

# ATKINS

## Appropriate Assessment Stage 1 Screening Report

### Proposed N24 Tower Road Junction Improvement Scheme,

Atkins Ireland Ltd  
Piltown, Co. Kilkenny





Ground Floor- Unit 3  
Bracken Business Park  
Bracken Road, Sandyford  
Dublin, D18 V4K6  
Tel: + 353 1 5677655  
Email: enviro@mores.ie

**Title: Appropriate Assessment Stage 1 Screening Report, Proposed N24 Tower Road Junction Improvement Scheme, Piltown, Co. Kilkenny**

**Job Number: E1479**

**Prepared By: Kathryn Broderick**

**Signed:** K. Broderick.

**Checked By: Dyfrig Hubble**

**Signed:** [Signature]

**Approved By: Kevin O'Regan**

**Signed:** KOR

**Revision Record**

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
00	14/01/19	AA	Draft	KB	DH	KOR
01	04/02/19	AA	Review	KB	DH	KOR
02	06/02/19	AA	Final	KB	DH	KOR

**Copyright and Third Party Disclaimer**

MORES has prepared this report for the sole use of our client (as named on the front the report) in accordance with the Client's instructions using all reasonable skill and competence and generally accepted consultancy principles. The report was prepared in accordance with the budget and terms of reference agreed with the Client and does not in any way constitute advice to any third party who is able to access it by any means. MORES excludes to the fullest extent lawfully permitted all liability whatsoever for any costs, liabilities or losses arising as a result of or reliance upon the contents of this report by any person or legal entity (other than the Client in accordance with the terms of reference). MORES has not verified any documents or information supplied by third parties and referred to herein in compiling this document and no warranty is provided as part of this document. No part of this report may be copied or reproduced without express written confirmation from MORES. Any methodology contained in this report is provided to the Client in confidence and must not be disclosed or copied to third parties without the prior written agreement of MORES. Disclosure of such information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests. Third parties who obtains access to this report by any means, including disclosure by the Client, will be subject to the Copyright and Third Party Disclaimer contained herein.

## Appropriate Assessment

### Proposed N24 Tower Road Junction Improvement Scheme,

### Piltown, Co. Kilkenny

### Atkins Ireland Ltd

## Contents

<b>1</b>	<b>INTRODUCTION</b> .....	<b>1</b>
1.1	Background .....	1
1.2	Regulatory Context .....	1
1.3	Stages of Appropriate Assessment.....	2
<b>2</b>	<b>SCREENING FOR APPROPRIATE ASSESSMENT</b> .....	<b>3</b>
2.1	Guidance Documents .....	3
2.2	Desk Based Studies.....	3
2.3	Field Based Studies .....	4
2.4	Statement of Authority .....	4
2.5	Survey Limitations .....	4
<b>3</b>	<b>DESCRIPTION OF THE PROJECT</b> .....	<b>5</b>
3.1	Site Context and Description .....	5
3.2	Need for the Proposed Development .....	6
3.3	Proposed Development .....	6
3.4	Environmental Impact Assessment Screening Report.....	9
<b>4</b>	<b>IDENTIFICATION OF NATURA 2000 SITES</b> .....	<b>10</b>
4.1	Lower River Suir SAC (Site Code: 002137) .....	11
<b>5</b>	<b>IDENTIFICATION &amp; ASSESSMENT OF POTENTIAL IMPACTS</b> 14	
5.1	Loss of, or Disturbance to, Habitats or Species.....	14
5.2	Potential Impairment of Water Quality .....	14
5.3	Potential Impacts during the Operational Phase.....	15
5.4	Analysis of ‘In-Combination’ Effects.....	15
<b>6</b>	<b>SCREENING CONCLUSIONS AND STATEMENT</b> .....	<b>16</b>
<b>7</b>	<b>REFERENCES</b> .....	<b>17</b>

## FIGURES

Figure 1: Site Location .....	1
Figure 2: Watercourses in the vicinity of the Site.....	5
Figure 3: Site Location and Natura 2000 Designated Sites within 15km.....	11

## TABLES

Table 1: Natura 2000 Designated Sites within 15km of the Site .....	10
Table 2: Qualifying Annex I Habitats for the Lower Suir SAC .....	12
Table 3: Qualifying Annex II Species for the Lower Suir SAC.....	12

## APPENDICES

Appendix A: Proposed Site Layout
Appendix B: Habitat Map
Appendix C: Lower River Suir SAC Conservation Objectives

# 1 INTRODUCTION

## 1.1 Background

Malone O'Regan Environmental (MOR Environmental) were commissioned by Kilkenny County Council (KCC) to undertake an Appropriate Assessment (AA) Screening Report for the proposed N24 Tower Road Junction Improvement Scheme on lands at Piltown, Co. Kilkenny (OS Reference S 449 225). The objective was to assess the potential impacts, if any, on nearby sites with European conservation designations (i.e. Natura 2000 sites).

The location of the proposed development ("the Site") is shown in Figure 1.

**Figure 1: Site Location**



The purpose of this assessment was to determine the appropriateness, or otherwise, of the proposed works in the context of the conservation objectives of such sites.

This AA will be submitted as part of the overall planning submission along with a preliminary Ecological Appraisal Report and preliminary Construction Environmental Management Plan in regards to implementing best practice guidelines for environmental management during construction and operational phases of the proposed development.

## 1.2 Regulatory Context

This AA Screening Report was prepared in compliance with the following legislation:

The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna better known as "The Habitats Directive" which provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These

are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC as amended 2009/149/EC) (better known as “The Birds Directive”).

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (now termed Natura Impact Statement (NIS)):

“Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site’s conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public”

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the project should aim to avoid any negative impacts on European sites by identifying possible impacts early in the planning stage, and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point, where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, it is rejected. If no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6 (4) of the Habitats Directive, then compensation measures are required for any remaining adverse effects.

### **1.3 Stages of Appropriate Assessment**

This AA Screening Report has been undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the ‘Habitats’ Directive 92/43/EEC (EC 2001) and the European Commission Guidance ‘Managing Natura 2000 Sites’. The Guidance for Planning Authorities issued by the Department of Environment, Heritage and Local Government (DOEHLG, December 2009, revised in February 2010) was also adhered to.

There are four distinct stages to undertaking an AA as outlined in the current EU and DOEHLG guidance:

1. Appropriate Assessment Screening;
2. Appropriate Assessment;
3. Assessment of alternatives in cases where significant impact cannot be prevented; and,
4. Where no alternatives exist, an assessment of compensatory issues in the case of projects or plans which can be considered to be necessary for imperative reasons of overriding public interest (IROPI).

This Report comprises a Stage 1 Screening Report, which seeks to determine whether the proposed development will, on its own or in combination with other plans / projects have a significant effect on Natura 2000 sites within a defined radius of the subject site.

## 2 SCREENING FOR APPROPRIATE ASSESSMENT

Screening determines whether Appropriate Assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with or necessary to the management of a Natura 2000 site; and,
2. Whether the project will have a potentially significant effect on a Natura 2000 site, either alone or in combination with other projects or plans, in view of the site's conservation objectives.

Screening involves the following:

- i) Description of a plan or project;
- ii) Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives;
- iii) Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary; and,
- iv) Screening Statement with conclusions.

### 2.1 Guidance Documents

The screening for Appropriate Assessment was prepared with reference and due consideration to the following documents:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild flora and fauna (Habitats Directive);
- Council Directive 79/409/EEC as amended 2009/149/EC on the conservation of wild birds (Birds Directive);
- Statutory Instrument No. 477/2011- European Communities (Birds and Natural Habitats) Regulation 2011;
- European Commission (2017). Managing Natura 2000 sites: the provisions of Article 6 of the Habitats Directive 92/43/EEC;
- European Commission (2001). Assessment of plans and projects significantly affecting Natura 2000 sites; Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC; and,
- Department of the Environmental, Heritage and Local Government (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for planning Authorities.

### 2.2 Desk Based Studies

A desk-based review of information was completed, which included the following sources of information:

- The National Parks and Wildlife Service (NPWS) website was consulted to obtain the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment (National Parks and Wildlife Service, 2019);
- The National Biodiversity Data Centre (NBDC) website was consulted with regard to species distributions (National Biodiversity Data Centre, 2019);

- The EPA Envision website was consulted to obtain details about watercourses in the vicinity of the Site (<http://gis.epa.ie/Envision/>) (EPA, 2019); and,
- The EPA Catchments website was also consulted to obtain details about watercourses in the vicinity of the Site (<https://www.catchments.ie/maps/>) (EPA, 2019).

### **2.3 Field Based Studies**

A Site walkover was undertaken on the 21<sup>st</sup> May 2018 by MOR Ecologists, to assess the on-site conditions and to identify any potential ecological receptors associated with the Natura 2000 sites.

### **2.4 Statement of Authority**

The Screening for Appropriate Assessment was prepared under the direction of Dyfrig Hubble, who provided peer review and support to the project.

Dyfrig Hubble has BSc has a B.Sc. (Hons) Tropical Environmental Science and an M.Sc. Environmental Forestry. Dyfrig is a full member of the Chartered Institute of Ecology and Environmental Management. Dyfrig has over 15 years' experience working in the ecological consultancy sector including habitat appraisals and specialist species specific surveys. Dyfrig has extensive experience in the preparation of appropriate assessment reports for various projects within both the UK and Ireland. He has conducted these projects for range of industrial sectors and different project types.

### **2.5 Survey Limitations**

No survey constraints in terms of accessing potential impacts on Natura 2000 Sites were encountered.

### 3 DESCRIPTION OF THE PROJECT

#### 3.1 Site Context and Description

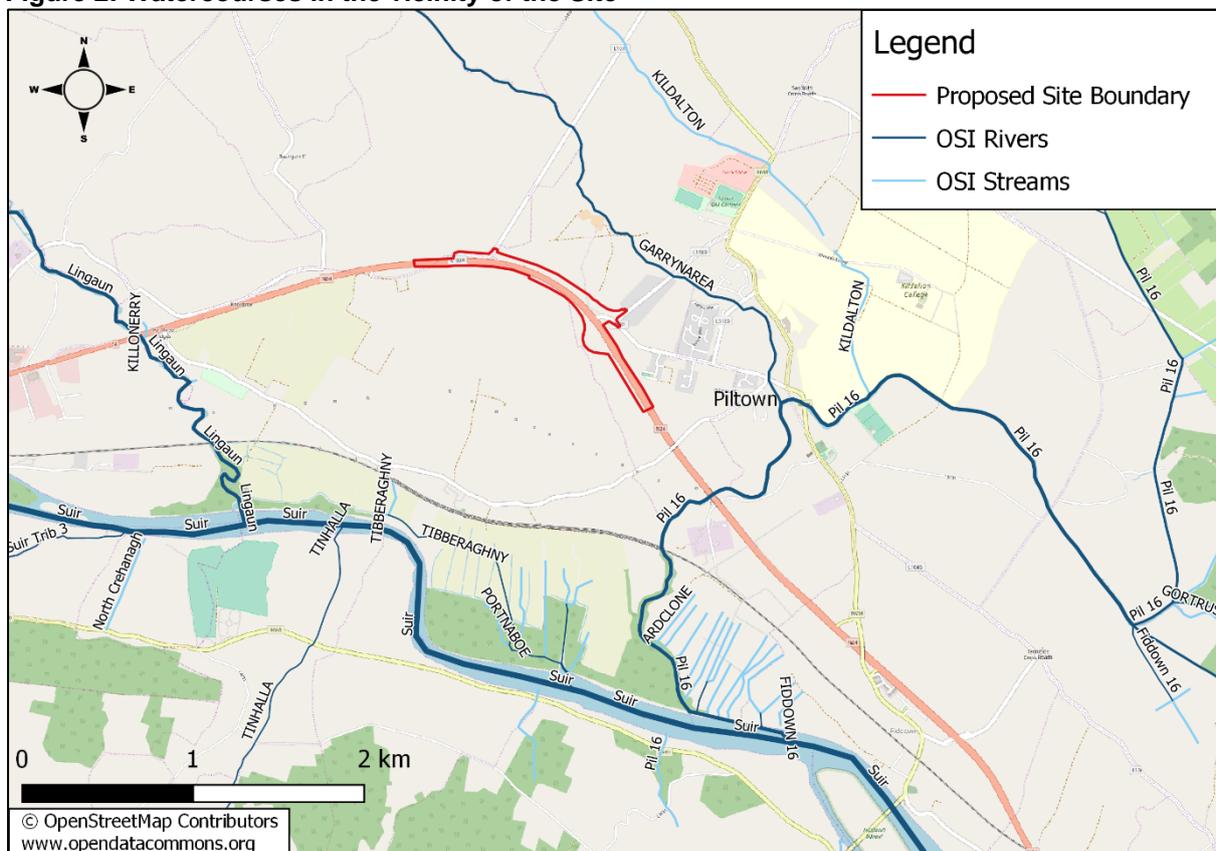
The Site, which is ca. 12ha in size, is located ca. 1.76km north west of the Kilkenny, Waterford, Tipperary County Border, along the National N24 Road directly west of Piltown, Co. Kilkenny, ca. 3.2km north east of Carrick-on-Suir, Co. Tipperary and 6.4km northwest of Portlaw, Co. Waterford within a predominantly rural landscape (refer to Figure 1).

The Site is comprised of a section of the N24 National Primary Road, along with associated hard shoulders, dry grassy verges, and connecting local road infrastructure including L3432 Tower Road, L1038 and L1039. The Site also includes the lands immediately surrounding the N24, which are comprised predominantly of agricultural fields. The majority of the fields comprise grasslands, which at the time of the survey were being used for grazing livestock and are comprised of a short grass sward. Areas of scrub were also noted within the Site Boundary (See Appendix B for attached Habitat Map).

The Garrynarea River is located ca. 280m north east of the proposed Site and is the nearest hydrological feature of note to the Site. The river flows in a south easterly direction and is a tributary of the River Pil\_16, which it joins ca. 700m east of the Site. The River Pil 16, forms part of the Lower River Suir SAC and flows in a southerly direction for ca.2.1km before discharging into the River Suir.

The River Suir, which is a designated Special Area of Conservation (SAC) flows in a south easterly direction, and eventually discharges to Waterford Harbour ca.28km downstream of the Site. The location of key local surface water features are presented in Figure 2.

**Figure 2: Watercourses in the vicinity of the Site**



## 3.2 Need for the Proposed Development

The objective of the proposed junction improvement works is to address existing safety concerns in the local road infrastructure and to facilitate safe junction movements.

The N24 National Primary Road connects the cities of Waterford and Limerick. In 2002, Kilkenny County Council completed a 9.3-kilometre improvement of the N24 between The Three Bridges (Tipperary/Kilkenny County Boundary) and Clonmore Cross, west of Mooncoin village. This wide single carriageway improvement bypassed the villages of Piltown and Fiddown.

After the completion of this section on the N24, from the period of 2002-2006, there were six fatal collisions, one serious injury collision and nine minor injury collisions. The problem of head-on collisions was evident on this section of road, and so in 2006, a two plus one (2+1) carriageway retrofit was carried out as a pilot project trialling this type of cross-section. Following the installation of the 2+1 scheme, road safety improved along the route with the severity of the collisions reducing.

Despite these road safety improvements, seven minor collisions were recorded from 2007-2009, specifically between the Ink Bottle and Tower Road Junctions, mainly involving conflicts from vehicles emerging from the junction and mainline traffic. Addressing these safety concerns, a low-cost scheme was introduced in 2010 in an effort to reduce collision rates at the junctions. The scheme channelled the N24 eastbound traffic down to one lane in advance of, and past, the Tower Road junction. Visibility improvements and measures to restrict overtaking were introduced.

In 2014, delineator posts were installed to prevent vehicles from turning right out of Ink Bottle Junction. Most recently in 2017, further interim improvements to the existing layout were funded by TII. The eastbound lane drop on the approach to the Tower Road junction was moved further west, signage and delineation were improved and two areas to facilitate speed enforcement were constructed.

Following these minor safety improvements for this section of the N24, Tramore House Regional Design Office carried out a Road Safety Impact Assessment (RSIA) to determine the most appropriate long-term solution for improving road safety at this section. The assessment found that from 2011 to 2016, there were two fatal collisions, three serious injury collisions and eight minor collisions along the 1.3km section of road under review. The assessment concluded that the interim measures, while worthwhile, would not be satisfactory as a long-term solution and identified this project concept as the preferred option.

It is anticipated that the proposed development will result in a significant decrease in collisions while also providing improved facilities for vulnerable road users, such as cyclists and pedestrians, using these junctions. Improvements to these junctions are necessary to ensure the safety of all road users.

## 3.3 Proposed Development

The proposal scheme entails the improvement of the N24 National Primary Route between the N24 Junction with the LS5010 Garrynarea Road and the eastern leg of the R698 compact grade-separated junction at Fiddown.

As part of the works, it is proposed to:

- Closure of the Ink Bottle Junction;
- Provide a new compact grade-separated junction and associated overbridge at the Tower Road Junction;

- Create a new link road and roundabout at Tower Road Junction in order to facilitate the closure of the Ink Bottle Junction;
- Provide provision of footpaths and cycle facilities at Tower Road Junction;
- Upgrade the current 2+1 N24 Road to two lanes in both directions on the N24 through the Tower Road Junction;
- Hard and soft landscaping;
- Installation of road markings and signage;
- Public lighting improvements;
- Development of a surface water drainage system; and,
- Accommodation works for land owners.

The project will aim to commence construction in mid-2020 with the opening of the new junction in 2021/2022 permitting planning approvals. The construction phase is expected to last for a maximum period of 12 months. The construction phase is to involve the following stages:

- Pre-earthworks: fencing of study-area boundary, study-area clearance, topsoil strip;
- Earthworks: cut and fill, borrow to fill, cut to tip, capping;
- Drainage and Services: pre-earthworks, temporary earthworks, carriageway drainage, services and footpaths;
- Structures: foundations, sub-structures, superstructures, finishing;
- Carriageway: sub base construction, road base, wearing course, footpath construction; and,
- Finishings: traffic signs, road markings, safety fencing.

The proposed Scheme Layout is illustrated in Appendix A. Full details of the proposed development are provided within the Planning Report which has been submitted as part of the planning application to Kilkenny County Council.

### **3.3.1 Surface Water Drainage**

The proposed surface water drainage system has been designed to provide a surface water run-off collection and attenuation system to accommodate the flow that will be generated by the proposed development, most notably the additional areas of hard standing.

The design methodology for the proposed drainage scheme shall be in line with TII drainage design guidelines and Sustainable Drainage Systems (SuDS) policy. The surface water drainage for the proposed works will tie into the existing surface water drainage system that is already in place along the N24. French drains and sewer drains run along the section of the N24 which forms part of the Site.

Road surface drainage will be retained by a kerb and gully system. New oversized filter drains shall be constructed on each side of N24 pavement to collect runoff from the road, capping and adjacent embankments. A longitudinal gradient will carry road surface runoff to gullies which will then discharge to the existing drainage network on the N24.

The oversized filter drains will be filled with gravel into which runoff water is fed. The gravel in the filter drain provides some filtering of the runoff, trapping sediment, organic matter and oil residues. The oversized filter drains shall act to provide pollution control. A petrol interceptor shall also be installed on the downstream end of the filter drains before the tie in point to the

existing drainage. Silts and pollutants shall be captured in gullies and filter drains by this process.

The newly installed oversized filter drains shall then tie-in and discharge to the existing surface water drainage pipes at the southern tie in point of the proposed road upgrade. These existing surface water drainage pipes channel to open drainage ditches. These open drainage ditches appear to be heavily vegetated. These vegetation sections of ditch will slow flow rates and act as a natural filter for the surface water prior to discharging into the River Pil.

The proposed new filter drains shall be designed to attenuate runoff (from the new impermeable areas) prior to discharge to the existing surface water drainage network to the south and therefore there shall be no net increase in runoff from the proposed development than in the existing situation.

Surface water runoff from the proposed development to the existing surface water drainage system will be attenuated to greenfield runoff rates. It is considered that these flows would have negligible impact on both the local surface water regime.

### **3.3.2 Construction Procedures**

During the construction phase, the methods of working will comply with all relevant legislation (e.g. Wildlife Act (Amended) 2000, Fisheries (Consolidation) Act 1959, Environmental Protection Agency Acts 1992 and 2003, and Local Government (Water Pollution) Acts 1977 and 1990.) and best practice in reducing the environmental impacts of the works. Although construction phase impacts will be localised in nature, the impacts will be reduced as far as practicable through compliance with current construction industry best practice guidelines.

All potential construction phase environmental impacts will also be addressed through the implementation of a comprehensive Construction Environmental Management Plan (CEMP) in accordance with current best practice guidelines. This Plan will be prepared by the Main Contractor in advance of any works commencing. It will include procedures for monitoring the effectiveness of the environmental protection measures.

The Contractor shall ensure that all personnel working onsite are trained and aware of the measures detailed within the CEMP. The following guidance will be referred to within the method statement and will be followed during the construction phase of the project to prevent water pollution;

- C532 – *Control of Water Pollution from Construction, Guidance for Consultants and Contractors* (Construction Industry Research and Information Association (CIRIA), 2001).
- C741 – *Environmental Good Practice on Site* (4<sup>th</sup> edition) (CIRIA, 2015); and,
- C648 – *Control of Water Pollution from Linear Construction Projects, technical guidance* (CIRIA, 2006).

The proposed working methods outlined in the pCEMP for the proposed development works meet the following criteria: -

- The proposed working methods are a demonstrable part of invariable routine practice and procedures;
- These methods of work form a part of standard practice to limit impacts on the local environment; and;
- The methods are not intended to avoid or reduce significant effects on any European Designated sites.

A pCEMP has been prepared for the proposed works and is provided as part of the overall planning submission.

The proposed works will take approximately 12 months to complete. Working hours will generally be restricted to between 07:00 and 19:00 Monday to Friday and between 07:00 and 14:00 on Saturdays, with the exception of essential activities such as repairs. Construction work will not be permitted on Sunday or at night-time except where safety concerns necessitate it or if agreed in advance with the Planning Authority.

### **3.3.3 Monitoring**

The construction works will be subject to monitoring works by an appointed Ecological Clerk of Works (ECoW), to ensure that the works will be completed in line with the measures and recommendations made within the EIA Screening Report, Preliminary Ecological Appraisal Report and pCEMP. The frequency of monitoring will be detailed within the CEMP, with monitoring to take place during the key instructive elements of the works.

In addition, the ECoW will either deliver or provide the resident engineer with sufficient environmental information to deliver a Site induction to personnel working on the Site.

### **3.4 Environmental Impact Assessment Screening Report**

An Environmental Impact Assessment (EIA) screening statement was prepared for the proposed N24 improvement scheme. Given the presence of the existing road infrastructure, the scale and nature of the proposed development and taking account of all available information, it is considered that the overall likelihood of impacts on the receiving environment is considered to be low / negligible. No significant environmental impacts are anticipated, once standard industry environmental management systems are in place.

The screening report concluded that the preparation of an Environmental Impact Assessment Report (EIAR) is not required for the proposed development under the Planning and Development Act 2000, as amended, and incorporating the Planning and Development Regulations 2001, as amended.

## 4 IDENTIFICATION OF NATURA 2000 SITES

In accordance with the European Commission Methodological Guidance (European Commission, 2002) a list of European sites that can be potentially affected by the proposed development has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government (DoEHLG, 2009) states that defining the likely zone of impact for the screening and the approach used will depend on the nature, size, location and the likely effects of the project. The key variables determining whether or not a particular Natura 2000 site is likely to be negatively affected by a project are: the physical distance from the project to the site; the sensitivities of the ecological receptors; and, the potential for in-combination effects.

Adopting the precautionary principle, all SAC and SPA sites within a 15km radius of the proposed development Site have been considered (Refer to Figure 4).

Four Natura 2000 designated site were identified within 15km of the Site (Table 1, Figure 3).

**Table 1: Natura 2000 Designated Sites within 15km of the Site**

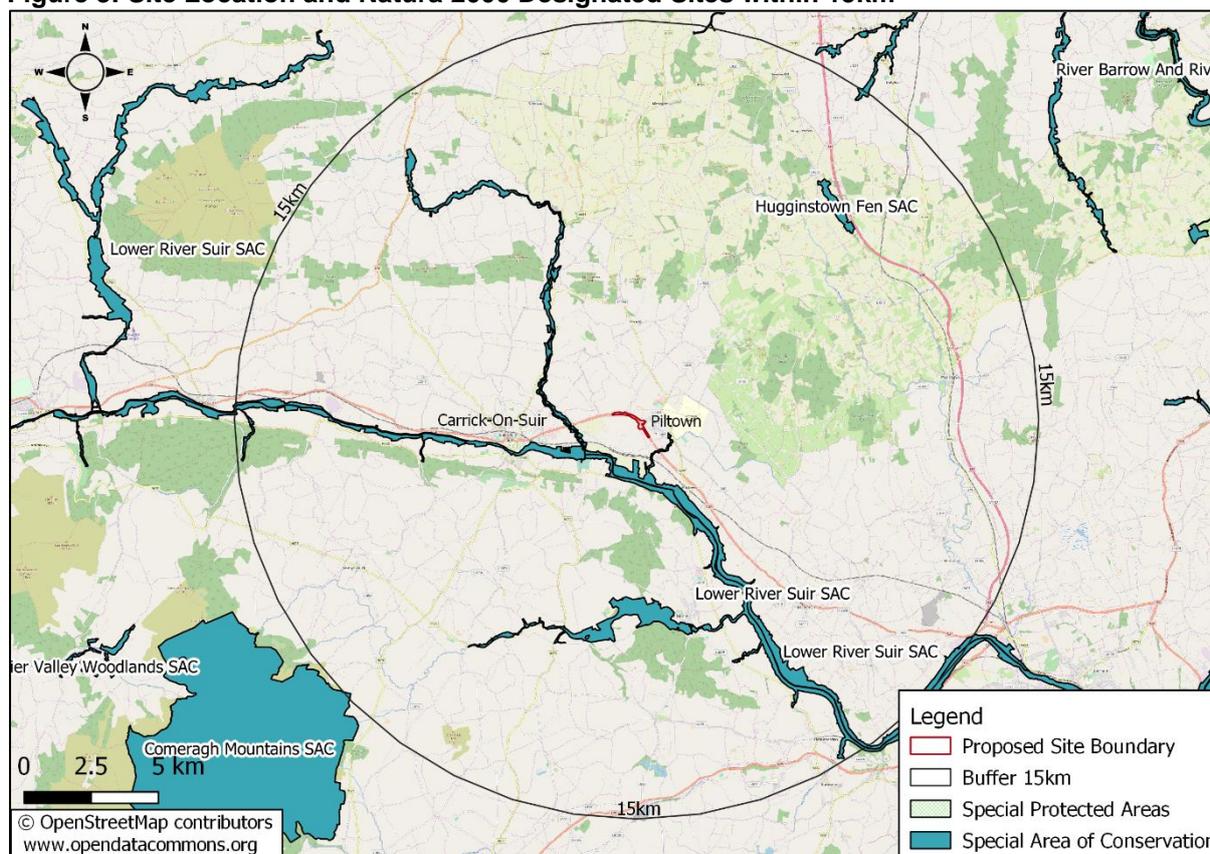
Site Name	Site Code	Distance	Direction
<b>Special Area of Conservation</b>			
Lower River Suir SAC	002137	570m	SE
Hugginstown Fen SAC	000404	10.4km	NE
Comeragh Mountains SAC	001952	14.8km	SW
River Barrow and River Nore SAC	002162	14.4km	NE

The proposed development Site is not located within or directly adjacent to any Natura 2000 sites, however, the boundary of Lower River Suir SAC is located within 2km of the Site (Refer to Figure 3).

Given the proximity of the Site to the SAC, further consideration will be given to this European Designated Site to assess potential impacts resulting from the proposed development. Further details are provided in Section 4.1.

Three of the Natura 2000 sites are located over 10km away from the proposed development. However given the distance separating the Site from these Natuta 2000 Site and the absence of any impact pathways, Hugginstown Fen SAC, Comeragh Mountains SAC, and River Barrow and River Nore SAC have been screened out and will not require further assessment.

**Figure 3: Site Location and Natura 2000 Designated Sites within 15km**



#### **4.1 Lower River Suir SAC (Site Code: 002137)**

The Lower River Suir SAC, is an extensive site, which covers the freshwater stretches of the River Suir from south of Thurles, Co. Tipperary, to the Barrow-Suir confluence east of Cheekpoint, Co. Waterford.

The SAC is comprised of a number of Annex I habitats, including the priority habitats alluvial forest and Yew woodland (Tables 1 and 2 below). Other habitats within the Site include wet and dry grassland, marsh, reed swamp, improved grassland, tidal river, deciduous woodland and mudflats.

The SAC is of conservation interest for the presence of a number of Annex II species including Freshwater Pearl Mussel, Otter, White-clawed Crayfish, Salmon, Twaide Shad and three species of Lampreys, Sea, Brook and River. The site is one of the only three known spawning grounds in the country for Twaite Shad. The site is also of ornithological importance for the number of Annex I bird species, E.U Birds Directive including Golden Plover, Whooper Swan and Kingfisher.

Intensive agriculture is the primary land use along the banks of the river. The widespread use of fertiliser and slurry pose the greatest threats to the conservation status of the SAC due to the related impairment in water quality. Furthermore, there are multiple industrial developments, which border the site, and discharge into the river. Fishing is the primary tourism attraction along the stretches of the Suir, including both commercial and leisure fishing with numerous Angler Associations.

**Table 2: Qualifying Annex I Habitats for the Lower Suir SAC**

Qualifying Habitats (* denotes Priority Habitat)	Code	Site Conservation Objective
Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )	1330	Restore favourable conservation condition
Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	1410	Restore favourable conservation condition
Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation	3260	Maintain favourable conservation condition
Old sessile oak woods with Ilex and Blechnum in British Isles	91A0	Restore favourable conservation condition
Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )	91E0	Restore favourable conservation condition
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	6430	Maintain favourable conservation condition
<i>Taxus baccata</i> woods of the British Isles*	91J0	Restore favourable conservation condition

**Table 3: Qualifying Annex II Species for the Lower Suir SAC**

Species	Species Name	Code
Mammals listed on Annex II of the Habitats Directive	Otter ( <i>Lutra lutra</i> )	1355
Fish listed on Annex II of the Habitats Directive	Atlantic salmon ( <i>Salmo salar</i> )	1106
	Sea lamprey ( <i>Petromyzon marinus</i> )	1095
	Brook lamprey ( <i>Lampetra planeri</i> )	1096
	River lamprey ( <i>Lampetra fluviatilis</i> )	1099
	Twaite shad ( <i>Alosa fallax</i> )	1103
Molluscs listed on Annex II of the Habitats Directive	Freshwater pearl mussel ( <i>Margaritifera margaritifera</i> )	1029
Crustaceans listed on Annex II of the Habitats Directive	White-clawed crayfish ( <i>Austropotamobis pallipes</i> )	1092

#### 4.1.1 Conservation Objectives

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as candidate Special Areas of Conservation. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Conservation objectives for Lower River Suir SAC are as follows (See Appendix C for full details):

To maintain or restore the favourable conservation condition of the Annex I habitat(s) and the Annex II species for which the SAC has been selected.'

The habitats and species for which the SAC is designated are listed in Table 2 and 3 above.

## 5 IDENTIFICATION & ASSESSMENT OF POTENTIAL IMPACTS

Potential impacts, if any, on the European sites identified within a 15km radius of the Site were considered.

A number of factors were examined at this stage and dismissed due to the very low risk associated with them. The following areas were examined in relation to potential impacts from the proposed development:

- Loss of, or Disturbance to, Habitats or Species;
- Potential Impairment of Water Quality; and,
- Potential Impacts during the Operational Phase.

### 5.1 Loss of, or Disturbance to, Habitats or Species

It is considered that the proposed development will not result in any direct or indirect loss or disturbance to any of the Annex I habitats (listed in Table 2) or Annex I or II species (listed in Table 3). This assumption is based on the localised nature of the proposed development, and also on the distance separating the Site from the nearest Natura 2000 site.

The Annex I habitats for which the SAC is designated are not present on or within the vicinity of the proposed development and the habitats onsite are considered unsuitable for the species for which the Lower River Suir SAC is designated.

Of the species for which the SAC is designated, only otter has the potential to disperse from the river, as the other species are entirely aquatic. However the onsite habitats are not considered suitable for otter, given the land use of the area and the large areas of hardstanding. Furthermore the levels of human activity reduce the suitability of the Site for otter. It should also be noted that the watercourse will not be impacted by the proposed works and will remain available for species such as otter should they utilise this area.

Furthermore, the intervening lands between the Site and the nearest Natura 2000 site also act as a significant buffer, this includes Piltown Village, large areas of agricultural grassland, along with the N24 National Primary Road and local road infrastructure (L1039 and L3432).

Taking the above into consideration, it is considered highly unlikely that the proposed works will have an impact on the Natura 2000 Sites or any of the qualifying species of interest.

### 5.2 Potential Impairment of Water Quality

The Garrynarea River is the main hydrological feature in close proximity to the Site, located ca.280m north east of the Site. However given the topography of the area no direct hydrological connectivity between these two Sites is present.

The River Pil 16, which is located ca. 570m southeast of the proposed development, forms part of the Lower River Suir SAC (Refer to Section 3.1). The topography both on Site and on the intervening lands between the Site and the River Pil is relatively flat. No surface water drainage ditches were noted on the Site.

Should contaminated run-off arising from both the construction of the proposed development and future operations of the road infrastructure enter the River Pil, this could adversely affect the water quality within the river and waterbodies further downstream and subsequently impact both protected habitats and species within the protected Natura 2000 sites (Lower River Suir SAC). Potential pollutants resulting from the construction works could include suspended solids and/or hydrocarbon leaks or spills.

However taking into consideration the nature of the Site in terms of the existing road infrastructure, the nature and scale of the works, the local topography and the distance

separating the Site from the River Pil, it is not likely that the proposed works will have any adverse effects on the qualifying species or habitats of interest for the Lower River Suir SAC. This assumption is also based on the localised nature of the development works and the intervening lands, agricultural grassland and road infrastructure separating the River Pil from the nearest construction area.

Furthermore, no waste water from the construction site will be pumped into the Garrynarea River or River Pil during the construction phase of the development. Nonetheless, all works will be undertaken in accordance with all recognised best practice guidelines as outlined in Section 3.2.2. of this report. It can therefore be considered that neither the proposed development works nor the future use of the proposed development will give rise to any significant impacts on the Garrynarea River or the River Pil and that the proposed development will not have any impact on either the surface water or groundwater quality of the Garrynarea River or the Lower River Suir SAC.

Comparing the current drainage system to the proposed drainage system, further attenuation will take place with the instalment of the oversized carrier pipes, potentially leading to improved filtration rates of runoff before enter the surface water channels, and thus improving the water quality of the runoff before reaching the River Pil.

It is considered that during both construction and operation, impacts are likely to be localized and temporary in duration. It is therefore considered that the proposed development will not any impact on the Lower River Suir SAC.

### **5.3 Potential Impacts during the Operational Phase**

The road improvement scheme is not within a Natura 2000 Site and at its nearest point is located over 500m away. It is not considered that the proposed road development works will result in any significant changes that will give rise to potential effects on the SAC.

### **5.4 Analysis of 'In-Combination' Effects**

The Habitats Directive requires competent authorities to undertake an appropriate assessment of any plan or project which is likely to have a significant effect alone or in combination with other plans and projects.

As described above, the proposed work alone is unlikely to have any direct or indirect significant effects on the Lower River Suir SAC. Furthermore, the development is considered unlikely to have any cumulative impact on the Lower River Suir SAC in the context of the existing N24 National Primary Road Infrastructure and associated activities.

This assumption is based on the distance separating the sites, the localised nature of the proposed development and the best practice measures that will be implemented during both the construction and operation phase.

Taking the above into account, it is concluded that there will not be any significant in-combination contribution by the proposed development to possible adverse effects on the Lower River Suir SAC or any European Designated Sites.

## 6 SCREENING CONCLUSIONS AND STATEMENT

The screening process has examined the details of the proposed development and has considered the potential for causing impacts on Natura 2000 European sites and their qualifying features of interests within a 15km radius of the proposed development.

Four designated sites, the Lower River Suir SAC, Hugginstown Fen SAC, Comeragh Mountains SAC, and River Barrow and River Nore SAC are located within a 15km radius of the proposed development.

Given the distance separating the sites and lack of impact pathways Hugginstown Fen SAC, Comeragh Mountains SAC, and River Barrow and River Nore SAC were screened out from further consideration. Further consideration was given to the Lower River Suir SAC.

It was however considered that given the localised nature of the development, the distances separating the Sites and existing road infrastructure as described in Section 5, it can be concluded that the proposed development will not result in any impacts either directly or indirectly on the conservation objectives or status of the SACs and will not result in the direct loss or disturbance of any Annex I habitats and / or Annex II species for which the Lower River Suir SAC, Hugginstown Fen SAC, Comeragh Mountains SAC, and River Barrow and River Nore SAC are designated.

In conclusion, activities associated with the proposed development either alone, or in combination with other projects or land uses, will not have any direct or indirect adverse effects on the conservation objectives of any European Designated sites.

This screening for Appropriate Assessment report is based on the information provided and best available scientific information. It is concluded that the proposed project poses no likely significant effects on the Natura 2000 sites. Accordingly, progression to Stage 2 of the Appropriate Assessment process (i.e. preparation of a Natura Impact Statement) is not considered necessary.

## 7 REFERENCES

- Bing Maps - Directions, trip planning, traffic cameras & more. (2019). *Bing Maps* . Retrieved from Bing Maps - Directions, trip planning, traffic cameras & more: <https://www.bing.com/maps/>
- Construction Industry Research and Information Association (CIRIA). (2001). *CIRIA C532 Control of Water Pollution from Construction, Guidance for Consultants and Contractors*. CIRIA.
- DoEHLG. (2009). *Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities*. Department of Environment, Heritage and Local Government .
- EPA. (2019). *Catchments*. Retrieved from Catchments.ie: <https://www.catchments.ie/maps/>
- EPA. (2019). *EPA Map Viewer*. Retrieved from EPA Maps: <http://gis.epa.ie/Envision>
- European Commission. (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of articles 6(3) and (4) of the Habitats Directive 92/43/EEC*. Luxembourg: Office for official publications of the European Communities .
- European Commission. (2011). *Science for Environment Policy; Reducing the potential 'ecological trap' of solar panels*. England: European Commission DG ENV.
- Fossitt, J. (2000). *A Guide to Habitats in Ireland* .
- Inland Fisheries Ireland. (2016). *Guidance and Protection of Fisheries during Construction Works in an adjacent to Water* . Dublin: IFI.
- National Biodiversity Data Centre. (2019). *National Biodiversity Live Maps*. Retrieved from National Biodiversity Data Centre: <http://maps.biodiversityireland.ie/>
- National Parks and Wildlife Service. (2019). *National Parks and Wildlife Service*. Retrieved from National Parks and Wildlife Service: <https://www.npws.ie>
- Ordnance Survey Ireland . (2015). *National Mapping Agency - Online Maps*. Dublin.
- Statutory Instrument (S.I.) No. 600 (2001), Planning and Development Regulations.

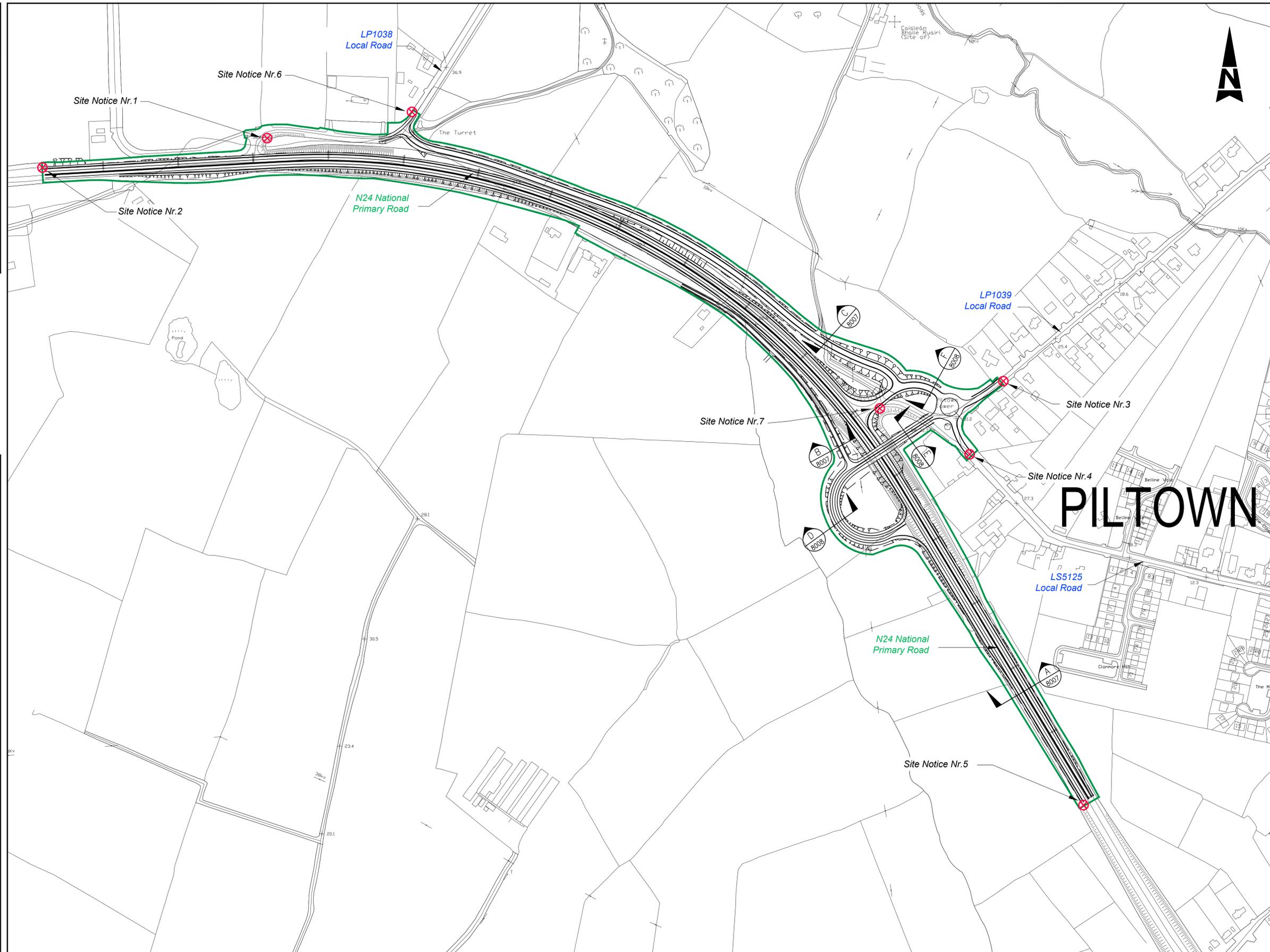
# APPENDICES

# APPENDIX A

100  
0 10  
A1

DO NOT SCALE

File: 5165044-HTR-DR-8003.dwg  
Date: Jan 31, 2019 - 6:05pm  
Plotted by: aosullivan



**GENERAL NOTES**

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE
2. ONLY WRITTEN DIMENSIONS SHALL BE USED. NO DIMENSIONS SHALL BE SCALED FROM THE DRAWINGS
3. ALL LEVELS ARE IN METRES AND ARE TO MALIN HEAD DATUM
4. ALL COORDINATES ARE IN METRES AND ARE TO IRISH TRANSVERSE MERCATOR
5. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION

**LEGEND:**

— PART 8 BOUNDARY

Purpose: **PART 8 PLANNING**

Title: **SITE LAYOUT PLAN**

Client: **KILKENNY COUNTY COUNCIL**

Project: **N24 TOWER ROAD JUNCTION IMPROVEMENT SCHEME**

Original Scale: 1:2500

Des/Drawn	RO'S	Checked	JR	Authorised	RAN
Date 18/12/18	Date 21/12/18	Date 21/12/18	Date 21/12/18		

Status: **P** Drawing Number: **5165044 / HTR / DR / 8003** Rev: **D**

© ORDNANCE SURVEY IRELAND LICENSE NR. AR 0082519. ORDNANCE SURVEY IRELAND & GOVERNMENT OF IRELAND

ATKINS NOT TO BE HELD LIABLE FOR THE USE OF THIS DATA ON ANY PROJECT OTHER THAN THE N24 TOWER ROAD JUNCTION IMPROVEMENT SCHEME.

**PART 8 PLANNING**

**Kilkenny County Council,**  
County Hall, John Street,  
Kilkenny R95 A39T

Rev	Description	By	Date	Chk'd	Auth
D	ISSUED FOR PART 8 PLANNING		01/19	JR	RAN
C	ISSUED FOR PART 8 PLANNING		01/19	JR	RAN
B	ISSUED FOR PART 8 PLANNING		01/19	JR	RAN
A	ISSUED FOR PART 8 PLANNING		01/19	JR	RAN
-	ISSUED FOR PART 8 PLANNING		01/19	JR	RAN

**ATKINS**

Member of the SNC-Lavalin Group

Atkins House, 150-155 Airside Business Park, Swords, Co. Dublin  
Tel (+353) 01 810 8000 Fax (+353) 01 810 8001

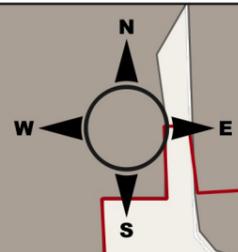
Unit 2B, 2200 Cork Airport Business Park, Cork  
Tel (+353) 021 429 0300 Fax (+353) 021 429 0360

2nd Floor Technology House Parkmore Technology Park, Galway  
Tel (+353) 091 786 050 Fax (+353) 091 779 830

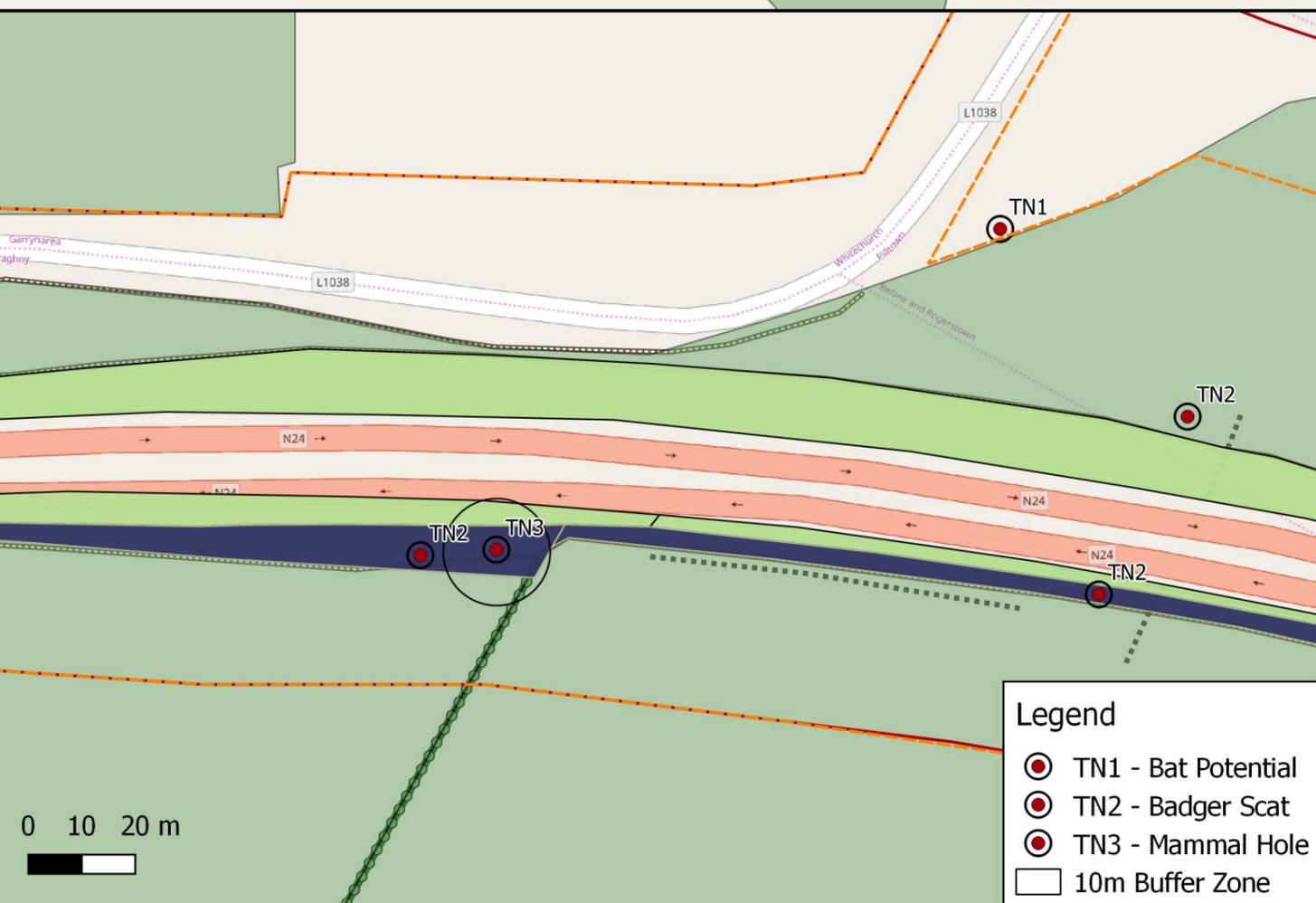
Client: **KILKENNY COUNTY COUNCIL**

Project: **N24 TOWER ROAD JUNCTION IMPROVEMENT SCHEME**

# APPENDIX B



- ### Legend
- Proposed Site Boundary
  - Surveyed Area
  - BC1 - Arable Crop
  - GA1 - Agricultural Grassland
  - GS2 - Grassy Verges
  - WS1 - Scrub
  - WS2 - Immature Woodland
  - WL1 - Hedgerow
  - WL2 - Treeline
  - WL1 / WL2 - Hedge / Treeline
  - FW4 - Drainage Ditch
  - Mammal Run
  - Fence
  - TN1 / TN1A - Bat Potential
  - TN2 - Badger Scat
  - TN3 - Mammal Hole



# APPENDIX C

# National Parks and Wildlife Service

---

## *Conservation Objectives Series*

---

### Lower River Suir SAC 002137



An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

---

Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs



**National Parks and Wildlife Service,  
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs,  
7 Ely Place, Dublin 2, Ireland.  
Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@ahg.gov.ie](mailto:nature.conservation@ahg.gov.ie)**

**Citation:**

**NPWS (2017) Conservation Objectives: Lower River Suir SAC 002137. Version 1.  
National Parks and Wildlife Service, Department of Arts, Heritage, Regional,  
Rural and Gaeltacht Affairs.**

**Series Editor: Rebecca Jeffrey  
ISSN 2009-4086**

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

### **Notes/Guidelines:**

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

Code	Description
002137	Lower River Suir SAC
1029	Freshwater Pearl Mussel <i>Margaritifera margaritifera</i>
1092	White-clawed Crayfish <i>Austropotamobius pallipes</i>
1095	Sea Lamprey <i>Petromyzon marinus</i>
1096	Brook Lamprey <i>Lampetra planeri</i>
1099	River Lamprey <i>Lampetra fluviatilis</i>
1103	Twaite Shad <i>Alosa fallax fallax</i>
1106	Salmon <i>Salmo salar</i>
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
1355	Otter <i>Lutra lutra</i>
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )
3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
91A0	Old sessile oak woods with <i>Quercus</i> and <i>Ilex</i> in the British Isles
91E0	Alluvial forests with <i>Alnus</i> and <i>Salix</i> (Alno-Padion, Alnion incanae, Salicion albae)
91J0	Wet heath

**Please note that this SAC is adjacent to River Barrow and River Nore SAC (002162). See map 2. The conservation objectives for this site should be used in conjunction with those for the adjacent site as appropriate.**

## Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: [www.npws.ie/Publications](http://www.npws.ie/Publications)

### NPWS Documents

<b>Year :</b>	1998
<b>Title :</b>	Conservation management of the white-clawed crayfish, <i>Austropotamobius pallipes</i>
<b>Author :</b>	Reynolds, J.D.
<b>Series :</b>	Irish Wildlife Manual No. 1
<b>Year :</b>	2006
<b>Title :</b>	Otter survey of Ireland 2004/2005
<b>Author :</b>	Bailey, M.; Rochford, J.
<b>Series :</b>	Irish Wildlife Manual No. 23
<b>Year :</b>	2006
<b>Title :</b>	Initiation of a monitoring program for the freshwater pearl mussel, <i>Margaritifera margaritifera</i> , in the Clodiagh River (Suir)
<b>Author :</b>	Ross, E.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2007
<b>Title :</b>	A survey of juvenile lamprey populations in the Corrib and Suir catchments
<b>Author :</b>	O'Connor, W.
<b>Series :</b>	Irish Wildlife Manual No. 26
<b>Year :</b>	2007
<b>Title :</b>	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
<b>Author :</b>	NPWS
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2008
<b>Title :</b>	National survey of native woodlands 2003-2008
<b>Author :</b>	Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2009
<b>Title :</b>	Saltmarsh monitoring project 2007-2008
<b>Author :</b>	McCorry, M.; Ryle, T.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2009
<b>Title :</b>	NS II freshwater pearl mussel sub-basin management plans: monitoring of the freshwater pearl mussel in the Clodiagh
<b>Author :</b>	Ross, E.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2009
<b>Title :</b>	NS II freshwater pearl mussel sub-basin management plans: fisheries survey. Stage 1 report
<b>Author :</b>	Paul Johnston Associates
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2009
<b>Title :</b>	NS II freshwater pearl mussel sub-basin management plans: report on biological monitoring of surface water quality in Clodiagh (Waterford) catchment
<b>Author :</b>	Morgan, G.
<b>Series :</b>	Unpublished report to NPWS

<b>Year :</b>	2010
<b>Title :</b>	A provisional inventory of ancient and long-established woodland in Ireland
<b>Author :</b>	Perrin, P.M.; Daly, O.H.
<b>Series :</b>	Irish Wildlife Manual No. 46
<b>Year :</b>	2010
<b>Title :</b>	A technical manual for monitoring white-clawed crayfish ( <i>Austropotamobius pallipes</i> ) in Irish lakes
<b>Author :</b>	Reynolds, J., O'Connor, W., O'Keeffe, C.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No.45
<b>Year :</b>	2010
<b>Title :</b>	Second draft Clodiagh freshwater pearl mussel sub-basin management plan (2009-2015). March 2010
<b>Author :</b>	NPWS
<b>Series :</b>	Unpublished document to the Department of Environment, Heritage and Local Government
<b>Year :</b>	2010
<b>Title :</b>	NS2 freshwater pearl mussel sub-basin management plans. Phytobenthos monitoring of the Clodiagh catchment, Co. Waterford (SERBD). June and July
<b>Author :</b>	Ní Chatháin, B.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2012
<b>Title :</b>	Lower River Shannon SAC (site code: 2165) Conservation objectives supporting document- Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche- Batrachion vegetation V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2013
<b>Title :</b>	National otter survey of Ireland 2010/12
<b>Author :</b>	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
<b>Series :</b>	Irish Wildlife Manual No. 76
<b>Year :</b>	2013
<b>Title :</b>	Irish semi-natural grasslands survey 2007-2012
<b>Author :</b>	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
<b>Series :</b>	Irish Wildlife Manual No. 78
<b>Year :</b>	2013
<b>Title :</b>	Results of monitoring survey of old sessile oak woods and alluvial forests
<b>Author :</b>	O'Neill, F.H.; Barron, S.J.
<b>Series :</b>	Irish Wildlife Manual No. 71
<b>Year :</b>	2013
<b>Title :</b>	Results of a monitoring survey of yew woodland
<b>Author :</b>	Cross, J.; Lynn, D.
<b>Series :</b>	Irish Wildlife Manual No. 72
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments

<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS
<b>Year :</b>	2017
<b>Title :</b>	Lower River Suir SAC (site code: 2137) Conservation objectives supporting document- coastal habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document
<b>Year :</b>	2017
<b>Title :</b>	Survey and condition assessment of the freshwater pearl mussel, <i>Margaritifera margaritifera</i> (L.), in the Clodiagh River (Suir, Portlaw)
<b>Author :</b>	Ross, E.; Moorkens, E.; Killeen, I.
<b>Series :</b>	Unpublished report to NPWS

## Other References

<b>Year :</b>	1898
<b>Title :</b>	Contributions towards a Cybele Hibernica. Second Edition
<b>Author :</b>	Colgan, N.; Scully, R.W.
<b>Series :</b>	Edward Ponsonby, Dublin
<b>Year :</b>	1982
<b>Title :</b>	Otter survey of Ireland
<b>Author :</b>	Chapman, P.J.; Chapman, L.L.
<b>Series :</b>	Unpublished report to Vincent Wildlife Trust
<b>Year :</b>	1988
<b>Title :</b>	The reproductive biology of freshwater mussels in Ireland, with observations on their distribution and demography
<b>Author :</b>	Ross, E.D.
<b>Series :</b>	Unpublished Ph.D. Thesis, National University of Ireland, Galway
<b>Year :</b>	1991
<b>Title :</b>	The spatial organization of otters ( <i>Lutra lutra</i> ) in Shetland
<b>Author :</b>	Kruuk, H.; Moorhouse, A.
<b>Series :</b>	Journal of Zoology, 224: 41-57
<b>Year :</b>	1992
<b>Title :</b>	Status of the freshwater pearl mussels <i>Margaritifera margaritifera</i> and <i>M. m. durrovensis</i> in the Nore, Barrow and Suir River tributaries, south-east Ireland
<b>Author :</b>	Moorkens, E.A.; Costello, M.J.; Speight, M.C.D.
<b>Series :</b>	Irish Naturalists' Journal, 24(3): 127-131
<b>Year :</b>	1996
<b>Title :</b>	Studies on the biology and ecology of <i>Margaritifera</i> in Ireland
<b>Author :</b>	Moorkens, E.
<b>Series :</b>	Unpublished Ph.D. thesis, University of Dublin, Trinity College.
<b>Year :</b>	1999
<b>Title :</b>	Diet of otters ( <i>Lutra lutra</i> ) on Inishmore, Aran Islands, west coast of Ireland
<b>Author :</b>	Kingston, S.; O'Connell, M.; Fairley, J.S.
<b>Series :</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 99B: 173-182

- Year :** 2001  
**Title :** Aquatic plants in Britain and Ireland  
**Author :** Preston, C.D.; Croft, J.M.  
**Series :** Harley Books, Colchester
- 
- Year :** 2002  
**Title :** Reversing the habitat fragmentation of British woodlands  
**Author :** Peterken, G.  
**Series :** WWF-UK, London
- 
- Year :** 2002  
**Title :** A survey of the white-clawed crayfish (*Austropotamobius pallipes*) Lereboullet and of water quality in two catchments of eastern Ireland  
**Author :** Demers, A.; Reynolds, J.D.  
**Series :** Bulletin Francais de la Peche et de la Pisciculture, 367: 729-740
- 
- Year :** 2003  
**Title :** Monitoring the river, sea and brook lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*  
**Author :** Harvey, J.; Cowx, I.  
**Series :** Conserving Natura 2000 Rivers Monitoring Series No. 5. English Nature, Peterborough
- 
- Year :** 2003  
**Title :** Ecology of watercourses characterised by Ranunculion fluitantis and Callitriche-Batrachion Vegetation  
**Author :** Hatton-Ellis, T.W.; Grieve, N.  
**Series :** Conserving Natura 2000 Rivers Ecology Series No. 11. English Nature, Peterborough
- 
- Year :** 2003  
**Title :** Ecology of the allis and twaite shad  
**Author :** Maitland, P.S.; Hatton-Ellis, T.W.  
**Series :** Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough
- 
- Year :** 2003  
**Title :** Pondweeds of Great Britain and Ireland  
**Author :** Preston, C.D.  
**Series :** BSBI Handbook, No. 8, London
- 
- Year :** 2003  
**Title :** Identifying lamprey. A field key for sea, river and brook lamprey  
**Author :** Gardiner, R.  
**Series :** Conserving Natura 2000 rivers, Conservation techniques No. 4. English Nature, Peterborough
- 
- Year :** 2006  
**Title :** Otters - ecology, behaviour and conservation  
**Author :** Kruuk, H.  
**Series :** Oxford University Press
- 
- Year :** 2006  
**Title :** The status of host fish populations and fish species richness in European freshwater pearl mussel (*Margaritifera margaritifera*) streams  
**Author :** Geist, J.; Porkka, M.; Kuehn, R.  
**Series :** Aquatic Conservation: Marine and Freshwater Ecosystems, 16: 251-266
- 
- Year :** 2007  
**Title :** Evolutionary history of lamprey paired species *Lampetra fluviatilis* L. and *Lampetra planeri* Bloch as inferred from mitochondrial DNA variation  
**Author :** Espanhol, R.; Almeida, P.R.; Alves, M.J.  
**Series :** Molecular Ecology, 16: 1909-1924

<b>Year :</b>	2008
<b>Title :</b>	Poor water quality constrains the distribution and movements of twaite shad ( <i>Alosa fallax fallax</i> , Lacepede, 1803) in the watershed of river Scheldt
<b>Author :</b>	Maas, J.; Stevens, M.; Breine, J.
<b>Series :</b>	Hydrobiologia, 602: 129-143
<b>Year :</b>	2008
<b>Title :</b>	Flora of County Waterford
<b>Author :</b>	Green, P.
<b>Series :</b>	The National Botanic Gardens of Ireland, Dublin
<b>Year :</b>	2010
<b>Title :</b>	Otter tracking study of Roaringwater Bay
<b>Author :</b>	De Jongh, A.; O'Neill, L.
<b>Series :</b>	Unpublished draft report to NPWS
<b>Year :</b>	2010
<b>Title :</b>	Addressing the conservation and rehabilitation of <i>Margaritifera margaritifera</i> populations in the Republic of Ireland within the framework of the habitats and species directive
<b>Author :</b>	Moorkens, E.
<b>Series :</b>	Journal of Conchology, 40: 339
<b>Year :</b>	2011
<b>Title :</b>	Comparison of field- and GIS-based assessments of barriers to Atlantic salmon migration: a case study in the Nore Catchment, Republic of Ireland
<b>Author :</b>	Gargan, P.G.; Roche, W.K.; Keane, S.; King, J.J.; Cullagh, A.; Mills, P.; O'Keeffe, J.
<b>Series :</b>	Journal of Applied Ichthyology, 27 (Suppl. 3): 66-72
<b>Year :</b>	2012
<b>Title :</b>	Rare and threatened bryophytes of Ireland
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	National Museums Northern Ireland
<b>Year :</b>	2013
<b>Title :</b>	Aspects of brook lamprey ( <i>Lampetra planeri</i> Bloch) spawning in Irish waters
<b>Author :</b>	Rooney, S.M.; O'Gorman, N.M.; Green, F.; King, J.J.
<b>Series :</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 113B(1): 13-25
<b>Year :</b>	2013
<b>Title :</b>	Management strategies for the protection of high status water bodies
<b>Author :</b>	Ní Chatháin, B.; Moorkens, E.; Irvine, K.
<b>Series :</b>	Strive Report Series No. 99. EPA, Wexford
<b>Year :</b>	2013
<b>Title :</b>	Interpretation manual of European Union habitats- Eur 28
<b>Author :</b>	European Commission- DG Environment
<b>Series :</b>	European Commission
<b>Year :</b>	2014
<b>Title :</b>	Assessing near-bed velocity in a recruiting population of the endangered freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) in Ireland
<b>Author :</b>	Moorkens, E.; Killeen, I.
<b>Series :</b>	Aquatic Conservation: Marine and Freshwater Ecosystems, 24(6): 853-862

<b>Year :</b>	2015
<b>Title :</b>	Water quality in Ireland 2010-2012
<b>Author :</b>	Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.
<b>Series :</b>	EPA, Wexford
<b>Year :</b>	2015
<b>Title :</b>	Behaviour of sea lamprey ( <i>Petromyzon marinus</i> L.) at man-made obstacles during upriver spawning migration: use of telemetry to access efficacy of weir modifications for improved passage
<b>Author :</b>	Rooney, S.M.; Wightman, G.D.; O Conchuir, R.; King, J.J.
<b>Series :</b>	Biology and Environment: Proceedings of the Royal Irish Academy, 115B: 1-12
<b>Year :</b>	2015
<b>Title :</b>	River engineering works and lamprey ammocoetes; impacts, recovery, mitigation
<b>Author :</b>	King, J.J.; Wightman, G.D.; Hanna, G.; Gilligan, N.
<b>Series :</b>	Water and Environment Journal, 29: 482-488
<b>Year :</b>	2016
<b>Title :</b>	A narrative for conserving freshwater and wetland habitats in England
<b>Author :</b>	Mainstone, C.; Hall, R.; Diack, I.
<b>Series :</b>	Natural England Research Reports Number 064
<b>Year :</b>	2016
<b>Title :</b>	The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016
<b>Author :</b>	SSCS (Standing Scientific Committee on Salmon)
<b>Series :</b>	Independent Scientific Report to Inland Fisheries Ireland
<b>Year :</b>	Undated
<b>Title :</b>	WFD111 (2a) Coarse resolution rapid-assessment methodology to assess obstacles to fish migration: Field manual level A assessment
<b>Author :</b>	SNIFFER (Scotland and Northern Ireland Forum for Environmental Research)
<b>Series :</b>	SNIFFER WFD111

## Spatial data sources

<b>Year :</b>	Revision 2010
<b>Title :</b>	Saltmarsh Monitoring Project 2007-2008. Version 1
<b>GIS Operations :</b>	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1330, 1410 (map 3)
<hr/>	
<b>Year :</b>	Revision 2010
<b>Title :</b>	National Survey of Native Woodlands 2003-2008. Version 1
<b>GIS Operations :</b>	QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	91A0, 91E0 (maps 4 and 5)
<hr/>	
<b>Year :</b>	Revision 2012
<b>Title :</b>	Margaritifera Sensitive Areas data
<b>GIS Operations :</b>	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1029 (map 6)
<hr/>	
<b>Year :</b>	2016
<b>Title :</b>	NPWS rare and threatened species database
<b>GIS Operations :</b>	Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1029, 1092 (maps 6 and 7)
<hr/>	
<b>Year :</b>	2010
<b>Title :</b>	EPA WFD Waterbodies data
<b>GIS Operations :</b>	Creation of 20m buffer to river and stream centreline data. Dataset combined with derived OSi data for 1355 SSCO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1355 (no map)
<hr/>	
<b>Year :</b>	2005
<b>Title :</b>	OSi Discovery series vector data
<b>GIS Operations :</b>	Creation of 80m buffer on the marine side of high water mark (HWM); creation of 10m buffer on terrestrial side of HWM; combination of 80m and 10m HWM buffer datasets. Datasets combined with derived EPA WFD Waterbodies data for 1355 SSCO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1355 (no map)

**1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)**

**To restore the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For the sub-site (Little Island) and potential areas mapped: 33.43ha. See map 3	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). The sub-site Little Island (SMP site ID: SMP0052) that supports Atlantic Salt Meadows (ASM) was mapped during the SMP (4.11ha) and additional areas of potential ASM habitat (29.32ha) were identified from an examination of aerial photographs, giving a total estimated area of 33.43ha within Lower River Suir SAC. NB further unsurveyed areas may be present within the SAC. See the Lower River Suir SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 3 for known and potential distribution	Based on data from McCorry and Ryle (2009). Saltmarsh occurs on the River Suir estuary downstream of Waterford City in old flood meadows where the embankment is absent, or has been breached, and along the tidal stretches of some of the in-flowing channels below Little Island. NB further unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Little Island saltmarsh contains a well-developed topography and large, deep creeks are present. See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Based on data from McCorry and Ryle (2009). Much of the shoreline along the Lower River Suir channel has been modified by embankments, infilling and drainage. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). There are several saltmarsh communities present and zonation is moderately well-developed in the sub-site surveyed. The ASM transitions to grassland and freshwater habitats. This is typical of an estuary type saltmarsh with a significant freshwater influence. See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). As the sub-site is not grazed, the sward height is lush and rank in places. However, the overall sward structure is still quite variable. See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in McCorry and Ryle (2009)	See the coastal habitats supporting document for further details

Vegetation composition: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1% where it is known to occur	Based on data from McCorry and Ryle (2009). Common cordgrass ( <i>Spartina anglica</i> ) is present in the SAC, but swards are not a significant feature. See the coastal habitats supporting document for further details
--	----------	--	--

---

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

**To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession	Mediterranean Salt Meadows (MSM) habitat was not recorded in Lower River Suir SAC during the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Thus the total area of the qualifying habitat in the SAC is unknown. An NPWS survey in the 1990s noted stands of sea rush ( <i>Juncus maritimus</i> ), indicative of MSM, on the saltmarsh at Grantstown (NPWS internal files), but the habitat was not recorded in the Little Island sub-site during the SMP in 2007 (McCorry and Ryle, 2009). NB unsurveyed areas may be present within the SAC. See the Lower River Suir SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes	See note on area above. NB unsurveyed areas may be present within the SAC. See the coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Attribute and target based on data from McCorry and Ryle (2009). Mediterranean salt meadow habitat is found high up in the saltmarsh but requires occasional tidal inundation. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation in the sward	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of the area outside of creeks vegetated	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with characteristic species listed in McCorry and Ryle (2009)	See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1% where it is already known to occur	Attribute and target based on data from McCorry and Ryle (2009). See the coastal habitats supporting document for further details

## Conservation Objectives for : Lower River Suir SAC [002137]

### 3260 Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation

To maintain the favourable conservation condition of Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Kilometres	Area stable or increasing, subject to natural processes	The description of habitat 3260 covers upland rivers with bryophytes and macroalgae to lowland depositing rivers with pondweeds and starworts. The selection of Lower River Suir SAC used this broad interpretation. Conservation objectives for habitat 3260 concentrate on the high conservation value sub-types, however, little is known of the habitat's distribution or its sub-types in Lower River Suir SAC. There is a large number of lowland and tidal rivers in the SAC, as well as faster-flowing tributaries. Note: rooted macrophytes should be absent or trace (<5% cover) in freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) habitat. The freshwater pearl mussel (1029) conservation objective takes precedence over this objective for habitat 3260 in the Clodiagh River (Portlaw) within this SAC, because the mussel requires environmental conditions close to natural background levels
Habitat distribution	Occurrence	No decline, subject to natural processes	Further study is needed of Irish sub-types and their conservation value to interpret the broad description of habitat 3260 (European Commission, 2013). As noted above, little is known about the distribution of the habitat and its sub-types in Lower River Suir SAC. The uncommon, protected opposite-leaved pondweed ( <i>Groenlandia densa</i> ) was recorded in the SAC from floodplain ditches of the Suir near Carrick-on-Suir and Clonmel, as well as the Clodiagh near Portlaw (Colgan and Scully, 1898; NPWS internal files). See NPWS (2012) for information on the requirements of opposite-leaved pondweed. There are no known records for rare or threatened bryophytes from the rivers in the SAC (Lockhart et al., 2012). The rivers in the SAC are mainly lowland, depositing and tidal, and are likely dominated by marginal and submerged higher plants. Some fast-flowing rivers also occur that should, naturally, be dominated by macroalgae and bryophytes, with limited submerged or emergent higher plants
Hydrological regime: river flow	Metres per second	Maintain appropriate hydrological regimes	High conservation value sub-types are associated with natural hydrology. A natural flow regime is required for both plant communities and channel geomorphology to be in favourable condition, exhibiting typical dynamics for the river type (Hatton-Ellis and Grieve, 2003). For many sub-types, high flows are required to maintain the substratum necessary for the characteristic species. Flow variation can be particularly important, with high and flood flows being critical to the hydromorphology. Other aspects of hydrology, such as tidal regime, are important for certain sub-types of the habitat. The rivers in the SAC vary from naturally flashy, through depositing to tidal reaches
Hydrological regime: groundwater discharge	Metres per second	Maintain appropriate hydrological regime	Even small groundwater contributions can significantly alter hydrochemistry, particularly where there is basic bedrock and/or subsoils. Freshwater seepages can be very important in tidal reaches

Hydrological regime: tidal influence	Daily water level fluctuations - metres	Maintain natural tidal regime	Opposite-leaved pondweed ( <i>Groenlandia densa</i> ) is typical of the tidal reaches of large Irish rivers, e.g. Suir, Slaney, Shannon and Blackwater (see Preston and Croft, 2001; Preston, 2003). This species is listed as Near Threatened (Wyse Jackson et al., 2016) and is protected on the Flora (Protection) Order, 2015 (Statutory Instrument No. 356 of 2015). Both the disturbance and substratum associated with the tidal regime may be important drivers
Substratum composition: particle size range	Millimetres	Maintain appropriate substratum particle size range, quantity and quality, subject to natural processes	Many of the high conservation value sub-types are dominated by coarse substrata, and it is likely that bedrock, boulders, cobbles and coarse gravels were naturally abundant in many tributaries in this SAC, particularly where the freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) occurred. Fine substrata are naturally abundant in depositing and tidal reaches. The size and distribution of particles are largely determined by the river flow. The chemical composition (particularly minerals and nutrients) of the substratum is also important. The quality of finer sediment particles is a notable driver of rooted plant communities. Note: increased fine sediment is contributing to the unfavourable status of the freshwater pearl mussel in the Clodiagh. See the freshwater pearl mussel (1029) conservation objective
Water quality	Various	Maintain appropriate water quality to support the natural structure and functioning of the habitat	The specific targets may vary among sub-types. Depositing and tidal stretches of rivers may, naturally, be more nutrient-rich and, therefore Water Framework Directive (WFD) good status may suffice in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos. Faster-flowing tributaries that are naturally dominated by bryophytes and macroalgae typically require WFD high status. High status targets apply to freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) habitat in the Clodiagh (see The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009 - S.I. No. 296 of 2009). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), Environmental Protection Agency (EPA) river water quality reports (e.g. Bradley et al., 2015) and Ní Chatháin et al. (2013)
Typical species	Occurrence	Maintain typical species in good condition, including appropriate distribution and abundance	The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined. The typical species may include higher plants, bryophytes, macroalgae and microalgae, and invertebrates. As noted above, the protected vascular plant species opposite-leaved pondweed ( <i>Groenlandia densa</i> ) is associated with rivers and floodplains in the SAC. The banks of the Suir, particularly its tidal stretches, support a notable population of the rare <i>Rumex crispus</i> subsp. <i>uliginosus</i> (Green, 2008)
Floodplain connectivity	Hectares	Maintain floodplain connectivity necessary to support the typical species and vegetation composition of the habitat	River connectivity with the floodplain is important for the functioning of this habitat. Channels with a naturally functioning floodplain are better able to maintain habitat and water quality (Hatton-Ellis and Grieve, 2003). Floodplain connectivity is particularly important in terms of sediment sorting and nutrient deposition. High conservation value rivers are intimately connected to floodplain habitats and function as important wildlife corridors, connecting otherwise isolated or fragmented habitats in the wider countryside (Hatton-Ellis and Grieve, 2003; Mainstone et al., 2016). Alluvial woodland (91E0) is an important feature of rivers in Lower River Suir SAC (see the conservation objective for 91E0)

Fringing habitats	Hectares	Maintain marginal fringing habitats that support the typical species and vegetation composition of the habitat	Riparian habitats (including those along lake shores), particularly natural/semi-natural woodlands and wetlands, are an integral part of the structure and functioning of river systems, even where they do not form part of a natural floodplain. Fringing habitats can contribute to the aquatic food web (e.g. allochthonous matter such as leaf fall), provide habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates, assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling. Shade may also be important in suppressing algal growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. See Mainstone et al. (2016). Alluvial and riparian woodland is important for the rivers in Lower River Suir SAC
-------------------	----------	--	---

---

## Conservation Objectives for : Lower River Suir SAC [002137]

### 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

**To maintain the favourable conservation condition of Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat in the SAC is unknown. The lowland type communities of the habitat are considered to occur in association with the various areas of alluvial forest (91E0) within the SAC, notably at Fiddown, below Carrick-on-Suir and at Tibberaghny Marshes. This habitat type would also be expected to occur in association with other woodland types in fringe areas along the river and with areas of open marsh or wet grassland within the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes on area above
Hydrological regime: Flooding depth/height of water table	Metres	Maintain appropriate hydrological regime	This habitat requires winter inundation, which results in deposition of naturally nutrient-rich sediment
Vegetation composition: positive indicator species	Number of species at a representative number of monitoring stops	At least three positive indicator species present	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species is also presented
Vegetation composition: positive indicator species	Percentage cover at a representative number of monitoring stops	Cover of positive indicator species at least 40%	Attribute and target based on O'Neill et al. (2013), where the list of positive indicator species is also presented
Vegetation composition: non-native species	Percentage cover at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013). The spread of Japanese knotweed ( <i>Fallopia japonica</i> ) is noted as a threat at Tibberaghny (NPWS internal files)
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Cover of negative indicator species not more than 33%	Attribute and target based on O'Neill et al. (2013), where the list of negative indicator species is also presented
Vegetation composition: scrub, bracken and heath	Percentage at a representative number of monitoring stops	Cover of scrub, bracken ( <i>Pteridium aquilinum</i> ) and heath not more than 5%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: height	Height (centimetres) at a representative number of monitoring stops	Herb height at least 50cm	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Cover of bare soil not more than 10%	Attribute and target based on O'Neill et al. (2013)
Physical structure: grazing and disturbance	Square metres in local vicinity of a representative number of monitoring stops	Area of the habitat showing signs of serious grazing or disturbance less than 20m <sup>2</sup>	Attribute and target based on O'Neill et al. (2013)

## Conservation Objectives for : Lower River Suir SAC [002137]

### 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

To restore the favourable conservation condition of Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 29.3ha for sites surveyed. See map 4	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> were surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Lyranearla (NSNW site code: 1834) and Inchinsquillib Wood (NSNW site code: 1898). The area of old oak woodlands in the surveyed sites within the SAC is estimated to be 29.3ha. It is important to note that further unsurveyed areas are present within the SAC, including at Portlaw Wood within the Curraghmore Estate and other small pockets within the SAC (NPWS internal files). Map 4 shows the old oak woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 4	Distribution shown based on Perrin et al. (2008). NB further unsurveyed areas are present within this SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak ( <i>Quercus petraea</i> ) generally regenerates poorly. In suitable sites, ash ( <i>Fraxinus excelsior</i> ) can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-listed and other rare or localised species. The rare lichen tree lungwort ( <i>Lobaria pulmonaria</i> ), an indicator of ancient woodlands, is found in Portlaw Wood (NPWS internal files)
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files

Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak ( <i>Quercus petraea</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Rhododendron ( <i>Rhododendron ponticum</i> ) infestation at Portlaw Wood is noted as being serious, as well as the occurrence of beech ( <i>Fagus sylvatica</i> ), sycamore ( <i>Acer pseudoplatanus</i> ) and silver fir ( <i>Abies alba</i> ) in the woodland (NPWS internal files). Beech was reported from Lyranearla (NSNW site code: 1834) by Perrin et al. (2008)

## Conservation Objectives for : Lower River Suir SAC [002137]

### 91E0 Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

To restore the favourable conservation condition of Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)\* in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 32.9ha for sites surveyed. See map 5	Alluvial forest was surveyed in Lower River Suir SAC by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Fiddown (NSNW site code: 0022), Mountbolton (NSNW site code: 1823) and Ballycanvan Big (NSNW site code: 1839). Fiddown (0022) was also included in a national monitoring survey (O'Neill and Barron, 2013). The area of alluvial woodlands in the surveyed sites within the SAC is estimated to be 32.9ha. It is important to note that further unsurveyed areas of alluvial forest are present within the SAC, for example at islands below Carrick-on-Suir, at Shanbally (Coillte LIFE project site), Tibberaghny Marshes, along the lower stretches of the more westerly of the Suir tributaries and along both banks of the Suir as far east as the Dawn River (NPWS internal files). Map 5 shows the alluvial woodlands surveyed by Perrin et al. (2008)
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 5	Distribution shown based on Perrin et al. (2008). NB further unsurveyed areas are present within the SAC
Woodland size	Hectares	Area stable or increasing. Where topographically possible, "large" woods at least 25ha in size and "small" woods at least 3ha in size	The target areas for individual woodlands aim to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). In some cases, topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	Described in Perrin et al. (2008) and NPWS internal files
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Alder ( <i>Alnus glutinosa</i> ) and oak ( <i>Quercus</i> spp.) tend to regenerate poorly. Ash ( <i>Fraxinus excelsior</i> ) often regenerates in large numbers although few seedlings reach pole size
Hydrological regime: flooding depth/height of water table	Metres	Appropriate hydrological regime necessary for maintenance of alluvial vegetation	Periodic flooding is essential to maintain alluvial woodlands along river floodplains, but not for woodland around springs/seepage areas
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder ( <i>Alnus glutinosa</i> ))	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) identify the site Ballycanvan Big (NSNW site code: 1839) as being "possible ancient woodland"
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder ( <i>Alnus glutinosa</i> ), willows ( <i>Salix</i> spp.), oak ( <i>Quercus</i> spp.), ash ( <i>Fraxinus excelsior</i> ) and birch ( <i>Betula pubescens</i> )	Species reported in Perrin et al. (2008) and NPWS internal files
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Norway spruce ( <i>Picea abies</i> ) and sycamore ( <i>Acer pseudoplatanus</i> ) occur at Shanbally (NPWS internal files). Spread of Japanese knotweed ( <i>Fallopia japonica</i> ) is a problem at Tibberaghny (NPWS internal files). Cherry laurel ( <i>Prunus laurocerasus</i> ) and rhododendron ( <i>Rhododendron ponticum</i> ) have been reported as occurring in part of Ballycanvan Big (NSNW site code: 1839) by Perrin et al. (2008), but not within the alluvial woodland

## Conservation Objectives for : Lower River Suir SAC [002137]

### 91J0 Taxus baccata woods of the British Isles

To restore the favourable conservation condition of *Taxus baccata* woods of the British Isles\* in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	<i>Taxus baccata</i> woods of the British Isles habitat has not been mapped in detail for Lower River Suir SAC and thus the total area of the qualifying habitat is unknown. Yew ( <i>Taxus baccata</i> ) woodland is known to occur at Cahir Park in an area of c.500m by 50m. Cahir Park was included in a national monitoring survey of yew woodland (Cross and Lynn, 2013). NB further unsurveyed areas may be present within the SAC
Habitat distribution	Occurrence	No decline	A narrow stand of yew woodland occurs along the steep western flank of a limestone knoll at Cahir Park within Lower River Suir SAC. See Cross and Lynn (2013) for further details. NB further unsurveyed areas may be present within the SAC
Woodland size	Hectares	Area stable or increasing	Yew ( <i>Taxus baccata</i> ) has been planted on deeper soil on top of the knoll at Cahir Park. If the transplants survive, the area of yew woodland will be considerably expanded. See Cross and Lynn (2013) for further details
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and herb and bryophyte layer	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Yew ( <i>Taxus baccata</i> ) regenerates poorly under its own canopy but can regenerate under a canopy of other species or in the open if the competition from the field layer is not too strong
Woodland structure: dead wood	m <sup>3</sup> per hectare; number per hectare	At least 30m <sup>3</sup> /ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources
Woodland structure: indicators of local distinctiveness	Occurrence	No decline	Includes ancient or long-established woodlands (see Perrin and Daly, 2010), archaeological and geological features as well as red-data and other rare or localised species
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	See Perrin et al. (2008) and Cross and Lynn (2013) for further details
Vegetation composition: typical species	Occurrence	A variety of typical native species present, including yew ( <i>Taxus baccata</i> ) and ash ( <i>Fraxinus excelsior</i> )	See Perrin et al. (2008) and Cross and Lynn (2013) for further details

Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	The most common invasive species in this woodland type is beech ( <i>Fagus sylvatica</i> ), although there is evidence to suggest that it actually facilitates regeneration of yew ( <i>Taxus baccata</i> ). Numerous exotic species, including cherry laurel ( <i>Prunus laurocerasus</i> ) in particular, have been reported from Cahir Park (Cross and Lynn, 2013)
---	------------	---	---

---

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Restore distribution to 10.4km. See map 6	The conservation objective applies to the Clodiagh freshwater pearl mussel ( <i>Margaritifera margaritifera</i> ) population, which is listed on The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. (S.I. 296 of 2009). Full baseline distribution and abundance mapping was conducted in 2006 (Ross, 2006). Mussel habitat is widespread in the Clodiagh, with mussels almost continually present in low numbers from downstream of Clonea to above Portlaw (Ross, 2006). Mussels were nowhere abundant; maximum density was 3 per square metre (Ross, 2006). The habitat is significantly below carrying-capacity. The distribution in the Clodiagh has contracted since the 1990s (Ross, 2006). The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Clodiagh system. See NPWS (2010) for further information
Population size	Number of adult mussels	Restore population to at least 10,000 adult mussels	Ross (2006) counted 1,206 mussels and estimated a total population of 2,412, concluding that, given the large areas of physically suitable habitat, a much larger population was previously present and a major population decline had occurred. Ross (2009) measured an 18.5% decline in mussel numbers between 2006 and 2009 at transect 1, indicating continued losses. Ross et al. (2017) recorded 'rapid and alarming' declines of 56-94% between 2006 and 2016 at five monitoring locations (67% decline overall). Moorkens (2010) estimated the population to be less than 10,000. The target of 10,000 is considered appropriate for a functional, self-sustaining population. NPWS (2013), in producing a national population estimate, assumed the Clodiagh population had declined at a rate of 3% per year. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Clodiagh system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of each population no more than 65mm in length; and at least 5% of each population no more than 30mm in length	Mussels ≤65mm are 'young mussels' and found buried in the substratum or beneath adult mussels. Mussels ≤30mm are 'juvenile mussels' and always buried in the substratum. See the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. The Clodiagh failed both targets in 2006, 2009 and 2016 (Ross, 2006, 2009; NPWS, 2010; Ross et al., 2017). Ross (2006) found no juveniles, ≤65mm extremely uncommon, smallest individual was 45.4mm and 97% was >80mm. In 2009, the smallest mussel was 78mm and (based on Ross, 1988) 15-20 years old (Ross, 2009). The smallest of 21 mussels measured in 1986 was 48.6mm (Ross, 1988). NPWS (2010) concluded there had been no successful recruitment from 1986 to 2009. The Clodiagh population is considered to be unsustainable owing to lack of survival of juvenile and adult mussels. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. The Clodiagh failed both targets in 2009 (Ross, 2009; NPWS, 2010) and, as noted above, a major population decline has occurred (Ross, 2006; Ross et al., 2017), and is presumed to be on-going. In 2009, 1 transect and 1 delimited count were counted: T1 numbers had fallen from 27 in 2006 to 22, representing a 18.5% decline, while numbers were the same in C2. Seven dead shells were found among 23 live mussels at one location, indicating high mortality in parts of the Clodiagh. In 2016, 67 mussels were counted at five monitoring sites that had 205 mussels in 2006 (Ross et al., 2017). The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: extent	Kilometres	Restore suitable habitat in more than 8.8km in the Clodiagh system and any additional stretches necessary for salmonid spawning	Mussel habitat in the Clodiagh is known to occur from Clonea to Portlaw, and is sparsely occupied from c.630m downstream of Clonea to c.1.8km above Portlaw (Ross, 2006). Mussels were recorded at Portlaw as recently as the 1990s and downstream of Portlaw in the early 20th century. It is possible that some mussel habitat occurs upstream or downstream of the mapped stretches, but few mussels are likely to be found (Ross, 2006). The mussel habitat has been severely impacted for a significant period by sedimentation, other hydromorphological changes, organic pollution and eutrophication (NPWS, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Suitable habitat: condition	Kilometres	Restore condition of suitable habitat	The species' habitat is a combination of the area of 1) habitat adult and juvenile mussels can occupy; 2) spawning and nursery habitats host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of the generalised mussel distribution. Only spawning areas that regularly contribute juvenile fish to adult mussel habitat should be considered. Availability of mussel and fish habitat is determined by flow and substratum conditions. It is highly sensitive to hydromorphological changes, sedimentation and enrichment. Pressures throughout the catchment contribute to such impacts. Mussel habitat is widespread in the Clodiagh but in unfavourable condition owing to sedimentation, other hydro-morphological changes and nutrient enrichment. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality - macroinvertebrates: EQR greater than 0.90 (Q4-5 or Q5); phytobenthos: EQR greater than 0.93	The EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). In 2009, the habitat in the Clodiagh system failed the macroinvertebrate target, but passed the phytobenthos target (Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). Q values in the mussel habitat were Q3-Q4 (Morgan, 2009). There has been a gradual decline in quality at several main-channel sites since the late 1970s (Morgan, 2009). Sewage discharge at Clonea is impacting water quality downstream of Clonea Bridge (Ross, 2006; Morgan, 2009; Ní Chatháin, 2010; NPWS, 2010). See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality - filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The Clodiagh failed the macrophyte target, but marginally passed the macroalgal target in 2009 (NPWS, 2010). Patches of abundant <i>Ranunculus</i> were recorded by all surveyors, with up to 40% cover in places (Morgan, 2009; Ross, 2009; Ní Chatháin, 2010; NPWS, 2010). Ross (2006) also recorded widespread and, in places, abundant (up to 80%) <i>Ranunculus</i> . Algae were generally absent in 2009, however up to 10% <i>Cladophora</i> cover was recorded downstream of Clonea Bridge (Ní Chatháin, 2010; NPWS, 2010), where sewage fungus had previously been recorded (Ross, 2006). Algae were also sparse in 2006 and 2016 (Ross, 2006; Ross et al., 2017). Tree shade may be suppressing plant growth over much of the mussel habitat (Ross et al., 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: sediment	Occurrence	Restore substratum quality - stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The Clodiagh failed the target for the Sub-basin Management Plan in 2009 and 2016, with strong silt plumes recorded in mussel habitat (Ross, 2009; NPWS, 2010; Ross et al., 2017). Ross et al. (2017) recorded extremely heavy silt plumes at every site, even in fast riffles. Ross (2006) recorded significant siltation of the mussel habitat and observed river bank erosion and collapse, and livestock entry to the river. Silt in the Clodiagh is providing a rooting medium for macrophytes. Sufficient survival of juvenile and adult mussels is being prevented by the poor condition of the river substratum. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system
Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. Average redox was very poor, 23-28% at four sites monitored in 2016, only three of the 40 measurements was <20% (Ross et al., 2017). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

Hydrological regime: flow variability	Metres per second	Maintain appropriate hydrological regime	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other key factor). To restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fine sediment or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle; see Moorikens and Killeen (2014). Groundwater inflow to the substratum contributes to water-cycling. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of Clodiagh system
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval stage of the freshwater pearl mussel and essential to completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for mussels and a lack of mussel recruitment, while significantly lower host fish density and biomass were associated with high juvenile mussel numbers. Fish movements must be such that 0+ fish remain in the mussel habitat until their 1+ summer. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. No glochidia were found on young Clodiagh fish in May 2009, although six trout and 38 salmon were caught (Johnston, 2009; NPWS, 2010)
Fringing habitat: area and condition	Hectares	Restore the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, particularly natural/semi-natural woodlands and wetlands, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats aid in the settlement of fine suspended matter, protect banks from erosion, contribute to nutrient cycling and to the aquatic food web (e.g. allochthonous matter such as leaf fall) and provide habitat for life-stages of fish, birds and aquatic invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers (e.g. along parts of the Clodiagh) and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Clodiagh system

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1092 White-clawed Crayfish *Austropotamobius pallipes*

To maintain the favourable conservation condition of White-clawed Crayfish in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Occurrence	No reduction from baseline. See map 7	White-clawed crayfish ( <i>Austropotamobius pallipes</i> ) occurs extensively on the River Suir and on many of its tributaries. On the River Suir main channel, the species has been recorded on almost the entire length of non-tidal river from the most upstream point at Cabragh, near Thurles, to downstream of Kilsheelan. It is also present on the following tributaries: Anner and Clashawley, Clodiagh and Owenbeg, Multeen, Tar, Nier, and Clodiagh Lower
Population structure: recruitment	Occurrence of juveniles and females with eggs	Juveniles and/or females with eggs in all occupied tributaries	See Reynolds et al. (2010) for further details
Negative indicator species	Occurrence	No alien crayfish species	Alien crayfish species are identified as a major direct threat to this species and as a disease vector. Ireland is currently free of non-native invasive crayfish species. See Reynolds (1998) for further details
Disease	Occurrence	No instances of disease	Disease is identified as a major threat and crayfish plague has occurred in Ireland even in the absence of alien vectors. Disease can, in some circumstances, be introduced through contaminated equipment and water in the absence of vector species. See Reynolds (1998) for further details
Water quality	EPA Q value	At least Q3-4 at all sites sampled by EPA	Target taken from Demers and Reynolds (2002). Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)
Habitat quality: heterogeneity	Occurrence of positive habitat features	No reduction in habitat heterogeneity or habitat quality	Crayfish need high habitat heterogeneity. Larger crayfish must have stones to hide under, or an earthen bank in which to burrow. Hatchlings shelter in vegetation, gravel and among fine tree roots. Smaller crayfish are typically found among weed and debris in shallow water. Larger juveniles in particular may also be found among cobbles and detritus, such as leaf litter. These conditions must be available on the whole length of occupied habitat

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1095 Sea Lamprey *Petromyzon marinus*

To restore the favourable conservation condition of Sea Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	Artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting the species to lower stretches and restricting access to spawning areas (Gargan et al., 2011; Rooney et al., 2015). Float-over surveys by Inland Fisheries Ireland (IFI) point to little success of sea lamprey adults in passing the weirs in Clonmel in Lower River Suir SAC. Modifications to these weirs would facilitate upstream passage of sea lamprey. IFI has embarked on a programme of detailed survey of major barriers in SAC catchments, in the context of sea lamprey passage, using the SNIFFER (Scotland and Northern Ireland Forum for Environmental Research) WFDIII methodology
Population structure of juveniles	Number of age/size groups	At least three age/size groups present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Juvenile density at least 1/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003). A catchment-wide larval lamprey survey was completed by IFI in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Lampreys spawn in clean gravels. Substantial areas of suitable spawning habitat are available from Cahir to Carrick-on-Suir, but access to areas upstream of Clonmel is problematic
Availability of juvenile habitat	Number of positive sites in 3rd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1096 Brook Lamprey *Lampetra planeri*

To restore the favourable conservation condition of Brook Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block or cause difficulties to lampreys' migration both up- and downstream, thereby possibly limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of brook/river lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between brook and river lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by IFI. Brook lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally (Rooney et al., 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1099 River Lamprey *Lampetra fluviatilis*

To restore the favourable conservation condition of River Lamprey in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage of river accessible	Access to all water courses down to first order streams	Artificial barriers can block river lampreys' migration both up- and downstream, thereby limiting species to specific stretches, restricting access to spawning areas and creating genetically isolated populations (Espanhol et al., 2007)
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present	Attribute and target based on data from Harvey and Cowx (2003) and O'Connor (2007). It is impossible to distinguish between river and brook lamprey juveniles in the field (Gardiner, 2003), hence they are considered together in this target
Juvenile density in fine sediment	Juveniles/m <sup>2</sup>	Mean catchment juvenile density of brook/river lamprey at least 2/m <sup>2</sup>	Juveniles burrow in areas of fine sediment in still water. Attribute and target based on data from Harvey and Cowx (2003) who state 10/m <sup>2</sup> in optimal conditions and more than 2/m <sup>2</sup> on a catchment basis. A catchment-wide larval lamprey survey was completed by Inland Fisheries Ireland (IFI) in 2016. The data are currently being analysed
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning beds	Attribute and target based on spawning bed mapping by Inland Fisheries Ireland (IFI). River lampreys spawn in clean gravels where they excavate shallow nests and can spawn communally in numbers (Rooney et al., 2013)
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive	Silting habitat is essential for larval lamprey and they can be severely impacted by sediment removal. Recovery can be rapid and newly-created habitat can be rapidly colonised (King et al., 2015). However, it is vital that such sedimenting habitats are retained

**Conservation Objectives for : Lower River Suir SAC [002137]****1103 Twaite Shad *Alosa fallax fallax***

**To restore the favourable conservation condition of Twaite Shad in Lower River Suir SAC, which is defined by the following list of attributes and targets:**

<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Distribution: extent of anadromy	Percentage of river accessible	Greater than 75% of main stem length of rivers accessible from estuary	In some catchments, artificial barriers block twaite shads' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Population structure: age classes	Number of age classes	More than one age class present	
Extent and distribution of spawning habitat	m <sup>2</sup> and occurrence	No decline in extent and distribution of spawning habitats	
Water quality: oxygen levels	Milligrams per litre	No lower than 5mg/l	Attribute and target based on Maas et al. (2008)
Spawning habitat quality: Filamentous algae; macrophytes; sediment	Occurrence	Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	See Maitland and Hatton-Ellis (2003) for further information

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1106 Salmon *Salmo salar*

To restore the favourable conservation condition of Atlantic Salmon in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmon's upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Suir is currently below CL, meeting 79% of CL
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers currently exceeding their conservation limit (CL). The average electrofishing value for the Suir in 2016 was 10.2 salmon fry, which is below the 17 fry target
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice ( <i>Lepeophtheirus salmonis</i> )
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels. Artificial barriers are generally not currently preventing salmon from accessing suitable spawning habitat in Lower River Suir SAC
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

## Conservation Objectives for : Lower River Suir SAC [002137]

### 1355 Otter *Lutra lutra*

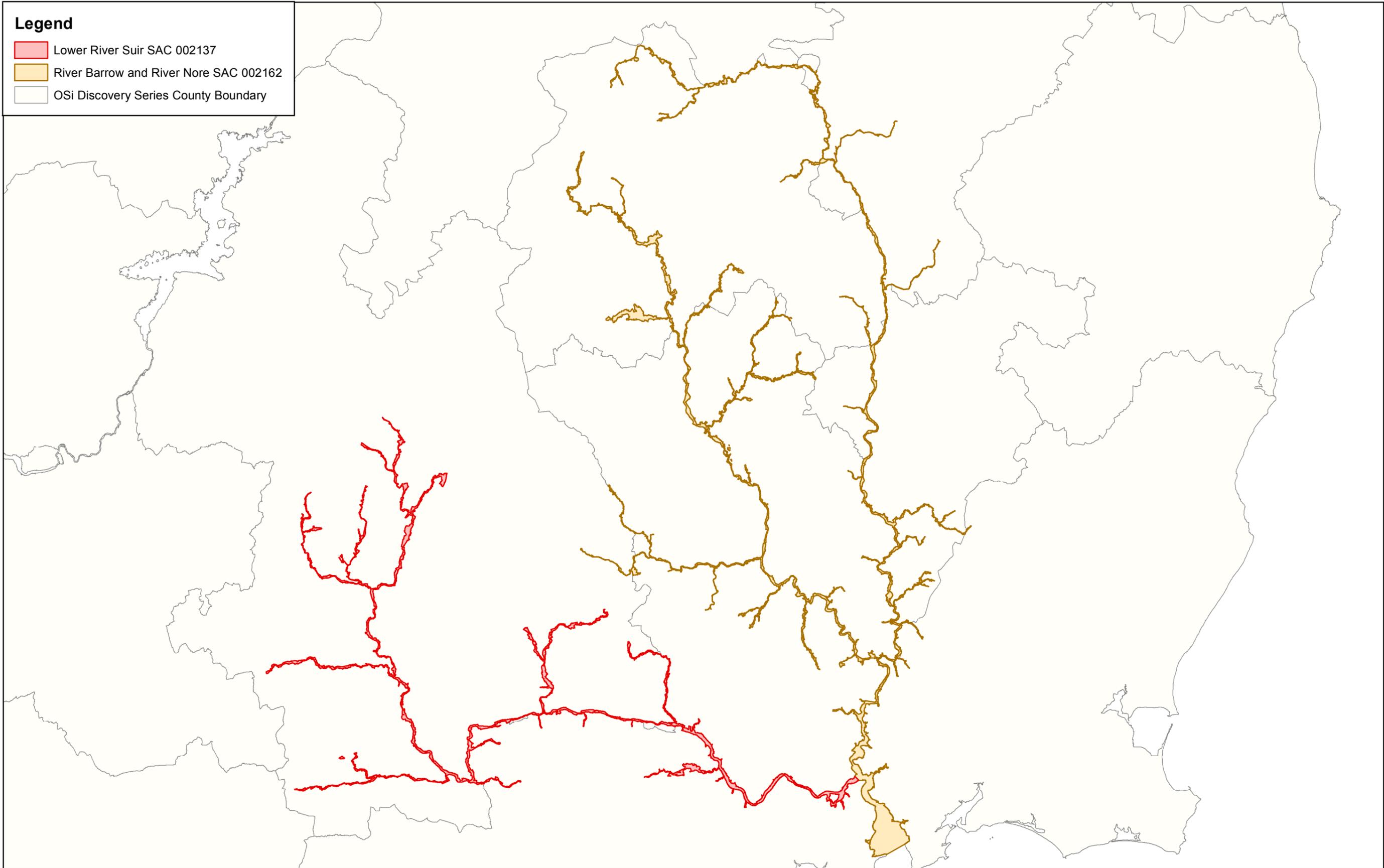
To maintain the favourable conservation condition of Otter in Lower River Suir SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al. 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 116.17ha above high water mark (HWM) and 726.61ha along river banks	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 712.27ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (Kruuk, 2006; NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 382.31km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed



**Legend**

- Lower River Suir SAC 002137
- River Barrow and River Nore SAC 002162
- OSi Discovery Series County Boundary




An Roinn Ealaíon, Oidhreacht,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs

**MAP 2:  
LOWER RIVER SUIR SAC  
CONSERVATION OBJECTIVES  
ADJOINING DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:  
**SAC 002137; version 3. SAC 002162; version 3.01**  
**CO. WATERFORD, CO. LIMERICK, CO. TIPPERARY,  
CO. KILKENNY**

0    6    12    18    24    30 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
Ordnance Survey of Ireland Licence No EN 0059216. © Ordnance Survey of Ireland Government of Ireland

Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas



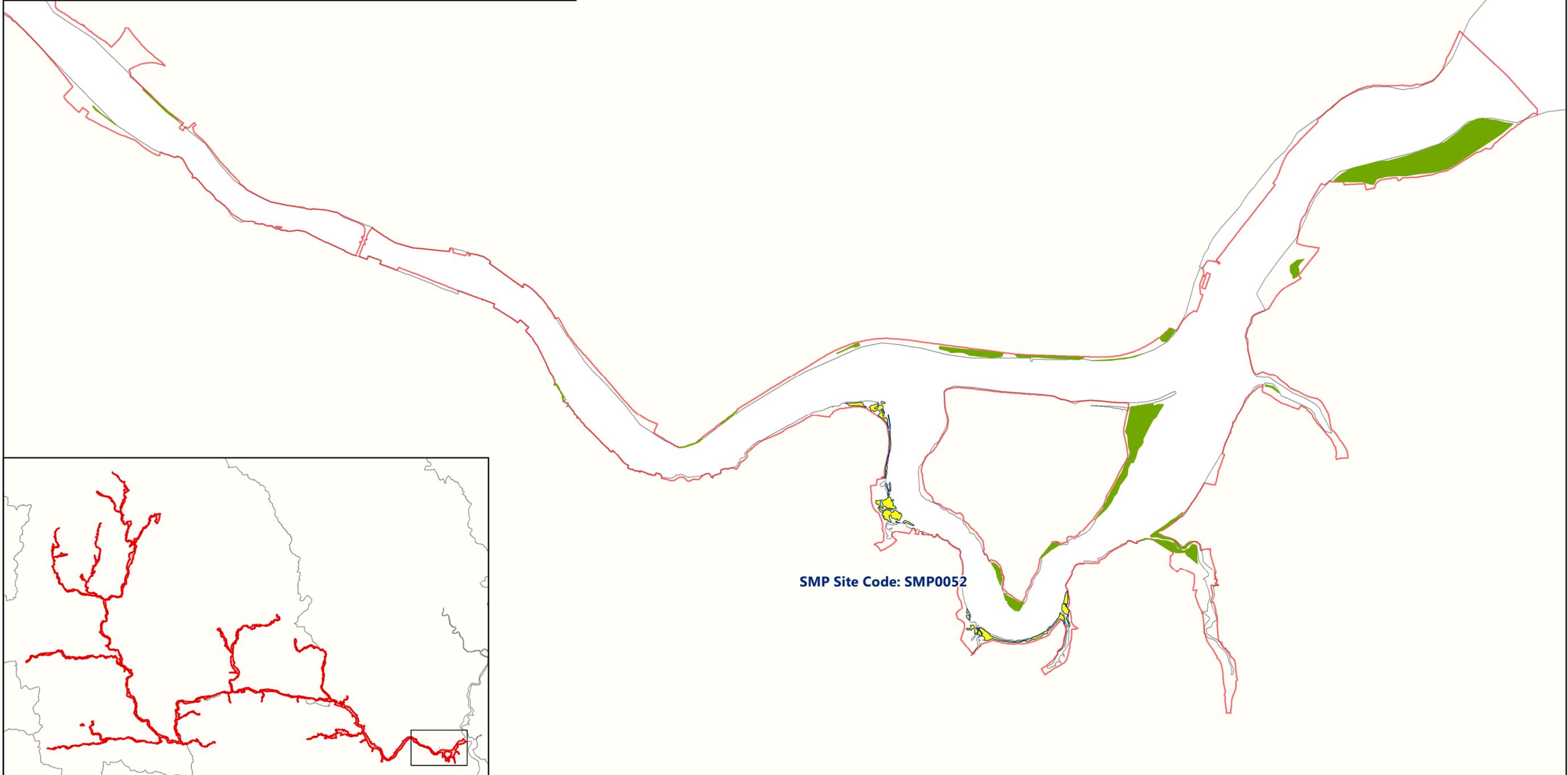
**Map Version 1**  
**Date: Oct 2016**

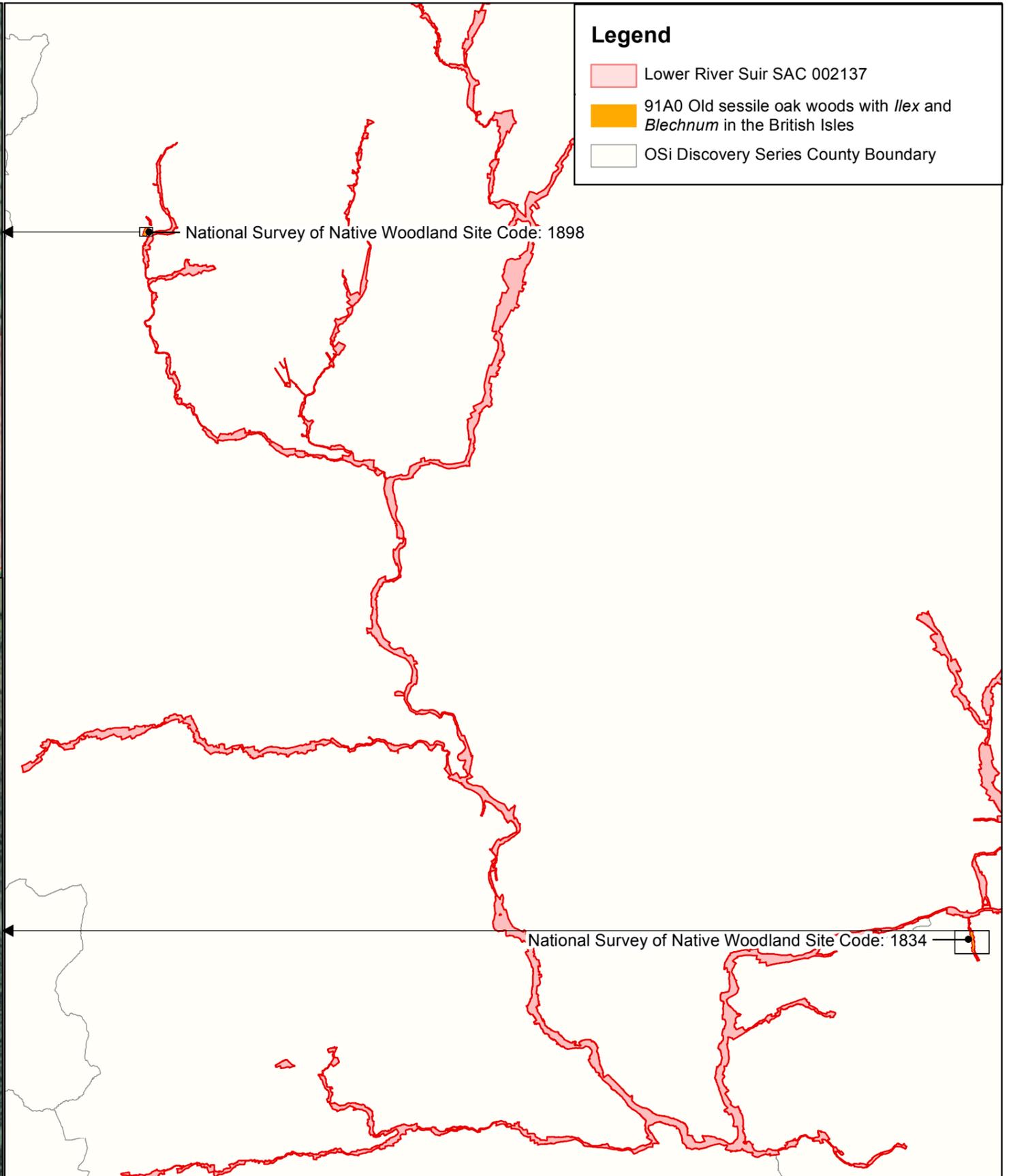
**Legend**

- Lower River Suir SAC 002137
- Saltmarsh Monitoring Project Survey Area

**Annex I Saltmarsh Habitats**

- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Potential 1330 Potential Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- OSi Discovery Series County Boundary





**Legend**

- Lower River Suir SAC 002137
- 91A0 Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
- OSi Discovery Series County Boundary

National Survey of Native Woodland Site Code: 1898

National Survey of Native Woodland Site Code: 1834



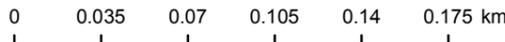
An Roinn Ealaíon, Oidhreachta,  
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,  
Regional, Rural and Gaeltacht Affairs

**MAP 4:  
LOWER RIVER SUIR SAC  
CONSERVATION OBJECTIVES  
OLD SESSILE OAK WOODLAND**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:  
SAC 002137; version 3.  
CO. WATERFORD, CO. LIMERICK, CO. TIPPERARY,  
CO. KILKENNY



The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
Ordnance Survey of Ireland Licence No EN 0059216. © Ordnance Survey of Ireland Government of Ireland

Nil sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas

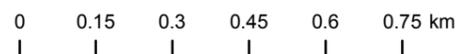
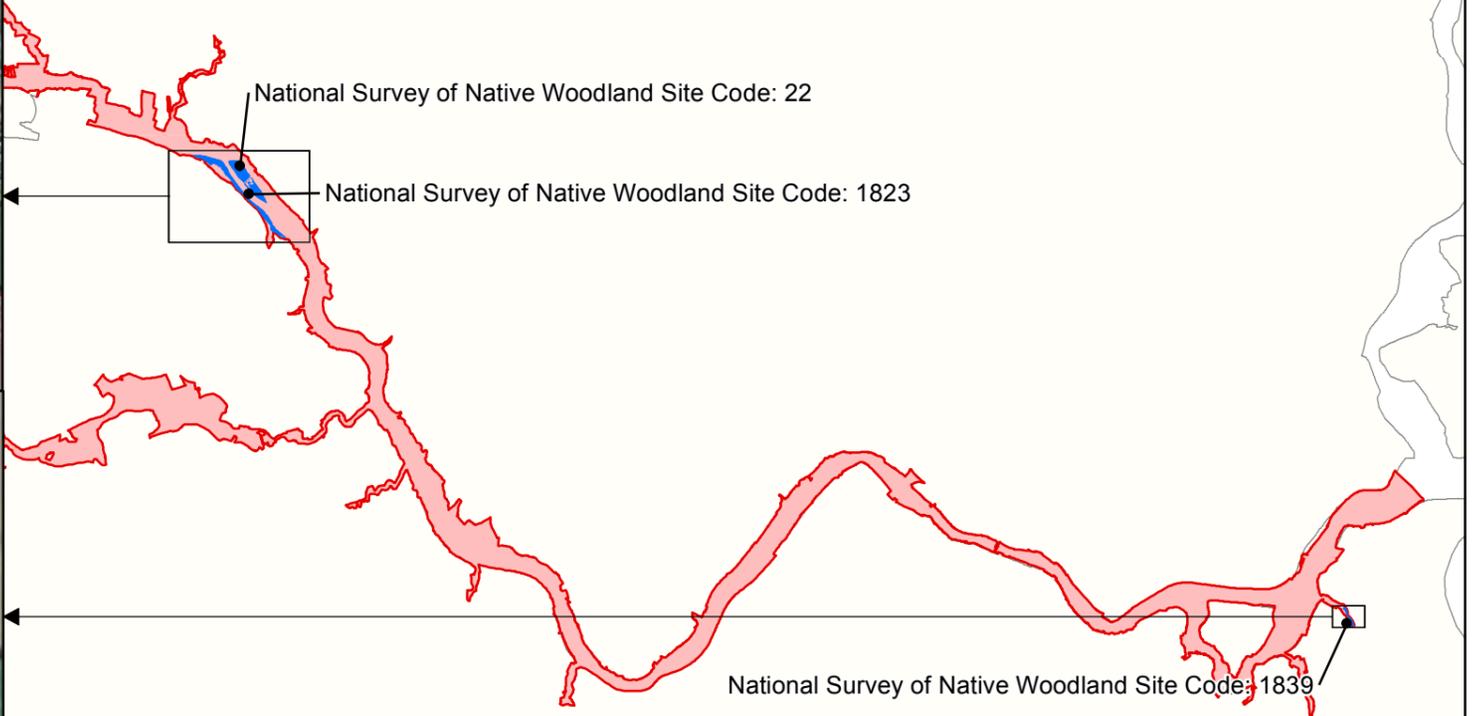


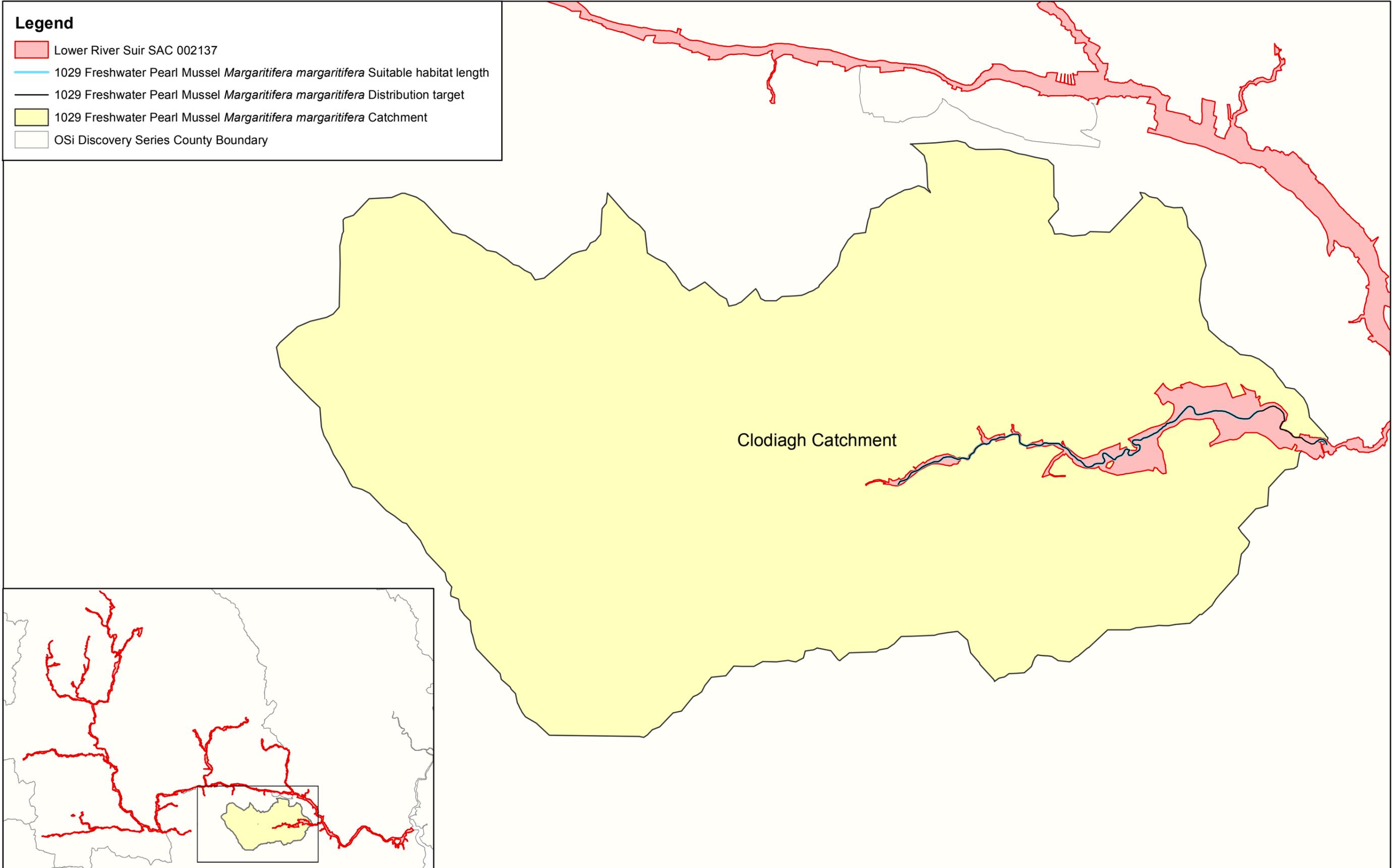
**Map Version 1**  
Date: Oct 2016



**Legend**

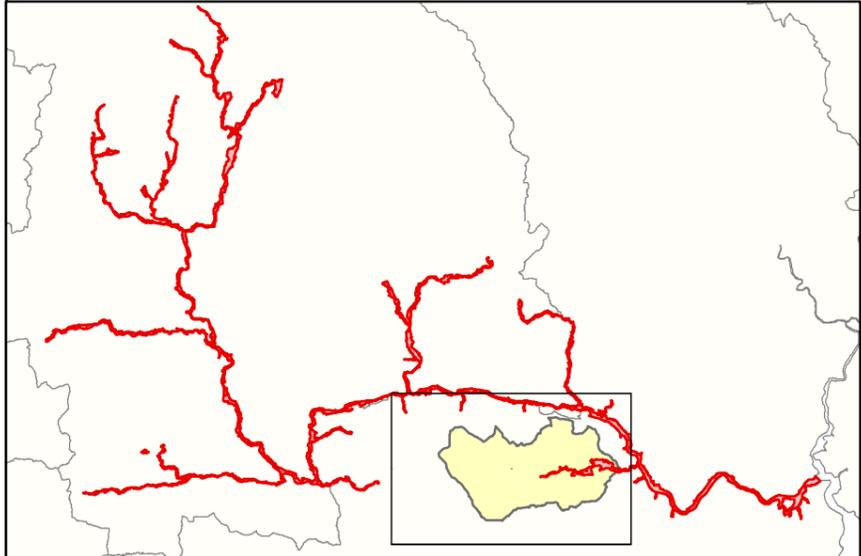
- Lower River Suir SAC 002137
- 91EO Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Pandion*, *Alnion incanae*, *Salicion albae*)
- OSi Discovery Series County Boundary





**Legend**

- Lower River Suir SAC 002137
- 1029 Freshwater Pearl Mussel *Margaritifera margaritifera* Suitable habitat length
- 1029 Freshwater Pearl Mussel *Margaritifera margaritifera* Distribution target
- 1029 Freshwater Pearl Mussel *Margaritifera margaritifera* Catchment
- OSi Discovery Series County Boundary



An Roinn Ealaíon, Oidhreacht, Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta  
 Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs

**MAP 6:**  
**LOWER RIVER SUIR SAC**  
**CONSERVATION OBJECTIVES**  
**FRESHWATER PEARL MUSSEL -**  
**MARGARITIFERA MARGARITIFERA**

Map to be read in conjunction with the NPWS Conservation Objectives Document.

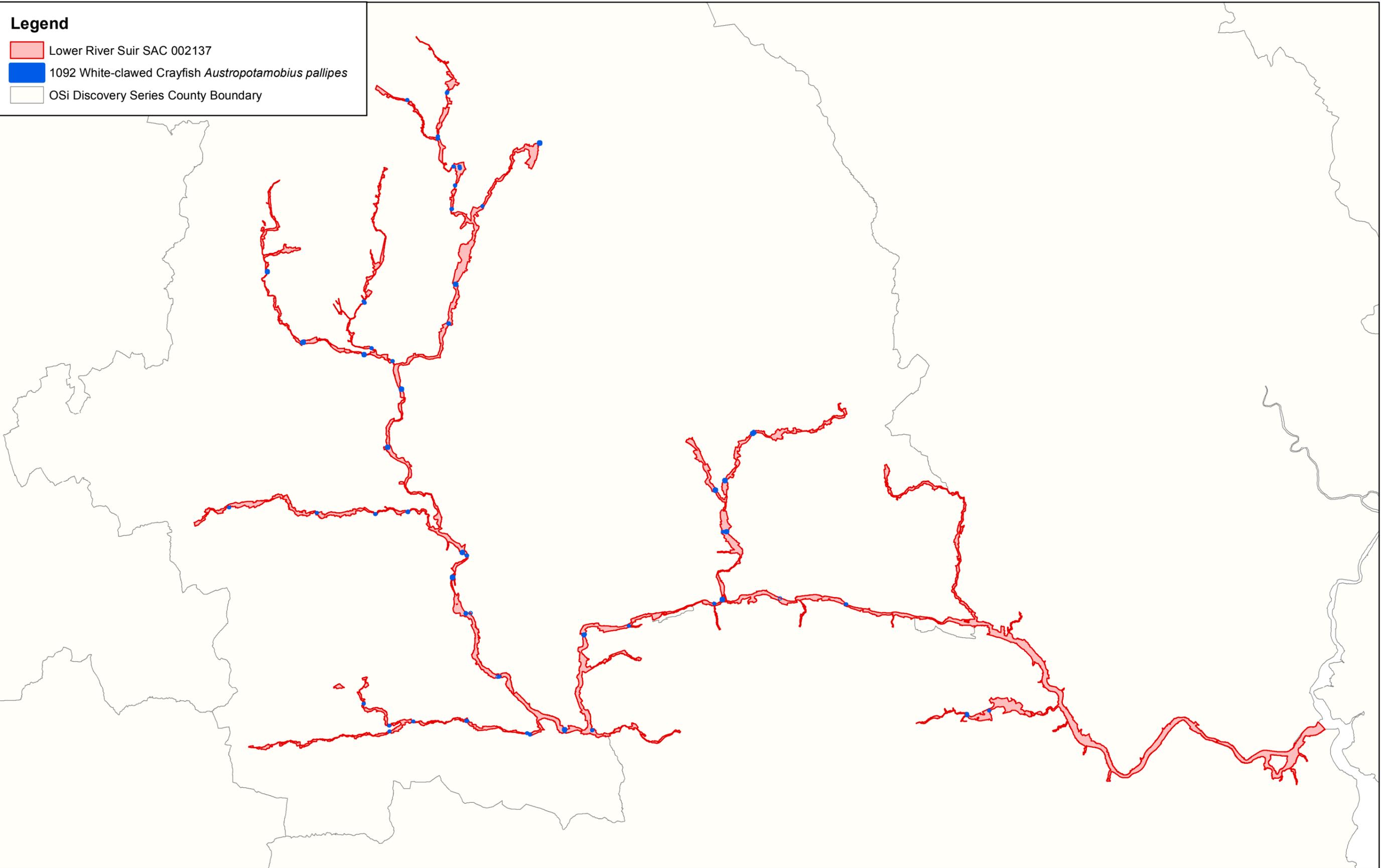
**SITE CODE:**  
**SAC 002137; version 3.**  
**CO. WATERFORD, CO. LIMERICK, CO. TIPPERARY,**  
**CO. KILKENNY**

0    0.8    1.6    2.4    3.2    4 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
 Ordnance Survey of Ireland Licence No EN 0059216. © Ordnance Survey of Ireland Government of Ireland

Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas

**N**  
  
**Map Version 1**  
**Date: Oct 2016**



**Legend**

- Lower River Suir SAC 002137
- 1092 White-clawed Crayfish *Austropotamobius pallipes*
- OSi Discovery Series County Boundary