Uisce Éireann

Lead in Drinking Water Mitigation Plan – 029 Illies WTP

Screening to inform Appropriate Assessment

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RYAN HANLEY ARUP
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 Uisce Éireann (UÉ) to undertake Screening for Appropriate Assessment (AA) for the proposed orthophosphate (OP) dosing (herein referred to as the Project) of drinking water supplied by Illies Water Treatment Plant (WTP) in Co. Donegal to Pollan Dam Water Supply Zone (WSZ) (0600PUB1020) and Inishowen East WSZ (0600PUB1022).

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 (hereafter 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 (ZoI) 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 Uisce Éireann, 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

Uisce Éireann, 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 UÉ 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[1] 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 UÉ'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 (UÉ, 2016[2]). 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 UÉ's ownership in private properties (UÉ, 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

[1] Now known as the Department of Housing, Planning and Local Government (DHPLG).
[2] Uisce Éireann (UÉ) (2016) Lead in Drinking Water Mitigation Plan. https://www.water.ie/docs/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 (µg/l) as per the European Union (Drinking Water) Regulations. From 2003 to 2013, the limit was 25 µg/l, which was a reduction on the previous limit (i.e. pre 2003) of 50 µg/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 UÉ 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 (UÉ, 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. UÉ 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 UÉ. 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.

UÉ 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 Pollan Dam WSZ will be 0.6 mg/l P for treated water supplied from Illies 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 to evaluate the significance of any such effects on European Sites. To facilitate the assessment of any significant effect 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 UÉ, RPS, NPWS, IFI, EPA etc. as part of Plan development.

- Information provided by UÉ as part of the project;
- Environmental Protection Agency – Water Quality www.epa.ie and www.catchments.ie;
- Geological Survey of Ireland – Geology, Soils and Hydrogeology 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;
- National Biodiversity Action Plan 2017 - 2021 (DCHG 2017);
- Article 17 Overview Report Volume 1 (NPWS, 2019a);
- Article 17 Habitat Conservation Assessments Volume 2 (NPWS, 2019b);
- Article 17 Species Conservation Assessment Volume 3 (NPWS, 2019c);
- EPA Qualifying Interests database, (EPA, 2015) and updated EPA Characterisation Qualifying Interests database (EPA/RPS, September 2016);
- River Basin Management Plan for Ireland 2022 - 2027 - www.housing.gov.ie;
- Ordnance Survey of Ireland – Mapping and Aerial photography 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.

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 ZoI to be considered during the AA process states the following:

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

project includes all of the hydrologically connected surface water sub catchments and groundwater bodies within the WSZ (Figure 5).

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 SSCOs 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 SSCOs 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. 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 2019 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 2019d). 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 of European Sites

3. DESCRIPTION OF THE PROJECT

3.1 DESCRIPTION OF THE PROPOSAL

Illies WTP currently supplies on average 11,805 m³/day to Pollan Dam WSZ. Illies WTP will supply the following WSZs with respective average flow rates: Inishowen East WSZ with a flow rate of 1,207m³/day; Buncrana WSZ with a flow rate of 1,190m³/day; Inishowen West WSZ with a flow rate of 1,647m³/day and Inishowen West Mixed (Carndonagh and Gleneely WSZs) with a flow rate of 2,676m³/day. Each WSZ will be considered under separate AA Screening Reports. This EAM assessment has considered OP dosed water supplied to the Pollan Dam West (0600PUB1020) WSZ.

Mains leakage across the WSZ is assumed to be 51%. The WSZ boundaries cover a large rural area which is served by a combination of WWTP agglomerations and DWWTS. There are an estimated 8,244 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 Pollan Dam West WSZ currently supplies drinking water to a supply area to the east of Letterkenny and part of the Inishowen Peninsula, including part of Buncrana. Based on an assessment of the risk of lead exceedances, and examination of the network configuration the Plumbosolvency Control Plan for 029 Illies WTP is that all areas receive OP dosed water. Specifically, 0.6 mg/l P will be dosed at Illies WTP (**Figure 1**).

Figure 1 Location of the Illies Water Treatment Plant site, Co. Donegal.

3.1.1 Construction Works

Two bunded phosphoric acid storage tanks (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 a constructed concrete ground slabs, located with the site of the Illies WTP. The required 60 days storage

volume at the Illies WTP site corresponds to 2.0 m^3. The Pb Control Plan also recommends upgrading final water pH correction facilities to achieve a pH of 8.0 in advance of OP dosing. The upgrade to the pH correction facility forms part of a separate contract and will not be assessed in this report.

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

- Initial site assessment, and site investigation works to determine existing conditions, services and pipe cable duct layouts at the site;

- Installation of OP dosing units may include excavations, construction of new water process and duct chambers, duct and pipe laying and reinstatement works (a typical dosing unit is shown in **Figure 2** and **Figure 3**). Exact locations will be confirmed following initial site assessment and investigations. Kiosks will be required to house the OP dosing unit as there is insufficient storage space within the existing buildings. Kiosks will be housed on concrete ground slabs, located within the WTP Site. A 1.0m wide concrete apron shall extend around the kiosk;

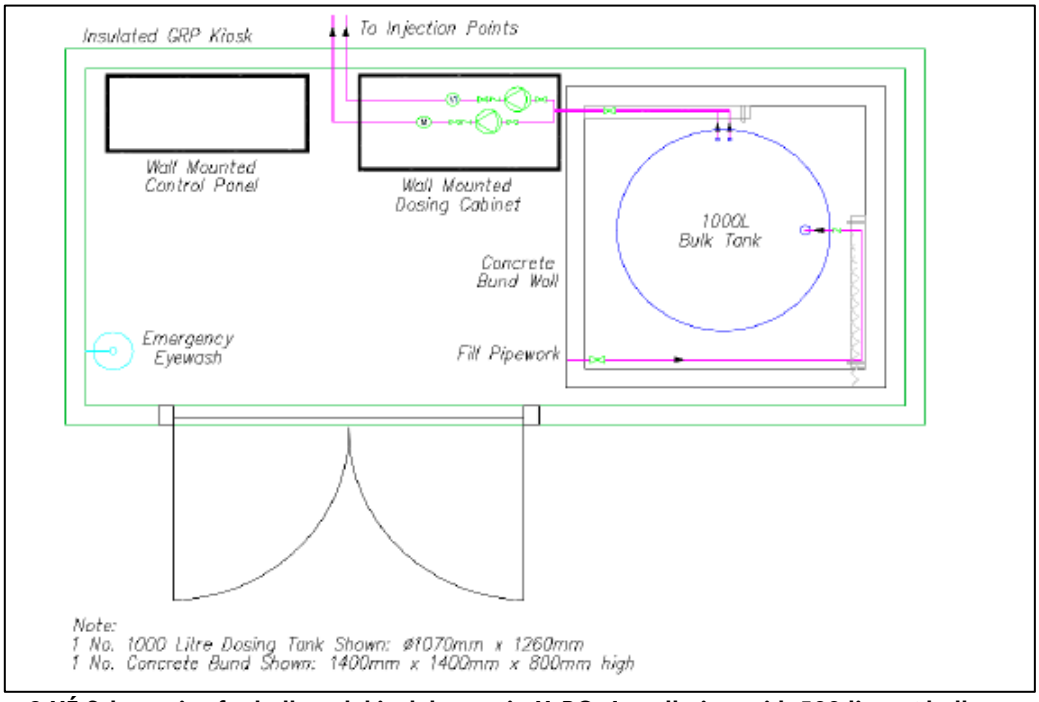

Figure 2 UÉ Schematic of a bulk tank kiosk layout in H_3PO_4 Installation with 500 litres< bulk storage ≤ 6,000 litres.

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 0.6 mg/l P for treated water from Illies WTP 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 significant effect on any European sites, in view of their COs;

At the early stages of consideration, UÉ 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, UÉ devised a conceptual model based on the 'source – pathway – receptor' framework. This sets out a specific environmental assessment of any proposed orthophosphate treatment and provides a methodology to determine the potential loading 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 orthophosphate 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 EAM risk assessment process.

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

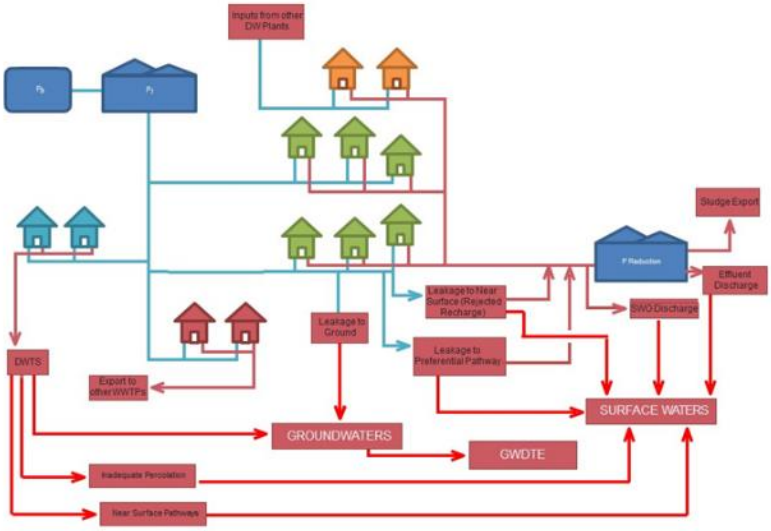

Figure 4 Conceptual Model of P Transfer

(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.)

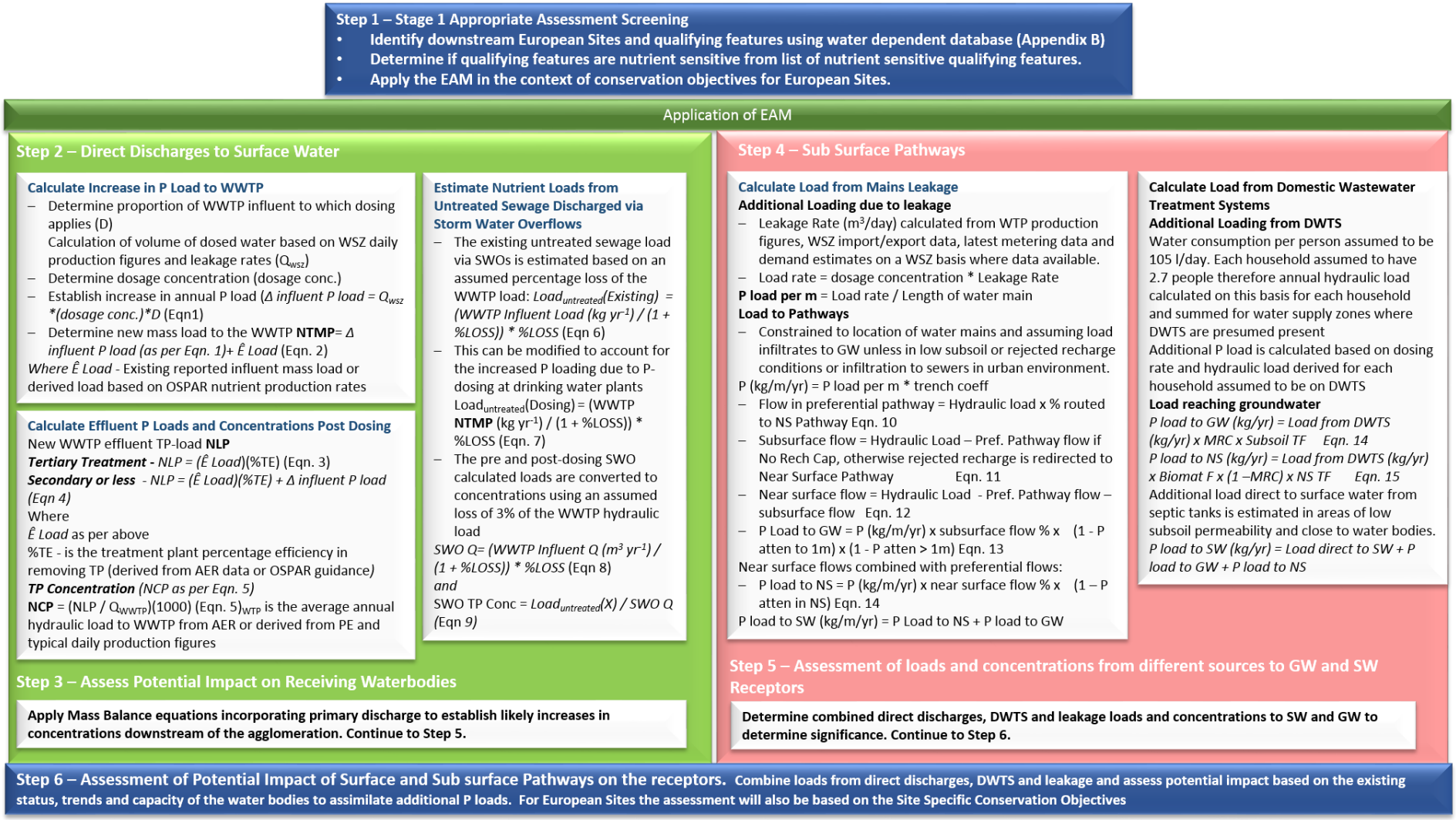

Figure 5 Stepwise Approach to the Environmental Assessment Methodology

4. PROJECT CONNECTIVITY TO EUROPEAN SITES

4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

4.1.1 CONSTRUCTION PHASE

Illies WTP site boundary is located on the banks of the River Crana (Crana_020 river waterbody) which is located >15 km upstream of Lough Swilly SAC (002287) (**Figure 6**). Given the location and taking account of the scale of the construction of the OP Dosing Unit for the proposed scheme, the potential for direct or indirect impacts during construction at Illies WTP site can be screened out at an early stage. Consideration of potential impact is in the absence of mitigation and with the acknowledgement that the Dosing Units are within the existing UÉ site and as significant distance upstream of any European Site, thereby having no links to European Sites. Construction impacts are therefore not discussed further in the report.

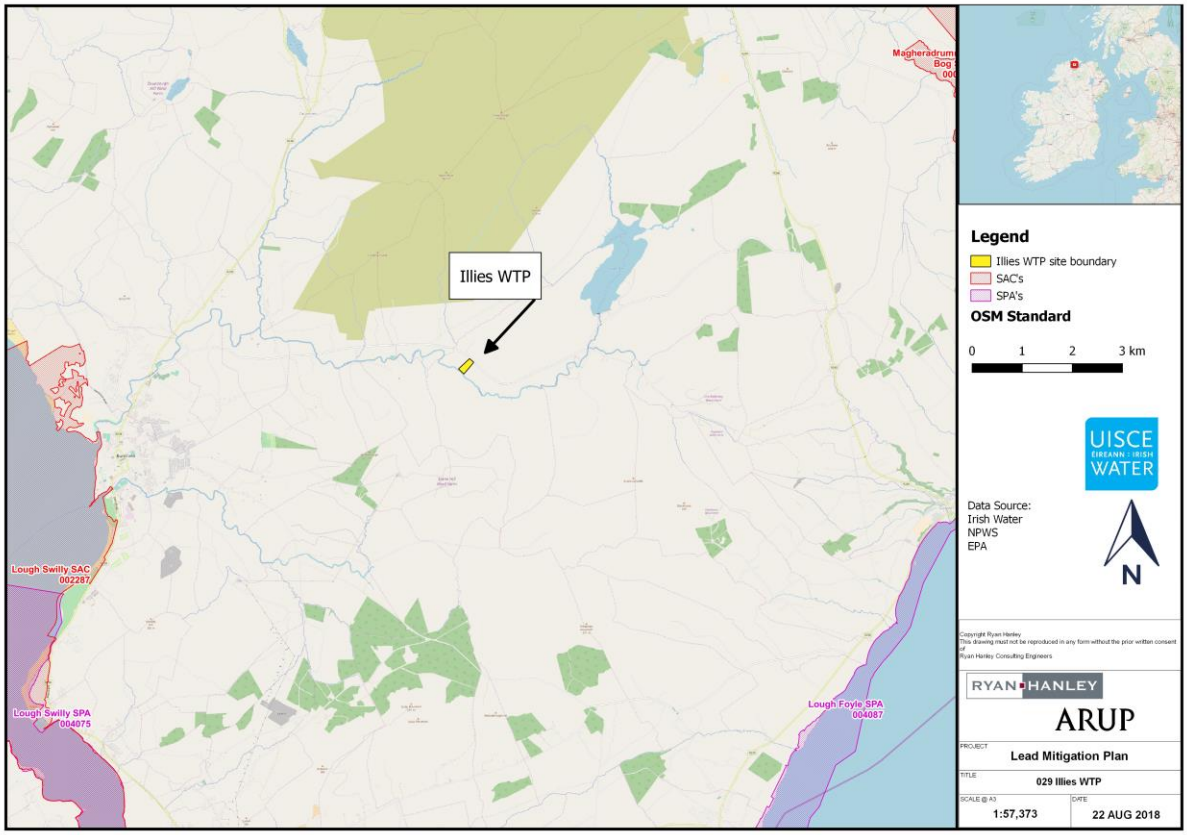

Figure 6 Location of the Illies Water Treatment Plant site with respect to European Sites

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 a ZoI, which was determined by establishing the potential for hydrological and hydrogeological connectivity between the Illies WTP and associated WSZ and European Sites. The 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 ZoI are listed in **Table 1** and are displayed in **Figure 7**.

The EAM process identified 36 river waterbodies and 7 transitional waterbodies and small 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:

- St Johnston_010 (E_NW_01S010280), Carrigans_010 (UKGBNI1NW010103062) and Ardmore_010 (IE_NW_40A08082) river waterbodies discharge into the Foyle and Faughan Estuary (IE_NW_220_0100) transitional waterbody and Lough Foyle (UKGBNI5NW250010) coastal waterbody.

- Swilly Burn_020 (IE_NW_01S030250) river waterbody discharges into Swilly Burn_030 (IE_NW_01S030500) before entering Foyle and Faughan Estuary (IE_NW_220_0100) transitional waterbody and Lough Foyle (UKGBNI5NW250010) coastal waterbody.

- Dooballagh Burn_010 (IE_NW_39D020200) and Leslie Hill Stream_010 (IE_NW_39L050600) river waterbodies discharge into Leslie Hill Stream_020 (IE_NW_39L050660) before entering Lough Swilly (IE_NW_220_0100) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Drumbarnet Stream_010 (IE_NW_39D030600) river waterbody discharges into Glar_010 (IE_NW_39G380790) before entering Lough Swilly (IE_NW_220_0100) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Glack_or_Bohullion_010 (IE_NW_39G170760) and Carrowen_010 (IE_NW_39C910930) river waterbodies discharge into Lough Swilly (IE_NW_220_0100) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Lisfannan_010 (IE_NW_39L170710) river waterbody discharges into Crana Estuary (IE_NW_220_0400) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Burnfoot_010 (IE_NW_39B020200) river waterbody discharges into Burnfoot_020 (IE_NW_39B020600) and Skeoge_010 (UKGBNI1NW393901002) river waterbodies which discharge into Inch Lough (IE_NW_220_0300) transitional waterbody, Lough Swilly (IE_NW_220_0100) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Mill (Donegal)_020 (IE_NW_39M020300) river waterbody discharges into Crana Estuary (IE_NW_220_0400) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Gortyarrigan_010 (IE_NW_39G110630), Owenerk_020 (IE_NW_39O020200) and Aghaweel_010 (IE_NW_39A010400) river waterbodies discharge into Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Owenboy (Crana)_010 (IE_NW_39O040400) and Cashelnacor_010 (IE_NW_39C010200) river waterbodies discharge into Crana_030 (IE_NW_39C020500) before discharging into Crana Estuary (IE_NW_220_0400) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Owennasop_010 (IE_NW_39O050100) and Crana_010 (IE_NW_39C020100) river waterbodies discharge into Crana_020 (IE_NW_39C020300) and Crana_030 (IE_NW_39C020500) before discharging into Crana Estuary (IE_NW_220_0400) transitional waterbody and Lough Swilly (IE_NW_220_0000) coastal waterbody.

- Clonmany_010 (IE_NW_40C010100) discharges into Clonmany_020 (IE_NW_40C010200) and Clonmany_030 which discharge into the North Atlantic Seaboard coastal waterbody.

The EAM process identified 6 groundwater bodies. Groundwater bodies touching or intersecting the WSZs, are also included in the ZoI. Hydrogeological linkages in karst areas are taken into account:

- Manor Cunningham (IE_NW_G_052);

- Raphoe (IE_NW_G_052);
- Foyle Gravels (IE_NW_G_075);
- East Inishowen (IEGBNI_NW_G_050);
- River Foyle (IEGBNI_NW_G_051);
- Lough Swilly (IEGBNI_NW_G_059)

Lough Swilly (IEGBNI_NW_G_059) is dominated by poor aquifer which is generally unproductive except for local zones. This groundwater body discharges surface and groundwater into Lough Swilly from west Inishowen, east Fanad Peninsula and east of the Glenveagh National Park. The main discharges are to rivers and streams crossing the GWB, reflecting short groundwater flow paths (30-300m) and overall flow direction is expected to be to the northwest as determined by topography. As a result of this only those European Sites within a 300m radius are considered in the ZoI.

East Inishowen (IEGBNI_NW_G_050) groundwater body is dominated by poor aquifer which is generally unproductive except for local zones (GWB descriptions, GSI 2004). Its main discharge mechanism is to rivers and streams crossing the groundwater body reflecting short groundwater flow paths (30-300m). As such only European sites within 300m of the dosing zone in this groundwater body are considered further.

River Foyle (IEGBNI_NW_G_051) is dominated by poor aquifer which is generally unproductive except for local zones. This groundwater body discharges locally to streams and rivers crossing the aquifer and also to small springs and seeps, reflecting short groundwater flow paths (30-300m). As a result of this only those European Sites within a 300m radius are considered in the ZoI.

Foyle Gravels (IE_NW_G_075) GWB occupies flat-lying ground along three river valleys – the Deele, Swilly Burn and the Foyle. The length of flow paths depends on the size and dimensions of the sand/gravel deposit, and also upon the spacing of internal groundwater divides and the distance between streams, if groundwater is discharging to them. In general, groundwater will flow at high angles to the Rivers Deele, Swilly Burn and Foyle and smaller streams, thus the flowpaths typically will be considerably less than about 500 m. As such only European sites within 500m of the dosing zone in this groundwater body are considered further.

Raphoe (IE_NW_G_052) groundwater body is dominated by poor aquifer which is generally unproductive except for local zones (GWB descriptions, GSI 2004). Its main discharge mechanism is to rivers and streams crossing the groundwater body reflecting short groundwater flow paths (30-300m). As such only European sites within 300m of the dosing zone in this groundwater body are considered further.

Manor Cunningham (IE_NW_G_052) groundwater body is dominated by poor aquifer which is generally unproductive except for local zones (GWB descriptions, GSI 2004). Its main discharge mechanism is to rivers and streams crossing the groundwater body reflecting short groundwater flow paths (30-300m). As such only European sites within 300m of the dosing zone in this groundwater body are considered further.

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

Table 1: European Sites within the ZoI of the Proposed Project

Site Name	SAC/SPA Code	Water Dependent Species/Habitats	Nutrient Sensitive	Potential Hydrological/ Hydrogeological Connectivity
Ballyhoorisky Point to Fanad Head SAC	**001975**	**Yes**	**Yes**	**No**
North Inishowen Coast SAC	**002012**	**Yes**	**Yes**	**Yes**
Lough Swilly SAC	**002287**	**Yes**	**Yes**	**Yes**

River Finn SAC	**002301**	**Yes**	**Yes**	**Yes**
Lough Swilly SPA	**004075**	**Yes**	**Yes**	**Yes**
Lough Foyle SPA	**004087**	**Yes**	**Yes**	**Yes**
Fanad Head SPA	**004148**	**Yes**	**Yes**	**No**
Horn Head to Fanad Head SPA	**004194**	**Yes**	**Yes**	**No**

Ballyhoorisky Point to Fanad Head SAC (001975) is located approximately 7.4 km nortwest of the proposed dosing area. This site is located on the western shoreline of the Lough Swilly coastal waterbody and is potentially hydrologically connected to the dosing area via this waterbody. The dosing area is located on the eastern shore of Lough Swilly and it is considered that any OP entering this large coastal waterbody will be significantly diluted. As a result, there will be no change in the OP indicative water quality status of this waterbody and therefore no impact on the Ballyhoorisky Point to Fanad Head SAC. Therefore, this site is not considered further in this report.

Fanad Head SPA (004148) and **Horn Head to Fanad Head SPA (004194)** are located approximately 7.6 km northwest of the proposed dosing area. These sites are located on the western shoreline of the Lough Swilly coastal waterbody and are potentially hydrologically connected to the dosing area via this waterbody. The dosing area is located on the eastern shore of Lough Swilly and it is considered that any OP entering this large coastal waterbody will be significantly diluted. As a result, there will be no change in the OP indicative water quality status of this waterbody and therefore no impact on the Ballyhoorisky Point to Fanad Head SAC. 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. 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**.

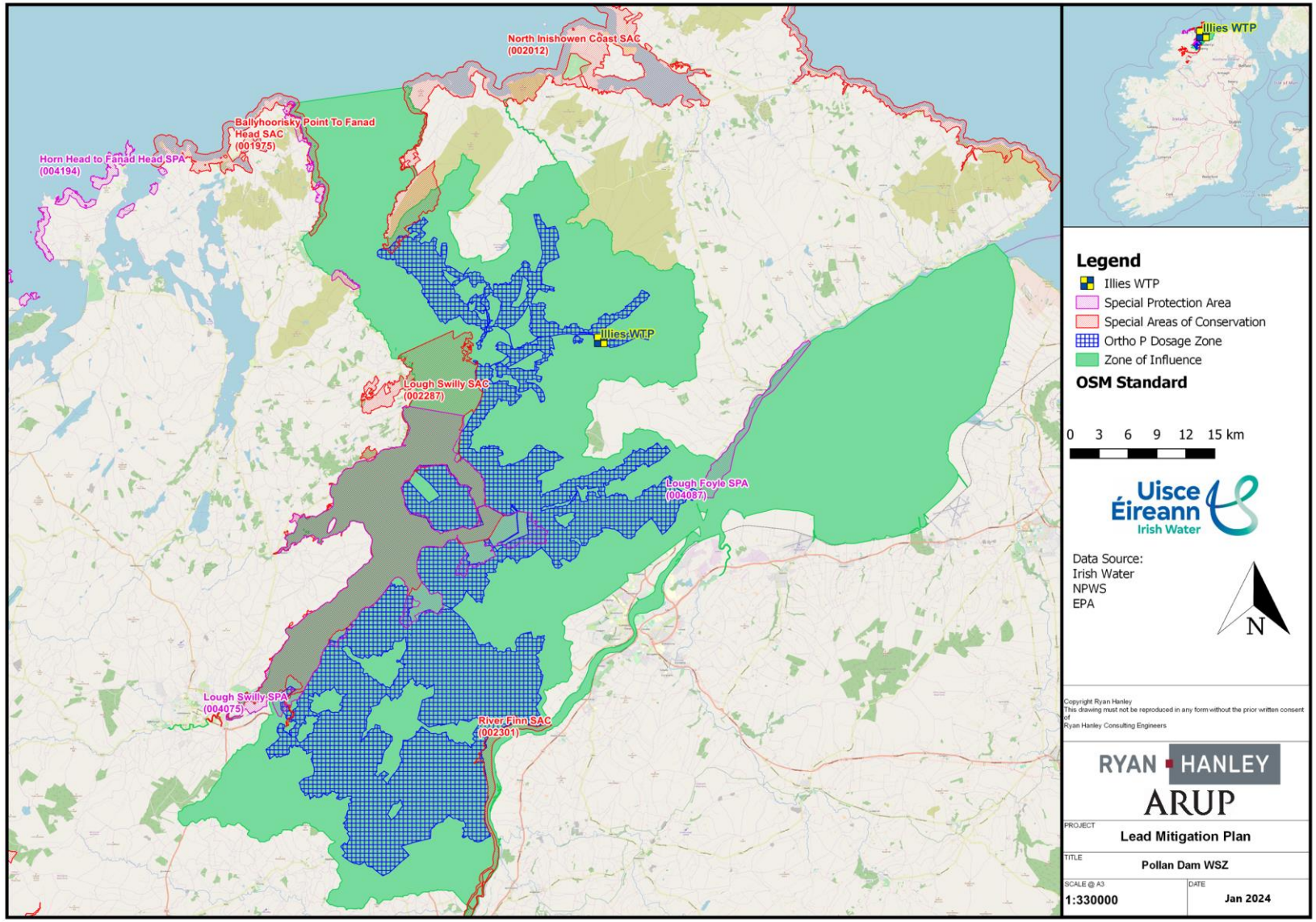

Figure 7 European Sites within the ZoI of the Proposed Project

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
North Inishowen Coast SAC	**002012**	**24th Nov 2014**	1014	Narrow-mouthed Whorl Snail *Vertigo angustior*	Yes	Yes	Yes for operational
			1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes	
			1220	Perennial vegetation of stony banks	Yes	No	
			1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Yes	Yes	
			1355	Otter *Lutra lutra*	Yes	Yes	
			2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Yes	Yes	
			21A0	Machairs (* in Ireland)	Yes	Yes	
			4030	European dry heaths	No	Yes	
Lough Swilly SAC	**002287**	**19th Jul 2011**	1130	Estuaries	Yes	Yes	Yes for operational
			1150	* Coastal lagoons	Yes	Yes	
			1330	Atlantic salt meadows (*Glauco Puccinellietalia maritimae*)	Yes	Yes	
			1355	Otter *Lutra lutra*	Yes	Yes	
			91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	No	Yes	
River Finn SAC	**002301**	**31st May 2017**	3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	Yes	Yes	Yes for operational
			4010	Northern Atlantic wet heaths with *Erica tetralix*	Yes	Yes	
			7130	Blanket bogs (* if active bog)	Yes	Yes	
			7140	Transition mires and quak ing bogs	Yes	Yes	
			1106	Salmon Salmo salar	Yes	Yes	
			1355	Otter *Lutra lutra*	Yes	Yes	
Lough Swilly SPA	**004075**	**19th Jul 2011**	A005	Great Crested Grebe *Podiceps cristatus*	Yes	Yes	Yes for operational
			A028	Grey Heron *Ardea cinerea*	Yes	Yes	
			A038	Whooper Swan *Cygnus cygnus*	Yes	Yes	
			A043	Greylag Goose *Anser anser*	Yes	Yes	
			A048	Shelduck *Tadorna tadorna*	Yes	Yes	
			A050	Wigeon *Anas penelope*	Yes	Yes	
			A052	Teal *Anas crecca*	Yes	Yes	
			A053	Mallard *Anas platyrhynchos*	Yes	Yes	
			A056	Shoveler *Anas clypeata*	Yes	Yes	
			A062	Scaup *Aythya marila*	Yes	Yes	
			A067	Goldeneye *Bucephala clangula*	Yes	Yes	

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
			A069	Red-breasted Merganser *Mergus serrator*	Yes	Yes	
			A125	Coot *Fulica atra*	Yes	Yes	
			A130	Oystercatcher *Haematopus ostralegus*	Yes	Yes	
			A143	Knot *Calidris canutus*	Yes	Yes	
			A149	Dunlin *Calidris alpina*	Yes	Yes	
			A160	Curlew *Numenius arquata*	Yes	Yes	
			A162	Redshank *Tringa totanus*	Yes	Yes	
			A164	Greenshank *Tringa nebularia*	Yes	Yes	
			A179	Black-headed Gull *Chroicocephalus ridibundus*	Yes	Yes	
			A182	Common Gull *Larus canus*	Yes	Yes	
			A191	Sandwich Tern *Sterna sandvicensis*	Yes	Yes	
			A193	Common Tern *Sterna hirundo*	Yes	Yes	
			A395	Greenland White-fronted goose *Anser albifrons flavirostris*	Yes	Yes	
			A999	Wetlands & Waterbirds	Yes	Yes	
Lough Foyle SPA	**004087**	**23rd Sept 2014**	A001	Red-throated Diver *Gavia stellata*	Yes	Yes	Yes for operational
			A005	Great Crested Grebe *Podiceps cristatus*	Yes	Yes	
			A037	Bewick's Swan *Cygnus columbianus bewickii*	Yes	Yes	
			A038	Whooper Swan *Cygnus cygnus*	Yes	Yes	
			A043	Greylag Goose *Anser anser*	Yes	Yes	
			A046	Brent Goose *Branta bernicla hrota*	Yes	Yes	
			A048	Shelduck *Tadorna tadorna*	Yes	Yes	
			A050	Wigeon *Anas penelope*	Yes	Yes	
			A052	Teal *Anas crecca*	Yes	Yes	
			A053	Mallard *Anas platyrhynchos*	Yes	Yes	
			A063	Eider *Somateria mollissima*	Yes	Yes	
			A069	Red-breasted Merganser *Mergus serrator*	Yes	Yes	
			A130	Oystercatcher *Haematopus ostralegus*	Yes	Yes	
			A140	Golden Plover *Pluvialis apricaria*	Yes	Yes	
			A142	Lapwing *Vanellus vanellus*	Yes	Yes	
			A143	Knot *Calidris canutus*	Yes	Yes	
			A149	Dunlin *Calidris alpina alpina*	Yes	Yes	
			A157	Bar-tailed Godwit *Limosa lapponica*	Yes	Yes	

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
			A160	Curlew *Numenius arquata*	Yes	Yes	
			A162	Redshank *Tringa totanus*	Yes	Yes	
			A179	Black-headed Gull *Chroicocephalus ridibundus*	Yes	Yes	
			A182	Common Gull *Larus canus*	Yes	Yes	
			A184	Herring Gull *Larus argentatus*	Yes	Yes	
			A999	Wetlands	Yes	Yes	

* 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* (EC, 2002). When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented include:

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

5.2 IMPACT IDENTIFICATION

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

The 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 orthophosphate 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 orthophosphate;

- 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).

5.4 ASSESSMENT OF OPERATIONAL IMPACTS

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 Illies WTP. 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. River waterbodies with mean phosphate concentrations of 0.0275 mg/l have 75% capacity left, i.e. high capacity, while river waterbodies with a mean of 0.0325 mg/l 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 Orthophosphate 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 of the Good/Moderate status) this test will pass as the OP dosing itself is not having a significant impact on the Orthophosphate 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.

Baseline Orthophosphate monitoring data and associated thresholds are available for Burnfoot_020, Crana_010, Crana_030, Drumbarbet Stream _010, Leslie Hill Stream_010, Mill (Donegal)_020, Owenrak_020, Owenboy (Crana)_010, Owennasop_010, Clonmany_010, Carrigans_010 and Skeoge_010.Where existing monitoring data is not available, a surrogate status is derived from the Orthophosphate indicative quality of the adjacent RWB. The mid-range of that surrogate status is used as baseline concentration. An additional test for groundwater bodies states that downward trends should not be reversed as a result of pollution. 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.

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[3]	Ortho P Status[4] and Trends[5]	Baseline[6] P Conc.[7,8]	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l)	Baseline Conc. @ 0.6 mg/l dosing rate	Evaluation
North Inishowen Coast SAC (002012)	Owenerk_020	RWB	High	0.0144	0.0188	2.3	0.0001	0.0145	No risk of deterioration to OP indicative WQ
	Clonmany_030	RWB	*Good*	0.0300	0.0325	36.2	0.0006	0.0306	No risk of deterioration to OP indicative WQ
	Lough Swilly	CWB	Summer High/ Winter High	0.0110/0.0125	0.0188	594	0.0007	0.0117/ 0.0132	No risk of deterioration to OP indicative WQ
Lough Swilly SAC (002287)	Leslie Hill Stream_020	RWB	Moderate	0.0555	0.0508	35.5	0.0006	0.0561*	No risk of deterioration to OP indicative WQ
	Glar_010	RWB	Good	0.0255	0.0325	63.0	0.0018	0.0273	No risk of deterioration to OP indicative WQ
	Carrowen_010	RWB	*Good*	0.0300	0.0325	5.3	0.0004	0.0304	No risk of deterioration to OP indicative WQ
	Glack_or_Bohullion_010	RWB	*High*	0.0125	0.0188	6.7	0.0006	0.0131	No risk of deterioration to OP indicative WQ
	Skeoge_010	RWB	High	0.0205	0.0188	34.5	0.0009	0.0214*	No risk of deterioration to OP indicative WQ
	Lisfannan_010	RWB	*High*	0.0125	0.0188	13.4	0.0012	0.0137	No risk of deterioration to OP indicative WQ
	Mill (Donegal)_020	RWB	High	0.0193	0.0188	9.9	0.0002	0.0195*	No risk of deterioration to OP indicative WQ
	Crana_030	RWB	High	0.0134	0.0188	58.7	0.0004	0.0138	No risk of deterioration to OP indicative WQ

[3] Monitoring period is annual unless specified.
[4] Surrogate Status indicated in italic.
[5] Distance to threshold in parentheses.
[6] Baseline year is 2014.
[7] Surrogate concentration is given in italic mg/l
[8] Ortho P in RWBs, TWBs, CWBs and GWBs; TP in LWBs.
[9] Cumulative Ortho P load to SW and GW from upstream and downstream dosing areas, Leakage, DWWTS and agglomerations (kg/yr).
[10] 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[3]	Ortho P Status[4] and Trends[5]	Baseline[6] P Conc.[7,8]	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l)	Baseline Conc. @ 0.6 mg/l dosing rate	Evaluation
	Lough Swilly	GWB	Good	0.0144	0.0263	15.6	0.0002	0.0146	No risk of deterioration to OP indicative WQ
	Manor Cunningham	GWB	*Good*	0.0175	0.0263	2.1	0.0003	0.0178	No risk of deterioration to OP indicative WQ
	Swilly Estuary	TWB	Summer High/ Winter High	0.0130/0.0160	0.0193/0.0198	625.6	0.0010	0.0140/ 0.0170	No risk of deterioration to OP indicative WQ
	Blanket Nook Lough	TWB	*Summer High/ Winter High*	*0.0125/0.0125*	0.0188	58.0	0.0016	0.0141	No risk of deterioration to OP indicative WQ
	Inch Lough	TWB	*Summer High/ Winter High*	*0.0125/0.0125*	0.0188	40.8	0.0011	0.0136	No risk of deterioration to OP indicative WQ
	Crana Estuary	TWB	*Summer High/ Winter High*	*0.30125/ 0.0125*	0.0188	61.5	0.0003	0.0128	No risk of deterioration to OP indicative WQ
	Lough Swilly	CWB	Summer High/ Winter High	0.0110/0.0125	0.0188	594	0.0007	0.0117/ 0.0132	No risk of deterioration to OP indicative WQ
River Finn SAC (002301)	Carrigans_010	RWB	Good	0.0286	0.0325	31.7	0.0013	0.0298	No risk of deterioration to OP indicative WQ
	St. Johnston_010	RWB	Good	0.0299	0.0325	9.1	0.0004	0.0303	No risk of deterioration to OP indicative WQ
	Swilly Burn_030	RWB	Moderate	0.0520	0.0508	5.5	0.0001	0.0521*	No risk of deterioration to OP indicative WQ
	River Foyle	GWB	Good	0.0105	0.0263	0.1	0.00001	0.0105	No risk of deterioration to OP indicative WQ
	Raphoe	GWB	*Good*	0.0175	0.0263	0.7	0.00003	0.0175	No risk of deterioration to OP indicative WQ
	Foyle and Faughan Estuaries	TWB	*Summer Moderate/ Winter Moderate*	0.0500	0.0550	62.6	0.0001	0.0501	No risk of deterioration to OP indicative WQ
Lough Swilly SPA (004075)	Leslie Hill Stream_020	RWB	Moderate	0.0555	0.0508	35.5	0.0006	0.0561*	No risk of deterioration to OP indicative WQ

Site Name (Code)	Contributing WB Code_Name	WB Type[3]	Ortho P Status[4] and Trends[5]	Baseline[6] P Conc.[7,8]	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l)	Baseline Conc. @ 0.6 mg/l dosing rate	Evaluation
	Glar_010	RWB	Good	0.0255	0.0325	63.0	0.0018	0.0273	No risk of deterioration to OP indicative WQ
	Carrowen_010	RWB	*Good*	0.0300	0.0325	5.3	0.0004	0.0304	No risk of deterioration to OP indicative WQ
	Glack_or_Bohullion_010	RWB	*High*	0.0125	0.0188	6.7	0.0006	0.0131	No risk of deterioration to OP indicative WQ
	Skeoge_010	RWB	High	0.0205	0.0188	34.5	0.0009	0.0214*	No risk of deterioration to OP indicative WQ
	Lisfannan_010	RWB	*High*	0.0125	0.0188	13.4	0.0012	0.0137	No risk of deterioration to OP indicative WQ
	Mill (Donegal)_020	RWB	High	0.0193	0.0188	9.9	0.0002	0.0195*	No risk of deterioration to OP indicative WQ
	Crana_030	RWB	High	0.0134	0.0188	58.7	0.0004	0.0138	No risk of deterioration to OP indicative WQ
	Lough Swilly	GWB	Good	0.0144	0.0263	15.6	0.0002	0.0146	No risk of deterioration to OP indicative WQ
	Manor Cunningham	GWB	*Good*	0.0175	0.0263	2.1	0.0003	0.0178	No risk of deterioration to OP indicative WQ
	Swilly Estuary	TWB	Summer High/ Winter High	0.0180/0.0150	0.0188	217.0	0.0011	0.0191/ 0.0161	No risk of deterioration to OP indicative WQ
	Blanket Nook Lough	TWB	*Summer Good/ Winter Good*	0.0325	0.0363	63.0	0.0018	0.0343	No risk of deterioration to OP indicative WQ
	Inch Lough	TWB	*Summer High/ Winter High*	0.0125	0.0188	46.5	0.0007	0.0132	No risk of deterioration to OP indicative WQ
	Crana Estuary	TWB	*Summer High/ Winter High*	0.0125	0.0188	73.8	0.0004	0.0129	No risk of deterioration to OP indicative WQ
Lough Foyle SPA (004087)	Ardmore_010	RWB	*High*	0.0125	0.0188	2.7	0.0001	0.0126	No risk of deterioration to OP indicative WQ
	East Inishowen	GWB	Good	0.0050	0.0263	16.8	0.0003	0.0053	No risk of deterioration to OP indicative WQ
	Foyle and Faughan Estuaries	TWB	*Summer Moderate/*	0.0500	0.0550	62.6	0.0001	0.0501	No risk of deterioration to OP indicative WQ

Site Name (Code)	Contributing WB Code_Name	WB Type[3]	Ortho P Status[4] and Trends[5]	Baseline[6] P Conc.[7,8]	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l)	Baseline Conc. @ 0.6 mg/l dosing rate	Evaluation
			Winter Moderate						
	Lough Foyle	CWB	*Summer Moderate/ Winter Moderate*	0.0500	0.0550	134.9	0.0001	0.0501	No risk of deterioration to OP indicative WQ

5.3.1 Assessment of direct impact from WWTPs and Storm Water Overflows

The conceptual model developed for P transfer identifies a number of pathways by which orthophosphate can reach receptors. In the case of these pathways, factors contributing to 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 Orthophosphate 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 any SWOs 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 = 0.6 mg/l P at Illies WTP

Agglomeration and Discharge Type	WWDL ELV AER (2022) Compliance		Annual average TP Load kg/yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
				0.5	0.4	0.68
Bridgeend Primary Discharge	OrthoPhosphate 1.5mg/l – Non-compliant	Pre-Dosing	140	0.91	0.73	1.24
		Post Dosing	157	1.03	0.82	1.40
		% Increase	12.1	13.2	12.3	12.9
Bridgeend SWOs (3 No.)		Pre-Dosing	9	0.28	0.22	0.38
		Post Dosing	9	0.30	0.24	0.40
Buncrana Primary Discharge	None	Pre-Dosing	4383	2.33	1.86	3.16
		Post Dosing	4733	2.51	2.01	3.42
		% Increase	8.0	7.7	8.1	8.2
Buncrana SWOs (3 No.)		Pre-Dosing	191	0.50	0.40	0.68
		Post Dosing	202	0.52	0.42	0.71
Burnfoot Primary Discharge	OrthoPhosphate 1mg/l – Non-compliant	Pre-Dosing	112	2.13	1.71	2.90
		Post Dosing	127	2.42	1.93	3.26
		% Increase	13.4	13.6	12.9	12.4
	None	Pre-Dosing	136	5.34	4.27	7.26

Carrigans Primary Discharge		Post Dosing	148	5.80	4.64	7.89
		% Increase	8.8	8.6	8.7	8.7
Fahan Primary Discharge	**OrthoPhosphate 8mg/l – Compliant**	Pre-Dosing	413	1.39	1.11	1.89
		Post Dosing	449	1.51	1.21	2.06
		% Increase	8.7	8.6	9.0	9.0
Fahan SWOs (1 No.)		Pre-Dosing	18	0.30	0.24	0.41
		Post Dosing	19	0.32	0.25	0.43
Inch Island Primary Discharge	**None**	Pre-Dosing	17	3.74	2.99	5.08
		Post Dosing	19	4.20	3.36	5.71
		% Increase	11.8	12.3	12.4	12.4
Killea Primary Discharge	**OrthoPhosphate 0.3mg/l – Non-compliant**	Pre-Dosing	186	1.63	1.31	2.22
		Post Dosing	210	1.84	1.47	2.50
		% Increase	12.9	12.9	12.2	12.6
Killea SWOs (2 No)		Pre-Dosing	12	0.50	0.40	0.68
		Post Dosing	12	0.53	0.42	0.72
Manorcunningh am Primary Discharge	**OrthoPhosphate 8mg/l – Compliant**	Pre-Dosing	273	2.32	1.86	3.16
		Post Dosing	307	2.61	2.09	3.55
		% Increase	12.5	12.5	12.4	12.3
Moness Primary Discharge	**None**	Pre-Dosing	20	3.74	2.99	5.08
		Post Dosing	23	4.20	3.36	5.71
		% Increase	15.0	12.3	12.4	12.4
Moville Primary Discharge	**None**	Pre-Dosing	1394	8.00	6.40	10.88
		Post Dosing	1471	8.44	6.75	11.48
		% Increase	5.5	5.5	5.5	5.5
Moville SWOs (5 No.)		Pre-Dosing	41	1.14	0.91	1.55
		Post Dosing	43	1.21	0.96	1.64
Newtowncunnin gham Primary Discharge	**OrthoPhosphate 0.5mg/l – Non-compliant**	Pre-Dosing	447	1.51	1.21	2.06
		Post Dosing	505	1.71	1.37	2.31
		% Increase	13.0	13.2	13.2	12.1
Newtowncunnin gham SWOs (4 No)		Pre-Dosing	28	0.46	0.37	0.63
		Post Dosing	30	0.49	0.39	0.67
St Johnston Primary Discharge	**OrthoPhosphate 8mg/l – Compliant**	Pre-Dosing	53	0.80	0.64	1.09
		Post Dosing	53	0.80	0.64	1.15
		% Increase	0.0	0.0	0.0	5.5
St Johnston SWOs (2 No)		Pre-Dosing	15	1.14	0.91	1.55
		Post Dosing	16	1.21	0.97	1.65

Bridgend WWTP Agglomeration

The Bridgend WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate

concentration will increase from 0.91 mg/l P to 1.03 mg/l P as a result of dosing (13% increase). The annual average SWO effluent concentration will increase from 0.28 mg/l P to 0.30 mg/l P as a result of dosing. This WWTP discharges into the River Skeoge (Skeoge_010) at approximate coordinates: E239470 N422012. The River Skeoge forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075)** approximately 1.3 km downstream.

Buncrana WWTP

The Buncrana WWTPprovides primary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 2.33 mg/l P to 2.51 mg/l P as a result of dosing (8% increase). The annual average SWO effluent concentration will increase from 0.50 mg/l P to 0.52 mg/l P as a result of dosing. This WWTP discharges directly into the Swilly Estuary at approximate coordinates: E233627 N431454. The Swilly Estuary forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075).**

Burnfoot WWTP

The Burnfoot WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 2.13 mg/l P to 2.42 mg/l P as a result of dosing (13.6% increase). There are no SWOs associated with this plant. This WWTP discharges into the Burnfoot River (Burnfoot_020) at approximate coordinates: E238252 N423738. The Burnfoot River forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075)** approximately 590 m downstream.

Carrigans WWTP

The Carrigans WWTP provides primary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 5.34 mg/l P to 5.80 mg/l P as a result of dosing (8.6% increase). There are no SWOs associated with this plant. This WWTP discharges into the Foyle and Faughan Estuaries transitional waterbody at approximate coordinates: E236740 N411575. The Foyle and Faughan Estuaries forms part of the **River Finn SAC (002301)** at this point.

Fahan WWTP

The Fahan WWTP provides primary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 1.39 mg/l P to 1.51 mg/l P as a result of dosing (8.6% increase). The annual average SWO effluent concentration will increase from 0.30 mg/l P to 0.32 mg/l P as a result of dosing. This WWTP discharges into the Swilly Estuary transitional waterbody at approximate coordinates: E234272 N425936. The Swilly Estuary forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075).**

Inch Island WWTP

The Inch Island WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 3.74 mg/l P to 4.20 mg/l P as a result of dosing (12% increase). There are no SWOs associated with this plant. This WWTP discharges into the Swilly Estuary transitional waterbody at approximate coordinates: E234225 N424446. The Swilly Estuary forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075).**

Killea WWTP

The Killea WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 1.63 mg/l P to 1.84 mg/l P as a result of dosing (13% increase). There are 2 no. SWOs associated with this plant and annual average SWO effluent concentration will increase from 0.50 mg/l P to 0.53 mg/l P as a result of dosing. This WWTP discharges into the Carrigans River (Carrigans_010) at approximate coordinates: E238038 N415251. The Carrigan River flows into the

Foyle and Faughan Estuaries approximately 6.3 km downstream. The Foyle and Faughan Estuaries forms part of the **River Finn SAC (002301)** at this point.

Manorcunningham WWTP

The Manorcunningham WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 2.32 mg/l P to 2.61 mg/l P as a result of dosing (12.5% increase). There are no SWOs associated with this plant. This WWTP discharges into the Leslie Hill Stream_010 at approximate coordinates: E223546 N411700 which forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075)** at this point.

Moness WWTP

The Moness WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 8.00 mg/l P to 8.44 mg/l P as a result of dosing (5.5% increase). There are 5 no. SWOs associated with this plant and annual average SWO effluent concentration will increase from 1.14 mg/l P to 1.21 mg/l P as a result of dosing. This WWTP discharges into the Carrowen River (Carrowen_010) at approximate coordinates: E234504 N420507 which forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075)** at this point.

Newtowncunningham WWTP

The Newtowncunningham WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 1.51 mg/l P to 1.71 mg/l P as a result of dosing (13% increase). There are 4 no. SWOs associated with this plant and annual average SWO effluent concentration will increase from 0.46 mg/l P to 0.49 mg/l P as a result of dosing. This WWTP discharges into the River Glar (Glar_010) at approximate coordinates: E230984 N416993. The River Glar forms part of the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075)** approximately 300 m downstream of this point.

St Johnston WWTP

The St. Johnston WWTP provides tertiary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will remain at 0.80 mg/l P as a result of dosing. The annual average SWO effluent concentration will increase from 1.14 mg/l P to 1.21 mg/l P as a result of dosing. This WWTP discharges into the St Johnston River (St Johnston_010) at approximate coordinates: E 234880 N409790. The St Johnston River forms part of the **River Finn SAC (002301)** 41 m downstream of this point.

5.3.2 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 dosing from the WWTP discharge, seepage from mains and DWWTS. Upstream dosing areas have been considered and cumulatively assessed by the EAM. The figures presented here are representative of this.

River waterbodies

- Owenerk_020 (IE_NW_39O020200) and Clomany_030 (IE_NW_40C010300) river waterbodies are hydrologically connected to the **North Inishowen Coast SAC (002012).**
- Leslie Hill Stream_020 (IE_NW_39L050660), Glar_010 (IE_NW_39G380790), Carrowen_010 (IE_NW_39C910930), Glack_or_Bohullion_010 (IE_NW_39G170760), Skeoge_010 (UKGBNI1NW393901002), Lisfannan_010 (IE_NW_39L170710), Mill (Donegal)_020 (IE_NW_39M020300), Crana_030 (IE_NW_39C020500) river waterbodies are hydrologically linked to **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075).**

- Carrigans_010 (UKGBNI1NW010103062), St. Johnston_010 (IE_NW_01S010280) and Swilly Burn_030 (IE_NW_01S030500) river waterbodies are hydrologically linked to the **River Finn SAC (002301)**.

- Ardmore_010 (IE_NW_40A080820) river waterbody is hydrologically connected to **Lough Foyle SPA (004087).**

- Donagh_030 (IE_NW_40D010400) river waterbody is hydrologically connected to **Trawbreaga Bay SPA (004034)**

The OP dosing contributes OP load to receiving RWBs via loading from mains leakage and domestic wastewater treatment systems (DWWTS) via subsurface pathways. Loading from mains leakage is estimated at 1,997 kg/yr P of which 1,633 kg/yr is assumed to be attenuated along flow paths. The hydraulic loading from the DWWTS is 747 kg/yr P, 741 kg/yr P of which is assumed to be attenuated along the flow paths.

The increase in OP concentrations in river waterbodies following dosing is estimated to be as much as 0.0018 mg/l P. The resulting Orthophosphate concentrations following dosing ranges from 0.0126 mg/l P to 0.0561 mg/l P. The increases do not cause a deterioration in the status of any river waterbody. All RWBs will receive a predicted dosing concentration below the 5% of Good/ High boundary (0.00125mg/l P) except for the Glar_010 which has a predicted dosing concentration of 0.0018 mg/l P. All RWBs including the Glar_010 and Carrowen_010 are within the 75% of upper threshold and therefore there is no risk of deterioration in the WFD OP indicative water quality of any RWBs.

Groundwater bodies

- East Inishowen (IEGBNI_NW_G_051) groundwater body is hydrologically linked to **Magheradrumman Bog SAC (000168)** and **Lough Foyle SPA (004087).**

- Lough Swilly (IEGBNI_NW_G_059) and Manor Cunningham (IE_NW_G_052) groundwater bodies are hydrologically connected to the **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075).**

- River Foyle (IEGBNI_NW_G_051) and Raphoe (IE_NW_G_054) groundwater bodies are hydrologically linked to the **River Finn SAC (002301).**

The OP dosing contributes OP load to receiving GWBs via subsurface and surface pathways. The increase in Orthophosphate concentrations due to dosing is up to 0.0003 mg/l P. The resulting Orthophosphate concentrations following dosing ranges from 0.0053 mg/l P to 0.0178 mg/l P The modelled increases are below the 5% of the Good / Fail boundary (0.00175 mg/l P) for GW, and do not result in a change of WFD OP indicative water quality of these waterbodies.

Transitional waterbodies

- Swilly Estuary (IE_NW_220_0100), Blanket Nook Lough (IE_NW_220_0200), Inch Lough (IE_NW_220_0300) and Crana Estuary (IE_NW_220_0400) transitional waterbodies are hydrologically linked to **Lough Swilly SAC (002287)** and **Lough Swilly SPA (004075).**

- Foyle and Faughan Estuaries (UKGBNI5NW250010) transitional waterbody is hydrologically linked to the **River Finn SAC (002301)** and **Lough Foyle SPA (004087).**

Coastal waterbodies

- Lough Swilly (IE_NW_220_0000) coastal waterbody is hydrologically linked to **Ballyhoorisky Point to Fanad Head SAC (001975), North Inishowen Coast SAC (002012), Lough Swilly SAC (002287), Lough Swilly SPA (004075), Fanad Head SPA (004148)** and **Horn Head to Fanad Head SPA (004194).**

- North atlantic Seabored (IE_NW_230_0000) coastal waterbody is hydrologically linked to **North Inishowen Coast SAC (002012)**
- Lough Foyle (GBNIIE6NW250) coastal waterbody is hydrologically linked to **Lough Foyle SPA (004087)**.
- Trawbreaga Bay (IE_NW_240_0000) coastal waterbody is hydrologically linked to **Trawbreaga Bay SPA (004034).**

The increase in OP concentrations in the transitional and coastal waterbodies as a result of the OP dosing is up to 0.0018 mg/l P. The resulting Orthophosphate concentrations following dosing ranges from 0.0117 mg/l P to 0.0501 mg/l P. Impact from OP dosing on transitional and coastal waterbodies does not lead to a reduction in their status and concentrations increase. All transitional and coastal waterbodies have predicted dosing concentrations below the 5% of Good/ Fail boundary (0.00125mg/l P) except for Blanket Nook Lough TWB which has a modelled dosing concentration of 0.0018 mg/l P. All transitional and coastal waterbodies are within the 75% of upper threshold of the WFD status and therefore there is no risk of deterioration in the WFD OP indicative water quality of these transitional and coastal waterbodies.

5.3.3 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 surface waterbody or groundwater body listed in **Table 3**. Concentrations from other dosing areas with regard to cumulative loading on downstream waterbodies has been considered in this assessment.

6. EVALUATION OF POTENTIAL FOR SIGNIFICANT EFFECTS

Impact pathways arising from the proposed construction and operational phases of the project have been investigated. Given the location and scale of the proposed construction works in relation to European sites, no potential construction impact pathways have been identified and therefore no assessment is regard in the context of significant effects for European Sites and their qualifying interests / conservation objectives.

With regard to operational impact pathways, 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**). Five European sites remain for evaluation of potential for significant effect: **North Inishowen Coast SAC (002012)**, **Lough Swilly SAC (002287)**, **River Finn SAC (002301)**, **Lough Swilly SPA (004075)** and **Lough Foyle SPA (004087)**. The potential for the proposed orthophosphate 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 NORTH INISHOWEN COAST SAC 002012

6.1.1 (1140) Mudflats and sandflats not covered by seawater at low tide

Mudflats and sandflats habitat was estimated at 988ha and the SSCOs (NPWS, 2014) state that the conservation objective is to maintain the favourable conservation condition, specifically permanent habitat stable/ increasing, maintain community Zostera-dominated community extent and high quality and conserve 'Fine to medium sand with *Eurydice pulchra* community complex; Muddy sand to coarse sediment with *Pygospio elegans* community complex; Sand with *Angulus tenuis* and *Scoloplos (Scoloplos) armiger* community complex' in a natural condition.

The CO supporting document (NPWS, 2014) requires no significant disturbance to communities. Disturbance can be in the form of nutrients, as in a change to the current input which are central to the development, growth and survival of the habitats and communities that exist there.

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 North Inishowen Coast SAC. Mud and sand habitat (1140) is associated with transitional and coastal waterbodies, in this case the Lough Swilly coastal waterbody has been assessed. Other surface waterbodies are not connected to this habitat particularly and neither are the groundwater bodies. As such only this coastal waterbody is considered further. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above listed waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to mud and sand habitat in North Inishowen Coast SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of this habitat in the North Inishowen Coast SAC / no deterioration of its favourable conservation condition is identified.

6.1.2 (1230) Vegetated sea cliffs of the Atlantic and Baltic coasts, (2130) Fixed coastal dunes with herbaceous vegetation (grey dunes), (21A0) Machairs

North Inishowen Coast SAC is designated for a range of coastal habitats as listed above that are usually found in close association with each other. The SSCOs (NPWS, 2014) and coastal supporting document (NPWS, 2014) set out the conservation objectives for these habitats 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 these habitats increasing the percentage of negative indicator species present.

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 the aforementioned coastal habitats North Inishowen Coast SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Owenerk_020 river waterbody (IE_NW_39O020200) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0145 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Clonmany_030 river waterbody and estimated an increase in OP concentrations of up to 0.0006 mg/l P. The resulting OP concentration following dosing is 0.0306 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above listed waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to these habitats in North Inishowen Coast SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of these habitats in the North Inishowen Coast SAC / no deterioration of its favourable conservation condition is identified.

6.1.3 (1014) Narrow-mouthed Whorl Snail (*Vertigo angustior*)

Vertigo angustior is a terrestrial groundwater-dependant species. There are two known sites for this species in this SAC on the sand dunes in the townlands of Lag and Drung and at Tullagh Bay (NPWS,

2014). The target is to maintain the favourable conservation condition. A review of the SSCOs targets and measures for *Vertigo angustior* found no nutrient specific targets for the species (NPWS, 2014). However, the IUCN Red List of threatened species lists eutrophication as a 'main threat' to this species. Increases in P levels would allow higher vegetation to grow and outcompete the yellow sedge and moss habitat that is required by the snail.

Table 3 identifies the groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to narrow-mouthed whorl snail in North Inishowen Coast SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Owenerk_020 river waterbody (IE_NW_39O020200) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0145 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Clonmany_030 river waterbody and estimated an increase in OP concentrations of up to 0.0006 mg/l P. The resulting OP concentration following dosing is 0.0306 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above listed waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to this species in North Inishowen Coast SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of this species in the North Inishowen Coast SAC / no deterioration of its favourable conservation condition is identified.

6.1.4 (1355) Otter (*Lutra lutra*)

The distribution of otter in this SAC is currently estimated at 93.6% and the distribution conservation objective is for no significant decline. A review of the SSCOs (NPWS, 2014) found no specific attributes or targets relating to water quality however the National Parks and Wildlife Service's Threat Response Plan for the Otter (NPWS, 2009), a review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

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 otter in North Inishowen Coast SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Owenerk_020 river waterbody (IE_NW_39O020200) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0145 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of

deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Clonmany_030 river waterbody and estimated an increase in OP concentrations of up to 0.0006 mg/l P. The resulting OP concentration following dosing is 0.0306 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above listed waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to this species in North Inishowen Coast SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of this species in the North Inishowen Coast SAC / no deterioration of its favourable conservation condition is identified.

6.2 LOUGH SWILLY SAC 002287

6.2.1 (1130) Estuaries

The attributes and targets that will maintain the favourable conservation condition of this habitat in Lough Swilly SAC do not make specific reference to water quality and nutrient conditions (NPWS, 2011); however, there is a requirement to conserve community types in their natural conditions (NPWS, 2011e). The COs supporting document for Marine habitats does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context -specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site. The attribute and target relevant to this project is as follows: to conserve 'Fine sand community complex; Intertidal mixed sediment with polychaetes; Subtidal mixed sediment with polychaetes and bivalves; Muddy fine sand with *Thyasira flexuosa*; Mud community complex and *Ostrea edulis* dominated 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 estuarine habitat in Lough Swilly SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Lough Swilly groundwater body (IEGBNI_NW_G_059) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0146mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of

deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Manor Cunningham groundwater body (IE_NW_G_052) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0178 mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Swilly Estuary transitional waterbody (IE_NW_220_0100) and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0191 mg/l P in summer and 0.0161 mg/l P in winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Blanket Nook Lough transitional waterbody (IE_NW_220_0200) and estimated an increase in OP concentrations of up to 0.0018 mg/l P. The resulting OP concentration following dosing is 0.0343 mg/l P in summer and winter (**Table 3; Appendix C**). The modelled dosing concentration is in exceedance of the significance threshold for high/good status for SW bodies (<0.00125 mg/l P), however, the predicted increase in concentration due to OP dosing is within the 75% status threshold (0.0188 mg/l P) and the TWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody and dosing will not prevent the restoration of this waterbody.

- Inch Lough transitional waterbody (IE_NW_220_0300) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0132 mg/l Pin summer and winter (Table 3; Appendix C). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Crana Estuary transitional waterbody (IE_NW_220_0400) 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 in summer and winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned surface waterbodies and groundwater bodies, there is sufficient capacity within

the status threshold, and there will be no potential for significant effect to water quality meaning there will be no alteration to estuarine habitat in Lough Swilly SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of estuarine habitat in Lough Swilly SAC / no deterioration of its favourable conservation condition is identified.

6.2.2 (1150) Coastal lagoons

Two coastal lagoons have been identified in Lough Swilly SAC, Inch and Blanket Nook and described in the SSCOs (NPWS, 2011). There is currently a restoration target for the MRP concentration in coastal lagoons in this SAC. Annual median MRP needs to be reduced to <0.01 mg/l at Inch and <0.02 mg/l at Blanket Nook.

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 coastal lagoon habitat in Lough Swilly SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Lough Swilly groundwater body (IEGBNI_NW_G_059) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0146mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Manor Cunningham groundwater body (IE_NW_G_052) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0178 mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Swilly Estuary transitional waterbody (IE_NW_220_0100) and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0191 mg/l P in summer and 0.0161 mg/l P in winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Blanket Nook Lough transitional waterbody (IE_NW_220_0200) and estimated an increase in OP concentrations of up to 0.0018 mg/l P. The resulting OP concentration following dosing is 0.0343 mg/l P in summer and winter (**Table 3; Appendix C**). The modelled dosing concentration is in exceedance of the significance threshold for high/good status for SW bodies (<0.00125 mg/l P), however, the predicted increase in concentration due to OP dosing is within the 75% status threshold (0.0188 mg/l P) and the TWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody and dosing will not prevent the restoration of this waterbody.

- Inch Lough transitional waterbody (IE_NW_220_0300) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0132 mg/l Pin summer and winter (Table 3; Appendix C). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing

concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Crana Estuary transitional waterbody (IE_NW_220_0400) 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 in summer and winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned surface waterbodies and groundwater bodies, there is sufficient capacity within the status threshold, and there will be no potential for significant effect to water quality meaning there will be no alteration to lagoons habitat in Lough Swilly SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of lagoons habitat in Lough Swilly SAC / no deterioration of its favourable conservation condition is identified.

6.2.3 (1330) Atlantic salt *meadows* (*Glauco-Puccinellietalia maritimae*)

Five sub-sites of Atlantic salt meadows have been mapped in Lough Swilly SAC. The SSCOs (NPWS, 2011) and coastal supporting document (NPWS, 2011) set out the conservation objectives for this habitat 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 these habitats 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 salt meadow habitat in Lough Swilly SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Lough Swilly groundwater body (IEGBNI_NW_G_059) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0146mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Manor Cunningham groundwater body (IE_NW_G_052) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0178 mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of

deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Swilly Estuary transitional waterbody (IE_NW_220_0100) and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0191 mg/l P in summer and 0.0161 mg/l P in winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Blanket Nook Lough transitional waterbody (IE_NW_220_0200) and estimated an increase in OP concentrations of up to 0.0018 mg/l P. The resulting OP concentration following dosing is 0.0343 mg/l P in summer and winter (**Table 3; Appendix C**). The modelled dosing concentration is in exceedance of the significance threshold for high/good status for SW bodies (<0.00125 mg/l P), however, the predicted increase in concentration due to OP dosing is within the 75% status threshold (0.0188 mg/l P) and the TWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody and dosing will not prevent the restoration of this waterbody.

- Inch Lough transitional waterbody (IE_NW_220_0300) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0132 mg/l Pin summer and winter (Table 3; Appendix C). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Crana Estuary transitional waterbody (IE_NW_220_0400) 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 in summer and winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned surface waterbodies and groundwater bodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to Atlantic salt meadows habitat in Lough Swilly SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of Atlantic salt meadows habitat in Lough Swilly SAC / no deterioration of its favourable conservation condition is identified.

6.2.4 (1355) *Lutra lutra* (Otter)

A review of the SSCOs for otter (NPWS, 2017) found no specific attributes or targets relating to water quality however the National Parks and Wildlife Service's Threat Response Plan for the Otter (NPWS, 2009), a review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. There will be no interference with the terrestrial, marine or freshwater habitat of the species as a result of this project. The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater. The current FCS target is for 88% however, the current range is 65% and so the CO for otter in the River Finn SAC is to restore the favourable conservation condition. A nutrient quality target of 'good' status is adopted here, to align with that outlined for fish fauna that form part of the diet of otter in the River Finn SAC.

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 otter habitat in Lough Swilly SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Leslie Hill Stream_020 river waterbody (IE_NW_39L050660) and estimated an increase in OP concentrations of up to 0.0006 mg/l P. The resulting OP concentration following dosing is 0.0561 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e Moderate. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Glar_010 river waterbody (IE_NW_39G380790) and estimated an increase in OP concentrations of up to 0.0016 mg/l P. The resulting OP concentration following dosing is 0.0141 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *High*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Carrowen_010 river waterbody (IE_NW_39C910930) and estimated an increase in OP concentrations of up to 0.0018 mg/l P. The resulting OP concentration following dosing is 0.0273 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Glack_or_Bohullion_010 river waterbody (IE_NW_39G170760) and estimated an increase in OP concentrations of up to 0.0006 mg/l P. The resulting OP concentration following dosing is 0.0131 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *High*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Skeoge_010 river waterbody (UKGBNI1NW393901002) and estimated an increase in OP concentrations of up to 0.0009 mg/l P. The resulting OP concentration following dosing is 0.0214 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Lisfannan_010 river waterbody (IE_NW_39L170710) and estimated an increase in OP concentrations of up to 0.0012 mg/l P. The resulting OP concentration following dosing is 0.0012 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *High*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Mill (Donegal)_020 river waterbody (IE_NW_39M020300) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0195 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Crana_030 river waterbody (IE_NW_39C020500) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0138 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Lough Swilly groundwater body (IEGBNI_NW_G_059) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0146mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Manor Cunningham groundwater body (IE_NW_G_052) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0178 mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Swilly Estuary transitional waterbody (IE_NW_220_0100) and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0191 mg/l P in summer and 0.0161 mg/l P in winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Blanket Nook Lough transitional waterbody (IE_NW_220_0200) and estimated an increase in OP concentrations of up to 0.0018 mg/l P. The resulting OP concentration following dosing is 0.0343 mg/l P in summer and winter (**Table 3; Appendix C**). The modelled dosing concentration is in exceedance of the significance threshold for high/good status for SW bodies (<0.00125 mg/l P), however, the predicted increase in concentration due to OP dosing is within the 75% status threshold (0.0188 mg/l P) and the TWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody and dosing will not prevent the restoration of this waterbody.

- Inch Lough transitional waterbody (IE_NW_220_0300) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0132 mg/l Pin summer and winter (Table 3; Appendix C). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Crana Estuary transitional waterbody (IE_NW_220_0400) 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 in summer and winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned surface waterbodies and groundwater bodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will no potential for significant effect to otter habitat in Lough Swilly SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of otter habitat in Lough Swilly SAC / no deterioration of its favourable conservation condition is identified.

6.3 RIVER FINN SAC 002301

6.3.1 (3110) Oligotrophic waters containing very few minerals of sandy plains

Lake habitat 3110 is likely to occur in Lough Derg, Finn and Belshade lakes. These lakes are upstream of the dosing area and therefore no hydrological connectivity has been established (NPWS, 2017). This habitat is therefore not assessed any further.

6.3.2 (4010) Northern Atlantic wet heaths with *Erica tetralix*, (7130) Blanket bogs (*if active bog), (7140) Transition mires and quaking bogs

Heath (4010) and bog habitat (7130 and 7140) are reported to occur in the upland areas of the SAC and therefore no hydrological connectivity has been established (NPWS, 2017). These habitats are therefore not assessed any further.

6.3.3 *Salmo salar* (Salmon)

The SSCOs for salmon in the River Finn SAC (NPWS, 2017) are to 'maintain' favourable conservation condition. The distribution target refers to '% river accessible' and therefore hydrological connectivity between the Letterkenny WSZs and River Finn SAC has been established and shown that the Deele (Donegal)_030 receives OP dosed water. Water quality is a particular threat to salmon King et al. (2011) highlight the deterioration in water quality and ongoing point and diffuse sources of pollution as a key threat to salmon including the potential effects from municipal discharges. The SSCO (NPWS, 2017) requires that the spawning habitat should not be reduced. Deterioration in water quality has the

potential for a detrimental effect on spawning habitats, particularly where nutrient conditions result in excessive algal growth and macrophyte abundance, leading to smothering, shading effects, alteration of macroinvertebrate communities and silt deposition. The SSCO for salmon also requires a Q-value of at least 4, which equates to good ecological status.

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 salmon in River Finn SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on surface waterbodies:

- Carrigans_010 river waterbody (IE_NW_UKGBNI1NW010103062) and estimated an increase in OP concentrations of up to 0.0013 mg/l P. The resulting OP concentration following dosing is 0.0298 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- St. Johnston_010 river waterbody (IE_NW_01S010280) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0303 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Swilly Burn_030 river waterbody (IE_NW_01S030500) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0490 mg/l P (Table 3; Appendix C). The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. Moderate. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody and dosing will not prevent the restoration of this waterbody to High status.

- River Foyle groundwater body (IEGBNI_NW_G_051) and estimated an increase in OP concentrations of up to 0.00001 mg/l P. The resulting OP concentration following dosing is 0.0105 mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Raphoe groundwater body (IE_NW_G_054) and estimated an increase in OP concentrations of up to 0.00003 mg/l P. The resulting OP concentration following dosing is 0.0175 mg/l P (**Table 3; Appendix C**). The GWB WFD OP status is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned coastal waterbody and groundwater body, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to habitats associated with salmon in River Finn SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of salmon in River Finn SAC / no deterioration of its favourable conservation condition is identified.

6.3.4 *Lutra lutra* (Otter)

A review of the SSCOs for otter (NPWS, 2017) found no specific attributes or targets relating to water quality however the National Parks and Wildlife Service's Threat Response Plan for the Otter (NPWS, 2009), a review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. There will be no interference with the terrestrial, marine or freshwater habitat of the species as a result of this project. The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater. The current FCS target is for 88% however, the current range is 93.6% and so the CO for otter in the River Finn SAC is to maintain the favourable conservation condition. A nutrient quality target of 'good' status is adopted here, to align with that outlined for fish fauna that form part of the diet of otter in the River Finn SAC.

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 otter in River Finn SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on surface waterbodies and groundwater bodies:

- Carrigans_010 river waterbody (IE_NW_UKGBNI1NW010103062) and estimated an increase in OP concentrations of up to 0.0013 mg/l P. The resulting OP concentration following dosing is 0.0298 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- St. Johnston_010 river waterbody (IE_NW_01S010280) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0303 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Swilly Burn_030 river waterbody (IE_NW_01S030500) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0490 mg/l P (Table 3; Appendix C). The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. Moderate. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody and dosing will not prevent the restoration of this waterbody to High status.

- River Foyle groundwater body (IEGBNI_NW_G_051) and estimated an increase in OP concentrations of up to 0.00001 mg/l P. The resulting OP concentration following dosing is 0.0105 mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Raphoe groundwater body (IE_NW_G_054) and estimated an increase in OP concentrations of up to 0.00003 mg/l P. The resulting OP concentration following dosing is 0.0175 mg/l P (**Table 3; Appendix C**). The GWB WFD OP status is unchanged following dosing, i.e. Good. The

modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Foyle and Faughan Estuaries transitional waterbody (UKGBNI5NW250010) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0501 mg/l P in summer and winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *Moderate* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned coastal waterbody and groundwater body, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to habitats associated with otter in River Finn SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of otter in River Finn SAC / no deterioration of its favourable conservation condition is identified.

6.4 LOUGH SWILLY SPA 004075

Lough Swilly SPA comprises the inner part of Lough Swilly from just east of Letterkenny northwards to Killygarvan on the west side and Buncrana on the east side; and incorporates Inch Lough. The site is characterised by improved pasture and arable fields – important to geese and swans; estuarine habitat of the River Swilly, the River Leannan and the Isle Burn and the predominant habitat is a series of extensive sand and mud flats which are exposed at low tide - both estuaries and sand/mud flats. The site is an SPA for: (A005) Great Crested Grebe, (A028) Grey Heron, (A038) Whooper Swan, (A043) Greylag Goose, (A048) Shelduck, (A050) Wigeon, (A052) Teal, (A053) Mallard, (A056) Shoveler, (A062) Scaup, (A067) Goldeneye, (A069) Red-breasted Merganser, (A125) Coot, (A130) Oystercatcher, (A143) Knot, (A149) Dunlin, (A160) Curlew, (A162) Redshank, (A164) Greenshank, (A179) Black-headed Gull, (A182) Common Gull, (A191) Sandwich Tern, (A193) Common Tern, (A395) Greenland White-fronted Goose and Wetland and Waterbirds (A999). The SSCOs (NPWS, 2014) for Lough Swilly SPA list targets for each species, specifically:

- Population trend: long term population trends should be stable or increasing; and
- Distribution: there should be no significant decrease in the range, timing or intensity of use of areas by the listed species, other than that occurring from natural patterns of variation.

Furthermore, the permanent area occupied by the wetland habitat (A999 – Wetlands) should be stable and not significantly lessened, other than that occurring from natural patterns of variation.

Changes in organic and nutrient loading to an estuary may have various consequences for the ecology of the estuarine system including changes in the abundances of some benthic invertebrates that form prey species for water birds (e.g. Burton et al. 2002). This could have knock-on effects upon water bird foraging distribution, prey intake rates, and ultimately upon survival and fitness.

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 these bird species in Lough Swilly SPA. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on surface waterbodies:

- Leslie Hill Stream_020 river waterbody (IE_NW_39L050660) and estimated an increase in OP concentrations of up to 0.0006 mg/l P. The resulting OP concentration following dosing is 0.0561 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged

following dosing, i.e Moderate. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Glar_010 river waterbody (IE_NW_39G380790) and estimated an increase in OP concentrations of up to 0.0016 mg/l P. The resulting OP concentration following dosing is 0.0141 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *High*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Carrowen_010 river waterbody (IE_NW_39C910930) and estimated an increase in OP concentrations of up to 0.0018 mg/l P. The resulting OP concentration following dosing is 0.0273 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Glack_or_Bohullion_010 river waterbody (IE_NW_39G170760) and estimated an increase in OP concentrations of up to 0.0006 mg/l P. The resulting OP concentration following dosing is 0.0131 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *High*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Skeoge_010 river waterbody (UKGBNI1NW393901002) and estimated an increase in OP concentrations of up to 0.0009 mg/l P. The resulting OP concentration following dosing is 0.0214 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Lisfannan_010 river waterbody (IE_NW_39L170710) and estimated an increase in OP concentrations of up to 0.0012 mg/l P. The resulting OP concentration following dosing is 0.0012 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. *High*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Mill (Donegal)_020 river waterbody (IE_NW_39M020300) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0195 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Crana_030 river waterbody (IE_NW_39C020500) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0138 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The modelled dosing concentration is below the significance threshold

for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.

- Lough Swilly groundwater body (IEGBNI_NW_G_059) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0146mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Manor Cunningham groundwater body (IE_NW_G_052) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0178 mg/l P (**Table 3; Appendix C**). The GWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good*. The modelled dosing concentration is below the significance threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Swilly Estuary transitional waterbody (IE_NW_220_0100) and estimated an increase in OP concentrations of up to 0.0011 mg/l P. The resulting OP concentration following dosing is 0.0191 mg/l P in summer and 0.0161 mg/l P in winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Blanket Nook Lough transitional waterbody (IE_NW_220_0200) and estimated an increase in OP concentrations of up to 0.0018 mg/l P. The resulting OP concentration following dosing is 0.0343 mg/l P in summer and winter (**Table 3; Appendix C**). The modelled dosing concentration is in exceedance of the significance threshold for high/good status for SW bodies (<0.00125 mg/l P), however, the predicted increase in concentration due to OP dosing is within the 75% status threshold (0.0188 mg/l P) and the TWB WFD OP indicative water quality is unchanged following dosing, i.e. *Good* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody and dosing will not prevent the restoration of this waterbody.

- Inch Lough transitional waterbody (IE_NW_220_0300) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0132 mg/l Pin summer and winter (Table 3; Appendix C). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Crana Estuary transitional waterbody (IE_NW_220_0400) 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 in summer and winter (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.0007 mg/l P. The resulting OP concentration following dosing is 0.0117 mg/l P during summer and 0.0132 mg/l P during winter (**Table 3; Appendix C**). The CWB WFD

OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to habitats associated with the above-mentioned bird species in Lough Swilly SPA.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of these species in Lough Swilly SPA / no deterioration of their favourable conservation condition is identified.

6.5 LOUGH FOYLE SPA 004087

Lough Foyle SPA comprises a section of the western shore of Lough Foyle from Muff to north of Vances Point in Co. Donegal. The site forms part of the larger cross-border Lough Foyle complex which regularly supports in excess of 20,000 wintering waterbirds. The site is an SPA for: (A001) Red-throated Diver, (A005) Great Crested Grebe, (A037 Bewick's Swan, (A038) Whooper Swan, (A043) Greylag Goose, (A046) Brent Goose, (A048) Shelduck, (A050) Wigeon, (A052) Teal, (A053) Mallard, (A063) Eider, (A069) Red-breasted, (A130) Oystercatcher, (A140) Golden Plover, (A142) Lapwing, (A143) Knot, (A149) Dunlin, (A157) Bar-tailed Godwit, (A160) Curlew, (A162) Redshank, (A179) Black-headed Gull

(A182) Common Gull, (A184) Herring Gull, (A999) Wetlands. The SSCOs (NPWS, 2014) for Lough Foyle SPA list targets for each species, specifically:

- Population trend: long term population trends should be stable or increasing; and
- Distribution: there should be no significant decrease in the range, timing or intensity of use of areas by the listed species, other than that occurring from natural patterns of variation.

Furthermore, the permanent area occupied by the wetland habitat (A999 – Wetlands) should be stable and not significantly lessened, other than that occurring from natural patterns of variation.

Changes in organic and nutrient loading to an estuary may have various consequences for the ecology of the estuarine system including changes in the abundances of some benthic invertebrates that form prey species for water birds (e.g. Burton et al. 2002). This could have knock-on effects upon water bird foraging distribution, prey intake rates, and ultimately upon survival and fitness.

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 these bird species in Lough Foyle SPA. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on surface waterbodies:

- Ardmore_010 river waterbody (IE_NW_40A080820) 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 WFD OP indicative water quality is unchanged following dosing, i.e. *High*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this river waterbody.
- East Inishowen groundwater body (IEGBNI_NW_G_050) 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 GWB WFD OP indicative water quality is unchanged following dosing, i.e. Good. The modelled dosing concentration is below the significance

threshold for good/fail status for GW bodies (<0.00175 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this groundwater body.

- Foyle and Faughan Estuaries transitional waterbody (UKGBNI5NW250010) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing for summer and winter is 0.0501 mg/l P (**Table 3; Appendix C**). The TWB WFD OP indicative water quality is unchanged following dosing, i.e. *Moderate*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this transitional waterbody.

- Lough Foyle coastal waterbody (GBNIIE6NW250) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0501 mg/l P in summer and winter (**Table 3; Appendix C**). The CWB WFD OP indicative water quality is unchanged following dosing, i.e. *Moderate*. The modelled dosing concentration is below the significance threshold for high/good status for SW bodies (<0.00125 mg/l P). Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Illies WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Illies WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of the above-mentioned coastal waterbody and groundwater body, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect to habitats associated with the above-mentioned bird species in Lough Foyle SPA.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of these species in Lough Foyle SPA / no deterioration of their favourable conservation condition is identified.

6.7 ASSESSMENT OF IN-COMBINATION EFFECTS WITH OTHER PLANS OR PROJECTS

In order to ensure all potential effects upon European sites within the project's ZoI 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. Impact 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.

Donegal County Council Development Plan was reviewed for developments that may have in-combination effects on European Sites with the ZoI. 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
Donegal County Council Development Plan 2018 – 2024. The objectives of relevance in the Donegal County Development Plan include under Infrastructure (Water and Environmental Services): **WES-0-3:** Provision of adequate and secure supply of clean and wholesome drinking water to existing supply areas and to those areas identified for growth; Protection and improvement of existing water quality supply; protection and conservation of the County's water resources through minimisation of leakage and promotion of public awareness and involvement in water conservation; provision of adequate wastewater treatment for public collection systems and adequate capacity. **WES-0-5:** Maintain, protect, improve and enhance surface waters and groundwater quality in accordance with the relevant River Basin Management Plan. **WES-0-6** Provision of environmental protection of surface water and groundwater from pollution in accordance with the River Basin Management Plan, Groundwater Protection Scheme and Source Protection Plans for public water supplies; protection against soil contamination; ensuring full compliance with relevant National and European Regulations, Statutes and Directives through monitoring and control of relevant activities. **CCG-P-4:** Any developments, in the form of individual projects and plans will be subjected, during the early planning and application stages to assessments to investigate their impacts, either alone or in combination with other plans or projects on Natura 2000 sites. Specific and targeted mitigation measures will be proposed for individual projects and plans as they evolve and are brought through the planning process. This approach will ensure that the content, policies and objectives of the Donegal County Development Plan 2018 to 2024 adequately protects, conserves or restores the Natura 2000 network.	▪ N/A	The Donegal County Council Development Plan 2018 – 2024 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 River Basin Management Plan for Ireland 2022-2027, and emphasises compliance with environmental objectives. There is no potential for cumulative effects with these plans.
River Basin Management Plan for Ireland 2022 – 2027 The document (Chapter 4) sets out the condition of Irish Waters, and a summary of statuses for all monitored waters in the 2013 – 2015 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,	▪ N/A	The objectives of the RBMP are to: ▪ Prevent deterioration; ▪ Restore good status; ▪ Reduce chemical pollution; and ▪ Achieve water related protected areas objectives. 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 previously observed long term trend of decline in the number of high status river sites has continued. Chapter 5 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each waterbody that is *At Risk* 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 81% of waterbodies nationally, which had been characterised at the time. 1,517 waterbodies were classed *At Risk* out of a total of 4,775, or 32%. An assessment of significant environmental pressures found that agriculture was the most significant pressure in 729 river and lake waterbodies that are *At Risk*. Urban waste water, hydromorphology and forestry were also significant pressures amongst others.		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.
Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive 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.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Alterations to water quality and/or water movement; ▪ Disturbance; and ▪ In-combination impacts within the same scheme	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 waterbodies. 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.
Foodwise 2025 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.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; and ▪ Disturbance to habitats / species	Foodwise 2025 was subject to its own AA[12]. 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

[12] http://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/environmentalanalysis/AgriFoodStrategy2025NISDRAFT300615.pdf

		compliance with 13 Statutory Management Requirements, EIA Agricultural Regulations 2011, GLAS, and AA Screening of licencing and permitting in the forestry and seafood sectors.
Rural Development Programme 2021 – 2025 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) 2014-2020 under the Common Agricultural Policy. The focus 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. 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 2021-2025 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. 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	▪ Overgrazing; ▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; and ▪ Disturbance to habitats / species;	The RDP for 2021 – 2025 has been subject to SEA[13], and AA[14]. 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 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.

[13] https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/StrategEnvironmAssessSumState090615.pdf

[14] https://www.agriculture.gov.ie/media/migration/agarchive/ruralenvironment/preparatoryworkfortherdp2014-2020/RDP20142020DraftAppropriateAssessmentReport160514.pdf

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.		
National Nitrates Action Programme 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 third Nitrates Action Programme came into operation in 2014 and has a timescale up to 2017. 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.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; and ▪ Disturbance to habitats / species	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[17]. 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.
Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2023 - 2027 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 2023-2027. A key objective within the Forestry Programme 2023-2027 that will influence the RBMP to establish 8,000 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 waterbodies, 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.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Water quality changes; and ▪ Disturbance to species.	Ireland's Forestry Programme 2023 - 2027 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.
Water Services Strategic Plan (WSSP, 2015) Uisce Éireann 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	▪ Habitat loss and disturbance from new	The overarching strategy was subject to AA and highlighted the need for additional plan/project environmental assessments to

[17] http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/Environment/Water/FileDownLoad,35218,en.PDF

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 Uisce Éireann 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 Uisce Éireann'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 Uisce Éireann Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Uisce Éireann owned asset and this is a significant piece of the puzzle in terms of the expected improvements from the RBMP.	/ upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; and ▪ Nutrient enrichment /eutrophication.	be carried out at the tier 2 and tier 3 level. Therefore, no likely significant in-combination effects are envisaged.
National Wastewater Sludge Management Plan (2016) The National Wastewater Sludge Management Plan was prepared in 2015, outlining the measures needed to improve the management of wastewater sludge.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; and ▪ Nutrient enrichment /eutrophication.	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 Uisce Éireann facilities. In relation to the plan as it stands, no in-combination effects are expected with the implementation of proposed mitigation measures.
Lead Mitigation Plan (2016) 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.	▪ Changes to water quality or quantity; and ▪ Nutrient enrichment /eutrophication.	The plan is subject to SEA and AA which have also been published and are available at http://www.water.ie. Upstream dosing areas have been considered in the EAM and the cumulative effect of dosing has been taken into account in the EAMs model.

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 Illies WTP, within the Pollan Dam WSZ and the ZoI. The potential for significant effects are evaluated with regard to the qualifying interests/species of conservation interests and associated conservation status.

The potential for direct, indirect and cumulative impacts affecting **North Inishowen Coast SAC (002012)**, **Lough Swilly SAC (002287)**, **River Finn SAC (002301)**, **Lough Swilly SPA (004075)**, **Lough Foyle SPA (004148)** has been assessed. The appraisal undertaken in this Screening report has been informed by an EAM (see **Appendix C**) with reference to the ecological communities and habitats potentially affected by the proposed project, in order to provide a scientific basis for the evaluations. 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

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National Parks and Wildlife Service

Conservation Objectives Series

North Inishowen Coast SAC 002012

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
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
E-mail: nature.conservation@ahg.gov.ie

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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***

002012	North Inishowen Coast SAC
1014	Narrow-mouthed Whorl Snail *Vertigo angustior*
1140	Mudflats and sandflats not covered by seawater at low tide
1220	Perennial vegetation of stony banks
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts
1355	Otter *Lutra lutra*
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*
21A0	Machairs (* in Ireland)
4030	European dry heaths

Please note that this SAC overlaps with Trawbreaga Bay SPA (004034) and Malin Head SPA (004146). See map 2. The conservation objectives for this site should be used in conjunction with those for overlapping sites as appropriate.

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	1996
Title :	Biomar survey of Irish machair sites
Author :	Crawford, I.; Bleasdale, A.; Conaghan, J.
Series :	Irish Wildlife Manual No. 3
Year :	1998
Title :	An inventory of Mollusca in potential SAC sites with special reference to *Vertigo angustior*, *V. moulinsiana* and *V. geyeri*: 1998 survey
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	1999
Title :	National Shingle Beach Survey of Ireland 1999
Author :	Moore, D.; Wilson, F.
Series :	Unpublished Report to NPWS
Year :	2006
Title :	Otter survey of Ireland 2004/2005
Author :	Bailey, M.; Rochford, J.
Series :	Irish Wildlife Manual No. 23
Year :	2007
Title :	A Survey of Intertidal Mudflats and Sandflats in Ireland
Author :	Aquatic Services Unit
Series :	Unpublished report to NPWS
Year :	2007
Title :	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
Author :	NPWS
Series :	Unpublished report to NPWS
Year :	2009
Title :	Coastal Monitoring Project 2004-2006
Author :	Ryle, T.; Murray, A.; Connolly, K.; Swann, M.
Series :	Unpublished report to NPWS
Year :	2009
Title :	Saltmarsh monitoring project 2007-2008
Author :	McCorry, M.; Ryle, T.
Series :	Unpublished report to NPWS
Year :	2011
Title :	National survey and assessment of the conservation status of Irish sea cliffs
Author :	Barron, S.J.; Delaney, A.; Perrin, P.M.; Martin, J.; O'Neill, F.
Series :	Irish Wildlife Manual No. 53
Year :	2011
Title :	Monitoring and condition assessment of populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland
Author :	Moorkens, E.; Killeen, I.
Series :	Irish Wildlife Manual No. 55

Year :	2013
Title :	National otter survey of Ireland 2010/12
Author :	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
Series :	Irish Wildlife Manual No. 76
Year :	2013
Title :	Monitoring survey of Annex I sand dune habitats in Ireland
Author :	Delaney, A.; Devaney, F.M; Martin, J.M.; Barron, S.J.
Series :	Irish Wildlife Manual No. 75
Year :	2014
Title :	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
Author :	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
Series :	Irish Wildlife Manual No. 79
Year :	2014
Title :	North Inishowen Coast SAC (site code: 2012) Conservation objectives supporting document-marine habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2014
Title :	North Inishowen Coast SAC (site code: 2012) Conservation objectives supporting document-coastal habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1982
Title :	Otter survey of Ireland
Author :	Chapman, P.J.; Chapman, L.L.
Series :	Unpublished report to Vincent Wildlife Trust
Year :	1991
Title :	The spatial organization of otters (*Lutra lutra*) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	J. Zool, 224: 41-57
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press
Year :	2006
Title :	The vegetation of Irish machair
Author :	Gaynor, K.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, vol 106B, No. 3: 311-321
Year :	2008
Title :	The phytosociology and conservation value of Irish sand dunes
Author :	Gaynor, K.
Series :	Unpublished PhD thesis, National University of Ireland, Dublin

Year :	2010
Title :	Otter tracking study of Roaringwater Bay
Author :	De Jongh, A.; O'Neill, L.
Series :	Unpublished draft report to NPWS
Year :	2013
Title :	Benthic survey services framework- Trawbreaga Bay intertidal surveys 2009 & 2010
Author :	RPS
Series :	Unpublished report to the Marine Institute and NPWS

Spatial data sources

Year :	Interpolated 2014
Title :	Intertidal surveys 2007, 2009, 2010
GIS Operations :	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
Used For :	1140, Marine community types (maps 3 and 4)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	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
Used For :	Marine community types base data (map 4)
Year :	2011
Title :	National survey and assessment of the conservation status of Irish sea cliffs
GIS Operations :	Clipped to SAC boundary
Used For :	1230 (map 5)
Year :	Revision 2014
Title :	National Shingle Beach Survey
GIS Operations :	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1220 (map 6)
Year :	2009
Title :	Coastal Monitoring Project 2004-2006. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
Used For :	2130, 21A0 (map 6)
Year :	2013
Title :	Sand Dune Monitoring Project 2011. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
Used For :	2130, 21A0 (map 6)
Year :	2012
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 :	1014 (map 7)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	Creation of an 80m buffer on marine side of high water mark (HWM); creation of a 10m buffer on terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on terrestrial side of river banks data. Datasets combined with derived EPA WFD Waterbodies data for the 1355 CO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising. Creation of 250m buffer on marine side of HWM to highlight potential commuting points
Used For :	1355 (map 8)
Year :	2010
Title :	EPA WFD Waterbodies data
GIS Operations :	Creation of a 20m buffer to river and stream centreline data; creation of 80m buffer on aquatic side of lake data; creation of 10m buffer on terrestrial side of lake data. Datasets combined with derived OSi data for the 1355 CO. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1355 (map 8)

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 North Inishowen Coast 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 988ha
Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community, subject to natural processes. See map 4	Based on an intertidal walkover undertaken in 2013. See marine supporting document for further details
Community structure: *Zostera* density	Shoots/m²	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes	Based on an intertidal walkover undertaken in 2013. See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Fine to medium sand with *Eurydice pulchra* community complex; Muddy sand to coarse sediment with *Pygospio elegans* community complex; Sand with *Angulus tenuis* and *Scoloplos* (*Scoloplos*) *armiger* community complex. See map 4	Based on intertidal surveys undertaken in 2007 (ASU, 2007), 2009 and 2010 (RPS, 2013). See marine supporting document for further details

1220 Perennial vegetation of stony banks

To maintain the favourable conservation condition of Perennial vegetation of stony banks in North Inishowen Coast 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 sub-sites mapped: Culdaff - 0.02ha; Doagh Isle - 1.21ha; Lag - 0.09ha; Lenankeel - 0.01ha; White Strand - 1.33ha. See map 6	Entire area within the SAC is unknown. 18 sub-sites (Tramone Bay; Slievebane; Bulbin; Portmore; Bulbinbeg; Esky Bay; Pebble Strand; Ineuran Bay; Whitestrand Bay; Whitestrand Bay - Culoort; Back Strand; Doaghmore Point; Lagacurry, Doagh Strand, Bincree, Binderg; Pollan Bay; Tullagh Bay and Tullan Point; Rockstown Harbour; Dunaff Bay; Lehan Bay) were surveyed during the National Shingle Beach Survey (NSBS) (Moore and Wilson, 1999) but extent is not recorded. The habitat was also recorded and mapped by the Coastal Monitoring Project (CMP) at Culdaff; Doagh Isle; Lag; Lenankeel and White Strand sub-sites, covering a total area of 3.46ha (Ryle et al., 2009). See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for surveyed locations	Complete distribution currently unknown. The best shingle formations in the county are found on the Inishowen Peninsula and on Doagh Isle (Moore and Wilson, 1999). See 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	Based on data from Moore and Wilson (1999). Shingle features are relatively stable in the long term. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Moore and Wilson (1999). Transitions from shingle to intertidal shingle, rocky shore, shingle-based grassland, cliff, sand dunes and machair occur in this SAC. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sea sandwort (*Honckenya peploides*), sea beet (*Beta vulgaris* ssp *maritima*), rock samphire (Crithmum maritimum), sea mayweed (*Tripleurospermum maritimum*), yellow-horned poppy (*Glaucium flavum*) and sea campion (*Silene uniflora*)	Based on data from Moore and Wilson (1999). Lichens were recorded at White Strand Bay-Culoort, Doaghmore Point, Tullagh Bay and Tullagh Point and Rockstown Harbour and are an indication of stabilisation. All sub-sites containing the habitat were rated of high interest except Doaghmore Point which was rated medium interest owing to damage caused by extraction. The rare and protected oysterplant (*Mertensia maritima*) was recorded at two sub-sites: White Strand Bay-Culoort and Tullagh Bay and Tullagh Point. See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Moore and Wilson (1999). Negative indicators include non-native species indicative of changes in nutrient status and species not considered characteristic of the habitat. Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. The negative indicator species, ragwort (*Senecio jacobaea*) and montbretia (*Crocosmia x crocosmiiflora*) were recorded in vegetated shingle at White Strand by Ryle et al. (2009) See coastal habitats supporting document for further details

1230 Vegetated sea cliffs of the Atlantic and Baltic coasts

To maintain the favourable conservation condition of Vegetated sea cliffs of the Atlantic and Baltic coasts in North Inishowen Coast SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat length	Kilometres	Area stable, subject to natural processes, including erosion. For sub-sites mapped: Glengad - 21.5km; Altnadarrow - 4.4km; Binbane - 1.2km; Carrickabraghy - 1.9km; Binnion - 3.3km; Dunaff - 6.4km; Lenan - 0.7km; Lederg - 3.7km; Mossy Glen - 15.7km; Tirmacroragh - 5.6km; Stookanillar and Five Fingers - 3.3km. See map 5	Based on data from the Irish Sea Cliff Survey (ISCS) (Barron et al., 2011). 11 sub-sites were identified using a combination of aerial photos and the DCENR helicopter viewer. Two of the sub-sites at Stookanillar and Five Fingers, and Dunaff were surveyed in the field by the ISCS and assessed using remote survey methodology. A further undocumented site at Dunree was also identified. Cliffs are linear features and are therefore measured in kilometres. Total length of cliff section mapped within SAC: 68.0km. Length of cliff likely to be underestimated. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5	Based on data from Barron et al. (2011). Cliffs are distributed throughout the SAC with the best examples to be found in the west of the site (Dunree to Leenan Head and Dunaff Head) and in the area north-west of Glengad Head. Hard cliffs are the dominant cliff type, however occasional soft cliffs were also recorded within the site. See coastal habitats supporting document for further details
Physical structure: functionality and hydrological regime	Occurrence of artificial barriers	No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures	Based on data from Barron et al. (2011). Maintaining natural geomorphological processes including natural erosion is important for the health of a vegetated sea cliff. Hydrological processes maintain flushes and in some cases tufa formations that can be associated with sea cliffs. Within this SAC, hydrological features, such as gullies, streams and cascades, were associated with the following sub-sites: Mossy Glen, Stookanillar and Five Fingers, Binnion, Dunaff, Lenan, Lederg, Tirmacroragh and Glengad. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession	Based on data from Barron et al. (2011). At Stookanillar and Five Fingers the following zones were recorded: scree, crevice ledge, heath and grazed coastal grassland on hard cliffs. At Dunaff three zones were recorded: Splash zone, crevice ledge and ungrazed coastal grassland on hard cliffs. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from Barron et al. (2011). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in the Irish Sea Cliff Survey (Barron et al., 2011)	Based on data from Barron et al. (2011). Rare species that occur on sea cliffs at this SAC include Scot's lovage (*Ligusticum scoticum*), moss campion (*Silene acaulis*), purple saxifrage (*Saxifraga oppositifolia*), ivy broomrape (*Orobanche hederae*) and roseroot (*Sedum rosea*). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Barron et al. (2011). See coastal habitats supporting document for further details

Vegetation composition: bracken and woody species	Percentage	Cover of bracken (*Pteridium aquilinum*) on grassland and/or heath less than 10%. Cover of woody species on grassland and/or heath less than 20%	Based on data from Barron et al. (2011). See coastal habitats supporting document for further details

2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)

To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation ('grey dunes') in North Inishowen Coast 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 including erosion and succession. For sub-sites mapped: Crummies Bay - 11.92ha; Culdaff - 17.03ha; Doagh Isle - 324.53ha; Lag - 103.17ha; Lenankeel - 6.27ha; Tullagh - 30.81ha; White Strand - 2.33ha. See map 6	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney et al., 2013). Habitat was mapped at seven sub-sites, giving a total estimated area of 496.06ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Fixed dunes were recorded at all of the seven sub-sites. See 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	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. At Lenankeel, rock armour affects the natural build up of the sand dune system. Extraction was noted from Tullagh and Doagh Isle sub-sites. Coastal protection works at Lag will cause a disruption to the natural functioning of the system over the longterm. See 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 Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from Ryle et al. (2009) and Delaney et al. (2013). At Crummies Bay, the absence of grazers has produced a rank sward with low species diversity. At Tullagh, heavy grazing and poaching occur. Undergrazing is a feature of Culdaff. Both undergrazing and over grazing occur at Doagh Isle. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Delaney et al. (2013)	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). The seven sub-sites support a characteristic dune flora. See coastal habitats supporting document for further details

Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea-buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. Negative indicator species bracken (*Pteridium aquilinum*) and montbretia (*Crocosmia x crocosmiiflora*) were recorded at Culdaff. At Lagg, creeping thistle (*Cirsium arvense*) and nettle (*Urtica dioica*) were associated with ring feeders. At Tullagh, bracken (*Pteridium aquilinuim*) occurs in the fixed dune. See coastal habitats supporting document for further details
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control	Based on data from Ryle et al. (2009) and Delaney et al. (2013). At Culdaff there are several areas of dense scrub. Scrub also occurs in wet and dry areas at Crummies Bay. See coastal habitats supporting document for further details

21A0 Machairs (* in Ireland)

To restore the favourable conservation condition of Machairs in North Inishowen Coast 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 sub-sites mapped: Doagh Isle - 90.11ha; Lenankeel - 12.15ha; Tullagh - 15.42ha, White Strand - 0.25ha. See map 6	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney et al., 2013). Four sub-sites (Doagh Isle, Lenankeel, Tullagh and White Strand) were mapped, giving a total estimated area of 117.96ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 6 for known distribution	The largest machair site is at Doagh Isle. See 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	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. At Lenankeel, rock armour affects the natural build up of the sand system. Extraction was noted from Tullagh and Doagh Isle sub-sites. See 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 data from Ryle et al. (2009), Delaney et al. (2013), Crawford et al. (1996) and Gaynor (2006). See 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 Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of machair habitat, subject to natural processes	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: sward height	Centimeters	Maintain structural variation within sward	Based on data from Ryle et al. (2009) and Delaney et al. (2013). At Tullagh, heavy grazing and poaching occur. Both undergrazing and overgrazing occur at Doagh Isle. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Delaney et al. (2013)	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). The four sub-sites support a characteristic machair flora. See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. See coastal habitats supporting document for further details
Vegetation composition: bryophytes	Percentage cover	Should always be at least an occasional component of the vegetation	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details

4030 European dry heaths

To maintain the favourable conservation condition of European dry heaths in North Inishowen Coast 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	Total area of this habitat has not been calculated, but estimated to cover more than 10% of the SAC. It occurs in mosaic with other habitats such as wet heath/blanket bog and exposed rock (NPWS internal files) and is a component of the vegetation of the Annex I habitat: Vegetated sea cliffs of the Atlantic and Baltic coasts (1230)- see the coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline from current habitat distribution, subject to natural processes	The heath in this SAC is widely distributed along the hard coastline and also occurs at higher altitudes such as on Binnion, Urris and Dunaff Hills (NPWS internal files)
Ecosystem function: soil nutrient status	Soil pH and nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Changes to soil nutrient status can occur from high stock densities or supplementary feeding above appropriate levels
Vegetation composition: positive indicator species	Number and percentage cover at a representative number of monitoring stops	At least two positive indicator species, as listed in Perrin et al. (2014), with combined cover of at least 50%	Attribute and target based on Perrin et al. (2014). Bell heather (*Erica cinerea*), ling (*Calluna vulgaris*), crowberry (*Empetrum nigrum*) and bilberry (*Vaccinium myrtillus*) are listed for the heath in this SAC (NPWS internal files)
Vegetation composition: bryophyte and non-crustose lichen species	Number at a representative number of monitoring stops	At least three bryophyte or non-crustose lichen species present, excluding *Campylopus* and *Polytrichum* moss species	Attribute and target based on Perrin et al. (2014)
Vegetation composition: rare/scarce species	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	
Vegetation composition: dwarf-shrub species	Percentage cover at a representative number of monitoring stops	Cover of bog myrtle (*Myrica gale*), creeping willow (*Salix repens*) and Western gorse (*Ulex gallii*) collectively less than 50%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: negative indicator weed species	Pecentage cover at a representative number of monitoring stops	Cover of negative indicator weed species collectively less than 1%	Attribute and target based on Perrin et al. (2014) where weed species are also listed
Vegetation composition: non-native species	Pecentage cover at a representative number of monitoring stops and in local vicinity	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: native trees and shrubs	Pecentage cover in local vicinity	Cover of scattered native trees and shrubs less than 20%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: bracken	Percentage cover in local vicinity	Cover of bracken (*Pteridium aquilinum*) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: soft rush	Percentage cover in local vicinity	Cover of soft rush (*Juncus effusus*) less than 10%	Attribute and target based on Perrin et al. (2014). Dense areas of soft rush can indicate disturbance
Vegetation structure: senescent ling	Percentage cover at a representative number of monitoring stops	Senescent proportion of ling (*Calluna vulgaris*) cover, less than 50%	Attribute and target based on Perrin et al. (2014)

Vegetation structure: growth phases of ling	Percentage cover in local vicinity	Outside boundaries of sensitive areas, all growth phases of ling (*Calluna vulgaris*) should occur throughout, with at least 10% of cover in mature phase	Attribute and target based on Perrin et al. (2014), where sensitive areas and growth phases are defined
Vegetation structure: signs of browsing	Percentage cover at a representative number of monitoring stops	Last complete growing season's shoots of ericoids showing signs of browsing collectively less than 33%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity	No signs of burning inside sensitive areas	Attribute and target based on Perrin et al. (2014), where sensitive areas are defined
Physical structure: disturbed bare ground	Percentage cover at a representative number of monitoring stops and in local vicinity	Cover of disturbed bare ground less than 10% (but if peat soil less than 5%)	Attribute and target based on Perrin et al. (2014)

1014 Narrow-mouthed Whorl Snail *Vertigo angustior*

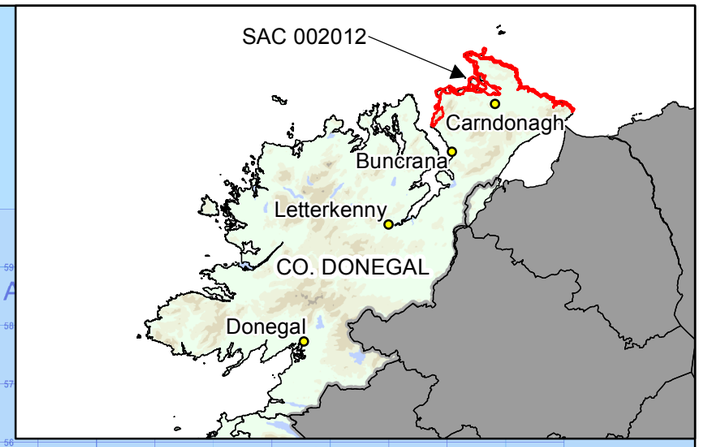
To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in North Inishowen Coast SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. There are two known sites for this species in this SAC, which overlaps with three 1km squares. See map 7	The species has been recorded from the sand dunes in the townlands of Lag and Drung behind Back Strand (site VaCAM12) as well as at Tullagh Bay (Moorkens, 1998; Moorkens and Killeen, 2011)
Presence: sampled locations	Percentage	Adult or sub-adult snails are present at 50% of sampled locations with suitable sub-optimal or better quality habitat at confirmed sites	There are two known sites within this SAC
Presence on transect	Occurrence	Adult or sub-adult snails are present in three of the eight maritime grassland zones on the transect with optimal or sub-optimal habitat	Transect established at Lag as part of condition assessment monitoring at this site (Moorkens and Killeen, 2011). See habitat extent target below for definition of optimal and sub-optimal habitat
Abundance	Number per sample	At least two samples on the transect should have more than 20 *V. angustior* individuals	From Moorkens and Killeen (2011)
Transect habitat quality	Metres	At least 40m of habitat along the transect is classed as optimal and at least another 55m as sub-optimal or optimal	From Moorkens and Killeen (2011). See habitat extent target below for definition of optimal and sub-optimal habitat
Transect optimal wetness	Metres	Soils, at time of sampling, are damp (optimal wetness) and covered with a layer of humid thatch for at least 55m along the transect	From Moorkens and Killeen (2011)
Habitat extent	Hectares	At least 30-35ha of the site at Lag/Drung comprises a mosaic of sub-optimal and optimal habitat. Adequate suitable habitat should also be present at Tullagh Bay	Optimal habitat is defined as fixed dune, species-rich grassland dominated by red fescue (*Festuca rubra*) and marram grass (*Ammophila arenaria*), with sparse lady's bedstraw (*Galium verum*), mouse-ear-hawkweed (*Pilosella officinarum*) and other low growing herbs. Vegetation height 10-30cm. Habitat growing on damp, friable soil covered with a layer of humid, open structured thatch. Sub-optimal habitat is as optimal habitat but with a higher proportion of white clover (*Trifolium repens*), and either vegetation height is less than 10cm or between 30 and 50cm, or the soil is dry and sandy, or the thatch is wetter with a denser structure. From Moorkens and Killeen (2011). Habitat at Tullagh Bay has not been described in detail

1355 Otter *Lutra lutra*

To maintain the favourable conservation condition of Otter in North Inishowen Coast SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 146.6ha above high water mark (HWM); 61.3ha along river banks/ around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 1099.2ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 30.9km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 2.7ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase. For guidance, see map 8	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed



ATLANTIC OCEA
An tAigéan Atlantach

Malin Head
Cionn Mhálanna

OAGH ISLAND
Oileán na Bumbeha

Trawbreaga Bay
Trá Bhréige

Glengad Head
Cionn Ghleann Gad

Dunaff Head
Cionn Dhún Dathaí

Ballyliffin
Baile Lifín

Clonmany
Cluain Maine

Carndonagh
Carn Domhnach

Culdaff
Cora Dabhcha

Dunree Head
Cionn an Dúin Riabhaigh

Slieve Snaght
Sliabh Sneachta

Slieve Main

Greencastle
An Caisleán Nua

Moville
Bun an Phobail

Legend

North Inishowen Coast SAC 002012

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MAP 1:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

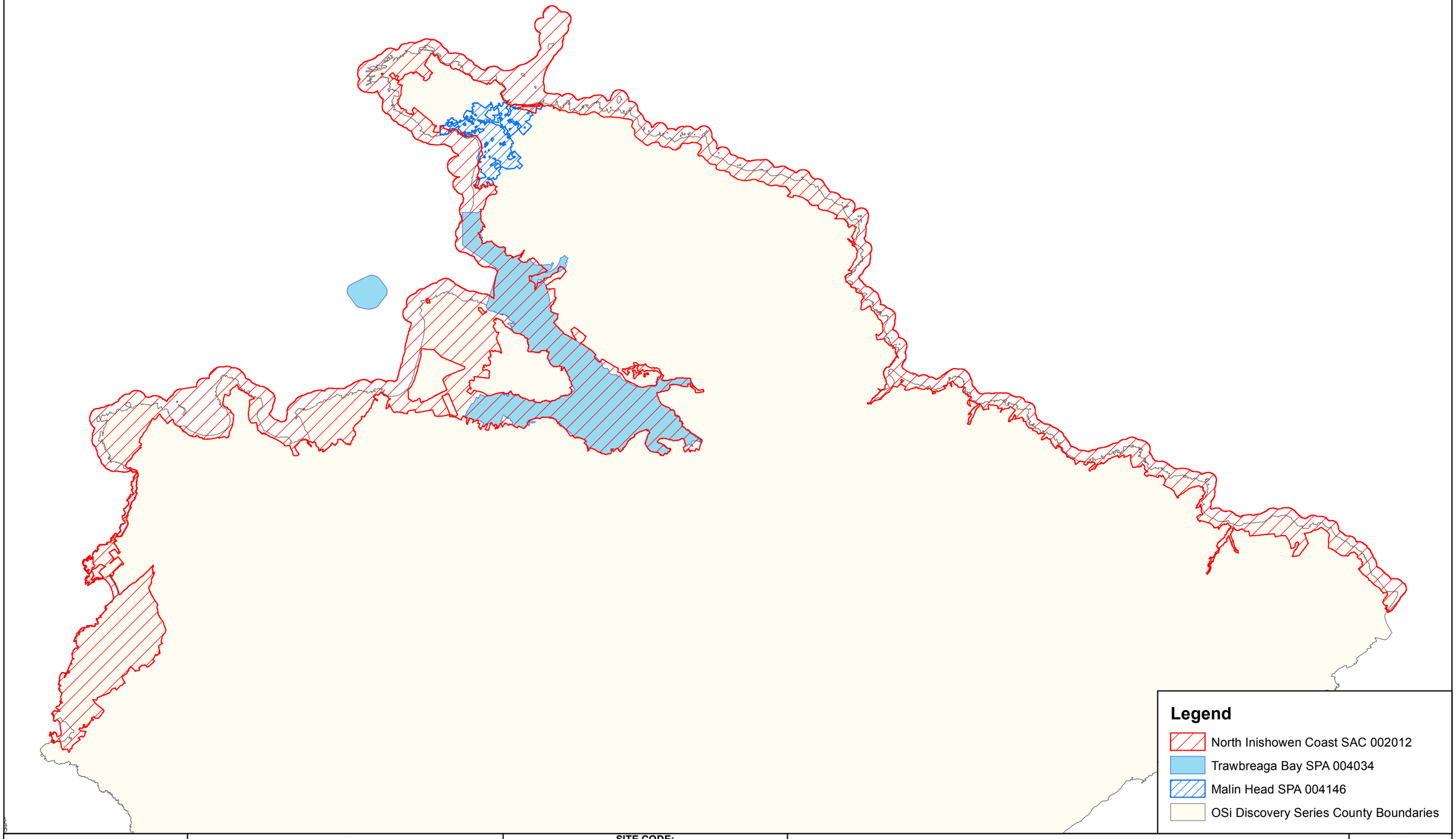
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002012; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014



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MAP 2:
NORTH INISHOWEN COAST SAC CONSERVATION OBJECTIVES ADJOINING / OVERLAPPING DESIGNATIONS

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

SITE CODE:
SAC 002012; version 3.
SPA 004034; version 1.05,
SPA 004146; version 1.03. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

Legend

- North Inishowen Coast SAC 002012
- 1140 Mudflats and sandflats not covered by sea water at low tide
- OSi Discovery Series County Boundaries

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MAP 3:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
TIDAL MUDFLATS AND SANDFLATS

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

SITE CODE:
SAC 002012; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

Legend

North Inishowen Coast SAC 002012

OSi Discovery Series County Boundaries

Marine Community Types

Fine to medium sand with *Eurydice pulchra* community complex

Muddy sand to coarse sediment with *Pygospio elegans* community complex

Reef community complex

Sand with *Angulus tenuis* and *Scoloplos (Scoloplos) armiger* community complex

Zostera-dominated community

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MAP 4:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

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

SITE CODE:
SAC 002012; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

Altnadarrow
Site Id: 03002

Glengad
Site Id: 03042

Binbane
Site Id: 03003

Stookanillar and
Five Fingers
Site Id: 03004

Carrickabraghy
Site Id: 03005

Binnion
Site Id: 03006

Tirmacroragh
Site Id: 03041

Mossy Glen
Site Id: 03001

Dunaff
Site Id: 03007

Lenan
Site Id:03008

Lederg
Site Id: 03009

Dunree

Legend

- North Inishowen Coast SAC 002012
- 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- Undocumented 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- OSi Discovery Series County Boundary

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MAP 5:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
VEGETATED SEA CLIFFS

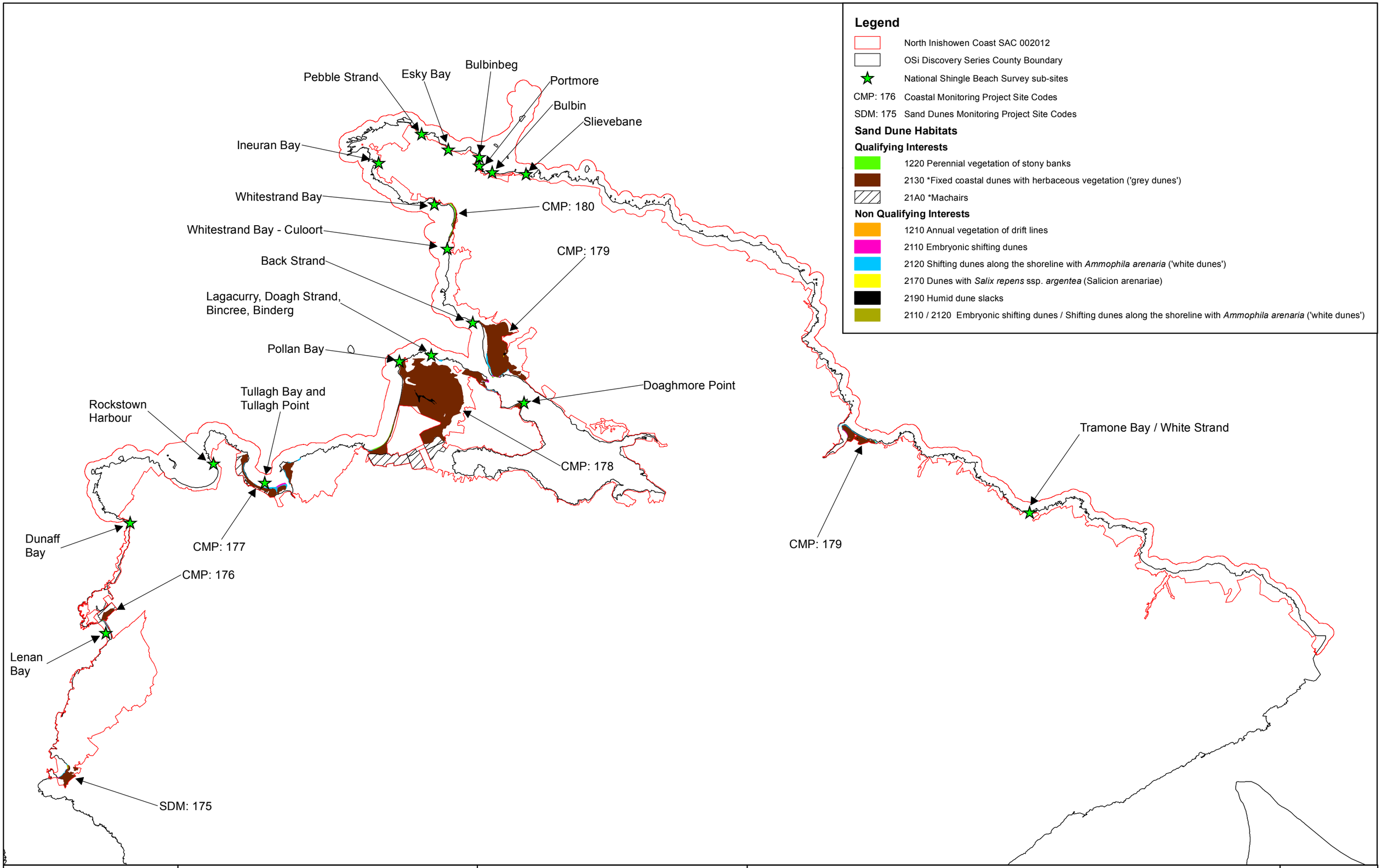
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002012; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014



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MAP 6:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
SAND DUNE HABITATS &
PERENNIAL VEGETATION OF STONY BANKS

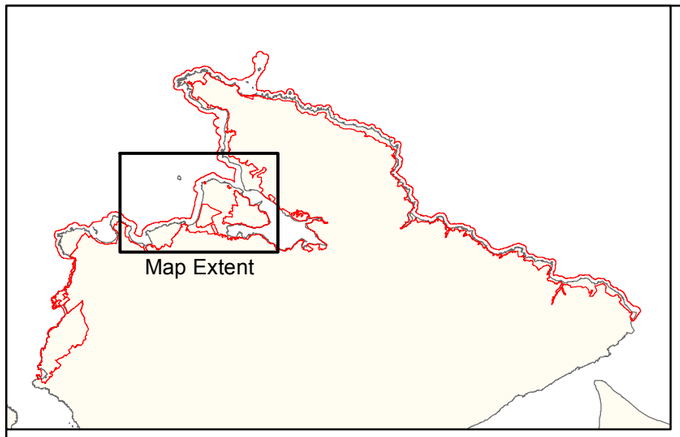
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002012; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014



C4253

C4252

C3548

Legend

- North Inishowen Coast SAC 002012
- 1014 Narrow-Mouthed Whorl Snail - *Vertigo angustior*
- OSi Discovery Series County Boundary

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MAP 7:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
NARROW-MOUTHED WHORL SNAIL

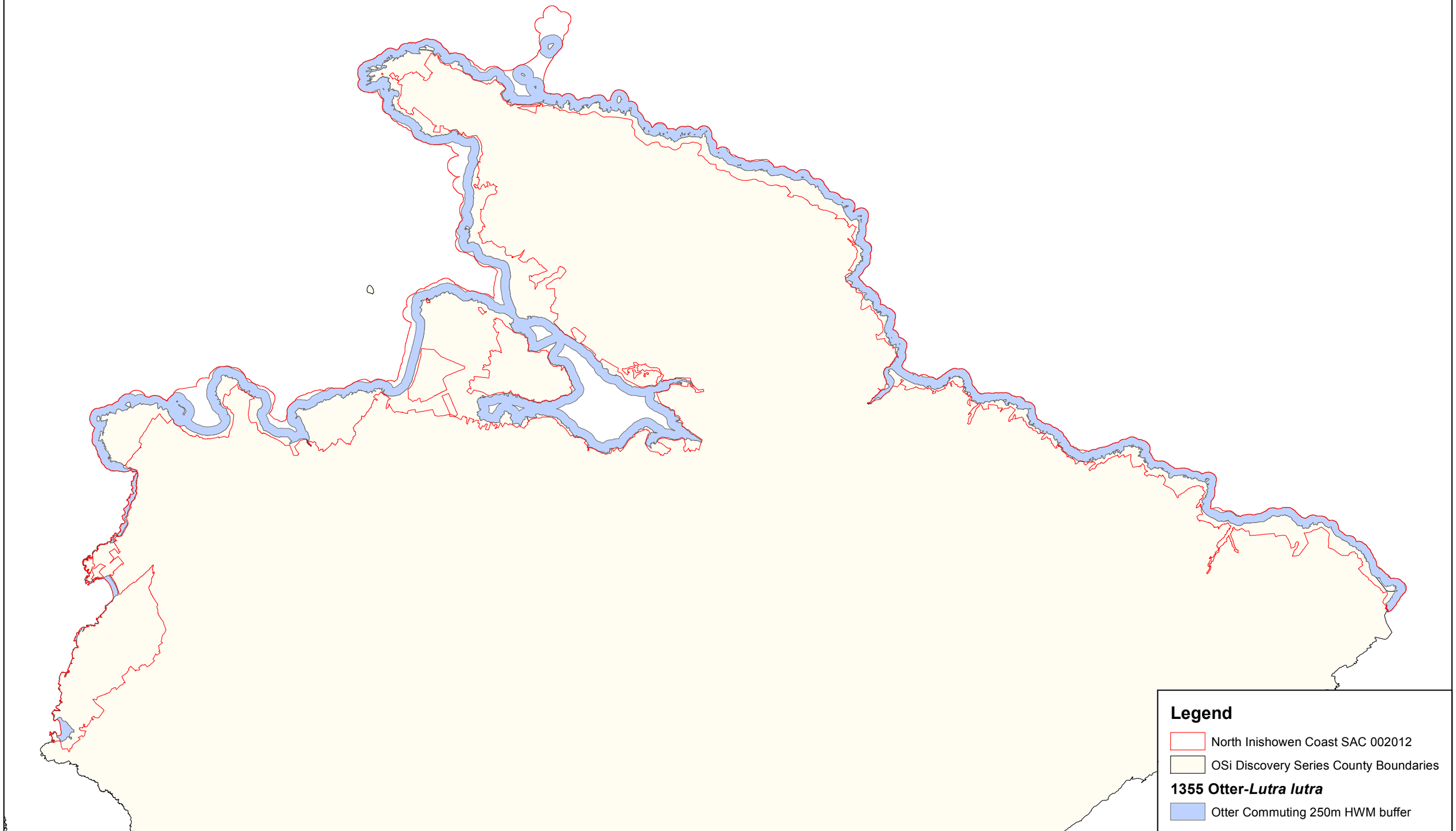
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002012; version 3. CO. DONEGAL

0 0.2 0.4 0.6 0.8 1 km

N

Map Version 1
Date: Nov 2014



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MAP 8:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
OTTER COMMUTING

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

SITE CODE:
SAC 002012; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

National Parks and Wildlife Service

Conservation Objectives

Lough Swilly SAC 002287
Lough Swilly SPA 004075

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Department of
Arts, Heritage and the Gaeltacht

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***

002287 Lough Swilly SAC

QI	Description
1130	Estuaries
1150	* Coastal lagoons
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
1355	Otter *Lutra lutra*
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles

004075 Lough Swilly SPA

QI	Description	
A005	Great Crested Grebe *Podiceps cristatus*	wintering
A028	Grey Heron *Ardea cinerea*	wintering
A038	Whooper Swan *Cygnus cygnus*	wintering
A043	Greylag Goose *Anser anser*	wintering
A048	Shelduck *Tadorna tadorna*	wintering
A050	Wigeon *Anas penelope*	wintering
A052	Teal *Anas crecca*	wintering
A053	Mallard *Anas platyrhynchos*	wintering
A056	Shoveler *Anas clypeata*	wintering
A062	Scaup *Aythya marila*	wintering
A067	Goldeneye *Bucephala clangula*	wintering
A069	Red-breasted Merganser *Mergus serrator*	wintering
A125	Coot *Fulica atra*	wintering
A130	Oystercatcher *Haematopus ostralegus*	wintering
A143	Knot *Calidris canutus*	wintering
A149	Dunlin *Calidris alpina*	wintering
A160	Curlew *Numenius arquata*	wintering
A162	Redshank *Tringa totanus*	wintering
A164	Greenshank *Tringa nebularia*	wintering
A179	Black-headed Gull *Chroicocephalus ridibundus*	breeding
A182	Common Gull *Larus canus*	wintering
A191	Sandwich Tern *Sterna sandvicensis*	breeding
A193	Common Tern *Sterna hirundo*	breeding
A395	Greenland White-fronted goose *Anser albifrons flavirostris*	wintering
A999	Wetlands & Waterbirds	

Supporting documents, relevant reports & publications (listed by date)

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

Title: Seabird Monitoring Programme (SMP) Database
Year: 2011
Author: JNCC
Series: http://jncc.defra.gov.uk/smp/Default.aspx

Title: Lough Swilly SAC (002287): Conservation objectives supporting document - coastal habitats [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: Lough Swilly SPA (004075): Conservation objectives supporting document [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: Lough Swilly SAC (002287): Conservation objectives supporting document - marine habitats [Version 1]
Year: 2011
Author: NPWS
Series: Unpublished Report to NPWS

Title: Otter tracking study of Roaringwater Bay
Year: 2010
Author: De Jongh, A.; O'Neill, L.
Series: Unpublished Draft Report to NPWS

Title: A provisional inventory of ancient and long-established woodland in Ireland
Year: 2010
Author: Perrin, P.M.; Daly, O.H.
Series: Irish Wildlife Manuals No. 46

Title: Saltmarsh Monitoring Report 2007-2008
Year: 2009
Author: McCorry, M.; Ryle, T.
Series: Unpublished Report to NPWS

Title: National Survey of Native Woodlands 2003-2008
Year: 2008
Author: Perrin, P.; Martin, J.; Barron, S.; O'Neill, F.; McNutt, K.; Delaney, A.
Series: Unpublished Report to NPWS

Title: Saltmarsh Monitoring Report 2006
Year: 2007
Author: McCorry, M.
Series: Unpublished Report to NPWS

Title: Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents, Article 17 forms and supporting maps

Year: 2007

Author: NPWS

Series: Unpublished Report to NPWS

Title: Inventory of Irish coastal lagoons

Year: 2007

Author: Oliver, G.

Series: Unpublished Report to NPWS

Title: Otter Survey of Ireland 2004/2005

Year: 2006

Author: Bailey, M.; Rochford, J.

Series: Irish Wildlife Manuals No. 23

Title: Otters - ecology, behaviour and conservation

Year: 2006

Author: Kruuk, H.

Series: Oxford University Press

Title: Seabird Populations of Britain and Ireland

Year: 2004

Author: Mitchell, P.I.; Newton, S.F.; Ratcliffe, N.; Dunn, T.E.

Series: Poyser, London

Title: Reversing the habitat fragmentation of British woodlands

Year: 2002

Author: Peterken, G.

Series: WWF-UK, London

Title: Diet of Otters *Lutra lutra* on Inishmore, Aran Islands, west coast of Ireland

Year: 1999

Author: Kingston, S.; O'Connell, M.; Fairley, J.S.

Series: Biol & Environ Proc R Ir Acad B 99B:173–182

Title: Seabird monitoring handbook for Britain and Ireland: a compilation of methods for survey and monitoring of breeding seabirds.

Year: 1995

Author: Walsh, P.; Halley, D.J.; Harris, M.P.; del Nevo, A.; Sim, I.M.W.; Tasker, M.L.

Series: JNCC, Peterborough

Title: The spatial organization of otters (*Lutra lutra*) in Shetland

Year: 1991

Author: Kruuk, H.; Moorhouse, A.

Series: J. Zool, 224: 41-57

Title: Otter survey of Ireland

Year: 1982

Author: Chapman, P.J.; Chapman, L.L.

Series: Unpublished Report to Vincent Wildlife Trust

Spatial data sources

Year:	2010
Title:	EPA transitional waterbody data
GIS operations:	Clipped to SAC boundary
Used for:	1130 (map 2)

Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; Saltmarsh and Sand Dune datasets erased out
Used for:	Marine community types base data (map 3)

Year:	Interpolated 2011
Title:	Intertidal/subtidal surveys 2009, 2010
GIS operations:	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data
Used for:	Marine community types (map 3)

Year:	Revision 2011
Title:	Inventory of Irish Coastal Lagoons. Version 3
GIS operations:	Clipped to SAC boundary
Used for:	1150 (map 4)

Year:	Revision 2010
Title:	Saltmarsh Monitoring Project 2007-2008. Version 1
GIS operations:	QI selected; clipped to SAC boundary
Used for:	1330 (map 5)

Year:	Revision 2010
Title:	National Survey of Native Woodlands 2003-2008. Version 1
GIS operations:	QIs selected; clipped to SAC boundary
Used for:	91A0 (map 6)

Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; saltmarsh data for site combined to HWM and LWM polygon feature class; resulting polygon feature class unioned with SPA boundary; resulting polygon feature class clipped to SPA boundary; bird use zone attributes assigned to each polygon
Used for:	Bird use zones (map 7)

Year:	2005
Title:	OSi Discovery series vector data
GIS operations:	Creation of an 80m buffer on the marine side of the high water mark (HWM); creation of a 10m buffer on the terrestrial side of the HWM; combination of 80m and 10m HWM buffer datasets; creation of a 10m buffer on the landward side of the river banks data; creation of a 20m buffer applied to river centerline and stream data; combination of 10m river banks and 20m river and stream centerline buffer datasets; combined river and stream buffer dataset clipped to HWM; combination of HWM buffer dataset with river and stream buffer dataset; overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary
Used for:	1355 (no map)

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in Lough Swilly 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 2	Habitat area was estimated at 6118ha using OSI data and the defined Transitional Water Body area under the Water Framework Directive. See marine habitats supporting document for further information
Community distribution	Hectares	The following communities should be conserved in a natural condition: Fine sand community complex; Intertidal mixed sediment with polychaetes; Subtidal mixed sediment with polychaetes and bivalves; Muddy fine sand with *Thyasira flexuosa*; Mud community complex and *Ostrea edulis* dominated community. See map 3	The communities were derived from the 2009 and 2010 intertidal survey and 2009 subtidal survey. See marine habitats supporting document for further information

1150 * Coastal lagoons

To restore the favourable conservation condition of Lagoons in Lough Swilly SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable, subject to slight natural variation. Favourable reference area 206ha- Inch Lough 176ha; Blanket Nook 30ha. See map 4	Areas calculated from spatial data derived from Oliver, 2007. Two lagoons are identified
Salinity regime	Practical salinity units (psu)	Maintain median annual salinity within natural ranges: Inch 0.1 - 3.0psu; Blanket Nook 10 - 20psu	Inch is one if the largest oligohaline (low salinity) lagoons in Ireland and most of the waterbody should have a salinity of 0.5 to 3.0 for most of the time but locally, fresh water may occur and at depth salinities of over 20 psu have been recorded. Blanket Nook is a mesohaline (medium salinity) lagoon. See Oliver (2007) for further information
Hydrological regime	Metres	Maintain current annual water level fluctuations and minima	Both lagoons are shallow- Inch only 2m and Blanket Nook 1m deep (Oliver, 2007). Small changes in summer levels would result in major losses of lagoonal area. Need to investigate normal fluctuations and set specific targets
Barrier	Sluice function	Maintain permeability, including appropriate management of sluices	Both lagoons are artificial with embankment barriers containing sluices. Need to identify main saline inputs and ensure that they, or equivalent, saline inputs are retained
Water quality: Chlorophyll a	µg/L	Reduce annual median chlorophyll a to less than 2.5µg/L at Inch; less than 5µg/L at Blanket Nook	These limits are needed to ensure that excessive shading from phytoplankton does not restrict macrophytes colonisation in the lagoons (J. Ryan, pers comm)
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	Reduce annual median MRP to less than 0.01mg/L at Inch; less than 0.02mg/L at Blanket Nook	These limits are needed to ensure that excessive shading from phytoplankton does not restrict macrophytes colonisation in the lagoons (J. Ryan, pers comm)
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Reduce annual median DIN to less than 0.15mg/L at Inch; less than 0.4mg/L at Blanket Nook	These limits are needed to ensure that excessive shading from phytoplankton does not restrict macrophytes colonisation in the lagoons (J. Ryan, pers comm)
Depth of macrophyte colonisation	Metres	Increase colonisation to maximum depth of both lagoons	Increased depth of colonisation increases both the extent and diversity of submergent macrophytes. This is especially important in Inch where, as well as being of major interest in their own right, the presence of a healthy submerged macrophyte sward is also important for the achievement of the SPA objectives
Typical plant species	Number and m^2	Maintain number and extent of listed lagoonal specialists, subject to natural variation	Species listed in Oliver (2007), especially *Chara canescens*, *Ruppia* spp. and *Zannichellia palustris* in Inch

1150 * Coastal lagoons

To restore the favourable conservation condition of Lagoons in Lough Swilly SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Typical invertebrate species	Number	Maintain listed lagoon specialists, subject to natural variation	Species listed in Oliver (2007), especially *Jaera ischiosetosa* (an isopod crutacean) in Blanket Nook
Negative indicator species	Number and % cover	Negative indicator species absent or under control	Because of eutrophication and the shallowness of both lagoons there is a danger that the cover of emergents and/or floating algal mats might increase at the expense of submerged macrophytes

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

To restore the favourable conservation condition of Atlantic salt meadows in Lough Swilly 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 sub-sites mapped: Fahan - 7.29ha, Green Hill - 2.02ha, Lower Lough Swilly - 8.44ha, Rathmelton - 10.01ha, Ray - 0.05ha. See map 5	Based on data from the Saltmarsh Monitoring Project (McCorry, 2007; McCorry and Ryle, 2009). Five sub-sites were mapped and additional areas of potential saltmarsh were identified from an examination of aerial photographs, giving a total estimated area of Atlantic salt meadow of 38.98ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 5 for known distribution	See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain/restore creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry (2007) and McCorry and Ryle (2009). Creek and pan structure is well developed at Rathmelton, but poorly developed or absent at all other sub-sites. Significant drainage has occurred at Green Hill. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitat zonations including transitional zones, subject to natural processes including erosion and succession. See map 5	Based on data from McCorry (2007) and McCorry and Ryle (2009). Most of the saltmarsh habitat in Lough Swilly is Atlantic salt meadow, although *Salicornia* mudflats have been recorded at Lower Lough Swilly and Rathmelton. Mediterranean salt meadow has also been recorded at Rathmelton. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from McCorry (2007) and McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from the Saltmarsh Monitoring Project (McCorry, 2007; McCorry and Ryle, 2009). See coastal habitats supporting document for further details

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

To restore the favourable conservation condition of Atlantic salt meadows in Lough Swilly SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with characteristic species listed in Saltmarsh Monitoring Project (McCorry & Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation composition: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of *Spartina*. No new sites for this species and an annual spread of less than 1% where it is already known to occur	Based on data from McCorry (2007) and McCorry and Ryle (2009). Significantly large stands of *Spartina* have been recorded at Rathmelton, Lower Lough Swilly and Green Hill. The evidence suggests that there has been recent spread of *Spartina* at Green Hill and parts of Rathmelton, while it may have been planted at Lower Lough Swilly. See coastal habitats supporting document for further details

1355 Otter *Lutra lutra*

To restore the favourable conservation condition of Otter in Lough Swilly SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range in north-west estimated at 65% (Bailey and Rochford, 2006)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 95.7ha above high water mark (HWM); 44.0ha along river banks/ around pools	No field survey. Areas mapped to include 10m terrestrial buffer along shoreline (above HWM and along river banks) identified as critical for otters (NPWS, 2007)
Extent of marine habitat	Hectares	No significant decline. Area mapped and calculated as 839.5ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (HWM) (NPWS, 2007; Kruuk, 2006)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 15.5km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline. Area mapped and calculated as 83.7ha	No field survey. Lagoons have been included with other freshwater habitat as they are low/medium salinity. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk, 2006; Kruuk and Moorhouse, 1991)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006) and wrasse and rockling in coastal waters (Kingston et al., 1999)
Barriers to connectivity	Number	No significant increase	Otters will regularly commute across stretches of open water up to 500m. e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010) . It is important that such commuting routes are not obstructed

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

To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in Lough Swilly SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, at least 58.68ha for sub-sites surveyed: Rathmullen wood - 26.00ha; Salt Pans wood - 13.47ha; Ballynarry wood - 15.61ha; Carrow Cashel wood - 3.60ha. See map 6	Area based on Perrin et al. (2008) - site codes 1420, 1430, 1434 and 1695 and internal NPWS reports. NB further unsurveyed areas maybe present within the site
Habitat distribution	Occurrence	No decline. Surveyed locations shown on map 6	Distribution based on Perrin et al. (2008) - site codes 1420, 1430, 1434 and 1695 and internal NPWS reports. NB further unsurveyed areas maybe present within the site
Woodland size	Hectares	Large woods at least 25ha in size and "small" woods at least 3ha in size	The sizes of at least some of the existing woodlands need to be increased in order to reduce habitat fragmentation and benefit those species requiring 'deep' woodland conditions (Peterken, 2002). Topographical constraints may restrict expansion
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer	Described in Perrin et al. (2008) - site codes 1420, 1430, 1434 and 1695 and internal NPWS reports
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types, including oak-ash; alder-ash in seepage areas and alongside streams; oak-birch; willow-alder-ash	Described in Perrin et al. (2008) - site codes 1420, 1430, 1434 and 1695 and internal NPWS reports
Woodland structure: natural regeneration	Seedling:sapling:pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy	Oak regenerates poorly. In suitable sites ash can regenerate in large numbers although few seedlings reach pole size
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter	Dead wood is a valuable resource and an integral part of a healthy, functioning woodland ecosystem
Woodland structure: veteran trees	Number per hectare	No decline	Mature and veteran trees are important habitats for bryophytes, lichens, saproxylic organisms and some bird species. Their retention is important to ensure continuity of habitats/niches and propagule sources

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

To restore the favourable conservation condition of Old oak woodland with Ilex and Blechnum in Lough Swilly SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Woodland structure: indicators of local disctinctiveness	Occurrence	No decline	Includes ancient or long-established (i.e. pre-1840s) woodlands, archaeological and geological features as well as red-listed and other rare or localised species. Perrin and Daly (2010) list Rathmullen wood, Salt pans wood and Ballynarry wood as potential ancient/long established woodlands
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%	Species reported in Perrin et al. (2008) - site codes 1420, 1430, 1434 and 1695 and internal NPWS reports
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including oak (*Quercus petraea*) and birch (*Betula pubescens)*	Species listed in Perrin et al. (2008)
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control	Species reported in Perrin et al. (2008) - site codes 1420, 1430, 1434 and 1695 and internal NPWS reports

A005 Great Crested Grebe *Podiceps cristatus*

To maintain the favourable conservation condition of Great Crested Grebe in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A028 Grey Heron *Ardea cinerea*

To maintain the favourable conservation condition of Grey Heron in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A038 Whooper Swan *Cygnus cygnus*

To maintain the favourable conservation condition of Whooper Swan in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A043 Greylag Goose *Anser anser*

To maintain the favourable conservation condition of Greylag Goose in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A048 Shelduck *Tadorna tadorna*

To maintain the favourable conservation condition of Shelduck in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A050 Wigeon *Anas penelope*

To maintain the favourable conservation condition of Wigeon in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A052 Teal *Anas crecca*

To maintain the favourable conservation condition of Teal in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A053 Mallard *Anas platyrhynchos*

To maintain the favourable conservation condition of Mallard in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A056 Shoveler *Anas clypeata*

To maintain the favourable conservation condition of Shoveler in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A062 Scaup *Aythya marila*

To maintain the favourable conservation condition of Scaup in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A067 Goldeneye *Bucephala clangula*

To maintain the favourable conservation condition of Goldeneye in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A069 Red-breasted Merganser *Mergus serrator*

To maintain the favourable conservation condition of Red-breasted Merganser in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A125 Coot *Fulica atra*

To maintain the favourable conservation condition of Coot in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A130 Oystercatcher *Haematopus ostralegus*

To maintain the favourable conservation condition of Oystercatcher in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A143 Knot *Calidris canutus*

To maintain the favourable conservation condition of Knot in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A149 Dunlin *Calidris alpina*

To maintain the favourable conservation condition of Dunlin in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A160 Curlew *Numenius arquata*

To maintain the favourable conservation condition of Curlew in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A162 Redshank *Tringa totanus*

To maintain the favourable conservation condition of Redshank in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A164 Greenshank *Tringa nebularia*

To maintain the favourable conservation condition of Greenshank in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A179 Black-headed Gull *Chroicocephalus ridibundus*

To maintain the favourable conservation condition of Black-headed Gull in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard gull survey methods (see Walsh et al., 1995). Mitchell et al. (2004) provides summary population information. The Seabird Monitoring Programme (CMP) also provides background data (JNCC, 2011)
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard gull survey methods (see Walsh et al., 1995).
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	

A182 Common Gull *Larus canus*

To maintain the favourable conservation condition of Common Gull in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment using (Generalised Additive Modelling (GAM)) could not be undertaken for this species due to an incomplete dataset. A measure of population change was calculated using the 'generic threshold' method. See Section 4 of the SPA conservation objectives supporting document for more details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A191 Sandwich Tern *Sterna sandvicensis*

To maintain the favourable conservation condition of Sandwich Tern in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). Mitchell et al. (2004) provides summary population information. The Seabird Monitoring Programme (CMP) also provides background data (JNCC, 2011)
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995)
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	The only known breeding site is on Inch Island

A193 Common Tern *Sterna hirundo*

To maintain the favourable conservation condition of Common Tern in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). Mitchell et al. (2004) provides summary population information. The Seabird Monitoring Programme (CMP) also provides background data (JNCC, 2011)
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995)
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	

A395 Greenland White-fronted goose *Anser albifrons flavirostris*

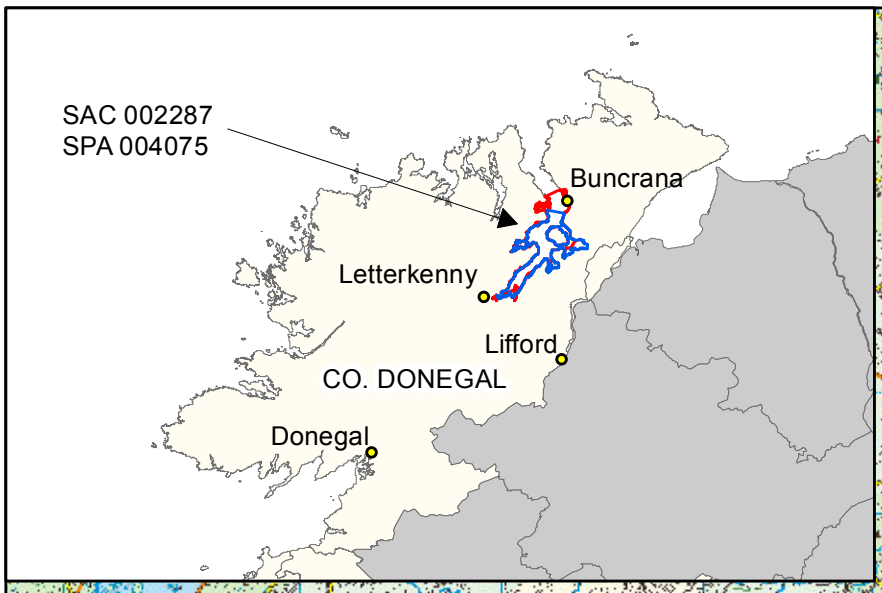
To maintain the favourable conservation condition of Greenland White-fronted Goose in Lough Swilly SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trend assessment (Generalised Additive Modelling (GAM)) was undertaken using waterbird count data collected through the Irish Wetland Bird Survey and other surveys. See the the SPA conservation objectives supporting document for further details
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in Section 5 of the SPA conservation objectives supporting document

A999 Wetlands & Waterbirds

To maintain the favourable conservation condition of the wetland habitat in Lough Swilly SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland habitat is stable and not significantly less than the areas of 4,162, 2,419, 201 and 317 hectares for subtidal, intertidal, supratidal and lagoon (and associated) habitats respectively, other than that occurring from natural patterns of variation. See map 7	Wetland areas defined as follows: subtidal- seaward extent of SPA boundary up to MLWM; intertidal- MLWM to MHWM; supratidal- MHWM to SPA boundary minus the area of terrestrial habitat; lagoon (and associated) habitats- lagoon extent and adjacent wetland habitat as defined by embankments



Inch Island
An Inis

Lough Swilly
Loch Súilí

Legend

SAC 002287

SPA 004075

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MAP 1:
LOUGH SWILLY
CONSERVATION OBJECTIVES
SAC & SPA DESIGNATIONS

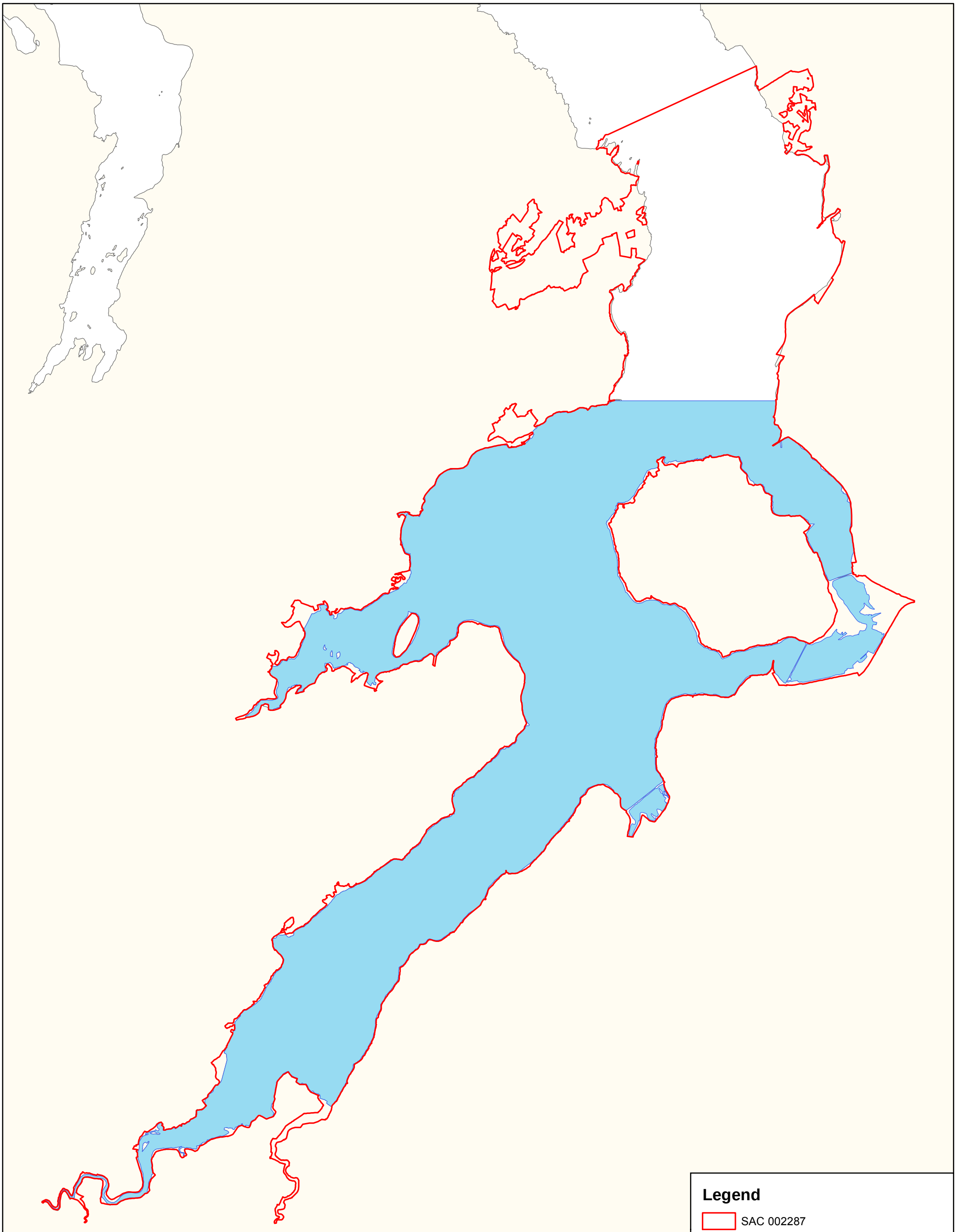
Map to be read in conjunction with the NPWS Conservation Objectives Document.

CO. DONEGAL

0 1 2 3 km

N

SITE CODE
SAC 002287
Version 1.01
SPA 004075
Version 1.04
Map Version 1
Date: March 2011



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MAP 2: LOUGH SWILLY CONSERVATION OBJECTIVES ESTUARIES

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

CO. DONEGAL

0 1 2 3 km

N

SITE CODE

SAC 002287
Version 1.01

Map Version 1
Date: March 2011

Legend

- SAC 002287
- SPA 004075
- OSi Discovery Series County Boundary

Marine Community Types

- Fine sand community complex
- Intertidal Mixed sediment with polychaetes
- Mud community complex
- Muddy fine sand with *Thyasira flexuosa*
- *Ostrea edulis* dominated community
- Subtidal mixed sediment with polychaetes and bivalves

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MAP 3:
LOUGH SWILLY
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

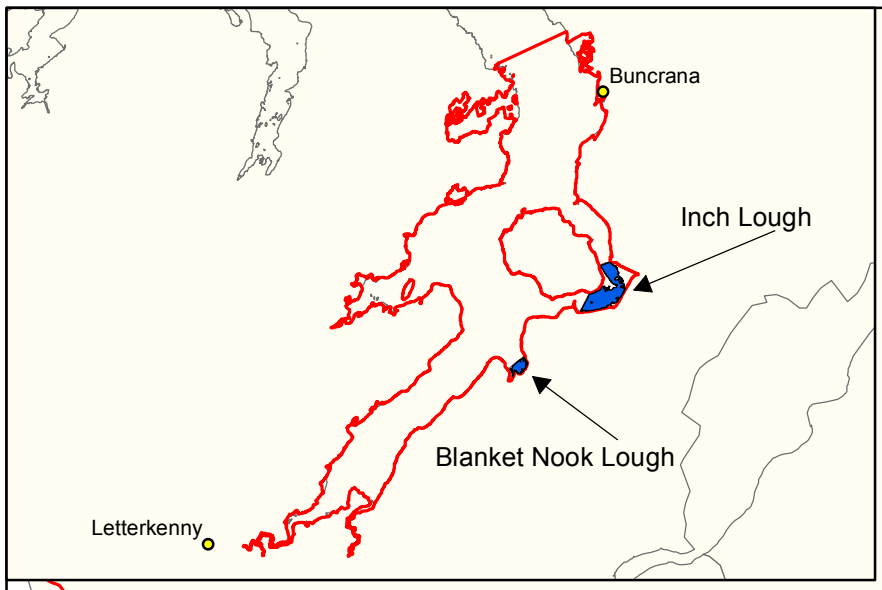
Map to be read in conjunction with the NPWS Conservation Objectives Document.

CO. DONEGAL

0 1 2 3 km

N

SITE CODE
SAC 002287
Version 1.01
SPA 004075
Version1.04
Map Version 1
Date: March 2011



Legend

- SAC 002287
- 1150 * Coastal Lagoons
- OSi Discovery Series County Boundary

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MAP 4: LOUGH SWILLY CONSERVATION OBJECTIVES COASTAL LAGOONS

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

CO. DONEGAL

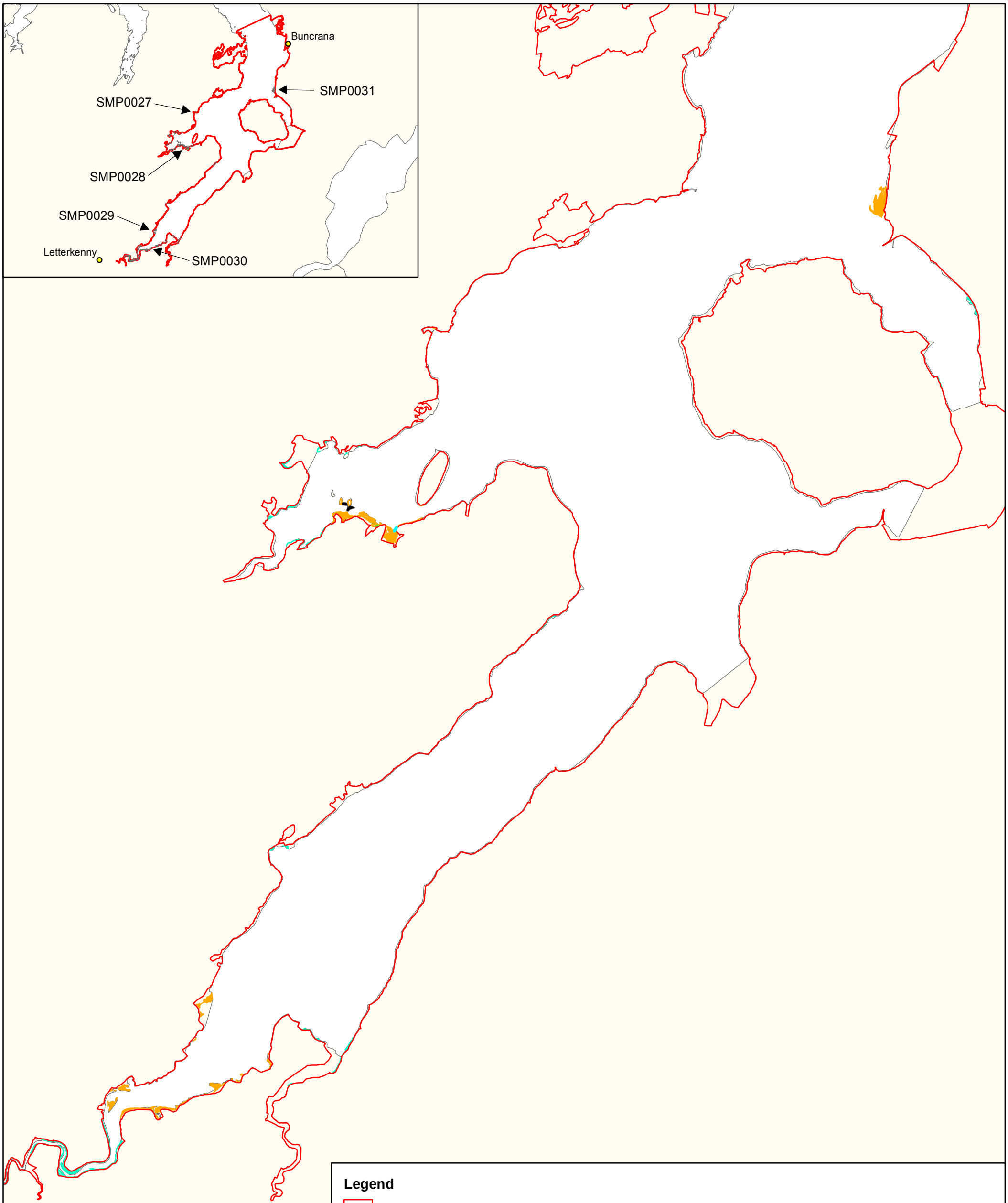
N

0 0.25 0.5 0.75 1 km

SITE CODE

SAC 002287
Version 1.01

Map Version 1
Date: March 2011



Legend

- SAC 002287
- OSi Discovery Series County Boundary

Saltmarsh Habitats

- 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Qualifying Interest
- 1330 / 1410 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Qualifying Interest / Mediterranean salt meadows (Juncetalia maritimi)
- Potential 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae) Qualifying Interest
- 1310 Salicornia and other annuals colonising mud and sand
- 1410 Mediterranean salt meadows (Juncetalia maritimi)

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MAP 5: LOUGH SWILLY CONSERVATION OBJECTIVES SALTMARSH HABITATS

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

CO. DONEGAL

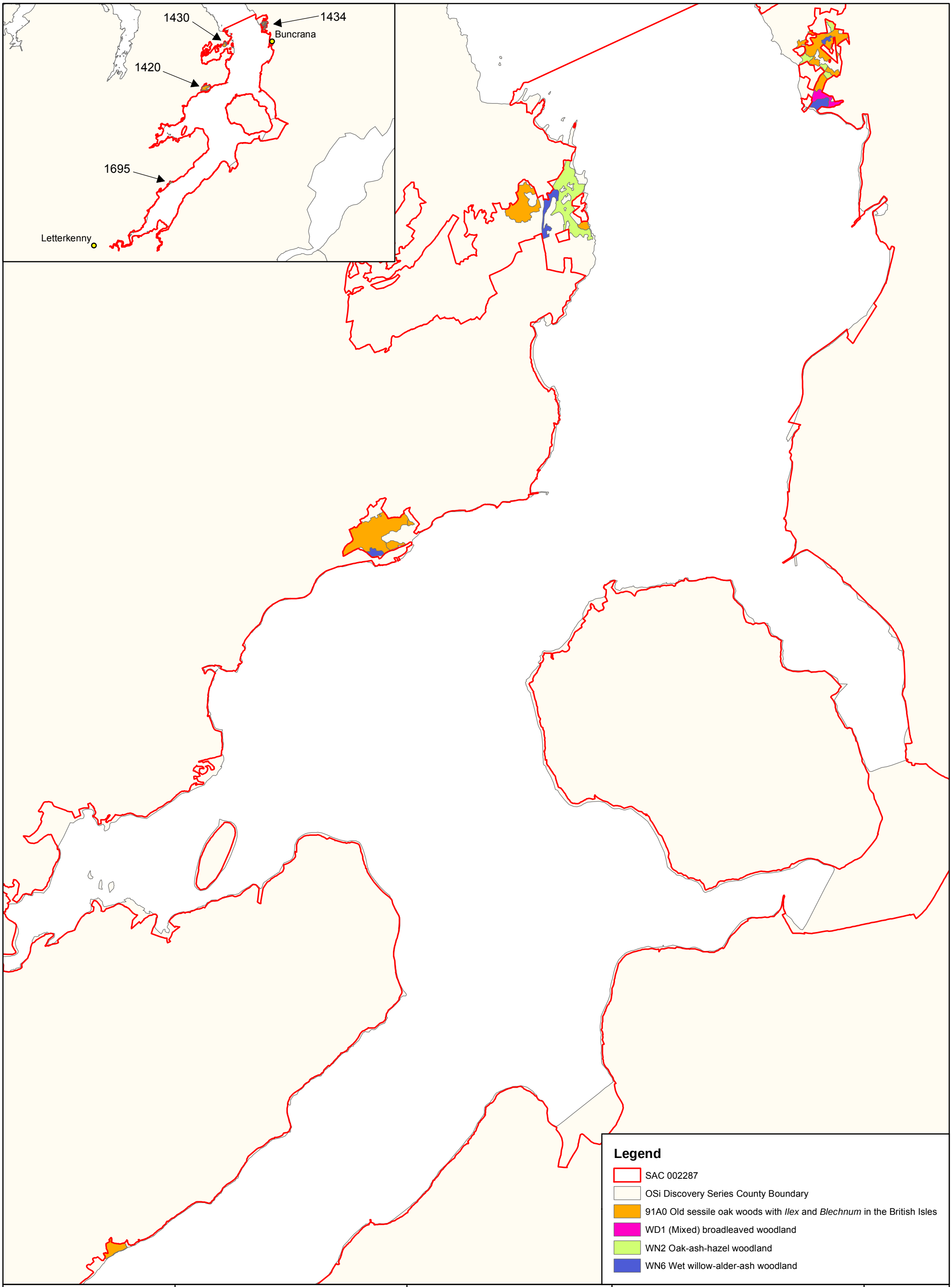
0 0.5 1 1.5 2 km

N

SITE CODE

SAC 002287
Version 1.01

Map Version 1
Date: March 2011



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MAP 6: LOUGH SWILLY CONSERVATION OBJECTIVES OLD OAK WOODLANDS

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

CO. DONEGAL

0 0.5 1 1.5 2 km N

SITE CODE

SAC 002287
Version 1.01

Map Version 1
Date: March 2011

Legend

- SPA 004075
- OSi Discovery Series County Boundary

Bird Use Zones

- Subtidal
- Intermittal
- Supratidal
- Lagoon and associated habitats
- Terrestrial

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MAP 7
LOUGH SWILLY
CONSERVATION OBJECTIVES
WETLANDS AND WATERBIRDS
BIRD USE ZONES

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

CO. DONEGAL

0 1 2 3 4 km

N

SITE CODE

SPA 004075
Version 1.04

Map Version 1
Date: March 2011

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Department of
Arts, Heritage and the Gaeltacht

Produced by: National Parks and Wildlife Service,
Department of Arts, Heritage and the Gaeltacht,
7 Ely Place, Dublin 2, Ireland.
Web: www.npws.ie
E-mail: natureconservation@environ.ie

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Conservation Objectives Series

River Finn SAC 002301

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

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

National Parks and Wildlife Service,
Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs,

7 Ely Place, Dublin 2, Ireland.

Web: www.npws.ie
E-mail: nature.conservation@ahg.gov.ie

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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***

002301	River Finn SAC
1106	Salmon *Salmo salar*
1355	Otter *Lutra lutra*
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
4010	Northern Atlantic wet heaths with *Erica tetralix*
7130	Blanket bogs (* if active bog)
7140	Transition mires and quaking bogs

Please note that this SAC overlaps with Derryveagh and Glendowan Mountains SPA (004039) and Lough Derg (Donegal) SPA (004057) and adjoins Meentygrannagh Bog SAC (000173), Dunragh Loughs/Pettigo Plateau SAC (001125) and Cloghernagore Bog and Glenveagh National Park SAC (002047). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjoining sites as appropriate.

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	1990
Title :	A survey to locate lowland blanket bogs of scientific interest in county Donegal and upland blanket bogs in counties Cavan, Leitrim and Roscommon
Author :	Douglas, C.; Dunnells, D.; Scally, L.; Wyse Jackson, M.
Series :	Unpublished report to NPWS
Year :	2006
Title :	Otter survey of Ireland 2004/2005
Author :	Bailey, M.; Rochford, J.
Series :	Irish Wildlife Manual No. 23
Year :	2007
Title :	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
Author :	NPWS
Series :	Unpublished report to NPWS
Year :	2012
Title :	Ireland Red List No. 8: Bryophytes
Author :	Lockhart, N.; Hodgetts, N.; Holyoak, D.
Series :	Ireland Red List series, NPWS
Year :	2013
Title :	National otter survey of Ireland 2010/12
Author :	Reid, N.; Hayden, B.; Lundy, M.G.; Pietravalle, S.; McDonald, R.A.; Montgomery, W.I.
Series :	Irish Wildlife Manual No. 76
Year :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2014
Title :	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
Author :	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
Series :	Irish Wildlife Manual No. 79
Year :	2015
Title :	Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting
Author :	O Connor, Á.
Series :	Unpublished document by NPWS
Year :	2016
Title :	Ireland Red List No. 10: Vascular Plants
Author :	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
Series :	Ireland Red Lists series, NPWS
Year :	2017
Title :	River Finn SAC (site code: 2301) Conservation objectives supporting document- blanket bog and associated habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1934
Title :	The Botanist in Ireland
Author :	Praeger, R.L.
Series :	Hodges, Figgis and Co., Dublin
Year :	1982
Title :	Otter survey of Ireland
Author :	Chapman, P.J.; Chapman, L.L.
Series :	Unpublished report to Vincent Wildlife Trust
Year :	1982
Title :	Eutrophication of waters. Monitoring assessment and control
Author :	OECD
Series :	OECD, Paris
Year :	1991
Title :	The spatial organization of otters (*Lutra lutra*) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	Journal of Zoology, 224: 41-57
Year :	2000
Title :	Colour in Irish lakes
Author :	Free, G.; Allott, N.; Mills, P.; Kennelly, C.; Day, S.
Series :	Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie, 27: 2620-2623
Year :	2002
Title :	Deterioration of Atlantic soft water macrophyte communities by acidification, eutrophication and alkalinisation
Author :	Arts, G.H.P.
Series :	Aquatic Botany, 73: 373-393
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press
Year :	2006
Title :	A reference-based typology and ecological assessment system for Irish lakes. Preliminary investigations. Final report. Project 2000-FS-1-M1 Ecological assessment of lakes pilot study to establish monitoring methodologies EU (WFD)
Author :	Free, G.; Little, R.; Tierney, D.; Donnelly, K.; Coroni, R.
Series :	EPA, Wexford
Year :	2008
Title :	Water Quality in Ireland 2004-2006
Author :	Clabby, K.J.; Bradley, C.; Craig, M.; Daly, D.; Lucey, J.; McGarrigle, M.; O'Boyle, S.; Tierney, D.; Bowman, J.
Series :	EPA, Wexford
Year :	2009
Title :	The identification, characterization and conservation value of isoetid lakes in Ireland
Author :	Free, G.; Bowman, J.; McGarrigle, M.; Little, R.; Coroni, R.; Donnelly, K.; Tierney, D.; Trodd, W.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems, 19 (3): 264–273

Year :	2010
Title :	Otter tracking study of Roaringwater Bay
Author :	De Jongh, A.; O'Neill, L.
Series :	Unpublished draft report to NPWS
Year :	2010
Title :	Water quality in Ireland 2007-2009
Author :	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
Series :	EPA, Wexford
Year :	2015
Title :	Water quality in Ireland 2010-2012
Author :	Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.
Series :	EPA, Wexford
Year :	2016
Title :	The Status of Irish Salmon Stocks in 2015 with Precautionary Catch Advice for 2016
Author :	SSCS (Standing Scientific Committee on Salmon)
Series :	Independent Scientific Report to Inland Fisheries Ireland

Spatial data sources

Year :	2008
Title :	OSi 1:5000 IG vector dataset
GIS Operations :	WaterPolygons feature class clipped to the SAC boundary. Expert opinion used to identify Annex I habitat and to resolve any issues arising
Used For :	3110 (map 3)
Year :	2010
Title :	OSi 1:5000 IG vector dataset
GIS Operations :	Creation of 80m buffer on the aquatic side of lake data; creation of 10m buffer on the terrestrial side of lake data. These datasets combined with the derived OSi Discovery Series river and canal datasets. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising. Creation of 250m buffer on aquatic side of the lake boundary to highlight potential commuting points
Used For :	1355 (map 4)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	Creation of a 10m buffer on the terrestrial side of river banks data; creation of 20m buffer applied to canal centreline data. Creation of 20m buffer applied to river and stream centreline data; These datasets combined with the derived OSI 1:5000 vector lake buffer data. Overlapping regions investigated and resolved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1355 (no map)

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

To restore the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in River Finn 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	Lake habitat 3110 is likely to occur in the larger lakes in River Finn SAC, such as Loughs Derg, Finn and Belshade. Lake habitat 3130 may also occur in Loughs Derg and Finn. The exact distribution of lake habitat 3110 in the SAC is unknown however, as little specific information on the lake vegetation is currently available. Lake habitat 3110 may co-occur with lake habitat 3160 in small and upland lakes. In line with Article 17 reporting (NPWS, 2013), all lakes larger than 1ha have been mapped as 'potential 3110' (see map 3). Two measures of extent should be used: 1. the area of the lake itself and; 2. the extent of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in the lake habitats supporting document for the purposes of site-specific conservation objectives and Article 17 reporting (O Connor, 2015)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, the exact distribution of lake habitat 3110 in River Finn SAC is not known. In map 3, all lakes larger than 1ha (based on 1:5,000 data) have been mapped as potential 3110
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see the Article 17 habitat assessment for lake habitat 3110 (NPWS, 2013) and the lake habitats supporting document (O Connor, 2015). The moss *Fontinalis antipyretica*, quillwort (*Isoetes lacustris*), bulbous rush (*Juncus bulbosus*), shoreweed (*Littorella uniflora*), water lobelia (*Lobelia dortmanna*), broad-leaved pondweed (*Potamogeton natans*) and floating bur-reed (*Sparganium angustifolium*) have been recorded in Lough Derg (Praeger, 1934; internal NPWS and EPA files). Environmental Protection Agency (EPA) biologists have also recorded slender naiad (*Najas flexilis*) in Lough Derg, suggesting lake habitat 3130 may occur. EPA records for stonewort (*Chara* sp.), intermediate water starwort (*Callitriche hamulata*) and pondweeds (*Potamogeton berchtoldii, P. gramineus* and *P. perfoliatus*) in Lough Finn are also indicative of lake habitat 3130
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	Further work is necessary to describe the characteristic zonation and other spatial patterns in lake habitat 3110 (see O Connor, 2015)
Vegetation distribution: maximum depth	Metres	Maintain maximum depth of vegetation, subject to natural processes	The maximum depth of vegetation is likely to be specific to the lake shoreline in question. Further work is necessary to develop indicative targets for lake habitat 3110. Water clarity is expected to be high in upland 3110 lakes, resulting in a large maximum depth of vegetation
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat	Fluctuations in lake water level are typical in Ireland, but can be amplified by activities such as abstraction and drainage. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to release of nutrients from the sediment. The hydrological regime of the lakes must be maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not reduced

Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the vegetation	Research is required to further characterise the substratum types (particle size and origin) and substratum quality (notably pH, calcium, iron and nutrient concentrations) favoured by each of the five Annex I lake habitats in Ireland. It is likely that lake habitat 3110 is associated with a range of nutrient-poor substrates, from stones, cobble and gravel, through sands, silt, clay and peat. Substratum particle size is likely to vary with depth and along the shoreline within a single lake
Water quality: transparency	Metres	Maintain appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. It can be affected by phytoplankton blooms, water colour and turbidity. Specific targets have yet to be established for lake habitat 3110 (O Connor, 2015). Habitat 3110 is associated with very clear water, particularly upland examples. The OECD fixed boundary system set transparency targets for oligotrophic lakes of ≥6m annual mean Secchi disk depth, and ≥3m annual minimum Secchi disk depth. Free et al. (2009) found high isoetid abundance in lakes with Secchi depths of more than 3m
Water quality: nutrients	µg/l P; mg/l N	Maintain the concentration of nutrients in the water column at sufficiently low levels to support the habitat and its typical species	As a nutrient-poor habitat, oligotrophic and Water Framework Directive (WFD) 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. For lake habitat 3110, annual average total phosphorus (TP) concentration should be ≤10µg/l TP, average annual total ammonia concentration should be ≤0.040mg/l N and annual 95th percentile for total ammonia should be ≤0.090mg/l N. See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton biomass	µg/l Chlorophyll *a*	Maintain appropriate water quality to support the habitat, including high chlorophyll *a* status	Oligotrophic and WFD 'high' status targets apply to lake habitat 3110. Where a lake has a chlorophyll *a* concentration that is lower than this target, there should be no decline within class, i.e. no upward trend in phytoplankton biomass. The average growing season (March-October) chlorophyll *a* concentration must be <5.8µg/l. The annual average chlorophyll *a* concentration should be <2.5µg/l and the annual peak chlorophyll *a* concentration should be ≤8.0µg/l. See also The European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water quality: phytoplankton composition	EPA phytoplankton composition metric	Maintain appropriate water quality to support the habitat, including high phytoplankton composition status	The EPA has developed a phytoplankton composition metric for nutrient enrichment of Irish lakes. As for other water quality indicators, lake habitat 3110 requires WFD high status
Water quality: attached algal biomass	Algal cover and EPA phytobenthos metric	Maintain trace/absent attached algal biomass (<5% cover) and high phytobenthos status	Nutrient enrichment can favour epiphytic and epipelic algae that can out-compete the submerged vegetation. The cover abundance of attached algae in lake habitat 3110 should, therefore, be trace/absent (<5% cover). EPA phytobenthos can be used as an indicator of changes in attached algal biomass. As for other water quality indicators, lake habitat 3110 requires high phytobenthos status
Water quality: macrophyte status	EPA macrophyte metric (The Free Index)	Maintain high macrophyte status	Nutrient enrichment can favour more competitive submerged macrophyte species that out-compete the typical and characteristic species for the lake habitat. The EPA monitors macrophyte status for WFD purposes using the 'Free Index'. The target for lake habitat 3110 is high status or an Ecological Quality Ratio (EQR) for lake macrophytes of ≥0.90, as defined in Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009

Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Acidification can impact on species abundance and composition in soft water lake habitats. In Europe, acidification of isoetid lakes can lead to loss of isoetids and dominance by submerged *Sphagnum* mosses and *Juncus bulbosus* (Arts, 2002). The specific requirements of lake habitat 3110, in terms of water and sediment pH, alkalinity and cation concentration, have not been determined. For lake habitat 3110, and adopting a precautionary approach based on Arts (2002), minimum pH should not be <5.5 pH units. Maximum pH should be <9.0 pH units, in line with the surface water standards established for soft waters (where water hardness is ≤100mg/l calcium carbonate). See Schedule Five of the European Communities Environmental Objectives (Surface Waters) Regulations 2009
Water colour	mg/l PtCo	Maintain appropriate water colour to support the habitat	Increased water colour and turbidity decrease light penetration and can reduce the area of available habitat for lake macrophytes, particularly at the lower euphotic depths. The primary source of increased water colour in Ireland is disturbance to peatland. No habitat-specific or national standards for water colour currently exist. Studies have shown median colour concentrations in Irish lakes of 38mg/l PtCo (Free et al., 2000) and 33mg/l PtCo (Free et al., 2006). It is likely that the water colour in all Irish lake habitats would naturally be <50mg/l PtCo. Water colour can be very low (<20mg/l PtCo or even <10mg/l PtCo) in lake habitat 3110, where the peatland in the lake's catchment is intact
Dissolved organic carbon (DOC)	mg/l	Maintain appropriate organic carbon levels to support the habitat	Dissolved (and particulate) organic carbon (OC) in the water column is linked to water colour and acidification (organic acids). Increasing DOC in water has been documented across the Northern Hemisphere, including afforested peatland catchments in Ireland. Damage and degradation of peatland, leading to decomposition of peat is likely to be the predominant source of OC in Ireland. OC in water promotes decomposition by fungi and bacteria that, in turn, releases dissolved nutrients. The increased biomass of decomposers can also impact directly on the characteristic lake communities through shading, competition, etc.
Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate units	Maintain appropriate turbidity to support the habitat	Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	Most lake shorelines have fringing habitats of reedswamp, other swamp, fen, marsh or wet woodland that intergrade with and support the structure and functions of the lake habitat. In River Finn SAC, active blanket bog and heath, transition mire, fen, flush or grassland could also occur. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species richness than the lake habitats themselves

4010 Northern Atlantic wet heaths with Erica tetralix

To restore the favourable conservation condition of Northern Atlantic wet heaths with *Erica tetralix* in River Finn 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	Northern Atlantic wet heaths with *Erica tetralix* has not been mapped in detail for River Finn SAC but from current available data the total area of the qualifying habitat is estimated to be approximately 187ha, covering 3% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the River Finn SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Wet heath occurs in association with blanket bog, upland grassland and exposed rock within the SAC. It occupies shallower peats and better drained slopes. It occurs quite widely at Owendoo/ Cloghervaddy (Douglas et al., 1990; NPWS internal files). Further information can be found within Douglas et al. (1990), 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
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	A variety of wet heath vegetation communities have been recorded in this SAC (Douglas et al., 1990; NPWS internal files), three of which correspond to communities 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: cross-leaved heath	Occurrence within 20m of a representative number of monitoring stops	Cross-leaved heath (*Erica tetralix*) present within a 20m radius of each monitoring stop	Attribute and target based on Perrin et al. (2014)
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%	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	Total cover of *Cladonia* and *Sphagnum* species, *Racomitrium lanuginosum* and pleurocarpous mosses at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: ericoid species and crowberry	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of ericoid species and crowberry (*Empetrum nigrum*) at least 15%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: dwarf shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf shrubs less than 75%	Attribute and target based on Perrin et al. (2014)
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). The non-native moss *Campylopus introflexus* has been recorded from the SAC (Douglas et al., 1990), but this species cannot be assigned specifically to wet heath
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%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken (*Pteridium aquilinum*) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush (*Juncus effusus*) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: *Sphagnum* condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the *Sphagnum* 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	Less than 33% collectively of the last complete growing season's shoots of ericoids, crowberry (*Empetrum nigrum*) and bog-myrtle (*Myrica gale*) 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 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)
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)
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). There is a historic record for the FPO listed and Vulnerable marsh clubmoss (*Lycopodiella inundata*) (Wyse Jackson et al., 2016) from Lough Belshade in the SAC (NPWS internal files), but this species cannot be assigned specifically to wet heath

7130 Blanket bogs (* if active bog)

To restore the favourable conservation condition of Blanket bogs (*if active bog) in River Finn 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 River Finn SAC but from current available data the total area of the qualifying habitat is estimated to be approximately 519ha, covering 9% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the River Finn SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Blanket bog is documented to occur throughout much of the upland areas of the SAC and along the edges of the river. The most extensive examples are found at Tullytresna and Owendoo/Cloghervaddy. A valley bog is present to the north-east of Lough Finn (Douglas et al., 1990; NPWS internal files). Further information can be found within Douglas et al. (1990), 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 (Douglas et al., 1990; NPWS internal files), four of which correspond to communities 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 *Sphagnum fallax*, 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). The non-native moss *Campylopus introflexus* has been recorded from the SAC (Douglas et al., 1990), but this species cannot be assigned specifically to blanket bog

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: *Sphagnum* condition	Condition at a representative number of 2m x 2m monitoring stops	Less than 10% of the *Sphagnum* 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 (*Empetrum nigrum*) and bog-myrtle (*Myrica gale*) 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). There is a historic record for the FPO listed and Vulnerable marsh clubmoss (*Lycopodiella inundata*) (Wyse Jackson et al., 2016) from Lough Belshade in the SAC (NPWS internal files), but this species cannot be assigned specifically to blanket bog

7140 Transition mires and quaking bogs

To restore the favourable conservation condition of Transition mires and quaking bogs in River Finn 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	Transition mires and quaking bogs have not been mapped in detail for River Finn SAC and thus total area of the qualifying habitat is unknown. Further details on this and the following attributes can be found in the River Finn SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat occurs at the interface between bog and waterbodies. An extensive area of this habitat is found at Owendoo/Cloghervaddy to the west of the Owendoo River. It is also though to occur in quaking areas associated with Cronakerny and Cronamuck. Other locations that support this habitat include Tullytresna and the lake edges of Lough Fad, Lough Finn, Lough Gulladuff and the small lakes south of Lough Belshade (Douglas et al., 1990; NPWS internal files). Further information can be found within Douglas et al. (1990), 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
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	A variety of transition mire vegetation communities have been recorded in this SAC (NPWS internal files), two of which correspond to communities 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: number of positive indicator species	Vegetation composition: number of positive indicator species	Number of positive indicator species at each monitoring stop is at least three for infilling pools and flushes and at least six for fens	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: number of core positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	At least one core positive indicator species present	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of positive indicator species is at least 25%	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented
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 structure: height	Percentage of leaves/shoots at a representative number of 2m x 2m monitoring stops	Proportion of live leaves and/or flowering shoots of vascular plants that are more than 15cm above the ground surface should be at least 50%	Attribute and target based on Perrin et al. (2014). This attribute is only applicable to fen and flush examples of the habitat, not to infilling pool examples
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)
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 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016)

1106 Salmon *Salmo salar*

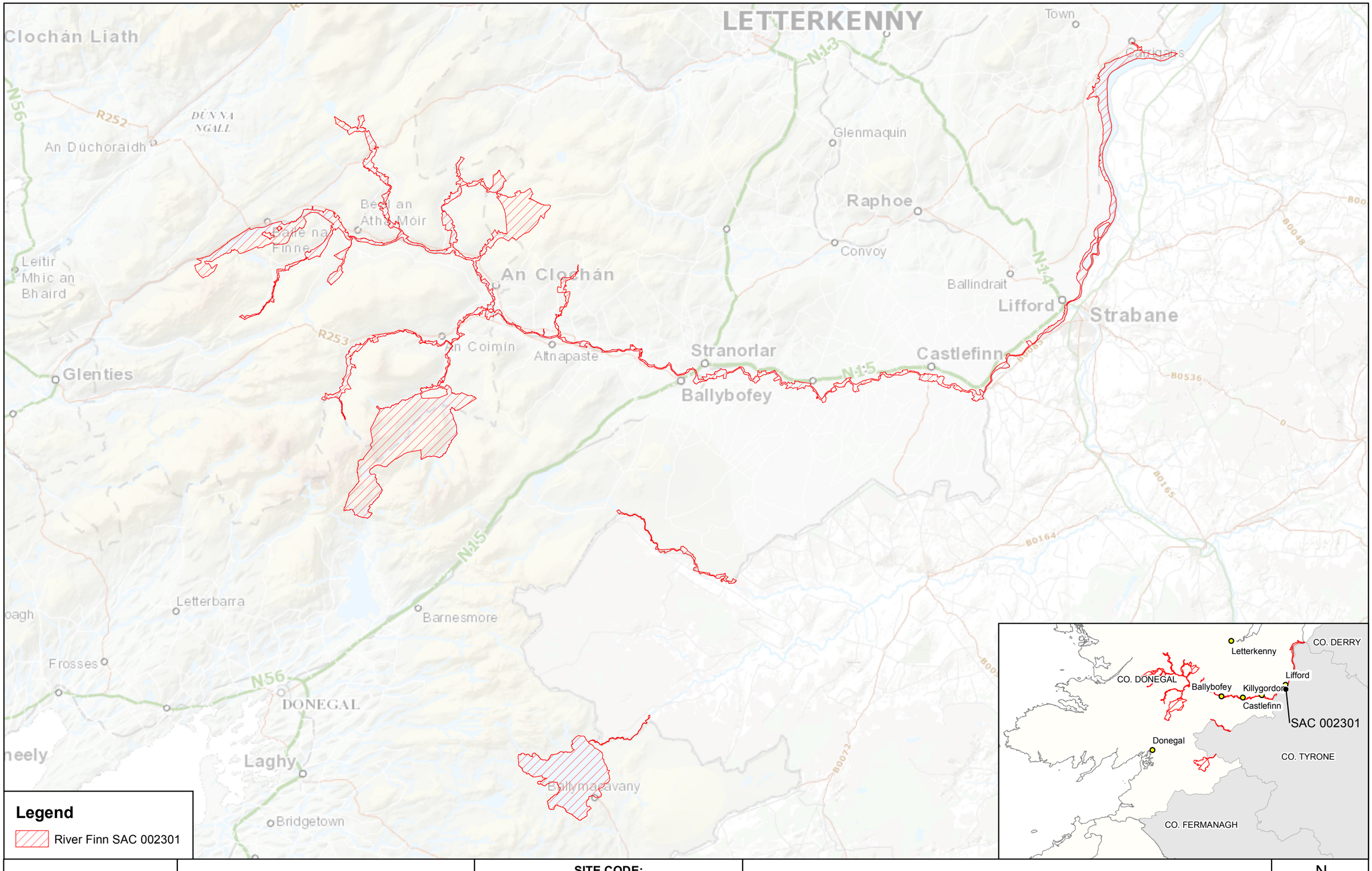
To maintain the favourable conservation condition of Atlantic Salmon in River Finn SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: extent of anadromy	Percentage of river accessible	100% of river channels down to second order accessible from estuary	Artificial barriers block salmons' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas
Adult spawning fish	Number	Conservation limit (CL) for each system consistently exceeded	A conservation limit (CL) is defined by the North Atlantic Salmon Conservation Organisation (NASCO) as "the spawning stock level that produces long-term average maximum sustainable yield as derived from the adult to adult stock and recruitment relationship". The target is based on the Standing Scientific Committee on Salmon (SSCS) annual model output of CL attainment levels. See SSCS (2016). Attainment of CL estimates are derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry/5 minutes sampling	The target is the threshold value for rivers currently exceeding their conservation limit (CL)
Out-migrating smolt abundance	Number	No significant decline	Smolt abundance can be negatively affected by a number of impacts such as estuarine pollution, predation and sea lice (*Lepeophtheirus salmonis*)
Number and distribution of redds	Number and occurrence	No decline in number and distribution of spawning redds due to anthropogenic causes	Salmon spawn in clean gravels
Water quality	EPA Q value	At least Q4 at all sites sampled by EPA	Q values based on triennial water quality surveys carried out by the Environmental Protection Agency (EPA)

1355 Otter *Lutra lutra*

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

Attribute	Measure	Target	Notes
Distribution	Percentage positive survey sites	No significant decline	Measure based on standard otter survey technique. Favourable Conservation Status (FCS) target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 390ha along river banks/lake shoreline/ around ponds	No field survey. Areas mapped to include 10m terrestrial buffer along river banks and around water bodies identified as critical for otters (NPWS, 2007)
Extent of freshwater (river) habitat	Kilometres	No significant decline. Length mapped and calculated as 182.2km	No field survey. River length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (Chapman and Chapman, 1982)
Extent of freshwater (lake) habitat	Hectares	No significant decline. Area mapped and calculated as 354ha	No field survey. Area mapped based on evidence that otters tend to forage within 80m of the shoreline (NPWS, 2007)
Couching sites and holts	Number	No significant decline	Otters need lying up areas throughout their territory where they are secure from disturbance (Kruuk and Moorhouse, 1991; Kruuk, 2006)
Fish biomass available	Kilograms	No significant decline	Broad diet that varies locally and seasonally, but dominated by fish, in particular salmonids, eels and sticklebacks in freshwater (Bailey and Rochford, 2006; Reid et al., 2013)
Barriers to connectivity	Number	No significant increase. For guidance, see map 4	Otters will regularly commute across stretches of open water up to 500m e.g. between the mainland and an island; between two islands; across an estuary (De Jongh and O'Neill, 2010). It is important that such commuting routes are not obstructed



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MAP 1:
RIVER FINN SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

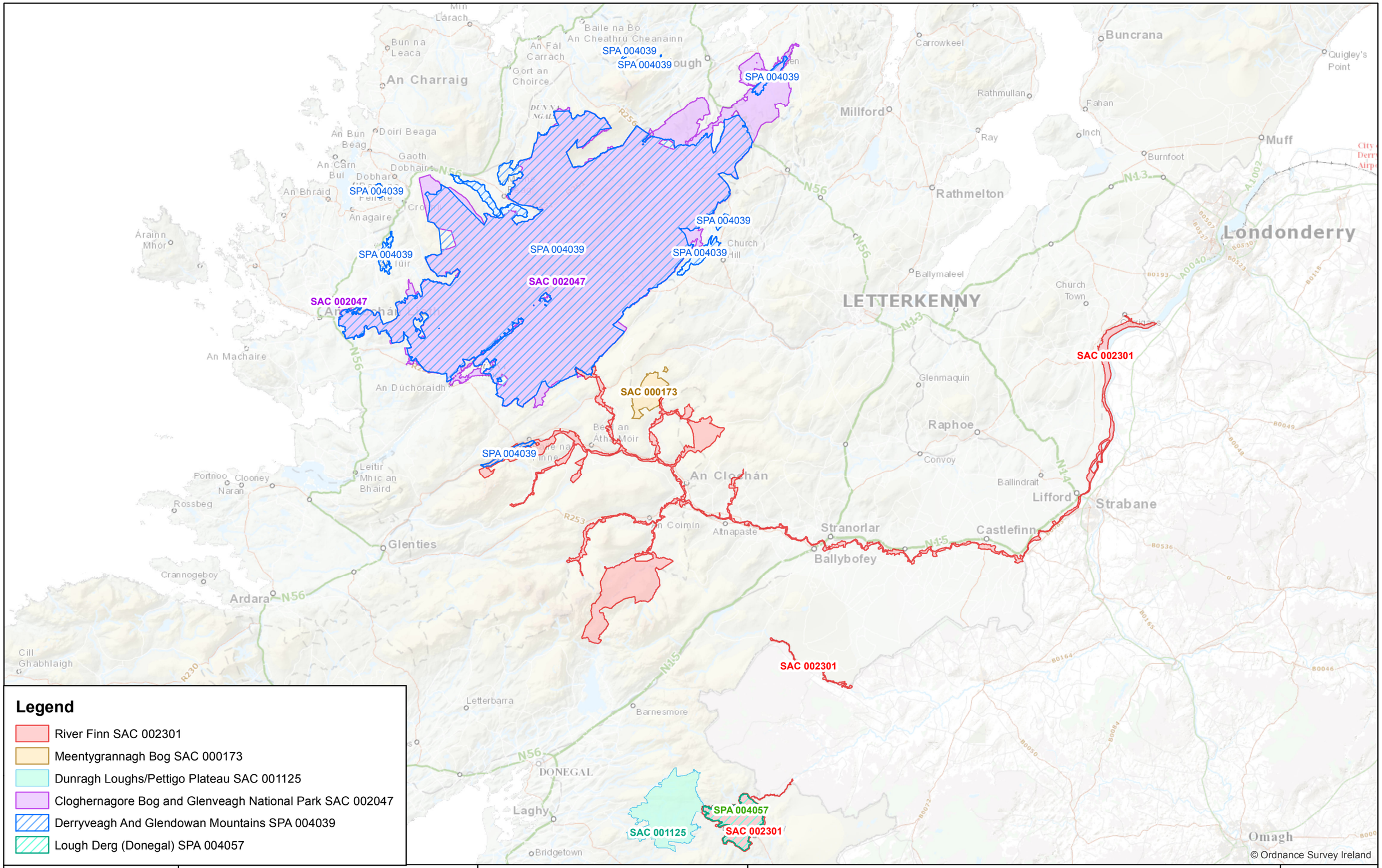
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 002301; version 3.01
CO. DONEGAL

0 2 4 6 8 km

N

Map Version 1
Date: May 2017



Legend

- River Finn SAC 002301
- Meentygrannagh Bog SAC 000173
- Dunragh Loughs/Pettigo Plateau SAC 001125
- Cloghernagore Bog and Glenveagh National Park SAC 002047
- Derryveagh And Glendowan Mountains SPA 004039
- Lough Derg (Donegal) SPA 004057

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

MAP 2:
RIVER FINN SAC
CONSERVATION OBJECTIVES
ADJACENT / ADJOINING AND OVERLAPPING DESIGNATIONS

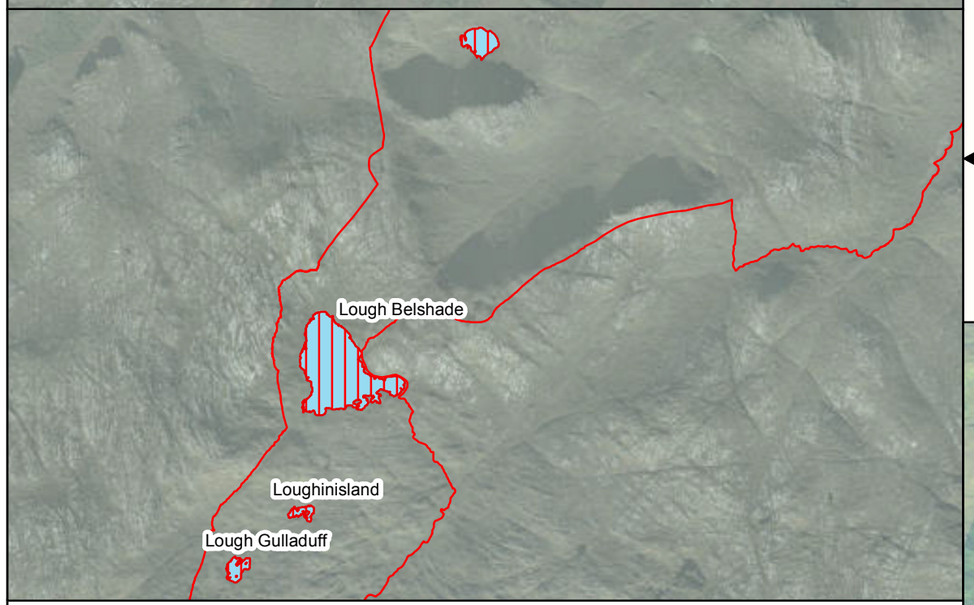
Map to be read in conjunction with the NPWS Conservation Objectives Document.

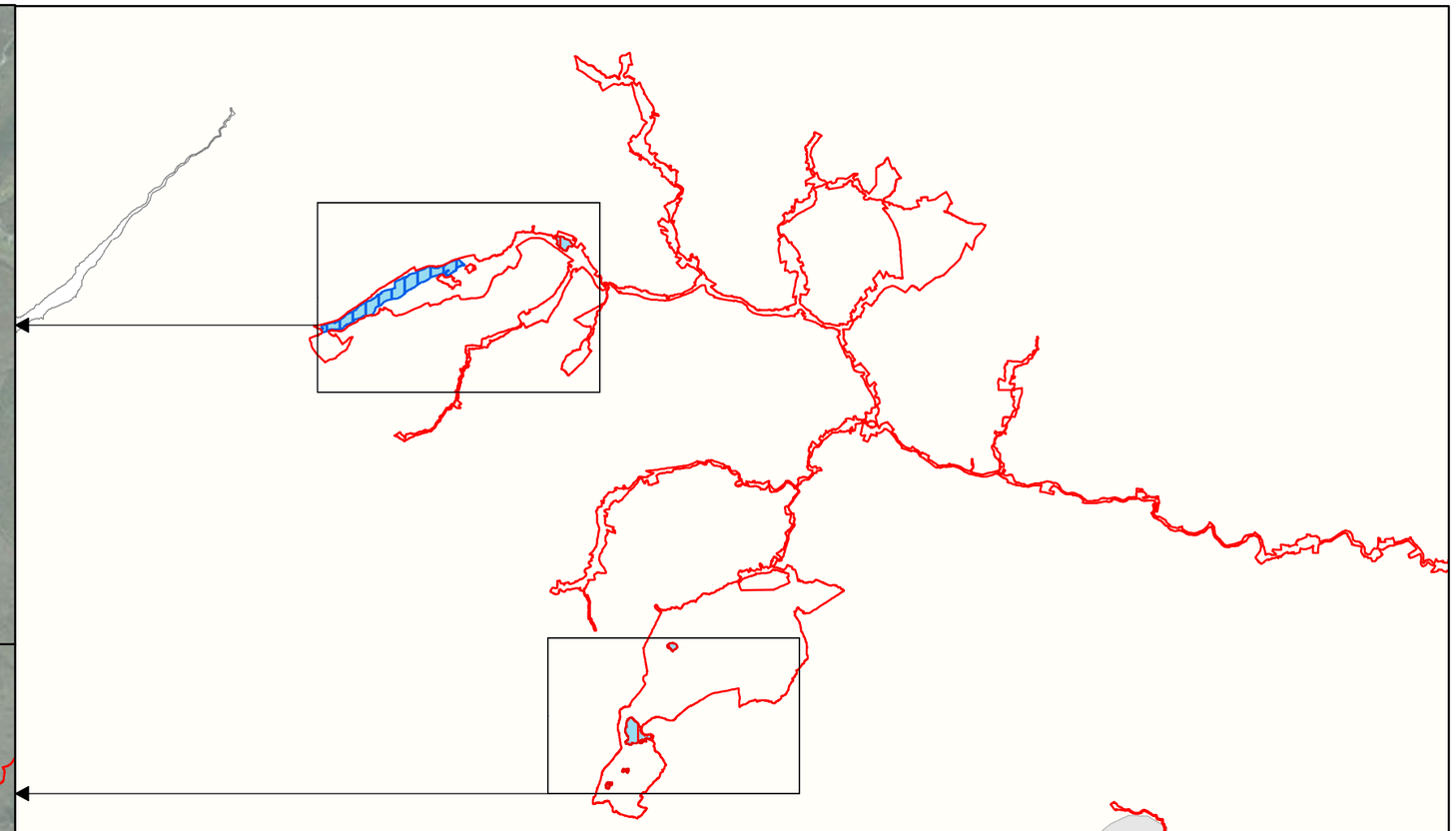
SITE CODE:
SAC 002301; version 3.01. SAC 000173; version 3.01.
SAC 002047; version 3. SAC 001125; version 3.
SPA 004039; version 3. SAC 004057; version 3.
CO. DONEGAL

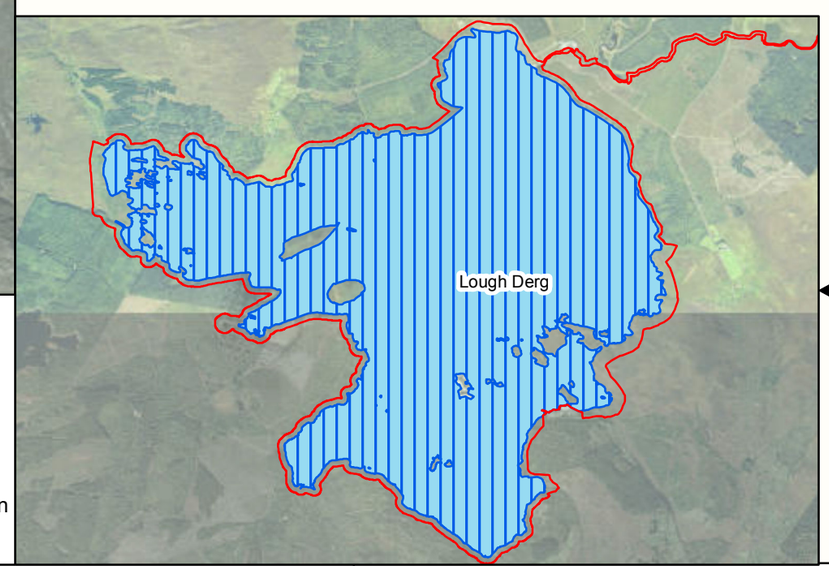
0 3 6 9 12 15 km

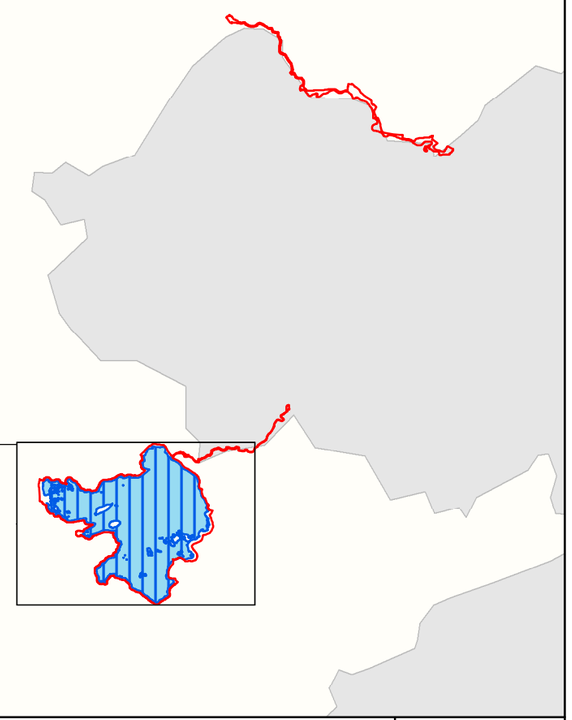
N

Map Version 1
Date: May 2017









Legend

- River Finn SAC 002301
- Potential 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
- Potential 3110 / Potential 3130 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) / Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*

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MAP 3:
RIVER FINN SAC
CONSERVATION OBJECTIVES
INDICATIVE LAKE HABITATS

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

SITE CODE:
SAC 002301; version 3.01.
CO. DONEGAL

0 2 4 6 8 10 km

N

Map Version 1
Date: May 2017

Legend

- 1355 Otter *Lutra lutra* Commuting
- River Finn SAC 002301
- OSi Discovery Series County Boundary
- Northern Ireland

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MAP 4:
RIVER FINN SAC
CONSERVATION OBJECTIVES
OTTER COMMUTING

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

SITE CODE:
SAC 002301; version 3.01
CO. DONEGAL

0 1.5 3 4.5 6 7.5 km

N

Map Version 1
Date: May 2017

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Lough Foyle SPA 004087

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
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
E-mail: nature.conservation@ahg.gov.ie

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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***

004087 Lough Foyle SPA

A001	Red-throated Diver *Gavia stellata*
A005	Great Crested Grebe *Podiceps cristatus*
A037	Bewick's Swan *Cygnus columbianus bewickii*
A038	Whooper Swan *Cygnus cygnus*
A043	Greylag Goose *Anser anser*
A046	Brent Goose *Branta bernicla hrota*
A048	Shelduck *Tadorna tadorna*
A050	Wigeon *Anas penelope*
A052	Teal *Anas crecca*
A053	Mallard *Anas platyrhynchos*
A063	Eider *Somateria mollissima*
A069	Red-breasted Merganser *Mergus serrator*
A130	Oystercatcher *Haematopus ostralegus*
A140	Golden Plover *Pluvialis apricaria*
A142	Lapwing *Vanellus vanellus*
A143	Knot *Calidris canutus*
A149	Dunlin *Calidris alpina alpina*
A157	Bar-tailed Godwit *Limosa lapponica*
A160	Curlew *Numenius arquata*
A162	Redshank *Tringa totanus*
A179	Black-headed Gull *Chroicocephalus ridibundus*
A182	Common Gull *Larus canus*
A184	Herring Gull *Larus argentatus*
A999	Wetlands

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	2014
Title :	Lough Foyle SPA (site code: 4087) Conservation objectives supporting document V1
Author :	NPWS
Series :	Conservation objectives supporting document

A005 Great Crested Grebe *Podiceps cristatus*

To maintain the favourable conservation condition of Great Crested Grebe in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by great crested grebe, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A037 Bewick's Swan *Cygnus columbianus bewickii*

To maintain the favourable conservation condition of Bewick's Swan in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in range, timing or intensity of use of areas by Bewick's swan, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A038 Whooper Swan *Cygnus cygnus*

To maintain the favourable conservation condition of Whooper Swan in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by whooper swan, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part four of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A043 Greylag Goose *Anser anser*

To maintain the favourable conservation condition of Greylag Goose in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by greylag goose, other than that occurring from natural patterns of variation.	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A046 **Brent Goose *Branta bernicla hrota***

To maintain the favourable conservation condition of Light-bellied Brent Goose in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by light-bellied brent goose, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A048 **Shelduck *Tadorna tadorna***

To maintain the favourable conservation condition of Shelduck in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by shelduck, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A050 Wigeon *Anas penelope*

To maintain the favourable conservation condition of Wigeon in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by wigeon, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A052 Teal *Anas crecca*

To maintain the favourable conservation condition of Teal in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by teal, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A053 Mallard *Anas platyrhynchos*

To maintain the favourable conservation condition of Mallard in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by mallard, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A063 **Eider *Somateria mollissima***

To maintain the favourable conservation condition of Eider in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by eider, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A069 Red-breasted Merganser *Mergus serrator*

To maintain the favourable conservation condition of Red-breasted Merganser in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by red-breasted merganser, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A130 Oystercatcher *Haematopus ostralegus*

To maintain the favourable conservation condition of Oystercatcher in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by oystercatcher, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part four of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A140 **Golden Plover *Pluvialis apricaria***

To maintain the favourable conservation condition of Golden Plover in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A142 Lapwing *Vanellus vanellus*

To maintain the favourable conservation condition of Lapwing in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by lapwing, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A143 **Knot *Calidris canutus***

To maintain the favourable conservation condition of Knot in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by knot, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A149 Dunlin *Calidris alpina alpina*

To maintain the favourable conservation condition of Dunlin in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by dunlin, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A157 Bar-tailed Godwit *Limosa lapponica*

To maintain the favourable conservation condition of Bar-tailed Godwit in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A160 Curlew *Numenius arquata*

To maintain the favourable conservation condition of Curlew in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by curlew, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A162 Redshank *Tringa totanus*

To maintain the favourable conservation condition of Redshank in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by redshank, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A179 Black-headed Gull *Chroicocephalus ridibundus*

To maintain the favourable conservation condition of Black-headed Gull in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas used by black-headed gull other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A182 Common Gull *Larus canus*

To maintain the favourable conservation condition of Common Gull in Lough Foyle SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by common gull, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A184 Herring Gull *Larus argentatus*

To maintain the favourable conservation condition of Herring Gull in Lough Foyle SPA, which is defined by the following list of attributes and targets:

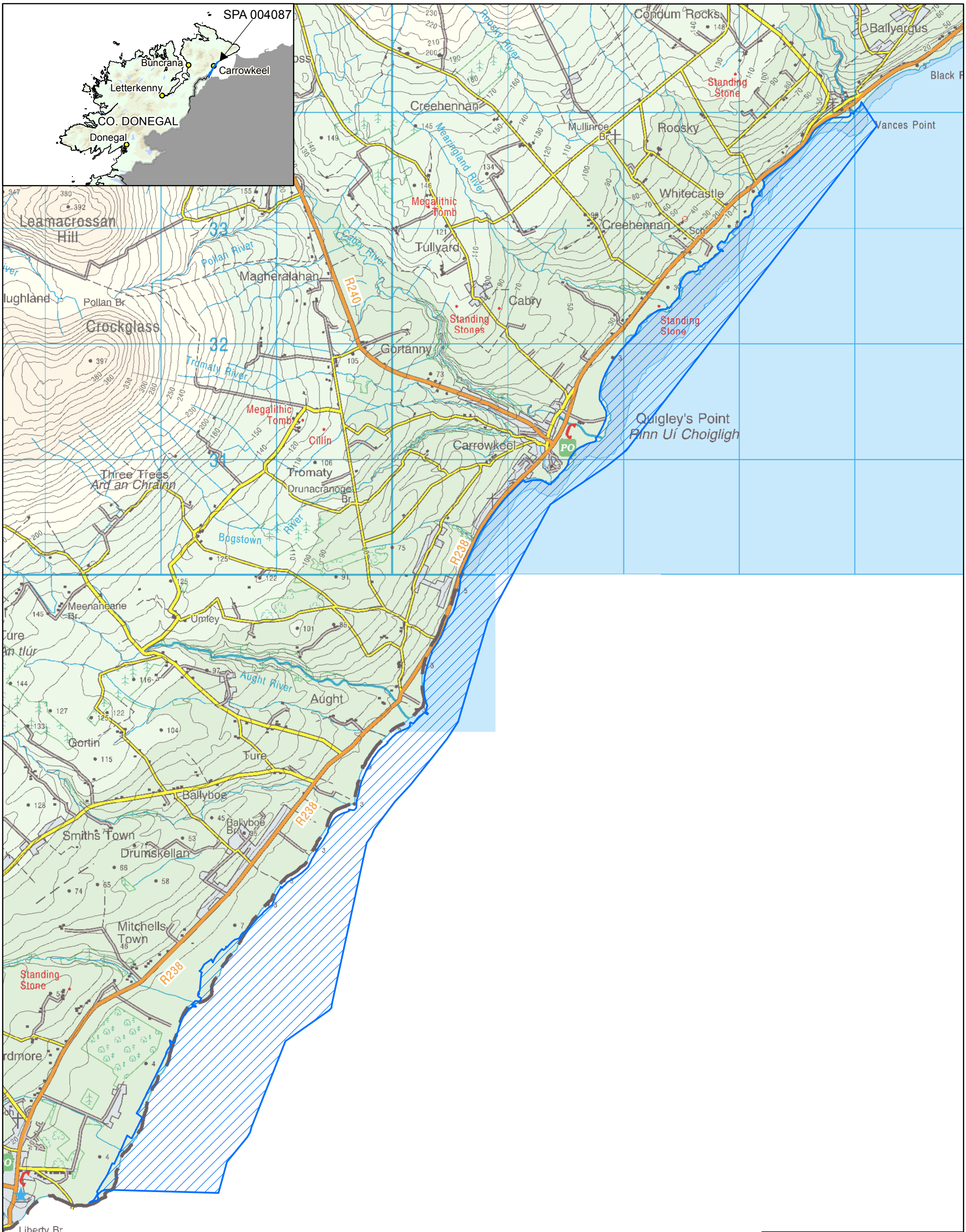
Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by herring gull, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 waterbird survey programme is discussed in part five of the conservation objectives supporting document

Conservation Objectives for : Lough Foyle SPA [004087]

A999 Wetlands

To maintain the favourable conservation condition of the wetland habitat in Lough Foyle SPA as a resource for the regularly occurring waterbirds that utilise it. This is defined by the following attribute and target:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 588 hectares, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 588ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document



Legend

Lough Foyle SPA 004087

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

MAP 1: LOUGH FOYLE SPA CONSERVATION OBJECTIVES SPA DESIGNATION

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

SITE CODE:
SPA 004087; version 2.01. CO. DONEGAL

0 0.5 1 km

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Map Version 1
Date: Sep 2014

Appendix B

Nutrient Sensitive Qualifying Interests

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

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

Appendix C

EAM Summary Report for 029 Pollan Dam WSZs

ARUP

Uisce Éireann

Lead in Drinking Water Mitigation Plan - EAM

Illies EAM

Reference: 029. Illies EAM I06

I06 | 03 January 2024

Job number 257367-10

Ove Arup & Partners Ireland Limited
50 Ringsend Road
Dublin 4
D04 T6X0
Ireland
arup.com

ARUP

Document Verification

Project title	Lead in Drinking Water Mitigation Plan - EAM
Document title	Illies EAM
Job number	257367-10
Document ref	029. Illies EAM I06
File reference	

Revision	**Date**	**Filename**	029. Illies EAM I06.docx		
Issue 6	03 January 2024	**Description**	Update to Dosing area, UFW and flow rate		
			Prepared by	**Checked by**	**Approved by**
		Name	Ezzah Rasheed	Alison Orr	Gerry Baker
		Signature			
		Filename			
		Description			
			Prepared by	**Checked by**	**Approved by**
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	**Checked by**	**Approved by**
		Name			
		Signature			

Issue Document Verification with Document ✓

Contents

Tables

Figures

1. Introduction

This document presents the results of the implementation of the Lead Mitigation Environmental Assessment Methodology (EAM) to assess the impact of dosing the Illies 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.
- 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

- AER – Annual Environmental Report
- Agglomeration- the catchment of the WWTP
- DWWTS -Domestic Wastewater 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 P04-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 (e.g. 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 – Wastewater Treatment Plant

3. Illies WSZ

Illies Water Supply Zone (WSZ) is located in County Donegal and comprises of Buncrana WSZ (0600PUB1018), Carndonagh Mixed (incl. Gleneely WSZ) WSZ (0600PUB1007), Inishowen West WSZ (0600PUB1005), Inishowen East WSZ (0600PUB1002) and Pollan Dam WSZ (0600PUB1020). The Illies WSZ currently supplies drinking water across a large area of County Donegal extending east of Letterkenny and across much of the Inishowen Peninsula. Figure 1, at the end of this report, shows the location of the proposed area to receive Orthophosphate dosed drinking water.

The average daily flows and accounted for water rates are as follows:

- Buncrana WSZ: 1,190 m^3/day, 51% AFW
- Carndonagh Mixed (incl. Gleneely WSZ) WSZ: 2,676 m^3/day, 53% AFW
- Inishowen West WSZ: 1,647 m^3/day, 46% AFW
- Inishowen East WSZ: 1,207 m^3/day, 72% AFW
- Pollan Dam WSZ: 11,805 m^3/day, 49% AFW

The WSZ boundary covers urban areas which are serviced by 22 Wastewater Treatment Plants (WWTPs) (Buncrana WWTP, Carndonagh Malin WWTP, Gleneely WWTP, Glengad WWTP, Malin Head WWTP, Ballyliffen WWTP, Clonmany WWTP, Greencastle Housing Scheme WWTP, Moville WWTP, Bridgeend WWTP, Burnfoot WWTP, Carrigans WWTP, Fahan WWTP, Greenbank No.1 Housing Scheme WWTP, Inch Island WWTP, Killea WWTP, Letterkenny WWTP, Manorcunningham WWTP, Moness WWTP, Newtowncunningham WWTP, Redcastle WWTP and St Johnston WWTP). There are an estimated 12,032 properties across the WSZ that are serviced by Domestic Waste Water Treatment Systems (DWWTS i.e. septic tanks).

Water Supply Zone	Illies WSZ
Step 1 – Appropriate Assessment Screening	To be completed by Ryan Hanley
Model Assumptions	All concentration and loading units for orthophosphate (P04-P) are expressed as mg/l P and kg P/yr. Adopted Orthophosphate Optimum Dosing Concentration is 0.6 mg/l P. Unaccounted for water from the mains is 28% - 54%. Seepage from the mains is distributed evenly across the entire length of the WSZ network. 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. Conversion factor for Total Phosphorus to Orthophosphate for WWTP effluent is 0.5. It is assumed there will be no treatment of additional OP 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 TP or OP then the ability of the plant to treat the additional load is confirmed with Irish Water. Where IW indicates a tertiary plant has not remaining treatment capacity it will be assumed the entire additional load is not treated. Where existing monitoring data is not available a surrogate status is derived from the Orthophosphate indicative quality of the waterbody in the following hierarchy: • Upstream waterbodies • Downstream waterbodies • Adjacent waterbodies of similar hydrological settings • Ecological status of the waterbody. The mid-point of that surrogate indicative quality range is used as baseline concentration.

Water Supply Zone	Illies WSZ
Step 2 & 3 – Impact on Waste Water Treatment Plant (WWTP) effluent concentrations and receiving WBs	This section assesses the influent and effluent P loads and resultant OP dosages at the 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. The treatment level and PE of the WWTPs within the agglomerations are as follows; • Ballyliffen – Secondary treatment PE 649 • Bridgeend – Secondary treatment PE 410 • Buncrana – Primary treatment PE 9,002 • Burnfoot – Secondary treatment PE 329 • Carndonagh Malin – Secondary treatment PE 4,888 • Carrigans – Primary treatment PE 280 • Clonmany – Secondary treatment PE 344 • Fahan – Primary treatment PE 848 • Gleneely – Secondary treatment PE 400 • Glengad – Secondary treatment PE 60 • Greenbank No.1 Housing Scheme – Primary treatment PE 28 • Greencastle Housing Scheme – Primary treatment PE 90 • Inch Island – Secondary treatment PE 50 • Killea – Secondary treatment PE 546 • Letterkenny – Tertiary treatment PE 23,847 • Malin Head – Secondary treatment PE 63 • Manorcunningham – Secondary treatment PE 800 • Moness – Secondary treatment PE 60 • Moville – No treatment PE 1,910 • Newtowncunningham – Secondary treatment PE 1,311 • Redcastle – Primary treatment PE 40 • St Johnston – Tertiary treatment PE 723 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.
Step 4 - Subsurface pathways	The loading from mains leakage is 9,117 m^3/d (1,997 kg/yr P). Approximately 1,633 kg/yr P of the load is attenuated along the flowpaths. The hydraulic loading from the DWWTS is 2,832 m3/d (747 kg/yr P). Approximately 741 kg/yr P of the load is attenuated along the flowpaths. Flow monitoring gauges are available for four RWBs within the assessment area Crana_010, Crana_020, Crana_030 and Owennasop_010. Where flow monitoring gauges are not available the river flows for receiving waterbodies are established from Hydrotool data or, if that is not available, using the Area-SAAR method. Baseline orthophosphate monitoring data and associated thresholds are available for 39 RWBs. There are 18 RWBs that require a surrogate water body status. There is no deterioration in any RWB status as a result of additional orthophosphate discharge through sub-surface pathways.
Step 5 and 6 - Combined Impact from direct and diffuse sources on River Waterbodies (RWB)	This section assesses the combined impact as a result of increased Orthophosphate load from WWTP discharges (Steps 2 & 3), seepage from mains and DWWTS and cumulative impacts from other dosing areas. Direct discharges from WWTPs are combined with diffuse discharges at the following receiving waterbodies and tracked downstream from that point: • Ballyliffen WWTP – Ardagh_010 • Bridgeend WWTP – Skeoge_010 • Buncrana WWTP – Crana_030 (SWO only) • Burnfoot WWTP – Burnfoot_020

Water Supply Zone	Illies WSZ
	• Carndonagh Malin WWTP – Donagh_030 • Carrigans WWTP – Carrigans_010 • Clonmany WWTP – Clonmany_020 • Gleneely WWTP – Culdaff_010 • Glengad WWTP – Portaleen_010 • Greencastle Housing Scheme WWTP – Greencastle_010 • Killea WWTP – Carrigans_010 • Malin Head WWTP – Keenagh_020 • Manorcunningham WWTP – Leslie hill stream_020 • Moness WWTP – Carrowen_010 • Moville WWTP – Bredagh_010 • Newtowncunningham WWTP – Glar_010 • Redcastle WWTP – Fad (Redcastle)_010 • St Johnston WWTP – ST Johnston_010 Figure 2 illustrates the scale of Orthophosphate loading to the receiving water bodies from mains leakage, DWWTS and direct discharges from WWTP and SWOs and upstream dosing areas. This illustrates that a significant proportion of the load is from mains leakage through the near surface and subsurface pathways and direct discharges from WWTPs. Upstream dosing areas account for a significant proportion of the load in Swilly (Donegal)_010 and Leslie Hill Stream_020. Figure 3 presents the total loading to the 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 upstream dosing areas, mains leakage and primary discharge account for the largest proportion of transported load and that a large proportion of the load from mains leakage and DWWTS is attenuated. The Orthophosphate concentrations in the RWBs following dosing are presented in Table 2. The modelled increase in concentration as a result of the drinking water treatment with orthophosphate does not cause a deterioration in the status of any river water body.
Step 5 and 6 - Combined Impact through subsurface and surface pathways on Groundwater Waterbodies (GWB)	The increase in orthophosphate concentrations in Groundwater Waterbodies (GWBs) as a result of the P drinking water dosing is shown in Table 3. Monitoring data is available for four (Carndonagh Gravel, East Inishowen, Lough Swilly and River Foyle) of the 7 groundwater bodies. The increase in concentration as a result of the orthophosphate dosing of the drinking water does not cause a deterioration in the status of either GWB.
Step 5 and 6 - Combined Impact from direct and diffuse sources on Lakes within the Water Supply Zone	There are no lake water bodies affected by the drinking water orthophosphate treatment.
Step 5 and 6 - Combined Impact from direct and diffuse sources on Transitional and Coastal Waterbodies	The increase in Orthophosphate concentrations in the downstream Transitional Waterbodies and small Coastal (TraC) Waterbodies as a result of drinking water dosing is shown in Table 4. Baseline orthophosphate monitoring data and associated thresholds are available for Swilly Estuary and Lough Swilly but not for the other 9 TraC waterbodies. Direct discharges from WWTPs are combined with diffuse discharges at the following receiving TraC waterbodies: Buncrana WWTP – Lough Swilly and Crana Estuary (SWO only) Fahan WWTP – Swilly Estuary Greenbank No.1 Housing Scheme WWTP – Lough Foyle Inch Island WWTP – Swilly Estuary Letterkenny WWTP – Swilly Estuary Moville WWTP – Lough Foyle (SWO only) The drinking water dosing with orthophosphate does not deteriorate the status of any TraC waterbody for both the summer and winter seasons.

Water Supply Zone	Illies WSZ
Step 5 and 6 Cumulative Assessment of impact from all EAMs within the catchment on: Transitional and Coastal Water Bodies AND Protected Waterbodies	<u>Step 5 and 6 Cumulative Assessment of impact from all EAMs within catchment on Transitional and Coastal Waterbodies</u> 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. The following EAM dosing areas are within the Lough Swilly, Foyle and Donagh-Moville Catchment and discharge to the same TraC WBs as Illies EAM, see Figure 4: 022. Letterkenny 103. Milford 136. Glentiles-Ardara 261. Fanad West (Tullyconnell) The increase in orthophosphate concentrations in the TraC WBs as a result of the drinking water dosing of all EAMs with orthophosphate is shown in Table 5. There is no deterioration in waterbody status as a result of the cumulative assessment. <u>Step 5 and 6 Cumulative Assessment of impact from EAMs on downstream Protected Waterbodies</u> The cumulative load from this dosing area and any upstream dosing area was tracked downstream to determine the potential concentration increase in any RWBs which are Special Areas of Conservation (SAC). There are no downstream protected waterbodies which have not already been considered as part of this assessment.
Conclusions	**Red, Amber, Green (RAG) STATUS: EAM Result - GREEN** 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 Amber 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 Red. If the EAM indicates there will not be a deterioration in the waterbody status as a result of drinking water dosing it will remain Green. A map of the RAG status of waterbodies is presented in Figure 5.
Recommendation	No recommendations required.

Table 1: Increased loading/concentration from WWTPs due to dosing of drinking water – Dosing rate = 0.6 mg/l

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2022) Compliance	Primary Discharge Receiving WB		Annual average TP Load kg/yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Ballyliffen Primary Discharge	Secondary	Orthophosphate 0.1mg/l – Non-compliant	Ardagh_010	Pre-Dosing	221	1.40	1.12	1.91
				Post Dosing	244	1.55	1.24	2.10
Ballyliffen SWOs (1 No.)				Pre-Dosing	14	0.43	0.34	0.58
				Post Dosing	14	0.45	0.36	0.61
Bridgeend Primary Discharge	Secondary	OrthoPhosphate 1.5mg/l – Non-compliant	Skeoge_010	Pre-Dosing	140	0.91	0.73	1.24
				Post Dosing	157	1.03	0.82	1.40
Bridgeend SWOs (3 No.)				Pre-Dosing	9	0.28	0.22	0.38
				Post Dosing	9	0.30	0.24	0.40
Buncrana Primary Discharge	Primary Treatment	None	Lough Swilly	Pre-Dosing	4383	2.33	1.86	3.16
				Post Dosing	4733	2.51	2.01	3.42
Buncrana SWOs (3 No.)				Pre-Dosing	191	0.50	0.40	0.68
				Post Dosing	202	0.52	0.42	0.71
Burnfoot Primary Discharge	Secondary	OrthoPhosphate 1mg/l – Non-compliant	Burnfoot_020	Pre-Dosing	112	2.13	1.71	2.90
				Post Dosing	127	2.42	1.93	3.26
Carrigans Primary Discharge	Primary Treatment	None	Carrigans_010	Pre-Dosing	136	5.34	4.27	7.26
				Post Dosing	148	5.80	4.64	7.89

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2022) Compliance	Primary Discharge Receiving WB		Annual average TP Load kg/yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Carndonagh Malin Primary Discharge	Secondary	Total Phosphate 2mg/l - Compliant	Donagh_030	Pre-Dosing	355	0.27	0.22	0.37
				Post Dosing	499	0.38	0.30	0.52
Carndonagh Malin SWOs (1 No)				Pre-Dosing	59	0.22	0.18	0.30
				Post Dosing	63	0.23	0.19	0.32
Clonmany Primary Discharge	Secondary	OrthoPhosphate 1.5mg/l – Non-compliant	Clonmany_020	Pre-Dosing	117	0.37	0.30	0.50
				Post Dosing	130	0.41	0.33	0.56
Clonmany SWOs (1 No.)				Pre-Dosing	7	0.11	0.09	0.15
				Post Dosing	8	0.12	0.10	0.16
Fahan Primary Discharge	Primary Treatment	OrthoPhosphate 8mg/l – Compliant	Swilly Estuary	Pre-Dosing	413	1.39	1.11	1.89
				Post Dosing	449	1.51	1.21	2.06
Fahan SWOs (1 No.)				Pre-Dosing	18	0.30	0.24	0.41
				Post Dosing	19	0.32	0.25	0.43
Gleneely Primary Discharge	Secondary	None	Culdaff_010	Pre-Dosing	136	3.74	2.99	5.08
				Post Dosing	148	4.05	3.24	5.50
Glengad Primary Discharge	Secondary	None	Portaleen_010	Pre-Dosing	20	3.74	2.99	5.08
				Post Dosing	22	4.05	3.24	5.50

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2022) Compliance	Primary Discharge Receiving WB		Annual average TP Load kg/yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Greenbank No.1 Housing Scheme Primary Discharge	Primary Treatment	None	Lough Foyle	Pre-Dosing	14	5.34	4.27	7.26
				Post Dosing	15	5.80	4.64	7.89
Greenbank No.1 Housing Scheme SWOs (1 No)				Pre-Dosing	1	1.14	0.91	1.55
				Post Dosing	1	1.21	0.97	1.64
Greencastle Housing Scheme Primary Discharge	Primary Treatment	None	Greencastle_010	Pre-Dosing	44	5.34	4.27	7.26
				Post Dosing	47	5.75	4.60	7.82
Inch Island Primary Discharge	Secondary	None	Swilly Estuary	Pre-Dosing	17	3.74	2.99	5.08
				Post Dosing	19	4.20	3.36	5.71
Killea Primary Discharge	Secondary	OrthoPhosphate 0.3mg/l – Non-compliant	Carrigans_010	Pre-Dosing	186	1.63	1.31	2.22
				Post Dosing	210	1.84	1.47	2.50
Killea SWOs (2 No)				Pre-Dosing	12	0.50	0.40	0.68
				Post Dosing	12	0.53	0.42	0.72
Letterkenny Primary Discharge	Tertiary	OrthoPhosphate 1mg/l – Compliant	Swilly Estuary	Pre-Dosing	376	0.05	0.04	0.06
				Post Dosing	376	0.05	0.04	0.06

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2022) Compliance	Primary Discharge Receiving WB		Annual average TP Load kg/yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Letterkenny SWOs (10 No)				Pre-Dosing	357	0.22	0.18	0.30
				Post Dosing	357	0.22	0.18	0.30
Malin Head Primary Discharge	Secondary	None	Keenagh_020	Pre-Dosing	21	3.74	2.99	5.08
				Post Dosing	23	4.05	3.24	5.50
Manorcunningham Primary Discharge	Secondary	OrthoPhosphate 8mg/l – Compliant	Leslie hill stream_020	Pre-Dosing	273	2.32	1.86	3.16
				Post Dosing	307	2.61	2.09	3.55
Moness Primary Discharge	Secondary	None	Carrowen_010	Pre-Dosing	20	3.74	2.99	5.08
				Post Dosing	23	4.20	3.36	5.71
Moville Primary Discharge	No Treatment	None	Bredagh_010	Pre-Dosing	1394	8.00	6.40	10.88
				Post Dosing	1471	8.44	6.75	11.48
Moville SWOs (5 No.)				Pre-Dosing	41	1.14	0.91	1.55
				Post Dosing	43	1.21	0.96	1.64
Newtowncunningham Primary Discharge	Secondary	OrthoPhosphate 0.5mg/l – Non-compliant	Glar_010	Pre-Dosing	447	1.51	1.21	2.06
				Post Dosing	505	1.71	1.37	2.31
Newtowncunningham SWOs (4 No)				Pre-Dosing	28	0.46	0.37	0.63
				Post Dosing	30	0.49	0.39	0.67

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2022) Compliance	Primary Discharge Receiving WB		Annual average TP Load kg/yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Redcastle Primary Discharge	Primary Treatment	None	Fad (Redcastle)_010	Pre-Dosing	19	5.34	4.27	7.26
				Post Dosing	21	5.82	4.65	7.89
St Johnston Primary Discharge	Tertiary	OrthoPhosphate 8mg/l – Compliant	St Johnston_010	Pre-Dosing	53	0.80	0.64	1.09
				Post Dosing	53	0.80	0.64	1.15
St Johnston SWOs (2 No)				Pre-Dosing	15	1.14	0.91	1.55
				Post Dosing	16	1.21	0.97	1.65

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

Name	EU_CD	Indicative Quality Surrogate Status in italic	Baseline Conc. (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Aghaweel_010	IE_NW_39A010400	Poor	0.0656	0.0868	7.6	0.0008	0.0664
Ardagh_010	IE_NW_40A090780	High	0.0165	0.0188	14.7	0.0017	0.0182
Ardmore_010	IE_NW_40A080820	*High*	0.0125	0.0188	2.7	0.0001	0.0126
Aught_010	IE_NW_40A010930	*Good*	0.0300	0.0325	13.7	0.0007	0.0307
Ballyboe_010	IE_NW_40B030400	High	0.0089	0.0188	1.1	0.0001	0.0090
Ballycramsy_010	IE_NW_40B200980	*High*	0.0125	0.0188	2.3	0.0002	0.0127
Ballygorman_010	IE_NW_40B210940	*High*	0.0125	0.0188	2.3	0.0002	0.0127
Ballyhallan_010	IE_NW_40B010200	High	0.0093	0.0188	0.7	0.0001	0.0094
Bredagh_010	IE_NW_40B020400	Poor	0.0656	0.0868	44.0	0.0026	0.0683
Burnfoot_010	IE_NW_39B020200	*High*	0.0125	0.0188	3.2	0.0005	0.0130
Burnfoot_020	IE_NW_39B020600	High	0.0184	0.0188	14.1	0.0008	0.0192
Cabry_010	IE_NW_40C030200	High	0.0160	0.0188	7.6	0.0007	0.0167
Carrigans_010	UKGBNI1NW010103062	Good	0.0286	0.0325	31.7	0.0013	0.0298
Carrowen_010	IE_NW_39C910930	*Good*	0.0300	0.0325	5.3	0.0004	0.0304
Carrowhugh_010	IE_NW_40C210960	*Good*	0.0300	0.0325	2.4	0.0003	0.0303
Cashelnacor_010	IE_NW_39C010200	High	0.0153	0.0188	4.2	0.0007	0.0161
Clonmany_010	IE_NW_40C010100	High	0.0094	0.0188	6.6	0.0005	0.0099

Name	EU_CD	Indicative Quality Surrogate Status in italic	Baseline Conc. (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Clonmany_020	IE_NW_40C010200	Good	0.0291	0.0325	31.9	0.0006	0.0297
Clonmany_030	IE_NW_40C010300	*Good*	0.0300	0.0325	36.2	0.0006	0.0306
Cloontagh_010	IE_NW_40C040400	High	0.0083	0.0188	7.7	0.0005	0.0088
Cooly_010	IE_NW_40C150980	*High*	0.0125	0.0188	2.0	0.0002	0.0127
Crana_010	IE_NW_39C020100	High	0.0061	0.0188	0.7	0.00005	0.0061
Crana_020	IE_NW_39C020300	*High*	0.0125	0.0188	10.4	0.0002	0.0127
Crana_030	IE_NW_39C020500	High	0.0134	0.0188	58.7	0.0004	0.0138
Culdaff_010	IE_NW_40C020100	Good	0.0253	0.0325	11.2	0.0002	0.0255
Culdaff_020	IE_NW_40C020150	High	0.0059	0.0188	11.4	0.0002	0.0061
Donagh_010	IE_NW_40D010040	High	0.0172	0.0188	2.3	0.0002	0.0174
Donagh_020	IE_NW_40D010100	*High*	0.0125	0.0188	9.2	0.0003	0.0128
Donagh_030	IE_NW_40D010400	High	0.0075	0.0188	91.9	0.0025	0.0099
Dooballagh Burn_010	IE_NW_39D020200	*Moderate*	0.0455	0.0508	3.3	0.0003	0.0458
Drumbarnet Stream_010	IE_NW_39D030600	High	0.0174	0.0188	3.2	0.0003	0.0178
Drung_010	IE_NW_40D020200	High	0.0050	0.0188	3.3	0.0004	0.0054
Fad (Redcastle)_010	IE_NW_40F010300	High	0.0215	0.0188	4.5	0.0004	0.0219*
GLACK_Or_BOHULLION_010	IE_NW_39G170760	*High*	0.0125	0.0188	6.7	0.0006	0.0131

Name	EU_CD	Indicative Quality Surrogate Status in italic	Baseline Conc. (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Glar_010	IE_NW_39G380790	Good	0.0255	0.0325	63.0	0.0018	0.0273
Glennagannon_020	IE_NW_40G010200	High	0.0080	0.0188	8.0	0.0003	0.0082
Gortyarrigan_010	IE_NW_39G110630	*High*	0.0125	0.0188	5.2	0.0007	0.0132
Greencastle_010	IE_NW_40G020400	Good	0.0315	0.0325	7.2	0.0007	0.0322
Keenagh_010	IE_NW_40K010200	*High*	0.0125	0.0188	2.9	0.0002	0.0127
Keenagh_020	IE_NW_40K010400	High	0.0208	0.0188	7.2	0.0003	0.0211*
Lenan_010	IE_NW_39L120930	*High*	0.0125	0.0188	2.2	0.0002	0.0127
Leslie Hill Stream_010	IE_NW_39L050600	High	0.0240	0.0188	9.7	0.0005	0.0245*
Leslie Hill Stream_020	IE_NW_39L050660	Moderate	0.0555	0.0508	35.5	0.0006	0.0561*
Lisfannan_010	IE_NW_39L170710	*High*	0.0125	0.0188	13.4	0.0012	0.0137
Malin Stream_010	IE_NW_40M010200	Good	0.0257	0.0325	5.9	0.0007	0.0264
Mill (Donegal)_020	IE_NW_39M020300	High	0.0193	0.0188	9.9	0.0002	0.0195*
Owenboy (Crana)_010	IE_NW_39O040400	Moderate	0.0361	0.0508	6.9	0.0002	0.0363
Owenerk_020	IE_NW_39O020200	High	0.0144	0.0188	2.3	0.0001	0.0145
Owennasop_010	IE_NW_39O050100	High	0.0083	0.0188	2.8	0.0001	0.0084
Portaleen_010	IE_NW_40P020200	Bad	0.1191	**	2.5	0.0003	0.1194
Rashenny_010	IE_NW_40R020770	*High*	0.0125	0.0188	4.2	0.0004	0.0129
Roosky_010	IE_NW_40R010300	Moderate	0.0356	0.0508	2.6	0.0003	0.0359

Name	EU_CD	Indicative Quality Surrogate Status in italic	Baseline Conc. (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Skeoge_010	UKGBNI1NW393901002	High	0.0205	0.0188	34.5	0.0009	0.0214*
St Johnston_010	IE_NW_01S010280	Good	0.0299	0.0325	9.1	0.0004	0.0303
Straid_010	IE_NW_40S010400	High	0.0085	0.0188	4.7	0.0002	0.0087
Swilly (Donegal)_010	IE_NW_39S020300	Moderate	0.0477	0.0508	161.8	0.0013	0.0490
Swilly Burn_030	IE_NW_01S030500	Moderate	0.0520	0.0508	5.5	0.0001	0.0521*

*Baseline concentration > 75% of threshold but concentration increase is <0.00125mg/l

** There is no upper threshold as the WB is at Bad status

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

Name	EU_CD	Indicative Quality Surrogate Status in italic	Baseline Conc. used in calculation (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential Baseline conc. following dosing (mg/l P)
Carndonagh Gravels	IE_NW_G_078	Good	0.0050	0.0263	2.5	0.0005	0.0055
East Inishowen	IEGBNI_NW_G_050	Good	0.0050	0.0263	16.8	0.0003	0.0053
Foyle Gravels	IE_NW_G_075	*Good*	0.0175	0.0263	0.001	0.0000002	0.0175
Lough Swilly	IEGBNI_NW_G_059	Good	0.0144	0.0263	15.6	0.0002	0.0146
Manor Cunningham	IE_NW_G_052	*Good*	0.0175	0.0263	2.1	0.0003	0.0178
Raphoe	IE_NW_G_054	*Good*	0.0175	0.0263	0.7	0.00003	0.0175
River Foyle	IEGBNI_NW_G_051	Good	0.0105	0.0263	0.1	0.00001	0.0105

Table 4: Orthophosphate concentrations in transitional waterbodies and small coastal waterbodies following dosing of drinking water

Name	EU_CD	Season	Indicative Quality Surrogate Status in italic	Baseline conc used in calculation (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Crana Estuary	IE_NW_220_0400	Summer	*High*	0.0125	0.0188	73.8	0.0004	0.0129
		Winter	*High*	0.0125	0.0188	73.8	0.0004	0.0129
Inch Lough	IE_NW_220_0300	Summer	*High*	0.0125	0.0188	46.5	0.0007	0.0132
		Winter	*High*	0.0125	0.0188	46.5	0.0007	0.0132
Blanket Nook Lough	IE_NW_220_0200	Summer	*Good*	0.0325	0.0363	63.0	0.0018	0.0343
		Winter	*Good*	0.0325	0.0363	63.0	0.0018	0.0343
Swilly Estuary	IE_NW_220_0100	Summer	High	0.0180	0.0188	217.0	0.0011	0.0191
		Winter	High	0.0150	0.0188	217.0	0.0011	0.0161
Outer Swilly Estuary	IE_NW_220_0500	Summer	*Good*	0.0325	0.0363	326.5	0.0006	0.0331
		Winter	*Good*	0.0325	0.0363	326.5	0.0006	0.0331
Lough Swilly	IE_NW_220_0000	Summer	High	0.0110	0.0188	594.0	0.0007	0.0117
		Winter	High	0.0125	0.0188	594.0	0.0007	0.0132
Foyle and Faughan Estuaries	UKGBNI5NW250010	Summer	*Moderate*	0.0500	0.0550	62.6	0.0001	0.0501
		Winter	*Moderate*	0.0500	0.0550	62.6	0.0001	0.0501
Lough Foyle	GBNIIE6NW250	Summer	*Moderate*	0.0500	0.0550	134.9	0.0001	0.0501
		Winter	*Moderate*	0.0500	0.0550	134.9	0.0001	0.0501

Name	EU_CD	Season	Indicative Quality Surrogate Status in italic	Baseline conc used in calculation (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Portstewart Bay	GBNIIE6NB010	Summer	*Good*	0.0325	0.0363	137.3	0.0001	0.0326
		Winter	*Good*	0.0325	0.0363	137.3	0.0001	0.0326
Northern Atlantic Seaboard (HAs 40;02)	IE_NW_230_0000	Summer	*Good*	0.0325	0.0363	118.3	0.0009	0.0134
		Winter	*Good*	0.0325	0.0363	118.3	0.0009	0.0134
Trawbreaga Bay	IE_NW_240_0000	Summer	*High*	0.0125	0.0188	194.8	0.0006	0.0331
		Winter	*High*	0.0125	0.0188	194.8	0.0006	0.0331

Table 5: Cumulative assessment of orthophosphate concentrations in transitional and coastal water bodies following dosing of drinking water

Name	EU_CD	Season	Indicative Quality Surrogate Status in italic	Baseline conc used in calculation (mg/l P)	75% of status threshold (mg/l P)	Load, (kg/yr P) from current EAM	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Swilly Estuary	IE_NW_220_0100	Summer	High	0.0180	0.0188	217.0	566.0	0.0009	0.0189
		Winter	High	0.0150	0.0188	217.0	566.0	0.0009	0.0159
Lough Swilly	IE_NW_220_0000	Summer	High	0.0110	0.0188	594.0	846.4	0.0009	0.0119
		Winter	High	0.0125	0.0188	594.0	846.4	0.0009	0.0134
Foyle and Faughan Estuaries	UKGBNI5NW250 010	Summer	Moderate	0.0500	0.0550	62.6	104.6	0.0001	0.0501
		Winter	Moderate	0.0500	0.0550	62.6	104.6	0.0001	0.0501
Lough Foyle	GBNIIE6NW250	Summer	Moderate	0.0500	0.0550	134.9	178.3	0.0002	0.0502
		Winter	Moderate	0.0500	0.0550	134.9	178.3	0.0002	0.0502
Portstewart Bay	GBNIIE6NB010	Summer	Good	0.0325	0.0363	137.3	179.7	0.0002	0.0327
		Winter	Good	0.0325	0.0363	137.3	179.7	0.0002	0.0327

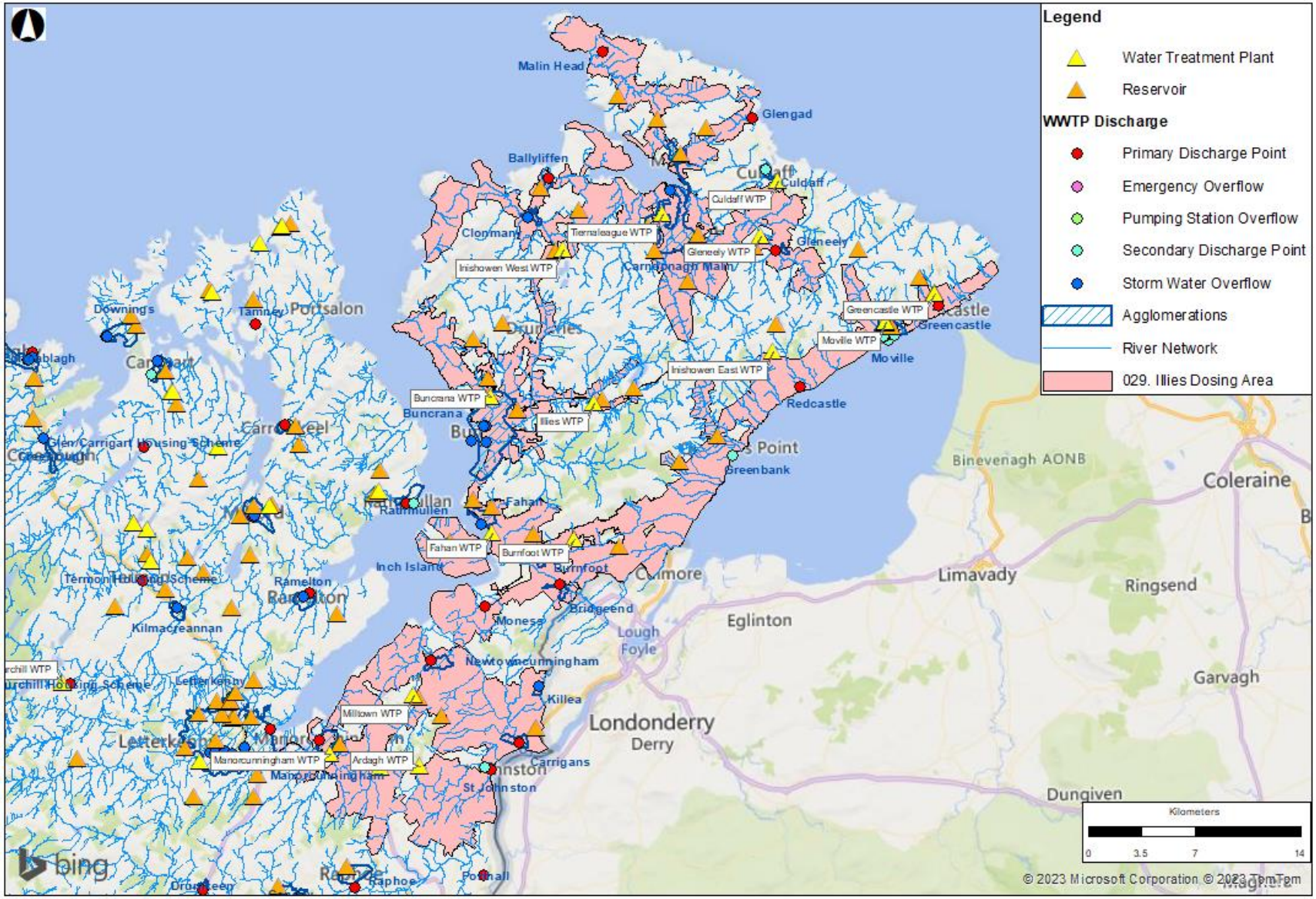

Figure 1: Illies WSZ Dosing Area

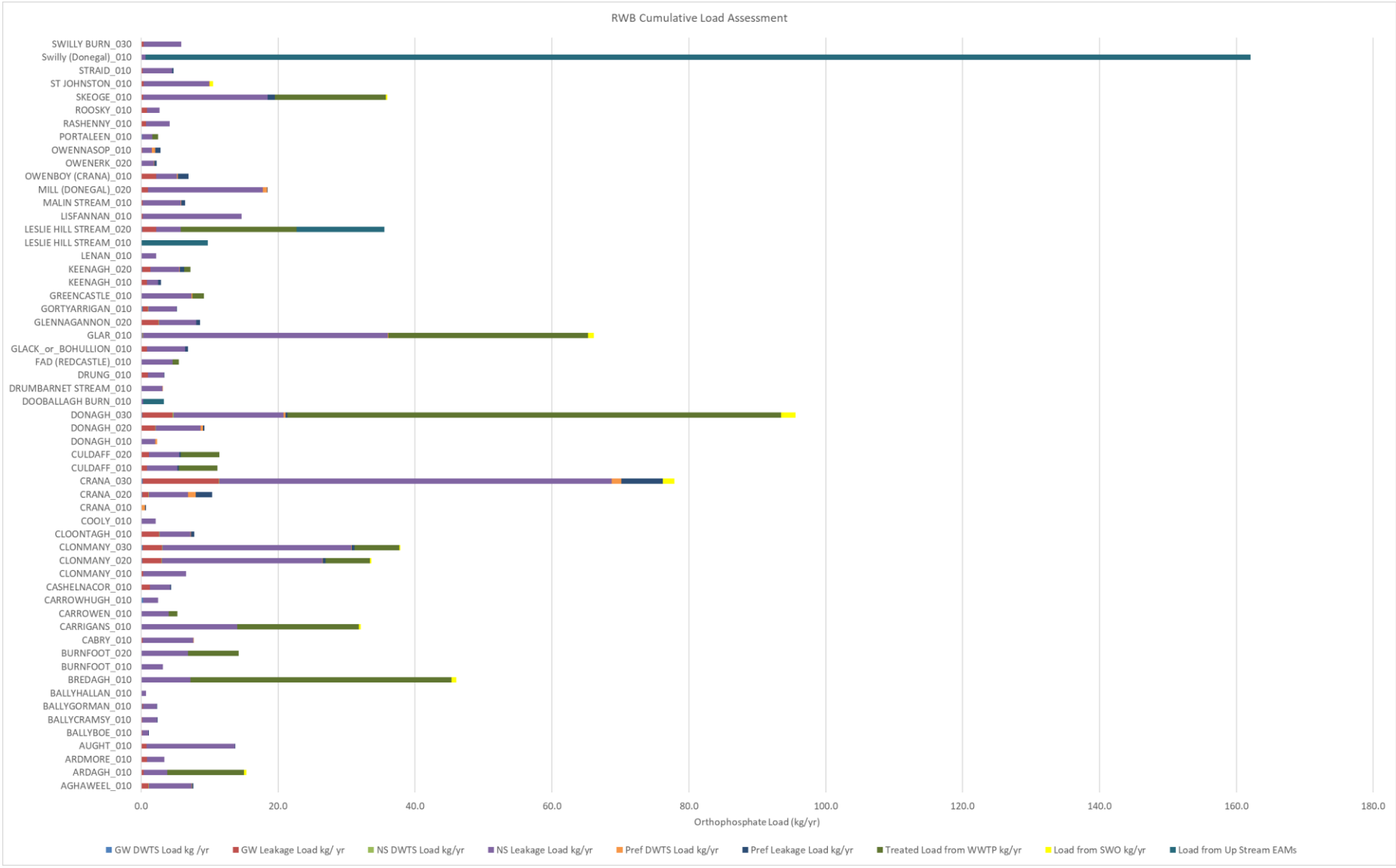

Figure 2: RWB Cumulative Loading Assessment

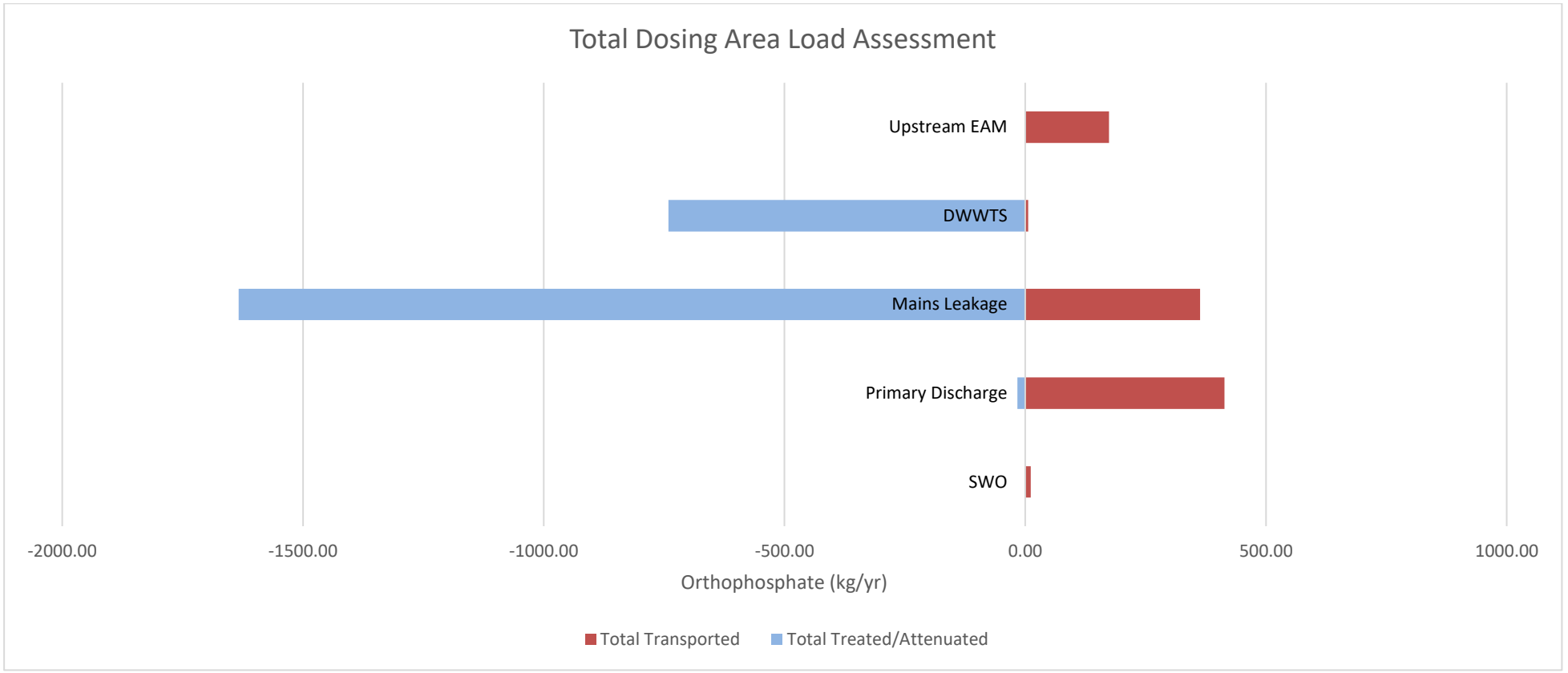

Figure 3: Total dosing area Attenuated, Treated and Transported Loads

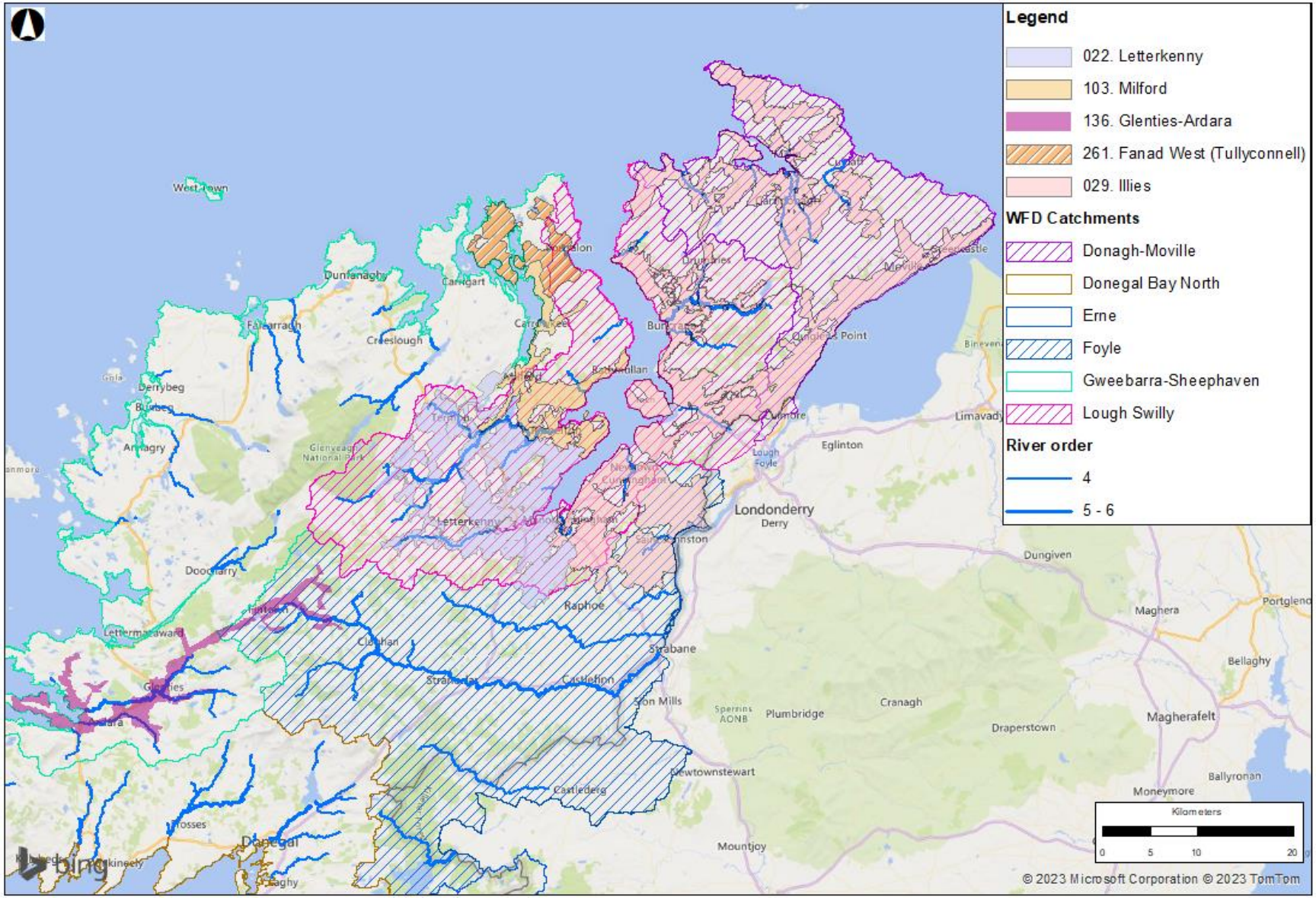

Figure 4: Upstream and downstream EAMs within WFD catchments

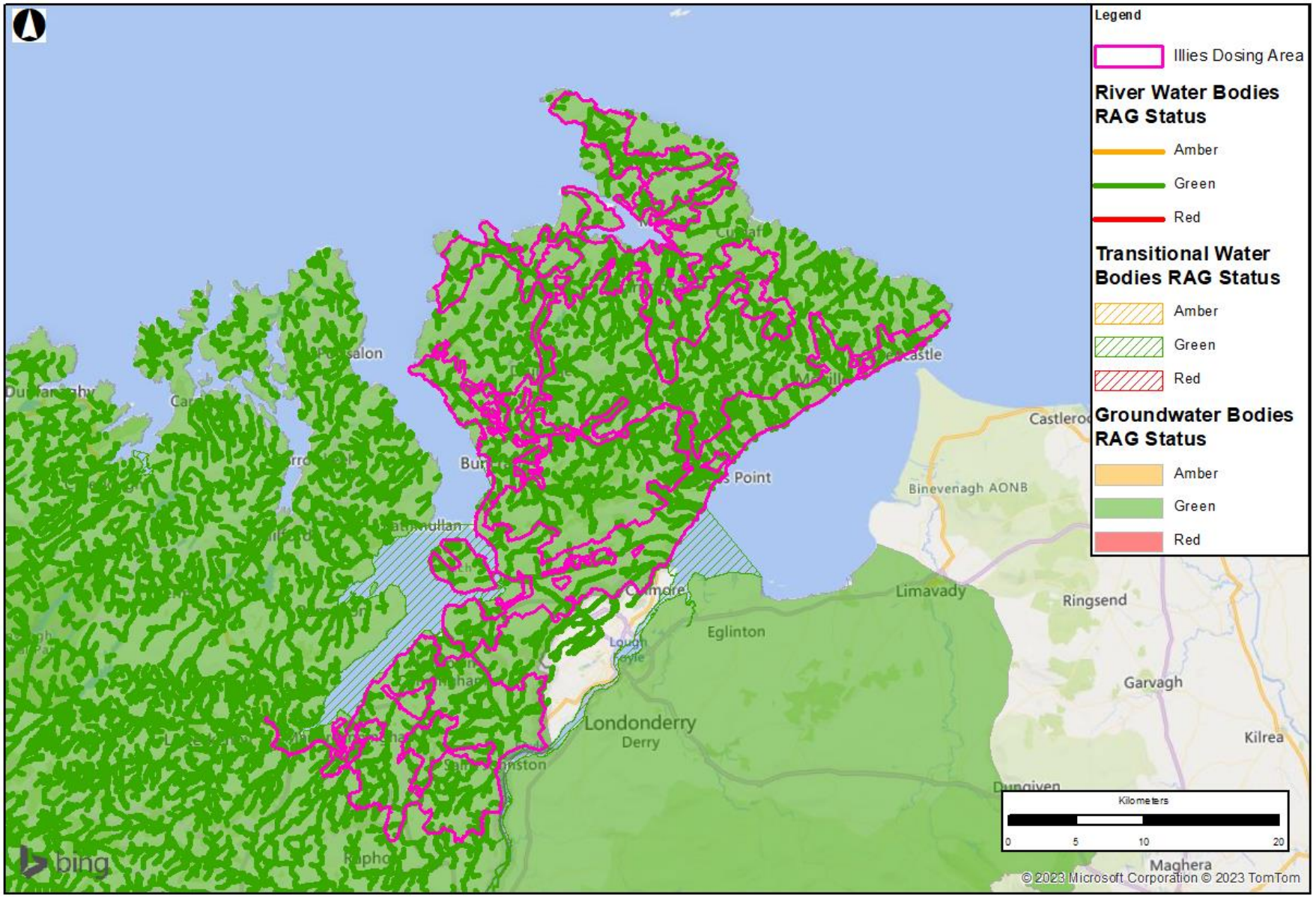

Figure 5: Red, Amber, Green (RAG) Status of waterbodies