



IRISH WATER

LEAD IN DRINKING WATER MITIGATION PLAN  
– 189 ACHILL WSZ

SCREENING TO INFORM APPROPRIATE ASSESSMENT  
JANUARY 2022



1 Galway Business Park, Dangan, Galway  
50 Ringsend Road, Dublin 4

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## GLOSSARY OF TERMS & ABBREVIATIONS

**Appropriate Assessment:** An assessment of the effects of a plan or project on European Sites.

**Biodiversity:** Word commonly used for biological diversity and defined as assemblage of living organisms from all habitats including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part.

**Birds Directive:** Council Directive of 2nd April 1979 on the conservation of wild birds (79/409/EEC) as codified by Directive 2009/147/EC.

**Geographical Information System (GIS):** A GIS is a computer-based system for capturing, storing, checking, integrating, manipulating, analysing and displaying data that are spatially referenced.

**Habitats Directive:** European Community Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Flora and Fauna and has been transposed into Irish law by the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011). It establishes a system to protect certain fauna, flora and habitats deemed to be of European conservation importance.

**Mitigation measures:** Measures to avoid/prevent, minimise/reduce, or as fully as possible, offset/compensate for any significant adverse effects on the environment, as a result of implementing a plan or project.

**Natura 2000:** European network of protected sites, which represent areas of the highest value for natural habitats and species of plants and animals, which are rare, endangered or vulnerable in the European Community. The Natura 2000 network of sites will include two types of area. Areas/ European Sites may be designated as Special Areas of Conservation (SAC) where they support rare, endangered or vulnerable natural habitats and species of plants or animals (other than birds). Where areas support significant numbers of wild birds and their habitats, they may become Special Protection Areas (SPA). SACs are designated under the Habitats Directive and SPAs are classified under the Birds Directive. In some situations, there may be overlap in extent of SAC and SPA.

**Scoping:** the process of deciding the content and level of detail to be included in the Screening for AA, including the key environmental issues, likely significant environmental effects and alternatives which need to be considered, the assessment methods to be employed, and the structure and contents of the Appropriate Assessment Screening Report.

**Screening:** The determination of whether implementation of a plan or project would be likely to have significant environmental effects on the Natura 2000 network.

**Special Area for Conservation (SAC):** An SAC designation is an internationally important site, protected for its habitats and species. It is designated, as required, under the EC Habitats Directive (1992).

**Special Protection Area (SPA):** An SPA is a site of international importance for breeding, feeding and roosting habitat for bird species. It is designated under the EC Birds Directive (1979).

**Statutory Instrument:** Any order, regulation, rule, scheme or byelaw made in exercise of a power conferred by statute.

## 1. INTRODUCTION

Ryan Hanley was commissioned by Irish Water (IW) to undertake Screening for Appropriate Assessment (AA) for the proposed orthophosphate (OP) dosing (herein referred to as the Project) of drinking water supplied from Achill WTP, Co. Mayo to Achill Water Supply Zone (WSZ).

This report comprises information in support of the Screening of the Project in line with the requirements of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora (here after referred to as the Habitats Directive). The report assesses the potential for significant effects resulting from the additional phosphorus (P) load to environmental receptors, resulting from OP dosing being undertaken to mitigate against consumer exposure to lead in drinking water. It is therefore necessary to consider the sources, pathways and receptors in relation to added P.

### 1.1 Purpose of this Report

Screening for AA, as a first step in determining the requirement for AA, is to determine whether the Project is likely to have a significant effect on any European Site within the zone of influence (Zol) of the Water Supply Zone (WSZ), either individually or in combination with other plans or projects, in view of the sites qualifying interests and conservation objectives. This Screening Report complies with the requirements of Article 6 of the Habitats Directive transposed in Ireland principally through the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). In the context of the proposed project, the governing legislation is the Birds and Habitats Regulations 2011 and the “public authority” is Irish Water, specifically:

*“The public authority shall determine that an Appropriate Assessment of a plan or project is not required where the plan or project is not directly connected with or necessary to the management of the site as a European Site and if it can be excluded on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site.”*

### 1.2 The Plan

Irish Water, as the national public water utility, prepared a Lead in Drinking Water Mitigation Plan (LDWMP) in 2016 (here after referred to as the Plan). The Plan provides a framework of measures for implementation to effectively address the currently elevated levels of lead in drinking water experienced by some IW customers as a result of lead piping. The Plan was prepared in response to the recommendations in the *National Strategy to reduce exposure to Lead in Drinking Water* which was published by the Department of Environment, Community and Local Government<sup>1</sup> and Department of Health in June 2015.

The overall objective of the Plan is to effectively address the risk of failure to comply with the drinking water quality standard for lead due to lead pipework in as far as is practical within the areas of IW’s responsibility. Lead in drinking water is derived from lead pipes that are still in place in the supply network. These pipes are mostly in old shared connections or in the short pipes connecting the (public) water main to the (private) water supply pipes (IW, 2016<sup>2</sup>). Problems can also be caused by lead leaching from domestic plumbing components made of brass and from lead-containing solder, with the most significant portion of the lead pipework lying outside of IW’s ownership in private properties (IW, 2016). Lead can be dissolved in water as it travels through lead supply pipes and internal lead plumbing. When lead is in contact with water it can slowly dissolve, a process known as plumbosolvency. The degree

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<sup>1</sup> Now known as the Department of Housing, Planning and Local Government (DHPLG).

<sup>2</sup> Irish Water (IW) (2016) Lead in Drinking Water Mitigation Plan. <https://www.water.ie/projects-plans/lead-mitigation-plan/Lead-in-Drinking-Water-Mitigation-Plan.pdf>

to which lead dissolves varies with the length of lead pipe, local water chemistry, temperature and the amount of water used at the property.

Health studies have identified risks to human health from ingestion of lead. In December 2013, the acceptable limit for lead in drinking water was reduced to 10 micrograms per litre ( $\mu\text{g}/\text{l}$ ) as per the European Union (Drinking Water) Regulations. From 2003 to 2013, the limit was 25  $\mu\text{g}/\text{l}$ , which was a reduction on the previous limit (i.e. pre 2003) of 50  $\mu\text{g}/\text{l}$ .

The World Health Organisation (WHO), Environmental Protection Agency (EPA) and Health Service Executive (HSE) recommend lead pipe replacement (both lead service connections in the public supply, and lead supply pipes and internal plumbing in private properties) as the ultimate goal in reducing long-term exposure to lead. It is recognised that this will inevitably take a considerable period of time. In recognition of this, short to medium term proposals to mitigate the risk are being examined.

The Plan sets out the short, medium and longer term actions that IW intends to undertake, subject to the approval of the economic regulator, the Commission for Regulation of Utilities (CRU). It is currently estimated that 85% to 95% of properties meet the lead compliance standards when sampled at the customer's tap. The goal is to increase this compliance rate to 98% by end of 2021 and 99% by the end of 2027 (IW, 2016). This is subject to a technological alternative to lead replacement being deemed environmentally viable.

The permanent solution to the lead issue is to replace all water mains that contain lead. IW proposes that a national programme of replacement of public lead service pipes is required. However, replacing the public supply pipe or the private pipe on its own will not resolve the problem. Research indicates that unless both are replaced, lead levels in the drinking water could remain higher than the Regulation standards. Where lead pipework or plumbing fittings occur within a private property, it is the responsibility of the property owner to replace it.

The Plan assesses a number of other lead mitigation options available to IW. Other measures, including corrective water treatment in the form of pH adjustment and OP treatment, are being considered as an interim measure for the reduction of lead concentrations in drinking water in some WSZs.

IW proposes to introduce corrective water treatment at up to 400 WTPs. This would be rolled out over an accelerated 3-year programme, subject to site-specific environmental assessments. The corrective water treatment will reduce plumbosolvency risk over the short to medium term in high risk water supplies where it is technically, economically and environmentally viable to do so. This practice is now the accepted method of lead mitigation in many countries e.g. Great Britain and Northern Ireland. The dosing would be required to continue whilst lead pipework is still in use, subject to annual review on a scheme by scheme basis.

Orthophosphate (OP) is added in the form of Phosphoric acid - a clear, odourless liquid that is safe for human consumption. Phosphoric acid is already approved for use as a food additive (E338) in dairy, cereals, soft drinks, meat and cheese. The average adult person consumes between 1,000 and 1,500 milligrams (mg) of P every day as part of the normal diet. The OP dose rate for Achill WSZ will be 0.8 mg/l P for treated water supplied from Achill WTP.

### 1.3 Project Background

Phosphorus (P) can influence water quality status through the process of nutrient enrichment and promotion of excessive plant growth (eutrophication). It is therefore necessary to quantify any potential environmental impact and the pathways by which the added (OP) may reach environmental receptors and to evaluate the significance of any such effects on European Sites. To facilitate the assessment of any significant effects to the receiving environment an Environmental Assessment Methodology (EAM) has been developed based on a conceptual model of P transfer (from the water distribution and wastewater collection systems), using the source-pathway-receptor framework.

The first step of Screening for AA is to identify the European sites that are in close proximity to or have a hydrological or hydrogeological connectivity to the WSZs affected by the proposed OP dosing. The Screening recognises that for those European Sites with nutrient sensitive Qualifying Interests (habitats and species) which have connectivity to the WSZ, there are pathways for effects which require further evaluation. The Screening Report applies objective scientific information from the EAM as outlined in this document and evaluates whether the proposed dosing will give rise to significant effects on any of these European Sites, in the context of the Site Specific Conservation Objectives (SSCO) as published on the NPWS website.

## 2. APPROPRIATE ASSESSMENT METHODOLOGY

### 2.1 Legislative Context

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora better known as the “Habitats Directive” provides 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 European Sites. 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/ECC) as codified by Directive 2009/147/EC.

The scope of the assessment is confined to the effects upon habitats and species of European Sites. As part of the assessment, a key consideration is ‘in combination’ effects with other plans or projects.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European Sites (Annex 1.1). Article 6(3) establishes the requirement for AA:

*“Any plan or project not directly connected with or necessary to the management of the [European] site but likely to have a significant effect thereon, either individually or in combination with other plans or 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 implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public”.*

Article 6(4) states:

*“If, in spite of a negative assessment of the implications for the [European] site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, Member States shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted”.*

Over time legal interpretation has been sought on the practical application of the legislation concerning AA, as some terminology has been found to be unclear. European and National case law has clarified a number of issues and some aspects of European Commission (EC) published guidance documents have been superseded by case law.

### 2.2 Guidance for the Appropriate Assessment Process

The assessment completed in this Screening, had regard to the following legislation and guidance documents:

### European and National Legislation:

- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (also known as the ‘Habitats Directive’);
- Council Directive 2009/147/EC on the conservation of wild birds, codified version, (also known as the ‘Birds Directive’);
- European Communities (Birds and Natural Habitats) Regulations 2011 to 2015; and
- Planning and Development Act 2000 (as amended).

### Guidance / Case Law:

- *Article 6 of the Habitats Directive – Rulings of the European Court of Justice*. Final Draft September 2014;
- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. DEHLG (2009, revised 10/02/10);
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. European Commission (2002);
- *Communication from the Commission on the Precautionary Principle*. European Commission (2000b);
- *EC study on evaluating and improving permitting procedures related to Natura 2000 requirements under Article 6.3 of the Habitats Directive 92/43/EEC*. European Commission (2013);
- *Guidance Document on Article 6(4) of the ‘Habitats Directive’ 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission*. European Commission (2007); and
- *Managing Natura 2000 sites: the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC*. European Commission (2000a).

### Departmental/NPWS Circulars:

- *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities*. Circular NPWS 1/10 and PSSP 2/10. (DEHLG, 2010);
- *Appropriate Assessment of Land Use Plans*. Circular Letter SEA 1/08 & NPWS 1/08;
- *Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments*. Circular L8/08;
- *Guidance on Compliance with Regulation 23 of the Habitats Directive*. Circular Letter NPWS 2/07; and
- *Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites*. Circular Letter PD 2/07 and NPWS 1/07.

### 2.3 Stages of the Appropriate Assessment Process

According to European Commission Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive, the assessment requirements of Article 6 establish a four-staged approach as described below. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. The four stages are as follows:

- Stage 1 – Screening of the proposed plan or project for AA;



- Stage 2 – An AA of the proposed plan or project;
- Stage 3 – Assessment of alternative solutions; and
- Stage 4 – Imperative Reasons of Overriding Public Interest (IROPI)/ Derogation.

Stages 1 and 2 relate to Article 6(3) of the Habitats Directive; and Stages 3 and 4 to Article 6(4).

### **Stage 1: Screening for a likely significant effect**

The aim of screening is to assess firstly if the plan or project is directly connected with or necessary to the management of European Site(s); or in view of best scientific knowledge, if the plan or project, individually or in combination with other plans or projects, is likely to have a significant effect on a European site. This is done by examining the proposed plan or project and the conservation objectives of any European Sites that might potentially be affected. If screening determines that there is potential for significant effects or there is uncertainty regarding the significance of effects then it will be recommended that the plan is brought forward to full AA.

### **Stage 2: Appropriate Assessment (Natura Impact Statement or NIS):**

The aim of Stage 2 of the AA process is to identify any adverse impacts that the plan or project might have on the integrity of relevant European Sites. As part of the assessment, a key consideration is 'in combination' effects with other plans or projects. Where adverse impacts are identified, mitigation measures can be proposed that would avoid, reduce or remedy any such negative impacts and the plan or project should then be amended accordingly, thereby avoiding the need to progress to Stage 3.

### **Stage 3: Assessment of Alternative Solutions**

If it is not possible during the Stage 2 to reduce impacts to acceptable, non-significant levels by avoidance and/or mitigation, Stage 3 of the process must be undertaken which is to objectively assess whether alternative solutions exist by which the objectives of the plan or project can be achieved. Explicitly, this means alternative solutions that do not have negative impacts on the integrity of a European Site. It should also be noted that EU guidance on this stage of the process states that, 'other assessment criteria, such as economic criteria, cannot be seen as overruling ecological criteria' (EC, 2002). In other words, if alternative solutions exist that do not have negative impacts on European Sites; they should be adopted regardless of economic considerations.

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

This stage of the AA process is undertaken where no alternative solutions exist and where adverse impacts remain. At this stage of the AA process, it is the characteristics of the plan or project itself that will determine whether or not the competent authority can allow it to progress. This is the determination of 'over-riding public interest'.

It is important to note that in the case of European Sites that include in their qualifying features 'priority' habitats or species, as defined in Annex I and II of the Directive, the demonstration of 'over-riding public interest' is not sufficient and it must be demonstrated that the plan or project is necessary for 'human health or safety considerations'. Where plans or projects meet these criteria, they can be allowed, provided adequate compensatory measures are proposed. Stage 4 of the process defines and describes these compensation measures.

## **2.4 Information Sources Consulted**

To inform the assessment for the Project and preparation of this Screening Report, the following key sources of information have been consulted, however it is noted this is not an exhaustive list and does not reflect liaison and/ or discussion with technical and specialist parties from IW, RPS, NPWS, IFI, EPA etc. as part of Plan development.

- Information provided by IW as part of the project;
- Environmental Protection Agency – Water Quality [www.epa.ie](http://www.epa.ie) and [www.catchments.ie](http://www.catchments.ie);
- Geological Survey of Ireland – Geology, Soils and Hydrogeology [www.gsi.ie](http://www.gsi.ie);
- Information on the conservation status of birds in Ireland (Colhoun & Cummins 2013);
- National Parks and Wildlife Service – online Natura 2000 network information [www.npws.ie](http://www.npws.ie);
- National Biodiversity Action Plan 2017 - 2021 (DCHG 2017);
- Article 17 Overview Report Volume 1 (NPWS, 2013a);
- Article 17 Habitat Conservation Assessment Volume 2 (NPWS, 2013b);
- Article 17 Species Conservation Assessment Volume 3 (NPWS, 2013c);
- EPA Qualifying Interests database, (EPA, 2015) and updated EPA Characterisation Qualifying Interests database (EPA/RPS, September 2016);
- River Basin Management Plan for Ireland 2018 - 2021 - [www.housing.gov.ie](http://www.housing.gov.ie);
- Ordnance Survey of Ireland – Mapping and Aerial photography [www.osi.ie](http://www.osi.ie);
- National Summary for Article 12 (NPWS, 2013d); and
- Format for a Prioritised Action Framework (PAF) for Natura 2000 (2014) [www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf](http://www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf).

## 2.5 Evaluation of the Receiving Environment

Ireland has obligations under EU law to protect and conserve biodiversity. This relates to habitats and species both within and outside designated sites. Nationally, Ireland has developed a National Biodiversity Plan (DCHG, 2017) to address issues and halt the loss of biodiversity, in line with international commitments. The vision for biodiversity is outlined: “*That biodiversity and ecosystems in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally*”.

Ireland aims to conserve habitats and species, through designation of conservation areas under both European and Irish law. The focus of this Screening is on those habitats and species designated pursuant to the EU Birds and EU Habitats Directives in the first instance, however it is recognised that wider biodiversity features have a supporting role to play in many cases where the Conservation Objectives of designated sites is to be maintained/restored.

### 2.5.1 Identification of European Sites

Current guidance (DEHLG, 2010) on the Zol to be considered during the AA process states the following:

*“A distance of 15km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson et al., 2006). For projects, the distance could be much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in-combination effects”.*

A buffer of 15km is typically taken as the initial Zol extending beyond the reach of the footprint of a plan, although there may be scientifically appropriate reasons for extending this Zol further depending on pathways for potential effects. With regard to the current project, the 15km distance is considered inappropriate to screen all likely pathways for European Sites in view of all hydrological and hydrogeological connections to aquatic and water dependant receptors. Therefore, the Zol for this

project includes all of the hydrologically connected surface water sub catchments and groundwater bodies.

### 2.5.2 Conservation Objectives

Article 6(3) of the Habitats Directive states that:

*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications of the site in view of the site's **conservation objectives**.*

Qualifying Interests (QIs)/ Special Conservation Interests (SCIs) are annexed habitats and annexed species of community interest for which an SAC or SPA has been designated respectively. The Conservation Objectives (COs) for European Sites are set out to ensure that the QIs/ SCIs of that site are maintained or restored to a favourable conservation condition. Maintenance of favourable conservation condition of habitats and species at a site level in turn contributes to maintaining or restoring favourable conservation status of habitats and species at a national level and ultimately at the Natura 2000 Network level.

In Ireland 'generic' COs have been prepared for all European Sites, while 'site specific' COs (SSCOs) have been prepared for a number of individual Sites to take account of the specific QIs/ SCIs of that Site. Both the COs and SSCO aim to define favourable conservation condition for habitats and species at the site level.

Generic COs which have been developed by NPWS encompass the spirit of SSCO in the context of maintaining and restoring favourable conservation condition as follows:

#### **For SACs:**

- *'To maintain or restore the favourable conservation condition of the Annex I habitats and/or Annex II species for which the SAC has been selected'.*

#### **For SPAs:**

- *'To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA'.*

Favourable Conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing;
- 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".

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;
- 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.

A full listing of the COs and QIs/ SCIs for each European Site, as well as the attributes and targets to maintain or restore the QIs/ SCIs to a favourable conservation condition, are available from the NPWS website [www.npws.ie](http://www.npws.ie). COs for the European Sites relevant for this Screening Report, are included in **Appendix A**.

### 2.5.3 Existing Threats and Pressures to EU Protected Habitats and Species

Given the nature of the proposed project, a review has been undertaken of those QIs/SCIs which have been identified as having sensitivity to orthophosphate loading. Information has been extracted primarily from a number of NPWS authored reports, including recently available statutory assessments on the conservation status of habitats and species in Ireland namely; The status of EU protected Habitats and Species in Ireland (NPWS 2013 a, b &c) and on information contained in Ireland's most recent Article 12 submission to the EU on the Status and trends of Birds species (NPWS 2013d). Water dependent species were identified as having the greatest connectivity and thus the highest sensitivity to the proposed dosing activity, and the Water Framework Directive SAC water dependency list (NPWS, December 2015), was used as part of the criteria for screening in European Sites.

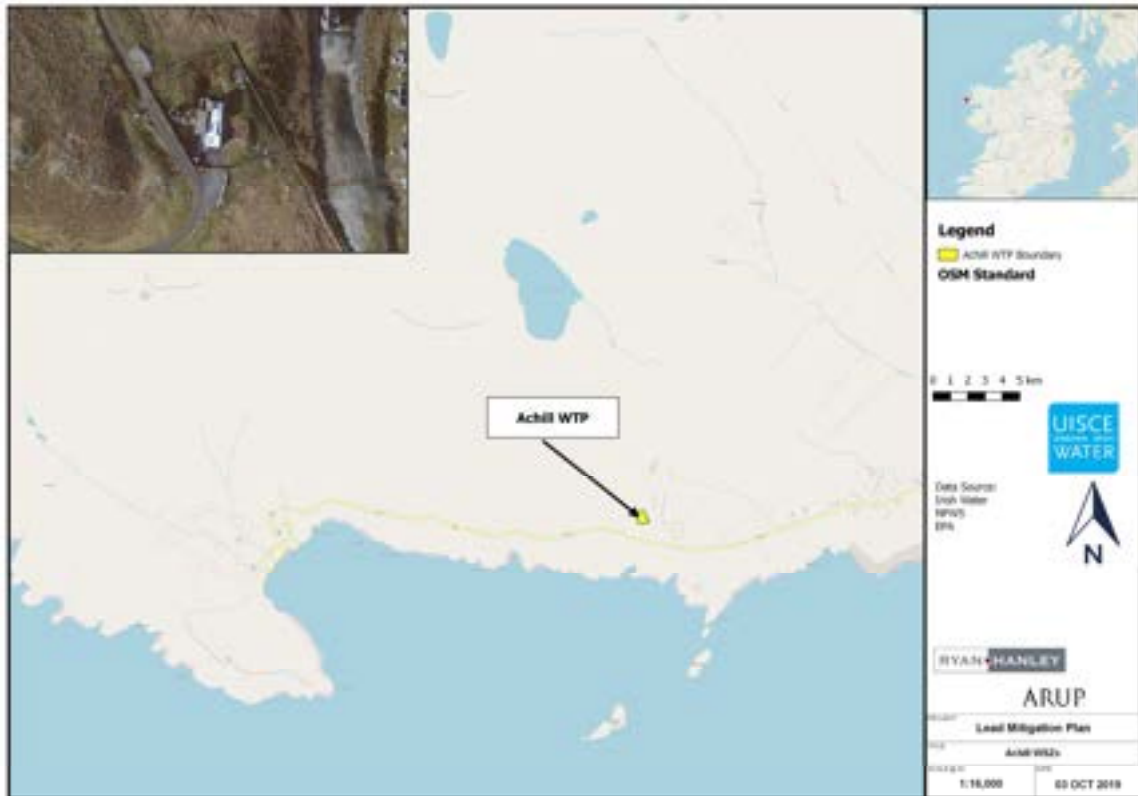
### 3. DESCRIPTION OF THE PROJECT

#### 3.1 Description of the proposal

The Achill WTP typically supplies 1,500 m<sup>3</sup>/day to the Achill WSZ which supplies drinking water to the island of Achill and the northern and western portions of the Curran Peninsula. The WTP also supplies 13 group water schemes namely Ards/Currane, Bleanaskil, Crumpaun/Achill, Doega, Dooniver, Dugort East, Dugort No. 1, Dugort No. 2, Saula/Achill, Sraheen (Achill), Valley 1, Valley 2 and Valley No. 3.

The WSZ boundary encompasses three WWTP, the Achill Sound WWTP, the Achill Island Central WWTP and the Doogort WWTP. There are an estimated 1,826 properties across the WSZs that are serviced by DWWTS and water discharged per person is assigned as 105 litres per day with an average of 2.7 persons per household assumed.

The Plumbosolvency Control Plan for Achill WSZ recommends that universal dosing be undertaken in order for all areas within the WSZ to receive OP dosed water. Specifically, 0.8 mg/l P at a pH of 8 will be dosed at Achill WTP (**Figure 1**).



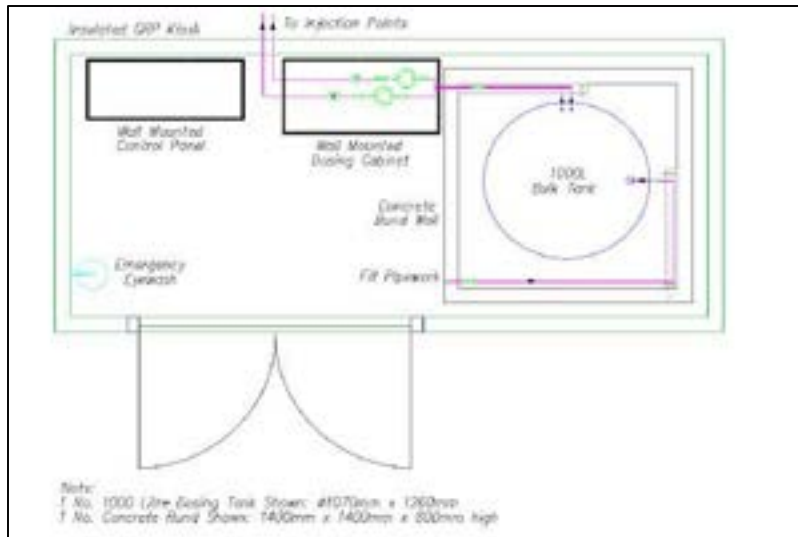
**Figure 1 Location of the Achill WTP site, Co. Mayo.**

#### 3.1.1 Construction Works

A bunded phosphoric acid storage tank (with capacity for a minimum of 60 days dosing of phosphoric acid at 75% concentration into supply) and a dosing installation housed in a kiosk, will be installed on constructed concrete ground slabs, located within the existing site of Achill WTP. The required 60 days storage volume at the Achill WTP site corresponds to 0.25 m<sup>3</sup>.

The scope of the **construction** works for the Achill WTP will include:

- Initial site assessment, and site investigation works to determine existing conditions, services and pipe cable duct layouts at the site;
- Installation of the OP dosing unit may include excavations, construction of new water process and duct chambers, duct and pipe laying and reinstatement works; and will have an area of approximately 30 m<sup>2</sup> (a typical dosing unit is shown in **Figure 2** and **Figure 3**). The exact location within the existing reservoir site will be confirmed following initial site assessment and investigations. A kiosk will be required to house the OP dosing unit as there is insufficient storage space within the existing buildings. The kiosk will be housed on a concrete base with cast in ducts within the Reservoir site boundaries. A 1.0 m wide concrete apron shall extend around the kiosk;



**Figure 2** IW schematic of a bulk tank kiosk layout in H3PO4 Installation with 500 litres < bulk storage ≤ 6,000 litres.



**Figure 3** Typical orthophosphate dosing unit

### 3.1.2 Operational Works

The scope of the **operational** works includes the dosing of OP to treated water at a rate of 0.8 mg/l P for treated water from Achill WTP to Achill WSZ in a process similar to the addition of chlorine for disinfection.

## 3.2 LDWMP Approach to Assessment

### 3.2.1 Work Flow Process

In line with the relevant guidance, the Screening Report to inform AA comprises two main steps:

- **Impact Prediction** – where the likely potential impacts of this project (impact source and impact pathways) are examined.
- **Assessment of Effects** - where project impacts are assessed on the basis of best scientific knowledge (the EAM); in order to identify whether they are likely to give rise to a significant effect on any European sites, in view of their COs;

At the early stages of consideration, IW identified the pathways by which the added orthophosphate may reach and / or affect environmental receptors including European Sites. In order to carry out a robust and defensible environmental assessment and to ensure a transparent and consistent approach, IW devised a conceptual model based on the 'source – pathway – receptor' framework. This sets out a specific environmental risk assessment of any proposed orthophosphate treatment and provides a methodology to determine the risk to the receiving environment of this corrective water treatment.

This conceptual Environmental Assessment Model (EAM), has been discussed with the EPA and has been developed using EPA datasets including the orthophosphate susceptibility output mapping for subsurface pathways; the nutrient risk assessment for waterbodies; water quality information; available low flow estimation for gauged and ungauged catchments; and a new methodology which has been developed for the assessment of water quality risk from domestic wastewater treatment systems.

Depending on the potential impacts identified, appropriate measures may be built into the project proposal, as part of an iterative process, to avoid / reduce those potential impacts for the orthophosphate treatment being proposed. Project measures adopted within the overall design proposal, as influenced by the Plumbosolvency Report and EAM output, may include selected placement of the orthophosphate treatment point within the WSZ; enhanced wastewater treatment (to potentially remove equivalent phosphorus levels related to the orthophosphate treatment at the WTP); reduced treatment rate; and water network leakage control. The EAM will be the basis of the decision support matrix to inform any programmes developed as part of the LDWMP. Further detail on the model is presented in **Section 3.2.2** below.

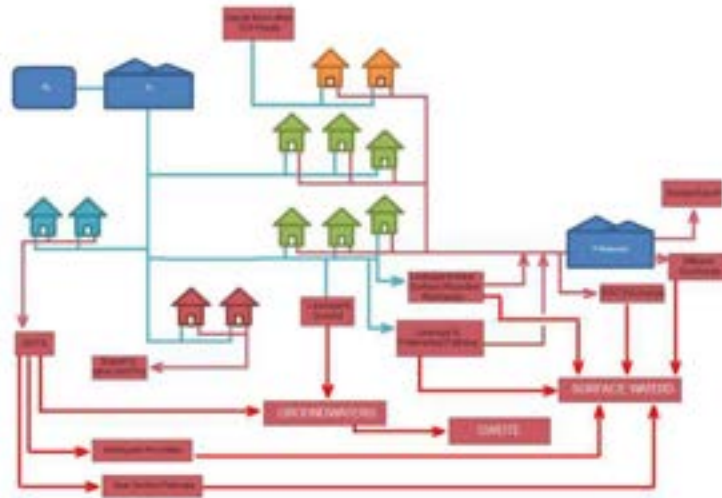
### 3.2.2 Environmental Assessment Methodology

The EAM has been developed based on a conceptual model of P transfer (see **Figure 4**), based on the source-pathway-receptor model, from the water distribution and wastewater collection systems.

- The *source* of phosphorus is defined as the orthophosphate dosing at water treatment plants which will be dependent on the water chemistry of the raw water quality, the integrity of the distribution network and the extent of lead piping.
- *Pathways* include discharges from the wastewater collection system (WWTP discharges and intermittent discharges – Storm Water Overflows (SWOs)), leakage from the distribution system and small point source discharges from Domestic Wastewater Treatment Systems (DWWTS).
- *Receptors*, and their sensitivity, is of key consideration in the EAM. A waterbody may be more sensitive to additional phosphorus loadings where it has a low capacity for assimilating the load e.g. high status sites, such as the habitat of the freshwater pearl mussel or oligotrophic lakes. Where an SAC/SPA is hydrologically connected to dosing from more than one WSZ, the potential for cumulative impacts on OP indicative water quality are considered in the EAM.

A flow chart of the methodology applied in the EAM is provided in **Figure 5** and illustrates the importance of the European Sites in the process. In all instances where nutrient sensitive qualifying features within the Natura 2000 network are hydrologically linked with the WSZ, a Screening to inform AA will be required in the first instance. For each WSZ where OP treatment is proposed the conceptual model allows the quantification of loads in a mass balance approach to identify potentially significant pathways, as part of the risk assessment process.

A summary report outlining the EAM is available in **Appendix C**, which further outlines P dynamics and the consideration of P trends and capacity in receiving waters and the potential for any impact on OP indicative water quality status from an increase in OP loading arising from the proposed OP dosing.



**Figure 4 Conceptual Model of P Transfer**

Diagrammatic layout of P transfers from drinking water source (top left), through DW distribution (blue), wastewater collection (brown) and treatment systems to environmental receptors (red). P transfers that by-pass the WWTP (leakages, storm overflows, discharges to ground, and misconnections) are also indicated.



**Step 1 – Stage 1 Appropriate Assessment Screening**

- Identify downstream European Sites and qualifying features using water dependent database (Appendix 8)
- Determine if qualifying features are nutrient sensitive from list of nutrient sensitive qualifying features.
- Apply the EAM in the context of conservation objectives for European Sites.

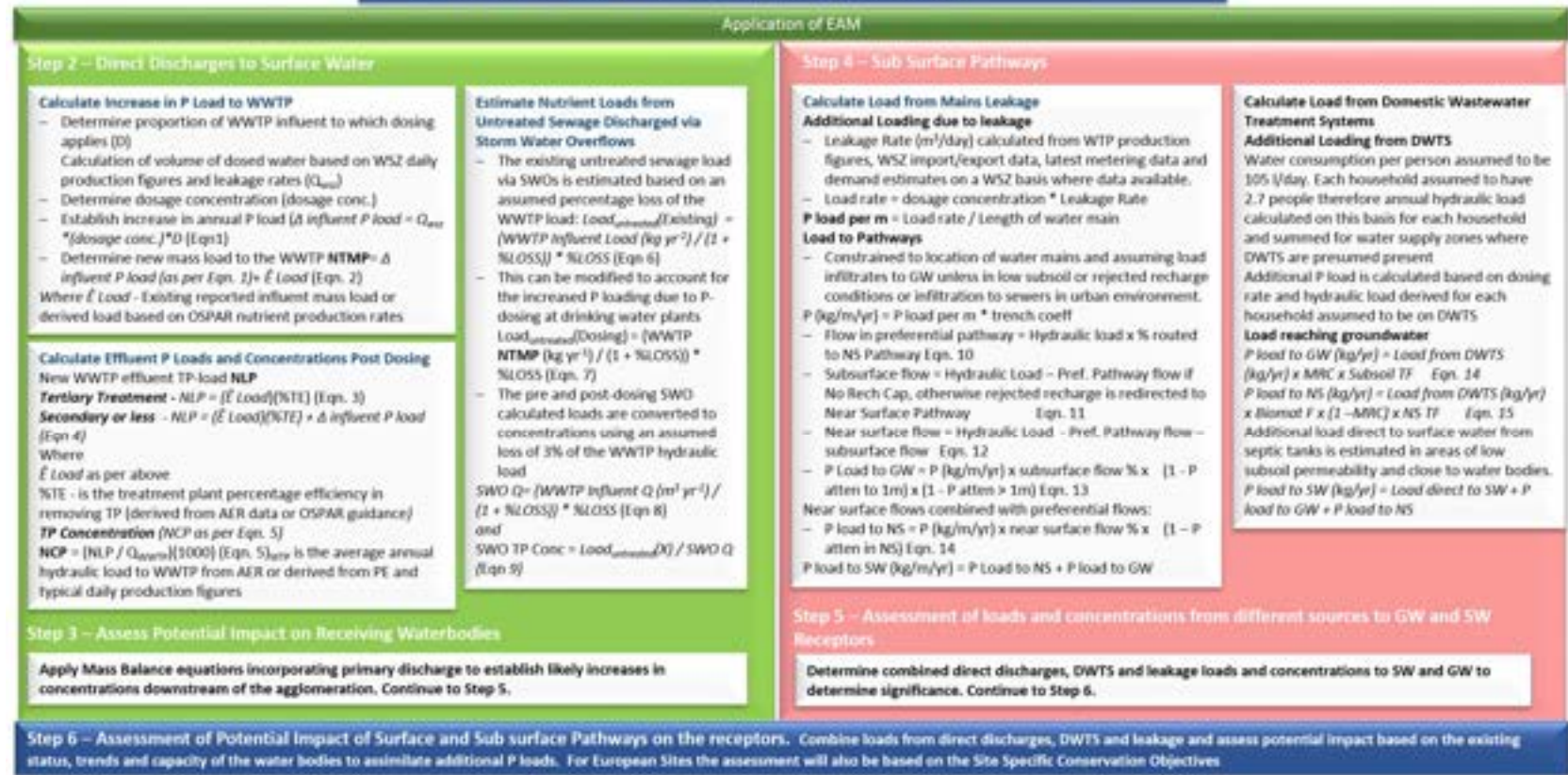


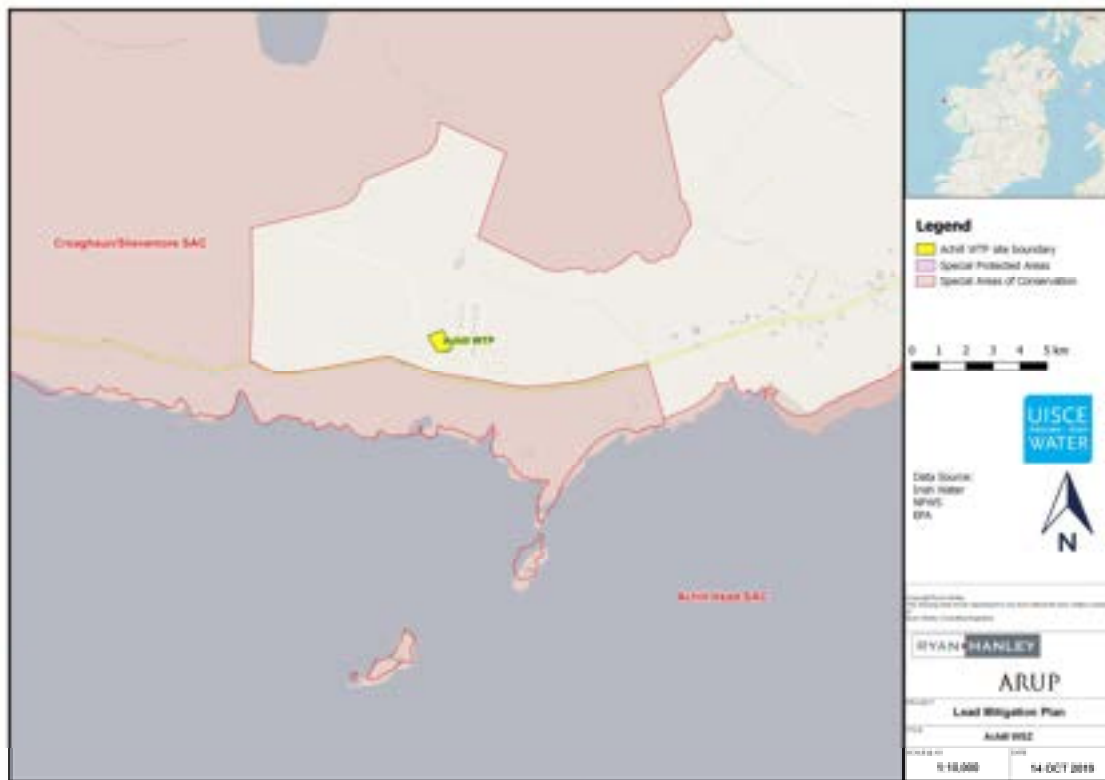
Figure 5 Stepwise Approach to the Environmental Assessment Methodology

## 4. PROJECT CONNECTIVITY TO EUROPEAN SITES

### 4.1 Overview of the Project Zone of Influence

#### 4.1.1 Construction Phase

Achill WTP site boundary is located approximately 80m away from the Croaghau/Slievemore SAC (**Figure 6**). The closest watercourse to the WTP is the Keel\_East\_010 RWB which is located approximately 372 m northeast of the WTP site boundary. The Keel\_East\_010 flows through the Croaghau/Slievemore SAC at this point. There will be direct and indirect impacts within the construction works Zone of Influence, however, given the location and taking account of the scale of the construction of the OP Dosing Unit for the proposed scheme, these direct and indirect construction impacts at Achill WTP will not have a significant effect on any European Site, and are henceforth screened out. Consideration of potential impact is in the absence of mitigation and with the acknowledgement that the Dosing Units are within the existing IW site and the construction elements do not include any designated European Sites within the Zone of Influence. Therefore construction impacts are not assessed further.



**Figure 6 Location of the Achill WTP site with respect to European Sites**

#### 4.1.2 Operational Phase

With regard to the operation of the proposed project, the pathways by which the added OP may reach and / or affect environmental receptors is considered by means of an operational activities ZoI, which was determined by establishing the potential for hydrological and hydrogeological connectivity between the Achill WTP and associated WSZs and European Sites. This operational ZoI was therefore defined by the surface water sub-catchments and groundwater bodies that are hydrologically and hydrogeologically connected with the Project. European Sites within the operational ZoI are listed in **Table 1** and are displayed in **Figure 7**.

The EAM process identified 7 river waterbodies, 4 lake waterbodies and 5 coastal waterbodies potentially impacted following OP dosing of drinking water. This AA Screening identifies the connectivity between EAM identified surface waterbodies and downstream receiving waterbodies and European Sites:

- Murrevagh\_010 (IE\_WE\_32M110390) river waterbody flows into the Clew Bay coastal waterbody.
- Bunanoo\_010 (IE\_WE\_33B090100), Cartron\_010 (IE\_WE\_33C020100) and Glendarary\_010 (IE\_WE\_33G400250) river waterbodies flow into the Blacksod Bay SW/ Achill Sound coastal waterbody.
- Dooega\_010 (IE\_WE\_33D010200) RWB and Keel\_East\_010 (IE\_WE\_33K020760) RWB, which takes in Keel MO and Acorrymore lake waterbodies, flow into the Western Atlantic Seaboard (IE\_WE\_250\_0000).
- Barnynagappul Stream\_010 (IE\_WE\_33B030960) river waterbody which takes in Loch na mBreac lake (unassigned by WFD) flows into the Blacksod Bay coastal waterbody.

The EAM process identified 3 groundwater bodies. Groundwater bodies touching or intersecting the WSZs, are also included in the Zol. Hydrogeological linkages in karst areas are considered:

- Achill (IE\_WE\_G\_0026)
- Belmullet (IE\_WE\_G\_0057)
- Malranny (IE\_WE\_G\_0027)

**Achill** groundwater body is a poor aquifer which is generally unproductive except for local zones that is entirely bounded by coastline. The land surface is characterised by steep slopes and mountainous terrain. The main discharges are to streams, rivers and lake within the GWB, reflecting short flow paths (up to 150 m) with flow direction expected to follow topography (Geological Survey Ireland, 2004). As a result of this only those European Sites within a 150 m radius are considered in the Zol.

**Belmullet** groundwater body is a poor aquifer which is generally unproductive except for local zones that comprises northwest Mayo. The main discharges are to streams and rivers crossing the aquifer and also to small springs and seeps reflecting short groundwater flow paths (30-300 m) (Geological Survey Ireland, 2004). As a result of this only those European Sites within a 300 m radius are considered in the Zol.

**Malranny** groundwater body is a poor aquifer which is generally unproductive except for local zones. The main discharges are to streams and lakes crossing the aquifer and also to small springs and seeps reflecting short groundwater flow paths (30-300 m) (Geological Survey Ireland, 2004). As a result of this only those European Sites within a 300m radius are considered in this Zol.

European Sites within the Zol are listed in **Table 1** and are displayed in **Figure 7** and **Figure 8**.

**Table 1: European Sites within the Zol of the Proposed Project**

Site Name	SAC/SPA Code	Water Dependent Species/Habitats	Nutrient Sensitive	Potential Hydrological/ Hydrogeological Connectivity
Inishbofin And Inishshark SAC	000278	Yes	Yes	No
Slyne Head Islands SAC	000328	Yes	Yes	No
Mullet/Blacksod Bay Complex SAC	000470	Yes	Yes	No
Broadhaven Bay SAC	000472	Yes	Yes	No
Cross Lough (Killadoon) SAC	000484	Yes	No	No

Site Name	SAC/SPA Code	Water Dependent Species/Habitats	Nutrient Sensitive	Potential Hydrological/ Hydrogeological Connectivity
Corraun Plateau SAC	000485	Yes	Yes	Yes
Duvillaun Islands SAC	000495	Yes	Yes	No
Glenamoy Bog Complex SAC	000500	Yes	Yes	No
Inishkea Islands SAC	000507	Yes	Yes	No
Lackan Saltmarsh And Kilcummin Head SAC	000516	Yes	Yes	No
Lough Gall Bog SAC	000522	Yes	Yes	Yes
Oldhead Wood SAC	000532	No	Yes	No
Owenduff/ Nephin Complex SAC	000534	Yes	Yes	No
Aughrusbeg Machair And Lake SAC	001228	Yes	Yes	No
Omey Island Machair SAC	001309	Yes	Yes	No
Rusheenduff Lough SAC	001311	Yes	Yes	No
Clew Bay Complex SAC	001482	Yes	Yes	No
Doogort Machair/ Lough Doo SAC	001497	Yes	Yes	Yes
Erris Head SAC	001501	Yes	Yes	No
Keel Machair/Menaun Cliffs SAC	001513	Yes	Yes	Yes
Lough Cahasy, Lough Baun And Roonah Lough SAC	001529	Yes	Yes	No
Mweelrea/ Sheeffry/ Erriff Complex SAC	001932	Yes	Yes	No
Croaghaun/Slievemore SAC	001955	Yes	Yes	Yes
The Twelve Bens/ Garraun Complex SAC	002031	Yes	Yes	No
Slyne Head Peninsula SAC	002074	Yes	Yes	No
Clare Island Cliffs SAC	002243	Yes	Yes	No
Kingstown Bay SAC	002265	Yes	Yes	No
Achill Head SAC	002268	Yes	Yes	Yes
West Connacht Coast SAC	002998	Yes	Yes	No
Inishkea Islands SPA	004004	Yes	Yes	No
Killala Bay/ Moy Estuary SPA	004036	Yes	Yes	No
Blacksod Bay/ Broadhaven SPA	004037	Yes	Yes	No
Stags of Broad Haven SPA	004072	Yes	Yes	No
Illanmaster SPA	004074	Yes	Yes	No
Inishglora and Inishkeeragh SPA	004084	Yes	Yes	No
Termoncarragh Lake and Annagh Machair SPA	004093	Yes	Yes	No
Owenduff/Nephin Complex SPA	004098	Yes	Yes	No
Duvillaun Islands SPA	004111	Yes	Yes	No
Clare Island SPA	004136	Yes	Yes	No
High Island, Inishshark and Davillaun SPA	004144	Yes	Yes	No
Slyne Head To Ardmore Point Islands SPA	004159	Yes	Yes	No
Cruagh Island SPA	004170	Yes	Yes	No
Bills Rocks SPA	004177	Yes	Yes	No
Cross Lough (Killadoon) SPA	004212	Yes	Yes	No
Mullet Peninsula SPA	004227	Yes	Yes	No
Inishbofin, Omey Island and Turbot Island SPA	004231	Yes	Yes	No
Doogort Machair SPA	004235	Yes	Yes	Yes

**Inishbofin and Inishshark SAC (000278)** is located 31km southwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Slyne Head Islands SAC (000328)** is located 65km southwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Mullet/Blacksod Bay Complex SAC (000470)** is located 5.5 km north of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Blacksod Bay coastal waterbody. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Broadhaven Bay SAC (000472)** is located 47 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Duvillaun Islands SAC (000495)** is located 7.2 km northwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Blacksod Bay coastal waterbody. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Glenamoy Bog SAC (000500)** is located 70 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Inishkea Islands SAC (000507)** is located 12 km northwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Blacksod Bay coastal waterbody. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Lackan Saltmarsh and Kilcummin Head SAC (000516)** is located 120 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Aughrusbeg Machair and Lake SAC (001228)** is located 36 km southwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factors in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Omey Island Machair SAC (001309)** is located 44 km southwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.



**Rusheenduff Lough SAC (001311)** is located 29 km southwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Clew Bay Complex SAC (000495)** is located 10.2 km west of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Clew Bay coastal waterbody. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Erris Head SAC (001501)** is located 34 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Lough Cahasy, Lough Baun and Roonah Lough SAC (001529)** is located 13 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Mweelrea/Sheeffry/Erriff Complex SAC (001932)** is located 27 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**The Twelve Bens/Garraun Complex SAC (002031)** is located 30 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Slyne Head Peninsula SAC (002074)** is located 65 km southwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Clare Island Cliffs SAC (002243)** is located 6.3 km west of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Clew Bay coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Kingstown Bay SAC (002265)** is located 47 km southwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and this European Site and taking into consideration the dilution factor in this coastal waterbody it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**West Connacht Coast SAC (002998)** is located 6.7 km west of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Clew Bay coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Inishglora and Inishkeeragh SPA (004084)** is located 13 km north of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Killala Bay/Moy Estuary SPA (004036)** is located 95 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Blacksod Bay/Broadhaven SPA (004037)** is located 95 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Stags of Broad Haven SPA (004072)** is located 61 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Illanmaster SPA (004074)** is located 67 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Inishglora and Inishkeeragh SPA (004074)** is located 31 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Termoncarragh Lake and Annagh Machair SPA (004093)** is located 35 km north of the dosing area. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Duvillaun Islands SPA (004111)** is located 7.2 km north of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Blacksod Bay coastal waterbody. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Clare Island SPA (004136)** is located 5.1 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**High Island Inishshark and Davillaun SPA (004144)** is located 31 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Slyne Head to Ardmore Point Island SPA (004159)** is located 57 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Cruagh Island SPA (004170)** is located 43 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Bills Rocks SPA (004177)** is located 10 km west of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Cross Lough (Killadoon) SPA (00412)** is located 17 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Mullet Peninsula SPA (004227)** is located 9 km northwest of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Blacksod Bay coastal waterbody. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Inishbofin, Omev Island and Turbot Island SPA (004231)** is located 32 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Western Atlantic Seaboard coastal waterbody. Given the significant distance between the dosing zone and the site it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Owenduff/Nepin Complex SAC (000534)** is located 2.1 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Murrevagh\_010 river waterbody. Given the significant distance between the dosing zone and the site and that this SAC is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

**Owenduff/Nepin Complex SPA (004098)** is located 2.1 km south of the dosing area. This site is potentially hydrologically connected to the OP dosing area via the Murrevagh\_010 river waterbody. Given the significant distance between the dosing zone and the site and that this SPA is located upstream of the dosing area it is not considered that OP dosing will have an impact on this site and therefore this site is not considered further in this report.

#### 4.2 Identification of Relevant European Sites

Each European Site was assessed for the presence of water dependent habitats and species, nutrient sensitivity and hydrological/hydrogeological connectivity (operational and construction Zol). A number of sites have been excluded from further assessment in Section 5 and 6, due to the absence of hydrological/hydrogeological connectivity to at least one nutrient sensitive and water-dependant QI or SCI. The remaining sites are included for further assessment in order to determine whether the Project is likely to give rise to significant effects; these sites are detailed in **Table 2**.



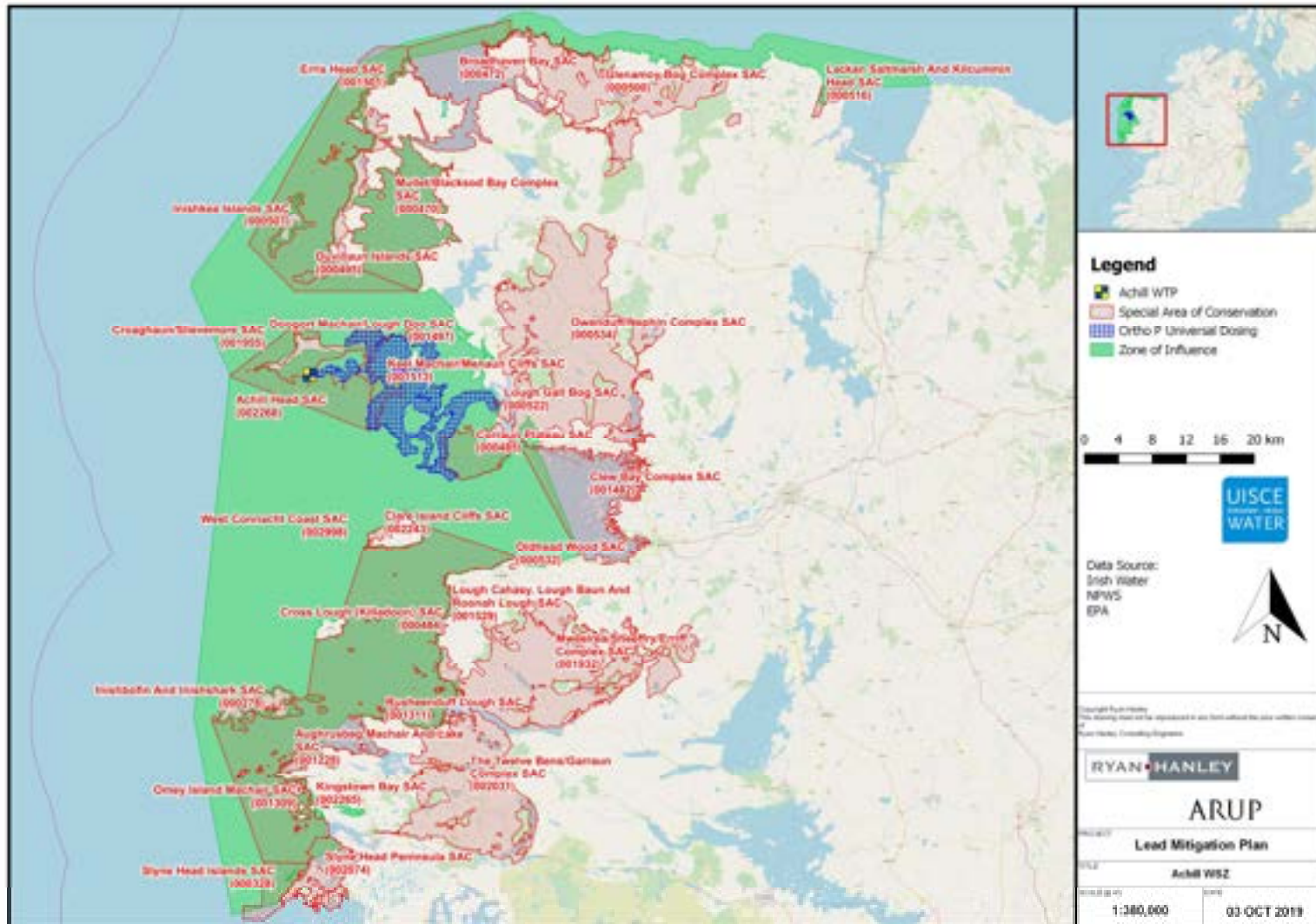


Figure 7 Special Areas of Conservation within the Zol of the Proposed Project

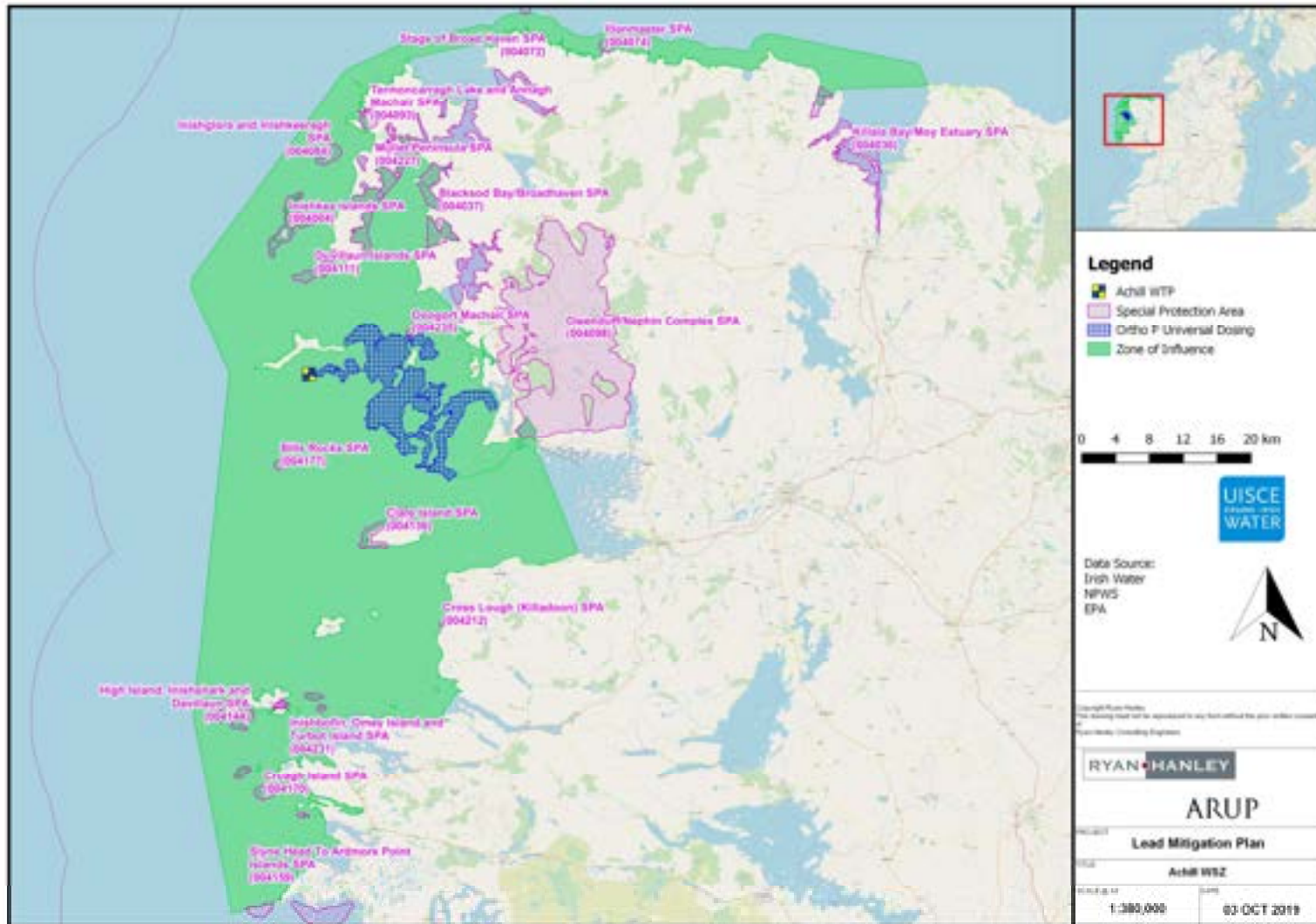


Figure 8 Special Protection Areas within the ZOI of the Proposed Project

**Table 2: European Sites Hydrologically Connected to or Downstream of the WTP and WSZ**

Site Name	SAC/ SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species/ Habitats	Nutrient Sensitive	Potential hydrological/ hydrogeological Connectivity
Corraun Plateau	SAC 000485	04 <sup>th</sup> Aug 2016	4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>	Yes	Yes	Yes for Operational Zol
			4030	European dry heaths	No	Yes	
			4060	Alpine and Boreal heaths	No	No	
			5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands	No	No	
			8110	Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> )	No	No	
			8220	Siliceous rocky slopes with chasmophytic vegetation	No	No	
Lough Gall Bog	SAC 000522	15 <sup>th</sup> May 2017	7130	Blanket bogs (* if active bog)	Yes	Yes	Yes for Operational Zol
			7150	Depressions on peat substrates of the Rhynchosporion	Yes	Yes	
Keel Machair/ Menaun Cliffs	SAC 001513	30 <sup>th</sup> May 2018	1220	Perennial vegetation of stony banks	Yes	No	Yes Operational Zol
			4060	Alpine and Boreal heaths	No	No	
			21A0	Machairs (* in Ireland)	Yes	Yes	
			1395	Petalwort ( <i>Petalophyllum ralfsii</i> )	Yes	Yes	
Croaghaun/ Slievemore	SAC 001955	21 <sup>st</sup> Feb 2018	4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>	Yes	Yes	Yes Operational Zol
			4030	European dry heaths	No	Yes	
			4060	Alpine and Boreal heaths	No	No	
			8110	Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> )	No	No	
			8220	Siliceous rocky slopes with chasmophytic vegetation	No	No	
Achill Head	SAC 002268	17 <sup>th</sup> Oct 2013	1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes	Yes Operational Zol
			1160	Large shallow inlets and bays	Yes	Yes	
			1170	Reefs	Yes	Yes	
Doogort Machair/Lough Doo	SAC 001513	27 <sup>th</sup> Jan 2017	1395	Petalwort <i>Petalophyllum ralfsii</i>	Yes	Yes	Yes Operational Zol
			21A0	Machairs (* in Ireland)	Yes	Yes	
Doogort Machair	SPA 004235	21 <sup>st</sup> Feb 2018	A466	Dunlin <i>Calidris alpina schinzii</i>	Yes	Yes	Yes Operational Zol

\* indicates a priority habitat under the Habitats Directive

## 5. EVALUATION OF POTENTIAL IMPACTS

### 5.1 Context for Impact Prediction

The methodology for the assessment of impacts is derived from the *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites* (as amended EC, 2018). When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented include:

- Direct and indirect impacts;
- Short and long-term impacts;
- Construction, operational and decommissioning impacts; and
- Isolated, interactive and cumulative impacts.

### 5.2 Impact Identification

#### Operational Phase

In considering the potential for impacts from implementation of the Project, a “source–pathway–receptor” approach has been applied.

The Screening for AA has considered the potential for the following significant effects to occur:

- Altered structure and functions relating to the physical components of a habitat (“structure”) and the ecological processes that drive it (“functions”). For aquatic habitats these include attributes such as vegetation and water quality.
- Altered species composition due to changes in abiotic conditions such as water quality;
- Reduced breeding success (e.g. due to disturbance, habitat alteration, pollution) possibly resulting in reduced population viability; and
- Impacts to surface water and groundwater and the species they support (changes to key indicators).

The source-pathway-receptor approach has identified a number of impact pathways associated with the OP dosing. These will be evaluated in relation to the potential for significant effects to any European Site with regard to:

- Excessive phosphate within an aquatic ecosystem may lead to eutrophication; with a corresponding reduction in oxygen levels, reduction in species diversity and subsequent impacts on animal life;
- Groundwater dependent habitats include both surface water habitats (e.g. hard oligo-mesotrophic lakes) and Groundwater Dependent Terrestrial Ecosystems (GWDTEs, e.g. alkaline fens). Any change in the water quality of these systems may have subsequent effects on these habitats and species; and therefore will be subject to an evaluation of the significance of any such effect;
- The discharge of additional P loads to the environment (through surface and sub surface pathways) may have implications for nutrient sensitive species such as the freshwater pearl mussel, Atlantic salmon and the white-clawed crayfish.
- Phosphorus (P) in wastewater collection systems is the result of drinking water and derived from a number of other sources, including P imported from areas outside the agglomeration through import of sludges or leachates for treatment at the plant. The disposal and use of P removed in

wastewater sludge is regulated (i.e. through nutrient management plans) and should not pose further threat of environmental impact;

- Leakage of phosphates from the drinking water supply network to the environment from use of OP;
- Direct discharges of increased P to waterbodies from the wastewater treatment plant licensed discharges; and
- Potential discharges to waterbodies of untreated effluent potentially high in OP Storm Water Overflows (SWOs).

### 5.3 Assessment of Impacts Relating to Operational Activities

Article 6 of the Habitats Directive states that:

*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications of the site in view of the site's conservation objectives.*

The focus of this section of the Screening to inform AA is the potential for significant effects arising from the additional OP load due to OP dosing at Achill WTP to the Achill WSZ. The conceptual model developed for OP transfer identified the surface and groundwater bodies that have the potential to be impacted by the OP dosing and which could provide a hydrological or hydrogeological pathway to the European Sites. These waterbodies are listed in **Table 3**. The table identifies the following:

- European sites included for assessment;
- Waterbodies hydrologically or hydrogeologically connected to the European Sites;
- Existing OP indicative water quality and trend of each waterbody;
- The baseline OP concentration of each waterbody;
- 75% of the upper threshold;
- Cumulative OP load to surface from leakage, DWWTS and agglomerations;
- The modelled OP concentration following dosing at the WTP; and,
- The OP potential baseline concentration (mg/l) following dosing at the WTP.

The EAM has been completed assuming the capacity of a waterbody is a measure of its ability to absorb extra pressures before its status changes. For example, a river waterbody at Good Status will have mean phosphate values in the range 0.025 to 0.035 mg/l P. River waterbodies with mean phosphate concentrations of 0.0275 mg/l P have 75% capacity left, i.e. high capacity, while river waterbodies with a mean of 0.0325 mg/l P have lower capacity (25%) as the concentrations are closer to the Good/Moderate Status boundary. In assessing the additional loads from the proposed orthophosphate dosing, the capacity of the water will be assessed. This information is available on the WFD App on a national basis using the "Distance to Threshold" parameter, where waterbodies with high capacity are termed "Far" from the threshold and those with low capacity are "Near" the threshold.

It is predicted that OP dosing will not have a significant impact on OP indicative water quality (or the Conservation Objectives of a European Site) where it does not cause the P concentration to increase to a level within 25% of the remaining capacity left within the existing status band, i.e. cause a change in the distance to threshold from far to near. This assessment will be supported by trend analysis as outlined below to ensure the additional OP dosing and statistically significant trends for a waterbody will not result in deterioration in status by 2021 even where the distance to threshold is currently assessed to be far. Where the waterbody baseline concentration is "Near" to the threshold before the effect of OP dosing is considered, this does not cause an automatic fail for this test. If the predicted increase in concentration due to OP is very low (i.e. below 5% / <0.00125 mg/l P of the High/Good status) this test will pass as the OP dosing itself is not having a significant impact on the OP indicative water quality



and thus not having the potential for significant effects on connected European Sites in terms of aquatic and water dependant QIs/SCIs and their conservation objectives.

The identification of statistically and environmentally significant trends for waterbodies is a specific requirement of the WFD and the Groundwater Daughter Directive. Guidance on trends in groundwater assessments (UKTAG 2009, EPA 2010) indicates that trends are environmentally significant if they indicate that the Good Status will not be achieved within two future river basin cycles, i.e. within the next 12 years.

An additional test for groundwater bodies states that downward trends should not be reversed as a result of pollution impact. This test applies to GWB with statistically significant trends according to the WFD App and the Sens Slope provided is used to assess direction and strength of trend. If the trend is negative and the predicted increase in OP concentration is lower than the absolute value of the Sens Slope, then the test passes. This assessment has used the EPA WFD App data relating to waterbody monitoring and characterisation downloaded in December 2021.

Baseline OP monitoring data and associated thresholds are not available for any RWBs within or adjacent to the assessment area. A surrogate status is derived from the ecological status of adjacent RWBs. The mid-range of that surrogate status is used as baseline concentration. On the basis of predicted loading, the risk of using surrogate data is excluded because even if high status was ascribed, the loading values are significantly below the 0.00125 mg/l P significance threshold and would not register a significant effect even on high status waterbodies with QI receptors that require high status.

**Table 3: Surface and groundwater bodies within the WSZ with a hydrological or hydrogeological connection to European Sites**

Site Name (Code)	Contributing WB Code_Name	WB Type <sup>3</sup>	P Status <sup>4</sup> and Trends <sup>5</sup>	Baseline <sup>6</sup> P Conc. <sup>7</sup> (mg/l)	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW <sup>8</sup>	Modelled Conc. <sup>9</sup> (mg/l)	Potential Baseline Conc. @0.8 mg/l	Evaluation
<b>Corraun Plateau SAC (000485)</b>	Belmullet	GWB	Good	0.0157	0.0263	3.0	0.00003	0.0157	No risk of deterioration to OP indicative WQ
	Bunanioo_010	RWB	Good	0.0300	0.0325	5.7	0.0002	0.0302	No risk of deterioration to OP indicative WQ
	Murrevagh_010	RWB	High	0.0125	0.0188	0.3	0.00001	0.0125	No risk of deterioration to OP indicative WQ
	Clew Bay	CWB	Summer High/ Winter High	0.0025/ 0.0125	0.0188	0.3	0.000003	0.0025/ 0.0125	No risk of deterioration to OP indicative WQ
<b>Lough Gall Bog SAC (000522)</b>	Belmullet	GWB	Good	0.0157	0.0263	3.0	0.00003	0.0157	No risk of deterioration to OP indicative WQ
	Cartron_010	RWB	Moderate	0.0078	0.0508	5.3	0.0002	0.0080	No risk of deterioration to OP indicative WQ
	Bellacragher Bay	CWB	Summer High/ Winter High	0.0125	0.0188	42.2	0.0004	0.0129	No risk of deterioration to OP indicative WQ
<b>Keel Machair/ Menaun Cliffs SAC (001513)</b>	Achill	GWB	Good	0.0175	0.0263	16.6	0.0011	0.0186	No risk of deterioration to OP indicative WQ
	Dooega_010	RWB	Moderate	0.0455	0.0508	3.9	0.0002	0.0457	No risk of deterioration to OP indicative WQ
	Keel_East_010	RWB	High	0.0125	0.0188	21.0	0.0004	0.0129	No risk of deterioration to OP indicative WQ
	Keel Mo	LWB	Good	0.0273	0.0213	21.0	0.0004	0.0277	No risk of deterioration to OP indicative WQ
	Western Atlantic Seaboard	CWB	Summer High/ Winter High	0.0125	0.0188	40.1	0.00003	0.0125	No risk of deterioration to OP indicative WQ

<sup>3</sup> Monitoring period is annual unless specified.

<sup>4</sup> Surrogate Status indicated in italic.

<sup>5</sup> Distance to threshold in parentheses.

<sup>6</sup> Baseline year is 2014.

<sup>7</sup> Surrogate concentration is given in italic mg/l

<sup>8</sup> Cumulative P load to SW from Upstream Dosing Areas, Leakage, DWWTS and agglomerations (kg/yr)

<sup>9</sup> Values above 5% of Good / High boundary (0.00125 mg/l) for SW or 5% of Good / Fail boundary (0.00175 mg/l) for GW highlighted in yellow.

Site Name (Code)	Contributing WB Code_Name	WB Type <sup>3</sup>	P Status <sup>4</sup> and Trends <sup>5</sup>	Baseline <sup>6</sup> P Conc. <sup>7</sup> (mg/l)	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW <sup>8</sup>	Modelled Conc. <sup>9</sup> (mg/l)	Potential Baseline Conc. @0.8 mg/l	Evaluation
<b>Croaghaun/Slievemore SAC (001955)</b>	Achill	GWB	Good	0.0175	0.0263	16.6	0.0011	0.0186	No risk of deterioration to OP indicative WQ
	Keel_East_010	RWB	High	0.0125	0.0188	21.0	0.0004	0.0129	No risk of deterioration to OP indicative WQ
	Blacksod Bay	CWB	Summer High/ Winter High	0.0125	0.0188	34.9	0.00004	0.0125	No risk of deterioration to OP indicative WQ
<b>Achill Head SAC (002268)</b>	Achill Head SAC WB	Specific	Summer High/ Winter High	0.0125	0.0188	7.7	0.0001	0.0126	No risk of deterioration to OP indicative WQ
<b>Doogort Machair/Lough Doo SAC (001497)</b>	Barnynagappul Stream_010	RWB	High	0.0125	0.0188	3.8	0.0001	0.0126	No risk of deterioration to OP indicative WQ
	Lough Doo	LWB	High	0.0050	0.0075	13.8	0.0003	0.0053	No risk of deterioration to OP indicative WQ
	Blacksod Bay	CWB	Summer High/ Winter High	0.0125	0.0188	34.9	0.00004	0.0125	No risk of deterioration to OP indicative WQ
	Achill	GWB	Good	0.0175	0.0263	16.6	0.0011	0.0186	No risk of deterioration to OP indicative WQ
<b>Doogort Machair SPA (004235)</b>	Barnynagappul Stream_010	RWB	High	0.0125	0.0188	3.8	0.0001	0.0126	No risk of deterioration to OP indicative WQ
	Lough Doo	LWB	High	0.0050	0.0075	13.8	0.0003	0.0053	No risk of deterioration to OP indicative WQ
	Blacksod Bay	CWB	Summer High/ Winter High	0.0125	0.0188	34.9	0.00004	0.0125	No risk of deterioration to OP indicative WQ
	Achill	GWB	Good	0.0175	0.0263	16.6	0.0011	0.0186	No risk of deterioration to OP indicative WQ



### 5.4.1 Assessment of direct impact from WWTPs and Storm Water Overflows

The conceptual model developed for P transfer identifies a number of pathways by which OP can reach receptors. In the case of these pathways, factors contributing to the potential direct impacts are:

- the quantitative increase in P loading to wastewater collecting systems;
- the efficiency of P removal at WWTPs;
- the increased P loading to surface waters via storm water overflows; and
- the sensitivity of receptors.

For the purposes of assessing the potential impact on the receiving environment within the EAM a number of scenarios have been assessed at the agglomerations which receive water from the WSZ (**Table 4**). The baseline OP indicative water quality in the existing situation prior to orthophosphate dosing is established and compared to the potential loading to the receiving waters post-dosing. In-combination impacts of the operation of the SWO and the continuous discharge from the WWTP were also assessed within the EAM.

The pre-dosing scenario is based on a mass balance calculation of both the intermittent SWO discharges, in combination with the continuous discharge from the WWTP. A comparison of the pre- and post-dosing scenarios is made to identify changes in predicted concentrations downstream of the point of discharge. A summary of the results and evaluation of orthophosphate dosing downstream of each agglomeration is provided below.

**Table 4** provides the data used for the WWTP continuous discharge, and the SWO intermittent discharge, to compare with the emission limit values (ELVs) from the waste water discharge licence (WWDL) (if it has been set) that are applicable to the agglomeration discharge to transitional waters or freshwaters.

**Table 4: Increased loading/concentration due to Orthophosphate Dosing – Dosing rate = 0.8 mg/l P at Achill WTP**

Agglom. & Discharge Type	ELV from WWDL	TP Load Kg/yr	Ortho P Concentration mg/l			
			TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%) <sup>10</sup>			
			0.5	0.4	0.68	
Achill Sound Primary Discharge	No ELVs	Pre-Dosing	278	2.38	1.90	3.24
		Post Dosing	292	2.50	2.00	3.40
		% Increase	5%	5%	5%	5%
Achill Sound SWOs (6 No.)	No ELVs	Pre-Dosing	7	0.30	0.24	0.41
		Post Dosing	8	0.32	0.26	0.44
Achill Island Central Primary Discharge	No ELVs	Pre-Dosing	436	0.48	0.38	0.65
		Post Dosing	470	0.51	0.41	0.70
		% Increase	7.8%	6.3%	7.9%	7.7%
Achill Island Central SWOs (1 No.)	No ELVs	Pre-Dosing	47	0.06	0.05	0.09
		Post Dosing	59	0.08	0.07	0.11
Doogort Primary Discharge	No ELVs	Pre-Dosing	10	0.01	0.01	0.02
		Post Dosing	23	0.03	0.02	0.04
		% Increase	130%	200%	100%	100%
Doogort SWO (1 No.)	No ELVs	Pre-Dosing	2	0.02	0.01	0.02
		Post Dosing	3	0.02	0.02	0.03

**Achill Sound Primary Discharge WWTP**

The Achill Sound WWTP provides secondary treatment. There are no ELVs associated with this WWTP. The annual average effluent OP concentration increases from 2.38 mg/l P to 2.50 mg/l P (5% increase) as a result of dosing. There are six SWO associated with this WWTP and the SWO concentration will increase from 0.30 mg/l P to 0.32 mg/l P as a result of dosing. The WWTP discharges directly into the Blacksod Bay coastal waterbody.

**Achill Island Central Primary Discharge WWTP**

Achill Island WWTP provides secondary treatment. There are no ELVs associated with this WWTP. The annual average effluent OP concentration increases from 0.48 mg/l P to 0.51 mg/l P (6.3% increase) as a result of dosing. There is one SWO associated with this WWTP and the SWO concentration will increase from 0.06 mg/l P to 0.08 mg/l P as a result of dosing. The WWTP discharges directly into the Western Atlantic Seaboard coastal waterbody.

**Doogort Primary Discharge WWTP**

Doogort WWTP provides secondary treatment. There are no ELVs associated with this WWTP. The annual average effluent OP concentration increases from 0.01 mg/l P to 0.03 mg/l P (200% increase) as a result of dosing. There is one SWO associated with this WWTP and the SWO concentration will increase from 0.02 mg/l P to 0.02 mg/l P as a result of dosing. The WWTP discharges directly into the Blacksod Bay coastal waterbody.

**5.4.2 Combined assessment of direct and indirect impacts to receiving waterbodies**

This section presents the results of the EAM regarding the combined loading as a result of increased OP load from the WWTP discharge, seepage from mains and DWWTS. Upstream dosing areas to Achill WSZs, are incorporated into the EAM and the cumulative impacts have been considered in the EAM and are assessed herein.

**River waterbodies**

- Bunanioo\_010 and Murrevagh\_010 river waterbodies are directly connected to **Corraun Plateau SAC (000485)**
- Carton\_010 river waterbody is hydrologically linked to **Lough Gall Bog SAC (000522)**.
- Barnynagappul Stream\_010 is hydrologically connected to **Croaghaun/Slievemore SAC (001955)**
- Dooega\_010 and Keel\_East\_010 are hydrologically linked to **Keel Machair/Menaun Cliffs SAC (001513)**
- Keel\_East\_010 is hydrologically linked to **Croaghaun/ Slievemore SAC (001955)**.
- Barnynagappul Stream\_010 is hydrologically linked to the **Doogort Machair/Lough Doo SAC (001497)** and **Doogort Machair SPA (004235)**.

A significant proportion of the OP loading to river waterbodies arises from primary discharges and SWOs from WWTPs and mains seepage through near surface pathway. The increase in OP concentrations in river waterbodies following dosing will be as much as 0.0004 mg/l P. All RWBs will receive a predicted dosing concentration below the 5% of Good/ High boundary (0.00125 mg/l P) (Table 3; Appendix C) and are within the 75% of upper threshold of their respective OP indicative water quality status and therefore there is no risk of deterioration in the status of these RWBs.

### **Lake waterbodies**

- Keel Mo is hydrologically connected to **Keel Machair/Menaun Cliffs SAC (001513)**
- Lough Doo is hydrologically connected to **Doogort Machair/Lough Doo SAC (001497)** and **Doogort Machair SPA (004235)**.

The EAM has identified that there will be no additional load discharged to the aforementioned lake waterbodies and so the baseline as presented in Table 3 will not change and therefore there will be no deterioration to water quality/ OP indicative water quality status as a result of this project. The increase in OP concentrations in lake waterbodies following dosing will be as much as 0.0004 mg/l P. All LWBs will receive a predicted dosing concentration below the 5% of Good/ High boundary (0.00125 mg/l P) (Table 3; Appendix C) and are within the 75% of upper threshold of their respective OP indicative water quality status and therefore there is no risk of deterioration in the status of these LWBs.

### **Groundwater bodies**

- Belmullet groundwater body is hydrologically linked to the **Corraun Plateau SAC (000485)** and **Lough Gall Bog SAC (000522)**
- Achill groundwater body is hydrologically linked to the **Keel Machair/Menaun Cliffs SAC (001513)**, **Croaghaun/Slievemore SAC (001955)**, **Doogort Machair/Lough Doo SAC (001497)** and **Doogort Machair SPA (004235)**

The increase in OP concentrations in the GWBs as a result of the OP dosing will be between 0.00000 mg/l and 0.0011 mg/l P. Impact from OP dosing on groundwater bodies does not lead to a reduction in GWB status. All GWBs have predicted dosing concentrations below the 5% of Good/ Fail boundary (0.00175 mg/l P) (Table 3) and are within the 75% of upper threshold of the OP indicative water quality status and therefore there is no risk of deterioration in the OP indicative water quality status of these GWBs.

### **Coastal waterbodies**

- Clew Bay CWB is hydrologically linked to **Corraun Plateau SAC (000485)**.
- Bellacragher Bay CWB is linked to **Lough Gall Bog SAC (000522)**
- Blacksod Bay CWB is linked to **Croaghaun/Slievemore SAC (001955)**, **Doogort Machair/Lough Doo SAC (001497)** and **Doogort Machair SPA (004235)**.
- Western Atlantic Seaboard CWB is linked to **Keel Machair/Menaun Cliffs SAC (001513)** and **Achill Head SAC (002268)**.

The increase in OP concentrations in the coastal waterbodies as a result of the OP dosing will be between 0.0001 mg/l P and 0.000003 mg/l P. Impact from OP dosing on coastal waterbodies does not lead to a reduction in their status. All coastal waterbodies have predicted dosing concentrations below the 5% of Good/ High boundary for SW (0.00125 mg/l P) (Table 3) and are within the 75% of upper threshold of the OP indicative water quality status and therefore there is no risk of deterioration in the OP indicative water quality status of these waterbodies.

### **5.5.3 Conclusions**

The EAM model data identifies that additional OP dosing as part of this Project does not cause a deterioration in the OP indicative water quality of any river waterbody or groundwater body listed in **Table 3**. Cumulative effects have been considered. Section 6 evaluates the OP indicative water quality 'no deterioration' in the context of AA and the QIs of the European Sites.

## 6. EVALUATION OF POTENTIAL FOR SIGNIFICANT EFFECTS

The key pressure associated with the proposed OP dosing is the potential for increased OP levels in the receiving waters and the connectivity to the qualifying interests (habitats and species) identified in **Table 2** that are both water dependent and nutrient sensitive (**Appendix B**). The potential for significant effects during operation is evaluated for the following seven European Sites: **Corraun Plateau (000485)**, **Lough Gall Bog (000522)**, **Keel Machair/ Menaun Cliffs (001513)**, **Croaghaun/ Slievemore (001955)**, **Doogort Machair/Lough Doo (001497)** and **Achill Head (002268)** SACs and **Doogort Machair (004235)** SPA. The potential for the proposed OP dosing to give rise to significant effects on these habitats and species, in view of their conservation objectives, are assessed in detail below.

### 6.1 CORRAUN PLATEAU SAC 000485

#### 6.1.1 (4010) Northern Atlantic wet heaths with *Erica tetralix*

Habitat 4010 covers 2,082 ha of this SAC. Relevant nutrients and their natural ranges are yet to be defined for this peatland habitat; however, Appendix B lists this habitat as water sensitive and nutrient dependent for the purposes of this OP dosing project.

**Table 3** identifies the surface waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to peat habitats in the Corraun Plateau SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Belmullet (IE\_WE\_G\_0057) groundwater body and estimated an increase in OP concentrations of up to 0.00003 mg/l P. The potential baseline OP concentration following dosing is 0.0157 mg/l P. The GWB OP indicative water quality is unchanged following dosing, i.e. Good, and therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this groundwater body.
- Bunanioo\_010 (IE\_WE\_33B090100) river waterbody and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The potential baseline OP concentration following dosing is 0.0302 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody.
- Murrevagh\_010 (IE\_WE\_32M110390) river waterbody and estimated an increase in OP concentrations of up to 0.00001 mg/l P. The potential baseline OP concentration following dosing is 0.0125 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody.
- Clew Bay (IE\_WE\_340\_0000) coastal waterbody and estimated an increase in OP concentrations of up to 0.000003 mg/l P for summer and winter. The resulting OP concentrations following dosing is 0.0025 mg/l P and 0.0125 mg/l P respectively (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Achill WTP to Achill WSZ on OP statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effect to the above mentioned heath habitat in Corraun Plateau SAC.

Furthermore, dosing will not prevent the maintenance/ restoration of favourable conservation condition of the above-mentioned heath habitat in Corraun Plateau SAC/ no deterioration of its favourable conservation condition is identified.

## 6.2 LOUGH GALL BOG SAC 000522

### 6.2.1 (7130) Blanket bogs (\*if active bog), (7150) Depressions on peat substrates of the Rhynchosporion

These peatland habitats occur in mosaics together and have not been mapped in detail for this SAC. Relevant nutrients and their natural ranges are yet to be defined for these habitats; however, Appendix B lists these habitats as water sensitive and nutrient dependent for the purposes of this OP dosing project.

**Table 3** identifies the surface waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to peat habitats in the Lough Gall Bog SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Belmullet (IE\_WE\_G\_0057) groundwater body and estimated an increase in OP concentrations of up to 0.00003 mg/l P. The potential baseline OP concentration following dosing is 0.0157 mg/l P. The GWB OP indicative water quality is unchanged following dosing, i.e. Good, and therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this groundwater body.
- Cartron\_010 (IE\_WE\_33C020100) river waterbody and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0080 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. Moderate. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody.
- Bellacragher Bay (IE\_WE\_380\_0000) coastal waterbody and estimated an increase in OP concentrations of up to 0.0004 mg/l P for both summer and winter. The resulting concentrations following dosing is 0.0129 mg/l P for both summer and winter (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Achill WTP to Achill WSZ on OP statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effects to the above-mentioned peat habitats in Lough Gall Bog SAC.

Furthermore, dosing will not prevent the maintenance/ restoration of favourable conservation condition of the above-mentioned peat habitats in Lough Gall Bog SAC/ no deterioration of its favourable conservation condition is identified.

## 6.4 KEEL MACHAIR/MENAUN CLIFFS SAC 001513

### 6.4.1 (21A0) Machairs (\*in Ireland), (1395) Petalwort *Petalophyllum ralfsii*

Machair habitat was recorded and mapped at the sub-site Trawmore, Keel with a total estimated area of 79.52 ha. The known population of *Petalophyllum ralfsii* in Keel Machair/Menaun Cliffs SAC is at Keel Machair on the edges of channelised and semi-natural water tracks. The SSCOs (NPWS, 2018) and coastal supporting document (NPWS, 2018) set out the conservation objectives for this habitat and

species and are defined by the following list of attributes and targets: Range, Area, Structure and Functions. Functions, is further broken into three attributes, i.e. physical structure, vegetation structure and vegetation composition. This OP dosing project has the potential to impact on the vegetation composition of this habitat and species increasing the percentage of negative indicator species present.

**Table 3** identifies the surface waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to Machairs and Petalworts in the Keel Machair/Menaun Cliffs SAC. In this case the Achill GWB, Dooega\_010 RWB and Western Atlantic Seaboard are associated with this habitat and specie and are evaluated as such. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Achill (IE\_WE\_G\_0026) groundwater body and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0186 mg/l P (Table 3; Appendix C). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this groundwater body.
- Dooega\_010 (IE\_WE\_33D010200) river waterbody and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0457 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. Moderate. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody.
- Western Atlantic Seaboard (IE\_WE\_250\_0000) coastal waterbody and estimated an increase in OP concentrations of up to 0.00003 mg/l P for both summer and winter. The resulting OP concentrations following dosing is 0.0125 mg/l P for both summer and winter (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Achill WTP to Achill WSZ on OP statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effects to the abovementioned habitats and species in Keel Machair/Menaun Cliffs SAC.

Furthermore, dosing will not prevent the maintenance/ restoration of favourable conservation condition of the above-mentioned habitats and species in Keel Machair/Menaun Cliffs SAC, no deterioration of its favourable conservation condition is identified.

## 6.5 CROAGHAUN/SLIEVEMORE SAC 001955

### 6.5.1 (4010) Northern Atlantic wet heaths with *Erica tetralix*

Northern Atlantic wet heaths habitat has not been mapped in detail for this SAC. Relevant nutrients and their natural ranges are yet to be defined for this habitat; however, Appendix B lists these habitats as water sensitive and nutrient dependent for the purposes of this OP dosing project.

**Table 3** identifies the surface waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to peat habitats in the Croaghaun/Slievemore SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Achill (IE\_WE\_G\_0026) groundwater body and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0186 mg/l P (Table 3; Appendix C). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this groundwater body.
- Keel\_East\_010 (IE\_WE\_33K020760) river waterbody and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0129 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody
- Blacksod Bay (IE\_WE\_360\_0000) coastal waterbody and estimated an increase in OP concentrations of up to 0.00004 mg/l P for both summer and winter. The resulting OP concentrations following dosing is 0.0125 mg/l P for both summer and winter (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Achill WTP to Achill WSZ on OP statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effects to the abovementioned peat habitats in Croaghaun/Slievemore SAC.

Furthermore, dosing will not prevent the maintenance/ restoration of favourable conservation condition of the above-mentioned peat habitats in Croaghaun/Slievemore SAC/ no deterioration of its favourable conservation condition is identified.

## 6.6 ACHILL HEAD SAC 002268

### 6.6.1 (1140) Mudflats and sandflats not covered by seawater at low tide

Mudflats and sandflats habitat were estimated at 16 ha and the SSCOs (NPWS, 2013) state that the conservation objective is to maintain the favourable conservation condition, specifically permanent habitat stable/ increasing and conserve 'Intertidal fine sand community' in a natural condition.

**Table 3** identifies the surface waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to mudflats and sandflats in the Achill Head SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Achill Head SAC specific coastal WB and estimated an increase in OP concentrations of 0.0001 mg/l P for both summer and winter. The resulting OP concentrations following dosing is 0.0126 mg/l P for both summer and winter (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Bunacurry Reservoir to Achill WSZ on OP statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effects to mudflats and sandflats in the Achill Head SAC.



Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of mudflats and sandflats in this SAC / no deterioration of its favourable conservation condition is identified.

### 6.6.2 (1160) Large shallow inlets and bays, (1170) Reefs

This site contains 6 recorded community types (NPWS, 2013): Intertidal fine sand community (1160), Mobile subtidal sand with *Gastrosaccus spinifer* community (1160), Subtidal sand with *Bathyporeia elegans* and polychaetes community complex (1160), Intertidal reef community complex (1160 and 1170), *Laminaria*-dominated community complex (1160 and 1170) and Subtidal reef community (1160 and 1170). SSCOs (NPWS, 2013) for these habitats are to conserve intertidal fine sand communities types in a natural condition; and to conserve the intertidal reef complex, *Laminaria*-dominated community complexes and subtidal reef community in a natural condition. Increased nutrients could negatively impact these communities by encouraging development of unfavourable sediment conditions.

**Table 3** identifies the surface and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to 1160 and 1170 habitats in Achill Head SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Achill Head SAC specific coastal WB and estimated an increase in OP concentrations of 0.0001 mg/l P for both summer and winter. The resulting OP concentrations following dosing is 0.0126 mg/l P for both summer and winter (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Achill WTP to Achill WSZ have demonstrated that there will be no change in the OP indicative water quality of surface waterbodies connected to Achill SAC, there is sufficient capacity within the status threshold, and no alteration to water quality meaning there will be no alteration to the nutrient conditions that support Large shallow inlets and bays (1160) and Reef (1170) habitats in this site. Therefore, potential for significant effects on these habitats can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of these habitats / no deteriorations of their favourable conservation condition is identified.

## 6.7 DOOGORT MACHAIR/LOUGH DOO SAC 001497

### 6.7.1 (21A0) Machairs (\*in Ireland), (1395) Petalwort *Petalophyllum ralfsii*

Machair habitat was recorded and mapped at the sub-site Lough Doo with a total estimated area of 88.2 ha. The known population of *Petalophyllum ralfsii* in Doogort Machair/ Lough Doo SAC is at Doogort Machair at three locations occurring on compact sandy soil on tightly grazed low sandhills and hummocks on the machair. The SSCOs (NPWS, 2017) and coastal supporting document (NPWS, 2017) set out the conservation objectives for this habitat and species and are defined by the following list of attributes and targets: Range, Area, Structure and Functions. Functions, is further broken into three attributes, i.e. physical structure, vegetation structure and vegetation composition. This OP dosing project has the potential to impact on the vegetation composition of this habitat and species increasing the percentage of negative indicator species present.

**Table 3** identifies the surface waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to dune habitats in the Doogort Machair/Lough Doo SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Achill (IE\_WE\_G\_0026) groundwater body and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0186 mg/l P (Table



3; Appendix C). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this groundwater body.

- Barnynagappul Stream\_010 (IE\_WE\_33K020760) river waterbody and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0126 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody
- Lough Doo specific lake waterbody and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0053 mg/l P (Table 3; Appendix C). The LWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody
- Blacksod Bay (IE\_WE\_360\_0000) coastal waterbody and estimated an increase in OP concentrations of up to 0.00004 mg/l P for both summer and winter. The resulting OP concentrations following dosing is 0.0125 mg/l P for both summer and winter (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Achill WTP to Achill WSZ have demonstrated that there will be no change in the OP indicative water quality of surface waterbodies connected to Doogort Machair/Lough Doo SAC, there is sufficient capacity within the status threshold, and no alteration to water quality meaning there will be no alteration to the nutrient conditions that support the above listed habitats and species in this site. Therefore, potential for significant effects on these qualifying interests can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of these qualifying interests / no deteriorations of their favourable conservation condition is identified.

## 6.8 DOOGORT MACHAIR SPA 004235

There are no SSCOs for the Doogort Machair SPA (NPWS, 2018). The Site Synopsis (NPWS, 2013) reported 10 pairs of breeding Dunlin in the Doogort Machair SPA site.

**Table 3** identifies the surface and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to Dunlin in Doogort Machair SPA. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Achill (IE\_WE\_G\_0026) groundwater body and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0186 mg/l P (Table 3; Appendix C). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this groundwater body.
- Barnynagappul Stream\_010 (IE\_WE\_33K020760) river waterbody and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0126 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody

- Lough Doo specific lake waterbody and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0053 mg/l P (Table 3; Appendix C). The LWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this river waterbody
- Blacksod Bay (IE\_WE\_360\_0000) coastal waterbody and estimated an increase in OP concentrations of up to 0.00004 mg/l P for both summer and winter. The resulting OP concentrations following dosing is 0.0125 mg/l P for both summer and winter (Table 3, Appendix C). The CWB OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Achill WTP to Achill WSZ for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Achill WTP to Achill WSZ have demonstrated that there will be no change in the OP indicative water quality of surface waterbodies connected to Doogort Machair SPA, there is sufficient capacity within the status threshold, and no alteration to water quality meaning there will be no alteration to the nutrient conditions that support Dunlin in this site. Therefore, potential for significant effects on these qualifying interests can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of Dunlin/ no deteriorations of their favourable conservation condition is identified.

## 6.9 ASSESSMENT OF IN-COMBINATION EFFECTS WITH OTHER PLANS OR PROJECTS

In order to ensure all potential effects upon European sites within the project's Zol were considered, including those direct and indirect impact pathways that are a result of cumulative or in-combination effects, the following steps were completed:

1. Identify projects/ plans which might act in combination: identify all possible sources of effects from the project or plan under consideration, together with all other sources in the existing environment and any other effects likely to arise from other proposed projects or plans;
2. Impacts identification: identify the types of impacts that are likely to affect aspects of the structure and functions of the site vulnerable to change;
3. Define the boundaries for assessment: define boundaries for examination of cumulative effects; these will be different for different types of impact and may include remote locations;
4. Pathway identification: identify potential cumulative pathways (e.g., via water, air, etc.; accumulations of effects in time or space);
5. Prediction: prediction of magnitude/ extent of identified likely cumulative effects, and
6. Assessment: comment on whether or not the potential cumulative effects are likely to be significant.

Mayo County Council Development Plan was reviewed for developments that may have in-combination effects on European Sites with the Zol. Plans relevant to the area were searched in order to identify any elements of the plans that may act cumulatively or in-combination with the proposed development. Based on this search and the Project Teams knowledge of the study area a list of those projects and Plans which may potentially contribute to cumulative or in-combination effects with the proposed project was generated and listed in **Table 5** below.

**Table 5 In-Combination Impacts with Other Plans, Programmes and Policies**

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
<p><b>Mayo County Council Development Plan 2022 – 2028.</b></p> <p>The objectives of relevance in the Mayo County Development Plan include under Infrastructure and Environment, Heritage &amp; Amenity:</p> <p><b>INO 1</b> To implement the Rural Water Programme 2019-2021 and any subsequent plans.</p> <p><b>INO 2</b> To provide guidance and advice regarding the protection of water supply to private wells with the overall responsibility for protection remaining with the householder.</p> <p><b>INO 3</b> To ensure that any new development connects to a public water supply or Group Water Scheme, where available. Connections to wells for individual housing units in unserved rural areas will only be considered where there is no public water main or Group Water Scheme serving the site and where it can be demonstrated that connection to the proposed well will not have significant adverse effects on water quality or water quantity in the area and can provide a potable water supply in accordance with EU Drinking Water standards.</p> <p><b>INO 4</b> To advance key Capital Projects as outlined in the 5-year Capital Programme.</p>	<ul style="list-style-type: none"> <li>▪ N/A</li> </ul>	<p>The Mayo County Council Development Plan 2022 – 2028 emphasises the objectives of its water services which include enhancement and improved quality of the service to its customers. The plan also outlines the importance of compliance with the Western River Basin Management Plan (now replaced by the National Plan 2022-2027), and emphasises compliance with environmental objectives. There is no potential for cumulative effects with these plans.</p>
<p><b>River Basin Management Plan For Ireland 2022 – 2027</b></p> <p>Public Consultation on the River Basin Management Plan (RBMP) for Ireland (2022 – 2027), began in September 2022. The document (Chapter 4) sets out the condition of Irish waters, and a summary of statuses for all monitored waters in the 2013 – 2018 period, including a description of the changes since 2007 – 2009. Nationally, both monitored river waterbodies and lakes at ‘high’ or ‘good’ ecological status, appear to have declined by 3% since 2007 – 2009; nevertheless, this figure does not reflect a significant number of improvements and dis-improvements across these waters since 2009. Provisional figures from the EPA suggest that approximately 900 river waterbodies and lakes have either improved or dis-improved. In addition, the previously observed long term trend of decline in the number of high status river sites has continued.</p> <p>Chapter 5 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each water body that is <i>At Risk</i> of not meeting the environmental objectives of the WFD. Importantly, the assessment includes a review of trends over time to see if conditions were likely to remain stable, improve or deteriorate by 2021. This work was presented in the RBMP for water bodies nationally, which had been characterised at the time. 1,603 waterbodies were classed <i>At Risk</i> out of a total of 4,842, or 33%. An</p>	<ul style="list-style-type: none"> <li>▪ N/A</li> </ul>	<p>The objectives of the RBMP are to:</p> <ul style="list-style-type: none"> <li>▪ Prevent deterioration;</li> <li>▪ Restore good status;</li> <li>▪ Reduce chemical pollution; and</li> <li>▪ Achieve water related protected areas objectives.</li> </ul> <p>The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each waterbody. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of this plan will have a positive impact on biodiversity and the Project will not affect the achievement of the RBMP objectives.</p>

<p>assessment of significant environmental pressures found that agriculture was the most significant pressure in 1,000 river and lake water bodies that are <i>At Risk</i>. Urban waste water, hydromorphology and forestry were also significant pressures amongst others.</p>		
<p><b>Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive</b>          The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC which is being carried out through a Catchment based Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.</p>	<ul style="list-style-type: none"> <li>▪ Habitat loss or destruction;</li> <li>▪ Habitat fragmentation or degradation;</li> <li>▪ Alterations to water quality and/or water movement;</li> <li>▪ Disturbance; and</li> <li>▪ In-combination impacts within the same scheme</li> </ul>	<p>CFRAM Studies and their product Flood Risk Management Plans, will each undergo appropriate assessment. Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of water bodies. The establishment of how flooding may be contributing to deterioration in water quality in areas where other relevant pressures are absent is a significant consideration in terms of achieving the objectives of the WFD. The AA of the plans will need to consider the potential for impacts from hard engineering solutions and how they might affect hydrological connectivity and hydromorphological supporting conditions for protected habitats and species. There is no potential for cumulative effects with the CFRAMS programme as no infrastructure is proposed as part of this project.</p>
<p><b>Foodwise 2025</b>          Foodwise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth Projection includes increasing the value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion.</p>	<ul style="list-style-type: none"> <li>▪ Land use change or intensification;</li> <li>▪ Water pollution;</li> <li>▪ Nitrogen deposition; and</li> <li>▪ Disturbance to habitats / species</li> </ul>	<p>Foodwise 2025 was subject to its own AA.          Growth is to be achieved through sustainable intensification to maximise production efficiency whilst minimising the effects on the environment however there is increased risk of nutrient discharge to receiving waters and in turn a potential risk to biodiversity and Europe Sites if not controlled. With the required mitigation in the Food Wise Plan, no significant in-combination effects are predicted. Mitigation measures included cross compliance with 13 Statutory Management Requirements, EIA Agricultural Regulations 2011, GLAS, and AA Screening of licencing and permitting in the forestry and seafood sectors.</p>
<p><b>Rural Development Programme 2014 – 2022</b>          The agricultural sector is actively enhancing competitiveness whilst trying to achieve more sustainable management of natural resources. The common set of objectives, principles and rules through which the European Union co-ordinates support for European agriculture is outlined in the Rural Development Programme (RDP) 2014-2022 under the Common Agricultural Policy. The focus</p>	<ul style="list-style-type: none"> <li>▪ Overgrazing;</li> <li>▪ Land use change or intensification;</li> <li>▪ Water pollution;</li> <li>▪ Nitrogen deposition; and</li> </ul>	<p>The RDP for 2014 – 2022 has been subject to SEA, and AA. The AA assessed the potential for impacts from the RDP measures e.g. for the GLAS scheme to result in inappropriate management prescriptions; minimum stocking rates under the Areas of Natural Constraints measure leading to overgrazing in sensitive habitats with dependent species, and TAMS supporting intensification. Mitigation included project specific</p>

<p>of the programme is to assist with the sustainable development of rural communities and while improvements are sought in relation to water management. Within the RDP are two targeted agri-environment schemes; Green Low Carbon Agri-Environment Scheme (GLAS) and Targeted Agriculture Modernisation Scheme (TAMS). They provide the role of a supportive measure to improve water quality and thus provide direct benefits in achieving the measures within the RBMP.</p> <p>The achievement of the objectives outlined within GLAS, to improve water quality, mitigate against climate change and promote biodiversity will be of direct positive benefit in achieving the measures within the RBMP and the goals of the Natura Directives. The scheme has an expected participation for 2014-2020 of 50,000 farmers which have to engage in specific training and tasks in order to receive full payment. Farmers within the scheme must have a nutrient management plan which is a strategy for maximising the return from on and off-farm chemical and organic fertilizer resources. This has a direct positive contribution towards protecting waterbodies from pollution through limiting the amount of fertiliser that is placed on the land. The scheme prioritises farms in vulnerable catchments with 'high status' waterbodies and also focuses on educating farmers on best practices to try and improve efficiency along with environmental outcomes.</p> <p>The TAMS scheme is open to all farmers and is focused on supporting productive investment for modernisation. This financial grant for farmers is focused on the pig and poultry sectors, dairy equipment and the storage of slurry and other farmyard manures. Within the TAMS scheme are two further schemes; the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have the ability to contribute towards a reduction in point and diffuse source pollution through improved nutrient management.</p>	<ul style="list-style-type: none"> <li>▪ Disturbance to habitats / species;</li> </ul>	<p>AA for individual building, tourism or agricultural reclamation projects, consultations with key stakeholders during detailed measure development, and site-based monitoring of the effects of RDP measures. With such measures in place, it was concluded that there would be no significant in-combination effects on Natura 2000 sites.</p>
<p><b>National Nitrates Action Programme</b></p> <p>Ireland is obliged under the Nitrates Directive 91/676/EEC to prepare a National Nitrates Action Programme which is designed to prevent pollution of surface and ground waters from agricultural sources. This will directly contribute to the improvement of water quality and thus the objectives within the RBMP. Ireland's fifth Nitrates Action Programme came into operation in 2022 and has a timescale up to 2025. The Agricultural Catchments Programme is an ongoing programme that monitors the efficiency of various measures within the nitrate regulations. It is spread across six catchments and encompasses approximately 300 farmers.</p>	<ul style="list-style-type: none"> <li>▪ Land use change or intensification;</li> <li>▪ Water pollution;</li> <li>▪ Nitrogen deposition; and</li> <li>▪ Disturbance to habitats / species</li> </ul>	<p>This programme has been subject to a Screening for Appropriate Assessment and it concluded that the NAP will not have a significant effect on the Natura 2000 network and a Stage 2 AA was not required. It concluded that the NAP was an environmental programme which imposes environmental constraints on all agricultural systems in the state. It therefore benefits Natura 2000 sites and their species. In terms of in-combination effects, it stated that the Food Wise 2025 strategy would have to operate within the constraints of the NAP.</p>

<p><b>Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2014 – 2020 (Extended to end 2022)</b></p> <p>Ireland's forestry sector is striving to increase forestry cover and one of the recommended policy actions in the Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) is to increase the level of afforestation annually over time and support afforestation and mobilisation measures under the Forestry Programme 2014-2020. Two key objectives within the Forestry Programme 2014-2020 that will influence the RBMP are to increase Ireland's forest cover to 18% and to establish 10,000 ha of new forests and woodlands per annum. As part of this programme there are a number of schemes that promote sustainable forest management and they include the Afforestation Scheme, the Woodland Improvement Scheme, the Forest Road Scheme and the Native Woodland Conservation Scheme. Under the Native Woodland Conservation Scheme funding is provided to restore existing native woodland which promotes Ireland's native woodland resource and associated biodiversity. Native woodlands provide wider ecosystem functions and services which once restored can contribute to the protection and enhancement of water quality and aquatic habitats. New guidance and plans are also being developed to address forestry adjacent to water bodies, Freshwater Pearl Mussel Plans for 8 priority catchments and a Hen Harrier Threat Response Plan (NPWS). The mitigation measures within these plans will be particularly important in terms of protecting sensitive habitats and species from such forestry increases.</p>	<ul style="list-style-type: none"> <li>▪ Habitat loss or destruction;</li> <li>▪ Habitat fragmentation or degradation;</li> <li>▪ Water quality changes; and</li> <li>▪ Disturbance to species.</li> </ul>	<p>Ireland's Forestry Programme 2014 – 2020 has undergone AA. A key recommendation is that all proposed forestry projects should be subject to an assessment of their impacts and the proximity of Natura 2000 habitats and species should be taken into account when proposals are generated. In-combination effects will therefore be assessed at the project specific scale. Adherence to this recommendation will ensure that there is no potential for cumulative effects with the proposed project.</p>
<p><b>Water Services Strategic Plan (WSSP, 2015)</b></p> <p>Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and WFD requirements. The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Irish Water's short, medium and long term objectives and identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new</p>	<ul style="list-style-type: none"> <li>▪ Habitat loss and disturbance from new / upgraded infrastructure;</li> <li>▪ Species disturbance;</li> <li>▪ Changes to water quality or quantity; and</li> <li>▪ Nutrient enrichment /eutrophication.</li> </ul>	<p>The overarching strategy was subject to AA and highlighted the need for additional plan/project environmental assessments to be carried out at the tier 2 and tier 3 level. Therefore, no likely significant in-combination effects are envisaged.</p>

<p>builds within the Irish Water owned asset and this is a significant piece of the puzzle in terms of the expected improvements from the RBMP.</p>		
<p><b>National Wastewater Sludge Management Plan (2016)</b>          The National Wastewater Sludge Management Plan was prepared in 2015, outlining the measures needed to improve the management of wastewater sludge.</p>	<ul style="list-style-type: none"> <li>▪ Habitat loss and disturbance from new / upgraded infrastructure;</li> <li>▪ Species disturbance;</li> <li>▪ Changes to water quality or quantity; and</li> <li>▪ Nutrient enrichment /eutrophication.</li> </ul>	<p>The plan was subject to both AA and SEA and includes a number of mitigation measures which were identified in relation to transport of materials, land spreading of sludge and additional education and research requirements. This plan does not specifically address domestic wastewater loads, only those relating to Irish Water facilities. In relation to the plan as it stands, no in-combination effects are expected with the implementation of proposed mitigation measures.</p>
<p><b>Lead Mitigation Plan (2016)</b>          Included in the WSSP (2015) is the strategy WS1e – Prepare and implement a “Lead in Drinking Water Mitigation Plan” to effectively address the risk of failure to comply with the drinking water quality standard for lead due to lead pipework. This strategy has been realised in the 2016 Lead Mitigation Plan.</p>	<ul style="list-style-type: none"> <li>▪ Changes to water quality or quantity; and</li> <li>▪ Nutrient enrichment /eutrophication.</li> </ul>	<p>The plan is subject to SEA and AA which have also been published and are available at <a href="http://www.water.ie">http://www.water.ie</a>. There are no upstream dosing areas to Achill WSZ however the downstream cumulative impacts of other dosing areas have been considered in the EAM and are assessed herein.</p>



## 7. SCREENING CONCLUSION STATEMENT

This Screening for AA has considered the potential for significant effects on European Sites arising from the proposed OP dosing at the Achill WTP, within Achill WSZ and the Zol. The potential for significant effects is evaluated with regard to the qualifying interests/species of conservation interests and associated conservation status.

The potential for direct, indirect and cumulative impacts affecting **Corraun Plateau (000485)**, **Lough Gall Bog (000522)**, **Keel Machair/Menaun Cliffs (001513)**, **Croaghaun/Slievemore (001955)** and **Achill Head (002268)** **Doogort Machair/Lough Doo (001497)** SACs and **Doogort Machair (004235)** SPA have been assessed. The appraisal undertaken in this Screening report has been informed by an EAM (**Appendix C**) with reference to the ecological communities and habitats. The Screening for AA has determined that there is not potential for significant direct, indirect or cumulative impacts which could affect the qualifying interests/special conservation interests of the European sites within the study area. It is therefore concluded, beyond reasonable scientific doubt, that the proposed project will not give rise to significant effects, either individually or in combination with other plans and projects, within the identified European Site(s).

On the basis of objective scientific information, this Screening has therefore excluded the potential for the proposed project, individually or in combination with other plans or projects, to give rise to any significant effect on a European Site. It is concluded that an AA is therefore not required.

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# Appendix A

## European Sites - Conservation Objectives

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Achill Head SAC 002268



*An Roinn  
Ealaíon, Oidhreachta agus Gaeltachta*  

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*Department of  
Arts, Heritage and the Gaeltacht*



**National Parks and Wildlife Service,  
Department of Arts, Heritage and the Gaeltacht,**

**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)**

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**ISSN 2009-4086**



## Introduction

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*

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002268	Achill Head SAC
1140	Mudflats and sandflats not covered by seawater at low tide
1160	Large shallow inlets and bays
1170	Reefs

**Please note that this SAC adjoins Keel Machair/Menaun Cliffs SAC (001513) and Croaghaun/Slievemore SAC (001955). See map 2. The conservation objectives for this site should be used in conjunction with those for adjacent sites 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

**Year :** 2013  
**Title :** Achill Head SAC (site code 2268) Conservation objectives supporting document- marine habitats V1  
**Author :** NPWS  
**Series :** Conservation objectives supporting document

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### Other References

**Year :** 1997  
**Title :** The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland  
**Author :** Picton, B.E.; Costello, M.J.  
**Series :** Environmental Science Unit, Trinity College Dublin

---

**Year :** 2012  
**Title :** Intertidal benthic survey of Achill Head SAC  
**Author :** MERC  
**Series :** Unpublished report to the Marine Institute and NPWS

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**Year :** 2012  
**Title :** Subtidal sediment and subtidal and intertidal reef survey of Achill Head SAC  
**Author :** MERC  
**Series :** Unpublished report to the Marine Institute and NPWS

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## Spatial data sources

<b>Year :</b>	Interpolated 2013
<b>Title :</b>	1995 BioMar Survey; 2011 intertidal and subtidal surveys
<b>GIS Operations :</b>	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1140, 1170, Marine community types (maps 3, 5 and 6)
<hr/>	
<b>Year :</b>	2005
<b>Title :</b>	OSi Discovery series vector data
<b>GIS Operations :</b>	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. EPA WFD transitional waterbody data erased from extent. Expert opinion used as necessary to resolve any issues arising
<b>Used For :</b>	1160 (map 4)
<hr/>	
<b>Year :</b>	2005
<b>Title :</b>	OSi Discovery series vector data
<b>GIS Operations :</b>	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
<b>Used For :</b>	Marine community types base data (map 6)
<hr/>	

## Conservation Objectives for : Achill Head SAC [002268]

### 1140 Mudflats and sandflats not covered by seawater at low tide

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Achill Head SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSi data as 16ha
Community distribution	Hectares	Conserve the following community type in a natural condition: Intertidal fine sand community. See map 6	Based on an intertidal survey undertaken in 2011 (MERC, 2012). See marine supporting document for further information

**1160 Large shallow inlets and bays**

**To maintain the favourable conservation condition of Large shallow inlets and bays in Achill Head SAC, which is defined by the following list of attributes and targets:**

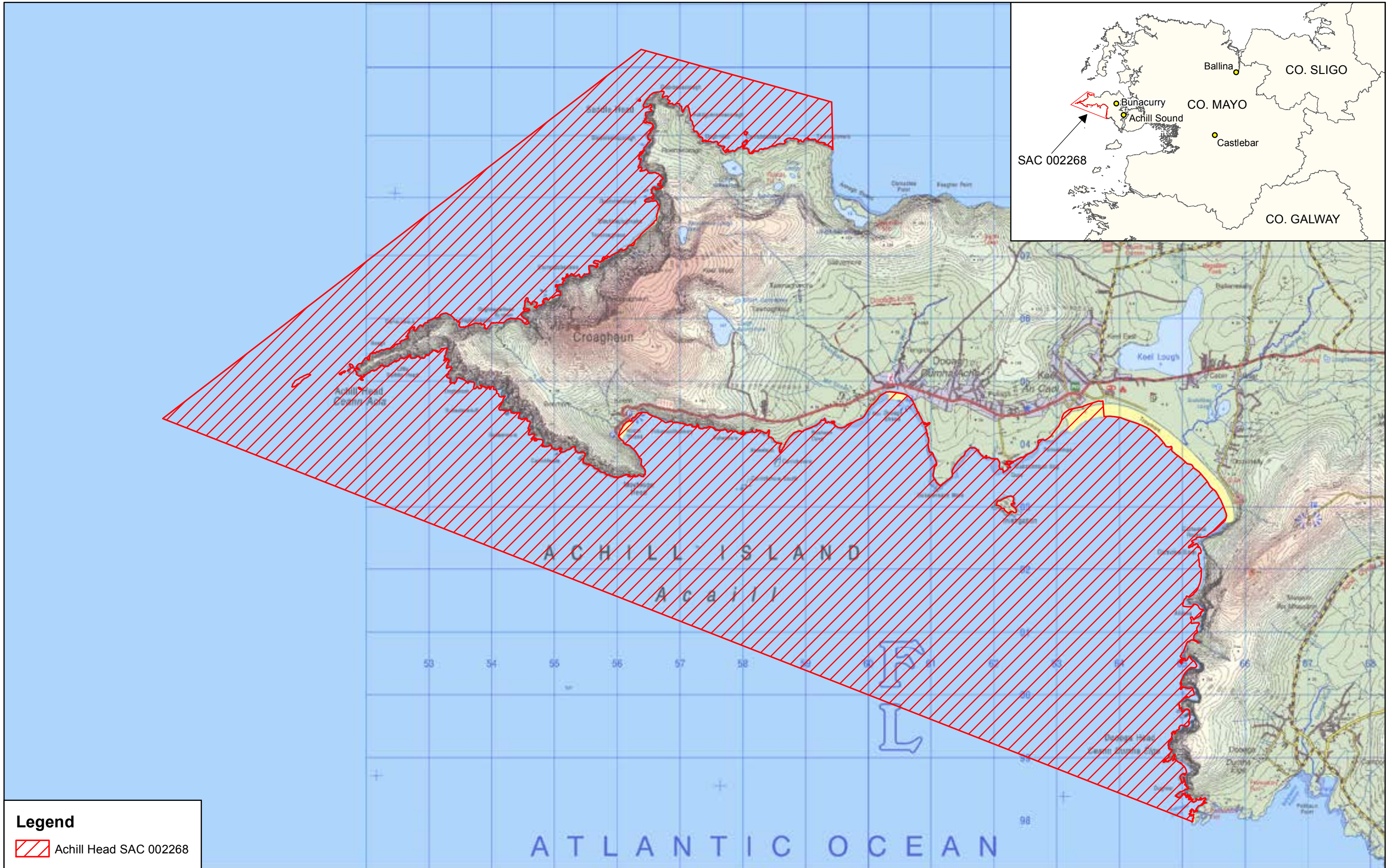
Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area was estimated as 6888ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal fine sand community; Mobile subtidal sand with <i>Gastrosaccus spinifer</i> community; Subtidal sand with <i>Bathyporeia elegans</i> and polychaetes community complex; Intertidal reef community complex; <i>Laminaria</i> -dominated community complex; Subtidal reef community. See map 5	Based on the BioMar survey in 1995 (Picton and Costello, 1997) and intertidal and subtidal surveys undertaken in 2011 (MERC, 2012). See marine supporting document for further information

**1170 Reefs**


**To maintain the favourable conservation condition of Reefs in Achill Head SAC, which is defined by the following list of attributes and targets:**


<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 5	Habitat area estimated as 1919ha from the 1995 BioMar Survey (Picton and Costello, 1997) and a reef survey in 2011 (MERC, 2012)
Distribution	Occurrence	The distribution of reefs remains stable, subject to natural processes. See map 5 for mapped distribution	Based on information from the 1995 BioMar Survey (Picton and Costello, 1997) and a reef survey in 2011 (MERC, 2012). See marine supporting document for further details
Community structure	Biological composition	Conserve the following community types in a natural condition: Intertidal reef community complex; <i>Laminaria</i> -dominated community complex; Subtidal reef community. See map 6	Reef mapping based on information from the 1995 BioMar Survey (Picton and Costello, 1997) and a reef survey in 2011 (MERC, 2012). See marine supporting document for further details





**Legend**

 Achill Head SAC 002268

 **An Roinn Ealaíon, Oidhreachta agus Gaeltachta**  
 Department of Arts, Heritage and the Gaeltacht

**MAP 1:**  
**ACHILL HEAD SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**

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

**SITE CODE:**  
**SAC 002268; version 3. CO. MAYO**

0 1 2 3 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059212).

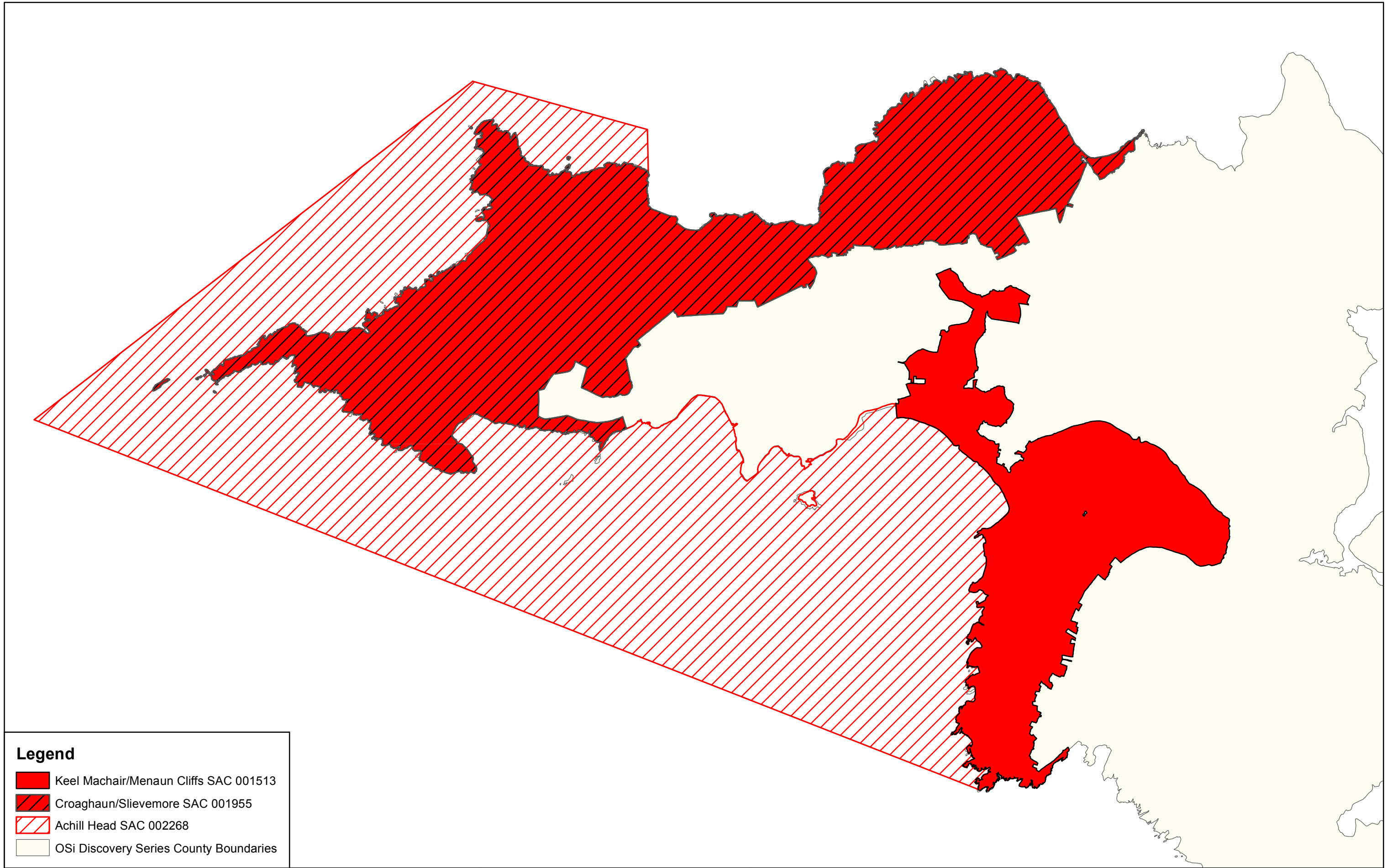
Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na goeantar comharthaíthe. Macasamhail d'ábhar na Suirbhéarachta Ordoanáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059212)

**N**



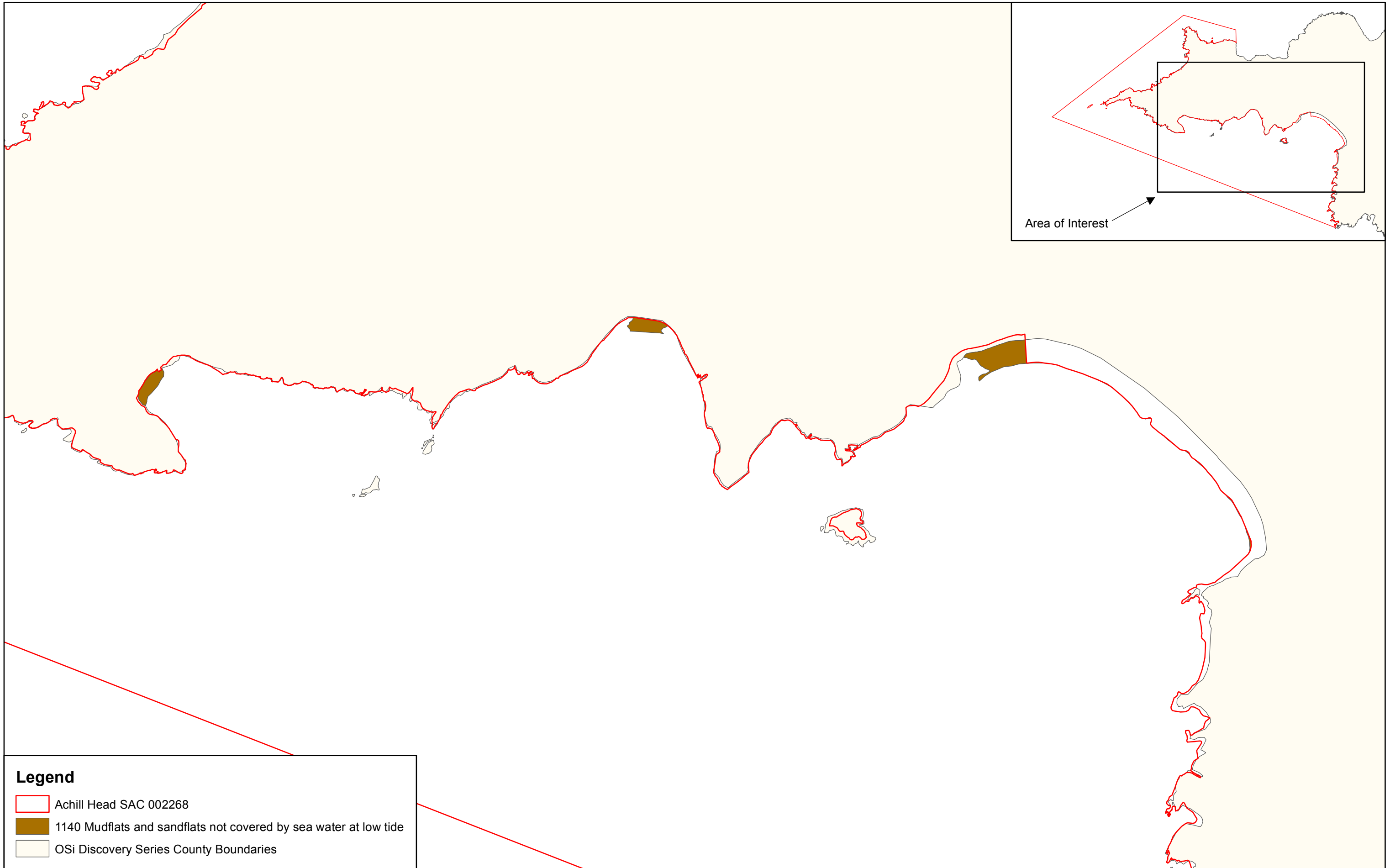
**Map Version 1**  
**Date: Oct 2013**





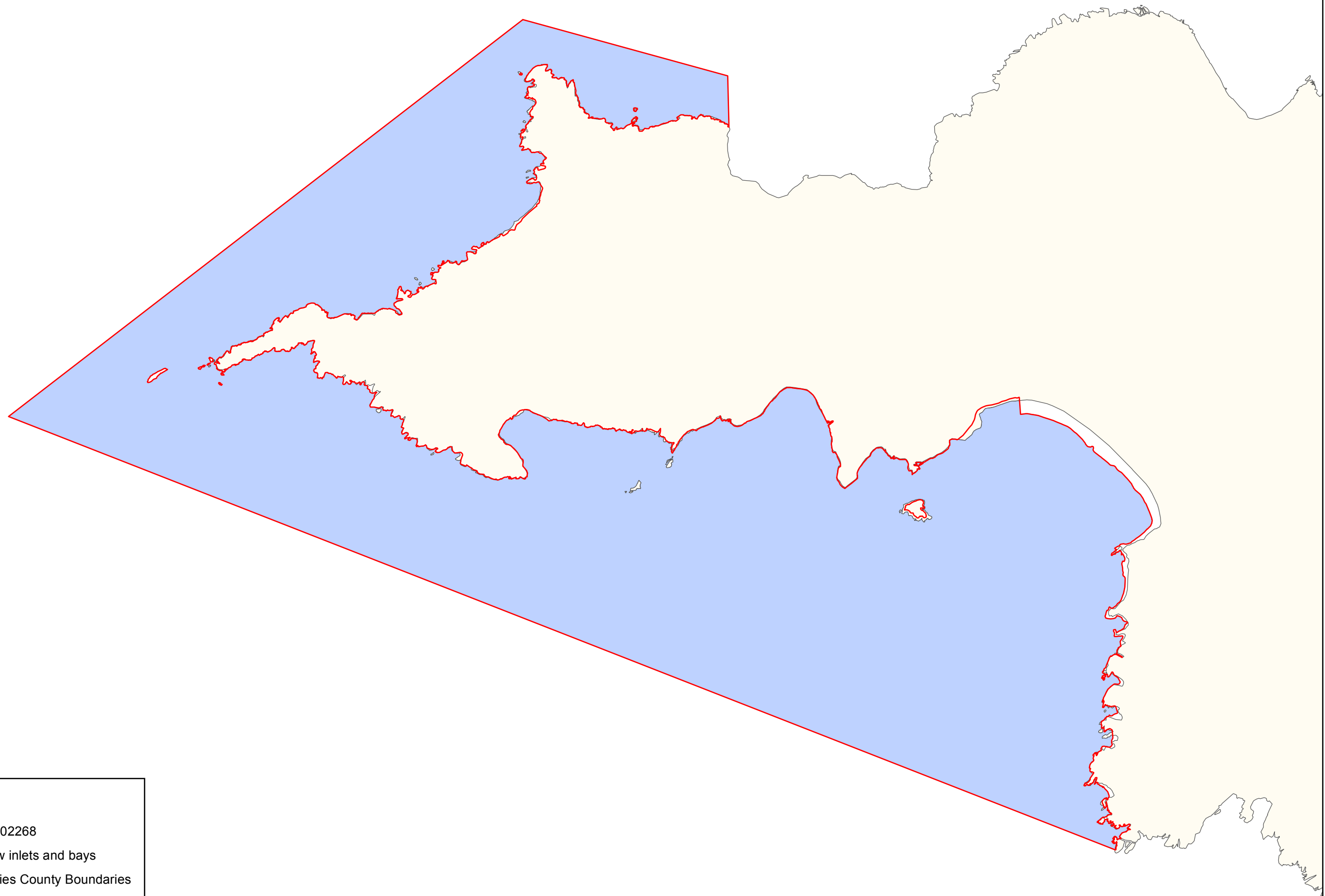
**Legend**

- Keel Machair/Menaun Cliffs SAC 001513
- Croaghaun/Slievemore SAC 001955
- Achill Head SAC 002268
- OSi Discovery Series County Boundaries



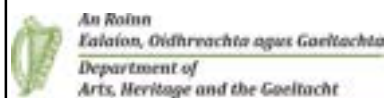
**Legend**

- Achill Head SAC 002268
- 1140 Mudflats and sandflats not covered by sea water at low tide
- OSi Discovery Series County Boundaries



**Legend**

- Achill Head SAC 002268
- 1160 Large shallow inlets and bays
- OSi Discovery Series County Boundaries



**MAP 4:  
ACHILL HEAD SAC  
CONSERVATION OBJECTIVES  
LARGE SHALLOW INLETS AND BAYS**

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

**SITE CODE:  
SAC 002268; version 3. CO. MAYO**

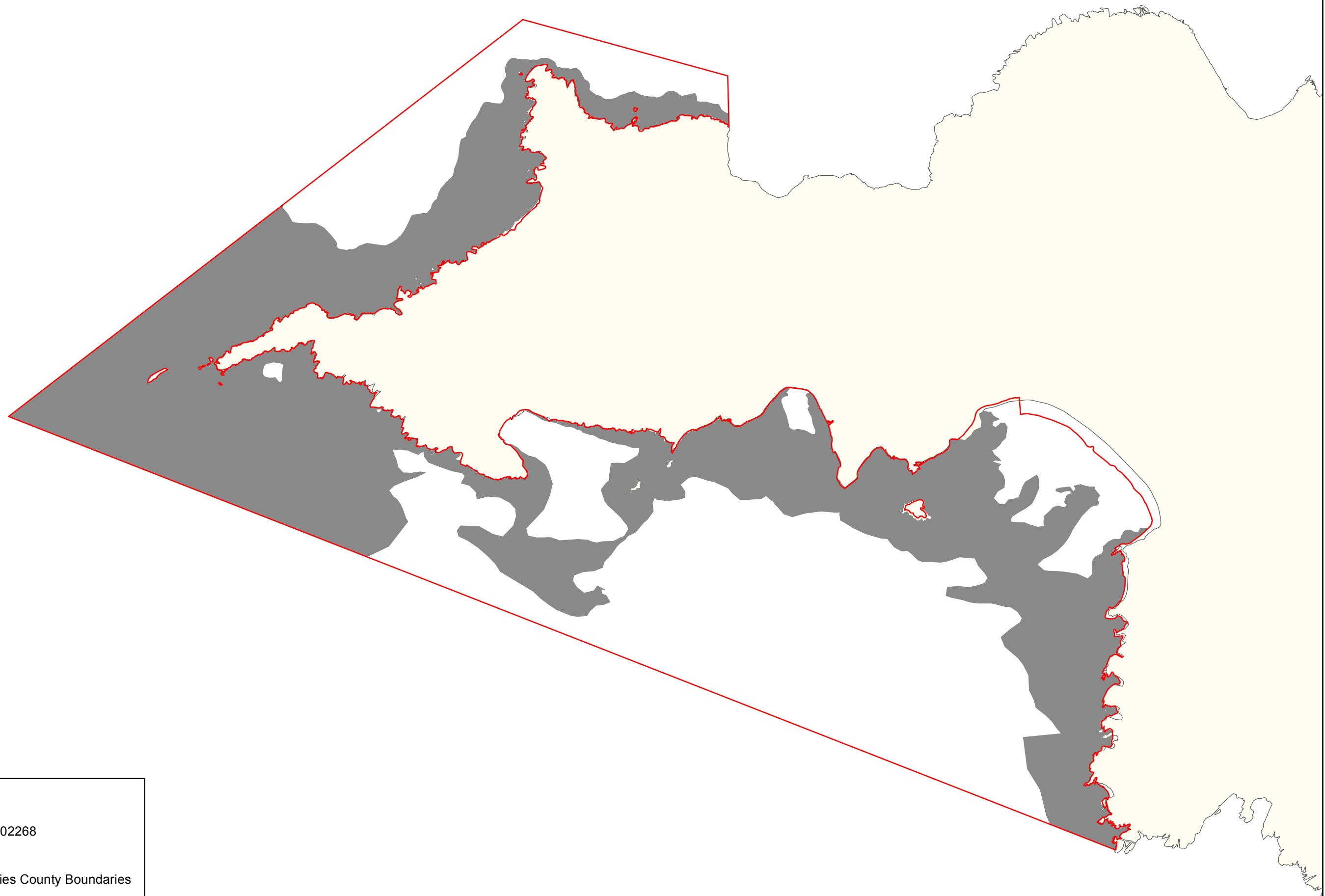


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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na goeantar comharthaíthe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059212)



**Map Version 1  
Date: Oct 2013**



**Legend**

- Achill Head SAC 002268
- 1170 Reefs
- OSi Discovery Series County Boundaries



**MAP 5:  
ACHILL HEAD SAC  
CONSERVATION OBJECTIVES  
REEFS**

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

**SITE CODE:  
SAC 002268; version 3. CO. MAYO**

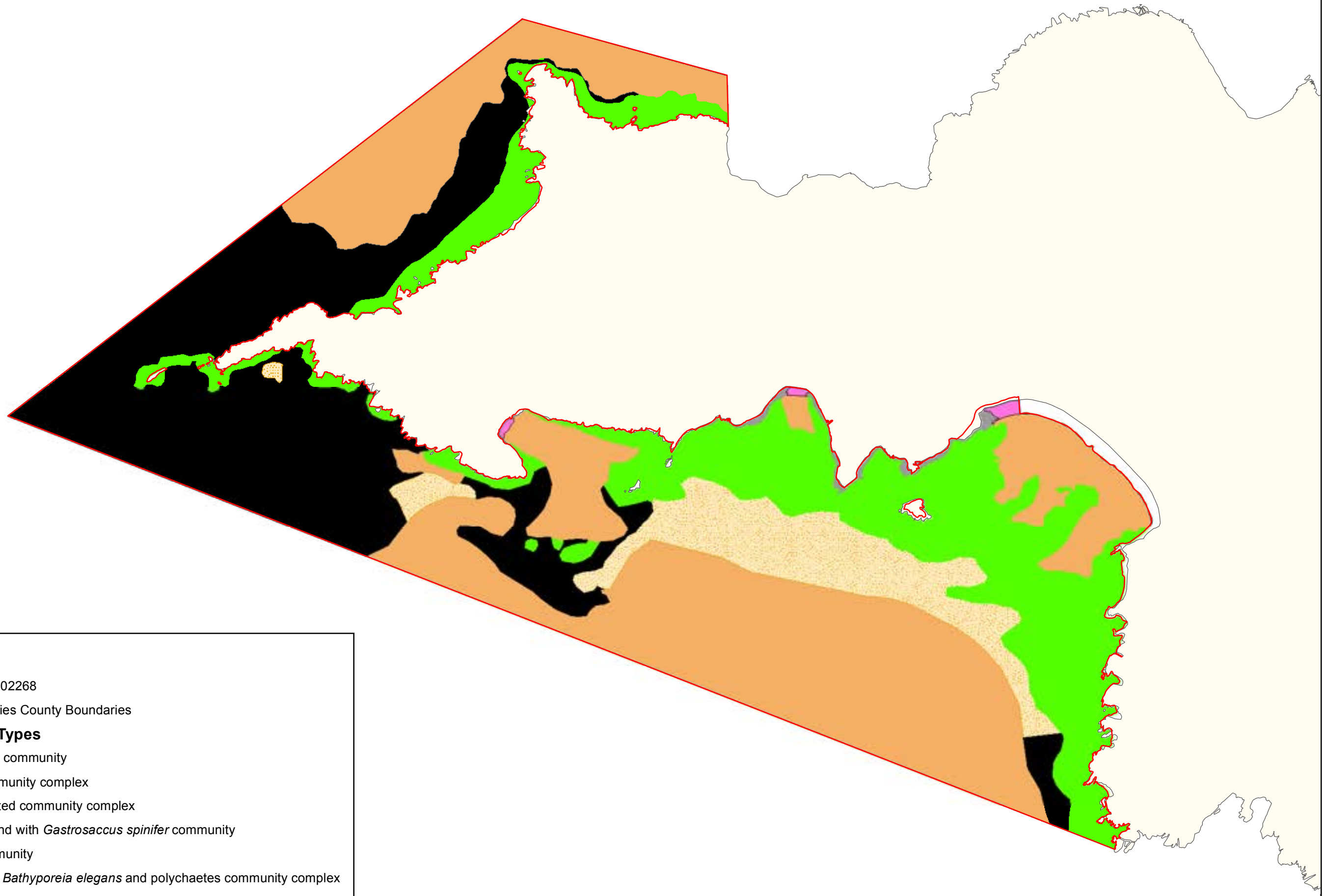


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**Map Version 1  
Date: Oct 2013**



**Legend**

- Achill Head SAC 002268
- OSi Discovery Series County Boundaries

**Marine Community Types**

- Intertidal fine sand community
- Intertidal reef community complex
- Laminaria*-dominated community complex
- Mobile subtidal sand with *Gastrosaccus spinifer* community
- Subtidal reef community
- Subtidal sand with *Bathyporeia elegans* and polychaetes community complex



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Corraun Plateau SAC 000485



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

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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:**

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Rural and Gaeltacht Affairs.**

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

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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*

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000485	Corraun Plateau SAC
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4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
4060	Alpine and Boreal heaths
5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands
8110	Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> )
8220	Siliceous rocky slopes with chasmophytic vegetation

**Please note that this SAC adjoins Owenduff/Nepin Complex SAC (000534). See map 2. The conservation objectives for this site should be used in conjunction with those for adjacent sites 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>	2012
<b>Title :</b>	The Conservation Status of Juniper Formations in Ireland
<b>Author :</b>	Cooper, F.; Stone, R.E.; McEvoy, P.; Wilkins, T.; Reid, N.
<b>Series :</b>	Irish Wildlife Manual No. 63
<hr/>	
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<hr/>	
<b>Year :</b>	2014
<b>Title :</b>	National survey of upland habitats (pilot survey phase, 2009-2010), site report no. 2: Corraun Plateau cSAC (000485), Co. Mayo (revision)
<b>Author :</b>	Roche, J.R.; Perrin, P.M.; Barron, S.J.; Daly, O.H.
<b>Series :</b>	Unpublished report to NPWS
<hr/>	
<b>Year :</b>	2014
<b>Title :</b>	National survey of upland habitats (phase 4, 2013-2014), summary report
<b>Author :</b>	Barron, S.J.; Perrin, P.M.
<b>Series :</b>	Unpublished report to NPWS
<hr/>	
<b>Year :</b>	2016
<b>Title :</b>	Corraun Plateau SAC (site code: 485) Conservation objectives supporting document- upland habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

## Spatial data sources

**Year :** 2010  
**Title :** National Survey of Upland Habitats  
**GIS Operations :** Habitat dataset for site clipped to SAC boundary. Relevant QI selected and exported to new dataset. Expert opinion used as necessary to resolve any issues arising  
**Used For :** 4010, 4030, 4060, 8110, 8220 (maps 3, 4, 5, 7 and 8)

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**Year :** 2012  
**Title :** The conservation status of juniper formations in Ireland  
**GIS Operations :** Juniper formations polygon centroids clipped to SAC boundary  
**Used For :** 5130 (map 6)

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**4010 Northern Atlantic wet heaths with *Erica tetralix***

**To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in Corraun Plateau SAC, which is defined by the following list of attributes and targets:**

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes	Corraun Plateau SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Roche et al., 2014 & Perrin et al., 2014). The total current area of wet heath in the SAC stated by Roche et al. (2014) is 2082.4ha. It is the most extensive Annex I habitat at the SAC covering 53.57% of the SAC. Roche et al. (2014) report obvious losses of habitat since 1995 of approximately 8.07ha. A summary of the mapping methodology and a brief discussion of restoration potential are presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 3	Wet heath was recorded by Roche et al. (2014) throughout the SAC except on the higher ground. Extensive patches occur at on the eastern and southern slopes. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Perrin et al. (2014) recorded five different wet heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of 2m x 2m monitoring stops	Presence of cross-leaved heath ( <i>Erica tetralix</i> ) near each monitoring stop	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50%	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). Further details can be found in the uplands supporting document
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of <i>Cladonia</i> and <i>Sphagnum</i> species, <i>Racomitrium lanuginosum</i> and pleurocarpous mosses at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry ( <i>Empetrum nigrum</i> ) at least 15%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Roche et al. (2014) and forming extensive carpets. A small population of <i>Rhododendron ponticum</i> was recorded from this habitat by Roche et al. (2014)

Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of 2m x 2m monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage cover in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	Roche et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Cladonia rangiferina</i> has been recorded from within the habitat. This species is listed on a preparatory list of rare and threatened lichens prepared by D. McFerran, National Museums Northern Ireland. This and any new records should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Roche et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Corraun Plateau SAC [000485]

### 4030 European dry heaths

**To restore the favourable conservation condition of European dry heaths in Corraun Plateau 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	Corraun Plateau SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Roche et al., 2014 & Perrin et al., 2014). The total current area of dry heath in the SAC stated by Roche et al. (2014) is 207.9ha. It covers 5.35% of the SAC. Roche et al. (2014) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current habitat distribution, subject to natural processes. See map 4	Dry heath was recorded by Roche et al. (2014) throughout the SAC, but was most abundant on the northern slopes of the SAC. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Roche et al. (2014) recorded three different dry heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Based on Perrin et al. (2014). The list of positive indicator species for this habitat, which is composed of dwarf shrubs, is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Based on Perrin et al. (2014). The list of positive indicator species for this habitat, which is composed of dwarf shrubs, is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. <i>Campylopus introflexus</i> was recorded within this habitat by Roche et al. (2014) but did not form extensive carpets
Vegetation structure: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details



Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Based on Perrin et al. (2014). The list of sensitive areas is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	Roche et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Roche et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Corraun Plateau SAC [000485]

### 4060 Alpine and Boreal heaths

**To restore the favourable conservation condition of Alpine and Boreal heaths in Corraun Plateau 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	Corraun Plateau SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Roche et al., 2014 & Perrin et al., 2014). The total current area of Alpine and Boreal heath in the SAC stated by Roche et al. (2014) is 278.3ha. It covers 7.16% of the SAC. Roche et al. (2014) report obvious losses of habitat since 1995 of approximately 0.45ha. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 5	Alpine and Boreal heath was recorded by Roche et al. (2014) on the high ground through the centre of the SAC, but was also recorded at lower elevations on the southern slopes. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Roche et al. (2014) recorded three different Alpine and Boreal heath communities within this SAC. Data on the abundance of these communities is reproduced in the uplands supporting document. Further information on these communities is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 66%	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: dwarf-shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf-shrub species at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 10%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Roche et al. (2014)
Vegetation structure: signs of grazing	Percentage of leaves browsed at a representative number of 2m x 2m monitoring stops	Less than 10% collectively of the live leaves of specific graminoids showing signs of grazing	Based on Perrin et al. (2014). See the uplands supporting document for further details including the list of specific graminoids
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids and crowberry ( <i>Empetrum nigrum</i> ) showing signs of browsing	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning within the habitat	Based on Perrin et al. (2014). See the uplands supporting document for further details

Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	Roche et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. <i>Cladonia rangiferina</i> has been recorded from within the habitat. This species is listed on a preparatory list of rare and threatened lichens prepared by D. McFerran, National Museums Northern Ireland. This and any new records should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Roche et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details

## Conservation Objectives for : Corraun Plateau SAC [000485]

### 5130 Juniperus communis formations on heaths or calcareous grasslands

To restore the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in Corraun Plateau 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>Juniperus communis</i> formations on heaths or calcareous grasslands occurs in close association with heath habitats, particularly Alpine and Boreal heaths (4060). Cooper et al. (2012) recorded the habitat on the southern facing slopes of the central section of the SAC
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 6 for survey location	See notes for area above
Juniper population size	Number per formation	At least 50 plants per formation	To classify as a juniper formation, at least 50 plants should be present (Cooper et al., 2012). At least 500 plants were recorded by Cooper et al. (2012)
Vegetation composition: typical species	Number per formation	At least 50% of the listed positive indicator species for the relevant vegetation group present	Cooper et al. (2012) lists positive indicator species for five vegetation groups. The formation described at this SAC by Cooper et al. (2012) falls into vegetation group 4 ( <i>Calluna vulgaris</i> / <i>Erica cinerea</i> group). See Cooper et al. (2012) for positive indicator species
Vegetation composition: negative indicator species	Occurrence per formation	Negative indicator species, particularly non-native invasive species, absent or under control	Negative indicator species listed by Cooper et al. (2012)
Vegetation structure: cone-bearing plants	Percentage per formation	At least 10% of juniper plants are bearing cones	Attribute and target based on Cooper et al. (2012)
Vegetation structure: seedling recruitment	Percentage per formation	At least 10% of juniper plants are seedlings	Attribute and target based on Cooper et al. (2012)
Vegetation structure: dead juniper	Percentage per formation	Mean percentage of each juniper plant dead less than 10%	Attribute and target based on Cooper et al. (2012)

## Conservation Objectives for : Corraun Plateau SAC [000485]

### 8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)

To restore the favourable conservation condition of Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) in Corraun Plateau 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	Corraun Plateau SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Roche et al., 2014 & Perrin et al., 2014). The total current area of siliceous scree in the SAC stated by Roche et al. (2014) is 30.3ha. This covers 0.78% of the SAC. Roche et al. (2014) report no significant losses of area since 1995. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 7	Siliceous scree was recorded by Roche et al. (2014) on the northern slopes of the SAC. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes and non-crustose lichen species at least 5%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of vegetation composed of negative indicator species less than 1%	Based on Perrin et al. (2014). The list of negative indicator species is given in Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of vegetation composed of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Roche et al. (2014)
Vegetation composition: positive indicator species	Number of species in local vicinity of a representative number of monitoring stops	Number of positive indicator species present in vicinity of each monitoring stop in block scree is at least one	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014) and is the same as for 8220 Siliceous rocky slopes. Further details can be found in the uplands supporting document
Vegetation composition: grass species and dwarf shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of grass species and dwarf shrubs less than 20%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and scrub less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed at a representative number of 2m x 2m monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: disturbance	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Ground disturbed by human and animal paths, scree running, vehicles less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details

Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	Roche et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. Hepatic mats of the <i>Calluna vulgaris-Herbertus aduncus</i> community were recorded within this habitat by Roche et al. (2014). No assessment of the conservation status of this community has been conducted but proposals for such an assessment are presented in Barron and Perrin (2014). See the uplands supporting document for further details
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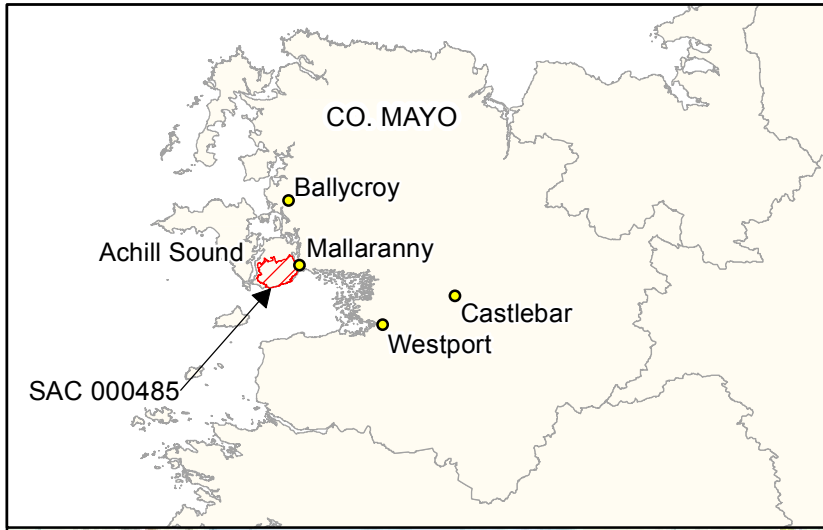
## Conservation Objectives for : Corraun Plateau SAC [000485]

### 8220 Siliceous rocky slopes with chasmophytic vegetation


**To restore the favourable conservation condition of Siliceous rocky slopes with chasmophytic vegetation in Corraun Plateau 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	Corraun Plateau SAC was surveyed as part of the National Survey of Upland Habitats (NSUH; see Roche et al., 2014 & Perrin et al., 2014). The total current area of siliceous rocky slopes in the SAC stated by Roche et al. (2014) is 15.0ha. This covers 0.39% of the SAC. A summary of the mapping methodology is presented in the uplands supporting document
Habitat distribution	Occurrence	No decline from current distribution, subject to natural processes. See map 8	Siliceous rocky slopes were recorded by Roche et al. (2014) with patches on the northern slopes and also in the south. A summary of the mapping methodology is presented in the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of monitoring stops	Number of positive indicator species present in vicinity of each monitoring stop is at least one	Based on Perrin et al. (2014). The list of positive indicator species for this habitat is presented in Perrin et al. (2014). Further details can be found in the uplands supporting document
Vegetation composition: non-native species	Percentage cover in local vicinity of a representative number of monitoring stops	Proportion of vegetation composed of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details. No non-native species were recorded within this habitat by Roche et al. (2014)
Vegetation composition: bracken, native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Total cover of bracken ( <i>Pteridium aquilinum</i> ), native trees and scrub less than 25%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: grazing and browsing	Percentage of leaves/shoots grazed/browsed in local vicinity of a representative number of monitoring stops	Live leaves of forbs and shoots of dwarf shrubs showing signs of grazing or browsing collectively less than 50%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	Roche et al. (2014) compiled and mapped existing rare and notable plant records for the SAC and added any new records collected during the NSUH survey. No relevant species were recorded in this habitat, however, new records should be considered within this attribute. See the uplands supporting document for further details





**Legend**

 Corraun Plateau SAC 000485



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

**MAP 1:  
CORRAUN PLATEAU SAC  
CONSERVATION OBJECTIVES  
SAC DESIGNATION**

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

**SITE CODE:  
SAC 000485; version 3.01. Co. Mayo**

0 0.5 1 1.5 2 km

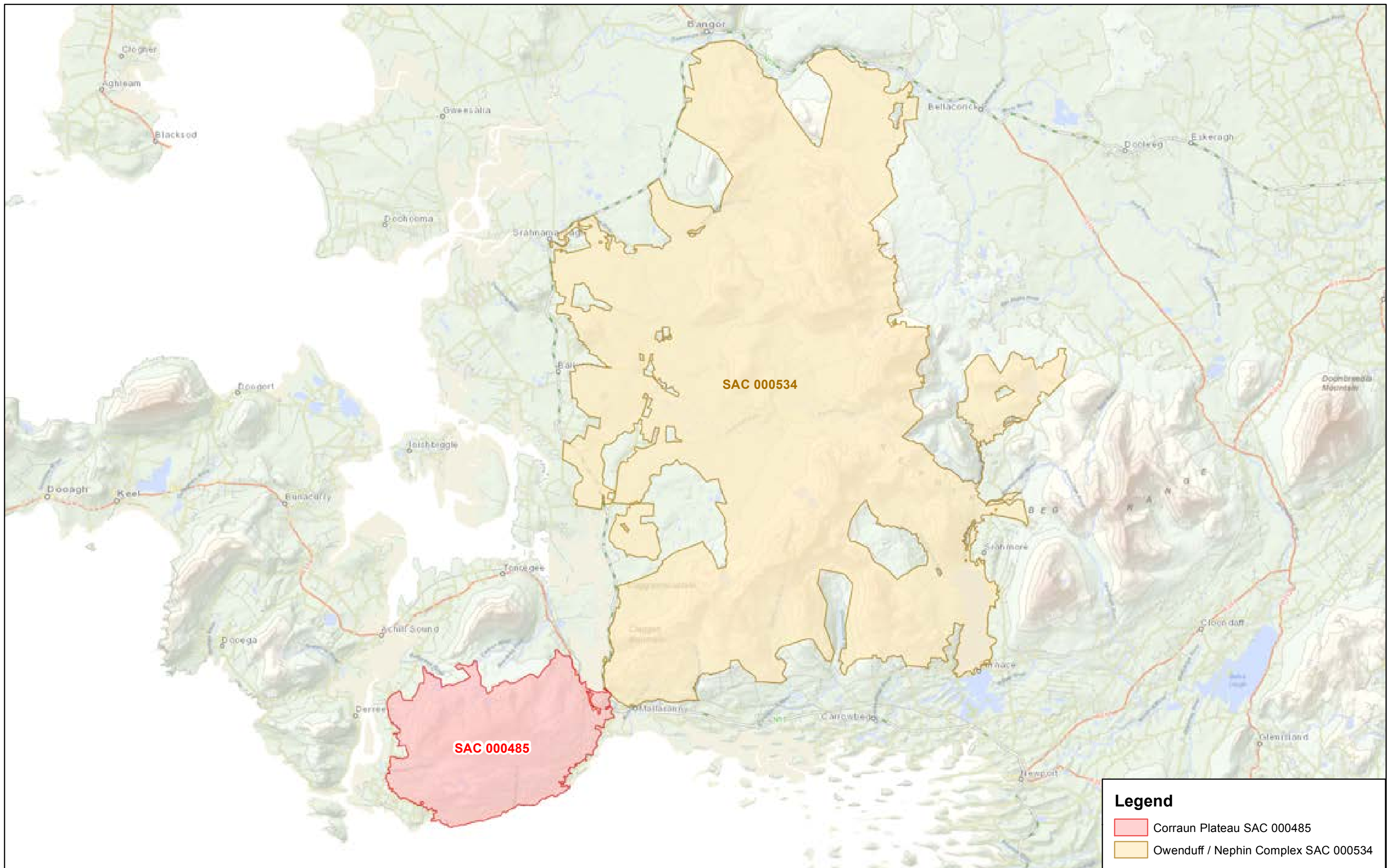
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
Ordnance Survey of Ireland Licence No EN 0059214. © Ordnance Survey of Ireland Government of Ireland.

Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnihe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059214. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann.



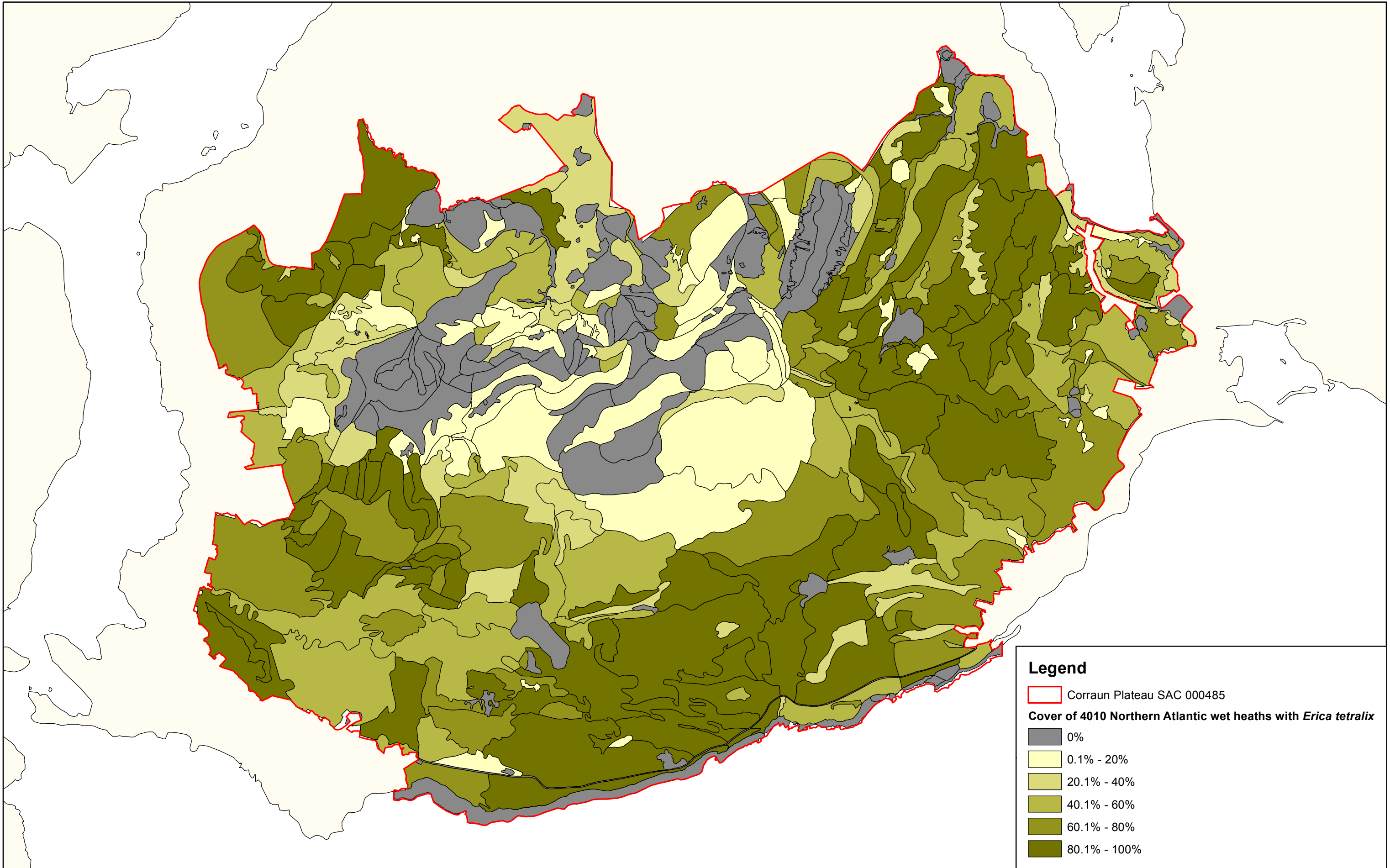
**Map Version 1  
Date: July 2016**





**Legend**

- Corraun Plateau SAC 000485
- Owenduff / Nephin Complex SAC 000534

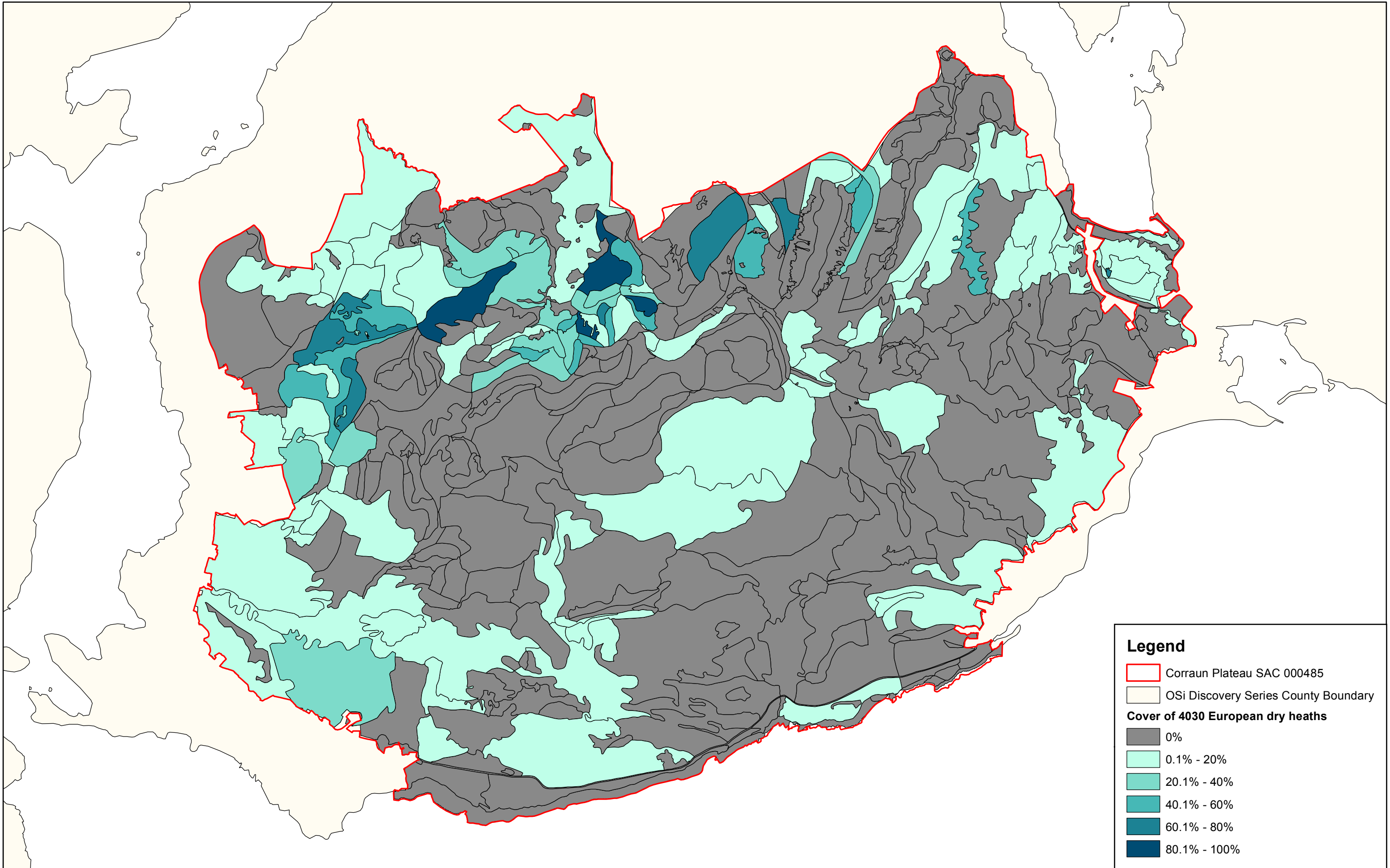


**Legend**

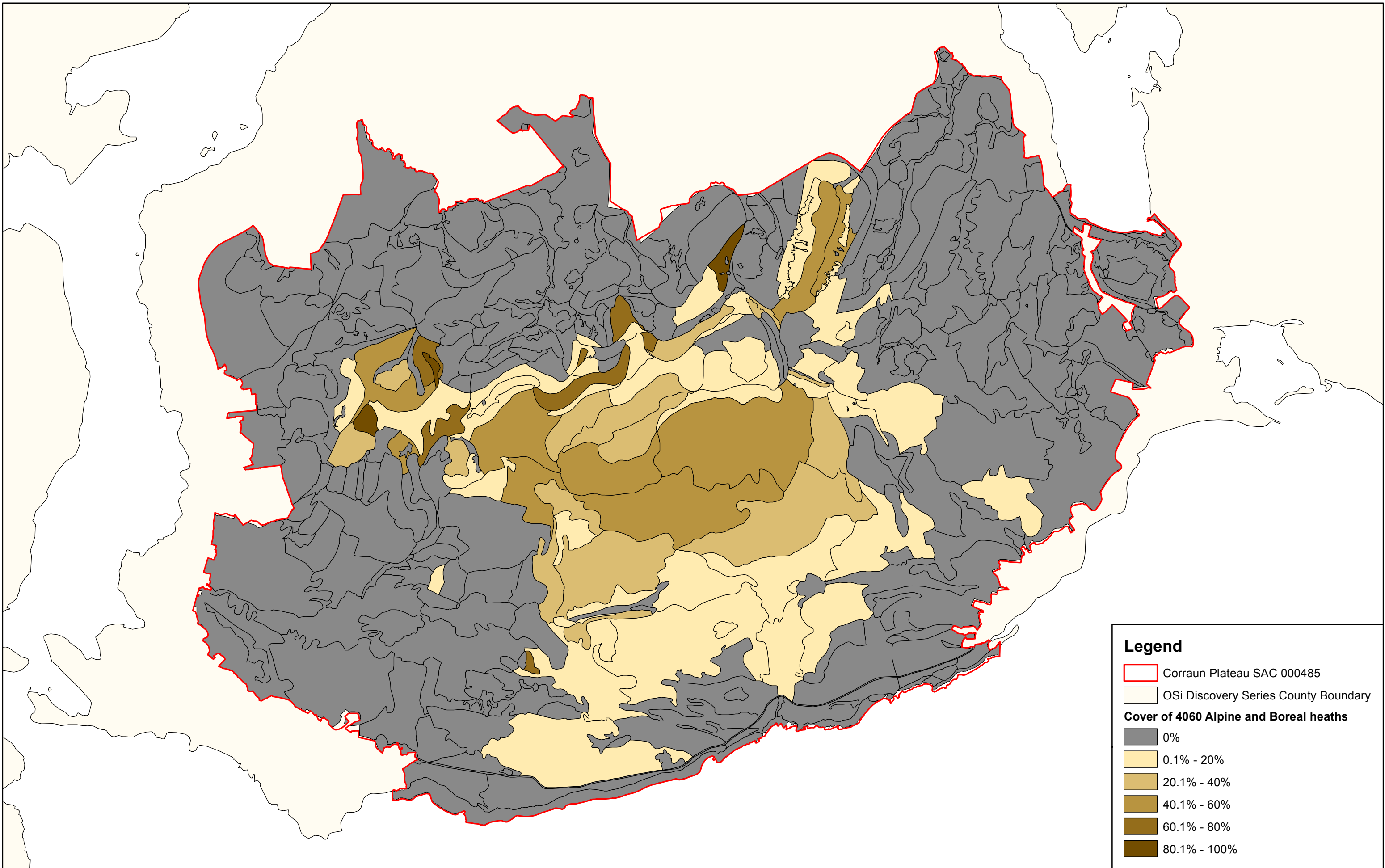
Corraun Plateau SAC 000485

**Cover of 4010 Northern Atlantic wet heaths with *Erica tetralix***

- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%





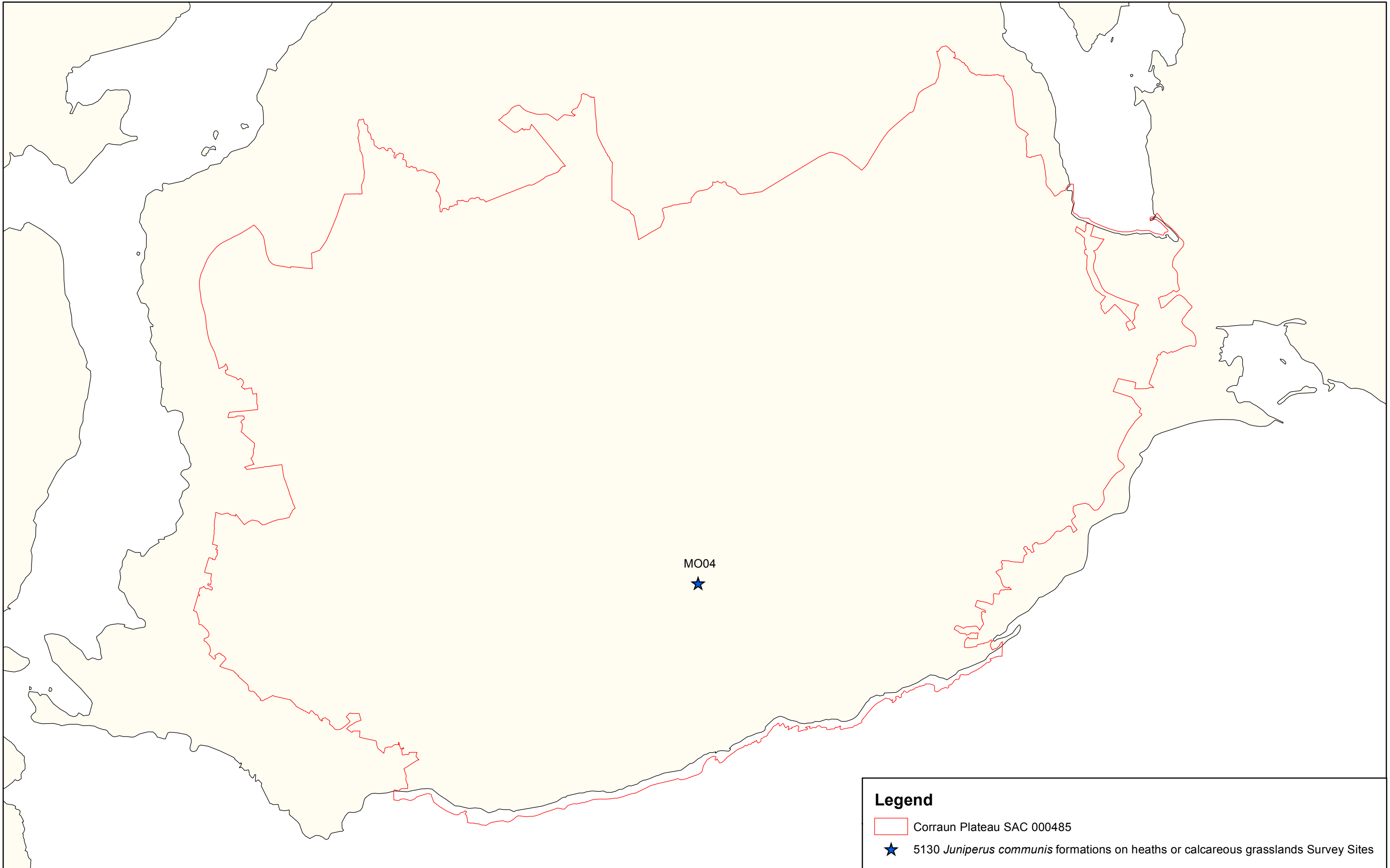


**Legend**

- Corraun Plateau SAC 000485
- OSi Discovery Series County Boundary

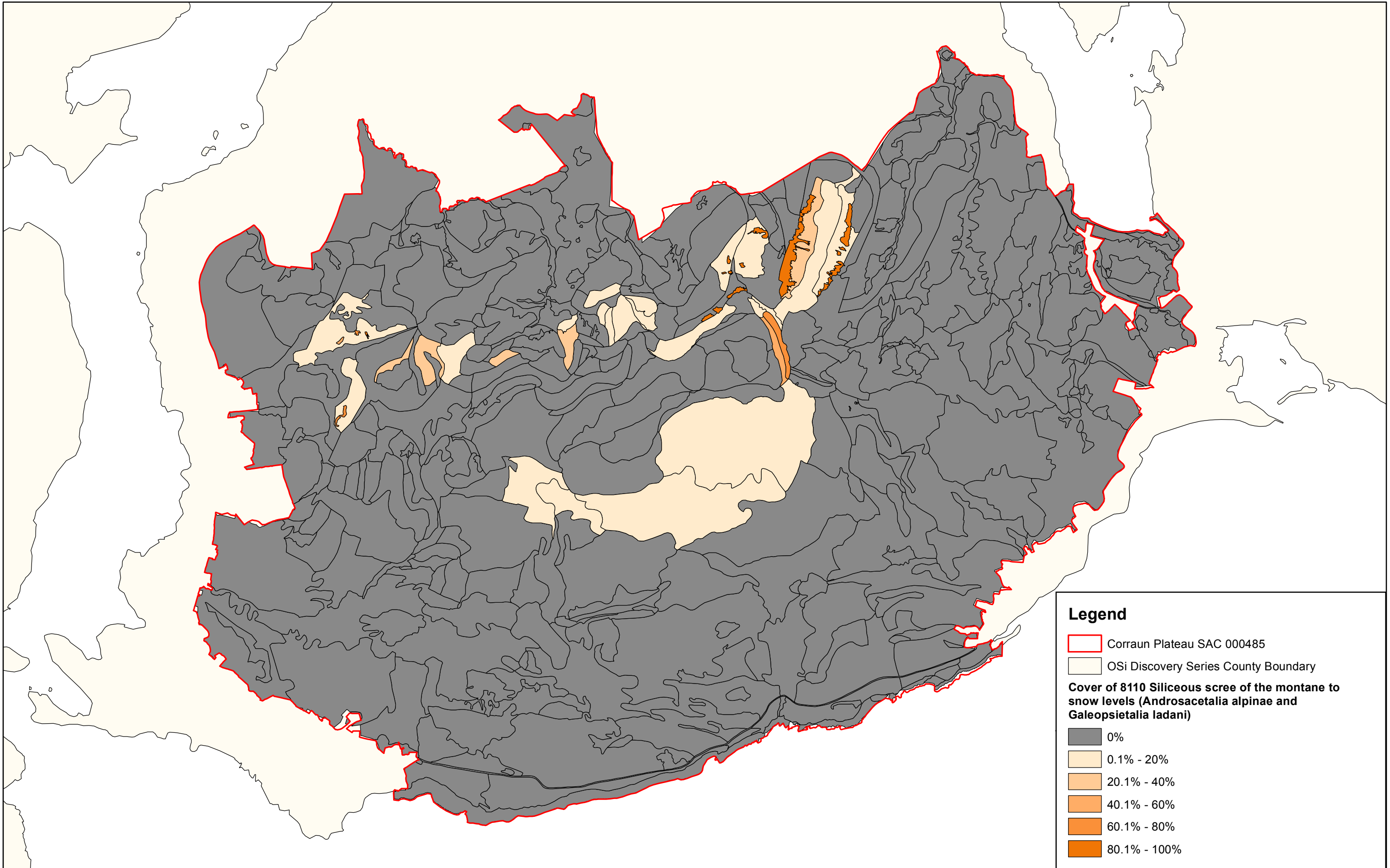
**Cover of 4060 Alpine and Boreal heaths**

- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%



**Legend**

- Corraun Plateau SAC 000485
- ★ 5130 *Juniperus communis* formations on heaths or calcareous grasslands Survey Sites



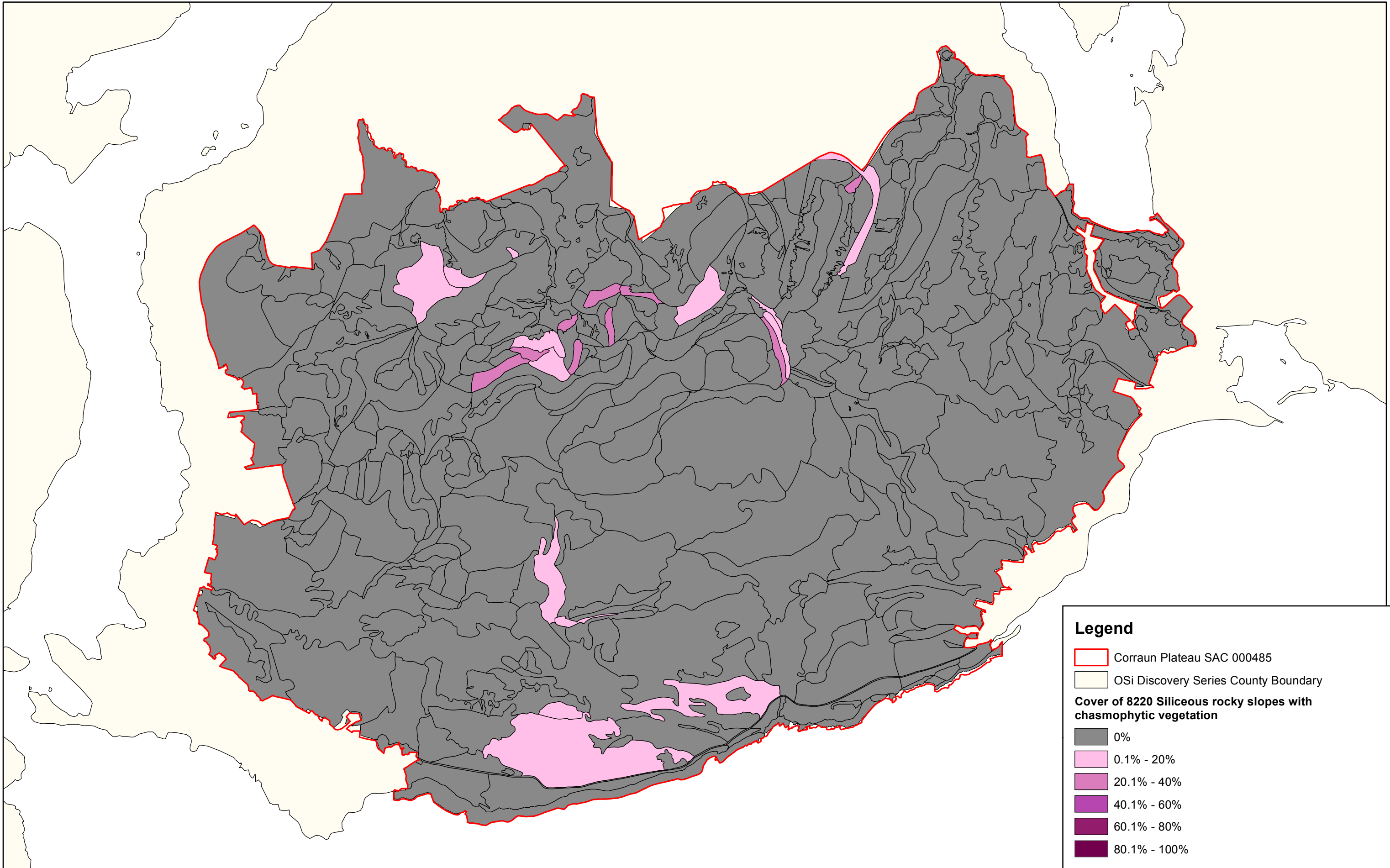
**Legend**

- Corraun Plateau SAC 000485
- OSi Discovery Series County Boundary

**Cover of 8110 Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)**

- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%





**Legend**

- Corraun Plateau SAC 000485
- OSi Discovery Series County Boundary

**Cover of 8220 Siliceous rocky slopes with chasmophytic vegetation**

- 0%
- 0.1% - 20%
- 20.1% - 40%
- 40.1% - 60%
- 60.1% - 80%
- 80.1% - 100%

## Conservation objectives for Croaghaun/Slievemore SAC [001955]

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.

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.

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

Code	Description
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i>
4030	European dry heaths
4060	Alpine and Boreal heaths
8110	Siliceous scree of the montane to snow levels ( <i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i> )
8220	Siliceous rocky slopes with chasmophytic vegetation

\* denotes a priority habitat



**Citation:** NPWS (2018) Conservation objectives for Croaghaun/Slievemore SAC [001955]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Keel Machair/Menaun Cliffs SAC 001513



An Roinn  
Cultúir, Oidhreacht agus Gaeltachta  

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Department of  
Culture, Heritage and the Gaeltacht



**National Parks and Wildlife Service,  
Department of Culture, Heritage and the Gaeltacht,  
90 King Street North, Dublin 7, D07 N7CV, Ireland.**

**Web: [www.npws.ie](http://www.npws.ie)  
E-mail: [nature.conservation@chg.gov.ie](mailto:nature.conservation@chg.gov.ie)**

**Citation:**

**NPWS (2018) Conservation Objectives: Keel Machair/Menaun Cliffs SAC  
001513. Version 1. National Parks and Wildlife Service, Department of Culture,  
Heritage and the Gaeltacht.**

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

## Introduction

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*

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001513      Keel Machair/Menaun Cliffs SAC

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1220      Perennial vegetation of stony banks

1395      Petalwort *Petalophyllum ralfsii*

21A0      Machairs (\* in Ireland)

4060      Alpine and Boreal heaths

**Please note that this SAC is adjacent to Achill Head SAC (002268).  
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>	Biomar survey of Irish machair sites 1996
<b>Author :</b>	Crawford, I.; Bleasdale, A.; Conaghan, J.
<b>Series :</b>	Irish Wildlife Manual No. 3
<b>Year :</b>	2009
<b>Title :</b>	Coastal Monitoring Project 2004-2006
<b>Author :</b>	Ryle, T.; Murray, A.; Connolly, K.; Swann, M.
<b>Series :</b>	Unpublished report to NPWS
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	Monitoring survey of Annex I sand dune habitats in Ireland
<b>Author :</b>	Delaney, A.; Devaney, F.M.; Martin, J.M.; Barron, S.J.
<b>Series :</b>	Irish Wildlife Manual No. 75
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2015
<b>Title :</b>	Monitoring methods for <i>Petalophyllum ralfsii</i> (Wils.) Nees & Gottsche (Petalwort) in the Republic of Ireland
<b>Author :</b>	Campbell, C.; Hodgetts, N.; Lockhart, N.
<b>Series :</b>	Irish Wildlife Manual No. 90
<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>	Survey and assessment of vegetated shingle and associated habitats at 30 coastal sites in Ireland
<b>Author :</b>	Martin, J.R.; Daly, O.H.; Devaney F.M.
<b>Series :</b>	Irish Wildlife Manual No. 98
<b>Year :</b>	2018
<b>Title :</b>	Keel Machair/Menaun Cliffs SAC (site code: 1513) Conservation objectives supporting document: coastal habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

## Other References

- Year :** 2006  
**Title :** The vegetation of Irish machair  
**Author :** Gaynor, K.  
**Series :** Biology and Environment: Proceedings of the Royal Irish Academy, 106B(3): 311-321
- 
- Year :** 2008  
**Title :** The phytosociology and conservation value of Irish sand dunes  
**Author :** Gaynor, K.  
**Series :** Unpublished Ph.D. Thesis, National University of Ireland, Dublin
- 
- Year :** 2013  
**Title :** Conservation of selected legally protected and Red Listed bryophytes in Ireland  
**Author :** Campbell, C.  
**Series :** Unpublished Ph.D. Thesis, Trinity College Dublin
-

## Spatial data sources

**Year :** 2017  
**Title :** Vegetated Shingle Monitoring Project  
**GIS Operations :** QIs selected; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising  
**Used For :** 1220, 21A0 (map 3)

---

**Year :** 2017  
**Title :** NPWS rare and threatened species database  
**GIS Operations :** Dataset created from spatial references in database records. Expert opinion used as necessary to resolve any issues arising  
**Used For :** 1395 (map 4)

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**1220 Perennial vegetation of stony banks**

**To maintain the favourable conservation condition of Perennial vegetation of stony banks in Keel Machair/Menaun Cliffs 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	Based on data from the Vegetated Shingle Monitoring Project (VSM) (Martin et al., 2017). Perennial vegetation of stony banks was not recorded in the sub-site Trawmore, Keel (VSM site code 006) during the VSM and thus the total area of the qualifying habitat within Keel Machair/Menaun Cliffs SAC is unknown. Martin et al. (2017) did note extensive areas of shingle beach in the sub-site during the VSM; however, no areas of the shingle were vegetated. NB further unsurveyed areas may be present within the SAC. See the Keel Machair/Menaun Cliffs SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline, subject to natural processes, including erosion and succession	The full distribution of the habitat in the SAC is unknown at present. It is possible that the habitat on the shingle beach in the Trawmore, Keel sub-site has been temporarily lost due to natural erosion and will re-establish in the future (Martin et al., 2017). See the coastal habitats supporting document for further details. NB further unsurveyed areas may be present within the SAC
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions	Rock armour is present within the Trawmore, Keel sub-site, but its impact on the formation of the habitat is considered to be minimal (Martin et al., 2017). See the coastal habitats supporting document for further details
Physical structure: disturbance	Percentage	No more than 20% of the habitat affected by disturbance	Based on data from Martin et al. (2017). Disturbance can include damage from heavy trampling, vehicle damage and removal of substrate. 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 Martin et al. (2017). See the coastal habitats supporting document for further details
Vegetation composition: communities and typical species	Occurrence	Maintain the typical species within the range of vegetated shingle communities	Based on data from Martin et al. (2017) where information on the vegetated shingle communities and associated typical species lists are presented. See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage	Negative indicator species cover in any individual monitoring stop should not be more than 25%; no negative indicator species should be present in more than 60% of monitoring stops	Based on data from Martin et al. (2017) where the list of negative indicator species for the habitat is also presented. Negative indicators include species indicative of changes in nutrient status and species not considered characteristic of the habitat. See the coastal habitats supporting document for further details

Vegetation composition: non-native species	Percentage	Non-native species cover in any individual monitoring stop should not be more than 1%; non-native species should not be present in more than 20% of monitoring stops; cover of non-native species across the whole site should not be more than 1%	Based on data from Martin et al. (2017). See the coastal habitats supporting document for further details
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## Conservation Objectives for : Keel Machair/Menaun Cliffs SAC [001513]

### 21A0 Machairs (\* in Ireland)

**To restore the favourable conservation condition of Machairs\* in Keel Machair/Menaun Cliffs 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 mapped: Trawmore, Keel - 79.52ha. See map 3	Based on data from the Vegetated Shingle Monitoring Project (VSM) (Martin et al., 2017). Machair habitat was surveyed and mapped at the sub-site Trawmore, Keel (VSM site code 006) to give a total estimated area of 79.52ha within Keel Machair/Menaun Cliffs SAC. See the Keel Machair/Menaun Cliffs 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 recorded distribution	Based on data from Martin et al. (2017). The habitat extends along the coast from Keel village in the west to just short of the foothills of Menaun cliffs in the south-east, and landwards to the shores of Keel Lough. See the coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. See the coastal habitats supporting document for further details
Physical structure: hydrological and flooding regime	Water table levels; groundwater fluctuations (metres)	Maintain natural hydrological regime	Based on Crawford et al. (1998), Gaynor (2006, 2008), Ryle et al. (2009) and Martin et al. (2017). 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 Ryle et al. (2009), Delaney et al. (2013) and Martin et al. (2017). See the coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 5% of machair habitat, subject to natural processes	Based on Delaney et al. (2013) and Martin et al. (2017). See the coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward. The mean sward height should be at least 8cm in July/August	Based on Delaney et al. (2013) and Martin et al. (2017). A mean vegetation height of 2.2cm was recorded by the VSM in the habitat in the Trawmore, Keel sub-site indicating that grazing levels are too high. See the coastal habitats supporting document for further details
Vegetation composition: flowering/fruiting	Percentage	Positive indicator species should be flowering or fruiting in more than 40% of monitoring stops	Based on Delaney et al. (2013) and Martin et al. (2017). The list of positive indicator species is presented in Delaney et al. (2013). See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Occurrence	Maintain range of sub-communities with typical species listed in Delaney et al. (2013)	See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage	Negative indicator species cover in any individual monitoring stop should not be more than 25%; no negative indicator species should be present in more than 60% of monitoring stops; cover of negative indicator species across the whole site should not be more than 5%	Based on Delaney et al. (2013) and Martin et al. (2017). Negative indicators include species indicative of changes in nutrient status and species not considered characteristic of the habitat. See the coastal habitats supporting document for further details

Vegetation composition: non-native species	Percentage	Non-native species should not be present in more than 20% of monitoring stops	Based on Delaney et al. (2013) and Martin et al. (2017). The non-native species New Zealand willowherb ( <i>Epilobium brunnescens</i> ) was recorded by the VSM within the machair habitat in the Trawmore, Keel sub-site. See coastal habitats supporting document for further details
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control	Based on Delaney et al. (2013) and Martin et al. (2017). See the coastal habitats supporting document for further details
Vegetation composition: bryophytes	Percentage cover	Should always be at least an occasional component of the vegetation, with a minimum cover of 1% within each monitoring stop	Based on Ryle et al. (2009), Delaney et al. (2013) and Martin et al. (2017). The Annex II and Flora (Protection) Order, 2015 listed liverwort petalwort ( <i>Petalophyllum ralfsii</i> ) has been recorded from the machair in the SAC (see Campbell et al., 2015). See the coastal habitats supporting document for further details. See also the conservation objective for petalwort (1395) in this volume

## Conservation Objectives for : Keel Machair/Menaun Cliffs SAC [001513]

### 4060 Alpine and Boreal heaths

**To maintain the favourable conservation condition of Alpine and Boreal heaths in Keel Machair/Menaun Cliffs 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	Alpine and Boreal heath has not been mapped in detail for Keel Machair/Menaun Cliffs SAC and thus the total area of qualifying habitat is unknown. It is documented that the habitat occurs around the summit of Menaun in a mosaic with blanket bog with numerous rock outcrops. At lower altitudes, the habitat merges with extensive areas of dry heath dominated by ling ( <i>Calluna vulgaris</i> ) (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See the notes on Habitat area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil pH and nutrient status within natural ranges	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The entire diversity of Alpine and Boreal heath communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three	Attribute and target based on Perrin et al. (2014). Alpine and Boreal heath is not necessarily rich in lichen and bryophyte species, but a minimum amount should still be present
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 66%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. Bearberry ( <i>Arctostaphylos uva-ursi</i> ), crowberry ( <i>Empetrum nigrum</i> ), juniper ( <i>Juniperus communis</i> subsp. <i>nana</i> ), bilberry ( <i>Vaccinium myrtillus</i> ) and the Near Threatened dwarf willow ( <i>Salix herbacea</i> ) (Wyse Jackson et al., 2016) have been reported from the Alpine and Boreal heath in this SAC (NPWS internal files)
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrub species at least 10%	Attribute and target based on Perrin et al. (2014). A lower cover of dwarf shrubs could indicate that the habitat is transitioning to another vegetation type such as grassland
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 10%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation structure: signs of grazing	Percentage of leaves grazed at a representative number of 2m x 2m monitoring stops	Less than 10% collectively of the live leaves of specific graminoids showing signs of grazing	Attribute and target based on Perrin et al. (2014). The specific graminoids are stiff sedge ( <i>Carex bigelowii</i> ), wavy hair-grass ( <i>Deschampsia flexuosa</i> ), sheep's-fescue ( <i>Festuca ovina</i> ) and viviparous sheep's-fescue ( <i>Festuca vivipara</i> ). High levels of grazing of these species would be undesirable as grazing is not required to maintain this habitat
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids and crowberry ( <i>Empetrum nigrum</i> ) showing signs of browsing	Attribute and target based on Perrin et al. (2014)

Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning within the habitat	Attribute and target based on Perrin et al. (2014). Alpine and Boreal heath does not require burning for the maintenance of the habitat
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human footprints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat and no decline in status of hepatic mats associated with this habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The Near Threatened dwarf willow ( <i>Salix herbacea</i> ) (Wyse Jackson et al., 2016) has been reported from the habitat in the SAC (NPWS internal files). Part of the heath vegetation on Menaun contains Northern Atlantic hepatic mat communities (NPWS internal files)

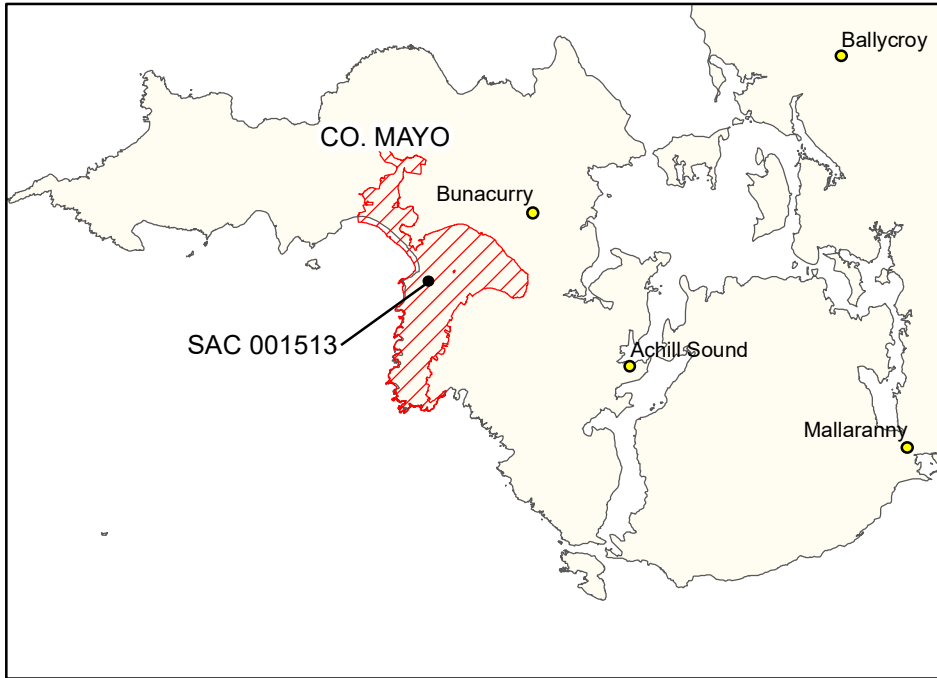
## Conservation Objectives for : Keel Machair/Menaun Cliffs SAC [001513]

### 1395 Petalwort *Petalophyllum ralfsii*


To maintain the favourable conservation condition of Petalwort in Keel Machair/Menaun Cliffs SAC, which is defined by the following list of attributes and targets:


Attribute	Measure	Target	Notes
Distribution	Number and geographical spread of populations	No decline, subject to natural processes. See map 4 for recorded locations	The known population of petalwort ( <i>Petalophyllum ralfsii</i> ) in Keel Machair/Menaun Cliffs SAC occurs at Keel Machair on tightly sheep-grazed turf on the edges of channelised and semi-natural water tracks and on small, partly bare patches of damp unshaded sand on the western and more calcareous side of the machair plain. Data from NPWS surveys (NPWS internal files). See Campbell et al. (2015) for further details
Area of suitable habitat	Hectares	No decline, subject to natural processes	The extent of suitable habitat at Keel Machair has not yet been accurately measured using GPS, but is estimated to be c.10,300m <sup>2</sup> (1.03ha) based on NPWS surveys (NPWS internal files). See Campbell et al. (2015) for further details
Hydrological conditions: soil moisture	Occurrence of damp soil conditions	Maintain hydrological conditions so that the substrate is kept moist and damp throughout the year, but is not subject to prolonged inundation by flooding in winter	Petalwort ( <i>Petalophyllum ralfsii</i> ) grows on damp sandy substrate. Based on Campbell (2013) and Campbell et al. (2015)
Hydrological conditions: water table level	Centimetres in a representative number of 1m x 1m monitoring plots	Mean groundwater level should not be more than 80cm from ground surface	See Campbell et al. (2015) for further details
Physical structure: bare soil	Percentage cover in a representative number of 1m x 1m monitoring plots	Mean percentage cover of bare soil should be more than 5%	At Keel Machair, petalwort ( <i>Petalophyllum ralfsii</i> ) grows in compacted, sandy ground. There is some threat from potential over-use by vehicles, dumping and mowing at this location (NPWS internal files). See Campbell et al. (2015) for further details
Vegetation structure: vegetation height	Centimetres in a representative number of 1m x 1m monitoring plots	Mean vegetation height should be less than 6cm	Very short vegetation, heavily grazed by sheep, has been reported in petalwort ( <i>Petalophyllum ralfsii</i> ) habitat at Keel Machair (NPWS internal files). See Campbell et al. (2015) for further details
Vegetation composition: shrub cover	Percentage cover in a representative number of 1m x 1m monitoring plots	Mean percentage shrub cover should be less than 25%	See Campbell et al. (2015) for further details
Vegetation composition: grass cover	Percentage cover in a representative number of 1m x 1m monitoring plots	Mean percentage grass species cover should be less than 60%	Part of this site is managed as a 9-hole pitch and putt course; low intensity management, with only the greens and tees re-seeded, has enabled petalwort ( <i>Petalophyllum ralfsii</i> ) to survive. Any intensification or expansion should be discouraged (NPWS internal files). See Campbell et al. (2015) for further details





**Legend**

 Keel Machair/Menaun Cliffs SAC 001513




An Roinn  
Cultúir, Oidhreachta agus Gaeltachta  
Department of  
Culture, Heritage and the Gaeltacht

**MAP 1:**  
**KEEL MACHAIR / MENAUN CLIFFS SAC**  
**CONSERVATION OBJECTIVES**  
**SAC DESIGNATION**

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

**SITE CODE:**  
**SAC 001513; version 3.02**  
**CO. MAYO**



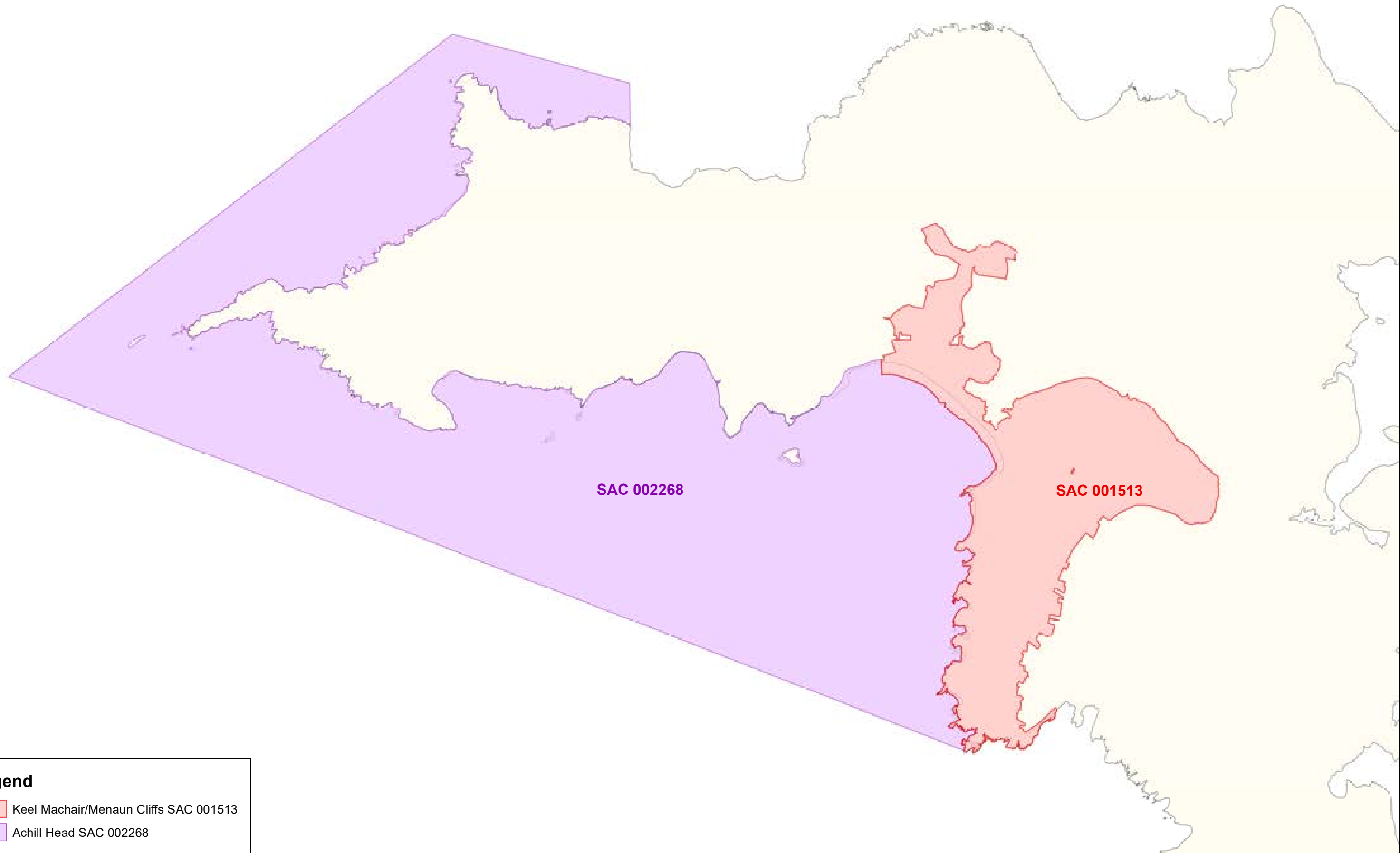
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Suirbhéarachta Ordonáis na hÉireann Ceadúnas Uimh EN 0059216. © Suirbhéarachta Ordonáis na hÉireann Rialtas na hÉireann.



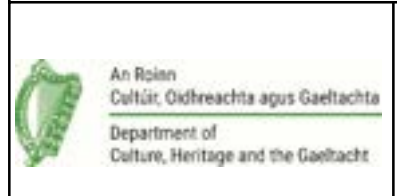
**Map Version 1**  
**Date: Aug 2017**





**Legend**

- Keel Machair/Menaun Cliffs SAC 001513
- Achill Head SAC 002268



**MAP 2:  
KEEL MACHAIR/MENAUN CLIFFS SAC  
CONSERVATION OBJECTIVES  
ADJACENT / ADJOINING AND  
OVERLAPPING DESIGNATIONS**

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

**SITE CODE:  
SAC 001513; version 3.02, SAC 002268; version 3.02  
CO. MAYO**

0    1    2    3    4 km


The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.  
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**Map Version 1  
Date: Aug 2017**

**Legend**


 Keel Machair/Menaun Cliffs SAC 001513

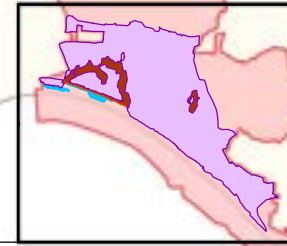
**Annex I Qualifying Interest**

 21A0\* Machair

**Annex I Non Qualifying Interest**

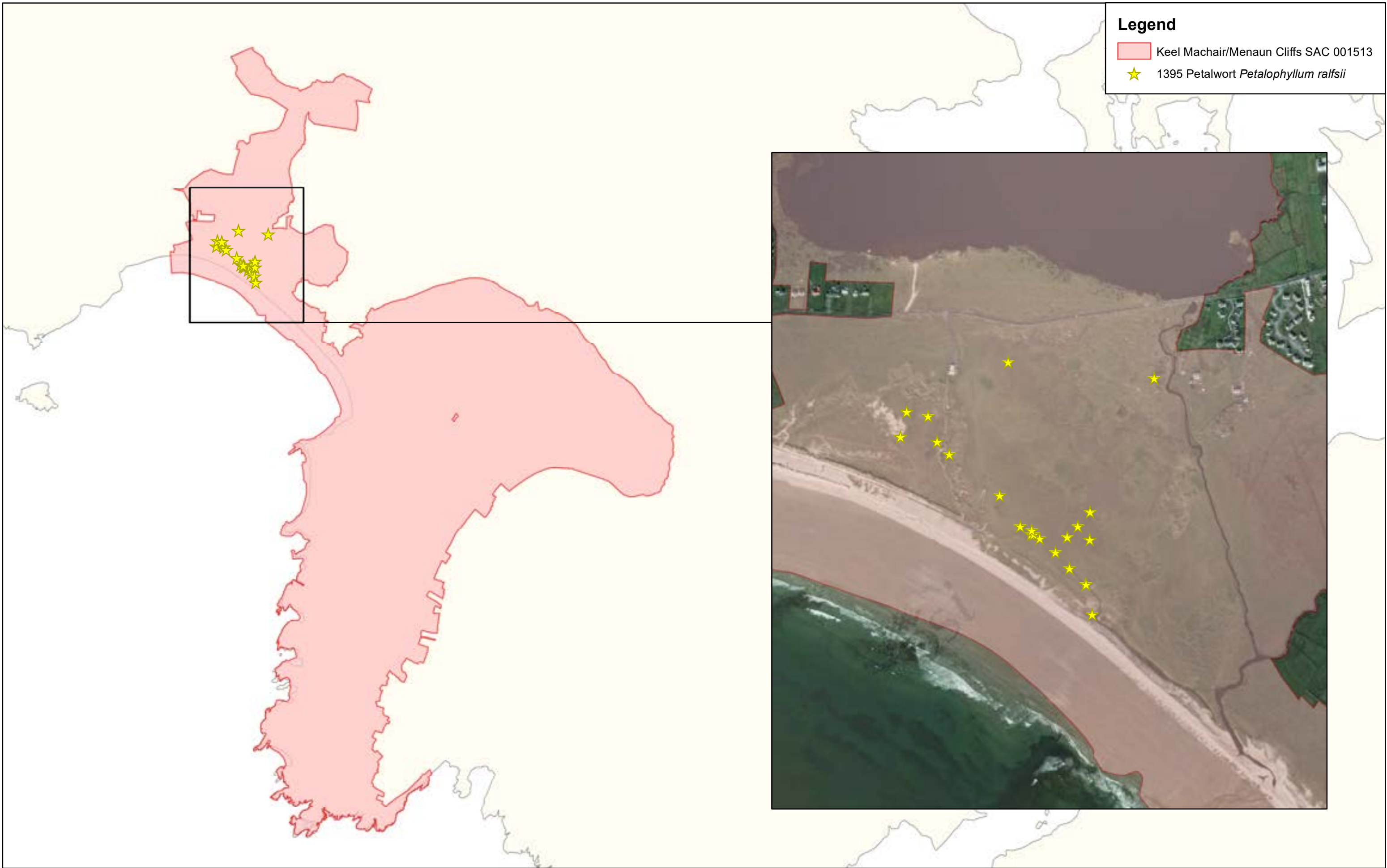
 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")

 2130\* Fixed dunes with herbaceous vegetation ("grey dunes")



**Legend**

- Keel Machair/Menaun Cliffs SAC 001513
- ★ 1395 Petalwort *Petalophyllum ralfsii*



# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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### Lough Gall Bog SAC 000522



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

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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: Lough Gall Bog SAC 000522. Version 1.  
National Parks and Wildlife Service, Department of Arts, Heritage, Regional,  
Rural and Gaeltacht Affairs.**

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



## Introduction

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*

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000522	Lough Gall Bog SAC
7130	Blanket bogs (* if active bog)
7150	Depressions on peat substrates of the Rhynchosporion



## 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>	1987
<b>Title :</b>	A survey to locate blanket bogs of scientific interest in County Mayo. Part I
<b>Author :</b>	Foss, P.; McGee, E.
<b>Series :</b>	A report commissioned by the Wildlife Service
<hr/>	
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<hr/>	
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<hr/>	
<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
<hr/>	
<b>Year :</b>	2017
<b>Title :</b>	Lough Gall Bog SAC (site code: 522) Conservation objectives supporting document- blanket bog and associated habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

## Conservation Objectives for : Lough Gall Bog SAC [000522]

### 7130 Blanket bogs (\* if active bog)

**To maintain the favourable conservation condition of Blanket bogs (\* if active bog) in Lough Gall Bog 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	Blanket bog has not been mapped in detail for Lough Gall Bog SAC but from current available data the total area of the qualifying habitat is estimated to be approximately 297ha, covering 82% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Lough Gall Bog SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat is documented to occur throughout the SAC and is the dominant habitat present. Further information can be found within Foss and McGee (1987), NPWS internal files and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: peat formation	Active blanket bog as a proportion of the total area of Annex I blanket bog habitat	At least 99% of the total Annex I blanket bog area is active	See the blanket bogs and associated habitats supporting document for further details
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Further details and a brief discussion of restoration potential is presented in the blanket bogs and associated habitats supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	A variety of blanket bog vegetation communities have been recorded in this SAC (Foss and McGee, 1987; NPWS internal files), one of which corresponds to a community recorded in the National Survey of Upland Habitats and listed in the provisional list of vegetation communities described in Perrin et al. (2014). Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding <i>Sphagnum fallax</i> , at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species less than 75%	Attribute and target based on Perrin et al. (2014). See the blanket bogs and associated habitats supporting document for the list of potential dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014)

Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: erosion	Percentage area in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Attribute and target based on Perrin et al. (2014)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 (FPO) and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The FPO listed and Vulnerable marsh clubmoss ( <i>Lycopodiella inundata</i> ) (Wyse Jackson et al., 2016) has been recorded within the SAC (NPWS internal files), but this species cannot be specifically assigned to blanket bog

## Conservation Objectives for : Lough Gall Bog SAC [000522]

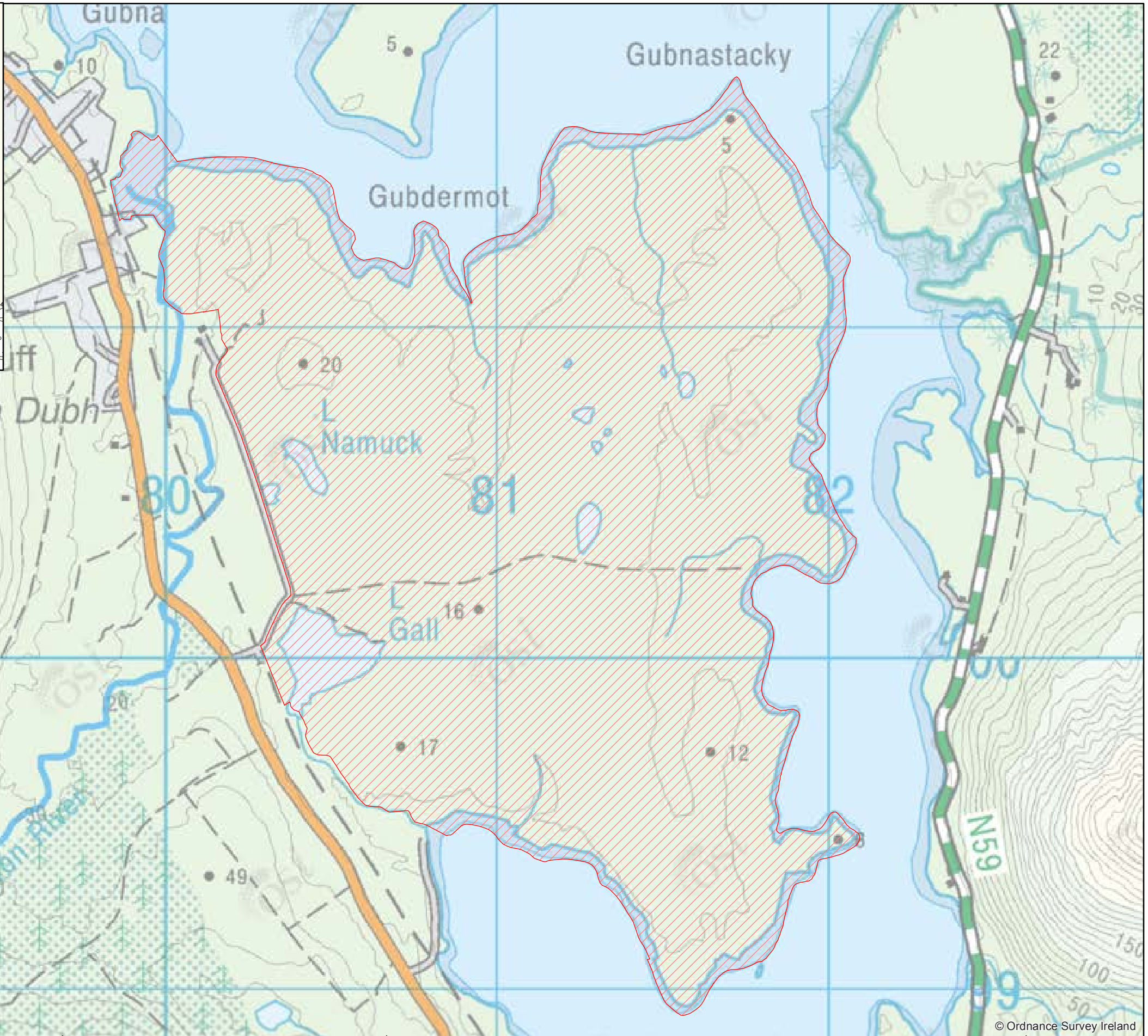
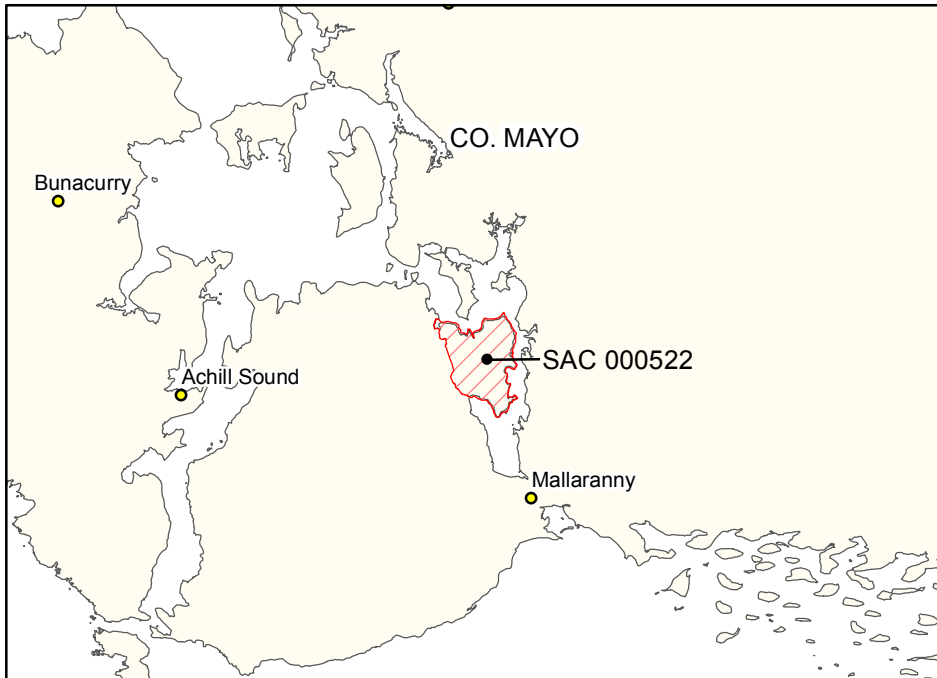
### 7150 Depressions on peat substrates of the Rhynchosporion

**To restore the favourable conservation condition of Depressions on peat substrates of the Rhynchosporion in Lough Gall Bog 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	Depressions on peat substrates of the Rhynchosporion has not been mapped in detail for Lough Gall Bog SAC and thus the total area of the qualifying habitat is unknown. Further details on this and the following attributes can be found in the Lough Gall Bog SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat is documented to occur scattered throughout blanket bog areas and is well-represented in locations with deep quaking peat (NPWS internal files). Foss and McGee (1987) note the presence of this habitat in the north-east of the SAC. Further information can be found in Foss and McGee (1987), NPWS internal files and the blanket bogs and associated habitats supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the blanket bogs and associated habitats supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least five	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: <i>Rhynchospora</i> spp.	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of white beaked sedge ( <i>Rhynchospora alba</i> ) and brown beaked sedge ( <i>R. fusca</i> ) at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: potential dominant species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of each of the potential dominant species individually less than 35%	Attribute and target based on Perrin et al. (2014). See the blanket bogs and associated habitats supporting document for the list of potential dominant species
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 1%	Attribute and target based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: <i>Sphagnum</i> condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the <i>Sphagnum</i> cover is crushed, broken and/or pulled up	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry ( <i>Empetrum nigrum</i> ) and bog-myrtle ( <i>Myrica gale</i> ) showing signs of browsing collectively less than 33%	Attribute and target based on Perrin et al. (2014)

Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas for this habitat is also presented
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: drainage	Percentage area in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	Attribute and target based on Perrin et al. (2014)
Physical structure: erosion	Percentage area in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Attribute and target based on Perrin et al. (2014)
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 (FPO) and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The FPO and Vulnerable marsh clubmoss ( <i>Lycopodiella inundata</i> ) (Wyse Jackson et al., 2016) is present within the SAC (NPWS internal files), but this species cannot be specifically assigned to this habitat





**Legend**

 Lough Gall Bog SAC 000522

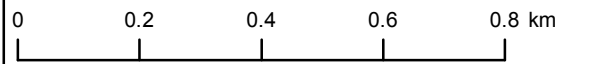


An Roinn Éireann, Oidhreachta, Gréimhál Réigiúnacha, Tuaithe agus Gaeltachta  
 Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs

**MAP 1:  
 LOUGH GALL BOG SAC  
 CONSERVATION OBJECTIVES  
 SAC DESIGNATION**

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

**SITE CODE:  
 SAC 000522; version 1.01  
 Co. Mayo**



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**Map Version 1  
 Date: Jan 2017**

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# Appendix B

## Nutrient Sensitive Qualifying Interests



Code	Qualifying Interest	Code	Qualifying Interest	Code	Qualifying Interest
A001	Red-throated Diver ( <i>Gavia stellata</i> )	A160	Curlew ( <i>Numenius arquata</i> )	1130	Estuaries
A003	Great Northern Diver ( <i>Gavia immer</i> )	A162	Redshank ( <i>Tringa totanus</i> )	1140	Tidal mudflats
A004	Little Grebe ( <i>Tachybaptus ruficollis</i> )	A164	Greenshank ( <i>Tringa nebularia</i> )	1150	Lagoons*
A005	Great Crested Grebe ( <i>Podiceps cristatus</i> )	A169	Turnstone ( <i>Arenaria interpres</i> )	1160	Large shallow inlets and bays
A013	Manx Shearwater ( <i>Puffinus puffinus</i> )	A179	Black-headed Gull ( <i>Larus ridibundus</i> )	1170	Reefs
A014	Storm Petrel ( <i>Hydrobates pelagicus</i> )	A182	Common Gull ( <i>Larus canus</i> )	1210	Annual vegetation of drift lines
A016	Gannet ( <i>Morus bassanus</i> )	A183	Lesser Black-backed Gull ( <i>Larus fuscus</i> )	1230	Sea cliffs
A017	Cormorant ( <i>Phalacrocorax carbo</i> )	A184	Herring Gull ( <i>Larus argentatus</i> )	1310	Salicornia mud
A018	Shag ( <i>Phalacrocorax aristotelis</i> )	A188	Kittiwake ( <i>Rissa tridactyla</i> )	1330	Atlantic salt meadows
A028	Grey Heron ( <i>Ardea cinerea</i> )	A199	Guillemot ( <i>Uria aalge</i> )	1410	Mediterranean salt meadows
A037	Bewick's Swan ( <i>Cygnus columbianus bewickii</i> )	A200	Razorbill ( <i>Alca torda</i> )	1420	Halophilous scrub
A038	Whooper Swan ( <i>Cygnus cygnus</i> )	A204	Puffin ( <i>Fratercula arctica</i> )	2110	Embryonic shifting dunes
A043	Greylag Goose ( <i>Anser anser</i> )	A229	Kingfisher ( <i>Alcedo atthis</i> )	2120	Marram dunes (white dunes)
A045	Barnacle Goose ( <i>Branta leucopsis</i> )	A395	Greenland White-fronted Goose ( <i>Anser albifrons flavirostris</i> )	2130	Fixed dunes (grey dunes)*
A046	Light-bellied Brent Goose ( <i>Branta bernicla hrota</i> )	A466	A/A149 Dunlin ( <i>Calidris alpina</i> )	2140	Decalcified Empetrum dunes*
A048	Shelduck ( <i>Tadorna tadorna</i> )	1013	Geyer's whorl snail ( <i>Vertigo geyeri</i> )	2150	Decalcified dune heath*
A050	Wigeon ( <i>Anas penelope</i> )	1014	Narrow-mouthed whorl snail ( <i>Vertigo angustior</i> )	2170	Dunes with creeping willow
A051	Gadwall ( <i>Anas strepera</i> )	1016	Desmoulin's whorl snail ( <i>Vertigo moulinsiana</i> )	2190	Dune slack
A052	Teal ( <i>Anas crecca</i> )	1024	Kerry Slug ( <i>Geomalacus maculosus</i> )	21A0	Machair*
A053	Mallard ( <i>Anas platyrhynchos</i> )	1029	Freshwater Pearl Mussel ( <i>Margaritifera margaritifera</i> )	3110	Lowland oligotrophic lakes
A054	Pintail ( <i>Anas acuta</i> )	1092	White-Clawed Crayfish ( <i>Austropotamobius pallipes</i> )	3130	Upland oligotrophic lakes
A056	Shoveler ( <i>Anas clypeata</i> )	1095	Sea Lamprey ( <i>Petromyzon marinus</i> )	3150	Natural eutrophic lakes
A061	Tufted Duck ( <i>Aythya fuligula</i> )	1096	Brook Lamprey ( <i>Lampetra planeri</i> )	3160	Dystrophic lakes
A062	Scaup ( <i>Aythya marila</i> )	1099	River Lamprey ( <i>Lampetra fluviatilis</i> )	3180	Turloughs*

Code	Qualifying Interest	Code	Qualifying Interest	Code	Qualifying Interest
A065	Common Scoter ( <i>Melanitta nigra</i> )	1103	Twaite Shad ( <i>Alosa fallax fallax</i> )	3260	Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation
A067	Goldeneye ( <i>Bucephala clangula</i> )	1106	Atlantic Salmon ( <i>Salmo salar</i> )	3270	<i>Chenopodium rubri</i>
A069	Red-breasted Merganser ( <i>Mergus serrator</i> )	1303	Lesser Horseshoe Bat ( <i>Rhinolophus hipposideros</i> )	6130	Calaminarian grassland
A130	Oystercatcher ( <i>Haematopus ostralegus</i> )	1349	Bottle-Nosed Dolphin ( <i>Tursiops truncatus</i> )	6210	Orchid-rich calcareous grassland*
A137	Ringed Plover ( <i>Charadrius hiaticula</i> )	1351	Harbour Porpoise ( <i>Phocoena phocoena</i> )	6410	<i>Molinia</i> meadows
A140	Golden Plover ( <i>Pluvialis apricaria</i> )	1355	Otter ( <i>Lutra lutra</i> )	6430	Hydrophilous tall herb
A141	Grey Plover ( <i>Pluvialis squatarola</i> )	1364	Grey Seal ( <i>Halichoerus grypus</i> )	7110	Raised bog (active)*
A142	Lapwing ( <i>Vanellus vanellus</i> )	1365	Common Seal ( <i>Phoca vitulina vitulina</i> )	7120	Degraded raised bogs
A143	Knot ( <i>Calidris canutus</i> )	1421	Killarney Fern ( <i>Trichomanes speciosum</i> )	7210	<i>Cladium</i> fen*
A144	Sanderling ( <i>Calidris alba</i> )	1528	Marsh Saxifrage ( <i>Saxifraga hirculus</i> )	7220	Petrifying springs*
A148	Purple Sandpiper ( <i>Calidris maritima</i> )	1833	Slender Naiad ( <i>Najas flexilis</i> )	7230	Alkaline fens
A156	Black-tailed Godwit ( <i>Limosa limosa</i> )	1990	Nore Freshwater Pearl Mussel ( <i>Margaritifera durrovensis</i> )	8240	Limestone pavement*
A157	Bar-tailed Godwit ( <i>Limosa lapponica</i> )	1110	Sandbanks	8330	Sea caves
				91A0	Old oak woodlands
				91E0	Residual alluvial forests*

# Appendix C

## EAM Summary Report for 189 Achill WSZ

Irish Water  
**Lead in Drinking Water  
Mitigation Plan - EAM**  
Achill EAM

Issue 10 | 19 January 2022

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 257367

**Ove Arup & Partners Ireland Ltd**

**Arup**  
50 Ringsend Road  
Dublin 4  
D04 T6X0  
Ireland  
[www.arup.com](http://www.arup.com)



# Document Verification

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# 1 Introduction

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This document presents the results of the implementation of the Lead Mitigation Environmental Assessment Methodology (EAM) to assess the impact of dosing Achill Water Supply Zone with orthophosphate.

The assessment tracks the orthophosphate dosed drinking water from source (i.e. water treatment plant), through drinking water distribution (i.e. watermains), waste water collection and treatment systems (i.e. wastewater treatment plants and septic tanks) to environmental receptors (i.e. river water, groundwater, lake, and transitional waterbodies). The orthophosphate load that by-passes the wastewater treatment plants (i.e. through leakages and storm overflows) are also included in the assessment.

The assessment methodology is described in full in RPS (2016) *Irish Water – Lead in Drinking Water Mitigation Plan. Environmental Assessment Methodology*.

The assessment includes processing steps in Geographic Information System (GIS) and Excel. The assessment also draws upon the following source data:

- Results of the Plumbosolvency reports by Ryan Hanley.
- Results of pre-processing GIS work to generate regional input files.
- Data relating to Waste Water Treatment Plants (WWTP) from Annual Environmental Reports (AER) and the Environmental Protection Agency (EPA) web-based WFD App which is accessed through their Eden Portal.
- Data relating to water body monitoring and characterisation from the EPA WFD App on the 16<sup>th</sup> December 2021.
- Data relating to rainfall and catchment areas from the OPW Flood Studies Update (FSU) Portal.
- GIS data river segment data providing river flows from the EPA “hydrotool data”.
- Gauge data providing river flows from the EPA web-based HydroNet.

## 2 Abbreviations & Glossary

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- AER – Annual Environmental Report
- Agglomeration- the catchment of the WWTP
- DWWTS -Domestic Waste Water Treatment System
- EAM – Environmental Assessment Method
- ELV – Emission Limit Values
- EPA- Environmental Protection Agency
- FSU – Flood studies Update Portal – website hosted
- GIS - Geographic Information Systems
- GWB- Ground Water Body
- IW – Irish Water
- LWB – Lake Water Body
- OP- Orthophosphate (measured as P<sub>04</sub>-P)
- PE- Population Equivalent or unit per capita loading in waste-water treatment. PE can be considered the estimated number of people required to produce a measured load (eg. of organic matter, water or P) at the WWTP
- RWB – River Water Body
- SAAR - Standard-period Average Annual Rainfall method. The 30%ile flow for the river catchment is calculated using the catchment area and the SAAR value at the catchment outlet point. The area of the total river catchment is calculated using the Water Framework Directive App defined river subbasin GIS layer. The SAAR value is from the OPW FSU portal.
- SWO- Storm Water Overflow
- TP- Total Phosphorus
- TraC – Transitional and Coastal
- WFD- Water Framework Directive
- WSZ - Water Supply Zone
- WWTP – Waste Water Treatment Plant

### 3 Achill Water Supply Zone

Achill Water Supply Zone (2200PUB1001) is located in County Mayo. The Achill WSZ (2200PUB1001) is supplied by the Achill Water Treatment Plant (WTP). Water is distributed to the WSZ from the WTP through 18 reservoirs, namely: Acorrymore Impoundment Reservoir, Keel West Reservoir, Keel East Reservoir, Keel Crumpaun Reservoir, Pollagh Reservoir, Dookineela Reservoir, Slievemore Reservoir 1, Slievemore Reservoir 2, Doogort East Reservoir, Dooniver Reservoir, Bunacurrey Reservoir 1, Bunacurrey Reservoir 2, Bunacurrey Small Reservoir, Cashel Reservoir, Salia Reservoir, Polranny Reservoir, Breanaskil Reservoir, Ashleam Reservoir.

The Plumbosolvency Control Plan for the WSZs proposes universal dosing of orthophosphate at Achill WTP. Figure 1, shows the location of the areas proposed to receive orthophosphate dosed water. The WSZ boundaries cover the Island of Achill and the northern and western portion of Curran Peninsula

The average flow from the Achill WTP is 1,500 m<sup>3</sup>/day. Approximately 41% of the flow is accounted for, and this fixed rate for water mains leakage is assumed throughout the dosed WSZ.. There are an estimated 1,826 properties across the WSZ that are serviced by Domestic Wastewater Treatment Systems (DWWTS).

Water Supply Zone	Achill (2200PUB1001)
<b>Step 1 – Appropriate Assessment Screening</b>	<i>To be completed by Ryan Hanley</i>
<b>Model Assumptions</b>	<p>Concentration and loading units for orthophosphate (as P<sub>04</sub>-P) are mg/l and kg/yr.</p> <p>Adopted orthophosphate optimum dosing concentration is 0.8 mg/l.</p> <p>Unaccounted for water from the mains is 59%. Seepage from the mains is distributed evenly across the entire length of the WSZ network.</p> <p>The water consumption per person has been assigned as 125 litres per day in order to calculate the direct discharges to surface water with 2.7 people per household. The water discharge per person is assigned as 105 litres per day for the discharge to DWWTS with 2.7 persons per household.</p> <p>Conversion factor for Total Phosphorus (TP) to Orthophosphate (OP) for WWTP effluent is 0.5.</p> <p>It is assumed there will be no treatment of additional orthophosphate load for WWTPs with secondary, primary or no treatment. For plants with tertiary treatment it is assumed all the additional load will be treated. Where a tertiary plant is in exceedance of its ELV for total phosphorus or orthophosphate then the ability of the plant to treat the additional load is confirmed with Irish Water. Where IW indicates a tertiary plant</p>

Water Supply Zone	Achill (2200PUB1001)
	<p>has not remaining treatment capacity it will be assumed the entire additional load is not treated.</p> <p>Where existing monitoring data is not available a surrogate status is derived from the orthophosphate indicative quality of the waterbody in the following hierarchy:</p> <ul style="list-style-type: none"> <li>• Upstream waterbodies</li> <li>• Downstream waterbodies</li> <li>• Adjacent waterbodies of similar hydrological settings</li> <li>• Ecological status of the waterbody.</li> </ul> <p>The mid-point of that surrogate indicative quality range is used as baseline concentration.</p>
<p><b>Step 2 &amp; 3 – Impact on Waste Water Treatment Plant (WWTP) Effluent Concentrations and receiving WBs</b></p>	<p>This section assesses the influent and effluent phosphorus loads and resultant orthophosphate dosages at WWTP within the WSZ before and after dosing. Inputs to and results of the Step 2 assessment for individual WWTP are given in Table 1. Where an agglomeration includes SWOs, discharges from this source are included. Emission Limit Value (ELVs) are assigned for WWTPs to protect the receiving River Waterbodies (RWB) from direct discharges during low flows. Where ELVs are in force these are shown in Table 1. WWTPs that are failing to comply with their ELVs are also indicated.</p> <p>The treatment level and PE of the WWTPs within the agglomerations are as follows;</p> <ul style="list-style-type: none"> <li>- Achill Sound– Secondary treatment PE 573</li> <li>- Achill Island Central – Secondary treatment PE 1,283</li> <li>- Doogort – Secondary treatment PE 495</li> </ul> <p>A sensitivity analysis was carried out on the conversion between orthophosphate and total phosphorus at three factors; 0.4, 0.5 and 0.68. The results of the assessment are presented in Table 1.</p>
<p><b>Step 4 - Subsurface pathways</b></p>	<p>The loading from mains leakage is 881 m<sup>3</sup>/d (257 kg/yr). Approximately 201 kg/yr of the load is attenuated along the flowpaths. The hydraulic loading from the DWWTs is 518 m<sup>3</sup>/d (151 kg/yr). Approximately 150 kg/yr of the load is attenuated along the flowpaths.</p> <p>Flow monitoring gauges are not available for any waterbodies within the assessment area. The river flows for receiving waterbodies are established from Hydrotool data or, if that is not available, using the using the Area-Standard-period Average Annual Rainfall (SAAR) method.</p> <p>Baseline orthophosphate monitoring data is available for Cartron_010 however there are only three samples to date and thus a surrogate value is applied. Baseline orthophosphate or thresholds are not available for any other RWBs within or adjacent to the assessment area. Ecological status is used when available, where no ecological status is available, a conservative ‘high’ is adopted.</p>

Water Supply Zone	Achill (2200PUB1001)
	<p>Orthophosphate drinking water dosing does not lead to a deterioration in RWB status from subsurface and near surface pathways.</p>
<p><b>Step 5 and 6 - Combined Impact from direct and diffuse sources on River Waterbodies (RWB)</b></p>	<p>This section assesses the combined impact as a result of increased orthophosphate load from WWTP discharges (Steps 2 &amp; 3), seepage from mains and DWWTS and cumulative impacts from other drinking water dosing areas on River Waterbodies (RWBs). The increase in orthophosphate concentrations in the RWBs as a result of the P drinking water dosing is shown in Table 2.</p> <p>Figure 2 illustrates the scale of orthophosphate loading to the receiving waterbodies from mains leakage, and DWWTS. This illustrates that a significant proportion of the loads come from mains seepage through the near surface and groundwater pathway.</p> <p>Figure 3 presents the total loading to the drinking water dosing area from the main sources and illustrates how much of the loading is attenuated in the subsurface, treated in WWTPs and ultimately how much is transported to the receiving RWBs. This illustrates that the mains leakage and DWWTS account for the largest proportion of load and that most of the DWWTS loads are attenuated along the flow path, while a large proportion of the mains leakage is attenuated along the flow path.</p> <p>There are no direct discharges from the WWTP entering any of the RWBs.</p> <p>The increase in concentration as a result of the drinking water dosing with orthophosphate does not cause a deterioration in the status of any RWB.</p>
<p><b>Step 5 and 6 - Combined Impact through subsurface and surface pathways on Groundwater Waterbodies (GWB)</b></p>	<p>The increase in orthophosphate concentrations in the Groundwater Waterbodies (GWBs) as a result of the P drinking water dosing is shown in Table 3.</p> <p>Monitoring data is available for the Belmullet GWB but not for the Achill GWB or Mulranny GWB. Multiple monitoring points are available for Belmullet GWB and the results are averaged spatially to derive a GWB average.</p> <p>The increase in concentration as a result of the drinking water dosing with orthophosphate does not cause a deterioration in the status of either GWB.</p>
<p><b>Step 5 and 6 - Combined Impact from direct and diffuse sources on Lakes within the Water Supply Zone</b></p>	<p>The increase in orthophosphate as a result of drinking water dosing is adopted as total phosphorus to assess the potential impact on lakes. The increase in concentrations in the Lake Waterbody (LWB) as a result of the drinking water dosing is shown in Table 4.</p> <p>Monitoring data is available for Keel MO, however there is no monitoring data for Doovier Sruhull or Loch na mBreac.</p>



Water Supply Zone	Achill (2200PUB1001)
	<p>The assessment indicates that the loading contribution to lakes is insignificant and does not cause a deterioration in status.</p>
<p><b>Step 5 and 6 - Combined Impact from direct and diffuse sources on Transitional and Coastal Waterbodies</b></p>	<p>The increase in orthophosphate concentrations in the downstream Transitional and Coastal (TraC) Waterbodies as a result of drinking water dosing is shown in Table 5.</p> <p>Baseline orthophosphate monitoring data and associated thresholds are available for Clew Bay during the summer but not for Blacksod Bay SW / Achill Sound, Bellacragher Bay, Blacksod Bay, the Western Atlantic Seaboard or Clew Bay during the winter.</p> <p>The Western Atlantic Seaboard CWB extends along the coast of Mayo. This WB was assessed only in the area where the dosing area is discharging into the WB. The drinking water dosing with orthophosphate does not deteriorate the status of any of the transitional or coastal waterbodies.</p>
<p><b>Step 5 and 6 Cumulative Assessment of impact from all EAMs within the catchment on:</b></p> <p><b>Transitional and Coastal Water Bodies</b></p> <p><b>AND</b></p> <p><b>Protected Waterbodies</b></p>	<p><u>Step 5 and 6 Cumulative Assessment of impact from all EAMs within catchment on Transitional and Coastal Waterbodies</u></p> <p>A cumulative assessment was undertaken to assess the impact on TraC WBs from all the contributing EAMs. The assessment is carried out on a catchment scale.</p> <p><b><u>Erriff-Clew</u></b></p> <p>The Tourmakeady EAM is also within the Erriff-Clew catchment, see Figure 4.</p> <p>The increase in orthophosphate concentrations in the downstream TraC WBs as a result of the drinking water dosing of both EAMs with orthophosphate is shown in Table 6.</p> <p><u>Step 5 and 6 Cumulative Assessment of impact from EAMs on downstream Protected Waterbodies</u></p> <p>The cumulative load from this dosing area and any upstream dosing area was tracked downstream to determine the potential concentration increase in any Special Areas of Conservation (SAC).</p> <p>The Achill Head SAC covers a coastal area to the west of Achill Island within the Western Atlantic Seaboard (Hydrometric Areas 32, 33 and 34) Coastal waterbody. The SAC receives orthophosphate load as a result of drinking water dosing in the Achill dosing area.</p> <p>The increase in orthophosphate concentrations in the waterbodies (WBs) as a result of the P drinking water dosing is shown in Table 7 and Table 8.</p> <p>The results show there is no deterioration in WB status downstream of the EAM. The results show that there will be no</p>

<b>Water Supply Zone</b>	<b>Achill (2200PUB1001)</b>
	discernible increase (i.e. above 0.00125mg/l) in any of the downstream SAC WBs.
<b>Conclusions</b>	<p><b>Red, Amber, Green (RAG) STATUS: EAM Result - GREEN</b></p> <p>The purpose of the RAG status is to indicate the waterbodies that are failing the EAM assessment on a map. Any waterbodies failing the EAM model will be marked as <b>Amber</b> in the interim while further analysis is being completed, where the further analysis confirms the water body is failing the water body will be coloured <b>Red</b>. If the EAM indicates there will not be a deterioration in the waterbody status as a result of drinking water dosing it will remain <b>Green</b>.</p> <p>A map of the RAG status of waterbodies is presented in Figure 5.</p>
<b>Recommendation</b>	No mitigation measures are required.

Table 1: Increased loading/concentration from WWTPs due to dosing of drinking water – Dosing rate = 0.8 mg/l

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2017) Compliance	Primary Discharge Receiving WB		Annual average TP Load (kg/yr)	OP Concentration (mg/l) TP – OP Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Achill Sound Primary Discharge	Secondary	No ELVs	Blacksod Bay SW / Achill Sound	Pre-Dosing	278	2.38	1.90	3.24
				Post Dosing	292	2.50	2.00	3.40
Achill Sound SWOs (6 No.)				Pre-Dosing	7	0.30	0.24	0.41
				Post Dosing	8	0.32	0.26	0.44
Achill Island Central Primary Discharge	Secondary	No ELVs	Western Atlantic Seaboard (HAs 32;33;34)	Pre-Dosing	436	0.48	0.38	0.65
				Post Dosing	470	0.51	0.41	0.70
Achill Island Central SWOs (1 No.)				Pre-Dosing	47	0.06	0.05	0.09
				Post Dosing	59	0.08	0.07	0.11
Doogort Primary Discharge	Secondary	No ELVs	Blacksod Bay	Pre-Dosing	10	0.01	0.01	0.02
				Post Dosing	23	0.03	0.02	0.04
Doogort SWO (1 No.)				Pre-Dosing	2	0.02	0.01	0.02
				Post Dosing	3	0.02	0.02	0.03

Table 2: Orthophosphate concentrations in river waterbodies following dosing of drinking water

Name	EU_CD	Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. (mg/l)	75% of status threshold mg/l	Cumulative Ortho P load (kg/yr)	Modelled dosing conc. (mg/l)	Potential conc. following dosing (mg/l)
Murrevagh_010	IE_WE_32M110390	<i>High</i>	0.0125	0.0188	0.3	0.00001	0.0125
Barnynagappul Stream_010	IE_WE_33B030960	<i>High</i>	0.0125	0.0188	3.8	0.0001	0.0126
Bunanioo_010	IE_WE_33B090100	<i>Good</i>	0.0300	0.0325	5.7	0.0002	0.0302
Cartron_010	IE_WE_33C020100	<i>Moderate</i>	0.0078	0.0508	5.3	0.0002	0.0080
Doega_010	IE_WE_33D010200	<i>Moderate</i>	0.0455	0.0508	3.9	0.0002	0.0457
Glendarary_010	IE_WE_33G400250	<i>High</i>	0.0125	0.0188	13.8	0.0003	0.0128
Keel_East_010	IE_WE_33K020760	<i>High</i>	0.0125	0.0188	21.0	0.0004	0.0129

Table 3: Orthophosphate concentrations in groundwater waterbodies following dosing of drinking water

Name	EU_CD	Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. (mg/l)	75% of status threshold mg/l	Cumulative Ortho P load (kg/yr)	Modelled dosing conc. (mg/l)	Potential Baseline conc. following dosing (mg/l)
Achill	IE_WE_G_0026	<i>Good</i>	0.0175	0.0263	16.6	0.0011	0.0186
Belmullet	IE_WE_G_0057	<i>Good</i>	0.0157	0.0263	3.0	0.00003	0.0157
Mulranny	IE_WE_G_0027	<i>Good</i>	0.0175	0.0263	0.004	0.0000001	0.0175

Table 4: Total Phosphorus concentrations in lake waterbodies following dosing of drinking water

Name	EU_CD	TP Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. (mg/l)	75% of status threshold (mg/l)	Cumulative TP load (kg/yr)	Modelled TP dosing conc. (mg/l)	Potential Baseline TP conc. following dosing (mg/l)
Dooniver Sruhill	IE_WE_33_1919	High	0.0050	0.0075	13.8	0.0003	0.0053
Keel MO	IE_WE_33_1895	Good	0.0273	0.0213	21.0	0.0004	0.0277*
Loch na mBreac	N/A - Non WFD LWB	High	0.0050	0.0075	3.8	0.0001	0.0051

\*Baseline concentration > 75% of threshold but dosing concentration is insignificant.

Table 5: Orthophosphate concentrations in transitional waterbodies and coastal waterbodies following dosing of drinking water

Name	EU_CD	Season	Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. (mg/l)	75% of status threshold (mg/l)	Cumulative load (kg/yr)	Modelled dosing conc. (mg/l)	Potential conc. following dosing (mg/l)
Clew Bay	IE_WE_340_00	Summer	High	0.0025	0.0188	0.3	0.000003	0.0025
		Winter	High	0.0125	0.0188	0.3	0.000003	0.0125
Bellacragher Bay	IE_WE_380_00	Summer	High	0.0125	0.0188	42.2	0.0004	0.0129
		Winter	High	0.0125	0.0188	42.2	0.0004	0.0129
Blacksod Bay SW / Achill Sound	IE_WE_370_00	Summer	High	0.0125	0.0188	5.3	0.0001	0.0126
		Winter	High	0.0125	0.0188	5.3	0.0001	0.0126
Blacksod Bay	IE_WE_360_00	Summer	High	0.0125	0.0188	34.9	0.00004	0.0125
		Winter	High	0.0125	0.0188	34.9	0.00004	0.0125
Western Atlantic Seaboard*	IE_WE_250_00	Summer	High	0.0125	0.0188	40.1	0.00003	0.0125
		Winter	High	0.0125	0.0188	40.1	0.00003	0.0125

\* Very large WB, assessed only in the vicinity of Achill Island

Table 6: Cumulative orthophosphate concentrations in transitional water bodies and coastal waterbodies following dosing of drinking water

Name	EU_CD	Season	Indicative Quality Surrogate Status in <i>italic</i>	Baseline Conc. (mg/l)	75% of status threshold (mg/l)	Load, (kg/yr P) from current EAM	Cumulative load (kg/yr)	Modelled dosing conc. (mg/l)	Potential conc. following dosing (mg/l)
Clew Bay	IE_WE_340_0000	Summer	High	0.0025	0.0188	0.3	196.1	0.0001	0.0026
		Winter	<i>High</i>	0.0125	0.0188	0.3	196.1	0.0001	0.0126

Table 7: Orthophosphate concentrations in downstream protected waterbodies following dosing of drinking water

Name	EU_CD	Season	Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. (mg/l)	75% of status threshold (mg/l)	Cumulative load (kg/yr)	Modelled Orthophosphate dosing conc. (mg/l)	Potential conc. following dosing (mg/l)
Achill Head SAC	IE002268 (EU_PA_Code)	Summer	<i>High</i>	0.0125	0.0188	7.7	0.0001	0.0126
		Winter	<i>High</i>	0.0125	0.0188	7.7	0.0001	0.0126
Doogort Machair/Lough Doo SAC and SPA	IE0001497 (EU_PA_Code)	Summer	<i>High</i>	0.0125	0.0188	17.6	0.0002	0.0127
		Winter	<i>High</i>	0.0125	0.0188	17.6	0.0002	0.0127

Table 8: Total phosphorus concentrations in downstream protected lake waterbodies following dosing of drinking water

Name	EU_CD	TP Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. (mg/l)	75% of status threshold (mg/l)	Cumulative TP load (kg/yr)	Modelled TP dosing conc. (mg/l)	Potential Baseline TP conc. following dosing (mg/l)
Lough Doo	N/A	<i>High</i>	0.0050	0.0075	13.8	0.0003	0.0053

Figure 1: Achill Dosing Area

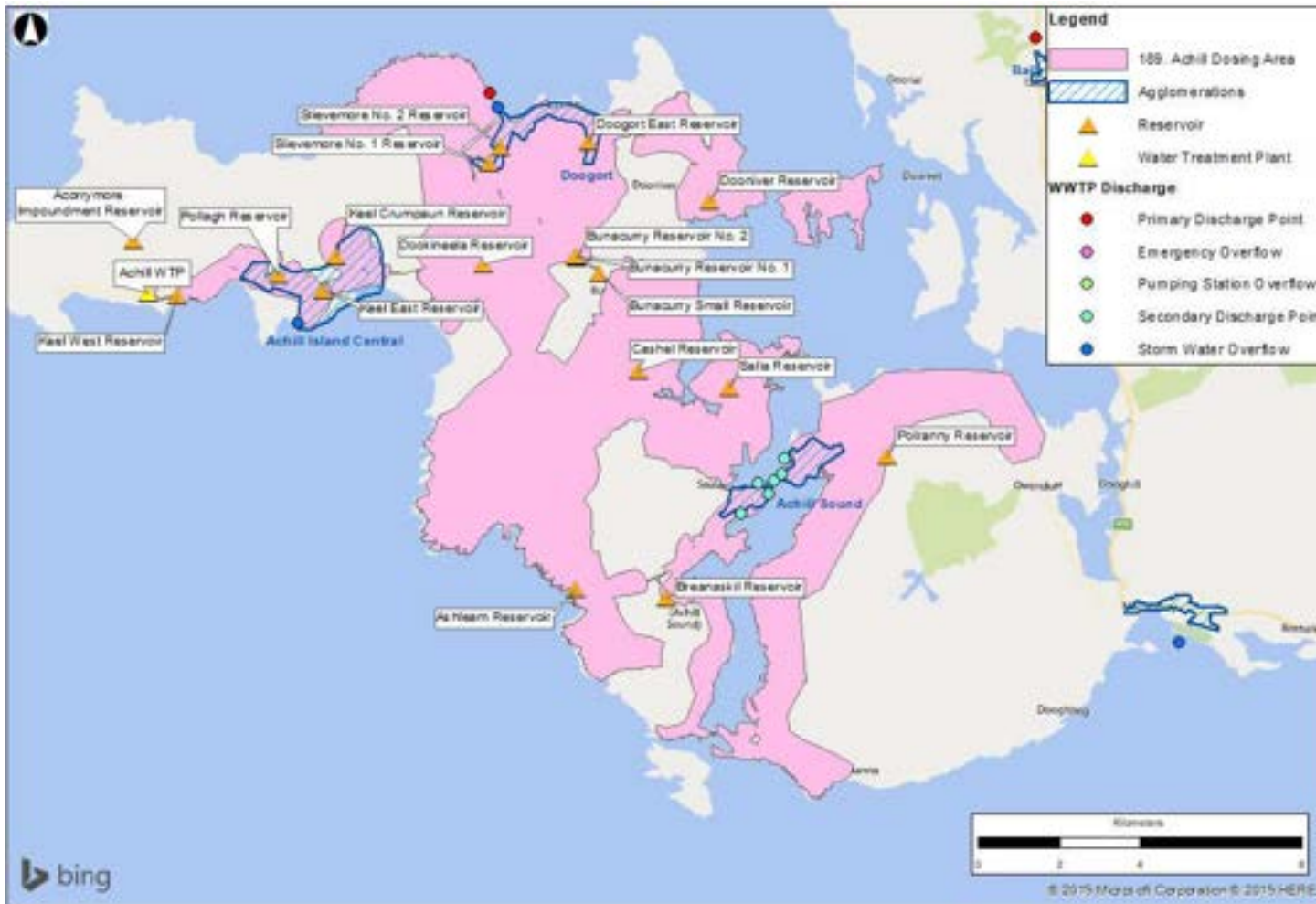




Figure 2: RWB Cumulative Loading Assessment

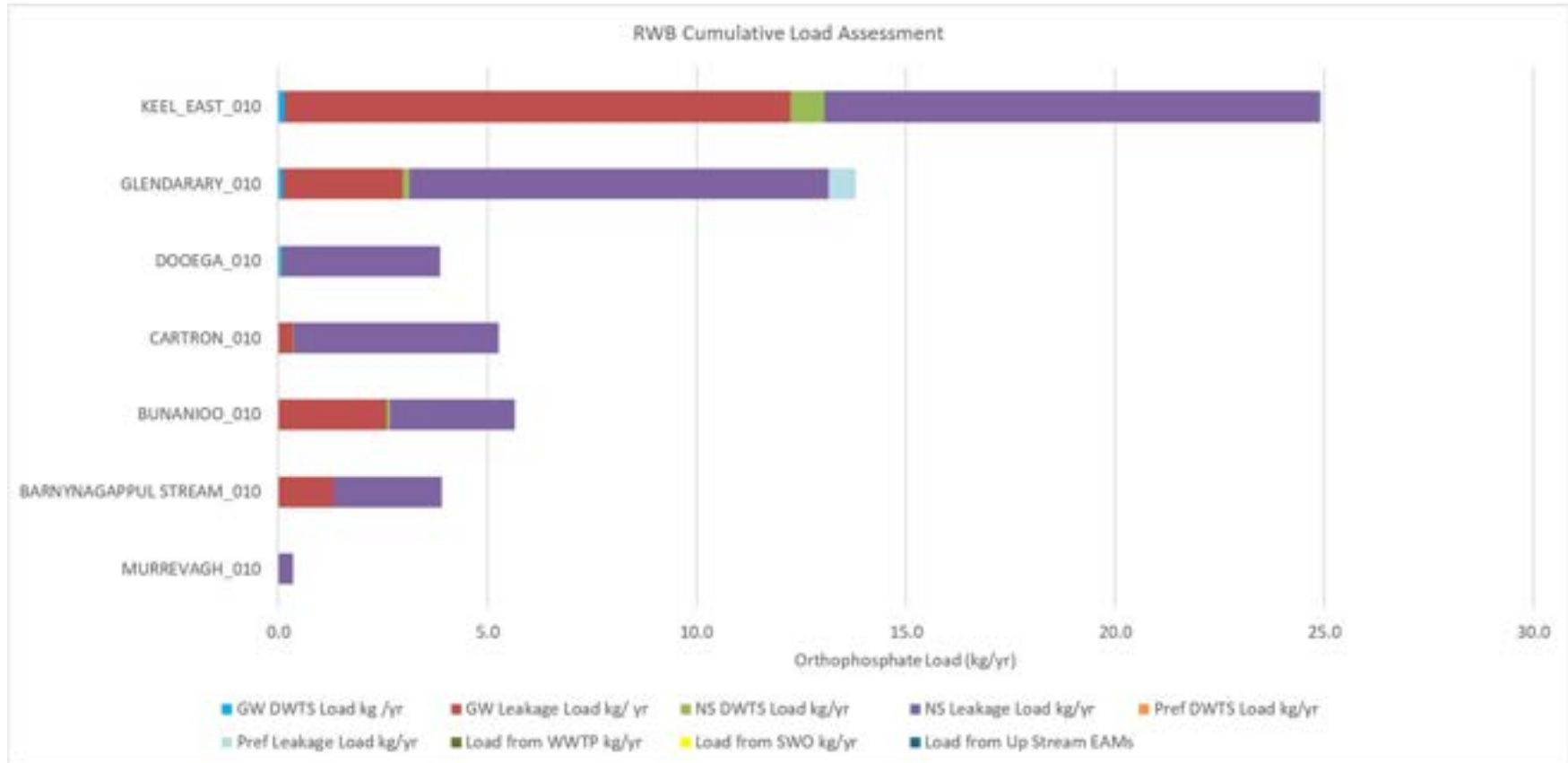


Figure 3: Total dosing area Attenuated, Treated and Transported Loads

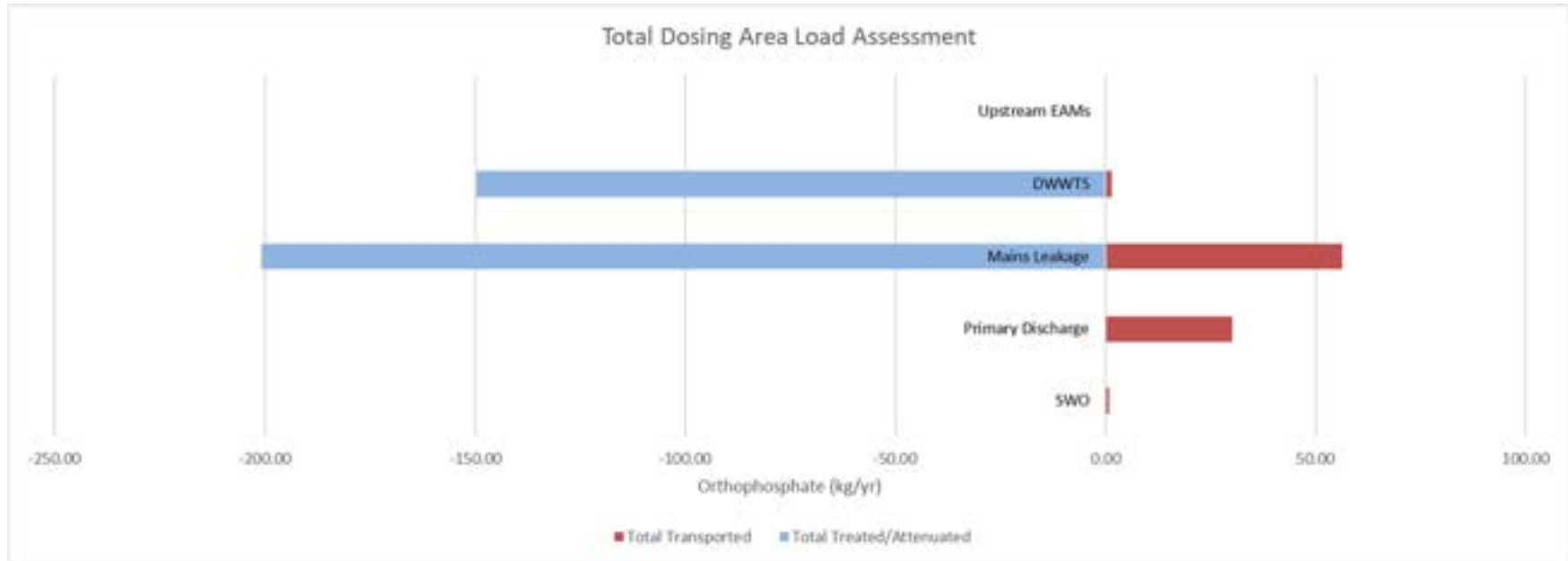


Figure 4: Upstream and downstream EAMs within WFD catchment

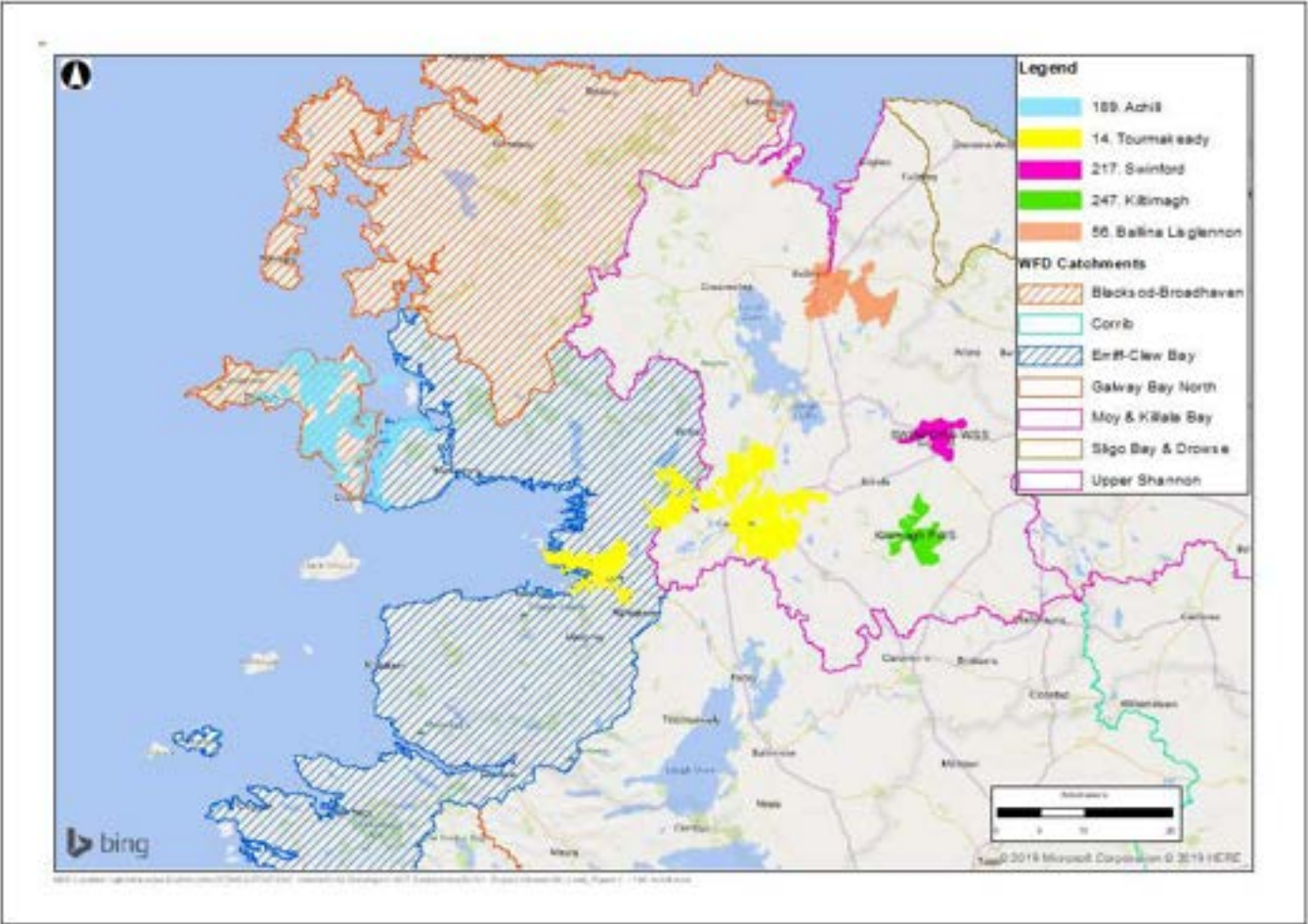


Figure 5: Red, Amber, Green (RAG) Status of waterbodies

