UISCE ÉIREANN

LEAD IN DRINKING WATER MITIGATION PLAN – 136 GLENTIES-ARDARA AND FINTOWN WSZS

SCREENING TO INFORM APPROPRIATE ASSESSMENT

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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 the Glenties-Ardara Water Treatment Plant (WTP) in Co. Donegal to Glenties-Ardara (0600PUB1070) and Fintown (0600PUB1065) Water Supply Zones (WSZs).

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

1.1 PURPOSE OF THIS REPORT

Screening for AA, as a first step in determining the requirement for AA, is to determine whether the Project is likely to have a significant effect on any European Site within the zone of influence (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,

[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/projects-plans/lead-mitigation-plan/Lead-in-Drinking-Water-Mitigation-Plan.pdf

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 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 Glenties – Ardara and Fintown WSZs will be 1.2 mg/l P for treated water supplied from Glenties-Ardara 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 potentially resulting in significant effects. 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 effect 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 (2018).

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 for European Sites that are designated for qualifying 'priority' habitats or species, as defined in Annex I and II of the Directive, the demonstration of 'over-riding public interest' is not sufficient. In such instances 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, 2013a);
- Article 17 Habitat Conservation Assessments Volume 2 (NPWS, 2013b);
- Article 17 Species Conservation Assessment Volume 3 (NPWS, 2013c);
- EPA Qualifying Interests database, (EPA, 2015) and updated EPA Characterisation Qualifying Interests database (EPA/RPS, September 2016);
- River Basin Management Plan for Ireland 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 15km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson et al., 2006). For projects, the distance could be much less than 15 km, 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 15 km 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 pathwas for 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.

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 2013 a, b &c) and on information contained in Ireland's most recent Article 12 submission to the EU on the Status and trends of Birds species (NPWS 2013d). Water dependent species were identified as having the greatest connectivity and thus the highest sensitivity to the proposed dosing activity and the Water Framework Directive SAC water dependency list (NPWS, December 2015), was used as part of the criteria for screening of European Sites.

3. DESCRIPTION OF THE PROJECT

3.1 DESCRIPTION OF THE PROPOSAL

Glenties-Ardara WTP supplies treated water to Glenties-Ardara WSZ (0600PUB1070) and Fintown WSZ (0600PUB1065). The average flow from the WTP is currently 1,803 m3/day. Approximately 55% of this flow is accounted for. Glenties-Ardara and Fintown WSZs are serviced by four WWTPs (Ardara WWTP, Fintown No 1 WWTP, Fintown No 2 WWTP and Glenties WWTP). There are an estimated 1597 properties across the WSZs that are serviced by DWWTS.

It is recommended that universal dosing of OP into treated water supplied by Glenties-Ardara WTP be undertaken for the Glenties-Ardara and Fintown WSZs at a dosing rate of 1.2 mg/l in order to achieve 98% RDT sampling compliance (Figure 1).

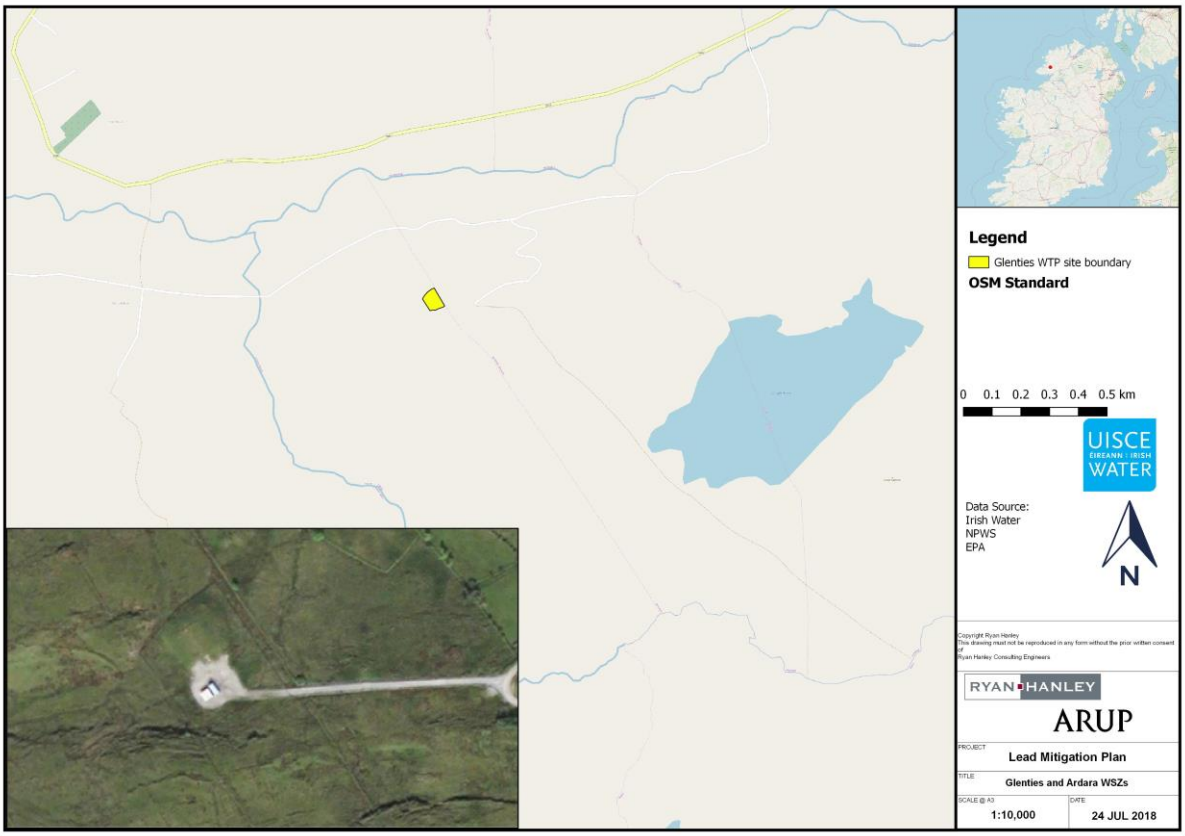

Figure 1 Location of the Glenties-Ardara Water Treatment Plant site, Co. Donegal.

3.1.1 Construction Works

The Plumbosolvency Control Plan Report has proposed that facilities for post pH correction be provided and utilised as part of the WTP works prior to OP dosing.

The Pb Report has proposed that a bunded phosphoric acid storage tank (with capacity for a minimum of 60 days dosing of phosphoric acid at 75% concentration into supply) and a dosing installation housed in a kiosk, will be installed on constructed concrete ground slabs, located with the site of the Glenties-Ardara WTP. The required 60 days storage volume at the Glenties-Ardara WTP site corresponds to 0.37m^3.

Facilities to raise the pH of the water to the recommended pH of 8.0 will also be installed at the WTP. These facilities will consist of three free standing storage/ dilution tanks (with capacity for a minimum of 60 days dosing of sodium hydroxide/ sodium carbonate) with dosing pumps and control panel and an allowance for dry product storage (pallets / silos) plus conveying equipment. Free standing bulk storage consisting of c 1,100 kg as solid storage bags/ pallets storage and two bulk storage tanks will hold c 0.5m^3 each.

The scope of the **construction** works for the Glenties-Ardara WTP will include:

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

- Installation of pH correction facilities with an area of approximately 90 m^2 (a typical installation is shown in **Figure 2**). Exact locations will be confirmed following initial site assessment and investigations.

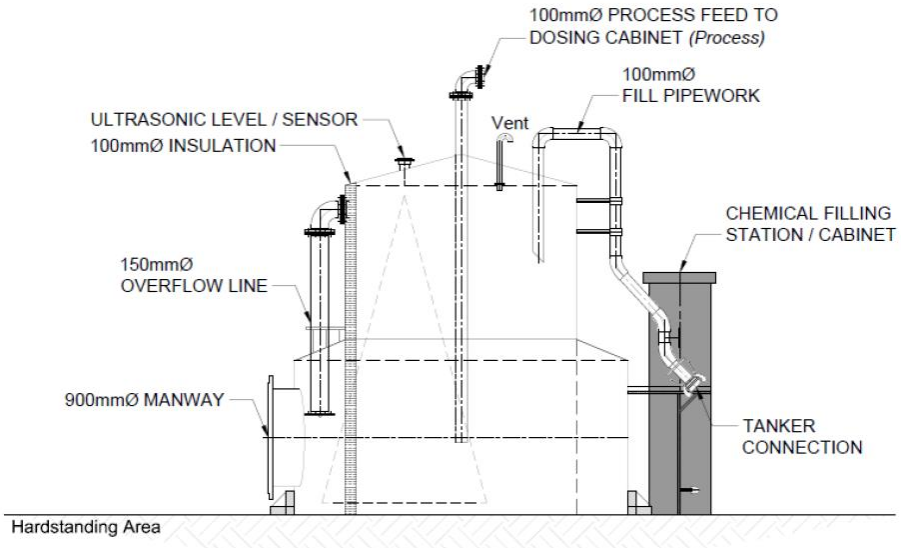

Figure 2 Sectional view of typical circular free standing chemical storage tank.

- Installation of the OP dosing unit may include excavations, construction of new water process and duct chambers, duct and pipe laying and reinstatement works; and will have an area of approximately 52 m^2 (a typical dosing unit is shown in **Figure 3** and **Figure 4**). Exact location of the dosing unit within the WTP site boundary 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 a concrete base with cast in ducts within the Reservoir site boundaries. A 1.0 m wide concrete apron shall extend around the kiosk.

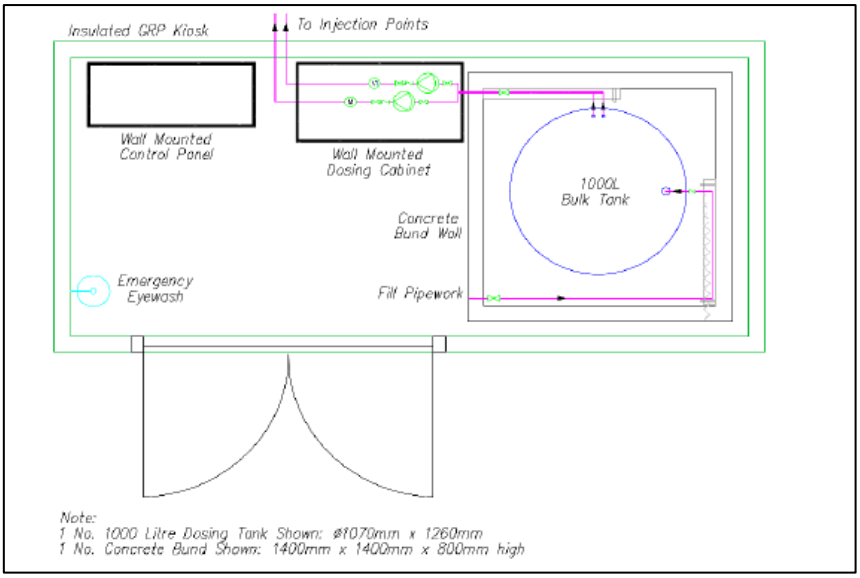

Figure 3 UÉ schematic of a bulk tank kiosk layout in H_3PO_4 Installation with 500 litres< bulk storage ≤ 6,000 litres.

Figure 4 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 1.2 mg/l P for treated water from Glenties-Ardara WTP to Glenties-Ardara WSZ and Fintown WSZ in a process similar to the addition of chlorine for disinfection. Similarly, pH correction will involve dosing NaOH/ Na_2CO_3 to treated water.

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 adverse 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 risk assessment of any proposed orthophosphate treatment and provides a methodology to determine the risk to the receiving environment of this corrective water treatment.

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

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

3.2.2 Environmental Assessment Methodology

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

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

A flow chart of the methodology applied in the EAM is provided in **Figure 5** and illustrates the importance of the European Sites in the process. In all instances where nutrient sensitive qualifying features within the Natura 2000 network are hydrologically linked with the WSZ, a Screening to inform AA will be required in the first instance. For each WSZ where 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 risk assessment process.

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

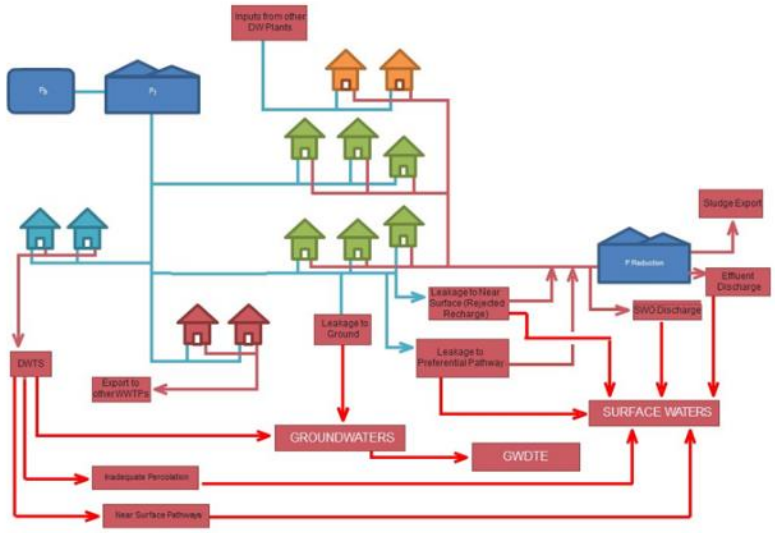

Figure 5 Conceptual Model of P Transfer

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.

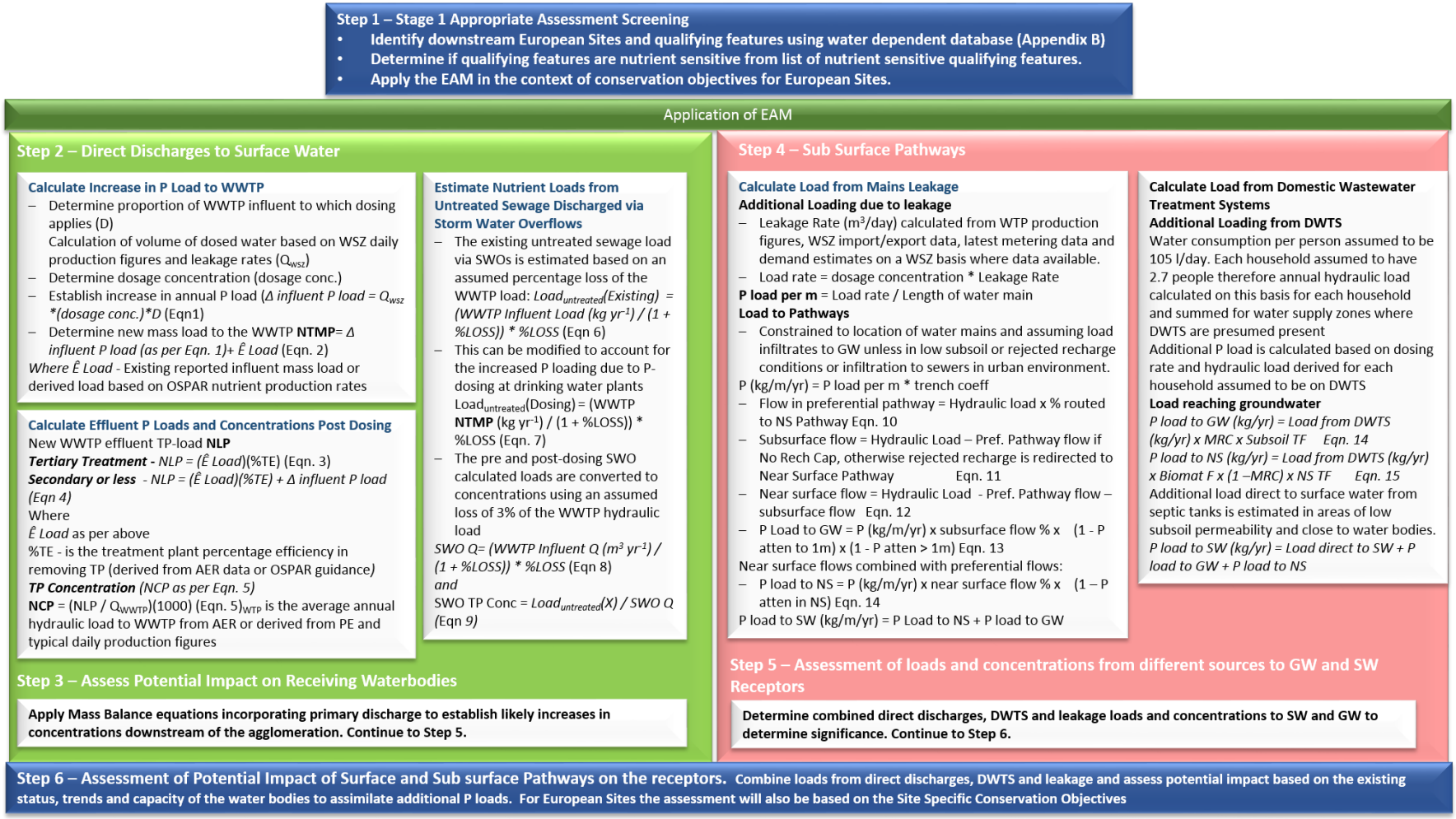

Figure 6 Stepwise Approach to the Environmental Assessment Methodology

4. PROJECT CONNECTIVITY TO EUROPEAN SITES

4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

4.1.1 Construction Phase

Glenties-Ardara WTP site boundary is located approximately 17 m away from Lough Nillan Bog (Carrickatlieve) SAC and Lough Nillan Bog SPA (Figure 6). However, the existing WTP site is made up entirely of hard standing surface and has no habitat or species for which the SAC is designated within its footprint. All proposed works are within the footprint of the WTP site. The construction works are limited to the placement of a concrete plinth, a conservative estimate of which is no more than 115 m^2 on an existing hardstanding surface thus requiring minimal excavation. The extent of excavation for pipework is further limited in scale. The dosing facilities will be located within the WTP site boundary.

It is considered that, given the scale (<115m^2) of the construction of a concrete base for the prefabricate OP Dosing and pH Units and associated pipework, the short duration of the works and the nature of the works that there is no potential for significant effects arising during the construction phase of the project. Consideration of potential construction impacts and pathways for significant effects on the proximate SAC is in the absence of mitigation and with the acknowledgement that the Dosing Units are within the existing WTP site compound. The potential for effects on the individual qualifying interests and the conservation objectives of the Lough Nillan Bog SAC/SPA is discussed further in Section 5 and 6 of this report.

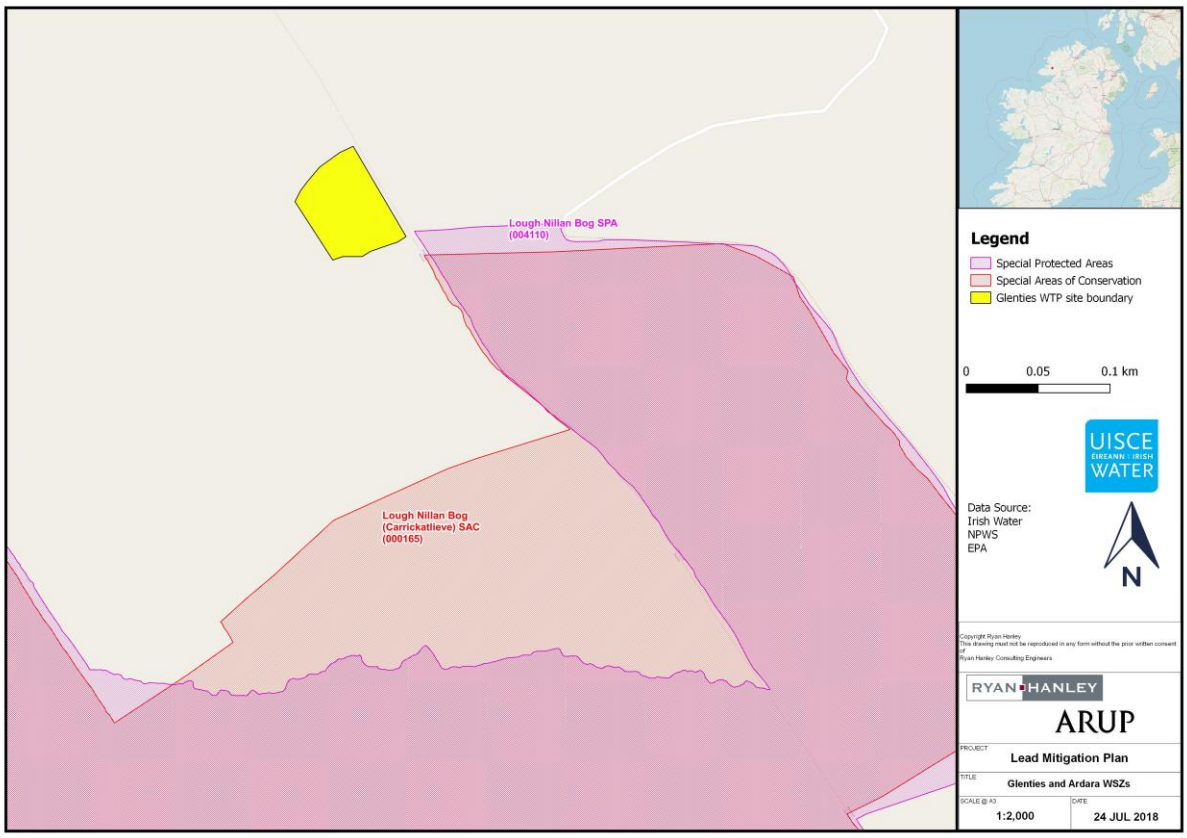

Figure 7 Location of the Glenties-Ardara Water Treatment Plant site with respect to European Sites

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 an operational activities ZoI, which was determined by establishing the potential for hydrological and hydrogeological connectivity between the Glenties-Ardara WTP and associated WSZs and European Sites. This operational ZoI was therefore defined by the surface water sub-catchments and groundwater bodies that are hydrologically and hydrogeologically connected with the Project. European Sites within the operational ZoI are listed in **Table 1** and are displayed in **Figure 7**.

The EAM process identified 18 river waterbodies and 5 lake 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:

- Cummirk_010 (IE_NW_01C030100) river waterbody flowing into the Cummirk_020 (IE_NW_01C030300), the Finn (Donegal)_020 (IE_NW_01F010350), the Finn (Donegal)_030 (IE_NW_01F010400), the Finn (Donegal)_040 (IW_NW_01F010500), the Finn (Donegal)_050 (IW_NW_01F010600), the Finn (Donegal)_060 (IW_NW_01F010800), the Finn (Donegal)_070 (IE_NW_01f010910), the Finn (Donegal)_080 (IE_NW_01F011100), the Finn River (UKGBNI1NW010104074), the River Foyle waterbodies and into the Foyle and Faughan Estuaries transitional waterbody(IE_NW_250_0100) and Lough Foyle coastal waterbody and Portstewart Bay coastal waterbody.

- Stranagoppoge_010 (IE_NW_01S020200) river waterbody flowing into the Finn (Donegal)_010 (IE_NW_01F010200), which incorporates Finn DL and Shivnagh lake waterbodies, the Finn (Donegal)_020 (IE_NW_01F010350), the Finn (Donegal)_030 (IE_NW_01F010400), the Finn (Donegal)_040 (IW_NW_01F010500), the Finn (Donegal)_050 (IW_NW_01F010600), the Finn (Donegal)_060 (IW_NW_01F010800), the Finn (Donegal)_070 (IE_NW_01f010910), the Finn (Donegal)_080 (IE_NW_01F011100), the Finn River (UKGBNI1NW010104074), the River Foyle waterbodies and into the Foyle and Faughan Estuaries transitional waterbody(IE_NW_250_0100) and Lough Foyle coastal waterbody and Portstewart Bay coastal waterbody.

- Shallogan_010 (IE_NW_38S030300) river waterbody flowing into the Stracashel_020 (IE_NW_38S010200), the Owenea_030 (IE_NW_38O040450), the Owenea_040 (IE_NW_38O040500) waterbodies and into the Owenea estuary (IE_NW_110_0100) transitional waterbody and Loughros Bay coastal waterbody.

- Mulnamin_beg_010 (IE_NW_38M290990) river waterbody flowing into the Gweebarra Estuary transitional waterbody (IE_NW_120_0100) and Gweebarra Bay coastal waterbody.

- Owenea_020 (IE_NW_38O040100) river waterbody flowing into the Owenea_030 (IE_NW_38O040450), the Owenea_040 (IE_NW_38O040500) waterbodies and into the Owenea estuary (IE_NW_110_0100) transitional waterbody and Loughros Bay coastal waterbody.

- Owentocker_010 (IE_NW_38O060050) river waterbody flowing into the Owentocker_020 (IE_NW_38O060300) waterbody and into the Owenea estuary (IE_NW_110_0100) transitional waterbody and Loughros Bay coastal waterbody.

- Owentocker_020 (IE_NW_38O060300), Bellanagoal_River_010 (IE_NW_38B070690) and Newtownburke_010 (IE_NW_38N040540) rivers flow into the Owenea estuary (IE_NW_110_0100) transitional waterbody and Loughros Bay coastal waterbody.

- Drumagh_010 (IE_NW_38D820870) and Newtownburke_010 (IE_NW_38N040540) rivers waterbody flowing into Loughros Bay coastal waterbody.

- Fad Portnoo (IE_NW_38_621) lake waterbody which flows into the Duvoge_010 (IE_NW_38D050300) river waterbody which flows into the Skeskinmore (IE_NW_38_545) lake waterbody prior to discharging to Owenea estuary (IE_NW_110_0100) transitional waterbody.

- Abberachrin_010 (IE_NW_38A010200) river waterbody flows into the Aderry (IE_NW_38_60) lake waterbody before discharging into the Duvoge_010 (IE_NW_38D050300) river waterbody which flows into the Skeskinmore (IE_NW_38_545) lake waterbody prior to discharging to Owenea estuary (IE_NW_110_0100) transitional waterbody.

The EAM identified two further lake waterbodies (Ananima and Warvanneil) which lie within the river basin receiving OP dosing but are upstream of the dosing area.

The EAM process identified 2 groundwater bodies (highlighted in bold). Groundwater bodies touching or intersecting the WSZs, are also included in the ZoI. Hydrogeological linkages in karst areas are considered:

- Northwest Donegal (IE_NW_G_049);
- Ballybofey (IEGBNI_NW_G_048);

Northwest Donegal is a large groundwater body (1451 km^2) accounting for approximately one third of the county. 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 (Groundwater Body Descriptions, Geological Survey Ireland, 2004). As a result of this only those European Sites within a 300m radius are considered in the ZoI. European Sites within the ZoI are listed in **Table 1** and are displayed in **Figure 7**.

Coolvoy Bog SAC is situated upstream of the dosing area within the Northwest Donegal groundwater body that has a very short flow path (30-300m) and so is not considered further.

Meenaguse Scragh SAC is predominantly situated in the Donegal South groundwater body and no rivers rise within the OP zone of influence and so this site is not considered further.

Meentygrannagh Bog SAC (000173), Cloghernagore Bog and Glenveagh National Park SAC (002047) and **Derryveagh and Glendowan Mountains SPA** lie upstream of the dosing area and so these sites are not considered further.

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
Lough Nillan Bog (Carrickatlieve) SAC	**000165**	**Yes**	**Yes**	**Yes**
Meentygrannagh Bog SAC	**000173**	**Yes**	**Yes**	**No**
Slieve Tooey/Tormore Island/Loughros Beg Bey SAC	**000190**	**Yes**	**Yes**	**Yes**
West of Ardara/Maas Road SAC	**000197**	**Yes**	**Yes**	**Yes**
Coolvoy Bog SAC	**001107**	**Yes**	**Yes**	**No**
Meenaguse Scragh SAC	**001880**	**Yes**	**Yes**	**No**

Cloghernagore Bog and Glenveagh National Park SAC	**002047**	**Yes**	**Yes**	**No**
River Finn SAC	**002301**	**Yes**	**Yes**	**Yes**
Derryveagh and Glendowan Mountains SPA	**004039**	**Yes**	**Yes**	**No**
Lough Foyle SPA	**004087**	**Yes**	**Yes**	**Yes**
Sheskinmore Lough SPA	**004090**	**Yes**	**Yes**	**Yes**
Lough Nillan Bog SPA	**004116**	**Yes**	**Yes**	**Yes**
Inishkeel SPA	**004116**	**Yes**	**Yes**	**Yes**
West Donegal Coast SPA	**004150**	**Yes**	**Yes**	**Yes**

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**.

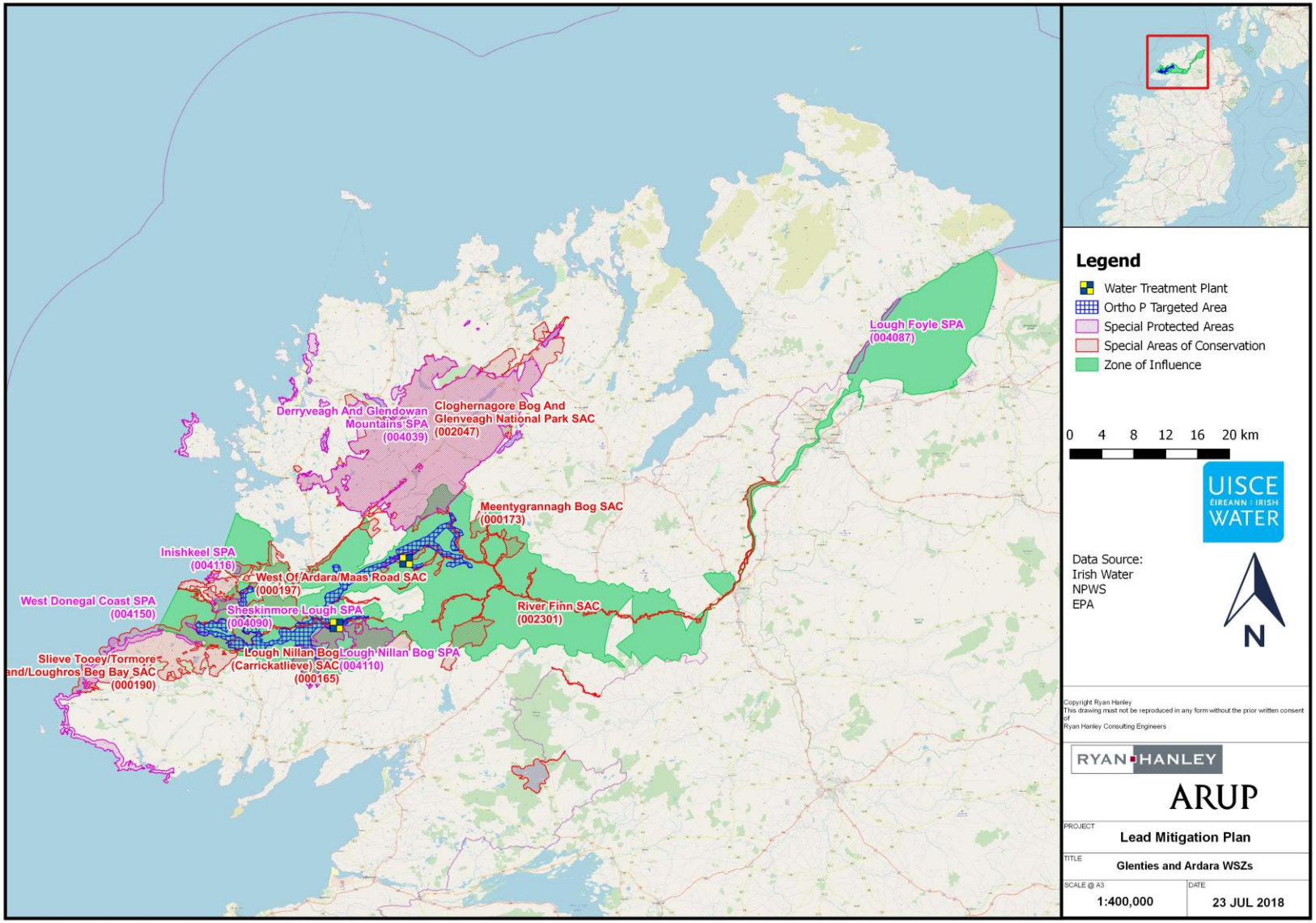

Figure 8 European Sites within the ZoI of the Proposed Project

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
River Finn	**SAC 002301**	**31st May 2017**	1106	Atlantic Salmon *Salmo salar*	Yes	Yes	Yes for Operational Zol
			1355	Otter *Lutra lutra*	Yes	Yes	
			3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	Yes	Yes	
			4010	Northern Atlantic wet heaths with (*Erica tetralix*)	Yes	Yes	
			7130	Blanket bogs (* if active bog)	Yes	Yes	
			7140	Transition mires and quaking bogs	Yes	Yes	
Lough Nillan Bog (Carrickatlieve)	**SAC 000165**	**06th Sep 2016**	3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	Yes	Yes	Yes for Construction and Operational Zol
			7130	Blanket bogs (* if active bog)	Yes	Yes	
Slieve Tooey/Tormore Island/Loughros Beg Bay	**SAC 000190**	**19th Aug 2015**	1014	Narrow-mouthed Whorl Snail *Vertigo angustior*	Yes	Yes	Yes for Operational Zol
			1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Yes	Yes	
			1355	Otter *Lutra lutra*	Yes	Yes	
			1364	Grey Seal *Halichoerus grypus*	Yes	Yes	
			2110	Embryonic shifting dunes	Yes	Yes	
			2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Yes	Yes	
			2140	Decalcified fixed dunes with *Empetrum nigrum**	Yes	Yes	
			2150	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)	Yes	Yes	
			4060	Alpine and Boreal heaths	No	No	
			7130	Blanket bogs (* if active bog)	Yes	Yes	
West of Ardara/ Maas Road	**SAC 00197**	**19th Aug 2015**	1013	Geyer's whorl snail *Vertigo geyeri*	Yes	Yes	Yes for Operational Zol
			1029	Freshwater pearl mussel *Margaritifera margaritifera*	Yes	Yes	
			1065	Marsh Fritillary *Euphydryas aurinia*	Yes	No	
			1106	Atlantic salmon *Salmo salar*	Yes	Yes	
			1130	Estuaries	Yes	Yes	
			1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes	
			1160	Large shallow inlets and bays	Yes	Yes	
			1330	Atlantic salt meadows	Yes	Yes	
			1355	Otter *Lutra lutra*	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
			1365	Harbour Seal *Phoca vitulina*	Yes	Yes	
			1395	Petalwort *Petalophyllum ralfsii*	Yes	Yes	
			1410	Mediterranean salt meadows	Yes	Yes	
			1833	Slender Naiad Najas flexilis			
			2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Yes	Yes	
			2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)	Yes	Yes	
			2140	Decalcified fixed dunes with *Empetrum nigrum*	Yes	Yes	
			2150	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)	Yes	Yes	
			2170	Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)	Yes	Yes	
			2190	Humid dune slacks	Yes	Yes	
			21A0	Machairs (* in Ireland)	Yes	Yes	
			3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	Yes	Yes	
			4010	Northern Atlantic wet heaths with *Erica tetralix*	Yes	Yes	
			4030	European dry heaths	No	Yes	
			4060	Alpine and Boreal heaths	No	No	
			5130	*Juniperus communis* formations on heaths or calcareous grasslands	No	No	
			6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	No	Yes	
			6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	Yes	Yes	
			6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	No	Yes	
			7130	Blanket bogs (* if active bog)	Yes	Yes	
			7150	Depressions on peat substrates of the *Rhynchosporion*	Yes	Yes	
			7230	Alkaline fens	Yes	Yes	
Sheskinmore Lough	**SPA 004090**	**21st Feb 2018**	A395	Greenland White-fronted Goose *Anser albifrons flavirostris*	Yes	Yes	Yes for Operational ZoI

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
Lough Nillan Bog	**SPA 004110**	**21st Feb 2018**	A098	Merlin *Falco columbarius*	Yes	No	Yes for Construction and Operational ZoI
			A140	Golden Plover *Pluvialis apricaria*	Yes	Yes	
			A395	Greenland White-fronted Goose *Anser albifrons flavirostris*	Yes	Yes	
			A466	Dunlin *Calidris alpina schinzii*	Yes	Yes	
Lough Foyle	**SPA 004087**	**23rd Sep 2014**	A001	Red-throated Diver *Gavia stellata*	Yes	Yes	Yes for Operational ZoI
			A005	Great Crested Grebe *Podiceps cristatus*	No	No	
			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*	No	No	
			A048	Shelduck *Tadorna tadorna*	Yes	Yes	
			A050	Wigeon *Anas penelope*	Yes	Yes	
			A052	Teal *Anas crecca*	Yes	Yes	
			A053	Mallard *Anas platyrhynchos*	No	Yes	
			A063	Eider *Somateria mollissima*	Yes	No	
			A069	Red-breasted Merganser *Mergus serrator*	Yes	Yes	
			A130	Oystercatcher *Haematopus ostralegus*	No	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	
			A160	Curlew *Numenius arquata*	Yes	No	
			A162	Redshank *Tringa totanus*	Yes	No	
			A179	Black-headed Gull *Chroicocephalus ridibundus*	Yes	No	
			A182	Common Gull *Larus canus*	Yes	No	
			A184	Herring Gull *Larus argentatus*	No	No	
			A999	Wetlands			
Inishkeel	**SPA 004116**	**21st Feb 2018**	A045	Barnacle Goose *Branta leucopsis*	Yes	Yes	Yes for Operational ZoI

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
West Donegal Coast	**SPA 004150**	**21st Feb 2018**	A009	Fulmar *Fulmarus glacialis*	No	No	Yes for Operational Zol
			A017	Cormorant *Phalacrocorax carbo*	Yes	Yes	
			A018	Shag *Phalacrocorax aristotelis*	No	No	
			A103	Peregrine *Falco peregrinus*	Yes	No	
			A184	Herring Gull *Larus argentatus*	No	No	
			A188	Kittiwake *Rissa tridactyla*	No	No	
			A200	Razorbill *Alca torda*	Yes	No	
			A346	Chough *Pyrrhocorax pyrrhocorax*	Yes	No	

* 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).

Construction Phase

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

- Increases in suspended sediment and hydrocarbons to receiving waterbodies during site works and connectivity to European Sites;
- Direct habitat loss;
- Disturbance of species during construction; and
- Potential for spread of invasive species.

These construction phase impacts and the potential for significant effects are assessed further in Section 5.3 and again in Section 6.

Operational Phase

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 effects;
- 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).

5.3 ASSESSMENT OF IMPACTS RELATING TO CONSTRUCTION ACTIVITIES

Glenties Ardara WTP site borders the Lough Nillan Bog (Carrickatlieve) SAC and Lough Nillan Bog SPA boundary (Figure 6). There will be no direct habitat loss associated with the proposed project as the existing WTP site is made up entirely of hard standing surface and has no habitat or species for which the SAC is designated within its footprint. All proposed works are within the WTP site boundary. The proposed works area and these European Sites are separated by a road, all access will be from the road and no entry/ disturbance required on the opposing road verge within the SAC/SPA boundary. Similarly, there will be no potential for disturbance to species during the construction and the site does not provide a corridor to suitable wildlife habitat, as the site boundary is already defined and utilised as a WTP and construction activities are limited to within the site boundary. The works are to be carried out within the hard standing surface of the site therefore there is no risk of presence of, or disturbance of invasive species associated with any construction works. The significance of any construction related impacts leading to increases in suspended sediment and hydrocarbons to receiving waterbodies will be evaluated further in section 6.1.

5.4 ASSESSMENT OF IMPACTS RELATING TO OPERATIONAL ACTIVITIES

Article 6 of the Habitats Directive states that:

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

The focus of this section of the Screening to inform AA is the potential for significant effects arising from the additional OP load due to OP dosing at Glenties - Ardara 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 P) following dosing at the WTP.

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

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

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.

Baseline OP monitoring data and associated thresholds are available for five RWBs. There are 13 RWBs (Cummirk_010, Abberachrin_010, Bellanagoal River_010, Duvoge_010, Drumagh_010, Mulnamin_Beg_010, Newtownburke_010, Owenea_020, Owenea_030, Owenea_040, Owentocker_010, Stracashel_020, Shallogan_010) that require a surrogate water body. Where existing monitoring data is not available, a surrogate status is derived from the OP indicative quality of adjacent RWBs. The mid-range of that surrogate status is used as baseline concentration. On the basis of predicted loading, the risk of using surrogate data is excluded based on this precautionary approach because even if high status was ascribed, the OP loading values resulting from dosing are significantly below the 0.00125 mg/l P significance threshold and would not register a significant effect even on high status waterbodies with QI receptors that require high status.

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

Site Name (Code)	Contributing WB Code_Name	WB Type[3]	Ortho P Status[4] and Trends[5]	Baseline[6] P Conc.[7],[8] (mg/l P)	75% of Status Threshold (mg/l P)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l P)	Baseline Conc. @ 1.2 mg/l P dosing rate	Evaluation
River Finn SAC (002301)	Finn DL	LWB	Good	0.0112	0.0213	16.8	0.0002	0.0113	No deterioration to OP indicative WQ.
	Shivnagh	LWB	High	0.0050	0.0075	16.8	0.0002	0.0052	No deterioration to OP indicative WQ
	Ballybofey	GWB	Good	0.0175	0.0263	6.0	0.0001	0.0176	No deterioration to OP indicative WQ
	Cummirk_010	RWB	High	0.0125	0.0188	0.3	0.00001	0.0125	No deterioration to OP indicative WQ
	Cummirk_020	RWB	High	0.0050	0.0188	4.9	0.0001	0.0051	No deterioration to OP indicative WQ
	Finn (Donegal)_010	RWB	High	0.0053	0.0188	16.8	0.0002	0.0055	No deterioration to OP indicative WQ
	Strangoppoge_010	RWB	High	0.0059	0.0188	1.0	0.00003	0.0059	No deterioration to OP indicative WQ
	Finn (Donegal)_020	RWB	High	0.0050	0.0188	27.0	0.0002	0.0052	No deterioration to OP indicative WQ
	Finn (Donegal) _030	RWB	High	0.0054	0.0188	27.0	0.0001	0.0054	No deterioration to OP indicative WQ
	Finn (Donegal) _040	RWB	High	0.0054	0.0188	27.0	0.00005	0.0054	No deterioration to OP indicative WQ
	Finn (Donegal) _050	RWB	High	0.0094	0.0188	27.0	0.00004	0.0095	No deterioration to OP indicative WQ
	Finn (Donegal) _060	RWB	Good	0.0278	0.0325	27.0	0.00004	0.0278	No 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] (mg/l P)	75% of Status Threshold (mg/l P)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l P)	Baseline Conc. @ 1.2 mg/l P dosing rate	Evaluation
	Finn (Donegal) _070	RWB	Good	0.0296	0.0325	27.0	0.00004	0.0296	No deterioration to OP indicative WQ
	Finn (Donegal) _080	RWB	Good	0.0312	0.0325	27.0	0.00003	0.0312	No deterioration to OP indicative WQ
	Foyle and Faughan Estuaries	TWB	Moderate	0.0500	0.0550	27.0	0.00002	0.0500	No deterioration to OP indicative WQ
Lough Nillan Bog (Carrickatlieve) SAC (000165)	Northwest Donegal	GWB	Good	0.0175	0.0263	8.5	0.0001	0.0176	No deterioration to OP indicative WQ
	Owentocker_010	RWB	High	0.0050	0.0188	2.6	0.0001	0.0051	No deterioration to OP indicative WQ
	Owentocker_020	RWB	High	0.0067	0.0188	11.4	0.0002	0.0069	No deterioration to OP indicative WQ
	Owenea_030	RWB	Good	0.0253	0.0325	35.3	0.0001	0.0255	No deterioration to OP indicative WQ
Slieve Tooey/ Tormore Island/ Loughros Bog Bay SAC (000190)	Newtownburke_010	RWB	High	0.0125	0.0188	4.5	0.0004	0.0129	No deterioration to OP indicative WQ
	Drumagh_010	RWB	High	0.0125	0.0188	1.3	0.00003	0.0125	No deterioration to OP indicative WQ
	Loughros Bay	CWB	Summer High/Winter High	0.0125	0.0188	120.1	0.0003	0.0128	No deterioration to OP indicative WQ
West of Ardara/Mass Road SAC (000197)	Northwest Donegal	GWB	Good	0.0175	0.0263	8.5	0.0001	0.0176	No deterioration to OP indicative WQ
	Gweebarra Bay	CWB	Summer High	0.0038	0.0188	180.9	0.0001	0.0038	No deterioration to OP indicative WQ
			Winter High	0.0125	0.0188	180.9	0.0001	0.0126	No deterioration to OP indicative WQ
	Loughros Bay	CWB	Summer High	0.013	0.0188	17.9	0.0001	0.0101	No deterioration to OP indicative WQ
			Winter High	0.013	0.0188	17.9	0.0001	0.0108	No 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] (mg/l P)	75% of Status Threshold (mg/l P)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l P)	Baseline Conc. @ 1.2 mg/l P dosing rate	Evaluation
	Gweebarra Estuary	TWB	Summer High	0.0100	0.0188	180.9	0.0007	0.0057	No deterioration to OP indicative WQ
			Winter High	0.0108	0.0188	180.9	0.0007	0.0107	No deterioration to OP indicative WQ
	Owenea Estuary	TWB	Summer *High*/Winter *High*	0.0125	0.0188	118.8	0.0003	0.0128	No deterioration to OP indicative WQ
	Skeskinmore	LWB	*High*	0.0050	0.0075	7.0	0.0003	0.0053	No deterioration to OP indicative WQ
	Aderry	LWB	*High*	0.0050	0.0075	0.5	0.00005	0.0050	No deterioration to OP indicative WQ
	Fad Portnoo	LWB	*High*	0.0050	0.0075	7.0	0.0003	0.0053	No deterioration to OP indicative WQ
	Mulnamin_Beg_010	RWB	*High*	0.0125	0.0188	17.9	0.0005	0.0130	No deterioration to OP indicative WQ
	Owenea_020	RWB	*Good*	0.0300	0.0325	5.0	0.0001	0.0301	No deterioration to OP indicative WQ
	Owenea_030	RWB	Good	0.0253	0.0325	35.3	0.0001	0.0255	No deterioration to OP indicative WQ
	Owenea_040	RWB	*Good*	0.0300	0.0325	43.5	0.0002	0.0302	No deterioration to OP indicative WQ
	Stracashel_020	RWB	High	0.0118	0.0188	15.9	0.0002	0.0120	No deterioration to OP indicative WQ
	Newtownburke_010	RWB	*High*	0.0125	0.0188	4.5	0.0004	0.0129	No deterioration to OP indicative WQ
	Bellangoal River_010	RWB	*High*	0.0125	0.0188	4.5	0.0004	0.0129	No deterioration to OP indicative WQ
	Abberachrin_010	RWB	*Good*	0.0300	0.0325	0.5	0.00005	0.0300	No deterioration to OP indicative WQ
	Duvoge_010	RWB	*Good*	0.0300	0.0325	7.0	0.0003	0.0303	No 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] (mg/l P)	75% of Status Threshold (mg/l P)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l P)	Baseline Conc. @ 1.2 mg/l P dosing rate	Evaluation
	Shallogan_010	RWB	*High*	0.0125	0.0188	11.1	0.0005	0.0130	No deterioration to OP indicative WQ
Sheskinmore Lough SPA (004090)	Bellangoal River_010	RWB	*High*	0.0125	0.0188	4.5	0.0004	0.0129	No deterioration to OP indicative WQ
	Duvoge_010	RWB	*Good*	0.0300	0.0325	7.0	0.0003	0.0303	No deterioration to OP indicative WQ
	Northwest Donegal	GWB	Good	0.0175	0.0263	8.5	0.0001	0.0176	No deterioration to OP indicative WQ
	Skeskinmore	LWB	*High*	0.0050	0.0075	7.0	0.0003	0.0053	No deterioration to OP indicative WQ
	Owenea Estuary	TWB	Summer *High*/*Winter High*	0.0125	0.0188	118.8	0.0003	0.0128	No deterioration to OP indicative WQ
	Loughros Bay	CWB	Summer High	0.013	0.0188	17.9	0.0001	0.0101	No deterioration to OP indicative WQ
			Winter High	0.013	0.0188	17.9	0.0001	0.0108	No deterioration to OP indicative WQ
Lough Nillan Bog SPA (004110)	Owentocker_010	RWB	High	0.0050	0.0188	2.6	0.0001	0.0051	No deterioration to OP indicative WQ
	Owentocker_020	RWB	High	0.0067	0.0188	11.4	0.0002	0.0069	No deterioration to OP indicative WQ
	Northwest Donegal	GWB	Good	0.0175	0.0263	8.5	0.0001	0.0176	No deterioration to OP indicative WQ
West Donegal Coast SPA (004150)	Newtownburke_010	RWB	*High*	0.0125	0.0188	4.5	0.0004	0.0129	No deterioration to OP indicative WQ
	Loughros Bay	CWB	Summer High	0.013	0.0188	17.9	0.0001	0.0101	No deterioration to OP indicative WQ
			Winter High	0.013	0.0188	17.9	0.0001	0.0108	No deterioration to OP indicative WQ
Lough Foyle SPA (004087)	Foyle and Faughan Estuaries	TWB	Moderate	0.0500	0.0550	27.0	0.00002	0.0500	No deterioration to OP indicative WQ
	Lough Foyle	CWB	Moderate	0.0500	0.0550	27.0	0.00002	0.0500	No 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] (mg/l P)	75% of Status Threshold (mg/l P)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l P)	Baseline Conc. @ 1.2 mg/l P dosing rate	Evaluation
Iniskeel SPA (004116)	Gweebarra Estuary	TWB	Summer High	0.0100	0.0188	180.9	0.0007	0.0057	No deterioration to OP indicative WQ
			Winter High	0.0108	0.0188	180.9	0.0007	0.0107	

5.4.1 Assessment of direct impact from WWTPs and Storm Water Overflows

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

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

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

The pre-dosing scenario is based on a mass balance calculation of both the intermittent SWO discharges, in combination with the continuous discharge from the WWTP. A comparison of the pre- and post-dosing scenarios is made to identify changes in predicted concentrations downstream of the point of discharge. A summary of the results and evaluation of OP 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 = 1.2 mg/l P at Glenties Ardara WTP

Agglom. & Discharge Type	ELV from WWDL		TP Load Kg/yr	Ortho P Concentration mg/l *TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)*		
				0.5	*0.4*	*0.68*
Ardara Primary Discharge	**Orthophosphate 8mg/l**	Existing	336	1.27	1.01	1.72
		Post Dosing	428	1.61	1.29	2.19
		% Increase	27%	27%	28%	27%
Ardara SWO (2 No.)		Existing	21	0.39	0.31	0.53
		Post Dosing	24	0.44	0.35	0.59
Fintown No 1 Primary Discharge	**None**	Existing	12	5.34	4.27	7.26
		Post Dosing	13	6.11	4.89	8.31
		% Increase	8%	14%	14.5%	14.5%
Fintown No 2 Primary Discharge	**None**	Existing	10	3.74	2.99	5.08
		Post Dosing	12	4.51	3.61	6.13
		% Increase	20%	21%	21%	21%
Glenties Primary Discharge	**Ortho-phosphate 1mg/l**	Existing	22	0.11	0.09	0.15
		Post Dosing	22	0.11	0.09	0.15
		% Increase	0%	0%	0%	0%
Glenties SWO (1 No.)		Existing	7	0.16	0.13	0.22
		Post Dosing	8	0.19	0.15	0.26

Ardara No. 2 Agglomeration

Ardara No. 2 Agglomeration provides secondary treatment and the ELV for OP is set at 8.0 mg/l P. The effluent OP concentration is estimated to increase from 1.27 mg/l P to 1.61 mg/l P (27%). The SWO concentration will increase from 0.39 mg/l P to 0.44 mg/l P as a result of drinking water dosing. The Agglomeration discharges to the confluence of the Owenea/Owentocker estuarial channel which is directly connected to the **West of Ardara/ Maas Road SAC.**

Fintown No 1 Primary Discharge

Fintown No 1 WWTP provides primary treatment and there is no ELV assigned for the plant. The effluent Orthophosphate concentration will increase from 5.34 mg/l P to 6.11 mg/l P (14%) as a result of dosing of Othophosphate. The outlet from Fintown No 1 Primary Discharge discharges into an unnamed stream tributary of Lough Finn. The **River Finn SAC** is located approximately 80m from the discharge point. **Derryveagh and Glendowan Mountains SPA** is located approximately 80m from the discharge point.

Fintown No 2 Primary Discharge

Fintown No 2 provides secondary treatment and has no ELV assigned for the plant. The effluent Orthophosphate concentration will increase from 3.74 mg/l P to 4.51 mg/l P (21%) as a result of dosing of Orthophosphate. Secondary treatment is discharged into groundwater in the immediate vicinity of Lough Finn lake and **River Finn SAC**.

Glenties Agglomeration

Glenties WWTP provides tertiary treatment and the ELV for OP is set at 1.0 mg/l P. The WWTP does not exceed the ELV and it has been assumed that additional OP loading can be entirely removed within the current operational management regime at the WWTP and there will be ***no*** increase in the effluent P concentration. The SWO concentration will however increase from 0.16 mg/l P to 0.19 mg/l P (19%). The WWTP discharges into the Stracashel_020 river waterbody which forms part of the **West of Ardara/Mass Road SAC.**

5.4.2 Combined assessment of direct and indirect impacts to receiving waterbodies

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

River waterbodies

- Mulnamin Beg_010 (IE_NW_38M290990), Stracashel_020 (IE_NW_38S010200), Owenea_020 (IE_NW_38O040100), Owenea_030 (IE_NW_38O040450), Owenea_040 (IE_NW_38O040500) Newtownburke_010 (IE_NW_38N040540), Bellangoal River_010 (IE_NW_38B070690), Abberachrin_010 (IE_NW_38A010200) and Duvoge_010 (IE_NW_38D050300) river waterbodies are connected directly to the **West of Ardara/Maas Road SAC (000197)**.

- Owentocker_010 (IE_NW_38O060050), Owentocker_020 (IE_NW_38O060300) and Owenea_030 (IE_NW_38O040450) river waterbodies are connected to **Lough Nillan Bog (Carrickatlieve) SAC (000165).**

- Newtownburke_010 (IE_NW_38N040540) and Drumagh_010 (Warvanneil) river waterbodies are connected to **Slieve Tooey/ Tormore Island/ Loughros Bog Bay SAC (000190).**

- Cummirk_010 (IE_NW_01C030100), Cummirk_020 (IE_NW_01C030300), Finn (Donegal)_010 (IE_NW_01F010200), Strangoppoge_010 (IE_NW_01S020200) and Finn (Donegal)_020 (IE_NW_01F010350) river waterbodies are connected directly to the **River Finn SAC (002301).**

- Bellangoal River_010 (IE_NW_38B070690) and Duvoge_010 (IE_NW_38D050300) river waterbodies are connected directly to the **Skeskinmore Lough SPA (004090).**

- Owentocker_010 (IE_NW_38O060050) and Owentocker_020 (IE_NW_38O060300) river waterbodies are connected to **Lough Nillan Bog SPA (004110).**

- Newtownburke_010 (IE_NW_38N040540) river waterbody is connected to **West Donegal Coast SPA (004150).**

A significant proportion of the OP loading to river waterbodies arises from primary discharges and SWOs from WWTPs and mains seepage through near surface pathway. The increase in OP concentrations in river waterbodies following dosing is estimated to be as much as 0.0005 mg/l P. The increases do not cause a deterioration in the OP status of any river waterbody. All RWBs will receive a predicted dosing concentrations below the 5% of Good/ High boundary (0.00125mg/l) (as highlighted in Table 3) and are within the 75% of upper threshold of their respective WFD OP indicative water quality and therefore there is no risk of deterioration in the OP indicative water quality of these RWBs.

Lake waterbodies

- Skeskinmore (IE_NW_38_545) is hydrologically connected to **Sheskinmore Lough SPA (004090)** and **West of Ardara/ Mass Road SAC (000197).**

- Fad Portnoo (IE_NW_38_621) and Aderry (IE_NW_38_60) are hydrologically connected to **West of Ardara/ Mass Road SAC (000197).**

- Finn DL and Shivnagh are hydrologically connected to **River Finn SAC (002301).**

The increase in OP concentration sin the LWBs has been assessed by the EAM and the predicted increases will be as much as 0.0003 mg/l P. When converted to TP the predicted concentrations do not lead to increases in baseline concentrations, i.e. 0.009 mg/l P for all lake waterbodies. Impact from OP dosing on lake waterbodies does not lead to a reduction in LWB status remain unchanged, and all LWBs have predicted dosing concentrations below the 5% of Good/ High boundary (0.00125mg/l) (as highlighted in Table 3) and are within the 75% of upper threshold of the WFD OP indicative water quality and therefore there is no risk of deterioration in the WFD OP indicative water quality of these LWBs.

Groundwater bodies

- Ballybofey groundwater body (IEGBNI_NW_G_048) is hydrologically linked to **River Finn SAC (002301).**

- Northwest Donegal (IE_NW_G_49) groundwater body is hydrologically linked to the **West of Ardara/ Maas Road SAC (000197), Lough Nillan Bog (Carrickatlieve) SAC (000165), Slieve Tooey/ Tormore Island/ Loughros Beg Bay SAC (000190), Cloghernagore Bog and**

Glenveagh National Park SAC (002047), Lough Nillan Bog SPA (004110), Sheskinmore Lough SPA (004090), West Donegal Coast SPA (004150).

The increase in OP concentrations in the GWBs as a result of the OP dosing is up to 0.0001 mg P/l. Impact from OP dosing on groundwater bodies does not lead to a reduction in GWB OP indicative water quality status for Northwest Donegal and Ballybofey GWBs. All GWBs have predicted dosing concentrations below the 5% of Good/ Fail boundary (0.00175mg/l) (as highlighted in Table 3) and 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 GWBs.

Transitional waterbodies

- Owenea Estuary (IE_NW_110_0100) is hydrologically linked to **West of Ardara/Mass Road SAC (000197), Sheskinmore Lough SPA (004090), West Donegal Coast SPA (004150).**

- Gweebarra Estuary (IE_NW_120_0100) is hydrologically linked to the **West of Ardara/Mass Road SAC (000197) Cloghernagore Bog and Glenveagh National Park SAC (002047), Coolvoy Bog SAC (001107), Gannivegil Bog SAC (000142) Derryveagh and Glendowan Mountains SPA (004039)**

- Foyle and Faughan Estuaries (IE_NW_250_0100) is hydrologically linked to the **River Finn SAC (002301), Lough Foyle SPA (004087).**

The increase in OP concentrations in the TWBs as a result of the OP dosing is up to 0.0003 mg P/l. Impact from OP dosing on groundwater bodies does not lead to a reduction in TWB OP indicative water quality status remains unchanged, all TWBs have predicted dosing concentrations below the 5% of Good/ High boundary (0.00125mg/l) (as highlighted in Table 3) and are within the 75% of upper threshold of the OP indicative water quality and therefore there is no risk of deterioration in the indicative water quality of these TWBs.

Coastal waterbodies

- Loughros Bay (IE_NW_110_0000) coastal waterbody is hydrologically linked to **Slieve Tooey/Tormore Island/Loughros Beg Bay SAC (000190), West of Ardara/Mass Road SAC (000197), Sheskinmore Lough SPA (004090), West Donegal Coast SPA (004150)**

- Gweebarra Bay (IE_NW_120_0000) is hydrologically linked to . **West of Ardara/Mass Road SAC (000197), Inishkeel SPA (004116).**

- Lough Foyle (GBNIIE6NW250) coastal waterbody is hydrologically linked to **Lough Foyle SPA (004087).**

The increase in OP concentrations in the CWBs as a result of the OP dosing is up to 0.0003 mg P/l. Impact from OP dosing on groundwater bodies does not lead to a reduction in CWB indicative water quality status remains unchanged, all CWBs have predicted dosing concentrations below the 5% of Good/ High boundary (0.00125mg/l) (as highlighted in Table 3) and are within the 75% of upper threshold of the OP indicative water quality status and therefore there is no risk of deterioration in the OP indicative water quality of these CWBs.

5.5.3 Conclusions

The EAM model data identifies that additional OP dosing as part of this Project does not cause a deterioration in the OP indicative water quality of any river waterbody or groundwater body listed in **Table 3**.

Cumulative impacts from other dosing areas on the above listed waterbodies have been taken into consideration by the EAM and the results presented in Section 5 above reflect these findings. Section 6 evaluates the OP indicative water quality 'no deterioration' in the context of AA and the QIs of the European Sites.

6. EVALUATION OF POTENTIAL FOR SIGNIFICANT EFFECTS

Impact pathways arising from the proposed construction and operational phases of the project have been investigated. Given the location of the proposed construction works in relation to European sites, potential construction impact pathways are assessed in the context of significant effect for each of the qualifying interests / conservation objective for the Lough Nillan Bog (Carrickatlieve) SAC and Lough Nillan Bog SPA.

The key pressure associated with the proposed OP dosing is the potential for increased OP levels in the receiving waters and the potential to impact upon the qualifying interests (habitats and species) identified in **Table 2** that are both water dependent and nutrient sensitive (**Appendix B**). Nine European sites are for the evaluation of potential for significant effect: **River Finn (002301), Lough Nillan Bog (Carrickatlieve) (000165), Slieve Tooey/ Tormore Island/ Loughros Beg Bay (000190), West of Ardara/ Maas Road (000197)** SACs and **Sheskinmore lough (004090), Lough Nillan Bog (004110), West Donegal Coast (004150), Lough Foyle (004087)** and **Iniskeel (004116)** SPAs. The potential for the proposed OP dosing to give rise to significant effects on these habitats and species, in view of their conservation objectives, are assessed in detail below.

6.1 CONSTRUCTION PHASE

Impact pathways arising during the construction phase have been identified and are limited to surface water linkages and potential for increased suspended sediment and hydrocarbons in the immediate vicinity of the WTP. Qualifying interests of the Lough Nillan Bog (Carrickatlieve) SAC/SPA with ecological dependence on this section of river waterbody include (3110) Oligotrophic waters containing very few minerals of sandy plains, (A098) Merlin, (A140) Golden Plover, (A395) Greenland White-fronted Goose and (A466) Dunlin.

The proposed construction works (to facilitate both the OP and pH dosing units) will be localised and contained to the immediate development area which supports buildings and artificial surfaces. Works such as excavations, will be contained to the defined working area, located on made ground within the WTP site; any necessary works with cast in place concrete will be undertaken within sealed shuttered units. The completion of the works as proposed will retain all potential construction related pollutants at source. As there is no potential for significant effects on the water quality there is no potential for significant effects on the QIs within the Lough Nillan Bog (Carrickatlieve) SAC/SPA.

6.2 OPERATIONAL PHASE

6.2.1 River Finn SAC 002301

6.2.1.1 (1106) Atlantic Salmon *Salmo salar*

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 Glenties- Ardara WSZs and River Finn SAC has been established and shown that Lough Finn, Cummirk_010, Cummirk_020, Finn (Donegal)_010, Finn (Donegal)_020 and Stranagoppoge_010 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

within the River Finn SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Cummirk_010 river waterbody (IE_NW_01C030100) and estimated an increase in OP concentrations of up to 0.00001 mg/l P. The resulting OP concentration following dosing is *0.0125* mg/l P (Table 3; Appendix C). The RWB OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Cummirk_020 river waterbody (IE_NW_01C030300) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0051 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Finn (Donegal)_010 river waterbody (IE_NW_01F010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0055 mg/l P (Table 3; Appendix C). RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in RWB OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Finn (Donegal)_020 river waterbody (IE_NW_01F010350) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is. 0.0052 mg/l P (Table 3; Appendix C). RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in RWB OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Finn DL lake waterbody (IE_NW_01_102) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0113 mg/l P (Table 3; Appendix C). LWB OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this lake waterbody.
- Shivnagh lake waterbody (IE_NW_01_111) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0052 mg/l P, (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody.
- Stranagoppoge_010 river waterbody (IE_NW_01S020200) and estimated an increase in OP concentrations of up to 0.00003 mg/l P. The resulting OP concentration following dosing is 0.0059 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP statuses have demonstrated that there will be no change in the OP indicative water quality of the above-mentioned WBs, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effects to Atlantic salmon in Croaghaun/Slievemore 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.

6.2.1.2 (1355) Otter *Lutra lutra*

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 to otter within the River Finn SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Cummirk_010 river waterbody (IE_NW_01C030100) and estimated an increase in OP concentrations of up to 0.00001 mg/l P. The resulting OP concentration following dosing is *0.0125* mg/l P (Table 3; Appendix C). The RWB OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Cummirk_020 river waterbody (IE_NW_01C030300) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0051 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Finn (Donegal)_010 river waterbody (IE_NW_01F010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0055 mg/l P (Table 3; Appendix C). RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in RWB OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Finn (Donegal)_020 river waterbody (IE_NW_01F010350) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is. 0.0052 mg/l P (Table 3; Appendix C). RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in RWB OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Finn DL lake waterbody (IE_NW_01_102) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0113 mg/l P (Table 3; Appendix C). LWB OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this lake waterbody.
- Shivnagh lake waterbody (IE_NW_01_111) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0052 mg/l P, (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody.
- Stranagoppoge_010 river waterbody (IE_NW_01S020200) and estimated an increase in OP concentrations of up to 0.00003 mg/l P. The resulting OP concentration following dosing is 0.0059 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.
- Ballybofey (IEGBNI_NW_G_048) groundwater body and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0176* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this groundwater body.

- Foyle and Faughan Estuaries (UKGBNI5NW250010) transitional waterbody and estimated an increase in OP concentrations for both winter and summer seasons of up to 0.00002 mg/l P. The resulting OP concentration following dosing is 0.0500 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. Moderate. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effects to 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.

6.2.1.3 (3110) Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)

Lake habitat 3110 is likely to occur in Lough Derg, Shivnagh, Finn and Belshade lakes. The Primary Discharge at Fintown No.1 WWTP discharges into an unnamed stream tributary of Lough Finn. The **River Finn SAC** is located approximately 80 m from the discharge point. According to the SSCOs, as a nutrient-poor habitat, Water Framework Directive (WFD) 'high' status targets apply for oligotrophic lake habitat. For lake habitat 3110, annual average total phosphorus (TP) concentration should be ≤10µg/l TP (NPWS, 2017).

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 within the River Finn SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Finn DL lake waterbody (IE_NW_01_102) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0113 mg/l P (Table 3; Appendix C). LWB OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this lake waterbody.

- Shivnagh lake waterbody (IE_NW_01_111) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0052 mg/l P, (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP statuses have demonstrated that there will be no change in the OP indicative water quality of these lake waterbodies, there is sufficient capacity within the status thresholds, and there will be no alteration to water quality meaning there is no potential for significant effects to habitat 3110 in River Finn SAC.

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

6.2.1.4 (4010) Northern Atlantic wet heaths with (*Erica tetralix*), (7130) Blanket bogs (* if active bog), (7140) Transition mires and quaking bogs

Heath (4010) occurs in association with blanket bog habitat (7130) and are reported to occur throughout much of the upland areas of the SAC and along the edges of the river (NPWS, 2017).

The SSCOs for transitional mires and quacking bogs in the River Finn SAC (NPWS, 2017) are to 'restore' the favourable conservation conditions. The habitat occurs at the interface between bog and waterbodies and has been identified along the lake edge of Lough Fad, Lough Finn and Lough Gulladuff.

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 bog habitats within the River Finn SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Cummirk_010 river waterbody (IE_NW_01C030100) and estimated an increase in OP concentrations of up to 0.00001 mg/l P. The resulting OP concentration following dosing is *0.0125* mg/l P (Table 3; Appendix C). The RWB OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Cummirk_020 river waterbody (IE_NW_01C030300) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0051 mg/l P (Table 3; Appendix C). The RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Finn (Donegal)_010 river waterbody (IE_NW_01F010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0055 mg/l P (Table 3; Appendix C). RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in RWB OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Finn (Donegal)_020 river waterbody (IE_NW_01F010350) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is. 0.0052 mg/l P (Table 3; Appendix C). RWB OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in RWB OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Finn DL lake waterbody (IE_NW_01_102) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0113 mg/l P (Table 3; Appendix C). LWB OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this lake waterbody.

- Shivnagh lake waterbody (IE_NW_01_111) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0052 mg/l P, (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody.

- Stranagoppoge_010 river waterbody (IE_NW_01S020200) and estimated an increase in OP concentrations of up to 0.00003 mg/l P. The resulting OP concentration following dosing is 0.0059 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality status following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Ballybofey (IEGBNI_NW_G_048) groundwater body and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0176* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this groundwater body.

- Foyle and Faughan Estuaries (UKGBNI5NW250010) transitional waterbody and estimated an increase in OP concentrations for both winter and summer seasons of up to 0.00002 mg/l P. The resulting OP concentration following dosing is 0.0500 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. Moderate. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP indicative water quality statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is not potential for significant effect to Annex I peatland habitats in River Finn SAC.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of Annex I peatland habitats in River Finn SAC / no deterioration of its favourable conservation condition is identified.

6.2.2 Lough Nillan Bog (Carrickatlieve) SAC 000165

6.2.2.1 (3110) Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)

Lake habitat 3110 is likely to occur in Loughs Nillan, Owenea, Magrath More and Beg, Nacloghcor, Anna, Kip and Nadeal. These lake habitats are located upstream of the WTP site boundary, upstream of the dosing zone and outside of the short flow paths (30-300m) identified in the Northwest Donegal groundwater body and therefore no hydrological connectivity has been established (NPWS, 2016). Therefore potential for significant effects from construction impact and operational impact on this habitat can be screened out.

6.2.2.2 (7130) Blanket bogs (* if active bog)

Bog habitat 7130 are reported to occur in the upland areas of the SAC, watercourses associated with this SAC rise above the dosing zone and the groundwater bodies associated with this site have short flow paths (30-300m) and therefore no hydrological connectivity has been established (NPWS, 2016). This habitat is therefore not assessed any further.

6.2.3 Slieve Tooey/ Tormore Island/ Loughros Beg Bay SAC 000190

6.2.3.1 (1014) Narrow-mouthed Whorl Snail *Vertigo angustior*

There is one known site for this species in this SAC at Glencolumbcille (NPWS, 2015). The target is to maintain the favourable conservation condition. The location of this species does not fall within the identified OP zone of influence and therefore no hydrological connectivity has been established (NPWS, 2015). This qualifying interest is therefore not assessed any further.

6.2.3.2 (1230) Vegetated sea cliffs of the Atlantic and Baltic coasts

Four sub-sites of Vegetated sea cliffs were identified in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC (NPWS, 2015). Both hard and soft cliffs are present with hard cliffs occurring most commonly. Hard cliffs are composed of rocks which are hard and relatively resistant to erosion. Vegetation of hard sea cliffs in exposed situations exhibits a strong maritime influence and is relatively stable. Sea cliffs can have groundwater influences in the form of flushes or seepages, in the case of Slieve Tooey/Tormore Island/Loughros SAC two groundwater seepages or flushes were identified in association with the sea cliffs both of which lie outside of the OP zone of influence (NPWS, 2015). Therefore vegetated sea cliffs are not assessed further.

6.2.3.3 (1355) Otter *Lutra lutra*

A review of the SSCOs for otter (NPWS, 2015) 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 Slieve Tooey/ Tormore Island/ Loughros Beg Bay 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 Slieve Tooey/ Tormore Island/ Loughros Beg 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 in Slieve Tooey/ Tormore Island/ Loughros Beg Bay SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Loughros Bay coastal waterbody (IE_NW_110_0000) and estimated an increase in OP concentrations for both summer and winter months of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP indicative water quality statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effect to otter in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of otters in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC / no deterioration of its favourable conservation condition is identified.

6.2.3.4 (1364) Grey Seal *Halichoerus grypus*

The grey seal is the larger of two species of the Phocidae genus that commonly breed around the coast of Ireland and has a preference for inhabiting sheltered coastal bays and estuaries. Grey seals in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC occupy both aquatic habitats and intertidal shorelines that become exposed during the tidal cycle (NPWS, 2015). The species is present at the site throughout the year during all aspects of its annual life cycle which includes breeding (August to December approx.), moulting (December to April approx.) and non-breeding foraging and resting phases. In acknowledging the limited understanding of aquatic habitat use by the species within the site, it should be noted that all suitable coastal and transitional aquatic habitat is considered relevant to the species range and ecological requirements at the site and is therefore of potential use by grey seals.

Attributes and targets set out by the SSCO which bear specific relevant to this project are: to conserve the breeding sites in a natural condition; to conserve the moult haul-out sites in a natural condition; to conserve the resting haul-out sites in a natural condition; and that human activities should occur at levels that do not adversely affect the grey seal population at the site. The OP dosing has the potential to alter the natural condition of the sites by increasing baseline P concentrations.

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 in Slieve Tooey/ Tormore Island/ Loughros Beg Bay SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Loughros Bay coastal waterbody (IE_NW_110_0000) and estimated an increase in OP concentrations for both summer and winter months of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effect to seals in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of seals in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC / no deterioration of its favourable conservation condition is identified.

6.2.3.5 (2110) Embryonic shifting dunes, (2120) Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes), (2140) Decalcified fixed dunes with *Empetrum nigrum**and (2150) Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)

Slieve Tooey/Tormore Island/Loughros Beg Bay SAC is designated for a range of coastal habitats and species as listed above that are usually found in close association with each other. The SSCOs (NPWS, 2015) and coastal supporting document (NPWS, 2015) 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 waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to otter in Slieve Tooey/ Tormore Island/ Loughros Beg Bay SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Loughros Bay coastal waterbody (IE_NW_110_0000) and estimated an increase in OP concentrations for both summer and winter months of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effect to dune habitats in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of dune habitats in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC / no deterioration of its favourable conservation condition is identified.

6.2.3.6 (7130) Blanket bogs (* if active bog)

Bog habitat 7130 was identified on the west coast of Loughros Bay outside of the OP zone of influence and therefore no hydrological connectivity has been established (NPWS, 2015). This habitat is therefore not assessed any further.

6.2.4 West of Ardara/Maas Road SAC (000197)

6.2.4.1 (1013) Geyer's whorl snail *Vertigo geyeri*

There is one known site for this species in this SAC. Geyer's whorl snail is associated with wetlands, marshy flushes and flat lowland fens with a constant water table and is threatened by drainage, or any change to the water table and habitat disturbance (Moorkens and Killeen, 2011). The SSCO does not make specific reference to water quality and nutrient condition (NPWS, 2015). The COs supporting document for monitoring and condition assessment of populations of *Vertigo geyeri* requires no significant impacts on groundwater quantity and quality and no excessive poaching of the sensitive vegetation it lives within. Table 3 does not identify any water bodies as hydrologically or hydrogeologically connected to OP dosed water in relation to Geyer's whorl snail supporting habitat and this species is not considered further.

6.2.4.2 (1029) Freshwater pearl mussel *Margaritifera margaritifera*

The species is widespread in the Owenea River, stretching from the townland of Mully in the east, to Owenea Bridge in the west, mussels were also found in the Stracashel tributary in 2012 (NPWS, 2015). The distribution target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Owenea system. The water quality target is to restore water quality macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93. For OP indicative water quality this equates to 'high' status >0.00125 mg/l P.

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 freshwater pearl mussel in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Shallogan_010 river waterbody (IE_NW_38S030300) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Stracashel_020 river waterbody (IE_NW_38S010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0120 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Owenea_020 river waterbody (IE_NW_38O040100) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0301* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality

following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_030 river waterbody (IE_NW_38O040450) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0255* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP indicative water quality statuses have demonstrated that there will be no change in the OP indicative water quality of waterbodies, and there will be no alteration to water quality meaning there is no potential for significant effect to freshwater pearl mussels in the West of Ardara/Maas Road SAC as a result of the proposed project.

Furthermore, dosing will not prevent the restoration of favourable conservation condition of habitat or water quality conditions supporting freshwater pearl mussel in the West of Ardara/Maas Road SAC.

6.2.4.3 (1106) Atlantic salmon *Salmo salar*

The SSCOs for salmon in the West of Ardara/ Maas Road SAC (NPWS, 2015) are to 'maintain' favourable conservation condition. The distribution target refers to '% river accessible'. 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, 2015) 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 the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Mulnamin_Beg_010 river waterbody (IE_NW_38M290990) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Shallogan_010 river waterbody (IE_NW_38S030300) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality

following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Stracashel_020 river waterbody (IE_NW_38S010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0120 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Owenea_020 river waterbody (IE_NW_38O040100) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0301* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_030 river waterbody (IE_NW_38O040450) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0255* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_040 river waterbody (IE_NW_38O040500) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is *0.0302* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Newtownburke_010 river waterbody (IE_NW_38N040540) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is *0.0129* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Bellangoal River_010 river waterbody (IE_NW_38B070690) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0308 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following

OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Abberachrin_010 river waterbody (IE_NW_38A010200) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0300 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Duvoge_010 river waterbody (IE_NW_38D050300) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0303 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Skeskinmore lake waterbody (IE_NW_38_*545*) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Aderry lake waterbody (IE_NW_38_60) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0050 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Fad Portnoo lake waterbody (IE_NW_38_621) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no

risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to salmon in the West of Ardara/Maas Road SAC from the proposed project.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of salmon in the West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.4 (1130) Estuaries

The attributes and targets that will maintain the favourable conservation condition of this habitat in West of Ardara/Maas Road SAC do not make specific reference to water quality and nutrient conditions (NPWS, 2015); however, there is a requirement to conserve community types in their natural conditions (NPWS, 2015). 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 'Sand with amphipods, polychaetes and *Tellina tenuis* community complex and Estuarine sand with oligochaetes community complex' 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 estuaries in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading

values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to estuaries in the West of Ardara/Maas Road SAC from the proposed project.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of estuaries in the West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.5 (1140) Mudflats and sandflats not covered by seawater at low tide

Mudflats and sandflats habitat was estimated at 1,259ha and the SSCOs (NPWS, 2015) state that the conservation objective is to maintain the favourable conservation condition, specifically permanent habitat stable/ increasing and conserve 'Sand with amphipods, polychaetes and *Tellina tenuis* community complex' in a natural condition.

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

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to mudflats and sandflats in the West of Ardara/Maas Road SAC from the proposed project.

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

6.2.4.6 (1160) Large shallow inlets and bays

'Large shallow inlets and bays' is a large physiographic feature that wholly incorporates 'Reefs' within its area. There are no nutrient specific targets in the SSCO (NPWS, 2015). The attributes and targets that will maintain the favourable conservation condition of this habitat do not make specific reference to water quality and nutrient conditions. The COs supporting document for Marine habitats (NPWS, 2015)

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.

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 large shallow inlets and bays in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to inlets and bays in the West of Ardara/Maas Road SAC from the proposed project.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of inlets and bays in the West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.7 (1330) Atlantic salt meadows

Two sub-sites of Atlantic salt meadows have been mapped in the West of Ardara/Maas Road SAC. The SSCOs (NPWS, 2015) and coastal supporting document (NPWS, 2015) 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 Atlantic salt meadows in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no

risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to Atlantic salt meadows in the West of Ardara/Maas Road SAC from the proposed project.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of Atlantic salt meadows in the West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.8 (1355) Otter *Lutra lutra*

A review of the SSCOs for otter (NPWS, 2015) 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 West of Ardara/Maas Road 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 West of Ardara/Maas Road 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 in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Mulnamin_Beg_010 river waterbody (IE_NW_38M290990) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Shallogan_010 river waterbody (IE_NW_38S030300) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using

surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Stracashel_020 river waterbody (IE_NW_38S010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0120 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Owenea_020 river waterbody (IE_NW_38O040100) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0301* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_030 river waterbody (IE_NW_38O040450) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0255* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_040 river waterbody (IE_NW_38O040500) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is *0.0302* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Newtownburke_010 river waterbody (IE_NW_38N040540) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is *0.0129* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Bellangoal River_010 river waterbody (IE_NW_38B070690) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0308 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Abberachrin_010 river waterbody (IE_NW_38A010200) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0300 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Duvoge_010 river waterbody (IE_NW_38D050300) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0303 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Skeskinmore lake waterbody (IE_NW_38_545) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Aderry lake waterbody (IE_NW_38_60) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0050 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Fad Portnoo lake waterbody (IE_NW_38_621) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for

this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to otter in the West of Ardara/Maas Road SAC.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of otter in the West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.9 (1365) Harbour Seal *Phoca vitulina*

The harbour seal is the smaller of two species of the Phocidae genus that commonly breed around the coast of Ireland. Harbour seals in the West of Ardara/Maas Road SAC occupy both aquatic habitats and intertidal shorelines that become exposed during the tidal cycle with a preference for enclosed sheltered coastal bays and estuaries. Attributes and targets set out by the SSCO which bear specific relevance to this project are: to conserve the breeding sites in a natural condition; to conserve the moult haul-out sites in a natural condition; to conserve the resting haul-out sites in a natural condition; and that human activities should occur at levels that do not adversely affect the harbour seal population at the site. The OP dosing has the potential to alter the natural condition of the sites by increasing the P concentrations.

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 harbour seal in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to seal in the West of Ardara/Maas Road SAC.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of seal in the West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.10 (1410) Mediterranean salt meadows

Mediterranean slat meadows is largely confined to the upper stretches of the saltmarsh, where it is characterised as upper marsh and has been recorded along the frontline, particularly around the rocky headland south of the intertidal zone at the Bellanagoal River. The SSCOs (NPWS, 2015) and coastal supporting document (NPWS, 2015) 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 Mediterranean salt meadows in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Bellangoal River_010 river waterbody (IE_NW_38B070690) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0308 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to Mediterranean salt meadows in the West of Ardara/Maas Road SAC.

Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation condition of Mediterranean salt meadows in the West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.11 (1833) Slender Naiad *Najas flexilis*

West of Ardara/Maas Road SAC contains three freshwater lakes with populations of *Najas flexilis*: Clooney, Sheskinmore and Kiltooris Loughs. Sheskinmore Lough is downstream of the dosing zone within the OP zone of influence. *Najas flexilis* is typically associated with high water quality, i.e. the absence of

eutrophication impacts and eutrophication is considered to have a significant negative impact on *Najas flexilis* (NPWS, 2015). An annual mean TP of < 10 µg l-1 is considered necessary for *Najas flexilis* lakes. Where the mean TP concentrations are lower than this standard, there should be no increase in annual mean, i.e. no upward trends (NPWS, 2015)

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 Mediterranean salt meadows in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Skeskinmore lake waterbody (IE_NW_38_545) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to *Najas flexilis* in West of Ardara/Maas Road SAC from the proposed project.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of *Najas flexilis* in West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.12 (2120) Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes), (2130) Fixed coastal dunes with herbaceous vegetation (grey dunes), (2140) Decalcified fixed dunes with *Empetrum nigrum,* (2150) Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), (2170) Dunes with *Salix repens ssp. argentea* (*Salicion arenariae*), (2190) Humid dune slacks, (21A0) Machairs (* in Ireland), (1395) Petalwort *Petalophyllum ralfsii*

West of Ardara/ Maas Road SAC is designated for a range of coastal habitats and species as listed above that are usually found in close association with each other. The SSCOs (NPWS, 2015) and coastal supporting document (NPWS, 2015) 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 waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to dune habitats in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Northwest Donegal groundwater body (IE_NW_G_049) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0176 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this groundwater body.

- Gweebarra Estuary (IE_NW_120_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0001 mg/l P for the summer and winter. The resulting OP concentration

following dosing in summer is *0.0101* mg/l P and winter 0.0108 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to the above listed habitats in West of Ardara/Maas Road SAC.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the above listed habitats in West of Ardara/Maas Road SAC / no deterioration of its favourable conservation condition is identified.

6.2.4.13 (3110) Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)

Habitat 3110, the oligotrophic lake habitat (in the Directive entitled 'Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)' typically occurs in soft-water, nutrient poor lakes frequently associated with acid bedrock catchments (notably granite and old red sandstone) overlain by peatland.

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

- Skeskinmore lake waterbody (IE_NW_38_*545*) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Aderry lake waterbody (IE_NW_38_60) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0050 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Fad Portnoo lake waterbody (IE_NW_38_621) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to oligotrophic lake habitat 3110 in West of Ardara/Maas Road SAC from the proposed project.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of oligotrophic lake habitat 3110 in West of Ardara/Maas Road SAC/ no deterioration of its favourable conservation condition is identified.

6.2.4.14 (4010) Northern Atlantic wet heaths with *Erica tetralix*, (6410) Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), (7130) Blanket bogs (* if active bog), (7150) Depressions on peat substrates of the *Rhynchosporion*

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

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

- Mulnamin_Beg_010 river waterbody (IE_NW_38M290990) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Shallogan_010 river waterbody (IE_NW_38S030300) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Stracashel_020 river waterbody (IE_NW_38S010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0120 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Owenea_020 river waterbody (IE_NW_38O040100) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0301* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_030 river waterbody (IE_NW_38O040450) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0255* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_040 river waterbody (IE_NW_38O040500) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is *0.0302* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Newtownburke_010 river waterbody (IE_NW_38N040540) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is *0.0129* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Bellangoal River_010 river waterbody (IE_NW_38B070690) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0308 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Abberachrin_010 river waterbody (IE_NW_38A010200) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0300 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Duvoge_010 river waterbody (IE_NW_38D050300) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0303 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Skeskinmore lake waterbody (IE_NW_38_545) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Aderry lake waterbody (IE_NW_38_60) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0050 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Fad Portnoo lake waterbody (IE_NW_38_621) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to the abovementioned peat habitats in West of Ardara/Maas Road SAC.

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

6.2.4.15 (7230) Alkaline fens

The full extent of this habitat within this SAC is currently unknown. Alkaline fens are sensitive to nutrient inputs and P tends to be the limiting nutrient.

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 alkaline fen habitat in the West of Ardara/Maas Road SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Mulnamin_Beg_010 river waterbody (IE_NW_38M290990) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Shallogan_010 river waterbody (IE_NW_38S030300) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0130 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Stracashel_020 river waterbody (IE_NW_38S010200) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0120 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Owenea_020 river waterbody (IE_NW_38O040100) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0301* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_030 river waterbody (IE_NW_38O040450) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0255* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. Good. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owenea_040 river waterbody (IE_NW_38O040500) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is *0.0302* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Newtownburke_010 river waterbody (IE_NW_38N040540) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is *0.0129* mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing,

i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Bellangoal River_010 river waterbody (IE_NW_38B070690) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0308 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Abberachrin_010 river waterbody (IE_NW_38A010200) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0300 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Duvoge_010 river waterbody (IE_NW_38D050300) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0303 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Skeskinmore lake waterbody (IE_NW_38_*545*) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Aderry lake waterbody (IE_NW_38_60) and estimated an increase in OP concentrations of up to 0.00005 mg/l P. The resulting OP concentration following dosing is 0.0050 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Fad Portnoo lake waterbody (IE_NW_38_621) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this lake waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is

excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP statuses have demonstrated that there will be no change in the OP WFD indicative water quality of waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no significant effect to alkaline fen habitat in West of Ardara/Maas Road SAC.

Furthermore, dosing will not prevent the maintenance/ restoration of favourable conservation condition of alkaline fen habitat in West of Ardara/Maas Road SAC/ no deterioration of its favourable conservation condition is identified.

6.2.5 Sheskinmore Lough SPA 004090

Sheskinmore Lough SPA is a shallow lake located approximately 5 km north-west of Ardara in Co. Donegal. The site comprises an intricate complex of coastal and freshwater habitats. The site is an SPA for (A395) Greenland White-fronted Goose *Anser albifrons flavirostris*. The COs (NPWS, 2018) are to maintain or restore the favourable conservation condition of the above listed bird species.

Table 3 identifies the surface water and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to qualifying interests potentially at risk within the Sheskinmore Lough SPA. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Bellangoal River_010 river waterbody (IE_NW_38B070690) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0308 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Duvoge_010 river waterbody (IE_NW_38D050300) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0303 mg/l P, (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Skeskinmore lake waterbody (IE_NW_38_545) 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 OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Northwest Donegal groundwater body (IE_NW_G_049) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0176 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following

dosing, i.e. *Good*. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this groundwater body.

- Owenea Estuary (IE_NW_110_0100) transitional waterbody, an estimated increase in OP concentrations of up to 0.0003 mg/l P for the summer and winter. The resulting OP concentration following dosing for summer and winter is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this transitional waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect.

- Loughros Bay coastal waterbody (IE_NW_110_0000) and estimated an increase in OP concentrations for both summer and winter months of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

6.2.6 Lough Nillan Bog SPA 004110

Lough Nillan Bog SPA covers a large area of the hills immediately south of Glenties in Co. Donegal. The site extends from Owenea Lough in the west to the summit of Silver Hill in the east. The site comprises an extensive complex of blanket bog, wet heath, lakes, rivers and streams, with the topography varying from level plains to steep hills. The site is an SPA for (A098) Merlin (*Falco columbarius*), (A140) Golden Plover (*Pluvialis apricaria)*, (A395) Greenland White-fronted Goose (*Anser albifrons flavirostris*) and (A466) Dunlin (*Calidris alpina schinzii*). The COs (NPWS, 2018) are to maintain or restore the favourable conservation condition of the above listed bird species.

Table 3 identifies the surface water and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to Merlin, Golden Plover, Greenland White-fronted Goose and Dunlin within the Lough Nillan Bog SPA. It is assumed that bird species have the potential to interact with all surface waterbodies and groundwater bodies (via seepages) identified in **Table 3.** The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality water quality on:

- Northwest Donegal groundwater body (IE_NW_G_049) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0176 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this groundwater body.

- Owenea_020 river waterbody (IE_NW_38O040100) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is *0.0301* mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *Good*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody. The status assigned to this waterbody is surrogate, however, on the basis of predicted loading, the risk of using surrogate data is excluded because the loading values are significantly below the 0.00125 mg/l P significance threshold and do not register a significant effect. The ecological status is 'good' which is not conducive to supporting freshwater pearl mussel, and requires restoration to 'high'. However, as the modelled dosing concentrations are <0.00125 mg/l P below the significance threshold this project will not register a significant effect.

- Owentocker_010 river waterbody (IE_NW_38O060050) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0051 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Owentocker_020 river waterbody (IE_NW_38O060300) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0069mg/l P, (Table 3; Appendix C). The RWB OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP/TP statuses have demonstrated that there will be no change in the OP/TP 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 significant effect on the habitats associated with the above-mentioned bird species in Lough Nillan Bog SPA.

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

6.2.7 West Donegal Coast SPA 004150

West Donegal Coast SPA comprises separate sections of the Co. Donegal coastline and extends from Muckros Head in the south, northwards to Slieve League, Malin Beg, Rocky Point, Glen Head, Slieve Tooey, Maghera, Loughros Point, Dunmore Head, Aran Island, Magheradrumman, Carrickfin, Carnboy, Bunbeg, Magheragallan, Lunniagh, as far as Carrick, to the south of Bloody Foreland. The site includes the high coast areas and sea cliffs of the mainland and Aran Island, the land adjacent to the cliff, areas of sand dunes/machair at Maghera, Mullaghderg, Braade/Carrickfin/Carnboy, Magheragallan and Lunniagh/Carrick, and also several areas further inland of the coast at Croaghmuckros and Slieve League, north of Glencolumbkille and south of Dunmore Head. The site is an SPA for (A009) Fulmar (*Fulmarus glacialis*), (A017) Cormorant (*Phalacrocorax carbo*), (A018) Shag (*Phalacrocorax aristotelis*), (A103) Peregrine (*Falco peregrinus*), (A184) Herring Gull (*Larus argentatus*), (A188) Kittiwake (*Rissa tridactyla*), (A200) Razorbill (*Alca torda*) and A346 Chough (*Pyrrhocorax pyrrhocorax)*. The COs (NPWS, 2018) are to maintain or restore the favourable conservation condition of the above listed bird species.

Table 3 identifies the surface water and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to the abovementioned bird species within the West Donegal Coast SPA. It is assumed that bird species have the potential to interact with all surface waterbodies and groundwater bodies (via seepages) identified in **Table 3.** The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Newtownburke_010 river waterbody (IE_NW_38N040540) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0129 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this river waterbody.

- Loughros Bay coastal waterbody (IE_NW_110_0000) and estimated an increase in OP concentrations for both summer and winter months of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0128 mg/l P (Table 3; Appendix C). The OP indicative water quality status is unchanged following dosing, i.e. *High*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP/TP statuses have demonstrated that there will be no change in the OP/TP 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 significant effect to habitats associated with the above-mentioned bird species in West Donegal Coast SPA.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of this species in West Donegal Coast SPA / no deterioration of their favourable conservation condition is identified.

6.2.8 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 is 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 (*Gavia stellate*), (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 alpine*), (A157) Bar-tailed Godwit (*Limosa lapponica*), (A160) Curlew (*Numenius arquata*), (A162) Redshank (*Tringa tetanus*), (A179) Black-headed Gull (*Chroicocephalus ridibundus*), (A182) Common Gull (*Larus canus*), (A184) Herring Gull (*Larus argentatus*) and (A999) Wetlands. The COs (NPWS, 2014) are to maintain or restore the favourable conservation condition of the above listed bird species.

Table 3 identifies the surface water and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to qualifying interests potentially at risk within the Lough Foyle SPA. It is assumed that bird species have the potential to interact with all surface waterbodies and groundwater bodies (via seepages) identified in **Table 3.** The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Foyle and Faughan Estuaries coastal waterbody (UKGBNI5NW250010) and estimated an increase in OP concentrations for both summer and winter months of up to 0.00002mg/l P. The resulting OP concentration following dosing for both winter and summer is 0.0500 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Moderate*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

- Lough Foyle coastal waterbody (GBNIIE6NW250) and estimated an increase in OP concentrations for both summer and winter months of up to 0.00002 mg/l P. The resulting OP concentration following dosing for both winter and summer is 0.0500 mg/l P (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. *Moderate*. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on OP statuses have demonstrated that there will be no change in the OP 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 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 this

species in Lough Foyle SPA / no deterioration of their favourable conservation condition is identified.

6.2.9 Inishkeel SPA 004116

Inishkeel SPA is a small island situated approximately 500 m offshore of Portnoo in the inner part of Gweebarra Bay in west Co. Donegal. At low tide it is accessible from the mainland by a sand spit. It is a rugged, low-lying island which is largely vegetated by a maritime grassland sward. The site includes the surrounding seas, to a distance of 200 m from the shore. The site is an SPA for (A045) Barnacle Goose (*Branta leucopsis*) The COs (NPWS, 2018) are to maintain or restore the favourable conservation condition of the above listed bird species.

Table 3 identifies the surface water and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to qualifying interests potentially at risk within the Inishkeel SPA. It is assumed that bird species have the potential to interact with all surface waterbodies and groundwater bodies (via seepages) identified in **Table 3.** The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Gweebarra Bay coastal waterbody (IE_NW_120_0000) and estimated an increase in OP concentrations for both summer and winter months of up to 0.0001 mg/l P. The resulting OP concentration following dosing for both summer and winter is 0.0038 mg/l P and 0.0126 mg/l P respectively (Table 3; Appendix C). The OP indicative water quality is unchanged following dosing, i.e. High. Therefore, there is no risk of deterioration in OP indicative water quality following OP dosing in Glenties-Ardara WTP for this coastal waterbody.

The EAM assessment results which evaluate the additional OP loading from dosing at Glenties-Ardara WTP on WFD OP/TP statuses have demonstrated that there will be no change in the OP/TP 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 alteration to habitats associated with the above-mentioned bird species in Inishkeel SPA.

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

6.3 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 impacts, the following steps were completed:

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

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 6.13: 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 water bodies. The establishment of how flooding may be contributing to deterioration in water quality in areas where other relevant pressures are absent is a significant consideration in terms of achieving the objectives of the WFD. The AA of the plans will need to consider the potential for impacts from hard engineering solutions and how they might affect hydrological connectivity and hydromorphological supporting conditions for protected habitats and species. There is no potential for cumulative effects with the CFRAMS programme as no infrastructure is proposed as part of this project.
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. Growth is to be achieved through sustainable intensification to maximise production efficiency whilst minimising the effects on the environment however there is increased risk of nutrient discharge to receiving waters and in turn a potential risk to biodiversity and Europe Sites if not controlled. With the required mitigation in the Food Wise Plan, no significant in-combination effects are predicted. Mitigation measures included cross compliance with 13 Statutory Management Requirements, EIA

		Agricultural Regulations 2011, GLAS, and AA Screening of licencing and permitting in the forestry and seafood sectors.
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 Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have	▪ 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[11], and AA[12]. 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.

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

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

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. 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 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	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance;	The overarching strategy was subject to AA and highlighted the need for additional plan/project environmental assessments to be carried out at the tier 2 and tier 3 level. Therefore, no likely significant in-combination effects are envisaged.

(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.	▪ Changes to water quality or quantity; and ▪ Nutrient enrichment /eutrophication.	
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. OP dosing upstream of Glenties Ardara and Fintown WSZs have been considered in the EAM and are assessed herein.

7. SCREENING CONCLUSION STATEMENT

This Screening for AA has considered the potential for significant effects on European Sites arising from the proposed OP dosing at the Glenties-Ardara WTP, within the Glenties-Ardara and Fintown 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 **River Finn SAC (002301)**, **Lough Nillan Bog (Carrickatlieve) SAC (000165)**, **Slieve Tooey/Tormore Island/Loughros Beg Bay (000190)**, **West of Ardara/Maas Road SAC (000197)**, **Sheskinmore Lough SPA (004090)**, **Lough Nillan Bog SPA (004110)**, **West Donegal Coast SPA (004150)**, **Lough Foyle SPA (004087)** and **Iniskeel SPA (004116)** have been assessed. The appraisal undertaken in this Screening report has been informed by an EAM (**Appendix C**) with reference to the ecological communities and habitats. The Screening for AA has determined that there is not potential for significant direct, indirect or cumulative impacts which could affect the qualifying interests/special conservation interests of the European sites within the study area. It is therefore concluded, beyond reasonable scientific doubt, that the proposed project will not give rise to significant effects, either individually or in combination with other plans and projects, within the identified European Site(s).

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

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Appendix A

European Sites - Conservation Objectives

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Conservation Objectives Series

Lough Nillan Bog (Carrickatlieve) SAC 000165

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

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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***

000165	Lough Nillan Bog (Carrickatlieve) SAC
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
7130	Blanket bogs (* if active bog)

Please note that this SAC overlaps with Lough Nillan Bog SPA (004110) and adjoins West of Ardara/Maas Road SAC (000197) and Meenaguse Scragh SAC (001880). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.

Supporting documents, relevant reports & publications

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

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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 :	Water quality in Ireland 2007-2009
Author :	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
Series :	EPA, Wexford
Year :	in prep.
Title :	Monitoring of hard-water lakes in Ireland using charophytes and other macrophytes
Author :	Roden, C.; Murphy, P.
Series :	Unpublished report to NPWS

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)

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

To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in Lough Nillan Bog (Carrickatlieve) 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	The selection of the SAC for habitat 3110 was based on the occurrence of c.11 small to medium sized lakes, many of which are surrounded by blanket bog. The habitat is likely to occur in Loughs Nillan, Owenea, Magrath More and Beg, Shivnagh, Nacloghcor, Anna, Kip and Nadeal. Lake habitat 3160 also occurs in small lakes and pool systems within blanket bog. Evidence of calcareous deposits and calcicole species at the outflow of Lough Nadeal warrants further investigation (Douglas et al., 1990). 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 habitat 3110 in the site is not known. Limited data are available on the lakes from Douglas et al. (1990) and NPWS site notes. Reedbeds with *Phragmites australis*, *Scirpus lacustris* and *Carex rostrata* were recorded in Loughs Nadeal, Shivnagh and Kip (Douglas et al., 1990). *Lobelia dortmanna*, *Littorella uniflora* and *Juncus bulbosus* were noted in Owenea Lough. Calicoles *Chara*, *Cinclidotus* and *Potamogeton* cf. *lucens* were recorded in Lough Nillan. *Potamogeton polygonifolius*, *P. natans*, *Nuphar lutea*, *Nymphaea alba* and *Sparganium angustifolium* were also recorded during the blanket bog survey (Douglas et al., 1990). 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 Article 17 habitat assessment for 3110 (NPWS, 2013) and the lake habitats supporting document (O Connor, 2015). *Littorella uniflora*, *Lobelia dortmanna*, *Juncus bulbosus*, *Potamogeton polygonifolius*, *Nymphaea alba*, *Sparganium angustifolium* and *Utricularia* spp. have been recorded in lakes in the SAC
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	The characteristic zonation of lake habitat 3140 has been described (Roden and Murphy, 2013; in prep.), however, significant further work is necessary to describe the characteristic zonation and other spatial patterns in the remaining four Annex I lake habitats
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. An indicative target has not yet been set for this lake habitat type

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. A specific target has yet to be established for this Annex I lake habitat. Habitat 3110 is associated with very clear water. 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 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, 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

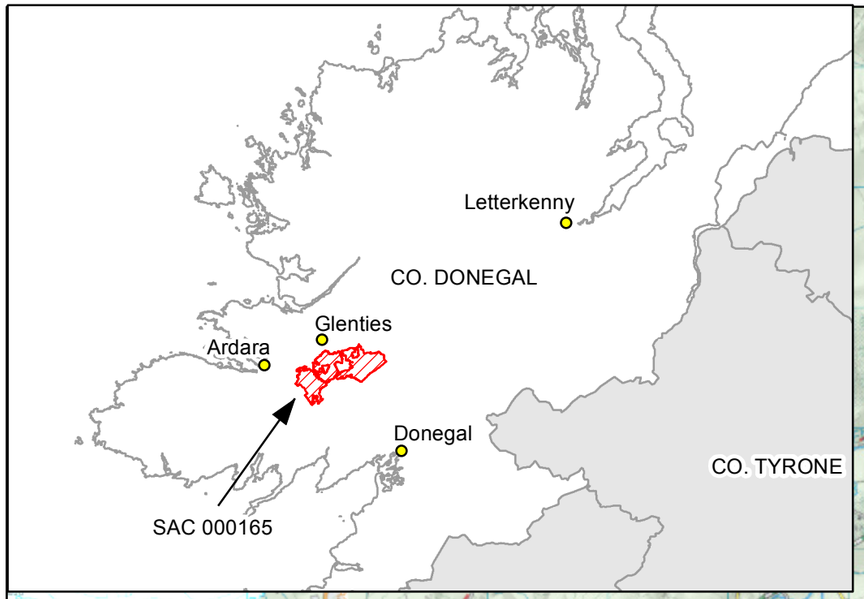
Fringing habitat: area	Hectares	Maintain the area and condition of fringing habitats necessary to support the natural structure and functioning of habitat 3110	Most lake shorelines have fringing habitats of reedswamp, other swamp, fen, marsh or wet-woodland that intergrade with and support the structure and functions of the lake habitat. In this SAC, blanket bog, flush and quaking bog/transition mire communities are likely to dominate lake shorelines. 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

7130 Blanket bogs (* if active bog)

To restore the favourable conservation condition of Blanket bogs in Lough Nillan Bog (Carrickatlieve) SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Blanket bog has not been mapped in detail for Lough Nillan (Carrickatlieve) SAC, but from current available data the total area of the qualifying habitat is approximately 2,600 ha. Further information can be found in Douglas et al. (1990). Further details on this and the following attributes can be found in the Lough Nillan Bog (Carrickatlieve) SAC conservation objectives supporting document for upland habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	Extensive areas of blanket bogs were recorded by Douglas et al. (1990) throughout this SAC. Further information can be found within this source and the uplands supporting document
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	See the uplands supporting document for further details
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 uplands 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 uplands supporting document
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Douglas et al. (1990) recorded a variety of blanket bog vegetation communities in this SAC, 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). See the uplands supporting document for further details
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least seven	Based on Perrin et al. (2014), where the list of positive indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: lichens and bryophytes	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of bryophytes or lichens, excluding *Sphagnum fallax*, at least 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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%	Based on Perrin et al. (2014). See the uplands supporting document for further details, including the list of potentially 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%	Based on Perrin et al. (2014), where the list of negative indicator species for this habitat is also presented. See the uplands supporting document for further details
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation composition: native trees and scrub	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
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	Based on Perrin et al. (2014). See the uplands supporting document for further details

Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Last complete growing season's shoots of ericoids, crowberry (*Empetrum nigrum*) and bog-myrtle (*Myrica gale*) showing signs of browsing collectively less than 33%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Based on Perrin et al. (2014), where the list of sensitive areas is also presented. See the uplands supporting document for further details
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: drainage	Percentage 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%	Based on Perrin et al. (2014). See the uplands supporting document for further details
Physical structure: erosion	Occurrence in local vicinity of a representative number of monitoring stops	Less than 5% of the greater bog mosaic comprises erosion gullies and eroded areas	Based on Perrin et al. (2014). See the uplands supporting document for further details
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	This includes species listed in the Flora (Protection) Order, 2015 and/or the red data lists, Curtis and McGough (1988) and Lockhart et al. (2012). See the uplands supporting document for further details



Legend

Lough Nillan Bog (Carrickatlieve) SAC 000165

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

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

MAP 1:
LOUGH NILLAN BOG (CARRICKATLIEVE) SAC CONSERVATION OBJECTIVES SAC DESIGNATION

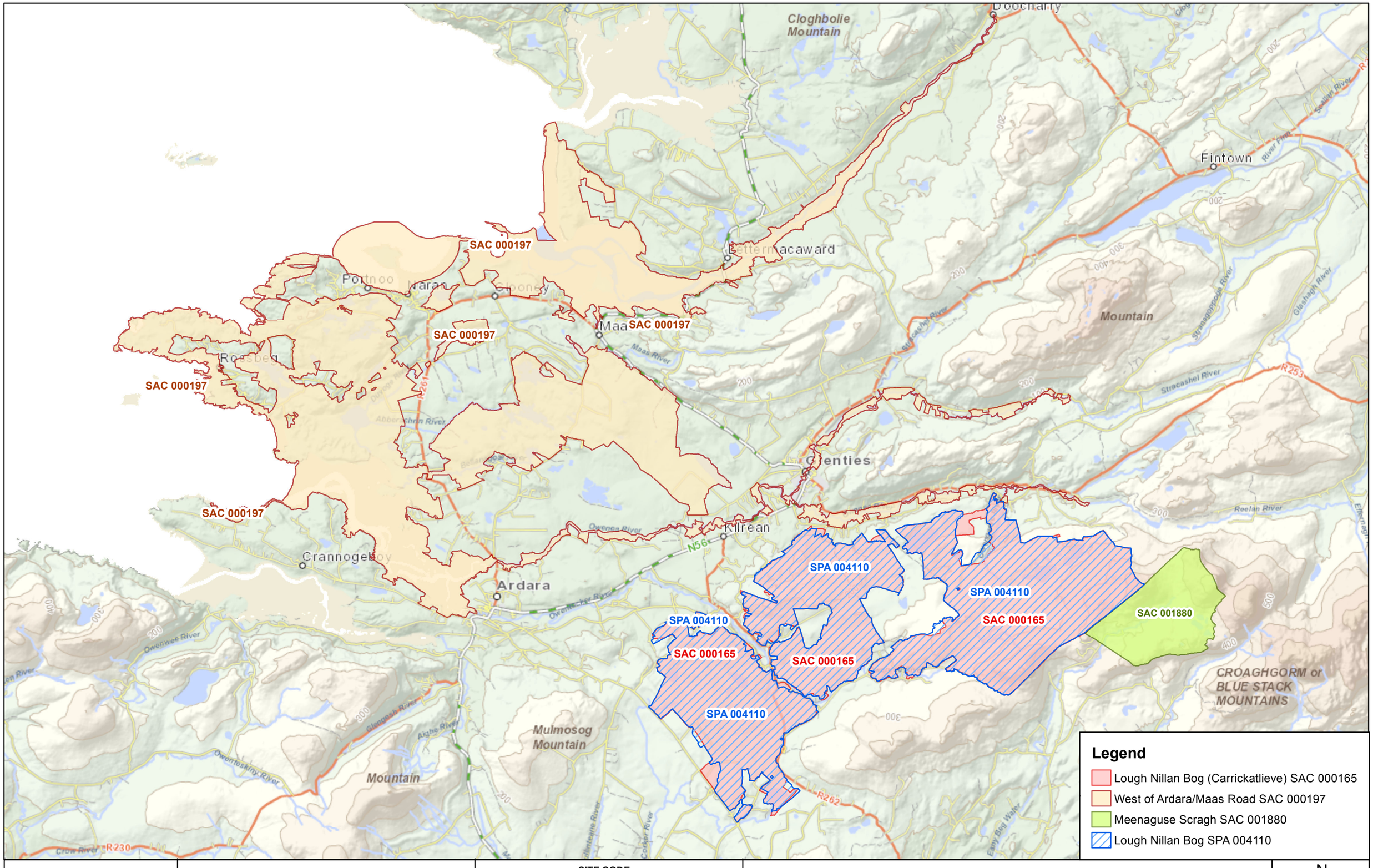
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 000165; version 3. CO. DONEGAL.

0 0.65 1.3 1.95 2.6 3.25 km

N

Map Version 1
Date: July 2016



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

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

MAP 2:
LOUGH NILLAN BOG (CARRICKATLIEVE) SAC
CONSERVATION OBJECTIVES
ADJOINING AND OVERLAPPING DESIGNATIONS

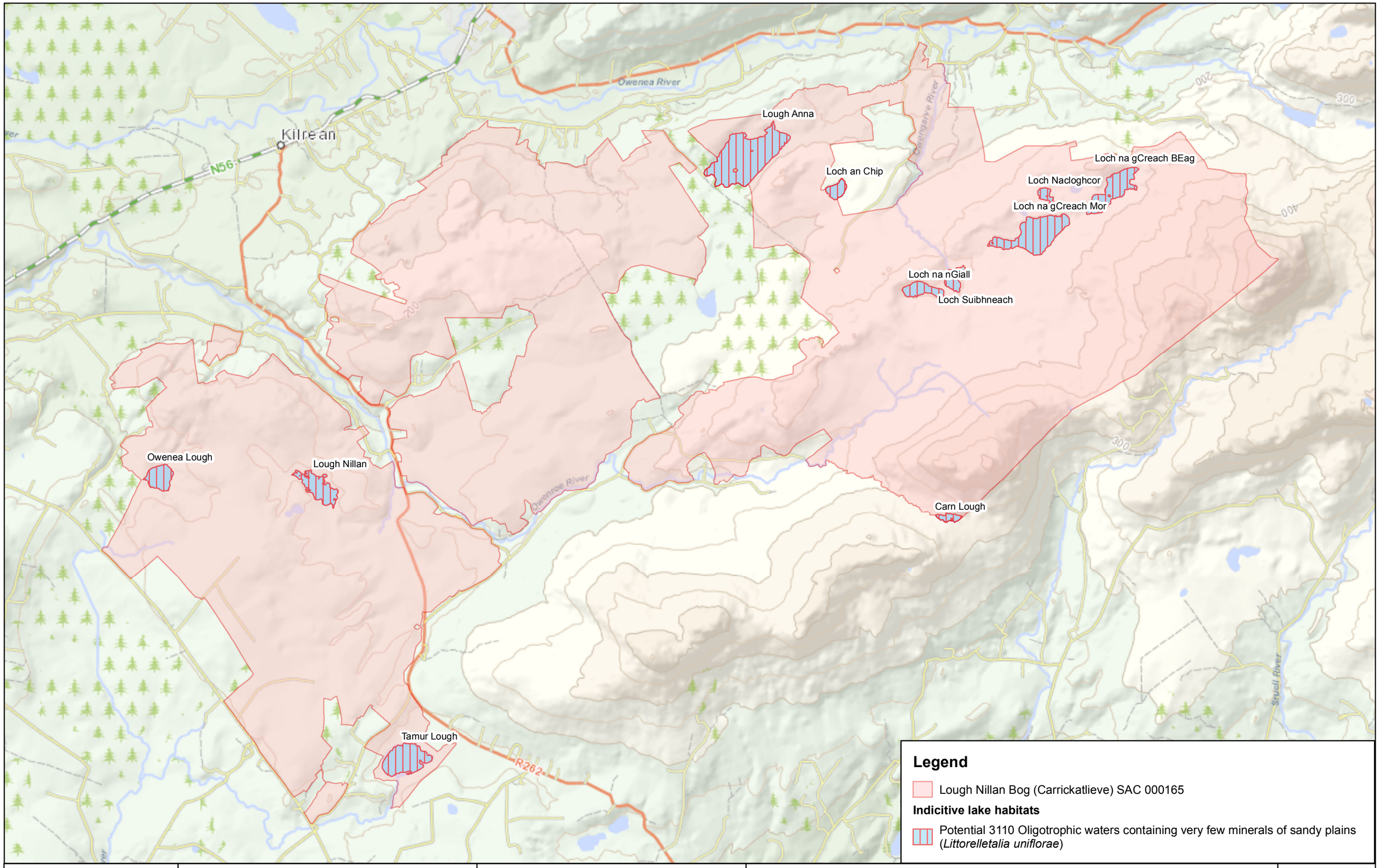
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 000165; version 3. SAC 000197; version 3.
SAC 001880; version 3. SPA 004110; version 3.
CO. DONEGAL.

0 1 2 3 4 5 km

N

Map Version 1
Date: July 2016



Legend

Lough Nillan Bog (Carrickatlieve) SAC 000165

Indicitive lake habitats

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

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

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

MAP 3:
LOUGH NILLAN BOG (CARRICKATLIEVE) SAC
CONSERVATION OBJECTIVES
INDICATIVE LAKE HABITATS

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

SITE CODE:
SAC 000165; version 3. CO. DONEGAL.

0 0.45 0.9 1.35 1.8 2.25 km

N

Map Version 1
Date: July 2016

Conservation objectives for West Donegal Coast SPA [004150]

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	Common Name	Scientific Name
A009	Fulmar	*Fulmarus glacialis*
A017	Cormorant	*Phalacrocorax carbo*
A018	Shag	*Phalacrocorax aristotelis*
A103	Peregrine	*Falco peregrinus*
A184	Herring Gull	*Larus argentatus*
A188	Kittiwake	*Rissa tridactyla*
A200	Razorbill	*Alca torda*
A346	Chough	*Pyrrhocorax pyrrhocorax*

Citation: *NPWS (2018) Conservation objectives for West Donegal Coast SPA [004150]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*

Conservation objectives for Inishkeel SPA [004116]

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	**Common Name**	**Scientific Name**
A045	Barnacle Goose	*Branta leucopsis*

Citation: *NPWS (2018) Conservation objectives for Inishkeel SPA [004116]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*

Conservation objectives for Lough Nillan Bog SPA [004110]

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	**Common Name**	**Scientific Name**
A098	Merlin	*Falco columbarius*
A140	Golden Plover	*Pluvialis apricaria*
A395	Greenland White-fronted Goose	*Anser albifrons flavirostris*
A466	Dunlin	*Calidris alpina schinzii*

Citation: *NPWS (2018) Conservation objectives for Lough Nillan Bog SPA [004110]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*

Conservation objectives for Sheskinmore Lough SPA [004090]

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Objective: To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:

Bird Code	Common Name	Scientific Name
A395	Greenland White-fronted Goose	*Anser albifrons flavirostris*

Citation: *NPWS (2018) Conservation objectives for Sheskinmore Lough SPA [004090]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht.*

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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

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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:

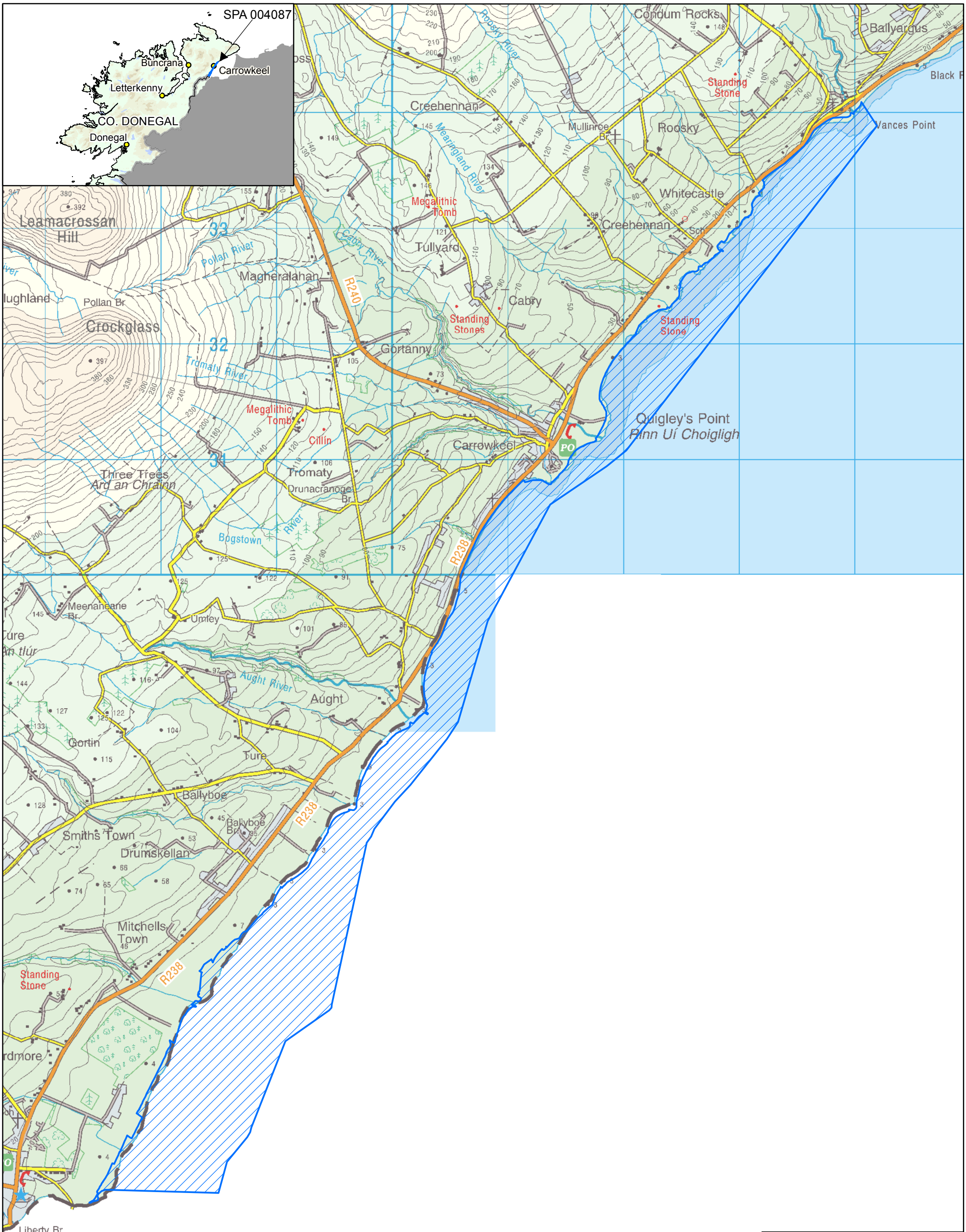
Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	Waterbird population trends are presented in part four of the conservation objectives supporting document
Distribution	Range, timing and intensity of use of areas	No significant decrease 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

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Map Version 1
Date: Sep 2014

ISSN 2009-4086

National Parks and Wildlife Service

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

Citation:

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Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

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

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

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

Qualifying Interests

**** indicates a priority habitat under the Habitats Directive***

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*

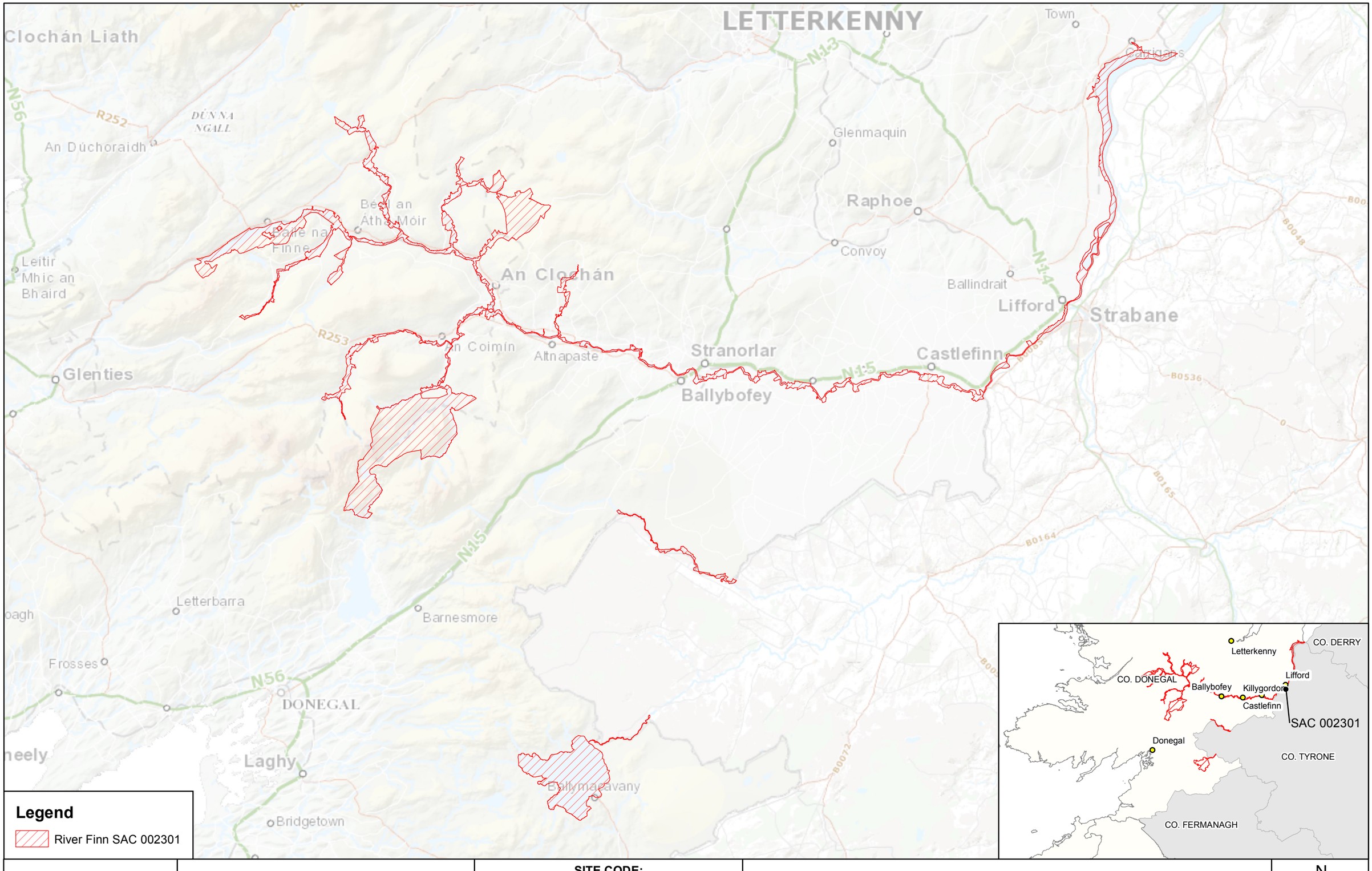
To maintain the favourable conservation condition of Atlantic Salmon in River Finn SAC, which is defined by the following list of attributes and targets:

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



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

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

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

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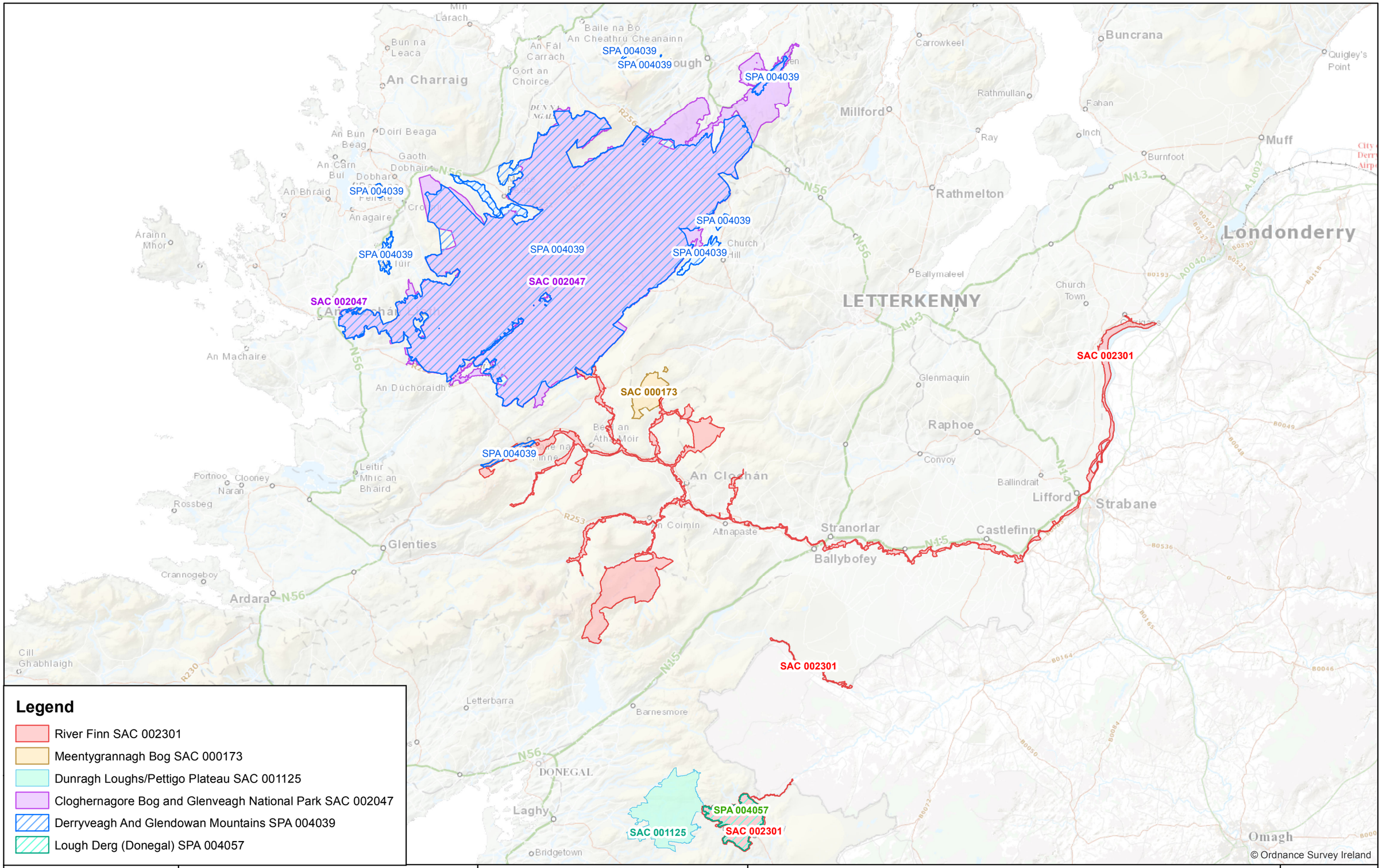
Map Version 1
Date: May 2017



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

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

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

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

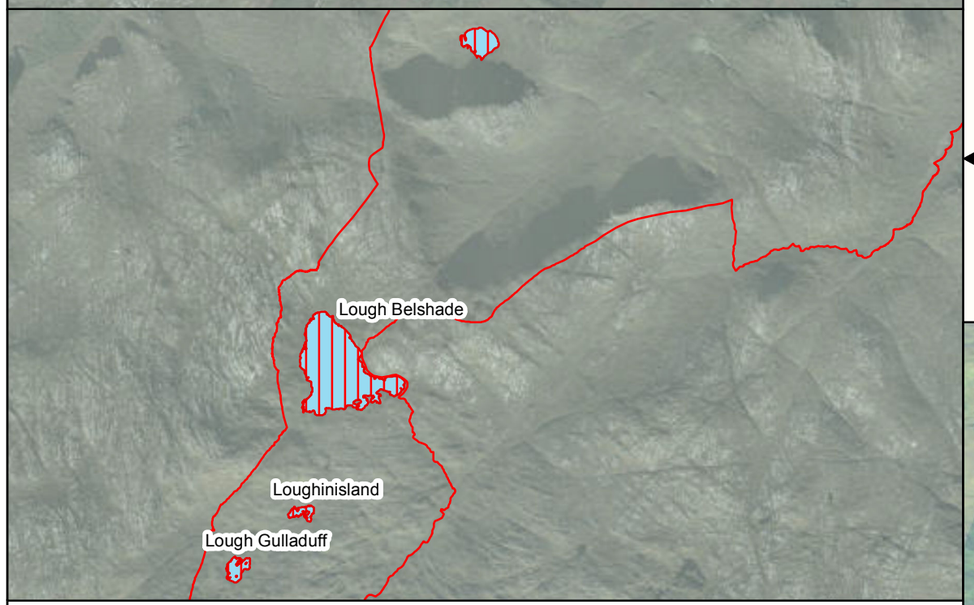
Map to be read in conjunction with the NPWS Conservation Objectives Document.

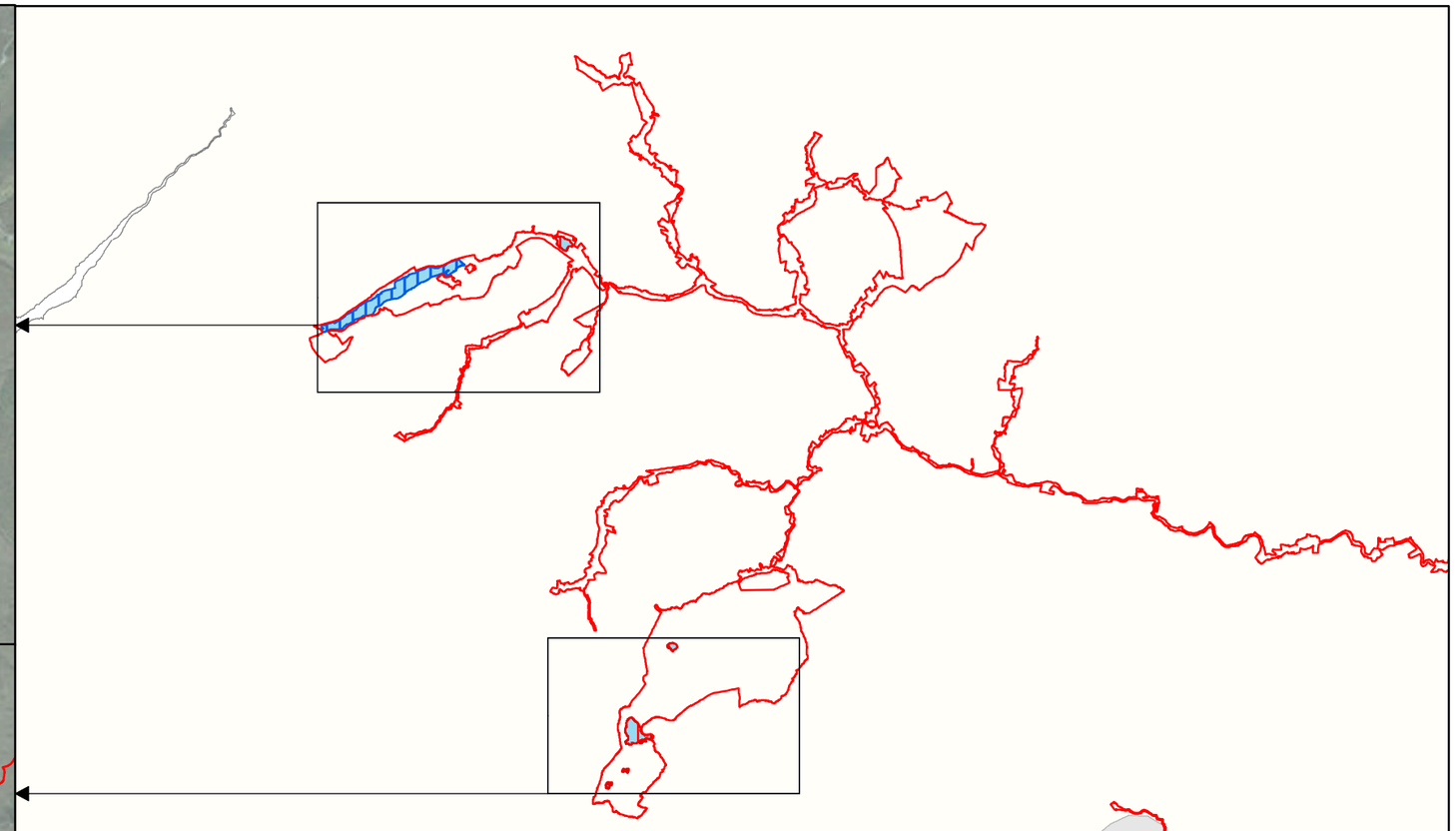
SITE CODE:
SAC 002301; version 3.01. SAC 000173; version 3.01.
SAC 002047; version 3. SAC 001125; version 3.
SPA 004039; version 3. SAC 004057; version 3.
CO. DONEGAL

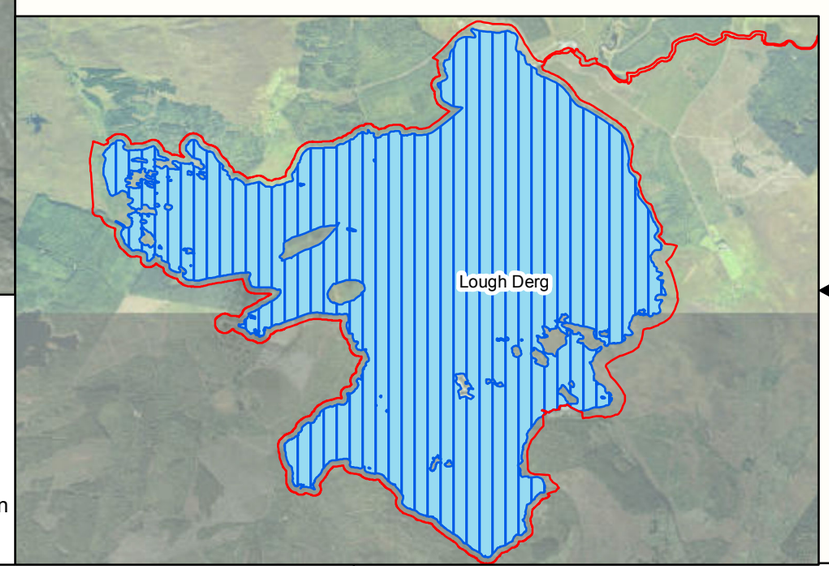
0 3 6 9 12 15 km

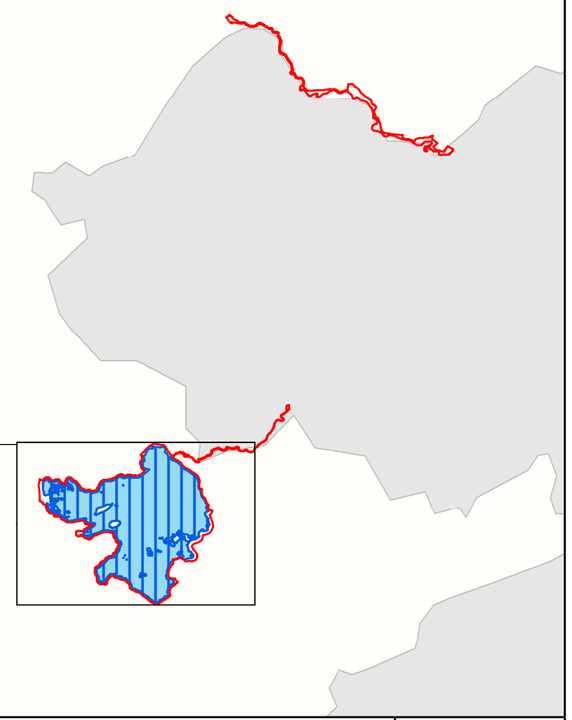
N

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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Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

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

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

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National Parks and Wildlife Service

Conservation Objectives Series

West of Ardara/Maas Road SAC 000197

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
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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***

000197 West of Ardara/Maas Road SAC

1013	Geyer's Whorl Snail *Vertigo geyeri*
1029	Freshwater Pearl Mussel *Margaritifera margaritifera*
1065	Marsh Fritillary *Euphydryas aurinia*
1106	Salmon *Salmo salar*
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1160	Large shallow inlets and bays
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
1355	Otter *Lutra lutra*
1365	Harbour Seal *Phoca vitulina*
1395	Petalwort *Petalophyllum ralfsii*
1410	Mediterranean salt meadows (Juncetalia maritimi)
1833	Slender Naiad *Najas flexilis*
2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*
2140	Decalcified fixed dunes with *Empetrum nigrum**
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)*
2170	Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae)
2190	Humid dune slacks
21A0	Machairs (* in Ireland)
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
4010	Northern Atlantic wet heaths with *Erica tetralix*
4030	European dry heaths
4060	Alpine and Boreal heaths
5130	*Juniperus communis* formations on heaths or calcareous grasslands
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
6510	Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)
7130	Blanket bogs (* if active bog)
7150	Depressions on peat substrates of the Rhynchosporion
7230	Alkaline fens

Please note that this SAC overlaps with Sheskinmore Lough SPA (004090), Inishkeel SPA (004116) and West Donegal Coast SPA (004150). It adjoins Lough Nillan Bog (Carrickatlieve) SAC (000165), Coolvoy Bog SAC (001107) and Lough Nillan Bog SPA (004110). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.

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

NPWS Documents

Year :	1984
Title :	The vegetation of Irish lakes
Author :	Heuff, H.
Series :	Unpublished report to NPWS
Year :	1990
Title :	1989 survey of breeding herds of common seal (*Phoca vitulina*) with reference to previous surveys
Author :	Harrington, R.
Series :	Unpublished report to Wildlife Service
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 :	1996
Title :	Biomar survey of Irish machair sites
Author :	Crawford, I.; Bleasdale, A.; Conaghan, J.
Series :	Irish Wildlife Manual No. 3
Year :	2004
Title :	Harbour seal population assessment in the Republic of Ireland: August 2003
Author :	Cronin, M.; Duck, C.; O Cadhla, O.; Nairn, R.; Strong, D.; O'Keeffe, C.
Series :	Irish Wildlife Manual No. 11
Year :	2004
Title :	Summary of National Parks and Wildlife Service surveys for common (harbour) seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), 1978 to 2003
Author :	Lyons, D.O.
Series :	Irish Wildlife Manual No. 13
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 :	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 :	2012
Title :	Web surveys and habitat assessment for the Marsh Fritillary - north and west Ireland 2012
Author :	Woodrow, W.
Series :	Unpublished report to 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 :	Irish semi-natural grasslands survey 2007-2012
Author :	O'Neill, F.H.; Martin, J.R.; Devaney, F.M.; Perrin, P.M.
Series :	Irish Wildlife Manual No. 78
Year :	2013
Title :	A survey of the benthic macrophytes of three hard-water lakes: Lough Bunny, Lough Carra and Lough Owel
Author :	Roden, C.; Murphy, P.
Series :	Irish Wildlife Manual No. 70
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 :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 3. Species assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2013
Title :	An aerial survey of harbour seals in Ireland. Part 1: Lough Foyle to Galway Bay. August 2011
Author :	Duck, C.; Morris, C.
Series :	Unpublished report to NPWS
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 :	2015
Title :	West of Ardara/Maas Road SAC (site code: 197) Conservation objectives supporting document- coastal habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2015
Title :	West of Ardara/Maas Road SAC (site code: 197) Conservation objectives supporting document- marine habitats and species V1
Author :	NPWS
Series :	Conservation objectives supporting document

Year :	2015
Title :	West of Ardara/Maas Road SAC (site code: 197) Conservation objectives supporting document- *Najas flexilis* V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	1980
Title :	An assessment of the status of the common seal (*Phoca vitulina vitulina*) in Ireland
Author :	Summers, C.F.; Warner, P.J.; Nairn, R.G.W.; Curry, M.G.; Flynn, J.
Series :	Biological Conservation 17: 115-123
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 :	1983
Title :	An assessment of the breeding populations of common seals (*Phoca vitulina vitulina* L.) in the Republic of Ireland during 1979
Author :	Warner, P.J.
Series :	Irish Naturalists' Journal 21: 24-26
Year :	1988
Title :	The reproductive biology of freshwater mussels in Ireland, with observations on their distribution and demography
Author :	Ross, E.D.
Series :	Unpublished PhD Thesis, National University of Ireland, Galway
Year :	1988
Title :	Aspects of the ecology of the freshwater pearl mussel *Margaritifera margaritifera* in north west Ireland, with special reference to life history strategy
Author :	Ross, H.C.G.
Series :	Unpublished MSc Thesis, The Queen's University of Belfast
Year :	1991
Title :	The spatial organization of otters (*Lutra lutra*) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	J. Zool, 224: 41-57
Year :	1996
Title :	The current distribution and status of the freshwater pearl mussel *Margaritifera margaritifera* L. in northwest Ireland
Author :	Beasley, C.R.; Roberts, D.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems 6, 169– 177
Year :	1996
Title :	The distribution and ecology of the freshwater pearl mussel, *Margaritifera margaritifera* L. 1758, in County Donegal, Ireland and implications for its conservation
Author :	Beasley, C.R.
Series :	Unpublished PhD Thesis, The Queen's University of Belfast

Year :	1997
Title :	The BioMar biotope viewer: a guide to marine habitats, fauna and flora in Britain and Ireland
Author :	Picton, B.E.; Costello, M.J.
Series :	Environmental Science Unit, Trinity College Dublin
Year :	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 :	2001
Title :	Aquatic plants in Britain and Ireland
Author :	Preston, C.D.; Croft, J.M.
Series :	Harley Books, Colchester
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 :	2005
Title :	*Margaritifera margaritifera* survey of the River Owenea in the vicinity of Glenties, County Donegal
Author :	Moorkens, E.
Series :	Unpublished report to Donegal County Council
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press
Year :	2006
Title :	The status of host fish populations and fish species richness in European freshwater pearl mussel (*Margaritifera margaritifera*) streams
Author :	Geist, J.; Porkka, M.; Kuehn, R.
Series :	Aquatic Conservation: Marine and Freshwater Ecosystems 16, 251?266
Year :	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 :	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 :	2006
Title :	Vegetation communities of British Lakes: a revised classification
Author :	Duigan, C.A.; Kovach, W.L.; Palmer, M.
Series :	Joint Nature Conservation Committee, Peterborough

Year :	2007
Title :	Interpretation manual of European Union habitats- EUR 27
Author :	European Commission, DG Environment
Series :	Reference document
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 :	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 :	2009
Title :	Report on a survey of the fresh water pearl mussel population of the lower Owenea River
Author :	Keys, A.
Series :	Unpublished report to the North Western Fisheries Board
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 :	2012
Title :	Intertidal benthic survey of West of Ardara/Maas Road SAC
Author :	MERC
Series :	Unpublished report to the Marine Institute and NPWS
Year :	2012
Title :	Subtidal benthic survey of West of Ardara/Maas Road SAC
Author :	MERC
Series :	Unpublished report to the Marine Institute and NPWS
Year :	2013
Title :	Conservation of selected legally protected and Red Listed bryophytes in Ireland
Author :	Campbell, C.
Series :	Unpublished Ph.D. Thesis, Trinity College Dublin
Year :	2015
Title :	The status of Irish salmon stocks in 2014 with precautionary catch advice for 2015
Author :	Standing Scientific Committee on Salmon
Series :	Independent scientific report to Inland Fisheries Ireland

Spatial data sources

Year :	2010
Title :	EPA WFD transitional waterbody data
GIS Operations :	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1130 (map 3)
Year :	Interpolated 2015
Title :	1993-1996 BioMar survey; 20012 intertidal and subtidal surveys
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 4 and 6)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. EPA WFD transitional waterbody data erased from extent. Expert opinion used as necessary to resolve any issues arising
Used For :	1160 (map 5)
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 6)
Year :	Revision 2010
Title :	Saltmarsh Monitoring Project 2007-2008. Version 1
GIS Operations :	QIs selected; clipped to SAC boundary; overlapping regions with Coastal CO data investigated and resolved with expert opinion used
Used For :	1330, 1410 (map 7)
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 :	2120, 2130, 2140, 2150, 2170, 2190, 21A0 (map 8)
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 :	2120, 2130, 2140, 2150, 2170, 2190, 21A0 (map 8)
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 9)
Year :	2012
Title :	The conservation status of juniper formations in Ireland
GIS Operations :	Juniper formations polygons clipped to SAC boundary
Used For :	5130 (map 9)

Year :	2015
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 :	1013, 1029, 1065, 1365, 1395 (maps 10, 11, 13 and 14)
Year :	Revision 2012
Title :	Margaritifera Sensitive Areas data
GIS Operations :	Relevant catchment boundaries identified. Expert opinion used as necessary to resolve any issues arising
Used For :	1029 (map 11)
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 terrestrial side of the river banks data; creation of 20m buffer applied to canal centreline data. These datasets are combined with the derived EPA WDF 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 12)
Year :	2010
Title :	EPA WFD Waterbodies data
GIS Operations :	Creation of a 20m buffer applied to river and stream centreline data; creation of 80m buffer on the aquatic side of lake data; creation of 10m buffer on the terrestrial side of lake data. These datasets are combined with the derived OSi data for the 1355 CO. Overlapping regions investigated and resloved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1355 (map 12)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1365 (map 13)
Year :	2013
Title :	Najas flexilis data
GIS Operations :	Lake habitat for species clipped to SAC boundary
Used For :	1833 (map 14)

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in West of Ardara/Maas Road 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 as 1,530ha using OSi data and the defined Transitional Water Body area under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Sand with amphipods, polychaetes and *Tellina tenuis* community complex; Estuarine sand with oligochaetes community complex. See map 6	Based on intertidal and subtidal surveys undertaken in 2012 MERC (2012) and BioMar surveys undertaken between 1993 and 1996 (Picton and Costello, 1997). See marine habitats supporting document for further information

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 West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area was estimated as 1,259ha using OSi data
Community distribution	Hectares	Conserve the following community type in a natural condition: Sand with amphipods, polychaetes and *Tellina tenuis* community complex. See map 6	Based on an intertidal survey undertaken in 2012 (MERC, 2012) and BioMar surveys undertaken between 1993 and 1996 (Picton and Costello, 1997). See marine supporting document for further information

1160 Large shallow inlets and bays

To maintain the favourable conservation condition of Large shallow inlets and bays in West of Ardara/Maas Road 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 5	Habitat area was estimated as 688ha using OSi data and the Transitional Water Body area as defined under the Water Framework Directive. See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Sand with amphipods, polychaetes and *Tellina tenuis* community complex; Reef community complex. See map 6	Based on intertidal and subtidal surveys undertaken in 2012 MERC (2012) and BioMar surveys undertaken between 1993 and 1996 (Picton and Costello, 1997). See marine supporting document for further information

1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

To restore the favourable conservation condition of Atlantic salt meadows (Glauco-Puccinellietalia maritimae) in West of Ardara/Maas Road 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: Sheskinmore-Beagh - 13.48ha; Roshin Point - 1.69ha. See map 7	Based on data from Saltmarsh monitoring Project (SMP) (McCorry and Ryle, 2009). Two sub-sites that supported Atlantic salt meadows (ASM) were mapped (15.57ha). A further 16.84ha of potential habitat from two unsurveyed sub-sites at Letteramacaward and Loughros More Bay-Ardara were also mapped giving a total estimated area of 32.01ha. NB further unsurveyed areas maybe present within the SAC. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 7 for known distribution	Based on data from McCorry and Ryle (2009). The saltmarsh in West of Ardara/Maas Road SAC is widely distributed, with the most important areas at Sheskinmore-Beagh. NB further unsurveyed areas maybe present within the SAC. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). At Sheskinmore, some sections of ASM display excellent examples of salt pan and natural creek drainage. At Roshin Point, although the ASM is not extensive, most of the habitat is in adequate condition. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Based on data from McCorry and Ryle (2009). 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 McCorry and Ryle (2009). At Sheskinmore, the ASM is part of a larger coastal ecosystem and there are natural transitions to other habitats including MSM and machair. There is evidence of zonation in the ASM throughout the site ranging from low to mid and upper ASM. At Roshin Point, the ASM forms part of a larger coastal ecosystem and there are natural transitions to other habitats along the isthmus and rock headland including fixed dune, machair, wet grassland and MSM. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). At Sheskinmore, the level of grazing (cattle and sheep) in general was rarely excessive. At Roshin Point grazing intensity varies though most of the ASM is grazed moderately. See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% area outside creeks vegetated	Based on data from McCorry and Ryle (2009). At Sheskinmore, trails associated with livestock were occasionally encountered. 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 SMP (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details

Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. This species should be prevented from establishing	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details

1410 Mediterranean salt meadows (Juncetalia maritimi)

To maintain the favourable conservation condition of Mediterranean salt meadows (Juncetalia maritimi) in West of Ardara/Maas Road 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: Sheskinmore-Beagh-28.67ha; Roshin Point - 4.34ha. See map 7	Based on data from the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009). Two sub-sites that support Mediterranean salt meadow were mapped (33.01ha). A further 14.39ha of potential habitat from two unsurveyed sub-sites at Letteramacaward and Loughros More Bay-Ardara were also mapped giving a total estimated area of 47.41ha. NB further unsurveyed areas maybe present within the SAC. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 7 for known distribution	Based on data from McCorry and Ryle (2009). The saltmarsh at West of Ardara/Maas Road is widely distributed. The MSM at Sheskinmore accounts for more than 60% of the total saltmarsh area. NB further unsurveyed areas maybe present within the SAC. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). At Sheskinmore, the MSM is in good condition and exhibits many characteristic features of the habitat. At Roshin Point, the MSM has favourable habitat structure though one area has been significantly modified by peat cutting. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	Mediterranean salt meadows is found high up in the saltmarsh but requires occasional tidal inundation. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of saltmarsh habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). At Sheskinmore, the MSM is extensive and highly diverse with a number of transitions evident throughout the site. At Roshin Point there is some transitional vegetation present where MSM is intermixed with modified blanket bog vegetation on deeper peat. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimetres	Maintain structural variation in the sward	Based on data from McCorry and Ryle (2009). Trails were noted through the MSM by the SMP at Sheskinmore. See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from McCorry and Ryle (2009). 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 characteristic species listed in SMP (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. This species should be prevented from establishing	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details

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

To maintain the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') in West of Ardara/Maas Road 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: Sheskinmore - 9.15ha; Clooney - 2.73ha; Roshin Point - 0.39ha; Lettermacaward - 7.35ha. See map 8	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 recorded from four sub-sites, giving a total estimated area of 19.62ha. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 8 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Shifting dunes were recorded from all four 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). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram grass (*Ammophila arenaria*) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. At Lettermacaward, the CMP noted good development of mobile dunes fronting a previously eroded fixed dune face. Accretion was also noted at Roshin Point and Sheskinmore at Trawmore and Ballinreavy Strand. At Clooney, the mobile dunes have eroded naturally but this has been exacerbated by pedestrian use of the top of the dunes. 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 Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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 dominated by marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*)	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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. Both bracken (*Pteridium aquilinum*) and sea-buckthorn (*Hippophae rhamnoides*) were recorded from the Clooney sub-site. At Roshin Point, bracken was recorded. 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 West of Ardara/Maas Road 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: Sheskinmore - 251.68ha; Clooney - 41.29ha; Roshin Point - 3.59ha; Lettermacaward - 112.08ha. See map 8	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 recorded from four sub-sites, giving a total estimated area of 408.64ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 8 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. 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). A range of coastal habitats occur in close proximity at all sub-sites. 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). Petalwort (*Petalophyllum ralfsii*) has been recorded at both Lettermacaward and Sheskinmore sub-sites. See coastal habitats supporting document for further details and the conservation objective for petalwort (1395)
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). The fixed dunes at Clooney are lightly grazed by sheep, cattle, horses and rabbits. At Lettermacaward, the fixed dunes are grazed by sheep and rabbits and overgrazing has occurred in places. The fixed dunes at Roshin Point are lightly grazed by cattle which is having a positive influence. At Sheskinmore, the winter grazing regime as part of conservation management plan agreed between NPWS and local farmers, is having a positive influence on the fixed dunes. 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). At Clooney, the Red Data Book (Curtis and McGough, 1988) species hoary whitlow grass *(Draba incana*) was recorded in the fixed dunes. At Lettermacaward, the dunes are species-rich and the CMP noted an abundance of orchids such as pyramidal orchid (*Anacamptis pyramidalis*) and fragrant orchid (*Gymnadenia conopsea*). As mentioned above, petalwort (*Petalophyllum ralfsii*) also occurs. See coastal habitats supporting document for further details.

Vegetation composition: negative indicator species (including *Hippophae rhamnoides*)	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. Both bracken (*Pteridium aquilinum*) and sea-buckthorn (*Hippophae rhamnoides*) were recorded from the Clooney sub-site. At Roshin Point, bracken was recorded. 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 Clooney, sycamore (*Acer pseudoplatanus*), blackthorn (*Prunus spinosa*) and burnet rose (*Rosa pimpinellifolia*) were recorded in the fixed dunes. See coastal habitats supporting document for further details

2140 Decalcified fixed dunes with Empetrum nigrum

To maintain the favourable conservation condition of Decalcified fixed dunes with *Empetrum nigrum* in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney et al., 2013). Habitat only recorded at Sheskinmore (0.75ha) sub-site by CMP but was not recorded by SDM as it did not meet minimum mapping requirement. Current status of habitat in Ireland is unclear and is under review. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, 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
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. 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 Gaynor (2008), 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 composition: sward height	Centimeters	Maintain structural variation within sward	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). At Sheskinmore, all areas of dune heath, dune slack and dunes with *Salix repens* were noted to be lightly grazed. 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 Ryle et al. (2009)	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). 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. 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). See coastal habitats supporting document for further details

2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea)

To maintain the favourable conservation condition of Atlantic decalcified fixed dunes (Calluno-Ulicetea) in West of Ardara/Maas Road 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. See map 8	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 only recorded at Sheskinmore (40.35ha) sub-site by CMP. An area of 2.70ha was subsequently recorded by SDM, as well as in a mosaic with fixed dunes (of which 7.49ha is estimated to be 2150), giving a total estimated area of 10.20ha. Habitat is difficult to map as it occurs in mosaics. Current status of habitat in Ireland is unclear and is under review. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 8 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. 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 Gaynor (2008), 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 composition: sward height	Centimeters	Maintain structural variation within sward	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). At Sheskinmore all areas of dune heath, dune slack and dunes with *Salix repens* were noted to be lightly grazed. 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). 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. 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). See coastal habitats supporting document for further details

2170 Dunes with Salix repens ssp. argentea (Salicion arenariae)

To maintain the favourable conservation condition of Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae) in West of Ardara/Maas Road 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-site mapped: Sheskinmore - 2.50ha. See map 8	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 recorded from one sub-site by SDM, giving a total estimated area of 2.50ha. NB additional unsurveyed areas maybe present. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 8 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. 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% cover, 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: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). At Sheskinmore, all areas of dune heath, dune slack and dunes with *Salix repens* were noted to be lightly grazed. 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). See coastal habitats supporting document for further details
Vegetation composition: cover and height of *Salix repens*	Percentage cover; centimetres	Maintain more than 10% cover of creeping willow (*Salix repens*); vegetation height should be in the average range 5-20cm	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). Cover of creeping willow (*Salix repens*) should be maintained (e.g. through an appropriate grazing regime) to prevent the development of a coarse, rank vegetation cover. 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. See coastal habitats supporting document for further details
Vegetation composition: scrub/trees	Percentage cover	For trees and scrub other than creeping willow (*Salix repens*), there should be no more than 5% cover or their presence should be under control	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details

2190 Humid dune slacks

To maintain the favourable conservation condition of Humid dune slacks in West of Ardara/Maas Road 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-site mapped: Sheskinmore: 12.31ha. See map 8	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 recorded from one sub-site by SDM, giving a total estimated area of 12.31ha. See coastal habitats supporting document for further details.
Habitat distribution	Occurrence	No decline, or change in habitrat distribution, subject to natural processes. See map 8 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Dune slacks were only recorded at Sheskinmore, in fixed dunes backing Trawmore Strand and along the east of the central headland at Magheramore. 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	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation, resulting in increased rates of erosion. 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 Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). 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 Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). At Sheskinmore the vast dune system supports a variety of habitats occurring in close association. See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 5% of dune slack habitat, with the exception of pioneer slacks which can have up to 20% bare ground	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: vegetation height	Centimetres	Maintain structural variation within sward	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). At Sheskinmore, all areas of dune heath, dune slack and dunes with *Salix repens* were noted to be lightly grazed. 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). Some of the slacks at Sheskinmore are deep and contain marsh vegetation. See coastal habitats supporting document for further details
Vegetation composition: cover of *Salix repens*	Percentage cover; centimetres	Maintain less than 40% cover of creeping willow (*Salix repens*)	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Cover of creeping willow (*Salix repens*) needs to be maintained (e.g. through an appropriate grazing regime) to prevent the development of a coarse, rank vegetation cover. 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: 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). See coastal habitats supporting document for further details

21A0 Machairs (* in Ireland)

To restore the favourable conservation condition of Machairs in West of Ardara/Maas Road 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: Sheskinmore - 21.28ha; Clooney - 8.82ha; Roshin Point - 5.19ha; Lettermacaward - 53.29ha. See map 8	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 recorded from four sub-sites, giving a total estimated area of 88.58ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 8 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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. See coastal habitats supporting document for further details
Physical structure: hydrological and flooding regime	Presence/ absence of water abstraction or drainage works	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). A range of coastal habitats have been identified in this SAC. 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). Petalwort (*Petalophyllum ralfsii*) was recorded at the Sheskinmore and Lettermacaward sub-sites. See coastal habitats supporting document for further details and the conservation objective for petalwort (1395)
Vegetation structure: sward height	Centimeters	Maintain structural variation within sward	Based on data from Ryle et al. (2009) and Delaney et al. (2013). At Clooney the machair is lightly grazed but undergrazed in places. The machair at Roshin Point is also lightly grazed by cattle. 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 Ryle et al. (2009)	Based on data from Ryle et al. (2009), Delaney et al. (2013) and Gaynor (2006). 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: 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 Lettermacaward, some scrub encroachment was noted in the southeastern part of the intact machair. 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

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

To maintain the favourable conservation condition of Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) in West of Ardara/Maas Road 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	The selection of the SAC for habitat 3110 was based on the occurrence of numerous small to medium sized lakes surrounded by blanket bog. Little information is available on the biota of these lakes, however. The occurrence of *Najas flexilis* in Sheskinmore, Kiltooris and Clooney Loughs indicate that lake habitat 3130 is also present in the site, while dystrophic lakes and ponds (3160) have been recorded in the Lackaghatermon blanket bog (Douglas et al., 1990). Map 9 provides an indicative distribution of lake habitats 3110 and 3130 in the SAC. 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	The exact distribution of habitat 3110 in the site is unknown, but it is considered likely to be widespread (see indicative distribution in map 9)
Typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	For lists of typical plant species, see Article 17 habitat assessment for 3110 (NPWS, 2013) and the lake habitats supporting document (O Connor, 2015)
Vegetation composition: characteristic zonation	Occurrence	All characteristic zones should be present, correctly distributed and in good condition	The characteristic zonation of lake habitat 3140 has been described (Roden and Murphy, 2013; in prep.), however significant further work is necessary to describe the characteristic zonation and other spatial patterns in the remaining four lake habitats
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. An indicative target of >6m has been developed for hard water lakes (3140) (see Roden and Murphy, 2013; in prep.). Indicative targets will be developed for the other lake habitats with time
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 the oligotrophic soft water habitat 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. A target has been set for hard water lakes (3140), however specific targets have yet to be established for the remaining lake habitats. Habitat 3110 is associated with very clear water. 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 to sufficiently low levels to support the habitat and its typical species	As a nutrient poor habitat, oligotrophic and Water Framework Directive '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 the oligotrophic soft water lake habitat, annual average 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 Water Framework Directive 'high' status targets apply to the oligotrophic soft water 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, 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 the oligotrophic soft water habitat 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, 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 Water Framework Directive purposes using the 'Free Index'. The target for the oligotrophic soft water lake habitat 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 oligotrophic soft water lakes (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 CaCO3). 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 oligotrophic soft water lakes (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 unit	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	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. 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 West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Stable or increasing, subject to natural processes	Northern Atlantic wet heaths with *Erica tetralix* has not been mapped in detail for this SAC and thus total area of the qualifying habitat is unknown. It occurs in mosaic with other habitats, including other heath habitats (4030), blanket bogs (7130), rocky outcrops and grasslands (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Further information on vegetation communities associated with this habitat is given in Perrin et al. (2014)
Vegetation composition: cross-leaved heath	Occurrence within 20m of a representative number of 2m x 2m monitoring stops	Presence of cross-leaved heath (*Erica tetralix*) near 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 given
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 is also given
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 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 2m x 2m monitoring stops	No signs of burning in sensitive areas, into the moss, liverwort or lichen layer or exposure of peat surface due to burning	Attribute and target based on Perrin et al. (2014) where the list of sensitive areas 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 cover in local vicinity of a representative number of monitoring stops	Area showing signs of drainage from heavy trampling, tracking or ditches less than 10%	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 book (Curtis and McGough, 1988)

4030 European dry heaths

To restore the favourable conservation condition of European dry heaths in West of Ardara/Maas Road 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	European dry heaths has not been mapped in detail for this SAC and thus total area of the qualifying habitat is unknown. It occurs in mosaic with other habitats, including other heath habitats (4010, 4060), rocky outcrops and grasslands (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
Vegetation community diversity	Number and variety	Maintain variety of vegetation communities, subject to natural processes	Further information on vegetation communities associated with this habitat is given in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is least three, excluding *Campylopus* and *Polytrichum* mosses	Attribute and target based on Perrin et al. (2014)
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Attribute and target based on Perrin et al. (2014)
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Attribute and target based on Perrin et al. (2014) where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also given
Vegetation structure: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle (*Myrica gale*), creeping willow (*Salix repens*) and western gorse (*Ulex gallii*) is less than 50%	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 is also given
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and shrubs	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of scattered native trees and shrubs less than 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: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling (*Calluna vulgaris*) cover less than 50%	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 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	Attribute and target based on Perrin et al. (2014) where the list of sensitive areas is also presented
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling (*Calluna vulgaris*) should occur throughout, with at least 10% of cover in the mature phase	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)
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 book (Curtis and McGough, 1988)

4060 Alpine and Boreal heaths

To restore the favourable conservation condition of Alpine and Boreal heaths in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alpine and Boreal heaths has not been mapped in detail for this SAC and thus total area of the qualifying habitat is unknown. It occurs in mosaic with other habitats, including other heath habitats (4010, 4030), rocky outcrops and *Juniperus communis* formations on heaths or calcareous grasslands (5130) (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is least three	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 66%	Attribute and target based on Perrin et al. (2014) where the list of positive indicator species for this habitat is also given
Vegetation composition: dwarf-shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf-shrub species at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 10%	Attribute and target based on Perrin et al. (2014) where the list of negative indicator species for this habitat is also given
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of grazing	Percentage of leaves browsed at a representative number of 2m x 2m monitoring stops	Less than 10% collectively of the live leaves of specific graminoids showing signs of grazing	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 and crowberry (*Empetrum nigrum*) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning within the habitat	Attribute and target based on Perrin et al. (2014)
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)

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 book (Curtis and McGough, 1988)

5130 Juniperus communis formations on heaths or calcareous grasslands

To maintain the favourable conservation condition of *Juniperus communis* formations on heaths or calcareous grasslands in West of Ardara/Maas Road 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 the qualifying habitat in the SAC is currently unknown. Cooper et al. (2012) record the habitat at Dawros Head (DL09), while Delaney et al. (2014) map it in mosaic with fixed dune (2130) habitat at Sheskinmore (see map 8). However, there are likely to be other formations present within the SAC. Juniper plants have been recorded elsewhere, but at least some populations will not be large enough to be classified as formations. See map 9 for location of sub-site (DL09) surveyed and mapped by Cooper et al. (2012), which is described as one of the largest known areas of the habitat in the country
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes for area above
Juniper population size	Number per formation	At least 50 plants per formation	To classify as a juniper formation, at least 50 plants should be present (Cooper et al., 2012)
Vegetation composition: typical species	Number per formation	At least 50% of the listed positive indicator species for the relevant vegetation group present	Cooper et al. (2012) lists positive indicator species for five vegetation groups. The formation described by Cooper et al. (2012) (DL09) falls into vegetation group 4 (*Calluna vulgaris/Erica cinerea* group). See Cooper et al. (2012) for positive indicator species
Vegetation composition: negative indicator species	Occurrence per formation	Negative indicator species, particularly non-native invasive species, absent or under control	Negative indicator species listed by Cooper et al. (2012)
Vegetation structure: cone-bearing plants	Percentage per formation	At least 10% of juniper plants are bearing cones	Attribute and target based on Cooper et al. (2012)
Vegetation structure: seedling recruitment	Percentage per formation	At least 10% of juniper plants are seedlings	Attribute and target based on Cooper et al. (2012)
Vegetation structure: dead juniper	Percentage per formation	Mean percentage of each juniper plant dead less than 10%	Attribute and target based on Cooper et al. (2012)

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)

To maintain the favourable conservation condition of Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) in West of Ardara/Maas Road SAC, which defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	The full extent of this habitat has not been mapped in detail in the SAC and thus the total area of the qualifying habitat is unknown. O'Neill et al. (2013) recorded very small fragmented areas in association with other habitats in the SAC such as other grasslands, heath and sand dunes adjacent to Sheskinmore Lough and Lough Doo. It is likely to be found in other locations also (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See notes for area above
Vegetation composition: typical species	Number at a representative number of monitoring stops	At least seven positive indicator species present, including two "high quality" species	List of positive indicator species, including high quality species, identified by the Irish semi-natural grasslands survey (O'Neill et al., 2013). This document should be consulted for further details
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	List of negative indicator species identified by O'Neill et al. (2013)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: woody species and bracken	Percentage at a representative number of monitoring stops	Cover of woody species (except certain listed species) and bracken (*Pteridium aquilinum*) not more than 5% cover	Woody species that can occur above 5% cover include juniper (*Juniperus communis*) and burnet rose (*Rosa spinosissima*). However, cover of these species above 25% may indicate transition to another Annex I habitat such as or *Juniperus communis* formations (5130). Attribute and target based on O'Neill et al. (2013)
Vegetation structure: broadleaf herb: grass ratio	Percentage at a representative number of monitoring stops	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: sward height	Percentage at a representative number of monitoring stops	At least 30% of sward between 5cm and 40cm tall	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: litter	Percentage at a representative number of monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013)
Physical structure: disturbance	Square metres	Area showing signs of serious grazing or other disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013)

6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)

To maintain the favourable conservation condition of *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) in West of Ardara/Maas Road 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	The full extent of this habitat has not been mapped in detail in the SAC and thus the total area of the qualifying habitat is unknown. O'Neill et al. (2013) recorded very small areas, adjacent to Sheskinmore Lough and Lough Doo, that graded into other grassland types as well as other habitats including heaths and sand dunes. It is likely to be found in other locations also (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note for area above
Vegetation composition: typical species	Number at a representative number of monitoring stops	At least seven positive indicator species present, including one "high quality" species as listed in O'Neill et al. (2013)	List of positive indicator species, including high quality species, identified by O'Neill et al. (2013). Note that purple moor-grass (*Molinia caerulea*) is a positive indicator species, but not necessarily an essential component of the habitat
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: moss species	Percentage at a representative number of monitoring stops	Hair mosses (*Polytrichum* spp.) not more than 25% cover	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: woody species and bracken	Percentage at a representative number of monitoring stops	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5% cover	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: broadleaf herb: grass ratio	Percentage at a representative number of monitoring stops	Broadleaf herb component of vegetation between 40% and 90%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: sward height	Percentage at a representative number of monitoring stops	At least 30% of sward between 10cm and 80cm tall	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: litter	Percentage at a representative number of monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare ground	Percentage	Not more than 10% bare ground	Attribute and target based on O'Neill et al. (2010)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Not more than 10% bare soil	Attribute and target based on O'Neill et al. (2013)
Physical structure: disturbance	Square metres	Area showing signs of serious grazing or other disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013)

6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)

To maintain the favourable conservation condition of Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) in West of Ardara/Maas Road 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	Internal NPWS files note a small number of species-rich meadows that are cut for hay. However, further work is required to establish the nature and extent of the Annex I habitat in the SAC, including the requirement for management by mowing
Habitat distribution	Occurrence	No decline, subject to natural processes	Distribution of this habitat in this SAC is currently unknown. See note for area above
Vegetation composition: typical species	Number at a representative number of monitoring stops	At least seven positive indicator species present, including one "high quality" species as listed in O'Neill et al. (2013)	List of positive indicator species, including high quality species, identified by the Irish semi-natural grasslands survey (O'Neill et al., 2013). This document should be consulted for further details
Vegetation composition: negative indicator species	Percentage at a representative number of monitoring stops	Negative indicator species collectively not more than 20% cover, with cover by an individual species not more than 10%	List of negative indicator species identified by O'Neill et al. (2013)
Vegetation composition: non-native species	Percentage at a representative number of monitoring stops	Cover of non-native species not more than 1%	Attribute and target based on O'Neill et al. (2013)
Vegetation composition: woody species and bracken	Percentage at a representative number of monitoring stops	Cover of woody species and bracken (*Pteridium aquilinum*) not more than 5%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: broadleaf herb: grass ratio	Percentage at a representative number of monitoring stops	Broadleaf herb component of vegetation between 40 and 90%	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: sward height	Percentage at a representative number of monitoring stops	At least 50% of sward between 10cm and 50cm tall	Attribute and target based on O'Neill et al. (2013)
Vegetation structure: litter	Percentage at a representative number of monitoring stops	Litter cover not more than 25%	Attribute and target based on O'Neill et al. (2013)
Physical structure: bare soil	Percentage at a representative number of monitoring stops	Not more than 5% bare soil	Attribute and target based on O'Neill et al. (2013)
Physical structure: disturbance	Square metres	Area showing signs of serious grazing or other disturbance less than 20m²	Attribute and target based on O'Neill et al. (2013)

7130 Blanket bogs (* if active bog)

To restore the favourable conservation condition of Blanket bogs in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Stable or increasing, subject to natural processes	Blanket bogs has not been mapped in detail for this SAC and thus total area of the qualifying habitat is unknown. It occurs in mosaic with other habitats, including heath habitats (4010, 4030), saltmarshes (1330, 1410) and rocky outcrops (Douglas et al., 1990; NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
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 bog	Blanket bogs are considered active when "still supporting a significant area of vegetation that is normally peat forming" (EC, 2007)
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Drains and erosion gullies can affect the natural hydrological processes of blanket bog
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014). Douglas et al. (1990) describes the habitat in this SAC
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014) where the list of positive indicator species for this habitat is also given
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) where potential dominant species are listed
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 given
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and scrub	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 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	Occurrence 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	Occurrence 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). The greater bog mosaic incorporates the blanket bog itself and associated vegetation types as well as non-vegetation cover types that appear to have been derived from former blanket bog including gravel, rock and running water
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 book (Curtis and McGough, 1988)

7150 Depressions on peat substrates of the Rhynchosporion

To maintain the favourable conservation condition of Depressions on peat substrates of the Rhynchosporion in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Depressions on peat substrates of the Rhynchosporion has not been mapped in detail for this SAC and thus total area of the qualifying habitat is unknown. It overlaps with blanket bogs (7130). Douglas et al. (1990) provides survey information on the blanket bog in this SAC
Habitat distribution	Occurrence	No decline, subject to natural processes	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least five	Attribute and target based on Perrin et al. (2014) where the list of positive indicator species for this habitat is also given
Vegetation composition: Rhynchospora spp.	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of white beaked sedge (*Rhynchospora alba*) and brown beaked sedge (*R. fusca*) 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 35%	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 given
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and scrub	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 of *Sphagnum* 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 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	Occurrence 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	Occurrence 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). The greater bog mosaic incorporates the blanket bog itself, associated vegetation types as well as non-vegetation cover types that appear to have been derived from former blanket bog including gravel, rock and running water
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 book (Curtis and McGough, 1988)

7230 Alkaline fens

To maintain the favourable conservation condition of Alkaline fens in West of Ardara/Maas Road 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	The full extent of this fen habitat within the SAC is currently unknown. The main area occurs in the vicinity of Sheskinmore Lough where it grades into other habitats such as Machairs (21A0). NB there may be other areas of Alkaline fen within the SAC (Internal NPWS files)
Habitat distribution	Occurrence	No decline, subject to natural processes	Full distribution of this habitat in this SAC is currently unknown- see note above
Hydrological regime	Metres	Appropriate natural hydrological regimes necessary to support the natural structure and functioning of the habitat	Maintenance of groundwater, surface water flows and water table levels within natural ranges is essential for this wetland habitat
Peat formation	Flood duration	Active peat formation, where appropriate	In order for peat to from, water levels need to be slightly below or above the soil surface for c.90% of the time (Jim Ryan, pers. comm.)
Water quality: nutrients	Water chemistry measures	Appropriate water quality to support the natural structure and functioning of the habitat	Fens receive natural levels of nutrients (e.g. iron, magnesium and calcium) from water sources. However, they are generally poor in nitrogen and phosphorus with the latter tending to be the limiting nutrient
Vegetation structure: typical species	Percentage	Maintain vegetation cover of typical species including brown mosses and vascular plants	Vascular plants listed for the fen at Sheskinmore include slender sedge (*Carex lasiocarpa*), long-stalked yellow sedge (*Carex lepidocarpa*), carnation sedge (*Carex panicea*), black bog rush (*Schoenus nigricans*), wild angelica (*Angelica sylvestris*), grass-of-Parnassus (*Parnassia palustris*), marsh helleborine (*Epipactis palustris*) and meadow thistle (*Cirsium dissectum*) (Internal NPWS files)
Vegetation composition: trees and shrubs	Percentage	Cover of scattered native trees and shrubs less than 10%	Scrub and trees will tend to invade if fen conditions become drier. Attribute and target based on upland habitat conservation assessment criteria (Perrin et al., 2014)
Physical structure: disturbed bare ground	Percentage	Cover of disturbed bare ground less than 10%. Where tufa is present, disturbed bare ground less than 1%	While grazing may be appropriate in this habitat, excessive areas of disturbed bare ground may develop due to unsuitable grazing regimes. Attribute and target based on upland habitat conservation assessment criteria (Perrin et al., 2014)
Physical structure: drainage	Percentage	Areas showing signs of drainage as a result of drainage ditches or heavy trampling less than 10%	Attribute and target based on upland habitat conservation assessment criteria (Perrin et al., 2014)

1013 Geyer's Whorl Snail *Vertigo geyeri*

To maintain the favourable conservation condition of Geyer's Whorl Snail in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. There is one known site for this species in this SAC within the 1km square G6995. See map 10	From Moorkens and Killeen (2011) (site code VgCAM8)
Presence in suitable habitat	Occurrence	Snails (living or recently dead adults and/or juveniles) are present in all polygons of suitable habitat defined as at least sub-optimal from Moorkens and Killeen (2011) and in 60% of samples defined as optimal and 20% of samples defined as sub-optimal	See habitat area below for definitions of optimal and sub-optimal habitat
Habitat area	Hectares	Stable or increasing, subject to natural processes and at least 14ha. Suitable habitat is defined as areas of flushed fen with small sedges and saturated mosses	From Moorkens and Killeen (2011) Optimal habitat is defined as flushed fen sward with sedge and densely mossy areas 5-15cm tall, containing species such as small-fruited yellow-sedge (*Carex viridula*) and other short sedges, common butterwort (*Pinguicula vulgaris*), grass-of-Parnassus (*Parnassia palustris*), marsh horsetail (*Equisetum palustre*), jointed rush (*Juncus articulatus*), marsh helleborine (*Epipactis palustris*), common cottongrass (*Eriophorum angustifolium*) and the mosses *Drepanocladus revolvens*, *Campylium stellatum*, with scattered tussocks of black bog-rush (*Schoenus nigricans*) no greater than 50cm tall. During sampling the water table should be between 0-5cm of the soil surface, but not above ground level. Sub-optimal habitat is defined as above but either vegetation height is less than 5cm or greater than 15cm, or the water table is below 5cm or ground is flooded at the time of sampling
Habitat quality: optimal habitat	Percentage area	At least 15% of the suitable habitat should be classed as optimal	From Moorkens and Killeen (2011). Optimal habitat defined above
Habitat quality: soil wetness	Percentage of monitoring transect; Percentage of a representative number of monitoiring stops	75% of transect should be classified as optimal wetness or 75% of a representative number of sampling stops in areas of optimal habitat should be classified as optimal wetness as defined by (Moorkens and Killeen 2011)	Transect established as part of condition assessment monitoring at Sheskinmore Nature Reserve (Moorkens and Killeen, 2011)

1029 Freshwater Pearl Mussel *Margaritifera margaritifera*

To restore the favourable conservation condition of Freshwater Pearl Mussel in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Kilometres	Maintain at 24.6km. See map 11	The conservation objective applies to the Owenea freshwater pearl mussel population. The species is widespread in the Owenea River, stretching from the townland of Mully in the east, to Owenea Bridge in the west. Its distribution was first mapped by H. Ross (1988), and local constrictions in distribution were noted by Beasley (1996) and Moorkens (2007). Mussels were found in the Stracashel tributary in 2012, however further survey is required to map the species' distribution in that river. Maps may change as better data become available. The target is for the species to be sufficiently widespread to maintain itself on a long-term basis as a viable component of the Owenea system. See also the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009, DEHLG (2010), Moorkens (2007), Beasley (1996), H. Ross (1988) and E. Ross (1988)
Population size	Number of adult mussels	Restore Owenea population to at least 10,000 adult mussels	The Owenea population was estimated as less than 10,000 in 2009 (DEHLG, 2010). NPWS (2013) estimated that it had reduced to c.8,200 in 2012, based on a 3% per year decline. Confidence in these estimates is low, however, given that there has been no full baseline survey of the Owenea system. A steady decline in the Owenea population has been noted since H. Ross (1988) estimated the Owenea had c. 200,000 mussels in the 1980s. Beasley (1996) noted a significant overall decline in density in the 12 years after H. Ross' survey. Moorkens (2007) noted further declines in adult numbers. The target is for the species to be sufficiently abundant to maintain itself on a long-term basis as a viable component of the Owenea system
Population structure: recruitment	Percentage per size class	Restore to at least 20% of population no more than 65mm in length; and at least 5% of population no more than 30mm in length	Mussels of no more than 65mm are considered 'young mussels' and may be found buried in the substratum and/or beneath adult mussels. Mussels of no more than 30mm are 'juvenile mussels' and are always buried in the substratum. See also the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009. In 2009, no juvenile or young mussels were found in the Owenea and the smallest mussel was 120mm (Moorkens, 2009; DEHLG, 2010). These results contrast with those of H. Ross (1988), who found mussels ranged from 7-98 years with a significant proportion aged 10-20 years. The target is for sufficient juvenile recruitment to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system
Population structure: adult mortality	Percentage	No more than 5% decline from previous number of live adults counted; dead shells less than 1% of the adult population and scattered in distribution	5% is considered the cut-off between the combined errors associated with natural fluctuations and sampling methods and evidence of true population decline. 1% of dead shells is considered to be indicative of natural losses. The Owenea failed the target for dead shells in 2009 (DEHLG, 2010). Moorkens (2009) reported a 16% decline in numbers at a site when compared to 2005 data. The target is for sufficient survival of adults to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system

Habitat extent	Kilometres	Restore suitable habitat in more than 19.0 km in the Owenea and more than 0.9 km in the Stracashel (see map 11) and any additional stretches necessary for salmonid spawning	The species' habitat covers much of the Owenea River and some of the Stracashel. It is a combination of 1) the area adult and juvenile mussels can occupy; 2) the area of spawning and nursery habitat host fish can occupy. Fish nursery and mussel habitat typically overlap. Fish spawning habitat is generally adjacent to mussel habitat, but may lie upstream of mussel distribution. Only spawning areas that can regularly contribute juvenile fish to areas occupied by adult mussels should be considered. Suitability of mussel and fish habitat is determined by flow and substratum conditions. It is sensitive to hydromorphological changes, sedimentation and nutrient enrichment. Pressures from throughout the catchment contribute to such impacts. The Owenea habitat is unsuitable for adult survival and juvenile recruitment (DEHLG, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system
Water quality: macroinvertebrate and phytobenthos (diatoms)	Ecological quality ratio (EQR)	Restore water quality- macroinvertebrates: EQR greater than 0.90; phytobenthos: EQR greater than 0.93	These EQRs correspond to high ecological status for these two Water Framework Directive biological quality elements. They represent high water quality with very low nutrient concentrations (oligotrophic conditions). The habitat in the Owenea River and the Stracashel tributary failed the macroinvertebrate standard during 2009 sampling for the Sub-basin Management Plans (DEHLG 2010). The Owenea habitat passed the phytobenthos standard in 2009 (DEHLG 2010). Diatoms were not sampled in the Stracashel tributary. See also the European Communities Environmental Objectives (Surface Waters) Regulations 2009. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system
Substratum quality: filamentous algae (macroalgae); macrophytes (rooted higher plants)	Percentage	Restore substratum quality- filamentous algae: absent or trace (less than 5%); macrophytes: absent or trace (less than 5%)	The habitat in the Owenea and Stracashel failed the filamentous algal target during 2009 sampling for the Sub-basin Management Plans, having high algal cover abundance (up to a maximum of 70%) at most sites (DEHLG, 2010). Macrophyte cover was low in 2009, however evidence suggested recent removal of rooted plants by decay and flood events. Moorkens (2007) recorded high macrophyte cover in mussel habitat. Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system
Substratum quality: sediment	Occurrence	Restore substratum quality- stable cobble and gravel substrate with very little fine material; no artificially elevated levels of fine sediment	The habitat for the species in the Owenea River and Stracashel tributary is currently unsuitable for the recruitment of juveniles owing to sedimentation of the substratum. Significant sedimentation has been recorded during all recent mussel monitoring surveys (Moorkens, 2007, 2009; DEHLG, 2010). Recruitment of juvenile mussels is being prevented by the poor quality of the river substrate. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system

Substratum quality: oxygen availability	Redox potential	Restore to no more than 20% decline from water column to 5cm depth in substrate	Differences in redox potential between the water column and the substrate correlate with differences in oxygen levels. Juvenile mussels require full oxygenation while buried in gravel. In suitable habitat, there should be very little loss of redox potential between the water column and underlying gravels. In 2009, the average redox potential loss in the Owenea in 2009 was 39.15% at 5cm depth (Moorkens, 2009; DEHLG, 2010). The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system
Hydrological regime: flow variability	Metres per second	Restore appropriate hydrological regimes	The availability of suitable freshwater pearl mussel habitat is largely determined by flow (catchment geology being the other important factor). In order to restore the habitat for the species, flow variability over the annual cycle must be such that: 1) high flows can wash fine sediments from the substratum; 2) high flows are not artificially increased so as to cause excessive scour of mussel habitat; 3) low flows do not exacerbate the deposition of fines or growth of algae/macrophytes and 4) low flows do not cause stress to mussels in terms of exposure, water temperatures, food availability or aspects of the reproductive cycle. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system
Host fish	Number	Maintain sufficient juvenile salmonids to host glochidial larvae	Salmonid fish are host to the larval form of the freshwater pearl mussel and, thus, are essential to the completion of the life cycle. 0+ and 1+ fish are typically used, both because of habitat overlaps and the development of immunity with age in fish. Fish presence is considered sufficient, as higher fish density and biomass is indicative of enriched conditions in mussel rivers. Geist et al. (2006) found that higher densities of host fish coincided with eutrophication, poor substrate quality for pearl mussels and a lack of pearl mussel recruitment, while significantly lower densities and biomass of host fish were associated with high numbers of juvenile mussels. No fish stocking should occur within the mussel habitat, nor any works that may change the salmonid balance or residency time. Good numbers of juvenile fish were present and glochidial encystment was recorded on Atlantic salmon, but not on brown trout, in 2009 (Johnston and Associates, 2009; DEHLG, 2010)
Fringing habitat	Hectares	Maintain the area and condition of fringing habitats necessary to support the population	Riparian habitats, including those along lake fringes, even where they do not form part of a natural floodplain, are an integral part of the structure and functioning of river systems. Fringing habitats assist in the settlement of fine suspended material, protect banks from erosion and contribute to nutrient cycling, as well as contributing to the aquatic food web (e.g. allochthonous matter such as leaf fall) and providing habitat (refuge and resources) for certain life-stages of fish, birds and aquatic invertebrates. Shade may also be important in suppressing algal and macrophyte growth in enriched rivers and moderating temperatures. Equally, fringing habitats are dependent on rivers/lakes, particularly their water levels, and support wetland communities and species of conservation concern. The target is for sufficient habitat in favourable condition to allow the species to maintain itself on a long-term basis as a viable component of the Owenea system

1065 Marsh Fritillary *Euphydryas aurinia*

To maintain the favourable conservation condition of Marsh Fritillary in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied 1km squares	Number	A minimum of three occupied 1km squares (see map 14), with a record of adults and/or webs in each of these squares at least one year in six	The mapped distribution 1995-2014 shows records from five of the six hectads that overlap this SAC (B70, B80, G69, G79, G89). There have been confirmed records since 2010 from three 1km squares in the SAC, G8393, G6895 and G6995 but there are considered to be other occupied and undocumented sites
Proof of breeding: larval webs	Number at a representative number of sub-sites	Proof of breeding, confirmed by detection of webs. Number of webs at Sheskinmore should exceed 50 in at least one year in six	A web count at Sheskinmore in 2012 was 46 (Woodrow, 2012). This is taken as a baseline for this sub-site but will need to be revised when a longer time series of monitoring data is available. There is no survey data for other sites within the SAC
Potential habitat: area	Hectares	Area of potential habitat stable or increasing, subject to natural processes	Potential habitat for marsh fritillary is defined as areas of vegetation where devil's-bit scabious (*Succisa pratensis*) is present, with mean height less than 50cm and with less than 10% cover of scrub more than 1m tall (Woodrow, 2012). There is no figure available for the total area of suitable habitat in the SAC
Good quality habitat: area	Hectares	Area of good quality habitat stable or increasing, subject to natural processes. At least 8.3ha at Sheskinmore	A 2012 survey found 8.3ha of suitable habitat in two areas within Sheskinmore Nature Reserve (Woodrow, 2012). There is no figure available for the total area of suitable habitat in good condition in the SAC. Good condition habitat is defined as that with more than 20% frequency of moderate to high density of the foodplant devil's-bit scabious (*Succisa pratensis*) (three plants per m^2) growing in 12-25cm high sward. There should be less than 10% cover of tall scrub (more than 0.5m tall) over a site. Negative habitat quality indicators include average sward height of less than 12cm or more than 25cm; more than 10% scrub; and low density of devil's-bit scabious (*Succisa pratensis*)

1106 Salmon *Salmo salar*

To maintain the favourable conservation condition of Atlantic Salmon in West of Ardara/Maas Road 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. There are a number of natural barriers to salmon migration on the Gweebarra river
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded	A conservation limit 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 of the National Salmon Commission's annual model output of CL attainment levels. See SSC (2015). Stock estimates are either derived from direct counts of adults (rod catch, fish counter) or indirectly by fry abundance counts. The Owenea/Stracashel and Owentocker rivers are currently exceeding their CLs
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	Target is 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. The habitat for salmon is good in the Gweebarra and Owenea catchments and habitat improvement works have been undertaken in both catchments under the Northern Rivers Project
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 West of Ardara/Maas Road 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 323.4ha	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 694.5ha	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 92.7km	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 212.9ha	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 12	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

1365 Harbour Seal *Phoca vitulina*

To maintain the favourable conservation condition of Harbour Seal in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use. See map 13	See marine supporting document for further details
Breeding behaviour	Breeding sites	Conserve the breeding sites in a natural condition. See map 13	Attribute and target based on background knowledge of Irish breeding populations, review of data summarised by Summers et al. (1980), Warner (1983), Harrington (1990), Lyons (2004), and unpublished NPWS records. See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	Conserve the moult haul-out sites in a natural condition. See map 13	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004), Cronin et al. (2004), Duck and Morris (2013) and unpublished NPWS records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	Conserve the resting haul-out sites in a natural condition. See map 13	Attribute and target based on background knowledge of Irish populations, review of data from Lyons (2004) and unpublished NPWS records. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	See marine supporting document for further details

1395 Petalwort *Petalophyllum ralfsii*

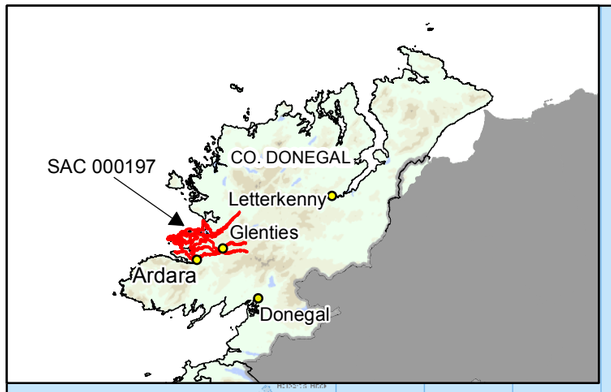
To maintain the favourable conservation condition of Petalwort in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution of populations	Number and geographical spread of populations	No decline. There are two known populations within the SAC. See map 10	There are currently two known sub-populations: (5a) Dooey Point, near the northern end of the machair and low ridge (bank between old fields) in wide, shallow dune-slack area supporting short grassland; and (5b) Sheskinmore, along the edge of a sandy bank in short turf with high bryophyte cover above a limestone outcrop. Data from NPWS surveys and Campbell (2013)
Population size	Number of individuals	No decline. Population at (5a) Dooey Point = c.4 thalli; (5b) Sheskinmore = c.105 thalli; Total = c.110 thalli	Counts of thalli: for Dooey Point, from mean number of thalli recorded by Holyoak 1999 and 2002 (4 and 3 thalli respectively) = 3.5 thalli; for Sheskinmore, from mean of number of thalli in two 1 x 1m plots, from three counts from early April 2009 to April 2011 (Campbell, 2013): 7.5 thalli per m^2 in 14 m^2 = 105 thalli
Area of suitable habitat	Hectares	No decline. Area of suitable habitat at Dooey Point currently unknown, but thought to be very small, c.0.00005ha. Area of suitable habitat at Sheskinmore estimated at c.0.001375ha. Total = 0.0015ha	The extent of suitable habitat at Dooey Point has not been measured by GPS, but is known to be very small (ca. 0.5m^2). The extent of suitable habitat at Sheskinmore, measured by GPS co-ordinates, is c.14m^2 (Campbell, 2013)
Hydrological conditions: soil moisture	Occurrence of damp soil conditions	Maintain hydrological conditions so that substrate is kept moist and damp throughout the year, but not subject to prolonged inundation by flooding in winter	*Petalophyllum ralfsii* grows in damp sand. Based on Campbell (2013)
Vegetation: open structure	Height and percentage cover of vegetation	Maintain open, low vegetation, with a high percentage cover of bryophytes (small acrocarps and liverwort turf) and bare ground	*Petalophyllum ralfsii* grows in compacted, sandy ground, maintained by rabbit (*Oryctolagus cuniculus*) and cattle grazing and trampling (by walkers). Recorded at Dooey Point on small, mainly bare patch of humic sand exposed on low ridge (Holyoak, 2002); at Sheskinmore, Campbell (2013) recorded a mean height of vegetation of 5.3cm, with bryophyte cover c.26-75% and bare ground c.3-10% (based on two 1 x 1m plots between 2009 and 2011). See also the conservation objectives for fixed coastal dunes (2130) and machairs (21A0)

1833 Slender Naiad *Najas flexilis*

To maintain the favourable conservation condition of Slender Naiad in West of Ardara/Maas Road SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Population extent	Hectares; distribution	No change to the spatial extent of *Najas flexilis* within each lake, subject to natural processes. See map 14 for known locations	See *Najas flexilis* supporting document for further details
Population depth	Metres	No change to the depth range of *Najas flexilis* within each lake, subject to natural processes	See *Najas flexilis* supporting document for further details
Population viability	Plant traits	No decline in plant fitness, subject to natural processes	See *Najas flexilis* supporting document for further details
Population abundance	Square metres	No change to the cover abundance of *Najas flexilis*, subject to natural processes	See *Najas flexilis* supporting document for further details
Species distribution	Occurrence	No decline, subject to natural processes	See *Najas flexilis* supporting document for further details
Habitat extent	Hectares	No decline, subject to natural processes	See *Najas flexilis* supporting document for further details
Hydrological regime: water level fluctuations	Metres	Maintain appropriate natural hydrological regime necessary to support the habitat for the species	See *Najas flexilis* supporting document for further details
Lake substratum quality	Various	Maintain appropriate substratum type, extent and chemistry to support the populations of the species	See *Najas flexilis* supporting document for further details
Water quality	Various	Maintain appropriate water quality to support the populations of the species	See *Najas flexilis* supporting document for further details
Acidification status	pH units; mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the populations of *Najas flexilis*, subject to natural processes	See *Najas flexilis* supporting document for further details
Water colour	mg/L PtCo	Maintain appropriate water colour to support the populations of *Najas flexilis*	See *Najas flexilis* supporting document for further details
Associated species	Species composition and abundance	Maintain appropriate associated species and vegetation communities to support the populations of *Najas flexilis*	See *Najas flexilis* supporting document for further details
Fringing habitat: area and condition	Hectares	Maintain the area and condition of fringing habitats necessary to support the populations of *Najas flexilis*	See *Najas flexilis* supporting document for further details



Legend

West of Ardara/Maas Road SAC 000197

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MAP 1:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 km

N

Map Version 1
Date: May 2015

SPA 004150

SAC 002047

SPA 004116

SAC 000197

SAC 001107

SPA 004090

SPA 004110

SPA 004150

SAC 000165

Legend

- West of Ardara/Maas Road SAC 000197
- Lough Nillan Bog (Carrickatlieve) SAC 000165
- Coolvoy Bog SAC 001107
- Cloghernagore Bog and Glenveagh National Park SAC 002047
- Sheskinmore Lough SPA 004090
- Lough Nillan Bog SPA 004110
- Inishkeel SPA 004116
- West Donegal Coast SPA 004150
- OSi Discovery Series County Boundary

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MAP 2:
WEST OF ADARA/MAAS ROAD SAC CONSERVATION OBJECTIVES ADJOINING / ADJACENT / OVERLAPPING DESIGNATIONS

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

SITE CODE:
SAC 000197; version 3, SAC 000165; version 3,
SAC 001107; version 3, SAC 002047; version 3.
SPA 004090; version 1.01, SPA 004110; version 1.01,
SPA 004116; version 2.01, SPA 004150; version 2.01. CO. DONEGAL

0 3 6 9 12 15 km

N

Map Version 1
Date: May 2015

Legend

- West of Ardara/Maas Road SAC 000197
- 1130 Estuaries
- OSi Discovery Series County Boundary

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MAP 3:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
ESTUARIES

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

Legend

- West of Ardara/Maas Road SAC 000197
- 1140 Mudflats and sandflats not covered by sea water at low tide
- OSi Discovery Series County Boundary

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MAP 4:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
TIDAL MUDFLATS AND SANDFLATS

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

Legend

- West of Ardara/Maas Road SAC 000197
- 1160 Large shallow inlets and bays
- OSi Discovery Series County Boundary

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MAP 5:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
LARGE SHALLOW INLETS AND BAYS

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

Legend

West of Ardara/Maas Road SAC 000197

OSi Discovery Series County Boundary

Marine Community Types

Estuarine sand with oligochaetes community complex

Reef community complex

Sand with amphipods, polychaetes and *Tellina tenuis* community complex

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MAP 6:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
MARINE COMMUNITY TYPES

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

Legend

West of Ardara/Maas Road SAC 000197

OSi Discovery Series County Boundary

SMP: 0127 Saltmarsh Monitoring Project Site Codes

Saltmarsh Habitats

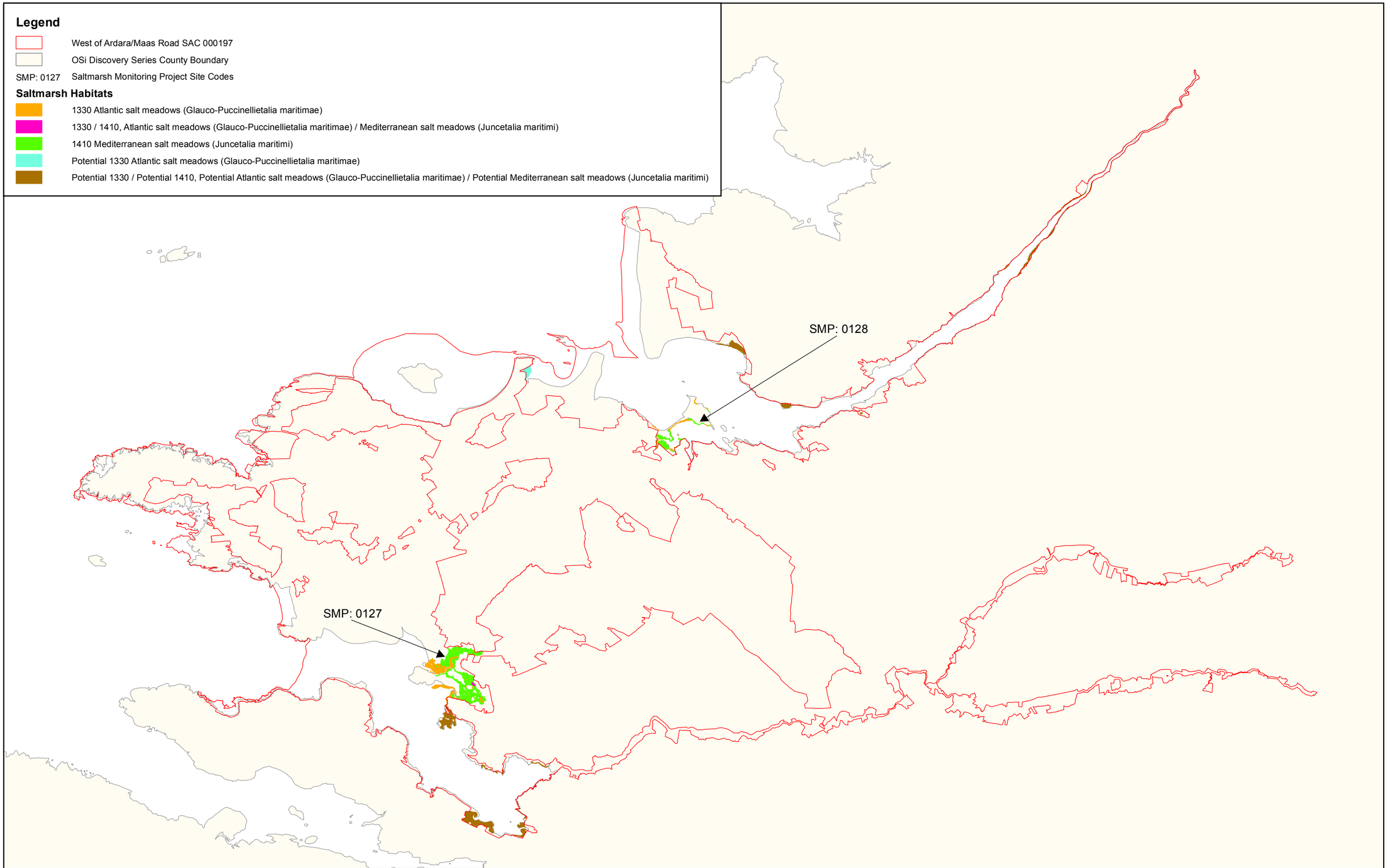
1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

1330 / 1410, Atlantic salt meadows (Glauco-Puccinellietalia maritimae) / Mediterranean salt meadows (Juncetalia maritimi)

1410 Mediterranean salt meadows (Juncetalia maritimi)

Potential 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

Potential 1330 / Potential 1410, Potential Atlantic salt meadows (Glauco-Puccinellietalia maritimae) / Potential Mediterranean salt meadows (Juncetalia maritimi)



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MAP 7:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
SALTMARSH HABITATS

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

CMP: 151

CMP: 149

CMP: 150

SDM: 148

SDM: 212

Legend

West of Ardara/Maas Road SAC 000197

OSi Discovery Series County Boundary

CMP: 149 Coastal Monitoring Project Site Codes

SDM: 148 Sand Dunes Monitoring Project Site Codes

Sand Dune Habitats

Qualifying Interests

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

2130 *Fixed coastal dunes with herbaceous vegetation ('grey dunes')

2130 / 2190, *Fixed coastal dunes with herbaceous vegetation ('grey dunes') / Humid dune slacks

2130 / 5130, *Fixed coastal dunes with herbaceous vegetation ('grey dunes') / *Juniperus communis* formations on heaths or calcareous grasslands

2150 *Atlantic decalcified fixed dunes (Calluno-Ulicetea)

2150 / 2130, *Atlantic decalcified fixed dunes (Calluno-Ulicetea) / *Fixed coastal dunes with herbaceous vegetation ('grey dunes')

2170 Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae)

2190 Humid dune slacks

2190 / 2130, Humid dune slacks / *Fixed coastal dunes with herbaceous vegetation ('grey dunes')

21A0 Machairs (*in Ireland)

Non Qualifying Interests

1210 Annual vegetation of drift lines

1220 Perennial vegetation of stony banks

2110 Embryonic shifting dunes

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MAP 8:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
SAND DUNE HABITATS

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

Legend

West of Ardara/Maas Road SAC 000197

OSi Discovery Series County Boundary

5130 *Juniperus communis* formations on heaths or calcareous grasslands Survey Sites

Lake Habitats

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

Potential 3110 / Potential 3130, Potential Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorarae) / Potential Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorarae and/or Isoeto-Nanojuncetea

DL09

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MAP 9:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
LAKE HABITATS &
JUNIPER FORMATIONS

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

5a West of Ardara Mass Road (Dooey Point)

5b West of Ardara Maas Road (Sheskinmore)

G6995

Legend

- West of Ardara/Maas Road SAC 000197
- 1014 Narrow-Mouthed Whorl Snail - *Vertigo angustior*
- 1395 Petalwort - *Petalophyllum ralfsii*
- OSi Discovery Series County Boundary

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MAP 10:
WEST OF ADARA/MAAS ROAD SAC CONSERVATION OBJECTIVES GEYER'S WHORL SNAIL & PETALWORT

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

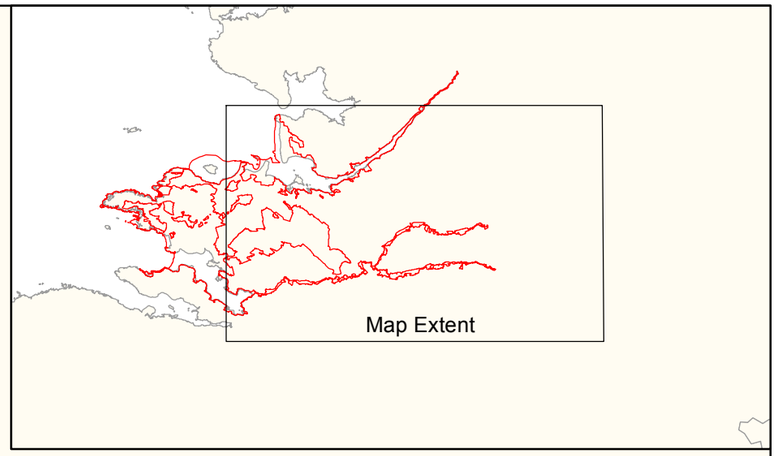
0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

Legend

- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Suitable habitat length
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Distribution target
- West of Ardara/Maas Road SAC 000197
- 1029 Freshwater Pearl Mussel - *Margaritifera margaritifera* Catchment
- OSi Discovery Series County Boundary



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MAP 11:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
FRESHWATER PEARL MUSSEL -
MARGARITIFERA MARGARITIFERA

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 km

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Map Version 1
Date: May 2015

Legend

- West of Ardara/Maas Road SAC 000197
- 1355 Otter - *Lutra lutra* Commuting 250m buffer
- OSi Discovery Series County Boundary

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MAP 12:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
OTTER COMMUTING

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

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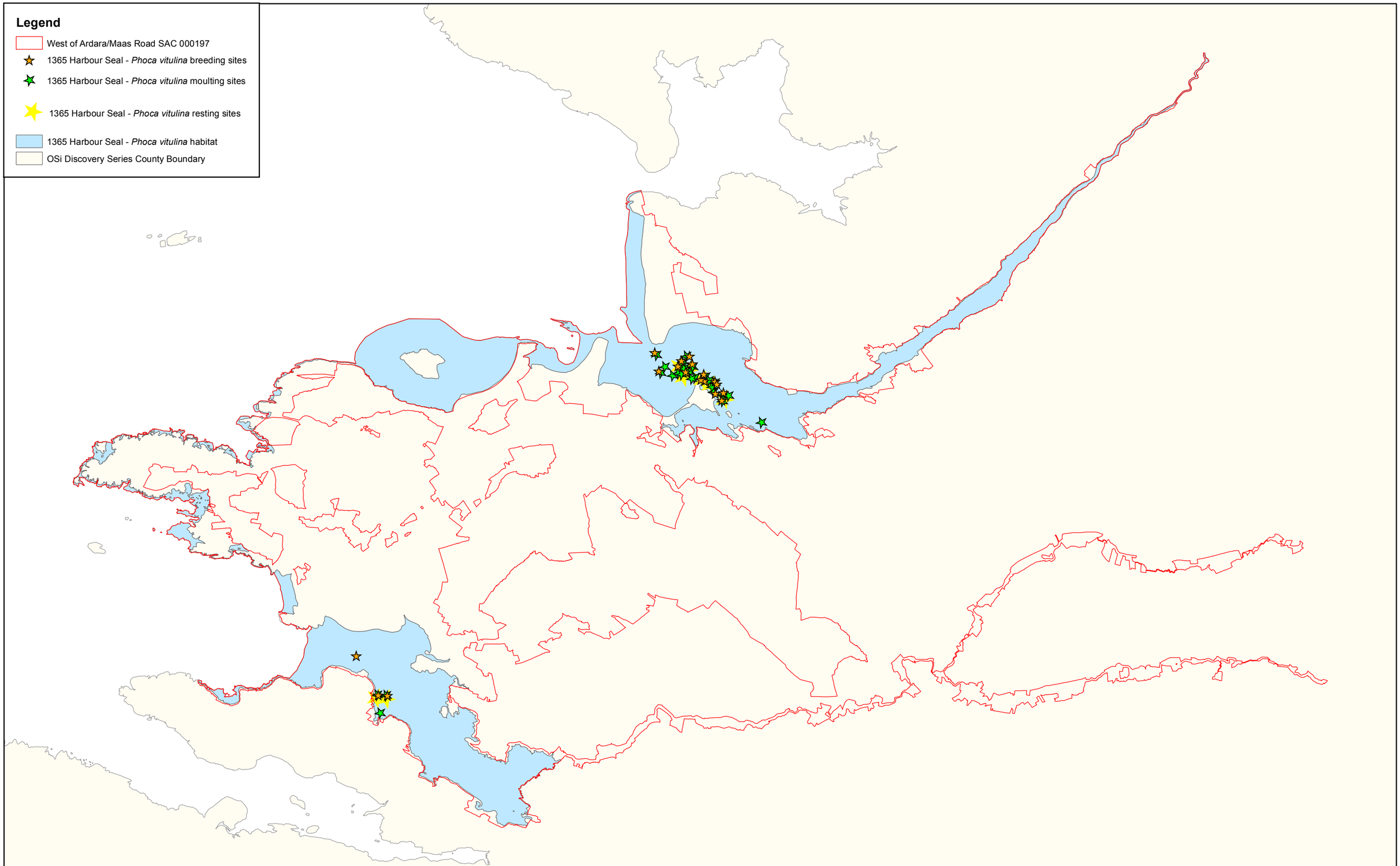
Map Version 1
Date: May 2015



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MAP 13:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
HARBOUR SEAL

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

Legend

- West of Ardara/Maas Road SAC 000197
- 1065 Marsh Fritillary - *Euphydryas aurinia*
- 1833 Slender Naiad - *Najas flexilis*
- OSi Discovery Series County Boundary

Clooney Lough

Kiltooris Lough

Sheskinmore L.

G6895 G6995

G8393

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MAP 14:
WEST OF ADARA/MAAS ROAD SAC
CONSERVATION OBJECTIVES
MARSH FRITILLARY - EUPHYDRYAS AURINIA
& SLENDER NAIAD - NAJAS FLEXILIS

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

SITE CODE:
SAC 000197; version 3. CO. DONEGAL

0 1 2 3 4 5 km

N

Map Version 1
Date: May 2015

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Slieve Tooey/Tormore Island/Loughros Beg Bay SAC 000190

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

7 Ely Place, Dublin 2, Ireland.

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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***

000190	Slieve Tooey/Tormore Island/Loughros Beg Bay SAC
1014	Narrow-mouthed Whorl Snail *Vertigo angustior*
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts
1355	Otter *Lutra lutra*
1364	Grey Seal *Halichoerus grypus*
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
2140	Decalcified fixed dunes with *Empetrum nigrum**
2150	Atlantic decalcified fixed dunes (Calluno-Ulicetea)*
4060	Alpine and Boreal heaths
7130	Blanket bogs (* if active bog)

Please note that this SAC overlaps with West Donegal Coast SPA (004150) and it adjoins Slieve League SAC (000189). See map 2. The conservation objectives for this site should be used in conjunction with those for overlapping and adjacent 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 :	2004
Title :	Harbour seal population assessment in the Republic of Ireland: August 2003
Author :	Cronin, M.; Duck, C.; O Cadhla, O.; Nairn, R.; Strong, D.; O'Keeffe, C.
Series :	Irish Wildlife Manual No. 11
Year :	2004
Title :	Summary of National Parks and Wildlife Service surveys for common (harbour) seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), 1978 to 2003
Author :	Lyons, D.O.
Series :	Irish Wildlife Manual No. 13
Year :	2004
Title :	Aerial surveying of grey seal breeding colonies on the Blasket Islands, Co. Kerry, the Inishkea Group, Co. Mayo and the Donegal coast during the 2003 breeding season
Author :	Cronin, M.; Ó Cadhla, O.
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 :	2007
Title :	Grey seal moult population survey in the Republic of Ireland, 2007
Author :	Ó Cadhla, O.; Strong, D.
Series :	Unpublished report to NPWS
Year :	2007
Title :	Management prescriptions for *Vertigo angustior* at cSAC sites for the species in the Republic of Ireland
Author :	Moorkens, E.
Series :	Unpublished report to NPWS
Year :	2008
Title :	An assessment of the breeding population of grey seals in the Republic of Ireland, 2005
Author :	O Cadhla, O.; Strong, D.; O'Keeffe, C.; Coleman, M.; Cronin, M.; Duck, C.; Murray, T.; Dower, P.; Nairn, R.; Murphy, P.; Smiddy, P.; Saich, C.; Lyons, D.O.; Hiby, L.
Series :	Irish Wildlife Manual No. 34
Year :	2009
Title :	Coastal Monitoring Project 2004-2006
Author :	Ryle, T.; Murray, A.; Connolly, K.; Swann, M.
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 of the breeding population of grey seals in Ireland, 2009 - 2012
Author :	Ó Cadhla, O.; Keena, T.; Strong, D.; Duck, C.; Hiby, L.
Series :	Irish Wildlife Manual No. 74
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 :	2013
Title :	An aerial survey of harbour seals in Ireland. Part 1: Lough Foyle to Galway Bay. August 2011
Author :	Duck, C.; Morris, C.
Series :	Unpublished report to NPWS
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 :	Slieve Tooey/Tormore Island/Loughros Beg Bay SAC (site code: 190) Conservation objectives supporting document- coastal habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document
Year :	2015
Title :	Slieve Tooey/Tormore Island/Loughros Beg Bay SAC (site code: 190) Conservation objectives supporting document- marine species 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 :	1983
Title :	The grey seal (*Halichoerus grypus*) in Ireland
Author :	Summers, C.F.
Series :	Unpublished Report to the Minister for Fisheries, Forestry and Wildlife
Year :	1991
Title :	The spatial organization of otters (*Lutra lutra*) in Shetland
Author :	Kruuk, H.; Moorhouse, A.
Series :	J. Zool, 224: 41-57
Year :	1998
Title :	Population biology of grey seals (*Halichoerus grypus*, Fabricius 1791) in western Ireland
Author :	Kiely, O.R.M.
Series :	Unpublished PhD thesis, National University of Ireland, University College Cork
Year :	1999
Title :	Diet of otters (*Lutra lutra*) on Inishmore, Aran Islands, west coast of Ireland
Author :	Kingston, S.; O'Connell, M.; Fairley, J.S.
Series :	Biol & Environ Proc R Ir Acad B 99B:173-182
Year :	2006
Title :	Otters - ecology, behaviour and conservation
Author :	Kruuk, H.
Series :	Oxford University Press
Year :	2007
Title :	Interpretation manual of European Union habitats- EUR 27
Author :	European Commission, DG Environment
Series :	Reference document
Year :	2007
Title :	Aerial surveying of grey seal breeding colonies on the Blasket Islands, Co. Kerry, the Inishkeas group, Co. Mayo and the Donegal coast, Ireland
Author :	Cronin, M.A.; Duck, C.D.; Ó Cadhla, O.
Series :	J. Nat. Conserv. 15(2): 77-83
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

Spatial data sources

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 3)
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 :	2110, 2120 2140, 2150 (map 4)
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 :	2110, 2120 2140, 2150 (map 4)
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, 1364 (maps 5 and 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 terrestrial side of the river banks data; creation of 20m buffer applied to canal centreline data. These datasets are combined with the derived EPA WDF 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 6)
Year :	2010
Title :	EPA WFD Waterbodies data
GIS Operations :	Creation of a 20m buffer applied to river and stream centreline data; creation of 80m buffer on the aquatic side of lake data; creation of 10m buffer on the terrestrial side of lake data. These datasets are combined with the derived OSi data for the 1355 CO. Overlapping regions investigated and resloved; resulting dataset clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1355 (map 6)
Year :	2005
Title :	OSi Discovery series vector data
GIS Operations :	High Water Mark (HWM) polyline feature class converted into polygon feature class; clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
Used For :	1364 (map 7)

Conservation Objectives for : Slieve Tooey/Tormore Island/Loughros Beg Bay SAC [000190]

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 Slieve Tooey/Tormore Island/Loughros Beg Bay 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 from desktop survey: Drumirrin - 2.95km; Glenlough - 27.63km; Malinmore - 2.41km. See map 3	Based on data from the Irish Sea Cliff Survey (ISCS) (Barron et al., 2011). Cliffs are linear features and are therefore measured in kilometres. Three sub-sites were identified using a combination of aerial photos and the DCENR helicopter viewer. The length of each cliff was measured (in some cases the cliff was measured in sections) to give a total estimated area of 32.99km
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 3	Sea cliffs are distributed throughout the coastline of this SAC. Both hard and soft cliffs are present, with hard cliffs more common (Browne, 2005; Barron et al., 2011). 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. Hydrological features such as gullies, streams or cascades were identified by the ISCS as occurring at Malinmore and Drumirrin sub-sites. Streams or cascades were also noted at the Glenlough sub-site. 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). Adjacent habitats in this SAC include sand dune systems, heath, exposed rock, littoral rock and littoral sediment. 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)	Rare plant species such as roseroot (*Rhodiola rosea*) and purple saxifrage (*Saxifraga oppositifolia*) were noted on low cliffs in this SAC. 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

2110 Embryonic shifting dunes

To maintain the favourable conservation condition of Embryonic shifting dunes in Slieve Tooey/Tormore Island/Loughros Beg Bay 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: Glen Bay - 0.13ha; Maghera - 4.75ha; Maghera Island - 0.44ha. See map 4	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 recorded from three sub-sites, giving a total estimated area of 5.32ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 4 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. At Glen Bay there is a dynamic band of fore dune development at the northwest tip of the dunes. At Maghera Island there is a good band of embryo and mobile dunes on the more sheltered side where there is ongoing accretion. 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). A range of coastal habitats including saltmarshes occur at both Glen Bay and Maghera. See coastal habitats supporting document for further details
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch grass (*Elytrigia juncea*) and/or lyme grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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: sand couch grass (*Elytrigia juncea*) and/or lyme grass (*Leymus arenarius*)	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) 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. See coastal habitats supporting document for further details

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

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) in Slieve Tooey/Tormore Island/Loughros Beg Bay 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: Glen Bay - 0.88ha; Maghera - 7.11ha; Maghera Island - 0.50ha. See map 4	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) and Sand Dunes Monitoring Project (SDM) (Delaney et al., 2013). Habitat was mapped at three sub-sites to give a total estimated area of 8.48ha. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 4 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Shifting dunes were recorded from both Glen Bay and Maghera. 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). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram grass (*Ammophila arenaria*) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. At Glen Bay the CMP noted a dynamic zone of fore dune development at northwest tip of dunes. Habitat noted to be accreting at Maghera by CMP and SDM. 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). A range of coastal habitats including saltmarshes occur at both Glen Bay and Maghera. See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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 dominated by marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*)	Based on data from Ryle et al. (2009) and Delaney et al. (2013). 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. See coastal habitats supporting document for further details

2140 Decalcified fixed dunes with Empetrum nigrum

To maintain the favourable conservation condition of Decalcified fixed dunes with *Empetrum nigrum* in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney et al., 2013). Habitat only recorded at Maghera (0.47ha) sub-site by CMP, but was not recorded by SDM who reclassified the same area as 2150 or 2130. Current status of this habitat in Ireland is unclear and is under review. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes	See note for area above and 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	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. 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 Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). A range of coastal habitats including saltmarshes occurs at Maghera. See coastal habitats supporting document for further details
Vegetation composition: sward height	Centimeters	Maintain structural variation within sward	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). At Maghera there is some sheep grazing in the heath habitat, though some areas are undergrazed. 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 Ryle et al. (2009)	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). 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. Bracken (*Pteridium aquilinum*) is an issue at Maghera in the heath habitat where in places it forms patches with hazel (*Corylus avellana*) and may have spread in to areas that were originally dune heath. 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). Hazel (*Corylus avellana*) and bramble (*Rubus fruticosus*) were recorded in dune heath habitat at Maghera. See coastal habitats supporting document for further details

2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea)

To maintain the favourable conservation condition of Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) in Slieve Tooey/Tormore Island/Loughros Beg Bay 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-site mapped: Maghera - 13.14ha. See map 4	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 recorded at one sub-site giving a total estimated area of13.14ha. Habitat is difficult to map as it occurs in mosaics. Maghera represents the best known site in Ireland (other than Murlough in County Down) for this habitat. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 4 for known distribution	Based on data from the Ryle et al. (2009) and Delaney et al. (2013). 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	Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. 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 Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation composition: sward height	Centimeters	Maintain structural variation within sward	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). At Maghera there is some sheep grazing in the dune heath habitat. 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 Ryle et al. (2009)	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). The dune heath at Maghera is the best example of classic dune heath formation in Ireland. The back of the site consists of a dense canopy of bog myrtle (*Myrica gale*), ling (*Calluna vulgaris*), cross-leaved heath (*Erica tetralix*), purple moorgrass (*Molinia caerulea*) and creeping willow (*Salix repens*) in association with marram grass (*Ammophila arenaria*) and sand sedge (*Carex arenaria*). 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. The spread of bracken (*Pteridium aquilinum*) is an issue in the dune heath habitat. 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). Hazel (*Corylus avellana*) and bramble (*Rubus fruticosus*) were recorded in dune heath habitat at Maghera. See coastal habitats supporting document for further details

4060 Alpine and Boreal heaths

To restore the favourable conservation condition of Alpine and Boreal heaths in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Alpine and Boreal heaths has not been mapped in detail for this SAC and thus total area of the qualifying habitat is unknown. It occurs in association with other habitats, including vegetated sea cliffs (1230), other heath types and acid grassland (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three	Attribute and target based on Perrin et al. (2014)
Vegetation composition: positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 66%	Attribute and target based on Perrin et al. (2014) where the list of positive indicator species for this habitat is also given
Vegetation composition: dwarf-shrub species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of dwarf-shrub species at least 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: negative indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Total cover of negative indicator species less than 10%	Attribute and target based on Perrin et al. (2014) where the list of negative indicator species for this habitat is also given
Vegetation composition: non-native species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation structure: signs of grazing	Percentage of leaves browsed at a representative number of 2m x 2m monitoring stops	Less than 10% collectively of the live leaves of specific graminoids showing signs of grazing	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 and crowberry (*Empetrum nigrum*) showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning within the habitat	Attribute and target based on Perrin et al. (2014)
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)

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 book (Curtis and McGough, 1988)

7130 Blanket bogs (* if active bog)

To restore the favourable conservation condition of Blanket bogs in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Stable or increasing, subject to natural processes	Blanket bogs has not been mapped in detail for this SAC and thus total area of the qualifying habitat is unknown. It occurs in mosaic with other habitats, such as heath habitats (Douglas et al., 1990; NPWS internal files)
Habitat distribution	Occurrence	No decline	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat in NPWS (2013)
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 bog	Blanket bogs are considered active when "still supporting a significant area of vegetation that is normally peat forming" (EC, 2007)
Ecosystem function: hydrology	Flow direction, water levels, occurrence of drains and erosion gullies	Natural hydrology unaffected by drains and erosion	Drains and erosion gullies can affect the natural hydrologial processes of blanket bog
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	Further information on vegetation communities associated with this habitat is presented in Perrin et al. (2014). Douglas et al. (1990) describes the habitat in this SAC
Vegetation composition: positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species at each monitoring stop is at least seven	Attribute and target based on Perrin et al. (2014) where the list of positive indicator species for this habitat is also given
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)
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 given
Vegetation composition: non-native species	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of non-native species less than 1%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: native trees and scrub	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 of *Sphagnum* 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 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	Occurrence 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	Occurrence 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). The greater bog mosaic incorporates the blanket bog itself and associated vegetation types as well as non-vegetation cover types that appear to have been derived from former blanket bog including gravel, rock and running water
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 book (Curtis and McGough, 1988)

1014 Narrow-mouthed Whorl Snail *Vertigo angustior*

To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution: occupied sites	Number	No decline. There is one known site in the SAC at Glencolumbcille in grid square G5285. See map 5	From Moorkens (2000, 2007); Moorkens and Killeen (2011) (site code VaCAM4)
Occurrence in suitable habitat	Percentage positive records in a representative number of samples	A minimum of 25% positive samples in areas of habitat that are at least sub-optimal	Target based on Moorkens and Killeen (2011). Positive samples mean the confirmed presence of snails (living or recently dead adults and/or juveniles). See habitat extent target below for definition of optimal and sub-optimal habitat
Habitat quality	Metres along transect; percentage of representative number of samples	90m of the established monitoring transect assessed as at least sub-optimal or at least 60% of samples within suitable habitat polygon at least sub-optimal	Transect established as part of condition assessment monitoring by Moorkens and Killeen (2011). See habitat extent target below for definition of optimal and sub-optimal habitat
Optimal soil wetness	Metres along transect; percentage of representative number of samples	90m of the established monitoring transect assessed as optimal wetness or at least 60% of sampling stops assessed as optimal wetness	Optimal wetness is defined by Moorkens and Killeen (2011)
Habitat extent	Hectares	Area of suitable habitat stable or increasing subject to natural processes and at least 7.1ha	From Moorkens and Killeen (2011). Optimal habitat is defined as fixed dune, species-rich grassland dominated by red fescue (*Festuca rubra*), with sparse marram grass (*Ammophila arenaria*), birds-foot trefoil (*Lotus corniculatus*), thyme (*Thymus praecox*), ribwort plantain (*Plantago lanceolata*), kidney vetch (*Anthyllis vulnereria*), white clover (*Trifolium repens*), lady's bedstraw (*Galium verum*) and other low growing herbs in vegetation with height between 10-30cm, growing on damp, friable soil covered with a layer of humid, open structured thatch. Sub-optimal habitat is as above but either vegetation height is less than 10cm or between 30 and 50cm, or the soil is dry and sandy, or the thatch is wetter, or the thatch has either a very dense structure, or the thatch is very sparse

1355 Otter *Lutra lutra*

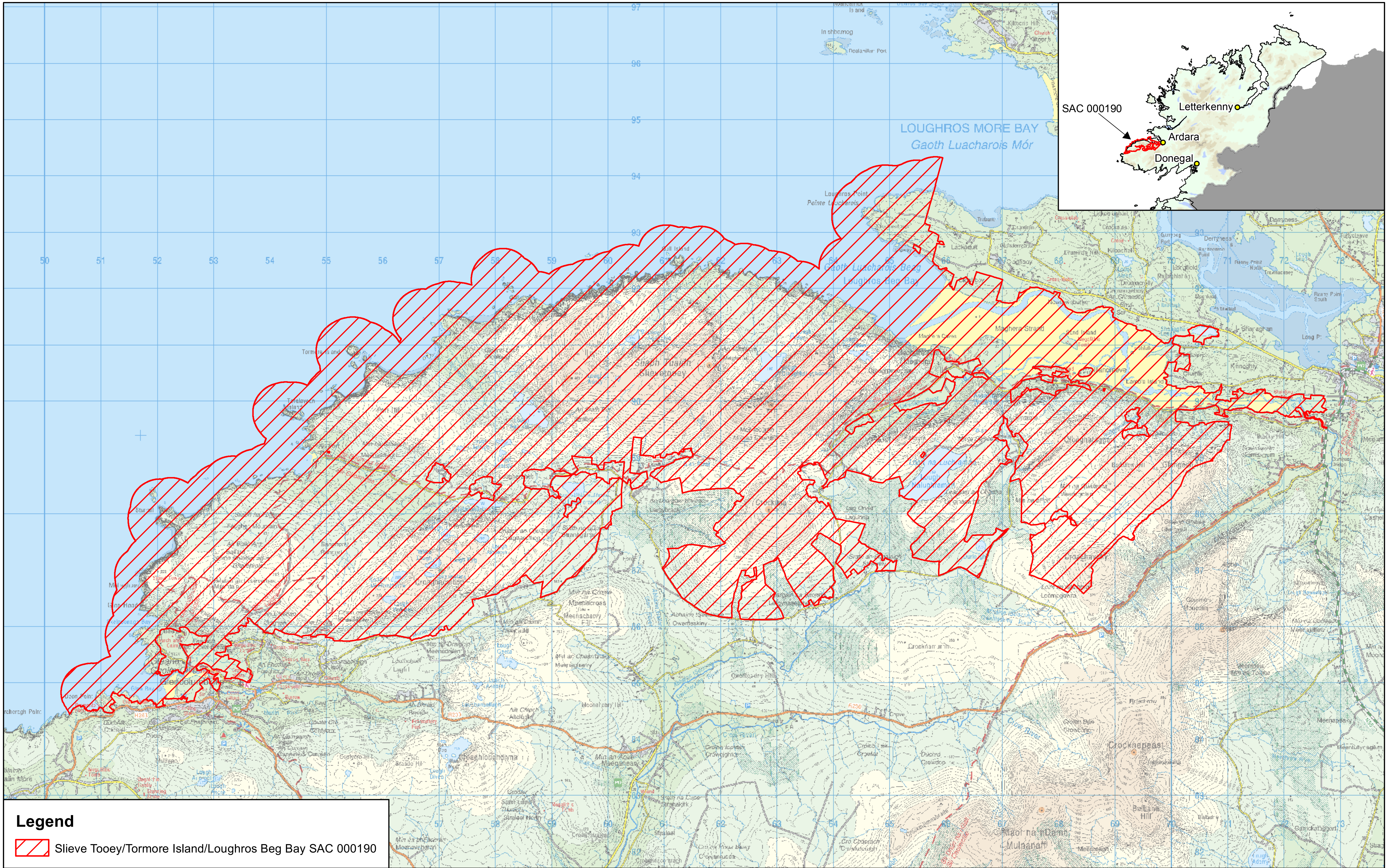
To maintain the favourable conservation condition of Otter in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC, which is defined by the following list of attributes and targets:

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 as 93.6% (Reid et al., 2013)
Extent of terrestrial habitat	Hectares	No significant decline. Area mapped and calculated as 272.4ha	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 523.9ha	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 93.9km	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 107.2ha	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 6	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

1364 Grey Seal *Halichoerus grypus*

To maintain the favourable conservation condition of Grey Seal in Slieve Tooey/Tormore Island/Loughros Beg Bay SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Access to suitable habitat	Number of artificial barriers	Species range within the SAC should not be restricted by artificial barriers to site use. See map 7	See marine supporting document for further details
Breeding behaviour	Breeding sites	Conserve the breeding sites in a natural condition. See map 7 for known sites	Attribute and target based on background knowledge of Irish breeding populations, a preliminary survey in 2003 (Cronin and Ó Cadhla, 2004; Cronin et al., 2007), comprehensive breeding surveys in 2005 (Ó Cadhla et al., 2008) and 2012 (Ó Cadhla et al., 2013) and unpublished NPWS records including those reported by Summers (1983) and Lyons (2004). See marine supporting document for further details
Moulting behaviour	Moult haul-out sites	Conserve the moult haul-out sites in a natural condition. See map 7 for known sites	Attribute and target based on background knowledge of Irish populations, on review of data from Kiely (1998) and Lyons (2004), a national moult survey (Ó Cadhla & Strong, 2007) and unpublished NPWS records. See marine supporting document for further details
Resting behaviour	Resting haul-out sites	Conserve the resting haul-out sites in a natural condition. See map 7 for known sites	Attribute and target based on review data from Lyons (2004), Cronin et al. (2004), Duck and Morris (2013) and unpublished NPWS records. See marine supporting document for further details
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the grey seal population at the SAC	See marine supporting document for further details



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MAP 1:
SLIEVE TOOEY/TORMORE ISLAND/LOUGHROS BEG BAY SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

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

SITE CODE:
SAC 000190; version 3. CO. DONEGAL

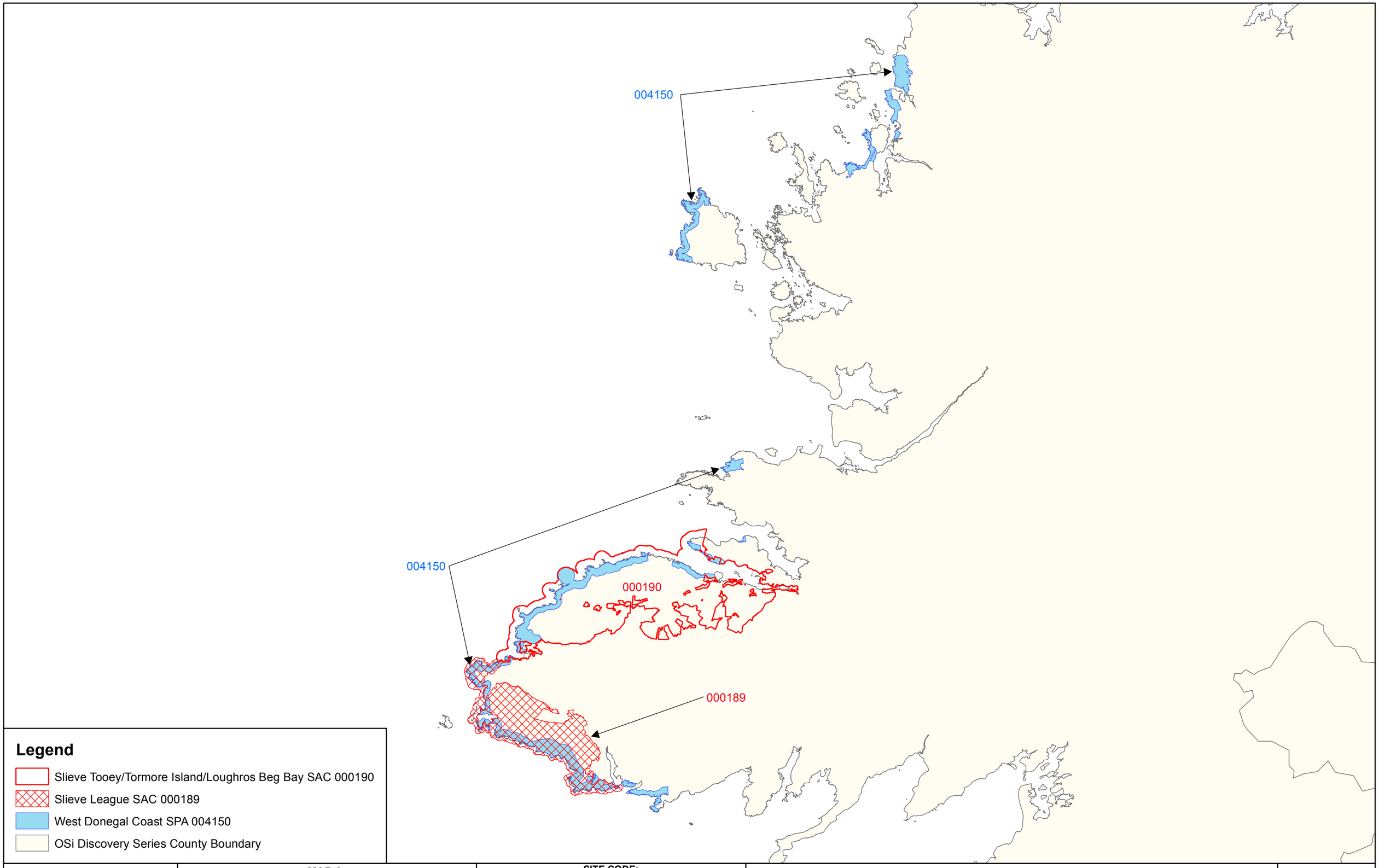
0 1 2 3 4 km

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.

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

N

Map Version 1
Date: May 2015



Legend

- Slieve Tooey/Tormore Island/Loughros Beg Bay SAC 000190
- Slieve League SAC 000189
- West Donegal Coast SPA 004150
- OSi Discovery Series County Boundary

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MAP 2:
SLIEVE TOOEY/TORMORE ISLAND/LOUGHROS BEG BAY SAC
CONSERVATION OBJECTIVES ADJOINING / OVERLAPPING DESIGNATIONS
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SAC 000190; version 3,
SAC 000189; version 3.01.
SPA 004150; version 2.01. CO. DONEGAL

0 5 10 15 km

N

Map Version 1
Date: May 2015

Drumirrin
Site Id: 03024

Malinmore
Site Id: 03025

Glenlough
Site Id: 03057

Legend

- Slieve Tooey/Tormore Island/Loughros Beg Bay SAC 000190
- 1230 Vegetated sea cliffs of the Atlantic and Baltic coasts
- OSi Discovery Series County Boundary

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MAP 3:
SLIEVE TOOEY/TORMORE ISLAND/LOUGHROS BEG BAY SAC
CONSERVATION OBJECTIVES
VEGETATED SEA CLIFFS

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

SITE CODE:
SAC 000190; version 3. CO. DONEGAL

0 1 2 3 4 km

N

Map Version 1
Date: May 2015

Legend

Slieve Tooey/Tormore Island/Loughros Beg Bay SAC 000190

OSi Discovery Series County Boundary

CMP: 146 Coastal Monitoring Project Site Codes

SDM: 147 Sand Dunes Monitoring Project Site Codes

Sand Dune Habitats

Qualifying Interests

2110 Embryonic shifting dunes

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

2150 *Atlantic decalcified fixed dunes (Calluno-Ulicetea)

Non Qualifying Interests

1220 Perennial vegetation of stony banks

2130 *Fixed coastal dunes with herbaceous vegetation ('grey dunes')

2170 Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae)

2190 Humid dune slacks

SDM: 147

CMP: 202

CMP: 146

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MAP 4:
SLIEVE TOOEY/TORMORE ISLAND/LOUGHROS BEG BAY SAC
CONSERVATION OBJECTIVES
SAND DUNE HABITATS

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

SITE CODE:
SAC 000190; version 3. CO. DONEGAL

0 1 2 3 4 km

N

Map Version 1
Date: May 2015

G5285

Legend

- Slieve Tooey/Tormore Island/Loughros Beg Bay SAC 000190
- 1014 Narrow-Mouthed Whorl Snail - *Vertigo angustior*
- OSi Discovery Series County Boundary

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MAP 5:
SLIEVE TOOEY/TORMORE ISLAND/LOUGHROS BEG BAY SAC
CONSERVATION OBJECTIVES
NARROW-MOUTHED WHORL SNAIL

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

SITE CODE:
SAC 000190; version 3. CO. DONEGAL

0 1 2 3 4 km

N

Map Version 1
Date: May 2015

Legend

- Slieve Tooey/Tormore Island/Loughros Beg Bay SAC 000190
- 1355 Otter - *Lutra lutra* Commuting 250m buffer
- OSi Discovery Series County Boundary

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MAP 6:
SLIEVE TOOEY/TORMORE ISLAND/LOUGHROS BEG BAY SAC
CONSERVATION OBJECTIVES
OTTER COMMUTING

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

SITE CODE:
SAC 000190; version 3. CO. DONEGAL

0 1 2 3 4 km

N

Map Version 1
Date: May 2015

Legend

- Slieve Tooey/Tormore Island/Loughros Beg Bay SAC 000190
- 1364 Grey Seal - *Halichoerus grypus* breeding sites
- 1364 Grey Seal - *Halichoerus grypus* moulting sites
- 1364 Grey Seal - *Halichoerus grypus* resting sites
- 1364 Grey Seal - *Halichoerus grypus* habitat
- OSi Discovery Series County Boundary

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MAP 7:
SLIEVE TOOEY/TORMORE ISLAND/LOUGHROS BEG BAY SAC
CONSERVATION OBJECTIVES
GREY SEAL

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

SITE CODE:
SAC 000190; version 3. CO. DONEGAL

0 1 2 3 4 km

N

Map Version 1
Date: May 2015

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 136 Glenties – Ardara and Fintown WSZs

ARUP

Uisce Éireann

Lead in Drinking Water Mitigation Plan - EAM

Glenties-Ardara and Fintown EAM

Reference: 136. Glenties Ardara EAM I05

I05 | 03 January 2023

Job number 257367-10

Report Reg Info

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ARUP

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Document title	Glenties-Ardara and Fintown EAM
Job number	257367-10
Document ref	136. Glenties Ardara EAM I05
File reference	

Revision	**Date**		
Issue 4	21 Jul 2023	**Filename**	136. Glenties-Ardara EAM I04.docx
		Description	Update to UFW and dosing rate

	Prepared by	**Checked by**	**Approved by**
Name	Ezzah Rasheed	Alison Orr	Gerry Baker
Signature			

Issue 5	03 Jan 2024	**Filename**	136. Glenties-Ardara EAM I05.docx
		Description	Updated with cumulative assessment

	Prepared by	**Checked by**	**Approved by**
Name	Ezzah Rasheed	Alison Orr	Gerry Baker
Signature			

		Filename
		Description

	Prepared by	**Checked by**	**Approved by**
Name			
Signature			

Issue Document Verification with Document ✓

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1. Introduction

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

3. Glenties-Ardara and Fintown WSZs

Glenties-Ardara WSZ (0600PUB1070) and Fintown WSZ (0600PUB1065) are located in County Donegal. Glenties-Ardara WTP supplies an area in the Western region of County Donegal.

The Draft Plumbosolvency Control Plan states targeted dosing is not an option and universal dosing at the Glenties-Ardara WTP is recommended due to the configuration of the network within the WSZs. Therefore, universal dosing at Glentiles-Ardara WTP take place. Figure 1 shows the location of the areas proposed to receive Orthophosphate dosed water.

The average flow from the WTP is currently 1,802.79 m^3/day. Approximately 55% of the flow is accounted for, and this fixed rate for water mains leakage is assumed in the Water Supply Zones (WSZs).

Glenties-Ardara and Fintown WSZs are serviced by four WWTPs (Ardara, Fintown No 1, Fintown No 2 and Glenties). There are an estimated 1,597 properties across the WSZs that are serviced by Domestic Waste Water Treatment Systems (DWWTS i.e. septic tanks).

Water Supply Zone	**Glenties-Ardara (0600PUB1070)** **Fintown (0600PUB1065)**
Step 1 – Appropriate Assessment Screening	To be completed by Ryan Hanley
Model Assumptions	All concentration and loading units for orthophosphate (PO_4-P) are expressed as mg/l P and kg P/yr. Adopted Orthophosphate Optimum Dosing Concentration is 1.2 mg/l P. Unaccounted for water from the mains is 45%. 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.
Step 2 & 3 – Impact on Waste Water Treatment Plant (WWTP) Effluent	This section assesses the influent and effluent P loads and resultant OP dosages at WWTP within the WSZ before and after dosing. Inputs to and results of the Step 2 assessment for individual WWTP are given in Table 1. Where an agglomeration includes SWOs, discharges from this source are included. Emission Limit Value (ELVs) are assigned for WWTPs to protect the receiving River Waterbodies (RWB) from

Water Supply Zone	Glenties-Ardara (0600PUB1070) Fintown (0600PUB1065)
Concentrations and receiving WBs	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; Ardara – Secondary treatment PE 987 Fintown No 1 – Primary treatment PE 24 Fintown No 2 – Secondary treatment PE 30 Glenties - Tertiary treatment PE 459 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 811 m^3/d (355 kg/yr P). Approximately 263 kg/yr P of the load is attenuated along the flowpaths. The hydraulic loading from the DWWTS is 453 m^3/d (198 kg/yr P). Approximately 191 kg/yr P of the load is attenuated along the flowpaths. Flow monitoring gauges are available for three RWBs within the assessment area – Clonconwal Ford and Nr. Glenties. Where flow monitoring gauges are not available the river flows for receiving water bodies 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 eight RWBs. There are 10 RWBs (Cummirk_010, Abberachrin_010, Bellanagoal River_010, Duvoge_010, Drumagh_010, Mulnamin_Beg_010, Newtownburke_010, Owenea_020, Owenea_040 and Shallogan_010) that require a surrogate water body. There is no deterioration in 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: Fintown No 1 WWTP – Finn (Donegal)_010 Glenties WWTP – Owenea_030 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 loads come from mains seepage through the groundwater, near surface and preferential pathways. 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 the mains leakage accounts for the largest proportion of load and that there is a large proportion of both the DWWTS and mains leakage is attenuated. The Orthophosphate concentrations in the RWBs following dosing are presented in Table 2. Orthophosphate dosing does not lead to a deterioration in RWB status from subsurface and near surface pathways.
Step 5 and 6 - Combined Impact through subsurface and surface pathways on Groundwater Waterbodies (GWB)	The increase in Orthophosphate concentrations in the GWBs as a result of the P dosing is shown in Table 3. Monitoring data is not available for the groundwater bodies within the assessment area. Direct discharges from WWTPs are combined with diffuse discharges at the following receiving GWB: Fintown No 2 WWTP – Ballybofey
Step 5 and 6 - Combined Impact from direct and diffuse sources on	The increase in Orthophosphate (P) as a result of drinking water dosing is adopted as Total Phosphorus (TP) to assess the potential impact on lakes. The increase in concentrations in the Lake Waterbody (LWB) as a result of the drinking water dosing is shown in Table 4.

Water Supply Zone	Glenties-Ardara (0600PUB1070) Fintown (0600PUB1065)
Lakes within the Water Supply Zone	Baseline TP monitoring data and associated thresholds are available for one LWB, Finn DL. There is water no monitoring data for six LWB within the assessment area. Orthophosphate dosing does not lead to a deterioration in status for any of the LWBs.
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 5. Baseline Orthophosphate monitoring data and associated thresholds are available for Gweebarra Estuary and Gweebarra Bay but not for Owenea Estuary, Loughros Bay, Foyle and Faughan Estuaries and Lough Foyle. Direct discharges from WWTPs are combined with diffuse discharges at the following receiving waterbody: Ardara WWTP – Owenea Estuary The drinking water dosing with orthophosphate does not deteriorate the status of any TraC waterbody for both the summer and winter seasons.
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 dosing areas. The assessment is carried out on a regional catchment scale. The following EAM dosing areas are within the Gweebarra Sheephaven Catchment and discharge to the same TraC WBs as Glenties-Ardara and Fintown see Figure 4: • 205 Lettermacaward The following EAM dosing areas are within the Donagh Moville (& Foyle) Catchment and discharge to the same TraC WBs as Glenties-Ardara and Fintown see Figure 4: • 029 Illies • 022 Letterkenny The increase in Orthophosphate concentrations in the downstream TraC WBs as a result of the drinking water dosing of all four EAMs with Orthophosphate is shown in Table 6. 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). The increase in Orthophosphate concentrations in the SAC RWBs as a result of dosing is shown in Table 7. The results show there is no deterioration in WB status downstream of the EAM. The results that there will be no discernible increase (i.e. above 0.00125mg/l) in any of the downstream SAC RWBs.
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 = 1.2 mg/l

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2021) 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
Ardara Primary Discharge	Secondary	Orthophosphate 8.0 mg/l - Compliant	Owenea Estuary	Existing	336	1.27	1.01	1.72
				Post Dosing	428	1.61	1.29	2.19
Ardara SWOs (5 No.)				Existing	21	0.39	0.31	0.53
				Post Dosing	24	0.44	0.35	0.59
Fintown No 1 Primary Discharge	Primary	None	Finn (Donegal)_010	Existing	12	5.34	4.27	7.26
				Post Dosing	13	6.11	4.89	8.31
Fintown No 2 Primary Discharge	Secondary	None	Ballybofey GWB	Existing	10	3.74	2.99	5.08
				Post Dosing	12	4.51	3.61	6.13
Glenties Primary Discharge	Tertiary	Orthophosphate 1 mg/l - Compliant	Stracashel_020 and Owenea_030	Existing	22	0.11	0.09	0.15
				Post Dosing	22	0.11	0.09	0.15
Glenties SWOs (2 No.)				Existing	7	0.16	0.13	0.22
				Post Dosing	8	0.19	0.15	0.26

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)
Cummirk_010	IE_NW_01C030100	*High*	0.0125	0.0188	0.3	0.00001	0.0125
Cummirk_020	IE_NW_01C030300	High	0.0050	0.0188	4.9	0.0001	0.0051
Finn (Donegal)_010	IE_NW_01F010200	High	0.0053	0.0188	16.8	0.0002	0.0055
Finn (Donegal)_020	IE_NW_01F010350	High	0.0050	0.0188	27.0	0.0002	0.0052
Stranagoppoge_010	IE_NW_01S020200	High	0.0059	0.0188	1.0	0.00003	0.0059
Abberachrin_010	IE_NW_38A010200	*Good*	0.0300	0.0325	0.5	0.00005	0.0300
Bellanagoal River_010	IE_NW_38B070690	*Good*	0.0300	0.0325	6.4	0.0008	0.0308
Duvoge_010	IE_NW_38D050300	*Good*	0.0300	0.0325	7.0	0.0003	0.0303
Drumagh_010	IE_NW_38D820870	*High*	0.0125	0.0188	1.3	0.00003	0.0125
Mulnamin_Beg_010	IE_NW_38M290990	*High*	0.0125	0.0188	17.9	0.0005	0.0130
Newtownburke_010	IE_NW_38N040540	*High*	0.0125	0.0188	4.5	0.0004	0.0129
Owenea_020	IE_NW_38O040100	*Good*	0.0300	0.0325	5.0	0.0001	0.0301
Owenea_030	IE_NW_38O040450	Good	0.0253	0.0325	35.3	0.0001	0.0255
Owenea_040	IE_NW_38O040500	*Good*	0.0300	0.0325	43.5	0.0002	0.0302
Owentocker_010	IE_NW_38O060050	High	0.0050	0.0188	2.6	0.0001	0.0051
Owentocker_020	IE_NW_38O060300	High	0.0067	0.0188	11.4	0.0002	0.0069
Stracashel_020	IE_NW_38S010200	High	0.0118	0.0188	15.9	0.0002	0.0120
Shallogan_010	IE_NW_38S030300	*High*	0.0125	0.0188	11.1	0.0005	0.0130

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)
Northwest Donegal	IE_NW_G_049	*Good*	0.0175	0.0263	8.5	0.0001	0.0176
Ballybofey	IEGBNI_NW_G_048	*Good*	0.0175	0.0263	6.0	0.0001	0.0176

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

Name	EU_CD	Indicative Quality *Surrogate Status in italic*	Baseline conc used in calculation (mg/l TP)	75% of status threshold (mg/l TP)	Cumulative load (kg/yr TP)	Modelled dosing conc. (mg/l TP)	Potential Baseline Total conc. following dosing (mg/l TP)
Warvanneil	IE_NW_38_539	*High*	0.0050	0.0075	6.4	0.0008	0.0058
Skeskinmore	IE_NW_38_545	*High*	0.0050	0.0075	7.0	0.0003	0.0053
Aderry	IE_NW_38_60	*High*	0.0050	0.0075	0.5	0.00005	0.0050
Fad Portnoo	IE_NW_38_621	*High*	0.0050	0.0075	7.0	0.0003	0.0053
Ananima	IE_NW_38_671	*Good*	0.0180	0.0213	35.3	0.0001	0.0181
Finn DL	IE_NW_01_102	Good	0.0112	0.0213	16.8	0.0002	0.0113
Shivnagh	IE_NW_01_111	*High*	0.0050	0.0075	16.8	0.0002	0.0052

Table 5: 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)
Owenea Estuary	IE_NW_110_0100	Summer	*High*	0.0125	0.0188	118.8	0.0003	0.0128
		Winter	*High*	0.0125	0.0188	118.8	0.0003	0.0128
Gweebarra Estuary	IE_NW_120_0100	Summer	High	0.0100	0.0188	17.9	0.0001	0.0101
		Winter	High	0.0108	0.0188	17.9	0.0001	0.0108
Loughros Bay	IE_NW_110_0000	Summer	*High*	0.0125	0.0188	120.1	0.0003	0.0128
		Winter	*High*	0.0125	0.0188	120.1	0.0003	0.0128
Gweebarra Bay	IE_NW_120_0000	Summer	High	0.0038	0.0188	17.9	0.0001	0.0038
		Winter	High	0.0125	0.0188	17.9	0.0001	0.0126
Foyle and Faughan Estuaries	UKGBNI5NW250010	Summer	*Moderate*	0.0500	0.0550	27.0	0.00002	0.0500
		Winter	*Moderate*	0.0500	0.0550	27.0	0.00002	0.0500
Lough Foyle	GBNIIE6NW250	Summer	*Moderate*	0.0500	0.0550	27.0	0.00002	0.0500
		Winter	*Moderate*	0.0500	0.0550	27.0	0.00002	0.0500

Table 6: 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)
Owenea Estuary	IE_NW_110_0100	Summer	High	0.0125	0.0188	118.8	118.8	0.0004	0.0129
		Winter	High	0.0125	0.0188	118.8	118.8	0.0004	0.0129
Gweebarra Estuary	IE_NW_120_0100	Summer	High	0.0100	0.0188	17.9	43.6	0.0002	0.0102
		Winter	High	0.0108	0.0188	17.9	43.6	0.0002	0.0110
Loughros Bay	IE_NW_110_0000	Summer	High	0.0125	0.0188	120.1	120.1	0.0003	0.0128
		Winter	High	0.0125	0.0188	120.1	120.1	0.0003	0.0128
Gweebarra Bay	IE_NW_120_0000	Summer	High	0.0038	0.0188	17.9	62.3	0.0002	0.0040
		Winter	High	0.0125	0.0188	17.9	62.3	0.0002	0.0127
Foyle and Faughan Estuaries	UKGBNI5NW250010	Summer	Moderate	0.0500	0.0550	27.0	104.6	0.0001	0.0501
		Winter	Moderate	0.0500	0.0550	27.0	104.6	0.0001	0.0501
Lough Foyle	GBNIIE6NW250	Summer	Moderate	0.0500	0.0550	27.0	178.7	0.0002	0.0502
		Winter	Moderate	0.0500	0.0550	27.0	178.7	0.0002	0.0502

Table 7: Orthophosphate concentrations in downstream protected 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 to SW (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Finn (Donegal)_030	IE_NW_01F010400	High	0.0054	0.0188	27.0	0.0001	0.0054
Finn (Donegal)_040	IE_NW_01F010500	High	0.0054	0.0188	27.0	0.00005	0.0054
Finn (Donegal)_050	IE_NW_01F010600	High	0.0094	0.0188	27.0	0.00004	0.0095
Finn (Donegal)_060	IE_NW_01F010800	Good	0.0278	0.0325	27.0	0.00004	0.0278
Finn (Donegal)_070	IE_NW_01F010910	Good	0.0296	0.0325	27.0	0.00004	0.0296
Finn (Donegal)_080	IE_NW_01F011100	Good	0.0312	0.0325	27.0	0.00003	0.0312
Finn River	UKGBNI1NW010104074	Moderate	0.0354	0.0508	27.0	0.00003	0.0354

Figure 1:Glenties-Ardara and Fintown Dosing Areas

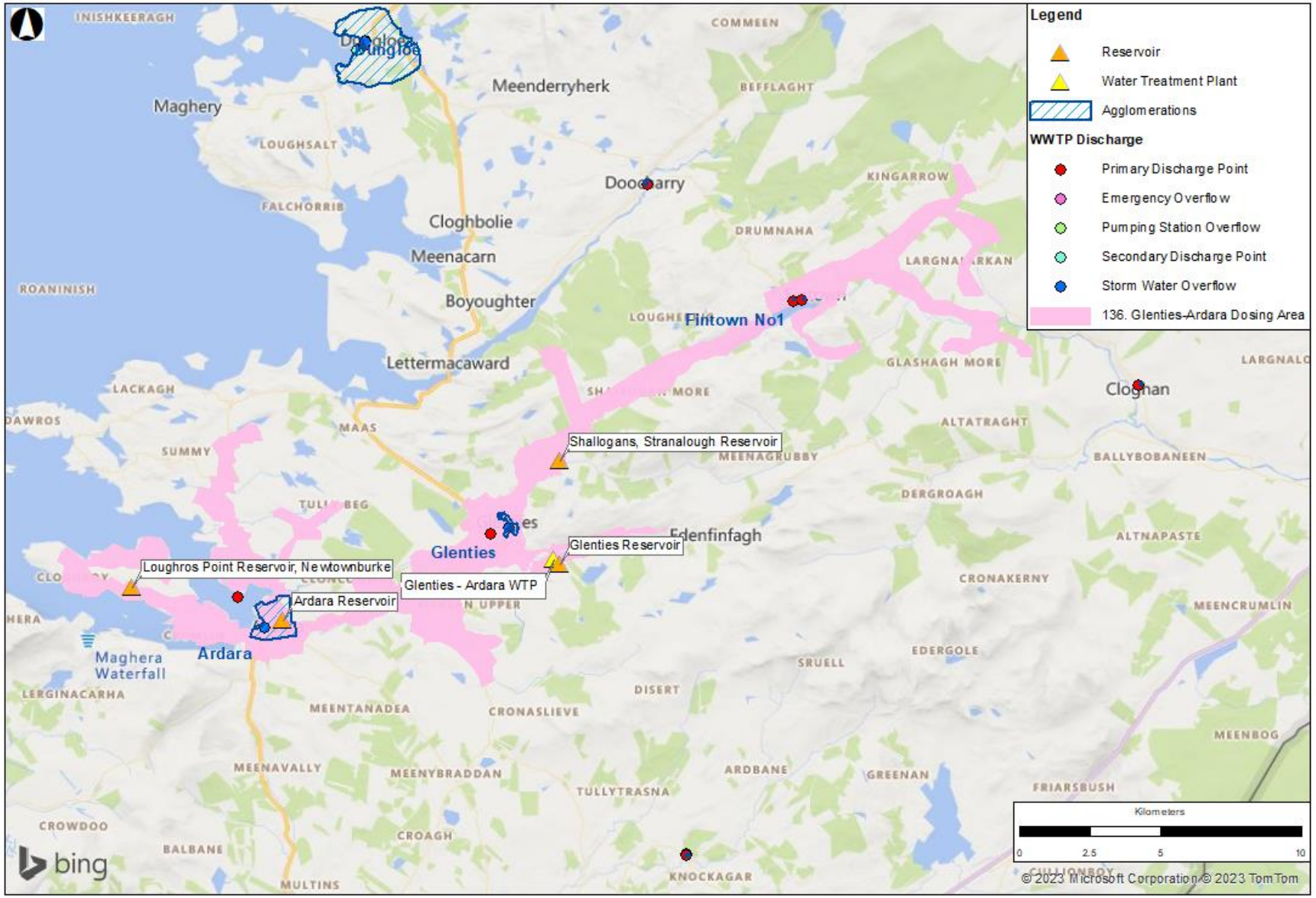

Figure 2:RWB Cumulative Loading Assessment

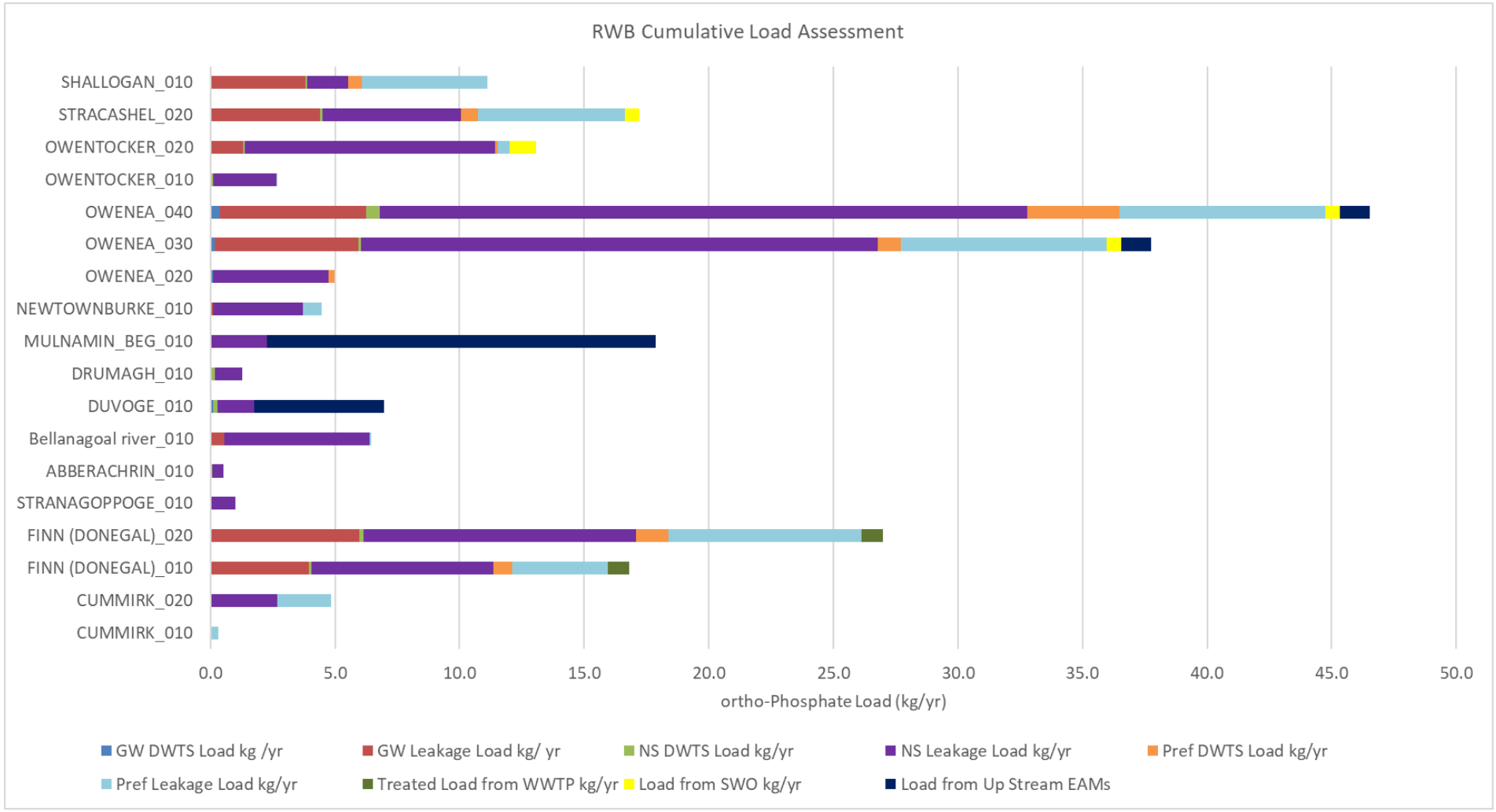

Figure 3:Total dosing area Attenuated, Treated and Transported Loads

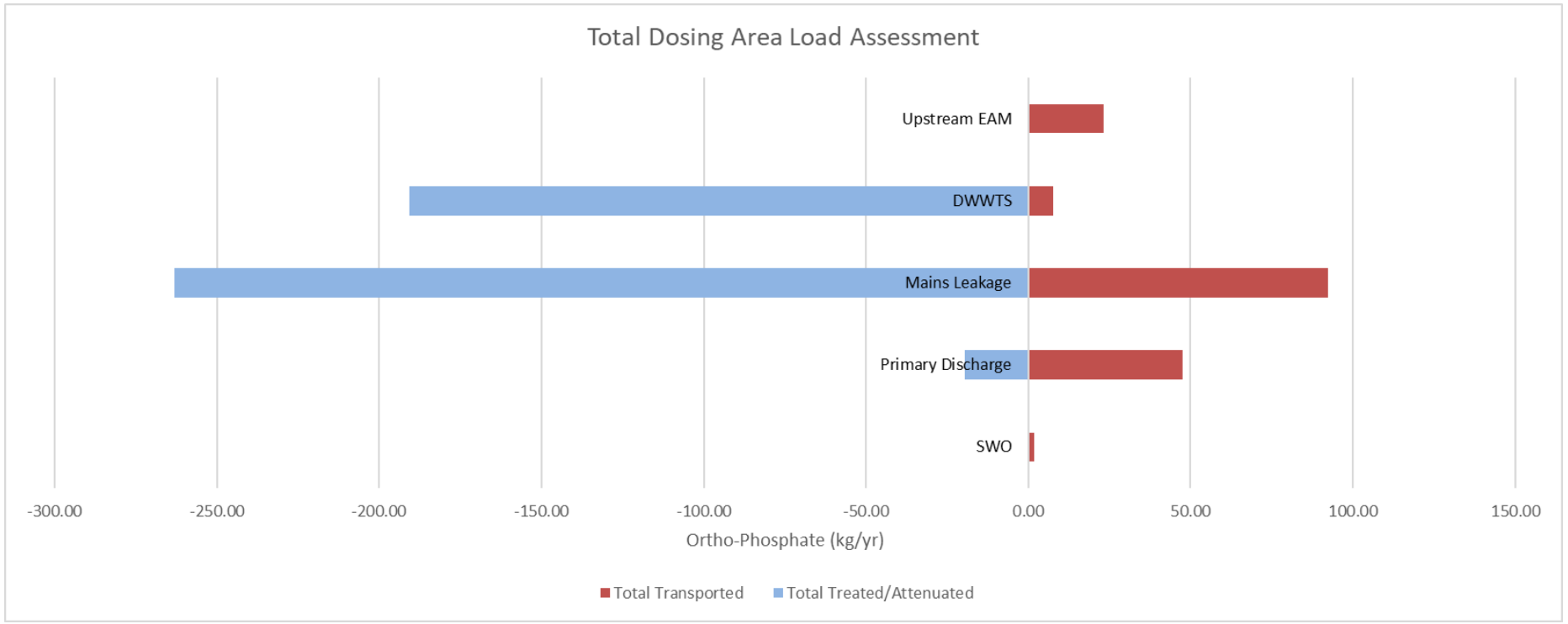

Figure 4:Upstream and downstream EAMs within WFD catchment

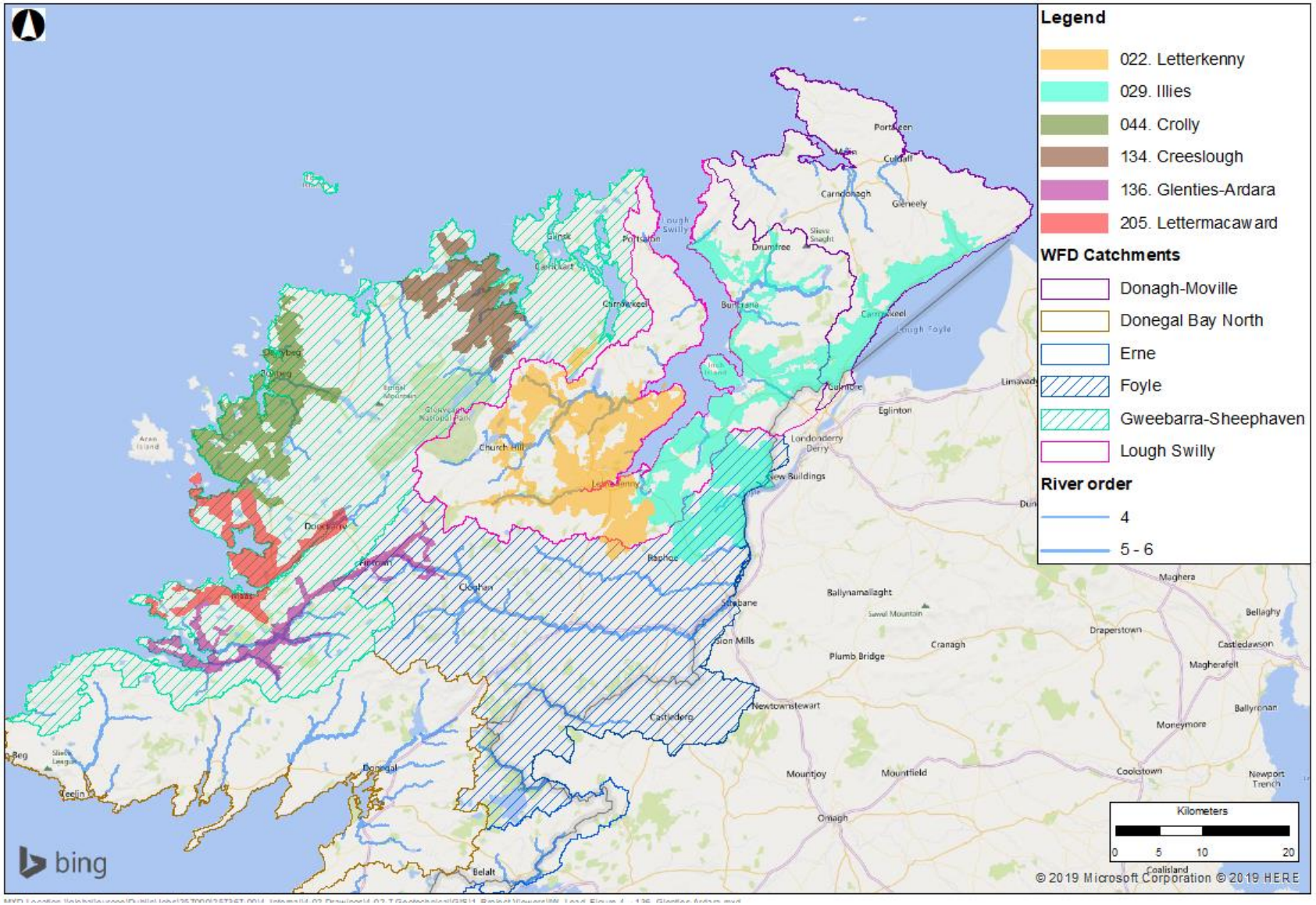

Figure 5:Red, Amber, Green (RAG) Status of waterbodies