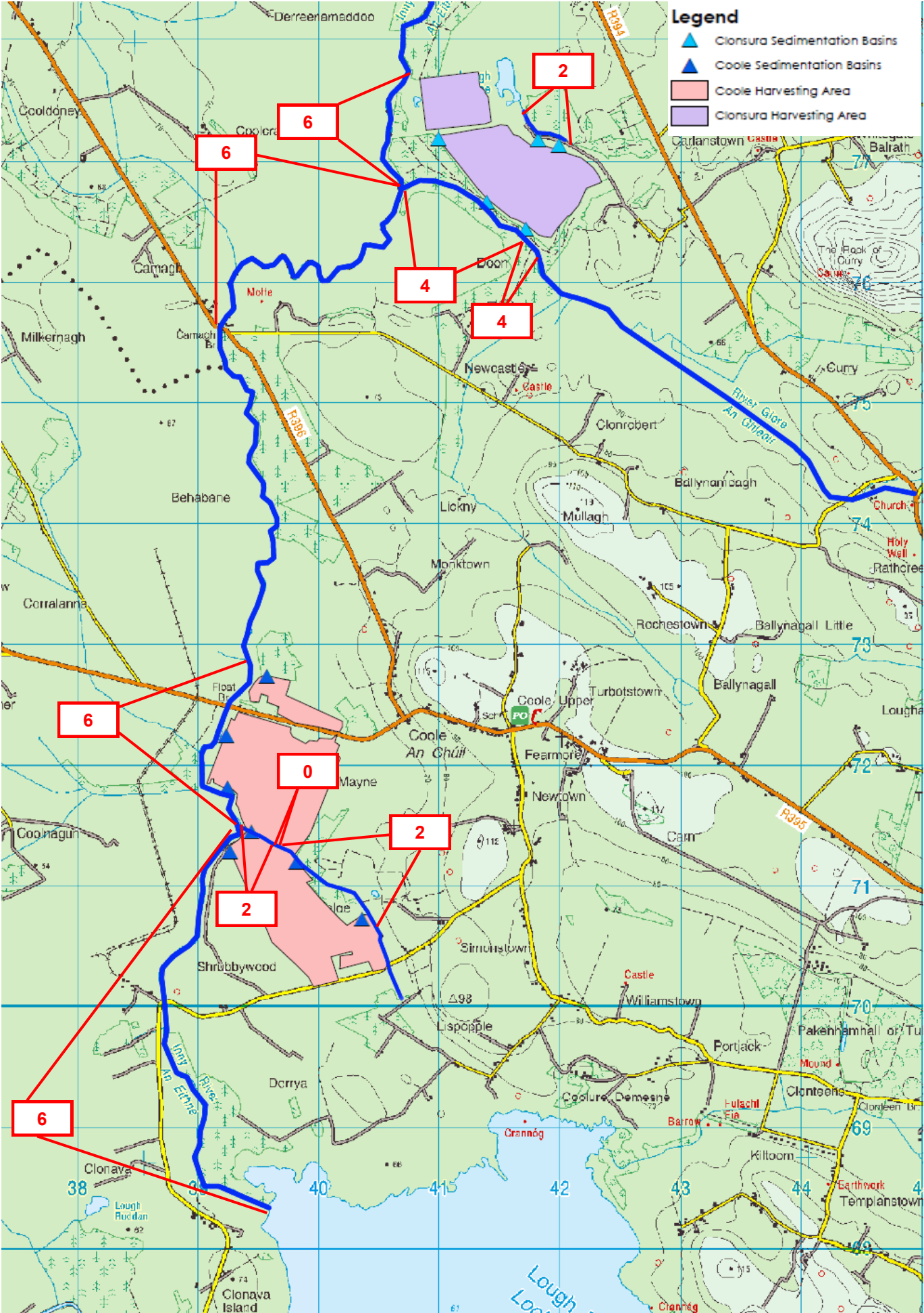
Rated on a scale of 0=None 2=Poor 4=Fair 6=Good 8=V.Good 10=Excellent



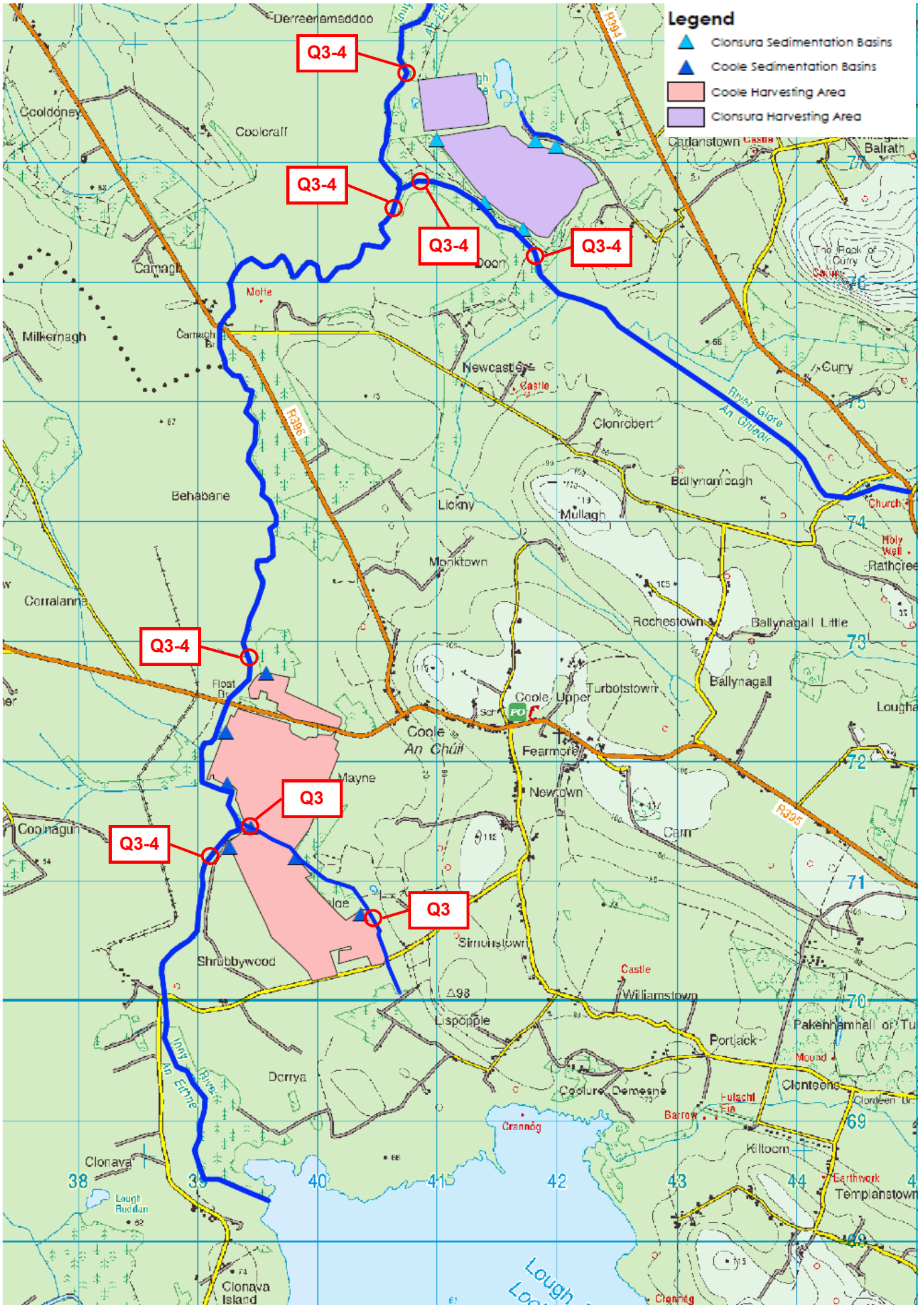


# MAP 9 COARSE FISH HABITAT

Rated on a scale of 0=None 2=Poor 4=Fair 6=Good 8=V.Good 10=Excellent



# MAP 10 BIOLOGICAL WATER QUALITY



# Attachment 6 - Water Monitoring Results

Water Quality at Bridge Near Shrubbywood

StationName	StationLocalCode	SamplePurpose	SampleLabCode	SampleDate	CompletionDate	Northing	Ammonia(N)	BOD	Ortho-Phosphate (P)
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07960005	09/01/2007	13/02/2007	270002	0.072	1.7	0.039
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07960141	07/02/2007	04/12/2007	270002	0.056	2.2	0.016
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07960243	07/03/2007	04/12/2007	270002	0.065	2.3	0.007
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07960369	02/04/2007	04/12/2007	270002	0.06	2.2	0.007
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07960517	30/04/2007	04/02/2008	270002	0.057	1.6	0.004
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07960650	30/05/2007	04/02/2008	270002	0.019	1.8	0.002
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07960827	02/07/2007	04/02/2008	270002	0.051	1.7	0.003
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07961008	07/08/2007	04/02/2008	270002	0.05	1.2	0.015
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07961193	06/09/2007	04/02/2008	270002	0.022	0.8	0.006
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07961401	16/10/2007	04/02/2008	270002	0.06	1.16	0.006
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	07961531	20/11/2007	04/02/2008	270002	0.245	2.64	0.021
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08960012	09/01/2008	20/02/2009	270002	0.068	2.04	0.021
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08960203	07/02/2008	20/02/2009	270002	0.069	3.47	0.012
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08960347	05/03/2008	20/02/2009	270002	0.047	2.22	0.004
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08960660	22/04/2008	20/02/2009	270002	0.041	1.94	0.004
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08960870	05/06/2008	20/02/2009	270002	0.077	1.8	0
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08961084	07/07/2008	20/02/2009	270002	0.162	3	0.023
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08961259	07/08/2008	20/02/2009	270002	0.062	1.1	0.011
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08961471	08/09/2008	20/02/2009	270002	0.054	1.25	0.01
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08961649	06/10/2008	20/02/2009	270002	0.066	1.45	0.011
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08961802	05/11/2008	16/01/2009	270002	0.057	1.45	0.013
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	08961942	03/12/2008	16/01/2009	270002	0.088	0.89	0.015
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09960030	07/01/2009	20/02/2009	270002	0.074	0.46	0.017
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09960255	04/02/2009	03/10/2009	270002	0.107	1.08	0.019
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09960565	02/03/2009	23/04/2009	270002	0.049	1.33	0.005
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09960843	31/03/2009	20/05/2009	270002	0.055	1.67	0.003
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09961045	05/05/2009	07/01/2009	270002	0.077	1.67	0.005
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09961258	02/06/2009	07/02/2009	270002	0.052	1.75	0.005
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09961524	01/07/2009	08/04/2009	270002	0.062	0.23	0.004
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09961759	04/08/2009	11/06/2009	270002		1.05	BLD
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09962007	01/09/2009	11/06/2009	270002	0.055	1.55	0.012
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09962259	05/10/2009	11/06/2009	270002	0.022	0.98	0.005
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09962433	02/11/2009	04/06/2010	270002	0.085	2.02	0.026
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	09962670	01/12/2009	04/06/2010	270002	0.057	0.22	0.012
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	10960005	04/01/2010	04/06/2010	270002	0.077	1.18	0.011
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	10960254	02/03/2010	04/06/2010	270002	0.047	0.17	0.003
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	10960413	06/04/2010	07/07/2010	270002	0.081	3.14	0.026
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	10960554	05/05/2010	07/07/2010	270002	0.038	1.53	BLD
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	10960671	01/06/2010	07/07/2010	270002	0.031	1.69	0.002
0700 - Bridge near Shrubbywood	700	WFD Programme - Shannon RBD	1096206	18/02/2010	04/06/2010	270002	0.061	1.5	0.011
<b>95%ile</b>							0.1125	3.0070	0.026
<b>Mean</b>							0.066	1.58	0.011



Coole No.1	14/04/2010		58	<10	3.7	0.03			320
Coole No.2	14/04/2010		61	<10	3.3	0.03			310
Coole No.3	14/04/2010		60	<10	3.3	0.04			330
Coole No.4	14/04/2010		68	<10	3.5	0.04			320
Coole No.5	14/04/2010		68	<10	0.07	0.07			320
Coole No.6	14/04/2010		60	<10	3.3	0.03			320
Coole No.7	14/04/2010								
<b>Min</b>			<b>58</b>		<b>0.07</b>	<b>0.03</b>			<b>310</b>
<b>Max</b>			<b>68</b>		<b>3.7</b>	<b>0.07</b>			<b>330</b>
<b>Average</b>			<b>62.5</b>		<b>2.86</b>	<b>0.04</b>			<b>320</b>
<b>Overall</b>	<b>Min</b>	<b>1.00</b>	<b>24.00</b>	<b>1.00</b>	<b>0.07</b>	<b>0.03</b>	<b>6.60</b>	<b>&lt;0.01</b>	<b>68.00</b>
	<b>Max</b>	<b>14.29</b>	<b>114.00</b>	<b>16.80</b>	<b>4.50</b>	<b>0.30</b>	<b>7.70</b>	<b>&lt;0.01</b>	<b>650.00</b>
	<b>Average</b>	<b>7.43</b>	<b>63.52</b>	<b>5.05</b>	<b>1.86</b>	<b>0.09</b>	<b>7.18</b>	<b>&lt;0.01</b>	<b>292.37</b>

Table B: Clonsura Site

Location	Date	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	Ammonia NH3-N (mg/l)	Phosphorus Total (mg/l)	pH (pH Units)	Settleable Solids (mg/l)	Colour (PtCo)
Clonsura 1	15/09/2011	6	26	7.6	0.19	0.07	7.4	<0.01	77
Clonsura 2	15/09/2011	6	29	13.6	0.22	0.11	7.3	<0.01	90
Clonsura 3	15/09/2011	5	19	11.2	0.1	0.11	7.2	<0.01	44
Clonsura 4	15/09/2011	4.5	34	10.8	0.28	0.07	6.9	<0.01	100
<b>Min</b>		<b>4.50</b>	<b>19.00</b>	<b>7.60</b>	<b>0.10</b>	<b>0.07</b>	<b>6.90</b>		<b>44.00</b>
<b>Max</b>		<b>6.00</b>	<b>34.00</b>	<b>13.60</b>	<b>0.28</b>	<b>0.11</b>	<b>7.40</b>		<b>100.00</b>
<b>Average</b>		<b>5.38</b>	<b>27.00</b>	<b>10.80</b>	<b>0.20</b>	<b>0.09</b>	<b>7.20</b>		<b>77.75</b>
Clonsura 1	29/10/2010	1.5	82	0.8	4	0.02	5.8		372
Clonsura 2	29/10/2010	1.5	80	1.6	4.1	0.04	5.6		367
Clonsura 3	29/10/2010	2	80	2.8	4	0.04	5.4		365
Clonsura 4	29/10/2010	1.5	83	2	4.1	0.04	5.4		363
<b>Min</b>		<b>1.50</b>	<b>80.00</b>	<b>0.80</b>	<b>4.00</b>	<b>0.02</b>	<b>5.40</b>		<b>363.00</b>
<b>Max</b>		<b>2.00</b>	<b>83.00</b>	<b>2.80</b>	<b>4.10</b>	<b>0.04</b>	<b>5.80</b>		<b>372.00</b>
<b>Average</b>		<b>1.63</b>	<b>81.25</b>	<b>1.80</b>	<b>4.05</b>	<b>0.04</b>	<b>5.55</b>		<b>366.75</b>
<b>Overall</b>	<b>Min</b>	<b>1.50</b>	<b>19.00</b>	<b>0.80</b>	<b>0.10</b>	<b>0.02</b>	<b>5.40</b>	<b>&lt;0.01</b>	<b>44.00</b>
	<b>Max</b>	<b>6.00</b>	<b>83.00</b>	<b>13.60</b>	<b>4.10</b>	<b>0.11</b>	<b>7.40</b>	<b>&lt;0.01</b>	<b>372.00</b>
	<b>Average</b>	<b>3.50</b>	<b>54.13</b>	<b>6.30</b>	<b>2.12</b>	<b>0.06</b>	<b>6.38</b>	<b>&lt;0.01</b>	<b>222.25</b>

**Customer Contact:** David Broderick  
**Customer:** Hydro Environmental Services Ltd  
**Customer Address:** 22 Main Street  
Dungarvan  
Co Waterford



**Report Reference:** 13-03366-  
**Report Version:** 1

**Report Date:** 10/07/2013

**Customer PO No.:** P1221  
**Chain of Custody No.:** 16174

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## Certificate Of Analysis

Analysis of 10 sample(s) submitted on 26/06/2013 is now complete.  
We have the pleasure of enclosing your certificate of analysis.

Should you have any queries regarding the report or require any further services, we would be happy to discuss your requirements. For additional information about the company please log-on to our web site at the above address.

Thank you for choosing City Analysts Limited. We look forward to assisting you again.

**Authorised By:**

  
\_\_\_\_\_  
Melissa Brady

**Date:** 10/07/2013

**Note:** Information on methods of analysis and performance characteristics is available on request.

Note: Results relate only to the items tested.

Test report shall not be reproduced except in full or with written approval of City Analysts Ltd.

Template 1146  
Revision 015

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Co Waterford

**Report Reference:** 13-03366-

**Report Version:** 1

**Date Received:** 26/06/2013



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**Sample Description:** Coole S.B. 6

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155810

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	0.220	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.038	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	3.11	mg/l	-	INAB
D/1049	26/06/2013	TSS	2	mg/l	-	INAB
D/1009	27/06/2013	COD	101	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total Viable Count

PV Value is the parametric value, taken from European Communities, (Drinking Water) (No. 2) Regulations, 2007. S.I. No. 278 of 2007, and relates only to drinking water samples.

Site D = Analysed at City Analysts Dublin. Site L = Analysed at City Analysts Limerick



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**Sample Description:** Coole S. B. 3

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155811

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	0.110	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.057	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	1.07	mg/l	-	INAB
D/1049	26/06/2013	TSS	3	mg/l	-	INAB
D/1009	27/06/2013	COD	84	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

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TVC - Total Viable Count

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**Sample Description:** Coole S. B 4

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155812

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	08/07/2013	Phosphorus, total as P	0.110	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.031	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	1.77	mg/l	-	INAB
D/1049	26/06/2013	TSS	3	mg/l	-	INAB
D/1009	27/06/2013	COD	99	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

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TVC - Total Viable Count

PV Value is the parametric value, taken from European Communities, (Drinking Water) (No. 2) Regulations, 2007. S.I. No. 278 of 2007, and relates only to drinking water samples.

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**Sample Description:** Coole S. B. 1

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155813

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	0.180	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.046	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	<1	mg/l	-	INAB
D/1049	26/06/2013	TSS	5	mg/l	-	INAB
D/1009	27/06/2013	COD	43	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	3	mg/l	-	INAB

**Note:**

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TVC - Total Viable Count

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**Sample Description:** Clonsura S.B. 1

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155814

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	0.100	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.070	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	<1	mg/l	-	INAB
D/1049	26/06/2013	TSS	2	mg/l	-	INAB
D/1009	27/06/2013	COD	45	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

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TVC - Total Viable Count

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**Sample Description:** Clonsura S. B. 3

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155815

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	1.210	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.035	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	3.41	mg/l	-	INAB
D/1049	03/07/2013	TSS	5	mg/l	-	INAB
D/1009	27/06/2013	COD	122	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

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**Sample Description:** R Inny (Downstream)

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155816

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	0.110	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.029	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	<1	mg/l	-	INAB
D/1049	26/06/2013	TSS	3	mg/l	-	INAB
D/1009	27/06/2013	COD	23	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

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TVC - Total Viable Count

PV Value is the parametric value, taken from European Communities, (Drinking Water) (No. 2) Regulations, 2007. S.I. No. 278 of 2007, and relates only to drinking water samples.

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**Sample Description:** R Inny (Middle)

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155817

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	<0.05	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.025	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	<1	mg/l	-	INAB
D/1049	26/06/2013	TSS	2	mg/l	-	INAB
D/1009	27/06/2013	COD	13	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total Viable Count

PV Value is the parametric value, taken from European Communities, (Drinking Water) (No. 2) Regulations, 2007. S.I. No. 278 of 2007, and relates only to drinking water samples.

Site D = Analysed at City Analysts Dublin. Site L = Analysed at City Analysts Limerick

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**Sample Description:** R Inny (Upstream)

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155818

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/1009	27/06/2013	COD	24	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB
D/3001	03/07/2013	Phosphorus, total as P	<0.05	mg/l	-	INAB
D/3000	28/06/2013	Ortho-phosphate as P	0.026	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	<1	mg/l	-	INAB
D/1049	26/06/2013	TSS	4	mg/l	-	INAB

**Note:**

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total Viable Count

PV Value is the parametric value, taken from European Communities, (Drinking Water) (No. 2) Regulations, 2007. S.I. No. 278 of 2007, and relates only to drinking water samples.

Site D = Analysed at City Analysts Dublin. Site L = Analysed at City Analysts Limerick



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**Sample Description:** R Glore

**Sample Type:** Surface Water

**Date Sampled:** 25/06/2013

**Lab Reference Number:** 155819

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	03/07/2013	Phosphorus, total as P	<0.05	mg/l	-	INAB
D/3000	04/07/2013	Ortho-phosphate as P	<0.025	mg/l	-	INAB
D/3000	28/06/2013	Ammonia as N	<1	mg/l	-	INAB
D/1049	26/06/2013	TSS	3	mg/l	-	INAB
D/1009	27/06/2013	COD	16	mg/l	-	INAB
D/1003	26/06/2013	CBOD5	2	mg/l	-	INAB

**Note:**

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total Viable Count

PV Value is the parametric value, taken from European Communities, (Drinking Water) (No. 2) Regulations, 2007. S.I. No. 278 of 2007, and relates only to drinking water samples.

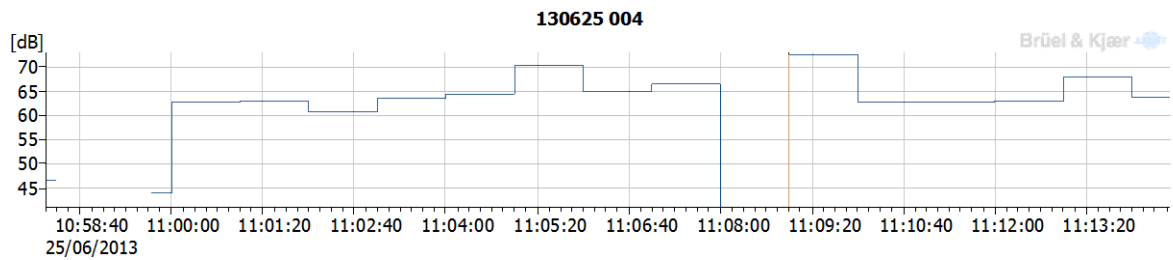
Site D = Analysed at City Analysts Dublin. Site L = Analysed at City Analysts Limerick

# Attachment 7 - Noise Monitoring Graphs

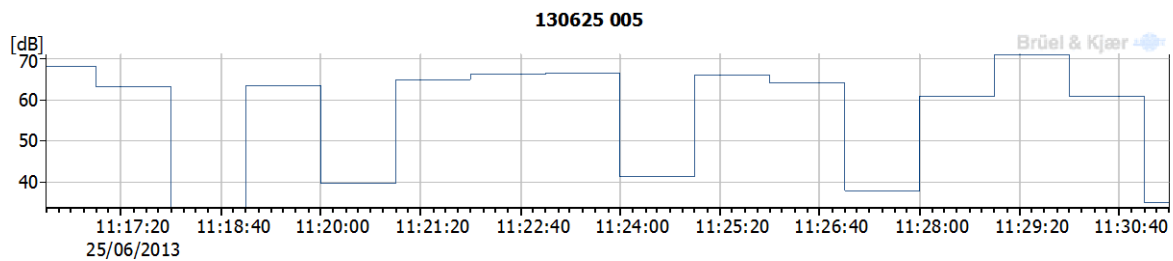
# Noise Monitoring Logs, June 25<sup>th</sup> 2013

## NM 1

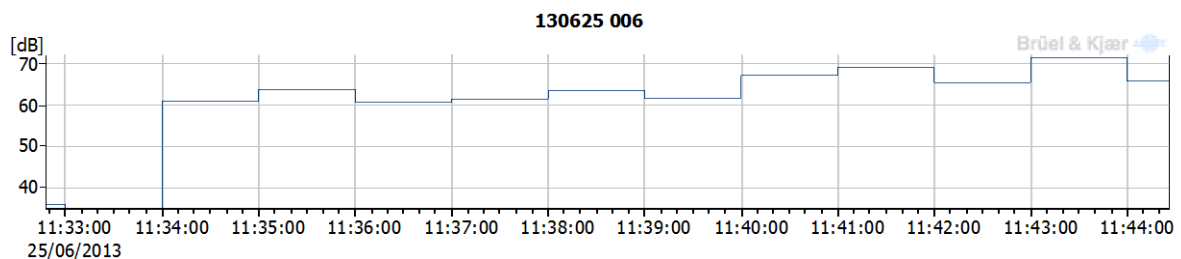
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4	10:58	11:14	00:15:00	66	91	34	37	62



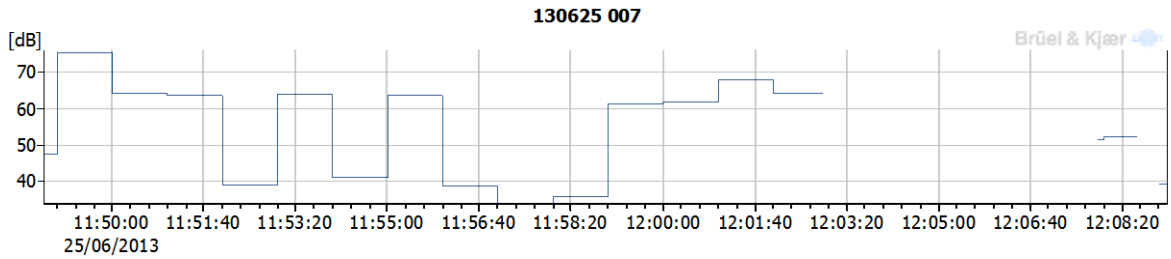
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5	11:16	11:31	00:15:00	64	88	28	33	60



File No:	Start Time	Stop Time	Elapsed Time	L <sub>Aeq</sub> [dB]	L <sub>A</sub> F <sub>max</sub> [dB]	L <sub>A</sub> F <sub>min</sub> [dB]	L <sub>A</sub> F <sub>90</sub> [dB]	L <sub>A</sub> F <sub>10</sub> [dB]
6	11:32	11:44	00:11:38	66	90	30	35	63

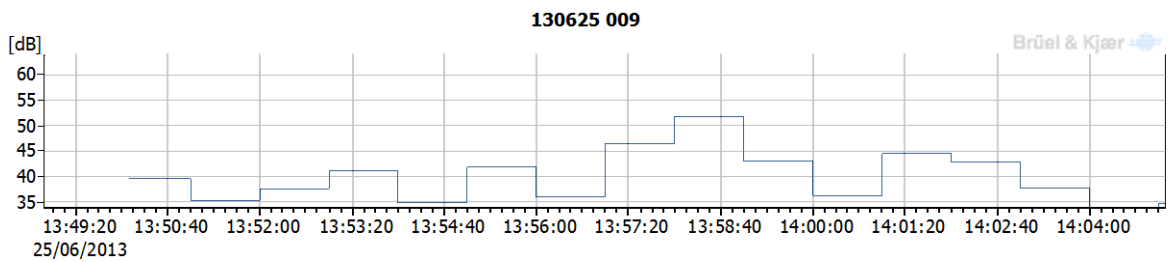


File No:	Start Time	Stop Time	Elapsed Time	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	LAF90 [dB]	LAF10 [dB]
7	11:48	12:09	00:15:00	66	91	30	34	59

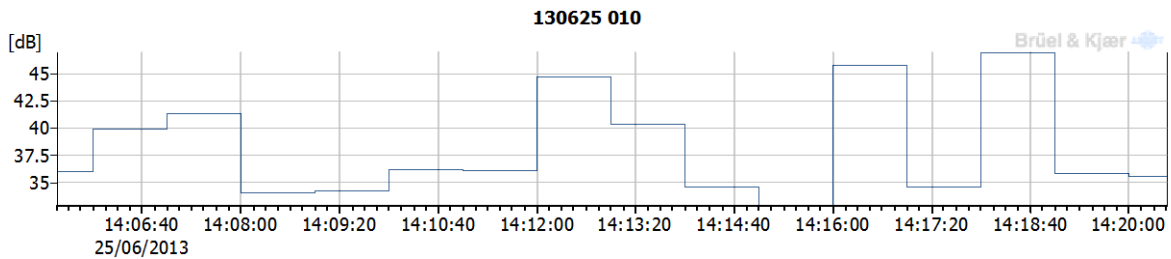


## NM 2

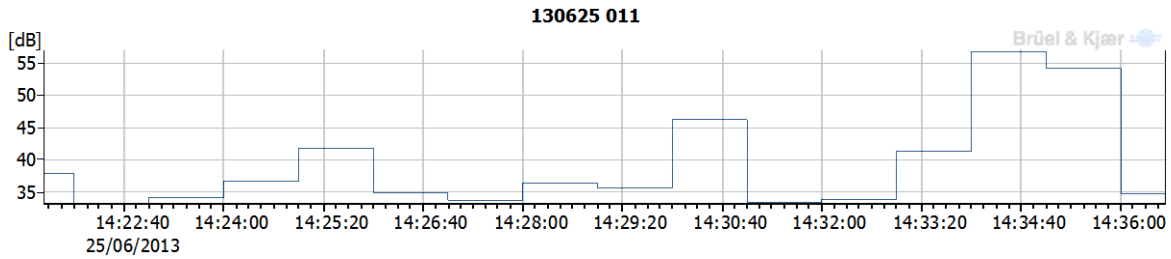
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9	13:48	14:05	00:15:00	44	75	24	30	45



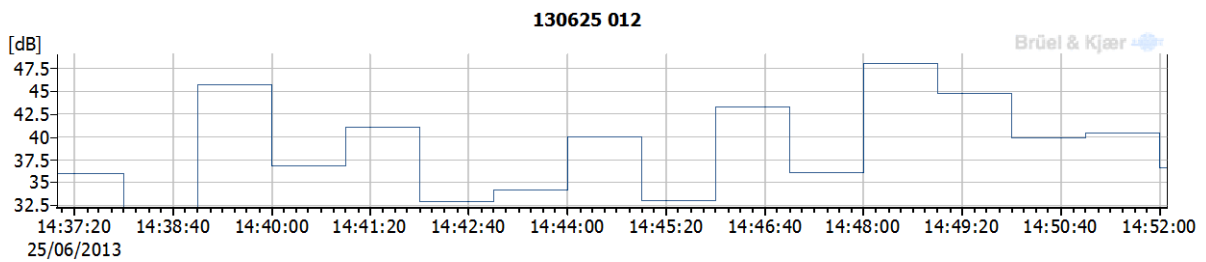
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10	14:05	14:20	00:15:00	41	59	24	29	43



File No:	Start Time	Stop Time	Elapsed Time	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	LAF90 [dB]	LAF10 [dB]
11	14:21	14:36	00:15:00	48	66	26	31	47

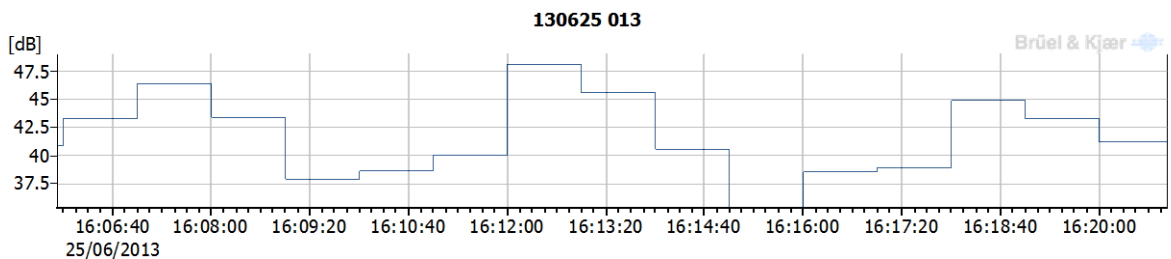


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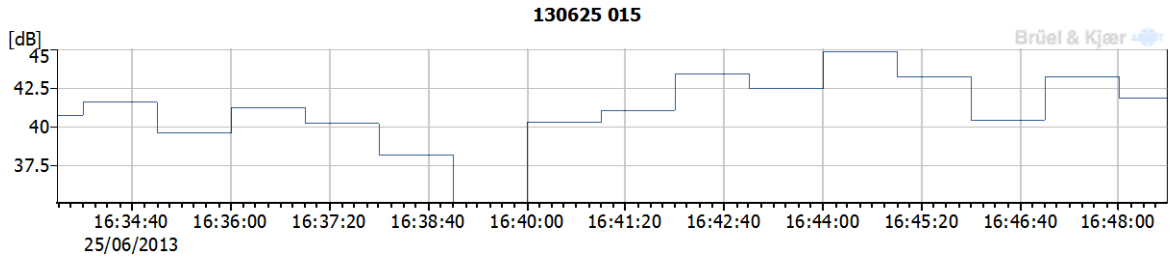


### NM 3

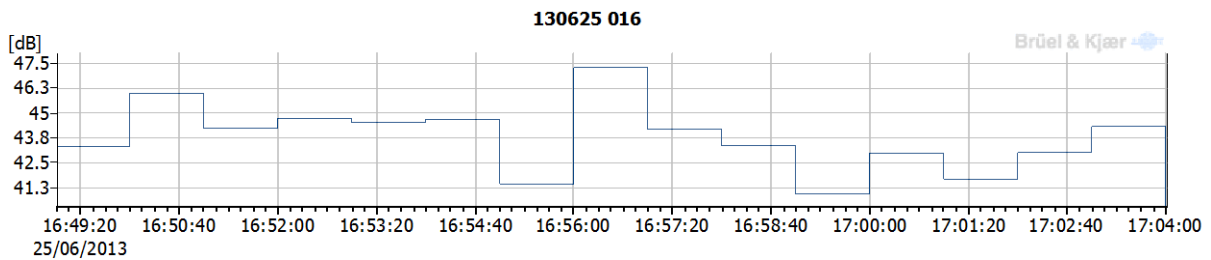
File No:	Start Time	Stop Time	Elapsed Time	LAeq [dB]	LAFmax [dB]	LAFmin [dB]	LAF90 [dB]	LAF10 [dB]
13	16:05	16:20	00:15:00	43	55	29	35	47



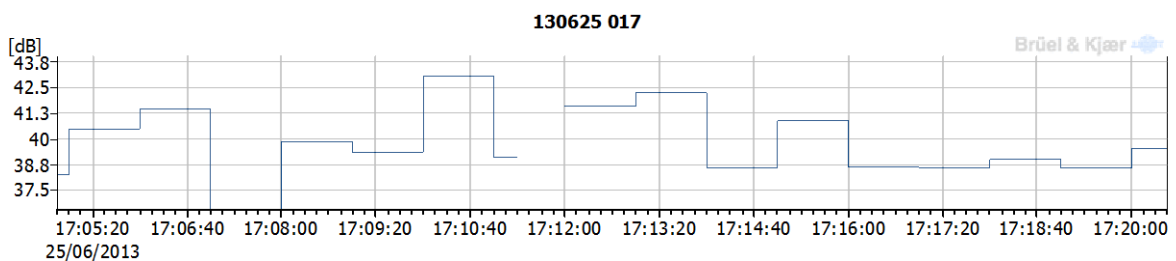
File No:	Start Time	Stop Time	Elapsed Time	L <sub>Aeq</sub> [dB]	L <sub>AFmax</sub> [dB]	L <sub>AFmin</sub> [dB]	L <sub>AF90</sub> [dB]	L <sub>AF10</sub> [dB]
15	16:33	16:48	00:15:00	42	58	31	35	45



File No:	Start Time	Stop Time	Elapsed Time	L <sub>Aeq</sub> [dB]	L <sub>AFmax</sub> [dB]	L <sub>AFmin</sub> [dB]	L <sub>AF90</sub> [dB]	L <sub>AF10</sub> [dB]
16	16:49	17:04	00:15:00	44	56	32	38	47



File No:	Start Time	Stop Time	Elapsed Time	L <sub>Aeq</sub> [dB]	L <sub>AFmax</sub> [dB]	L <sub>AFmin</sub> [dB]	L <sub>AF90</sub> [dB]	L <sub>AF10</sub> [dB]
17	17:04	17:20	00:15:00	40	57	30	33	44



# Attachment 8 - Dr. Maurice Hurley Report

**Peat Harvesting Operations in the Townlands of  
Coole, Mayne, Ballinealoe & Clonsura, County Westmeath.**

**Cultural Heritage & Archaeology**

**By**

**Maurice F. Hurley MA, D.Litt, *FSA, MIAI***

**For**

**OES Consulting**

**July 2013**



## **1 Introduction**

This report is prepared as part of an Environmental Impact Assessment of ongoing peat harvesting operations on lands at Lower Coole, Mayne, Ballinaloe (referred to as the Coole site) & Clonsura (referred to as the Clonsura site), near Coole & Finnea, County Westmeath (Figure 1).

The peat lands under review in County Westmeath comprise of 4 separate holdings. The units are numbered units 1-3 for the Coole site (Figure 2A) and units 1-2 for the Clonsura site (Figure 2B) for ease of reference in this report. The total land area covered by the site under review is approximately 252ha. No new areas of land will be incorporated into existing operations. Although separate, the two sites are all managed by the same Peat Harvesting Manager.

No Recorded Monument lies within the boundary of the sites under review. Several ringforts are located at distance of *c.* 1km to the east of the Coole site on the higher ground in the townlands of Mayne and Ballinaloe. A crannog is located in Lough Bane, *c.* 190m east of the Clonsura site. An ancient wooden trackway (togher/bog road) was identified in the course of field inspection extending east-west across the Coole site. The trackway was previously identified in 2005 and subject to partial archaeological excavation in 2006 (Appendix 2). The trackway is not a Recorded Monument.

## **2 The Activity**

It is understood that peat harvesting on the site originally commenced in the late 1950s. The site was then commercially drained and developed in 1982 with State funding during a time of energy crisis. Westland Horticulture Ltd. took over occupation of the site in the mid 1990s with the aim of producing milled peat for use in horticulture.

Westland's site operations involve milling of peat typically through April to September. The work is largely weather dependent; peat milling can only be undertaken when the weather is warm and dry. Peat milling, involving drying and harrowing, ridging and collecting (harvesting)

are repeated regularly. Harvesting removes only a thin layer of peat thereby only slowly reducing the levels of the peat surface. In addition bog maintenance involved the regular deepening (ditching) of the drains generally in autumn and prior to production in the spring.

### **3 Method of Study**

In regard to studies of this type, The Department of the Arts Heritage & the Gaeltacht generally requires the following. The methodology was based on the *Code of Practice between the Department of Arts, Heritage & Gaeltacht and The National Museum of Ireland and Bord na Mona* (2012) and the methodology was discussed with Archaeologist Officers in the Department of Arts, Heritage & Gaeltacht.

#### ***Methodology***

Documentary and map research regarding the location of the area under review with particular reference to the archaeological landscape.

- Site inspection(s)/field survey.
- A detailed record of any upstanding monuments that are or could be affected by the existing peat harvesting activities
- Aerial photographic research.
- Search of the Record of Monuments and Places (RMP).
- Search of the Topographic files, Irish Antiquities Divisions, National Museum of Ireland.
- Recommended mitigatory measures to protect archaeological deposits/features.

#### ***Consultations***

The Department of Arts, Heritage & Gaeltacht was consulted and the proposed methodologies discussed prior to the undertaking the field survey.

## 4 Scope of the study

The following resources and methods of establishing the archaeological status of the existing peat harvesting sites were used:

- The proposed site was examined by field-walking/inspection in June 2013. At the time of inspection the surface had been removed from all the bogs under review and peat harvesting operations were ongoing. All of the drains were accessible; each drain was c. 1m wide and 12m apart with slightly 'V' shaped profiles, varying from 2m-4m in depth. The weather was dry and sunny at the site of site inspection and the water level in the drains was relatively low.
- For the purposes of this study, the two sites are divided into numbered units for ease of reference; the Coole site, unit 1 had east-west drains, unit 2 had north-south drains and unit 3 had east-west drains. The Clonsura site, unit 1 had northeast-southwest drains and unit 2 had north-south drains. All the units were systematically fieldwalked and each drain was visually examined. The drains provide regular section faces through the sites.
- Several of the monuments in the vicinity were also visited. Most of the monuments in the higher ground to the east of the Coole site are ringforts located above the 70mOD contour (Figure 2 & 3). The nearest monument to the Clonsura site is a crannog located on what is now the drier margins of Lough Bane but was once (and now in periods of wet weather) lacustrine.
- The Record of Monuments and Places (RMP) for Co. Westmeath was consulted for the relevant area.
- The topographical files held by the Irish Antiquities Divisions, National Museum of Ireland.
- All editions of the Ordnance Survey maps were consulted.
- All available archaeological cartographic and historical literature for the area was consulted.
- *Framework and Principles for the Protection of Archaeological Heritage*, (Dept. of Arts, Heritage, Gaeltacht and the Islands, 1999).

- *Code of Practice between the Department of Arts, Heritage & Gaeltacht and The National Museum of Ireland and Bord na Mona* (February 2012).
- Excavation summaries (I. Bennett ed.) and [www.excavations.ie](http://www.excavations.ie).
- Vertical aerial photographs for the area were examined.

## **5 The Receiving Environment and the Field survey (Figures 2A & 2B)**

### ***The Coole Site, Coole Townland Unit 1 (Plates 1-3)***

An irregular rectangular area, bounded on the south by the R395, on the west by lands flanking the River Inny and on the north and east by an area of regenerating vegetation (Plate 2) flanked by forestry. The bog drains run east-west (Plate 1). The peat was consistent and homogenous but in places concentrations of round-wood branches and twigs (mostly Birch and Hazel) were apparent. No pattern of depth of distribution was obvious and it is likely that the wood is of natural origin and not deposited by the hand of man (i.e. non archaeological). In one area a spread of mineral soil/silt was apparent on the surface (Plate 3). This appears to be derived from the presence of a high point in the underlying geology of the mineral soils. No finds or features of potential archaeological significance were observed in the course of field inspection.

### ***The Coole Site, Mayne Townland Unit 2 (Plates 5-11)***

An extensive 'L'-shaped area bounded on the north by the R395, on the west by ground adjoining the River Inny, on the east by an area of unexploited bog and forestry at the foot of gently rising farmland rising towards the village of Coole and on the south by a large drainage ditch (division between units 2 & 3). The drains run north – south (Plate 4).

The peat was generally homogenous though surface undulations result in depths varying between 2m and 3m apparent in the drains.

The only archaeological feature observed was a wooden trackway (bog road/togher). This trackway has been known since at least 2005 when the site was visited by officers from the Department of Environment, Heritage & Local Government (now the Dept. Arts, Heritage &

Gaeltacht). The trackway was partially excavated in 2006 by Jane Whitaker (ADS Ltd) on behalf of the Department (Licence No. 06E0928). Details of the excavation are provided in Appendix 2. The trackway is now apparent over a length of *c.* 450m (Figure 5 and Plates 5-11), i.e. recorded in 35 drains. On the eastern side of the bog the timbers occur at a depth of 0.40m-0.50m below the current surface (Plate 6) but further to the west the timbers run closer to the surface (Plates 8-9) and in places, especially towards the west are now scattered along the surface of the bog (Plate 11) currently in production. The timbers appear to be large planks resting on brushwood but in at least one instance a plank appear to resting on a round-wood rail (Plate 10). The trackway appears to be 4.5m to 6m in width (Plates 5-7) and where apparent the trackway surface is made of planks, some with mortices (Plates 8 & 9). This concurs with the evidence recorded in the excavation in 2006.

When recorded in 2006 the length of the trackway was 657m ‘but was seen to extend beyond both recorded limits’ (Whitaker, in *Excavations 2006*). It is likely that the trackway extended from a crossing point on the River Inny linking the higher ground to the east and west. A radiocarbon (C14) date of 1200-820bc was obtained from the excavated structure (*ibid*), and therefore it is likely that the construction and operation of the trackway is dated to the Late Bronze Age and its use continuing into the Iron Age or perhaps even the early Medieval period.

The trackway is not a Recorded Monument and hence peat milling operations have continued in this area leading to ongoing impact on the remains.

No other finds or features of potential archaeological significance were observed in the course of field inspection.

### ***The Coole Site, Ballinaloe Townland, Unit 3 (Plates 12-13)***

Irregular rectangular area with east-west drains. Bounded on the south by a local road leading from Coole to Multyfarnham, on the west by a main drain separating the bog under review from other adjoining commercially exploited bogs, on the north by main drain (dividing units 2 & 3) and a meander of the River Inny, and on the east by an area of forest leading to gently sloping agricultural land. The bog has a general saucer shaped profile probably relating to the underlying

geological pattern. The peat is very soft and homogenous and in places depth of up to 4m are apparent, however many of the drains were deeply filled with water leading to some collapse of the side (Plate 13). No finds or features of potential archaeological significance were observed in the course of field inspection.

***The Clonsura Site, Clonura Townland, Unit 1 (Plates 14-15)***

A roughly rectangular area with northeast-southwest drains. Bounded on three sides by forestry and on the northwest side by a large open drain separating unit 1 from unit 2. The River Inny lays c. 300m to the west. The peat is very homogenous and significant surface undulations were apparent. No significant variations in the consistency of the peat were observed and only occasional natural round wood branches and twigs were recorded. No finds or features of potential archaeological significance were observed in the course of field inspection.

***The Closura Site, Closura Townland, Unit 2. (Plates 16-18).***

A rectangular area with north-south drains. Bounded on the southern side by the Clonsura Stream/S1 separating unit 2 from unit 1, on the western side by an area of unexploited bog standing to 0.50m higher than the harvested bog (Plate 16). Lough Bane (Figure 2B) with its associated crannog (RMP WM001-028) lies c. 190m to the east. The northern side adjoins an area of cutaway bog (Plate 17) and an area of forestry to the northwest, the western side contains unexploited bog and forestry close to the River Inny which lies c. 250m to the west; the River Inny represents the boundary between Counties Westmeath and Longford in this area.

The peat is generally soft and homogenous with very little internal structure apparent. Many of the drains contained significant amounts of water at c 1m-1.5m below the surface (Plate 18).

## **6 General History & Archaeology of the area**

Peatland areas characteristic feature of the Irish midlands, and covers about 17,000 hectares (9%) of County Westmeath. Most of the bogs are raised bog (such as those at the Coole site and the Clonsura site) and fen, many of which are cutaway or are currently under exploitation as cutover bog. Midland bogs represent a significant archaeological resource as they are capable of

preserving a spectrum of Ireland's cultural heritage over many millennia. Preservation can often be comprehensive and spectacular due to the anaerobic conditions (oxygen free) prevailing in the peat.

Westmeath is generally flat terrain with occasional glacial ridges (eskers) and hillocks such as the hillock where the village of Coole is located (115m-117m summits). Peat bogs occupy much of the low-lying ground (basin peats) such as the area flanking the River Inny and others in the River Shannon catchment basin. The slow flowing meandering rivers were significant transport and communication arteries in ancient times. The rivers, especially those flanked by broad areas of bogland such as those at the Coole and Clonsura sites, were also significant barriers to overland transport and as such were frequently boundaries between provinces, counties, territories (baronies) and townland; the northern reaches of the River Inny near Clonsura defines the boundaries between Co. Westmeath and Longford and Counties Meath and Cavan also meet at Lough Sheelin c. 5km to the north of the Clonsura site.

The bogs in this area of Westmeath are either un-reclaimed, having a covering of scrub and rushes (i.e. living bogs) or are exploited (i.e. cutaway for traditional open cast peat-cutting or drained and cutover for peat harvesting as in the case of the bogs under review), others are reclaimed for forestry or agricultural use.

The bogs present a unique environment for archaeologists. Bogs could not be used in the same way as agricultural lands (on mineral soils) and therefore a specific range of uses tends to be represented within the peatlands. The recovery of human remains from bogs (bog bodies/ 'bog persons') is well documented (one of the most recently reported sites was a body found at a Bord na Mona site near Kinnegad, Co. Meath...*Irish Times* 10/December/2012) and in some instances appears to represent the deliberate deposition of bodies on significant points such as territorial boundaries. For example a body found in a bog at Cul na Mona, between Abbeyleix and Portlaoise, Co. Laoise was said by Dr. Ned Kelly, keeper at the National Museum of Ireland to be a ritual deposition on a territorial boundary (quoted in the *Irish Times* 12/August/2011). While many prehistoric examples are now documented, bog bodies tend to date primarily to the late medieval or modern times. Most of the burials appear to have been accidental (possibly as a

result of bog slides or falling into bog holes. In many cases these bodies are found complete with preserved clothing, footwear and personal items. The more macabre cases of deliberate burial possibly after strangulation and mutilation have of late been more highly publicised (*Irish Times*, 8<sup>th</sup>/September/2011 and exhibition at the National Museum of Ireland entitled *Kingship and Sacrifice*).

Other than these the uses of bogs can be defined either by pre-bog occupation, use of the bog as a resource for defence and storage or overcoming the obstacles to transport created by the bog. Pre-bogland occupation (Mesolithic), lake settlements (*crannogs*, Bronze Age to Medieval), transport routes across bogs (*toghers* or bog roads) which may date from the Bronze Age up to post medieval times. Artefacts of all periods may be found trapped within the bogs and are frequently spectacular by virtue of their preservation. The more common 'stray or casual' finds include the remarkable wooden drinking vessels (*mether*), shoes/clothing and weapons and of course 'bog butter' and these may occur anywhere throughout bogland but are presumably most likely to be close to areas of occupation. A Viking sword, for example, was recently discovered along with other artefacts in a bog near the River Shannon in Co. Offaly (*Metro/Herald* 17<sup>th</sup>/December/2012).

Mesolithic (7000BC) shoreline-settlements are known to occur on the margins of former lakes which were subsequently covered by peat, examples are known from Lough Boora, Co. Offaly (Ryan 1980, 1981, 1984). Generally these settlements are located on the upper surface of the mineral soils underlying the bogs which commenced growing since *c.* 7000BC. The Mesolithic camp sites tend to contain flint artefacts, axe heads as well as burnt mammal fish and bird bones. The large raised bogs such as those at the Coole and Clonsura sites may not contain such evidence as these probably had begun to form following the end of the last glaciations some 10,000 years ago. In any case cut-over peat harvesting tends not to impact on the underlying soil levels.

By Neolithic times (*c.* 5000BC), the raised bogs of the midlands had grown considerably and appear to have been unattractive to human occupation.



By the Bronze Age, possible pressure on the population appear to have resulted in the construction of crannogs or lake settlements (Hencken 1936) but most of the crannogs appear to have been constructed in lakes and marshes as defended homesteads within the Early Medieval period; as such they are mostly contemporary with ringforts. The subsequent draining of lakes, marshes, fens and peat land has resulted in crannogs appearing today as a simple mounds in a lake or bog. The crannog at Lough Bane (RMP WM01-006-011), now located on the margins of the lake was once completely surrounded by water. Within bogs, evidence for crannogs is generally recognisable by the large concentrations of timbers, brushwood, wickerwork, straw and even bracken with possible occurrence of stone and other material used by the occupiers to build a raised platform enclosure and dwellings above the water level.

The raised bogs were major obstacles to transport since Neolithic times (5,000BC) and ever since then trackways known as toghers have been constructed to facilitate transport, including both pedestrian and wheeled traffic. A variety of construction techniques have been employed in the construction of these toghers including oak planks resting on long runners (rails) or bunches of brushwood, layers of gravel were sometimes used especially in Co. Offaly. As the bogs continued to grow the many of the toghers were regularly built and replaced and therefore several levels may be represented in a bog.

The togher located in the Coole site (see Section 5 and appendix 2), has been dated to 1200-800bc by radiocarbon dating. The construction of the togher and possibly its use is likely to have predated the Early Medieval ringfort settlements near Coole. Nevertheless the togher connected the higher ground at Coole to a crossing point on the River Inny and further on to ridges at the west between the villages of Lismacaffry and Street.

The location of ringforts (see below and Figures 3 & 4) in close proximity to the townland boundary between Mayne and Ballinaloe may be significant as the boundary traverses the bog in the vicinity of the line of the ancient togher (Figure 3).

Details of the excavation undertaken in 2006 are provided in Appendix 2. The togher is clearly of the oak plank type with mortices, rails or runners were apparent beneath the planks in some of

the drains (Plate 10). The proportions of the trackway at 3.5m to 4m in width and once extending for more than 600m and its construction of oak planks laid edge to edge (Appendix 2) is comparable in proportions to a wooden bog road excavated at Corlea, Co. Longford, where the roadway was interpreted as a transport route for wheeled vehicles and possibly part of a wider network of communication (Raftery 1991, 110). There appears to be only one significant level of trackway on the Coole site, i.e. there is no obvious evidence of raising or rebuilding. The possibility of the increased likelihood of the occurrence of artefacts, lost, discarded and dumped in the vicinity of an accessible route such as a trackway (together) has to be a consideration; wooden block-wheels are an obvious possibility.

### **Archaeological sites in the region**

There are no known Recorded Monuments within the existing peat harvesting sites but there are a number in the wider environs. The sites are shown on Figures 2A & 2B these sites are Recorded Monuments (Appendix 1).

### **The Coole Site (Coole/Mayne/Ballinealoe townlands)**

<b>Reference Number</b>	<b>WM006-011</b>
Monument Type	Ringfort
Townland	Shrubbywood
County	Westmeath
NGR	638769, 770130
Distance to site boundary	1km. Lies to the W of the River Inny.

<b>Reference Number</b>	<b>WM003-053</b>
Monument Type	Windmill
Townland	Mayne
County	Westmeath
NGR	641047, 772728
Distance to site boundary	1km

<b>Reference Number</b>	<b>WM003-086</b>
Monument Type	Earthwork
Townland	Ballinealoe
County	Westmeath
NGR	640500, 770949
Distance to site boundary	500m

<b>Reference Number</b>	<b>WM003-081</b>
Monument Type	Ringfort
Townland	Mayne
County	Westmeath
NGR	639493, 770288
Distance to site boundary	1.2km

<b>Reference Number</b>	<b>WM003-082</b>
Monument Type	Ringfort
Townland	Ballinealoe
County	Westmeath
NGR	640995, 771166
Distance to site boundary	1.1km

<b>Reference Number</b>	<b>WM003-087</b>
Monument Type	Ringfort
Townland	Ballinealoe
County	Westmeath
NGR	640965, 770720
Distance to site boundary	800m

<b>Reference Number</b>	<b>WM003-088</b>
-------------------------	------------------

Monument Type	Ringfort
Townland	Ballinealoe
County	Westmeath
NGR	640988, 770521
Distance to site boundary	1km

<b>Reference Number</b>	<b>WM007-001</b>
Monument Type	Earthwork
Townland	Lispopple
County	Westmeath
NGR	640955, 770870
Distance to site boundary	1km

### The Clonsura Site

<b>Reference Number</b>	<b>WM006-011</b>
Monument Type	Crannog
Townland	Clonsura
County	Westmeath
NGR	641542, 777502
Distance to site boundary	190m

## 7 Likely Significant Impact on the Cultural Heritage

Throughout most of the Coole and Clonsura sites there was no evidence of finds or features of archaeological significance. Other than the trackway/bog road/togher, no other finds or features of archaeological significance were identified in the course of the research or the field work. The bog road/trackway or togher crossing the Coole site is a notable exception and this structure is clearly of archaeological significance. The togher was first reported to the Department of Environment, Heritage & Local Government (now Dept. Arts, Heritage & Gaeltacht) in 2005

and a small part was excavated in 2006 (Appendix 2). The trackway was not entered into the Record of Monuments and Places and therefore is not a Recorded Monument with associated statutory protection (Appendix 1). The trackway was impacted initially when the bog was drained in the 1980's and has been subject to ongoing activity from peat milling operation. Today much of its former length has disappeared.

The long term survival of an organic feature, such as the wooden trackway within a drained bog, is vulnerable to the altered drier environmental conditions; the anaerobic conditions that resulted in the survival of the trackway no longer pertain. Consequently, the only available option is to archaeologically record the salient features of the find. While a limited archaeological excavation has already been done (Appendix 2), the archaeological monitoring and recording of the remaining elements of the trackway within the area subject to impact by peat harvesting is recommended (see Section 8, below). The situation undoubtedly presents further opportunities for archaeological research, in particular obtaining a range of dendrochronological dates (tree ring dating) from the oak timbers. The dendrochronology dating would have the benefit of providing a more precise date for the construction of the trackway as the date range obtained from the radiocarbon dating (C14) is very broad. Such a programme of sampling and dating undertaken in association with archaeological monitoring of work in the vicinity of the trackway could offer an acceptable mitigation. (see Mitigation, Section 8, below).

## **8 Mitigating Adverse Impacts on the Cultural Heritage**

The ongoing peat harvesting of the bog at the Coole site, undoubtedly presents further opportunities for archaeological research in particular obtaining a range of dendrochronological dates from the oak timbers. It is suggested that a dendrochronology dating programme would have the benefit of providing a more precise date for the construction of the trackway as the date range obtained from the radiocarbon dating is very broad (Appendix 2, '1200-800bc'). Such a programme of sampling and dating undertaken in conjunction with archaeological monitoring of the existing peat harvesting activity in the vicinity could offer an acceptable mitigation.

## 9 Conclusions and Recommendations

With the exception of a wooden trackway (togher) in the Coole site, no other finds or features of archaeological significance came to light in the course of research and field work. Substantial amounts of the trackway remain *in situ* although the trackway is not a Recorded Monument (hence harvesting works continued) and was subject to limited archaeological excavation in 2006 (Appendix 2). Mitigation by archaeological monitoring of the existing peat harvesting activities in that area undertaken in conjunction with a programme of dendrochronology dating of timbers is suggested. The monitoring archaeologist should also be alert to the possibility of stray finds occurring on or nearby the trackway.

### Non Technical Summary

This report is prepared as part of an Environmental Impact Assessment of ongoing peat harvesting operations on lands at Lower Coole, Mayne, Ballinealoe & Clonsura, near Coole & Fineagh, County Westmeath.

The peat lands under review in County Westmeath comprise of 4 separate holdings. No Recorded Monument lies within the boundary of the site under review. Several ringforts are located at distance of *c.* 1km to the east of the Coole site on higher ground. A crannog is located in Lough Bane, *c.* 190m east of the Clonsura site. An ancient wooden trackway (togher/bog road) was identified in the course of field inspection extending across the Coole site. The trackway was previously identified in 2005 and subject to partial archaeological excavation in 2006. The trackway is not a Recorded Monument hence it has been subject to on-going disturbance from operations and today much of its former length has disappeared. The main draining of the peatlands in the 1980s would have initially compromised the preservation of the togher.

The long term survival of an organic feature, such as the wooden trackway within a drained bog, is vulnerable to altered drier environmental conditions. The only available option is to archaeologically record the salient features of the find and this has already been done.

It is suggested that an appropriate mitigation may be provided by archaeological monitoring and a dendrochronology dating programme which would have the benefit of providing a more precise date for the construction of the trackway.

## References

Bennett, I. 2006 *Excavations summaries*.

*Code of Practice between the Department of Arts, Heritage & Gaeltacht and The National Museum of Ireland and Bord na Mona* (dated February 2012).

*Framework and Principles for the Protection of Archaeological Heritage*. 1999 (Prepared by the Department of Arts, Gaeltacht & the Islands).

Hencken, H O'Neill 1936 'Ballinderry Crannog, no 1', *Proc Roy Ir Acad*, 43c (1935-7), 103-239.

*Irish Times* (12/8/2011, 8/9/2011, 10/12/2012).

Lynch, A. 1991 'Wetland Archaeology' in M. Ryan (ed). *The Illustrated Archaeology of Ireland*. 27-30.

*Metro/herald* (17/12/2012).

Raftery, B. 1991 'The Early Iron Age' in M. Ryan (ed). *The Illustrated Archaeology of Ireland*. 107-112.

Ryan, M. 1980 'An Early Mesolithic site in the midlands', *Antiquity* 54, 46-47.

Ryan, M. 1981 'Ireland's first inhabitants', *Ireland Today No. 987*, 13-16.

Ryan, M. 1984 'Archaeological Excavations at Lough Boora, Broughal townland, Co. Offaly, 1977', in M. O' Rourke (ed), *Proceedings of the 7<sup>th</sup> International Peat Congress, Dublin, June 18-23 1984, vol. 1*. 407-13.



## APPENDIX 1

### National Monuments Legislation

All archaeological sites have the full protection of the National Monuments legislation (Principal Act 1930 and Amendments 1954, 1987 and 1994).

In amendment of Section 2 of the Principal Act (1930) in the National Monuments (Amendment) Act 1987, a 'monument' is defined as:

**Definition of a Monument**

- (a) any artificial or partly artificial building, structure or erection or group of such buildings, structures or erections,
- (b) any cave, stone or other natural product, whether or not forming part of the ground, that has been artificially carved, sculptured or worked upon or which (where it does not form part of the place where it is) appears to have been purposely put or arranged in position,
- (c) any, or any part of any, prehistoric or ancient-
  - (i) tomb, grave or burial deposit, or
  - (ii) ritual, industrial or habitation site,and
- (d) any place comprising the remains or traces of any such building, structure or erection, any such cave, stone or natural product or any such tomb, grave, burial deposit or ritual, industrial or habitation site...'

Under Section 14 of the Principal Act (1930):

- Interference With a** 'It shall not be lawful for any person...'  
(a) to demolish or remove wholly or in part or to disfigure,

**Monument**

deface, alter, or in any manner injure or interfere with any such national monument without or otherwise than in accordance with the consent hereinafter mentioned [a licence issued by the Office of Public Works National Monuments Branch], or

- (b) to excavate, dig, plough or otherwise disturb the ground within, around, or in the proximity to any such national monument without or otherwise than in accordance with the consent hereinafter mentioned [a licence issued by the Office of Public Works National Monuments Branch]...’

Under Amendment to Section 23 of the Principal Act:

**Reporting of an Archaeological Find**

‘A person who finds an archaeological object shall, within 4 days after finding, make a report of it to a member of the Garda Síochána...or the Director of the National Museum or a servant or agent of his....’

The latter is of particular relevance to any finds made during the peat harvesting activities.

The 1994 Amendment (Section 12 (1-4) of the Principal Act (1930) established the Record of Monuments. All the sites and ‘places’ recorded by the Sites and Monuments Record of the Office of Public Works were provided with a new status in law. This new status provides protection to the listed sites, which is equivalent to that accorded to ‘Registered’ sites (Section 5-(1-10), National Monuments (Amendment) Act 1987) as follows:

**The Record of Monuments**

(1) The Commissioners shall establish and maintain a record of monuments and places where they believe there are monuments and the record shall be comprised of a list of monuments and such places and a map or maps showing each monument and such place in respect of each count in the State.

(2) The Commissioners shall cause to be exhibited in a prescribed manner in each county the list and map or maps of that county drawn up under subsection (1) of this section and shall publish in a prescribed manner information about when and where the lists and maps may be consulted.

(3) When the owner or occupier (not being the Commissioners) of a monument or place which has been recorded under *subsection (1)* of this section or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Commissioners and shall not, except in the case of urgent necessity and

with the consent of the Commissioners, commence the work for a period of two months after having given the notice.’

In effect the record is the list of known archaeological sites and areas drawn up from The Sites and Monuments Record for each county. It includes:

- 1) All known monuments, e.g., ringforts, castles, etc. dating to before 1700AD, each surrounded by a standard circle defining a Zone of Archaeological Potential associated with the monument.
- 2) The details of the proposed record and its existence in law from the 1<sup>st</sup> January 1999 were advertised on the national papers on Wednesday 30<sup>th</sup> December 1998.
- 3) It requires that each person intending to undertake works on their property within a monument or zone must notify the Commissioners. The onus is on the owner/developer.

## **Appendix 2**

### **Summary account of 2006 excavation of trackway at Mayne Bog**

**Westmeath**

**2006:2056**

**Mayne Bog, Mayne**

Plank trackway

**239327 271793 to 239965 271642**

**06E0928**

In 2005 a plank trackway was reported to the Department of the Environment, Heritage and Local Government (DOEHLG) and was subsequently visited by Conleth Manning and Geraldine Stout. It was discovered to be a substantial transversely laid plank trackway. In September 2006 a small-scale investigatory excavation was undertaken on behalf of the DOEHLG.

The site was orientated north–south, running across industrial peatland from the River Inny on the east to an area of higher ground to the west. The recorded length of the trackway was 657m, but it was seen to extend beyond both recorded limits.

The trackway was investigated in a single cutting and 43 sightings of the trackway in drainage ditches were also recorded. This work was carried out on 11–14 September 2006. Excavation exposed a structure composed of tightly packed transverse oak planks, most of which had been mortised and fixed in place with roundwood pegs. The planks measured up to 4.4m in length, 0.3m in width and 0.06m in thickness. The substructure consisted of light brushwoods, plank fragments and wood chips which were scattered across the surface of the bog. Some of these elements had been arranged into three roughly longitudinal lines of brushwoods. A 14C date of 1200–820 bc was obtained from the superstructure.

Further archaeological and environmental investigations of the plank trackway have been recommended in order to ascertain the structure's full length, to develop a picture of the local environment at the time of its construction and to examine the role it may have played in the landscape.

**Jane Whitaker, ADS Ltd, Windsor House, 11 Fairview Strand, Dublin 3.**

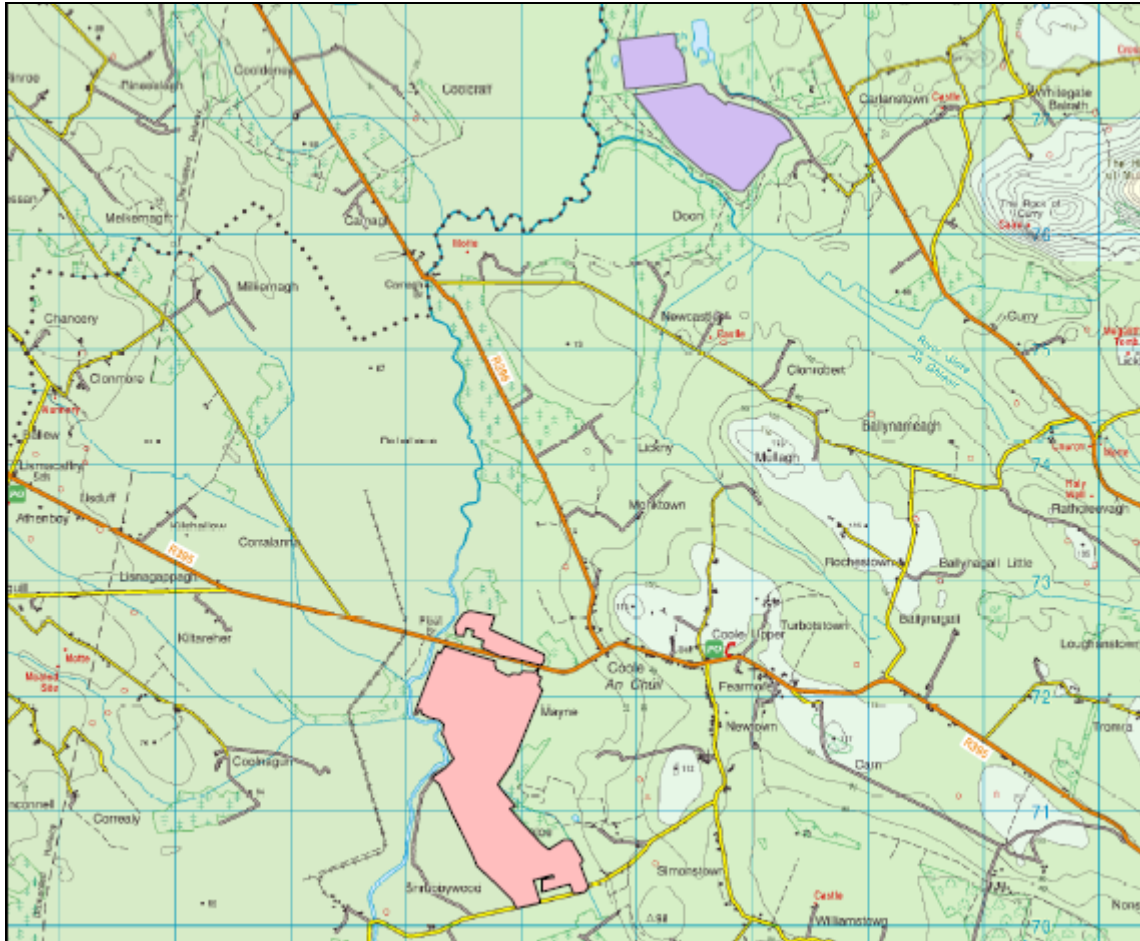


Figure 1 Site location; Coole Bog (in the townlands of Coole, Mayne and Ballinaloe (pink southern) and Clonsura Bog in the townland of Clonsura (purple, north)



Figure 2A. Recorded Monuments in the vicinity of Coole bog in the townlands of Coole, Mayne and Ballinealoe, the study area boundary is outlined in red and divided into three units (1-3) for ease of description.



Figure 2B. Recoded Monuments in the vicinity of Clonsura bog, in the townland of Clonsura. The study area boundary is outlined in red and divided into two units (1-2) for ease of description.

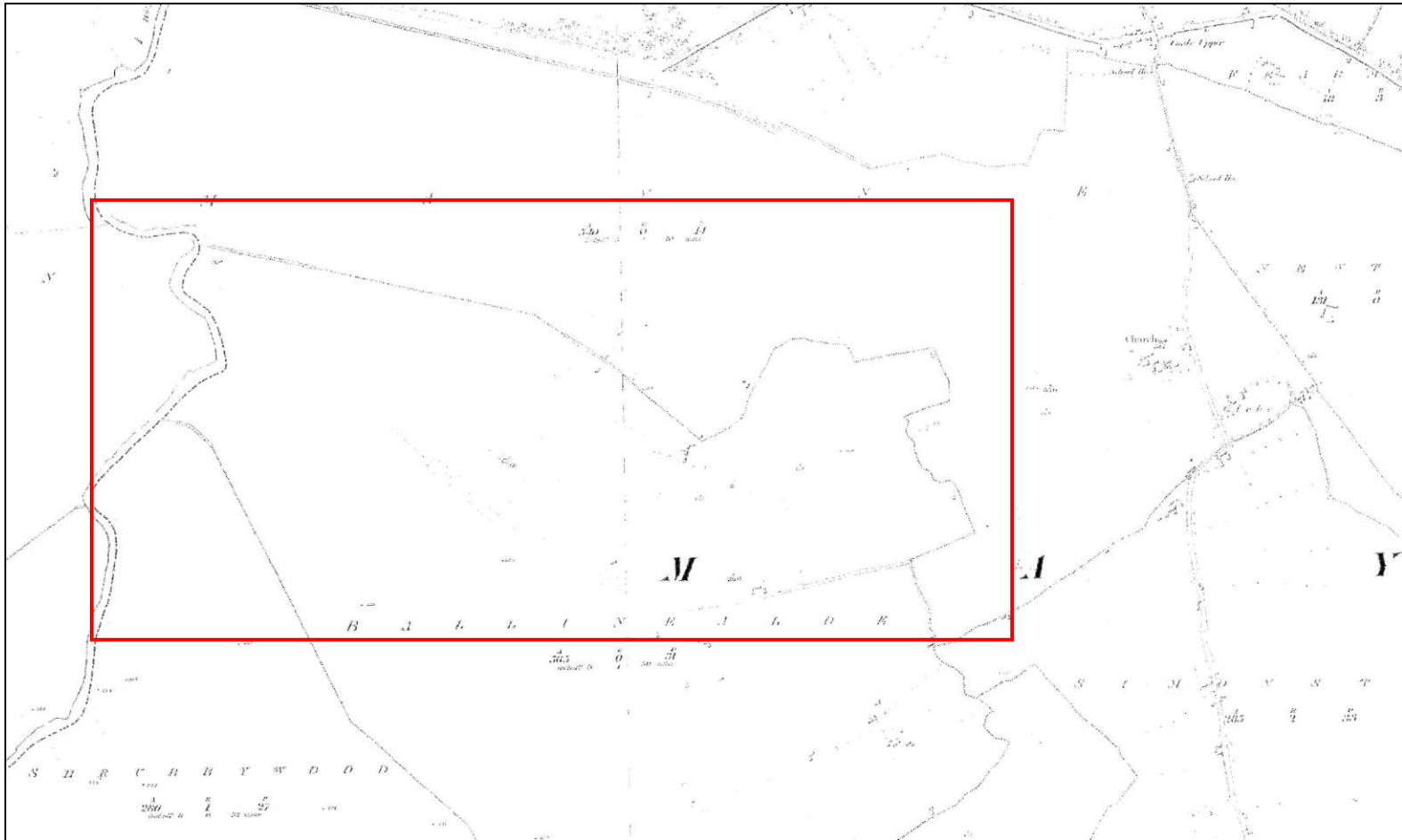


Figure 3. 6" scale map (1829-41) of Coole Bog, in Coole, Mayne and Ballinaloe townland. The red box highlights the townland boundary between Mayne and Ballinaloe which appears to follow a drain or track across the bog. Note, the location of ringforts on the high ground in close proximity to either side of the townland boundary; this may be reflective of an ancient land division.



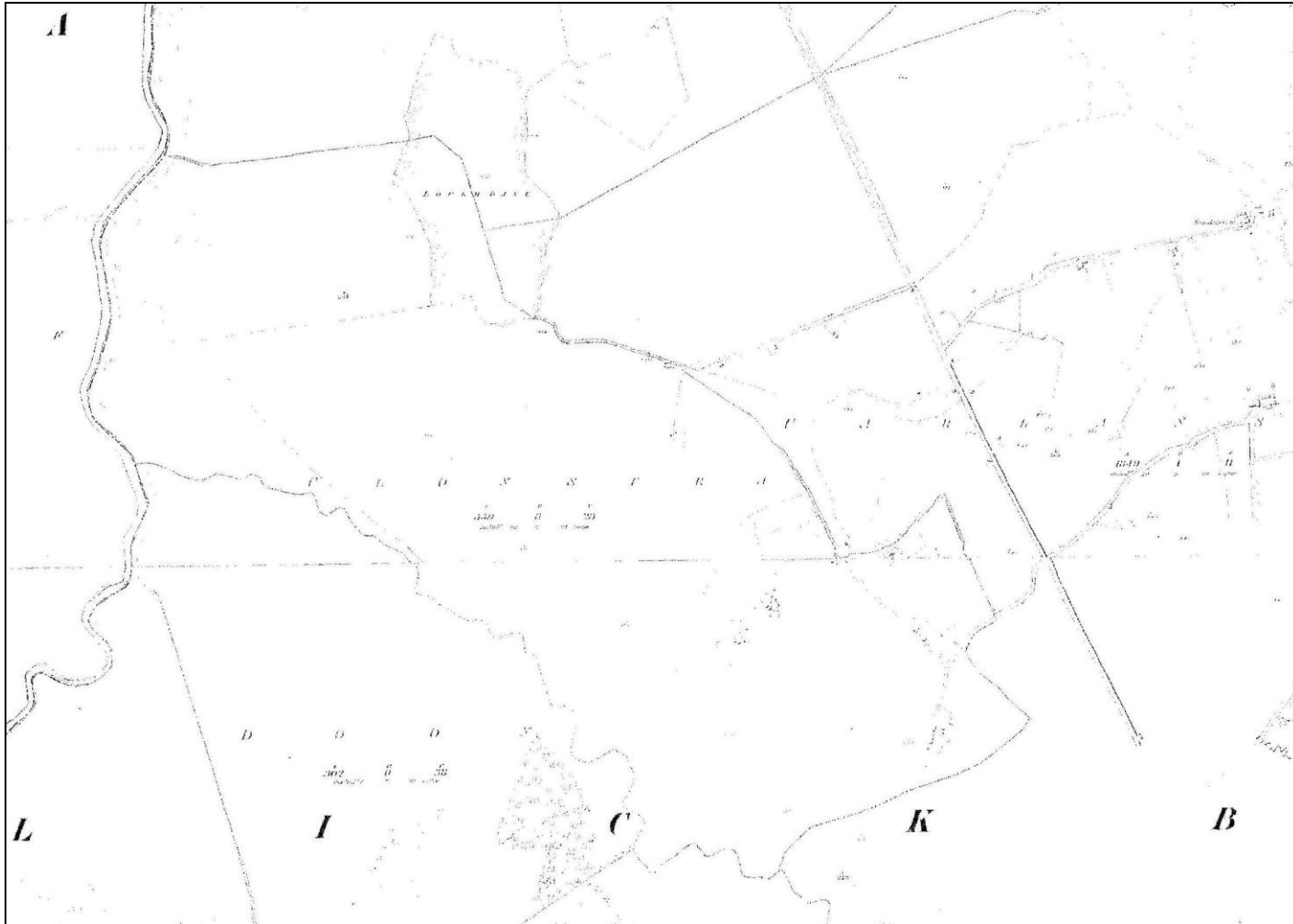


Figure 4. 6" scale map (1829-410) of Closura Bog, Clonsura townland). Note the townland boundaries of Clonsura, Carlanstown and Derrycrave meet at the crannog site (RMP WM001-028) in Lough Bane to the east of the bog under review



Figure 5. Approximate location of trackway/togher in Coole Bog



Plate 1 Coole Bog, general view  
looking W (unit 1, Coole townland)



Plate 2 Coole Bog, (unit 1, Coole  
townland)



Plate 3 Coole Bog, mineral soil lying  
on the surface of the peat results  
from the excavation of drains to  
mineral levels at a depth of c. 1m  
indicating a high point in the  
underlying topography (unit 1, Coole  
townland)



Plate 4 Looking S in Coole bog , typical pattern of slightly 'v' shaped drains c 1m wide at the surface and located every 12m apart with drainage sumps connected to piped drains at the end of each (unit 2, Mayne townland)



Plate 5 Coole Bog, evidence of a wooden roadway/track (*togher*) at the E side of the bog. In this area the timbers were c. 0.20m below the surface (unit 2, Mayne townland ).



Plate 6 At the E side of this bog, the timbers of the trackway were 0.40m -0.50m below the surface (Coole Bog, unit 2, Coole Bog, Mayne townland ).



Plate 7 On average the timbers were c. 0.20m-0.30m below the surface and consisted of planks running N-S giving the trackway a width of c 4.50m – 6m in places. (Unit 2, Coole Bog, Mayne townland)



Plate 8 & 9 In places the planks of the trackway lay on or just below the surface (Coole Bog, unit 3, Mayne townland).





Plate 10 Detail of trackway showing roundwood rail supporting a plank



Plate 11 Where the trackway lay close to the surface timbers were broken-up and scattered (unit 2, Coole bog, Mayne townland)



Plate 12 Looking W/SW, the peat was very soft and uniform in nature in this area (unit 3, Coole Bog, Ballinealoe townland)



Plate 13 Looking SW the peat was soft in this area leading to collapse of the drains in places (unit 3, Coole Bog, Ballinealoe townland)



Plate 14, Clonsura townland (unit 1). Close to the margins of the commercial peat bog, the surrounding areas are afforested. Typical view of the soft uniform peat.



Plate 15 Clonsura townland (unit 1), sumps and drainage systems at the end of the drains.



Plate 16 Clonsura townland (unit 2), the commercial peat has been reduced by c. 0.50m relative to the adjoining bog surface.



Plate 17 Clonsura townland , adjoining areas have been subject to peat cutting by others



Plate 18 Clonsura townland (unit 2), the drains were typically 1m wide in soft peat



# Attachment 9 - Abacus Transportation Surveys

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 01

DATE: 4th July 2013

LOCATION: R395/L57671 Clonsura

DAY: Thursday

TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	2	2	0	1	0	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	5	1	0	1	0	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	4	3	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	8	3	0	0	0	11	11	1	0	0	0	0	1	1	2	0	0	0	0	2	2
<b>H/TOT</b>	<b>19</b>	<b>9</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>30</b>	<b>33</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
08:00	8	2	0	0	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	4	2	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	5	2	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	4	7	0	0	0	11	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>21</b>	<b>13</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>34</b>	<b>34</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
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09:15	5	1	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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09:45	5	1	0	1	0	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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10:45	4	2	0	0	0	6	6	0	0	0	0	0	0	0	2	0	0	0	0	2	2
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11:45	3	2	0	0	0	5	5	1	0	0	0	0	1	1	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>13</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>22</b>	<b>24</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
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12:45	3	4	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>15</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>24</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
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SITE: 01

DATE: 4th July 2013

LOCATION: R395/L57671 Clonsura

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TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	4	2	0	1	0	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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16:45	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>18</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>25</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
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17:15	5	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	5	1	0	1	0	7	8	1	0	0	0	0	1	1	0	0	0	0	0	0	0
17:45	6	2	0	0	0	8	8	0	0	1	0	0	1	2	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>17</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>24</b>	<b>26</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
18:00	5	2	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	5	1	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	4	1	1	1	0	7	9	0	0	0	0	0	0	0	1	0	0	0	0	1	1
18:45	4	1	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>18</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>25</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>P/TOT</b>	<b>203</b>	<b>82</b>	<b>15</b>	<b>7</b>	<b>0</b>	<b>307</b>	<b>324</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>10</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>7</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 01

DATE: 4th July 2013

LOCATION: R395/L57671 Clonsura

DAY: Thursday

TIME	MOVEMENT 4						MOVEMENT 5						MOVEMENT 6								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3
07:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	3	0	0	1	0	4	5
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>9</b>
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	4	4
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	2	0	9	12
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	0	1	0	10	11
08:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	2	0	0	0	3	3
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>16</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>26</b>	<b>30</b>
09:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	0	0	3	4
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	6	6
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	5	5
09:45	0	1	0	0	0	1	1	1	0	0	0	0	1	1	5	1	1	0	0	7	8
<b>H/TOT</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>11</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>22</b>
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	6	6
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	3	4
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	3
10:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	2	1	0	0	0	3	3
<b>H/TOT</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>14</b>	<b>16</b>
11:00	1	0	0	0	0	1	1	1	0	0	0	0	1	1	2	0	0	0	0	2	2
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	4	5
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	6	6
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	1	0	13	14
<b>H/TOT</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>19</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>25</b>	<b>27</b>
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	0	6	8
12:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	3	0	0	0	3	3
12:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3	0	0	0	0	3	3
12:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	3	1	0	0	0	4	4
<b>H/TOT</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>9</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>16</b>	<b>18</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 01

DATE: 4th July 2013

LOCATION: R395/L57671 Clonsura

DAY: Thursday

TIME	MOVEMENT 4						MOVEMENT 5						MOVEMENT 6								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2	0	1	0	4	5
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	5	5
13:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	3	1	0	0	0	4	4
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	4	7
<b>H/TOT</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>6</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>17</b>	<b>21</b>
14:00	0	1	0	0	0	1	1	0	0	0	0	0	0	0	4	1	1	1	0	7	9
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	3	0	0	0	14	14
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	8	8
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	1	0	0	7	8
<b>H/TOT</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>26</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>36</b>	<b>38</b>
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	5
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	8	8
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6	6
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	2	0	0	8	9
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>27</b>	<b>28</b>
16:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	5	1	1	0	0	7	8
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	1	0	0	6	7
16:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	11	0	2	0	0	13	14
16:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	8	4	1	0	0	13	14
<b>H/TOT</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>26</b>	<b>8</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>39</b>	<b>42</b>
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	3	1	0	0	12	13
17:15	0	0	1	0	0	1	2	0	0	0	0	0	0	0	13	4	2	0	0	19	20
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	1	0	0	10	11
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3	0	0	0	10	10
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>12</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>51</b>	<b>53</b>
18:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	7	3	1	0	0	11	12
18:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	8	1	3	1	0	13	16
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	3	0	1	0	15	16
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	4	5
<b>H/TOT</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>27</b>	<b>9</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>43</b>	<b>48</b>
<b>P/TOT</b>	<b>7</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>13</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>215</b>	<b>72</b>	<b>23</b>	<b>13</b>	<b>0</b>	<b>323</b>	<b>351</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 02

DATE: 4th July 2013

LOCATION: R396/R395 Coole

DAY: Thursday

TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	2	1	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0
07:15	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	2	1	0	1	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	3	2	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	1	0	1	2
<b>H/TOT</b>	<b>10</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>15</b>	<b>16</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>
08:00	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	3	1	0	0	0	4	4	0	1	0	0	0	1	1	0	0	0	0	0	0	0
08:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	7	0	0	0	1	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>12</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>15</b>	<b>16</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
09:00	1	2	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	3	0	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0
09:45	6	2	0	0	0	8	8	1	0	0	0	0	1	1	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>13</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>17</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
10:00	2	4	1	1	0	8	10	1	0	0	0	0	1	1	0	0	0	0	0	0	0
10:15	4	2	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	7	1	1	0	0	9	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>14</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>24</b>	<b>26</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
11:00	5	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	2	1	0	0	0	3	3	0	1	1	0	0	2	3	2	0	0	0	0	2	2
11:30	3	0	0	0	1	4	5	1	0	0	0	0	1	1	0	0	0	0	0	0	0
11:45	3	1	0	0	0	4	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1
<b>H/TOT</b>	<b>13</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>16</b>	<b>17</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>
12:00	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	1	0	1	2
12:15	1	3	0	0	0	4	4	0	0	1	0	0	1	2	0	0	0	0	0	0	0
12:30	2	1	1	0	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	1	2	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>5</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 02

DATE: 4th July 2013

LOCATION: R396/R395 Coole

DAY: Thursday

TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	1	2	1	0	0	4	5	0	0	0	0	0	0	0	0	1	0	1	0	2	3
13:15	5	1	0	0	0	6	6	1	0	0	0	0	1	1	1	0	0	0	0	1	1
13:30	5	4	1	1	0	11	13	0	1	0	0	0	1	1	0	0	0	0	0	0	0
13:45	2	2	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>13</b>	<b>9</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>25</b>	<b>27</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>4</b>
14:00	5	0	0	0	0	5	5	0	1	0	0	0	1	1	1	0	0	0	0	1	1
14:15	6	0	0	0	0	6	6	2	0	0	0	0	2	2	0	1	0	0	0	1	1
14:30	1	0	1	0	0	2	3	0	1	0	0	0	1	1	1	0	0	0	0	1	1
14:45	4	0	0	1	0	5	6	1	0	0	0	0	1	1	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>16</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>18</b>	<b>20</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>
15:00	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1
15:15	2	1	0	0	0	3	3	0	0	0	0	0	0	0	2	0	0	0	0	2	2
15:30	2	1	1	0	0	4	5	1	0	0	0	0	1	1	3	0	1	0	0	4	5
15:45	3	1	1	0	1	6	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>8</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>14</b>	<b>16</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>8</b>
16:00	1	2	0	0	0	3	3	0	0	0	0	0	0	0	1	0	0	0	0	1	1
16:15	4	2	0	0	0	6	6	0	1	0	0	0	1	1	0	0	0	0	0	0	0
16:30	1	0	2	1	0	4	6	0	0	0	0	0	0	0	2	0	1	0	0	3	4
16:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>15</b>	<b>17</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>5</b>
17:00	1	2	1	1	0	5	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	4	0	0	0	0	4	4	1	0	0	0	0	1	1	1	0	0	0	0	1	1
17:30	5	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	6	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>16</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>20</b>	<b>22</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
18:00	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	4	1	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	5	2	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>P/TOT</b>	<b>138</b>	<b>49</b>	<b>12</b>	<b>6</b>	<b>3</b>	<b>208</b>	<b>225</b>	<b>12</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>21</b>	<b>16</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>23</b>	<b>28</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 02

DATE: 4th July 2013

LOCATION: R396/R395 Coole

DAY: Thursday

TIME	MOVEMENT 4						MOVEMENT 5						MOVEMENT 6								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	2	2	1	0	0	5	6	1	1	0	0	0	2	2	1	1	0	0	0	2	2
07:15	5	2	1	0	0	8	9	3	1	1	1	0	6	8	0	0	0	0	0	0	0
07:30	8	4	0	0	0	12	12	2	4	0	0	0	6	6	1	1	0	1	0	3	4
07:45	9	3	0	0	0	12	12	1	2	0	0	0	3	3	1	0	0	1	0	2	3
<b>H/TOT</b>	<b>24</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>37</b>	<b>38</b>	<b>7</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>17</b>	<b>19</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>7</b>	<b>10</b>
08:00	6	1	0	1	0	8	9	7	2	0	0	0	9	9	0	1	0	1	0	2	3
08:15	3	0	0	0	0	3	3	7	1	0	0	1	9	10	1	1	0	0	0	2	2
08:30	3	1	0	0	1	5	6	4	1	0	0	0	5	5	2	0	0	0	0	2	2
08:45	5	3	0	0	0	8	8	5	2	0	0	0	7	7	2	0	0	0	0	2	2
<b>H/TOT</b>	<b>17</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>24</b>	<b>26</b>	<b>23</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>30</b>	<b>31</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>9</b>
09:00	3	0	1	0	0	4	5	7	1	0	0	1	9	10	2	0	0	0	0	2	2
09:15	0	1	1	0	0	2	3	1	2	0	0	0	3	3	1	1	0	0	0	2	2
09:30	4	1	0	1	0	6	7	1	4	0	1	0	6	7	2	0	0	0	0	2	2
09:45	5	2	1	2	0	10	13	2	5	1	0	0	8	9	1	2	0	0	0	3	3
<b>H/TOT</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>22</b>	<b>27</b>	<b>11</b>	<b>12</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>26</b>	<b>29</b>	<b>6</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>9</b>
10:00	1	3	0	0	0	4	4	4	2	0	1	0	7	8	2	1	0	0	0	3	3
10:15	5	2	0	0	0	7	7	4	2	1	0	0	7	8	3	1	0	0	0	4	4
10:30	3	1	0	1	0	5	6	8	3	0	0	0	11	11	2	1	1	0	0	4	5
10:45	1	1	1	2	0	5	8	1	0	2	0	0	3	4	3	0	0	0	0	3	3
<b>H/TOT</b>	<b>10</b>	<b>7</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>21</b>	<b>25</b>	<b>17</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>28</b>	<b>31</b>	<b>10</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>15</b>
11:00	2	3	0	0	0	5	5	6	0	1	1	0	8	10	3	0	0	0	0	3	3
11:15	6	2	1	0	0	9	10	6	1	0	1	0	8	9	4	1	0	0	0	5	5
11:30	12	6	1	0	0	19	20	4	2	2	0	0	8	9	5	1	0	0	0	6	6
11:45	8	1	0	0	0	9	9	6	1	0	0	0	7	7	1	2	2	0	0	5	6
<b>H/TOT</b>	<b>28</b>	<b>12</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>42</b>	<b>43</b>	<b>22</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>31</b>	<b>35</b>	<b>13</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>20</b>
12:00	4	4	0	0	0	8	8	10	3	1	1	0	15	17	1	2	1	0	0	4	5
12:15	7	2	1	0	0	10	11	5	2	0	0	0	7	7	0	1	0	0	0	1	1
12:30	1	0	0	1	0	2	3	8	0	1	0	0	9	10	4	0	0	0	0	4	4
12:45	3	2	0	0	0	5	5	4	4	0	0	0	8	8	1	4	0	0	0	5	5
<b>H/TOT</b>	<b>15</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>25</b>	<b>27</b>	<b>27</b>	<b>9</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>39</b>	<b>41</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>15</b>



## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 02

DATE: 4th July 2013

LOCATION: R396/R395 Coole

DAY: Thursday

TIME	MOVEMENT 4						MOVEMENT 5						MOVEMENT 6								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	4	1	1	0	0	6	7	10	2	0	0	0	12	12	2	1	0	0	0	3	3
13:15	2	0	0	0	0	2	2	8	0	0	0	0	8	8	3	1	0	0	0	4	4
13:30	5	1	0	1	0	7	8	8	0	2	0	0	10	11	1	1	1	0	0	3	4
13:45	5	2	0	0	0	7	7	5	2	2	0	0	9	10	1	0	0	0	0	1	1
<b>H/TOT</b>	<b>16</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>22</b>	<b>24</b>	<b>31</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>39</b>	<b>41</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>12</b>
14:00	4	1	0	0	0	5	5	6	1	0	1	0	8	9	4	1	0	0	0	5	5
14:15	11	1	0	0	0	12	12	3	3	1	0	0	7	8	1	0	0	0	0	1	1
14:30	11	2	0	0	0	13	13	9	0	0	1	0	10	11	0	1	1	0	0	2	3
14:45	8	1	1	0	0	10	11	11	3	0	0	1	15	16	8	1	0	0	0	9	9
<b>H/TOT</b>	<b>34</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>41</b>	<b>29</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>40</b>	<b>44</b>	<b>13</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>18</b>
15:00	7	8	0	0	0	15	15	8	2	1	0	0	11	12	4	2	0	1	0	7	8
15:15	9	1	0	0	0	10	10	7	3	0	0	0	10	10	1	0	1	0	0	2	3
15:30	4	1	0	0	0	5	5	7	1	0	2	0	10	13	2	1	1	0	0	4	5
15:45	6	2	1	2	0	11	14	9	4	1	0	0	14	15	1	1	1	0	0	3	4
<b>H/TOT</b>	<b>26</b>	<b>12</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>41</b>	<b>44</b>	<b>31</b>	<b>10</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>45</b>	<b>49</b>	<b>8</b>	<b>4</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>16</b>	<b>19</b>
16:00	7	1	0	0	0	8	8	7	4	0	0	0	11	11	4	1	0	0	0	5	5
16:15	5	2	1	0	1	9	11	12	6	1	0	1	20	22	5	0	0	0	0	5	5
16:30	2	3	1	0	0	6	7	2	4	1	0	0	7	8	3	1	0	0	0	4	4
16:45	7	2	0	1	0	10	11	5	4	1	0	0	10	11	3	1	0	0	0	4	4
<b>H/TOT</b>	<b>21</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>33</b>	<b>36</b>	<b>26</b>	<b>18</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>48</b>	<b>51</b>	<b>15</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>18</b>
17:00	5	2	0	0	0	7	7	9	2	0	0	0	11	11	3	3	0	0	0	6	6
17:15	4	3	0	0	0	7	7	7	8	1	0	0	16	17	6	3	1	0	1	11	13
17:30	8	2	0	0	0	10	10	9	1	1	0	0	11	12	3	2	0	0	0	5	5
17:45	5	5	1	0	0	11	12	12	4	1	0	0	17	18	4	1	1	0	0	6	7
<b>H/TOT</b>	<b>22</b>	<b>12</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>15</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>55</b>	<b>57</b>	<b>16</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>28</b>	<b>30</b>
18:00	7	2	1	0	0	10	11	8	3	1	0	0	12	13	6	1	0	0	0	7	7
18:15	6	1	1	0	0	8	9	9	2	0	1	0	12	13	5	2	1	0	0	8	9
18:30	6	3	0	0	0	9	9	6	2	0	0	0	8	8	4	1	0	0	0	5	5
18:45	11	1	2	1	0	15	17	5	0	1	0	0	6	7	3	0	0	0	0	3	3
<b>H/TOT</b>	<b>30</b>	<b>7</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>42</b>	<b>45</b>	<b>28</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>38</b>	<b>40</b>	<b>18</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>24</b>
<b>P/TOT</b>	<b>255</b>	<b>95</b>	<b>19</b>	<b>13</b>	<b>2</b>	<b>384</b>	<b>412</b>	<b>289</b>	<b>107</b>	<b>25</b>	<b>11</b>	<b>4</b>	<b>436</b>	<b>467</b>	<b>120</b>	<b>47</b>	<b>12</b>	<b>4</b>	<b>1</b>	<b>184</b>	<b>196</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 03

DATE: 4th July 2013

LOCATION: R395/Main Access Mayne

DAY: Thursday

TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3									
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
07:00	2	2	1	0	0	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	5	2	1	0	0	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	8	4	0	0	0	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	9	3	0	1	0	13	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>24</b>	<b>11</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>38</b>	<b>40</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
08:00	5	1	0	1	0	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	3	1	0	0	1	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	5	3	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>16</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>23</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
09:00	3	0	1	0	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	1	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	4	1	0	1	0	6	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	5	2	1	2	0	10	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>12</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>22</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
10:00	1	3	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	5	2	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	3	1	0	1	0	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	1	1	1	2	0	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>10</b>	<b>7</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>21</b>	<b>25</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
11:00	2	3	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	8	1	1	0	0	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	12	6	1	0	0	19	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	9	1	0	0	0	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>31</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>44</b>	<b>45</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
12:00	4	4	0	1	0	9	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	7	2	1	0	0	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	1	0	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	3	2	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>15</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>26</b>	<b>29</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 03

DATE: 4th July 2013

LOCATION: R395/Main Access Mayne

DAY: Thursday

TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	4	2	1	1	0	8	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	5	1	0	1	0	7	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	5	2	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>17</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>25</b>	<b>28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
14:00	5	1	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	11	2	0	0	0	13	13	0	0	0	0	0	0	0	0	1	0	0	0	1	1
14:30	12	2	0	0	0	14	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	8	1	1	0	0	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>36</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>43</b>	<b>44</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
15:00	8	8	0	0	0	16	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	11	1	0	0	0	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	7	1	1	0	0	9	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	6	2	1	2	0	11	14	1	0	0	0	0	1	1	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>32</b>	<b>12</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>48</b>	<b>52</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
16:00	8	1	0	0	0	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	5	2	1	0	1	9	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	4	2	2	0	0	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	6	2	0	1	0	9	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>23</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>35</b>	<b>39</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
17:00	5	2	0	0	0	7	7	0	0	0	0	0	0	0	1	0	0	0	0	1	1
17:15	5	3	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	8	2	0	0	0	10	10	0	0	0	0	0	0	0	0	1	0	0	0	1	1
17:45	5	5	1	0	0	11	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>23</b>	<b>12</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>36</b>	<b>37</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
18:00	7	2	1	0	0	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	6	1	1	0	0	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	6	3	0	0	0	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	11	1	2	1	0	15	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>30</b>	<b>7</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>42</b>	<b>45</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>P/TOT</b>	<b>269</b>	<b>95</b>	<b>21</b>	<b>16</b>	<b>2</b>	<b>403</b>	<b>436</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 03

DATE: 4th July 2013

LOCATION: R395/Main Access Mayne

DAY: Thursday

TIME	MOVEMENT 4						MOVEMENT 5						MOVEMENT 6								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	1	0	6	8
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	6	6
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	3
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>8</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>18</b>	<b>20</b>
08:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	7	2	0	0	0	9	9
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	0	0	1	10	11
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	5	5
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	7	7
<b>H/TOT</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>31</b>	<b>32</b>
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	1	9	10
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	3
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	1	0	7	8
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	1	0	0	9	10
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>12</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>28</b>	<b>31</b>
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	1	0	8	9
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	1	0	0	7	8
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	3	0	0	0	11	11
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	3	4
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>29</b>	<b>32</b>
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	1	0	8	10
11:15	0	1	0	0	0	1	1	0	1	1	0	0	2	3	6	1	0	1	0	8	9
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	2	0	0	9	10
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	7	7
<b>H/TOT</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>23</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>32</b>	<b>36</b>
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	1	1	0	15	17
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	1	0	0	8	9
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	1	0	0	9	10
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	8	8
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>27</b>	<b>9</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>40</b>	<b>43</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 03

DATE: 4th July 2013

LOCATION: R395/Main Access Mayne

DAY: Thursday

TIME	MOVEMENT 4						MOVEMENT 5						MOVEMENT 6								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	0	0	12	12
13:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	8	0	0	0	0	8	8
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	2	0	0	11	12
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	2	0	0	9	10
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>31</b>	<b>5</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>42</b>
14:00	0	0	0	0	0	0	0	0	1	0	0	0	1	1	6	1	0	1	0	8	9
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	1	0	0	9	10
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	1	0	11	12
14:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	12	2	0	0	1	15	16
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>32</b>	<b>7</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>43</b>	<b>47</b>
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	1	0	0	12	13
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3	0	0	0	10	10
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	0	2	0	11	14
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	4	1	0	0	14	15
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>33</b>	<b>10</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>47</b>	<b>51</b>
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	4	0	0	0	11	11
16:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	12	6	1	0	1	20	22
16:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	2	4	1	0	0	7	8
16:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	5	4	1	0	0	10	11
<b>H/TOT</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>26</b>	<b>18</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>48</b>	<b>51</b>
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	0	0	0	11	11
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	1	0	0	17	18
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	1	0	0	11	12
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	4	1	0	0	17	18
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>38</b>	<b>15</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>56</b>	<b>58</b>
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	3	1	0	0	12	13
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	0	1	0	12	13
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	0	8	8
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	1	0	0	6	7
<b>H/TOT</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>38</b>	<b>40</b>
<b>P/TOT</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>7</b>	<b>300</b>	<b>109</b>	<b>26</b>	<b>11</b>	<b>4</b>	<b>450</b>	<b>481</b>

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 04

DATE: 4th July 2013

LOCATION: L1826/Main Access Ballinealoe

DAY: Thursday

TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 04

DATE: 4th July 2013

LOCATION: L1826/Main Access Ballinealoe

DAY: Thursday

TIME	MOVEMENT 1						MOVEMENT 2						MOVEMENT 3								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>P/TOT</b>	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1

## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 04

DATE: 4th July 2013

LOCATION: L1826/Main Access Ballinealoe

DAY: Thursday

TIME	MOVEMENT 4					TOT	PCU	MOVEMENT 5					TOT	PCU	MOVEMENT 6					TOT	PCU		
	CAR	LGV	OGV1	OGV2	BUS			CAR	LGV	OGV1	OGV2	BUS			CAR	LGV	OGV1	OGV2	BUS				
07:00	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
07:15	1	0	0	0	0	1	1	3	2	0	0	0	5	5	0	0	0	0	0	0	0	0	0
07:30	1	0	0	0	0	1	1	2	2	0	0	0	4	4	0	0	0	0	0	0	0	0	0
07:45	0	1	0	0	0	1	1	4	3	1	0	0	8	9	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>9</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
08:00	0	2	0	0	0	2	2	5	3	0	0	0	8	8	0	0	0	0	0	0	0	0	0
08:15	1	0	0	0	0	1	1	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0
08:30	3	1	0	0	0	4	4	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
08:45	2	1	0	0	0	3	3	1	2	0	0	0	3	3	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
09:00	2	1	0	0	0	3	3	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	1	0	1	0	0	2	3	1	0	0	0	0	0	1	1	1
09:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
10:00	0	1	0	0	0	1	1	3	1	1	0	0	5	6	0	0	0	0	0	0	0	0	0
10:15	1	0	1	0	0	2	3	4	2	0	0	0	6	6	0	0	0	0	0	0	0	0	0
10:30	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	3	1	0	0	0	4	4	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>12</b>	<b>8</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
11:00	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
11:15	2	1	0	0	0	3	3	6	1	0	0	0	7	7	0	0	0	0	0	0	0	0	0
11:30	3	2	1	0	0	6	7	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	0
11:45	3	3	0	0	0	6	6	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>9</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>17</b>	<b>13</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
12:00	1	0	1	0	0	2	3	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0
12:15	2	1	0	0	0	3	3	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
12:30	4	0	0	0	0	4	4	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0
12:45	3	1	1	0	0	5	6	4	1	0	0	0	5	5	0	0	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>10</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>15</b>	<b>11</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



## ABACUS TRANSPORTATION SURVEYS

**COOLE CO. WESTMEATH TRAFFIC COUNTS  
MANUAL CLASSIFIED JUNCTION COUNT**

**JULY 2013  
ATH/13/045**

SITE: 04

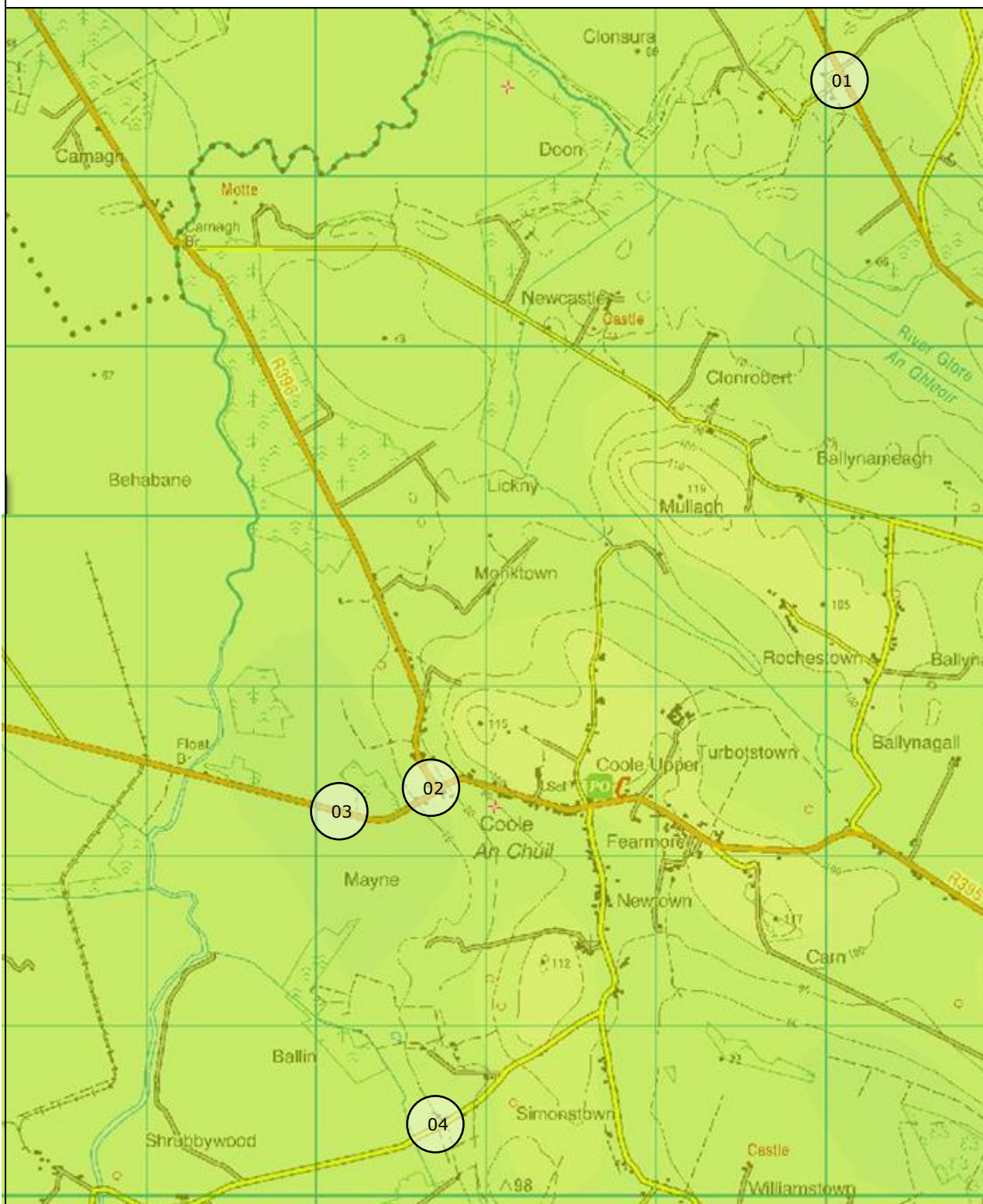
DATE: 4th July 2013



LOCATION: L1826/Main Access Ballinealoe

DAY: Thursday

TIME	MOVEMENT 4						MOVEMENT 5						MOVEMENT 6								
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
13:00	1	2	0	0	0	3	3	2	0	0	0	0	2	2	0	0	0	0	0	0	0
13:15	1	0	0	0	0	1	1	1	1	1	0	0	3	4	0	0	0	0	0	0	0
13:30	5	0	1	0	0	6	7	0	1	0	0	0	1	1	0	0	0	0	0	0	0
13:45	5	1	0	0	0	6	6	4	0	2	0	0	6	7	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>12</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>17</b>	<b>7</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
14:00	1	0	0	0	0	1	1	4	1	0	0	0	5	5	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	3	2	0	0	0	5	5	0	0	0	0	0	0	0
14:30	2	1	0	0	0	3	3	3	1	0	0	0	4	4	0	0	0	0	0	0	0
14:45	2	1	0	0	0	3	3	5	1	0	0	0	6	6	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>7</b>	<b>15</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
15:00	3	0	0	0	0	3	3	3	1	1	0	0	5	6	0	0	0	0	0	0	0
15:15	1	3	1	0	0	5	6	2	0	0	0	0	2	2	0	0	0	0	0	0	0
15:30	2	2	0	0	0	4	4	2	1	0	0	0	3	3	0	0	0	0	0	0	0
15:45	2	0	1	0	0	3	4	6	0	2	0	0	8	9	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>8</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>16</b>	<b>13</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
16:00	2	1	1	0	0	4	5	3	1	1	0	0	5	6	0	0	0	0	0	0	0
16:15	2	1	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0
16:30	4	1	0	0	0	5	5	2	1	0	0	0	3	3	0	0	0	0	0	0	0
16:45	3	0	1	0	0	4	5	1	0	0	0	0	1	1	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>11</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>16</b>	<b>17</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
17:00	5	0	0	0	0	5	5	3	2	2	0	0	7	8	0	0	0	0	0	0	0
17:15	7	3	1	0	0	11	12	4	1	1	0	0	6	7	0	0	0	0	0	0	0
17:30	5	1	1	0	0	7	8	3	1	1	0	0	5	6	0	0	0	0	0	0	0
17:45	2	0	0	0	0	2	2	1	1	0	0	0	2	2	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>19</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>26</b>	<b>11</b>	<b>5</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>22</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
18:00	6	0	2	0	0	8	9	4	3	1	0	0	8	9	0	0	0	0	0	0	0
18:15	6	2	0	0	0	8	8	4	4	0	0	0	8	8	0	0	0	0	0	0	0
18:30	3	1	1	0	0	5	6	4	3	0	0	0	7	7	0	0	0	0	0	0	0
18:45	0	6	1	0	0	7	8	2	1	2	0	0	5	6	0	0	0	0	0	0	0
<b>H/TOT</b>	<b>15</b>	<b>9</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>30</b>	<b>14</b>	<b>11</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>P/TOT</b>	<b>107</b>	<b>43</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>165</b>	<b>173</b>	<b>123</b>	<b>50</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>192</b>	<b>202</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>

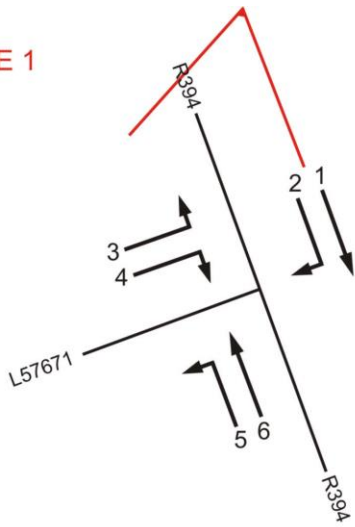
# Site Locations



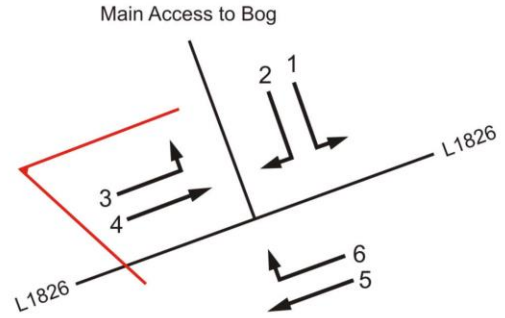
	Job number: ATH/13/045	Job date: 4 <sup>th</sup> July 2013	Drawing No: ATH/13/045-1	 Transportation Surveys
	Client: OES	Day: Thursday	Author: SPW	

# Turning Movements

SITE 1

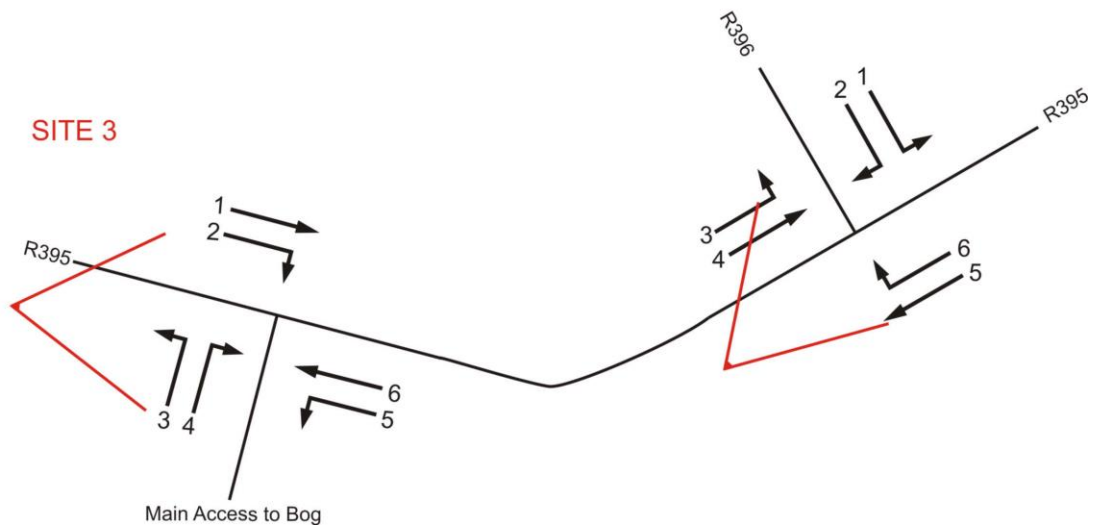




SITE 4



SITE 2

SITE 3



	Job number: ATH/13/045	Job date: 4 <sup>th</sup> July 2013	Drawing No: ATH/13/045-2	 Transportation Surveys
	Client: OES	Day: Thursday	Author: SPW	