IRISH WATER

LEAD IN DRINKING WATER MITIGATION PLAN – 091 INISHOWEN WEST WTP

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 Irish Water (IW) to undertake Screening for Appropriate Assessment (AA) for the proposed orthophosphate (OP) dosing (herein referred to as the Project) of drinking water supplied by the Inishowen West Water Treatment Plant (WTP) in Co. Donegal to Inishowen West Water Supply Zone (WSZ) (0600PUB1005) and Carndonagh WSZ (0600PUB1007).

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

1.1 PURPOSE OF THIS REPORT

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

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

1.2 THE PLAN

Irish Water, as the national public water utility, prepared a Lead in Drinking Water Mitigation Plan (LDWMP) in 2016 (here after referred to as the Plan). The Plan provides a framework of measures for implementation to effectively address the currently elevated levels of lead in drinking water experienced by some IW customers as a result of lead piping. The Plan was prepared in response to the recommendations in the *National Strategy to reduce exposure to Lead in Drinking Water* which was published by the Department of Environment, Community and Local Government[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 IW's responsibility. Lead in drinking water is derived from lead pipes that are still in place in the supply network. These pipes are mostly in old shared connections or in the short pipes connecting the (public) water main to the (private) water supply pipes (IW, 2016[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 IW's ownership in private properties (IW, 2016). Lead can be dissolved in water as it travels through lead supply pipes and internal lead plumbing. When lead is in contact with water it can slowly dissolve, a process known as plumbosolvency. The degree 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

[1] Now known as the Department of Housing, Planning and Local Government (DHPLG).

[2] Irish Water (IW) (2016) Lead in Drinking Water Mitigation Plan. https://www.water.ie/docs/Lead-in-Drinking-Water-Mitigation-Plan.pdf

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

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

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

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

Orthophosphate (OP) is added in the form of Phosphoric acid - a clear, odourless liquid that is safe for human consumption. Phosphoric acid is already approved for use as a food additive (E338) in dairy, cereals, soft drinks, meat and cheese. The average adult person consumes between 1,000 and 1,500 milligrams (mg) of P every day as part of the normal diet. The OP dose rate for Inishowen West and Carndonagh WSZ will be 0.6 mg/l P for treated water supplied from Inishowen West WTP.

1.3 PROJECT BACKGROUND

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

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

2. APPROPRIATE ASSESSMENT METHODOLOGY

2.1 LEGISLATIVE CONTEXT

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora better known as the "Habitats Directive" provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of European Sites. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

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

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

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

Article 6(4) states:

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

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

2.2 GUIDANCE FOR THE APPROPRIATE ASSESSMENT PROCESS

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

European and National Legislation:

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

Guidance / Case Law:

- *Article 6 of the Habitats Directive – Rulings of the European Court of Justice*. Final Draft September 2014;
- *Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities*. DEHLG (2009, revised 10/02/10);

- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*. European Commission (2002);
- *Communication from the Commission on the Precautionary Principle*. European Commission (2000b);
- *EC study on evaluating and improving permitting procedures related to Natura 2000 requirements under Article 6.3 of the Habitats Directive 92/43/EEC*. European Commission (2013);
- *Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission*. European Commission (2007); and
- *Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC*. European Commission (2000a).

Departmental/NPWS Circulars:

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

2.3 STAGES OF THE APPROPRIATE ASSESSMENT PROCESS

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

- Stage 1 – Screening of the proposed plan or project for AA;
- Stage 2 – An AA of the proposed plan or project;
- Stage 3 – Assessment of alternative solutions; and
- Stage 4 – Imperative Reasons of Overriding Public Interest (IROPI)/ Derogation.

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

Stage 1: Screening for a likely significant effect

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

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

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

Stage 3: Assessment of Alternative Solutions

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

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

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

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

2.4 INFORMATION SOURCES CONSULTED

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

- Information provided by IW as part of the project;
- Environmental Protection Agency – Water Quality www.epa.ie and www.catchments.ie;
- Geological Survey of Ireland – Geology, Soils and Hydrogeology www.gsi.ie;
- Information on the conservation status of birds in Ireland (Colhoun & Cummins 2013);
- National Parks and Wildlife Service – online Natura 2000 network information www.npws.ie;
- National Biodiversity Action Plan 2017 - 2021 (DCHG 2017);
- Article 17 Overview Report Volume 1 (NPWS, 2019a);
- Article 17 Habitat Conservation Assessments Volume 2 (NPWS, 2019b);
- Article 17 Species Conservation Assessment Volume 3 (NPWS, 2019c);
- EPA Qualifying Interests database, (EPA, 2015) and updated EPA Characterisation Qualifying Interests database (EPA/RPS, September 2016);

- River Basin Management Plan for Ireland 2018 - 2021 - www.housing.gov.ie;
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie;
- National Summary for Article 12 (NPWS, 2013d); and
- Format for a Prioritised Action Framework (PAF) for Natura 2000 (2014) www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf.

2.5 EVALUATION OF THE RECEIVING ENVIRONMENT

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

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

2.5.1 Identification of European Sites

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

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

A buffer of 15km is typically taken as the initial ZoI extending beyond the reach of the footprint of a plan, although there may be scientifically appropriate reasons for extending this ZoI further depending on pathways for potential effects. With regard to the current project, the 15 km distance is considered inappropriate to screen all likely pathways to European Sites in view of all hydrological and hydrogeological connections to aquatic and water-dependant receptors. Therefore, the ZoI for this project includes all of the hydrologically connected surface water sub catchments and groundwater bodies within the WSZ (Figure 5).

2.5.2 Conservation Objectives

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

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

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

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

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

For SACs:

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

For SPAs:

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

Favourable Conservation status of a habitat is achieved when:

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

Favourable Conservation status of a species is achieved when:

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

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

2.5.3 Existing Threats and Pressures to EU Protected Habitats and Species

Given the nature of the proposed project, a review has been undertaken of those QIs/SCIs which have been identified as having sensitivity to orthophosphate loading. Information has been extracted primarily from a number of NPWS authored reports, including recently available statutory assessments on the conservation status of habitats and species in Ireland namely; The status of EU protected Habitats and Species in Ireland (NPWS 2019 a, b &c) and on information contained in Ireland's most recent Article 12 submission to the EU on the Status and trends of Birds species (NPWS 2019d). Water dependent species were identified as having the greatest connectivity and thus the highest sensitivity to the proposed dosing activity and the Water Framework Directive SAC water dependency list (NPWS, December 2015), was used as part of the criteria for screening of European Sites

3. DESCRIPTION OF THE PROJECT

3.1 DESCRIPTION OF THE PROPOSAL

There is a current average demand of 2,000 m^3/day at the Inishowen West and 2,300m^3/day at the Inishowen West Mixed (Carndonagh and Gleneely) WSZs. It is anticipated that these WSZs will be connected to the Inishowen dosed network in the future. As such dosing of these WSZs is evaluated at the Inishowen West WTP site.

Mains leakage across the WSZ is assumed to be 42%. The Inishowen West WSZ (0600PUB1005) currently supplies drinking water to the Inishowen peninsula including the towns of Ballyliffen and Clonmany. The Inishowen West Water Treatment Plant (WTP) also supplies the Carndonagh WSZ, with 45% of their supply. There are an estimated 3,738 properties across the WSZs that are serviced by DWWTS and water discharged per person is assigned as 105 litres per day with an average of 2.7 persons per household assumed.

Based on an assessment of the risk of lead exceedances, and examination of the network configuration the Plumbosolvency Control Plan for 091 Inishowen West is that all areas receive OP dosed water. Specifically, 0.6 mg/l P will be dosed at Inishowen West WTP (Figure 1).

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

3.1.1 Construction Works

Proposed construction works involves installation of Orthophosphate dosing unit and post treatment pH correction facility as detailed below.

The scope of the **construction** works for Orthophosphate dosing unit at Inishowen West WTP will include:

- Initial site assessment, and site investigation works to determine existing conditions, services and pipe cable duct layouts at the site;
- Re-purposing the old disused chlorine building and install an orthophosphate dosing unit, chemical storage including 1500L Storage tank, dosing equipment including duty standby pumps, and control panel. Extractor fans, replacement roller door, eyewash and all ancillary pipe works. Dosing will be prior to plant reservoir.
- Dosing pipelines, carrier water pipework and electrical cables shall typically be installed within 100mm diameter ducts, placed in trenches. The ducts will be installed at approximately 700mm below ground level and following installation the trench will be backfilled and the surface reinstated to match the existing surface. Where pipework and cables are routed through existing structures, they shall be surface mounted within trunking.
- In addition, safety equipment shall be provided where concentrated orthophosphoric acid is stored, filled or dosed. The equipment will include; free standing emergency shower and eyewash, provision of a potable water supply to safety shower/eyewash and safety signage.
- No site clearance or building demolition is required;
- Works duration will not extend beyond 20 working days.

Figure 2: Disused Chlorine Room

The scope of the **construction** works for post treatment pH correction facility at Inishowen West WTP will include:

- Installation of a sodium bicarbonate unit handling and storage area in the existing chemical room to increase the alkalinity level leaving the plant and stabilise pH variation in the network.
- The dosing point is post treatment and prior to reservoir.
- Sodium bicarbonate is to be installed along with the existing sodium hydroxide dosing at the plant. The batching area is to be located where temporary PACL trial was carried out, and storage to be confirmed inside rolling door of same building.

- Pallet mechanical lifting equipment will also be provided for offloading pallets of sodium bicarbonate at plant.

3.1.2 Operational Works

The scope of the **operational** works includes the dosing of OP to treated water at a rate of 0.6 mg/l P for treated water from Inishowen West WTP in a process similar to the addition of chlorine for disinfection.

3.2 LDWMP APPROACH TO ASSESSMENT

3.2.1 Work Flow Process

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

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

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

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

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

3.2.2 Environmental Assessment Methodology

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

- The *source* of phosphorus is defined as the orthophosphate dosing at water treatment plants which will be dependent on the water chemistry of the raw water quality, the integrity of the distribution network and the extent of lead piping.

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

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

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

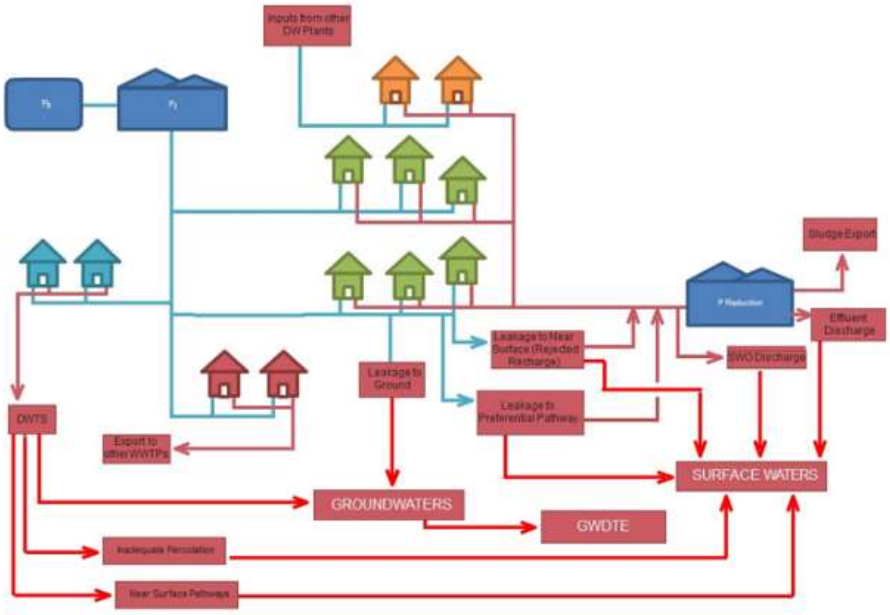

Figure 3 Conceptual Model of P Transfer

(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.)

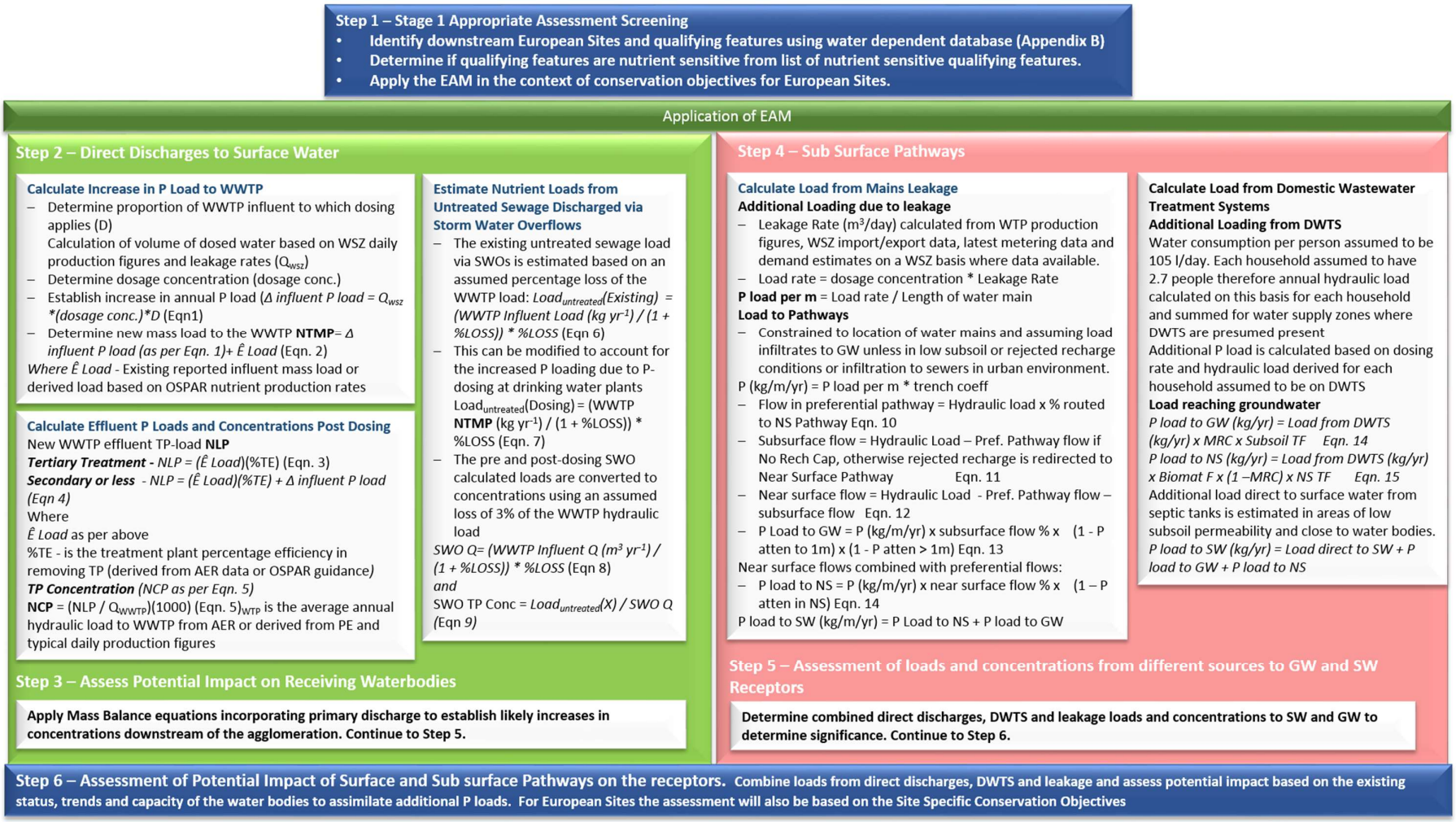

Figure 4 Stepwise Approach to the Environmental Assessment Methodology

4. PROJECT CONNECTIVITY TO EUROPEAN SITES

4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

4.1.1 CONSTRUCTION PHASE

Inishowen West WTP site boundary is located near to the Clonmany_010 (IE_NW_40C010100) river waterbody which flows into the North Inishowen Coast SAC approximately 5km from the WTP. Given the location and taking account of the scale of the construction of the OP Dosing Unit for the proposed scheme, the potential for direct or indirect impacts during construction at Inishowen West WTP site can be screened out at an early stage. Consideration of potential impact is in the absence of mitigation and with the acknowledgement that the Dosing Units are within the existing IW site and as significant distance upstream of any European Site, thereby having no links to European Sites. Construction impacts are therefore not discussed further in the report.

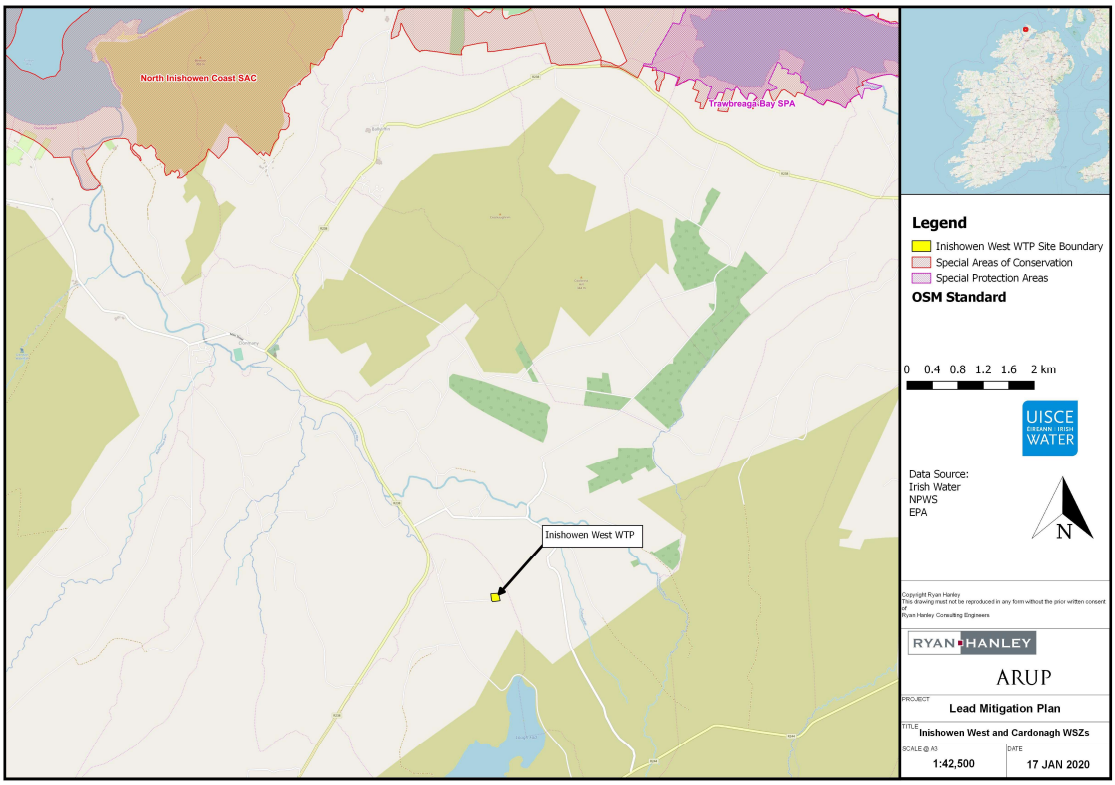

Figure 5 Location of the Inishowen West Water Treatment Plant site with respect to European Sites

4.1.2 OPERATIONAL PHASE

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

The EAM process identified 23 river waterbodies and 3 coastal waterbodies, potentially impacted following OP dosing of drinking water. This AA Screening identifies the connectivity between EAM identified surface waterbodies and downstream receiving waterbodies and European Sites:

- Culdaff_010 (IE_NW_40C020100) river waterbody flows into the Culdaff_020 (IE_NW_40C020150) river waterbody which discharges into the Northern Atlantic Seaboard (Has 40;02) (IE_NW_230_0000) coastal waterbody.

- Redford_Glebe_010 (IE_NW_40R040490), Portaleen_010 (IE_NW_40P020200), Ballycramsy_010 (IE_NW_40B200980), Ballygorman_010 (IE_NW_40B210940), Ardagh_010 (IE_NW_40A090780) river waterbodies discharge directly into the Northern Atlantic Seaboard (Has 40;02) (IE_NW_230_0000) coastal waterbody.

- Glennagannon_020 (IE_NW_40G010200) river waterbody which discharges into the Trawbreaga Bay (IE_NW_240_0000) coastal waterbody.

- Donagh_010 (IE_NW_40D010040) river waterbody flows into the Donagh_020 (IE_NW_40D10100) and Donagh_030 (IE_NW_40D010400) river waterbodies which then discharge into the Trawbreaga Bay (IE_NW_240_0000) coastal waterbody.

- Ballyboe_010 (IE_NW_40B030400), Malin Stream_010 (IE_NW_40M010200), Ballycramsy_010 (IE_NW_40B200980), Straid_010 (IE_NW_40S010400), Rashenny_010 (IE_NW_40R020770) river waterbodies discharge directly into the Trawbreaga Bay (IE_NW_240_0000) coastal waterbody.

- Keenagh_010 (IE_NW_40K010200) river waterbody flows into the Keenagh_020 (IE_NW_40K010400) river waterbody which discharges into the Northern Atlantic Seaboard (Has 40;02) (IE_NW_230_0000) coastal waterbody.

- Cloontagh_010 (IE_NW_40C040400) river waterbody and Clonmany_010 (IE_NW_40C010100) flow into the Clonmany_020 (IE_NW_40C010200) and Clonmany_030 (IE_NW_40C010300) river waterbodies which discharges into the Northern Atlantic Seaboard (Has 40;02) (IE_NW_230_0000) coastal waterbody.

- Ballyhallan_010 (IE_NW_40B010200) river waterbody flows into the Clonmany_030 (IE_NW_40C010300) river waterbody which discharges into the Northern Atlantic Seaboard (Has 40;02) (IE_NW_230_0000) coastal waterbody.

- Lenan_010 (IE_NW_39L120930) river waterbody flows directly into the Lough Swilly (IE_NW_220_0000) coastal waterbody.

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

- Lough Swilly (IEGBNI_NW_G_059);

- East Inishowen (IEGBNI_NW_G_050);

- Carndonagh Gravels (IE_NW_G_078);

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

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

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

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
Magheradrumman Bog SAC	000168	Yes	Yes	Yes
Ballyhoorisky Point to Fanad Head SAC	001975	Yes	Yes	No
North Inishowen Coast SAC	002012	Yes	Yes	Yes
Lough Swilly SAC	002287	Yes	Yes	No
Trawbreaga Bay SPA	004034	Yes	Yes	Yes
Lough Swilly SPA	004075	Yes	Yes	No
Malin Head SPA	004146	Yes	Yes	Yes
Fanad Head SPA	004148	Yes	Yes	No
Horn Head to Fanad Head SPA	004194	Yes	Yes	No

Ballyhoorisky Point to Fanad Head SAC (001975) is located approximately 5.5km west of the proposed dosing area. This site is located on the western shoreline of the Lough Swilly coastal waterbody and is potentially hydrologically connected to the site via this waterbody. The dosing area is located on the eastern shore of Lough Swilly and it is considered that any OP entering this large coastal waterbody will be significantly diluted. As a result, there will be no change in the OP indicative water quality status of this waterbody and therefore no impact on the Ballyhoorisky Point to Fanad Head SAC. Therefore, this site is not considered further in this report.

Lough Swilly SAC (002287) and **Lough Swilly SPA (004075)** are located approximately 8.3km southwest of the proposed dosing area. These sites are potentially hydrologically linked to the dosing area via the Lough Swilly coastal waterbody and the Lough Swilly groundwater body. These sites are located approximately 13.6 km upstream of the dosing area via the Lough Swilly coastal waterbody and it is considered that any OP entering this large coastal waterbody will be significantly diluted. As a result, there will be no change in the OP indicative water quality status of this coastal waterbody and therefore no impact on Lough Swilly SAC/SPA. The site is also hydrologically linked via the Lough Swilly groundwater body which is a poor aquifer that is considered to have short flow paths. Given the considerable distance to the site, and the short flowpaths of the groundwater body (30-300 m), the potential for risk can be screened out and these sites not assessed further.

Fanad Head SPA (004148) and **Horn Head to Fanad Head SPA (004194)** are located approximately 6km west of the proposed dosing area. This site is located on the western shoreline of the Lough Swilly coastal waterbody and is potentially hydrologically connected to the site via this waterbody. The dosing area is located on the eastern shore of Lough Swilly and it is considered that any OP entering this large coastal waterbody will be significantly diluted. As a result, there will be no change in the OP indicative water quality status of this waterbody and therefore no impact on the Ballyhoorisky Point to Fanad Head SAC. Therefore, this site is not considered further in this report.

4.2 IDENTIFICATION OF RELEVANT EUROPEAN SITES

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

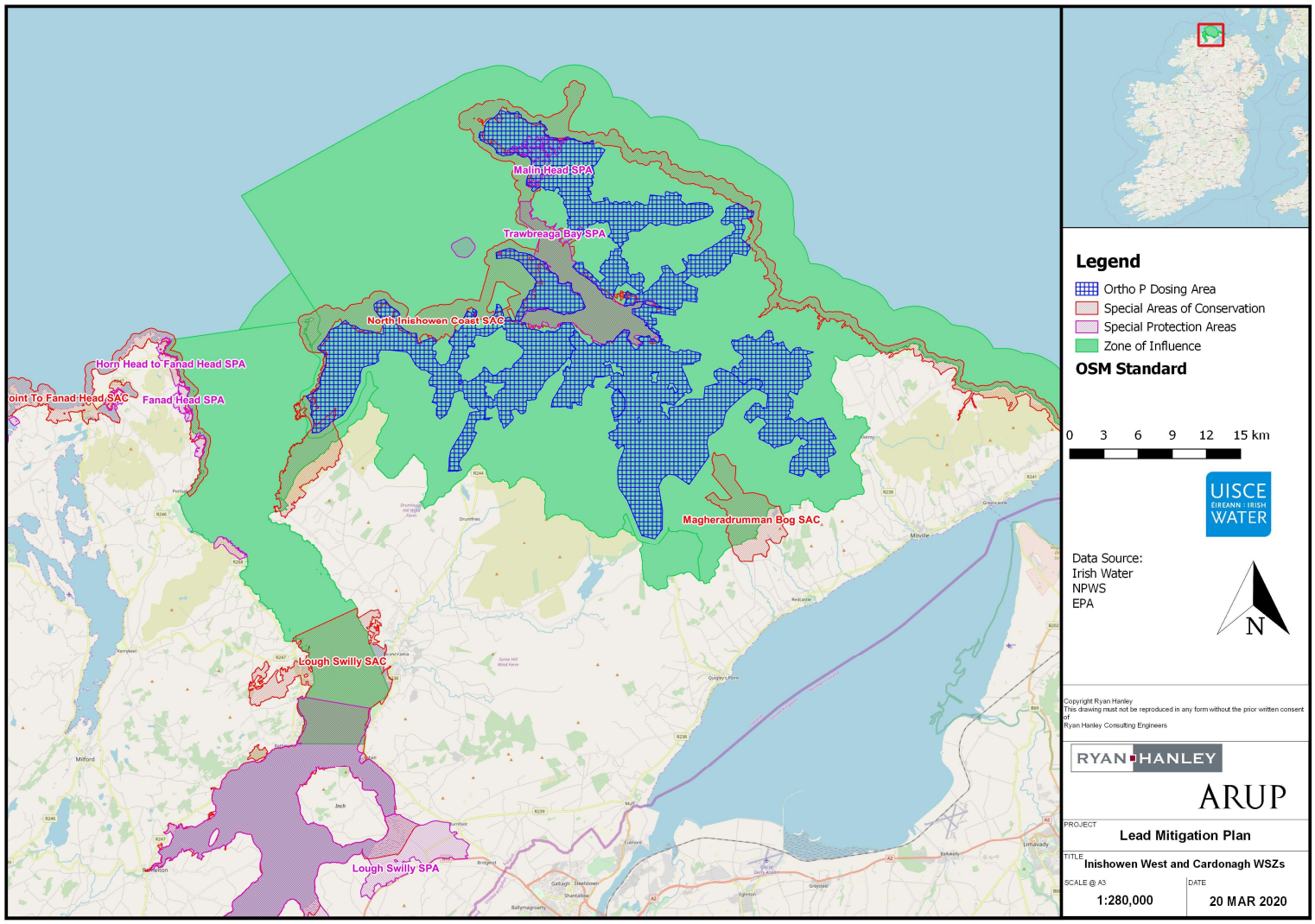

Figure 6 European Sites within the ZoI of the Proposed Project

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
Magheradrumman Bog SAC	**000168**	**15th May 2017**	4010	Northern Atlantic wet heaths with *Erica tetralix*	Yes	Yes	Yes for operational
			7130	Blanket bogs (* if active bog)	Yes	Yes	
North Inishowen Coast SAC	**002012**	**24th Nov 2014**	1014	Narrow-mouthed Whorl Snail *Vertigo angustior*	Yes	Yes	Yes for operational
			1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes	
			1220	Perennial vegetation of stony banks	Yes	No	
			1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Yes	Yes	
			1355	Otter *Lutra lutra*	Yes	Yes	
			2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Yes	Yes	
			21A0	Machairs (* in Ireland)	Yes	Yes	
			4030	European dry heaths	No	Yes	
Malin Head SPA	**004146**	**21st Feb 2018**	A122	Corncrake (*Crex crex*)	Yes	Yes	Yes for operational
Trawbreagh Bay SPA	**004034**	**21st Feb 2018**	A045	Barnacle Goose (*Branta leucopsis*)	Yes	Yes	Yes for operational
			A046	Light-bellied Brent Goose (*Branta bernicla hrota*)	Yes	Yes	
			A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes	
			A999	Wetland and Waterbirds	Yes	Yes	

* indicates a priority habitat under the Habitats Directive

5. EVALUATION OF POTENTIAL IMPACTS

5.1 CONTEXT FOR IMPACT PREDICTION

The methodology for the assessment of impacts is derived from the *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites* (EC, 2002). When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented include:

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

5.2 IMPACT IDENTIFICATION

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

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

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

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

- Excessive phosphate within an aquatic ecosystem may lead to eutrophication; with a corresponding reduction in oxygen levels, reduction in species diversity and subsequent impacts on animal life;
- Groundwater dependent habitats include both surface water habitats (e.g. hard oligo-mesotrophic lakes) and Groundwater Dependent Terrestrial Ecosystems (GWDTEs, e.g. alkaline fens). Any change in the water quality of these systems may have subsequent effects on these habitats and species, and therefore will be subject to an evaluation of the significance of any such effect
- The discharge of additional P loads to the environment (through surface and sub surface pathways) may have implications for nutrient sensitive species such as the freshwater pearl mussel, Atlantic salmon and the white-clawed crayfish;
- Phosphorus (P) in wastewater collection systems is the result of drinking water and derived from a number of other sources, including P imported from areas outside the agglomeration through import of sludges or leachates for treatment at the plant. The disposal and use of P removed in wastewater sludge is regulated (i.e. through nutrient management plans) and should not pose further threat of environmental impact;
- Leakage of phosphates from the drinking water supply network to the environment from use of orthophosphate;

- Direct discharges of increased P to waterbodies from the wastewater treatment plant licensed discharges; and
- Potential discharges to waterbodies of untreated effluent potentially high in OP Storm Water Overflows (SWOs).

5.4 ASSESSMENT OF OPERATIONAL IMPACTS

Article 6 of the Habitats Directive states that:

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

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

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

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

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

The identification of statistically and environmentally significant trends for waterbodies is a specific requirement of the WFD and the Groundwater Daughter Directive. Guidance on trends in groundwater assessments (UKTAG 2009, EPA 2010) indicates that trends are environmentally significant if they

indicate that the Good Status will not be achieved within two future river basin cycles, i.e. within the next 12 years.

Baseline Orthophosphate monitoring data and associated thresholds are available for Ballyboe_010, Ballyhallan_010, Clonmany_010, Clonmany_020, Cloontagh_010, Culdaff_010, Culdaff_020, Donagh_010, Donagh_030, Glennagannon_020, Keenagh_020, Malin Stream_010, Portaleen_010 and Straid_010.Where existing monitoring data is not available, a surrogate status is derived from the Orthophosphate indicative quality of the adjacent RWB. The mid-range of that surrogate status is used as baseline concentration. An additional test for groundwater bodies states that downward trends should not be reversed as a result of pollution. This test applies to GWB with statistically significant trends according to the WFD App and the Sens Slope provided is used to assess direction and strength of trend. If the trend is negative and the predicted increase in OP concentration is lower than the absolute value of the Sens Slope, then the test passes. This assessment has been carried out using existing WFD App data (downloaded December 2022).

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

Site Name (Code)	Contributing WB Code_Name	WB Type[3]	Ortho P Status[4] and Trends[5]	Baseline [6] P Conc.[7,8]	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l)	Baseline Conc. @ 0.6 mg/l dosing rate	Evaluation
Magheradrumman Bog SAC (000168)	East Inishowen	GWB	Good	0.0050	0.0263	16.2	0.0003	0.0053	No risk of deterioration to OP indicative WQ
North Inishowen Coast SAC (002012)	Redford Glebe_010	RWB	*High*	*0.0125*	0.0188	0.0	0.0000	0.0125	No risk of deterioration to OP indicative WQ
	Portaleen_010	RWB	*High*	0.0090	0.0188	3.6	0.0005	0.0095	No risk of deterioration to OP indicative WQ
	Ballygorman_010	RWB	*High*	0.0125	0.0188	2.1	0.0002	0.0127	No risk of deterioration to OP indicative WQ
	Keenagh_020	RWB	High	0.0200	0.0188	10.5	0.0004	0.0204	No risk of deterioration to OP indicative WQ
	Ballycramsy_010	RWB	*High*	0.0125	0.0188	1.2	0.0001	0.0126	No risk of deterioration to OP indicative WQ
	Rashenny_010	RWB	*High*	0.0125	0.0188	7.8	0.0008	0.0133	No risk of deterioration to OP indicative WQ
	Ardagh_010	RWB	*High*	0.0125	0.0188	47.7	0.0056	0.0181	No risk of deterioration to OP indicative WQ
	Donagh_030	RWB	High	0.0075	0.0188	134.5	0.0036	0.0111	No risk of deterioration to OP indicative WQ
	Ballyboe_010	RWB	High	0.0089	0.0188	0.7	0.0001	0.0090	No risk of deterioration to OP indicative WQ
	Malin Stream_010	RWB	High	0.0311	0.0325	8.0	0.0009	0.0320	No risk of deterioration to OP indicative WQ
	Glennagannon_020	RWB	High	0.0080	0.0188	10.8	0.0004	0.0083	No risk of deterioration to OP indicative WQ

[3] Monitoring period is annual unless specified.
[4] Surrogate Status indicated in italic.
[5] Distance to threshold in parentheses.
[6] Baseline year is 2022.
[7] Surrogate concentration is given in italic mg/l
[8] Ortho P in RWBs, TWBs, CWBs and GWBs; TP in LWBs.
[9] Cumulative Ortho P load to SW and GW from upstream and downstream dosing areas, Leakage, DWWTS and agglomerations (kg/yr).
[10] Values above 5% of Good / High boundary (0.00125 mg/l) for SW or 5% of Good / Fail boundary (0.00175 mg/l) for GW highlighted in yellow.

Site Name (Code)	Contributing WB Code_Name	WB Type[3]	Ortho P Status[4] and Trends[5]	Baseline [6] P Conc.[7,8]	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l)	Baseline Conc. @ 0.6 mg/l dosing rate	Evaluation
	Lenan_010	RWB	*High*	0.0125	0.0188	4.3	0.0003	0.0128	No risk of deterioration to OP indicative WQ
	Lough Swilly	GWB	*Good*	0.0175	0.0263	0.1	0.000001	0.0066	No risk of deterioration to OP indicative WQ
	Carndonagh Gravels	GWB	Good	0.0050	0.0263	4.5	0.0009	0.0059	No risk of deterioration to OP indicative WQ
	East Inishowen	GWB	0.0050	0.0263	16.2	0.0003	0.0053	0.0050	No risk of deterioration to OP indicative WQ
	Trawbreaga Bay	CWB	*Summer High/ Winter High*	0.0125	0.0188	171.3	0.0014	0.0139	No risk of deterioration to OP indicative WQ
	Northern Atlantic Seaboard	CWB	*Summer High/ Winter High*	0.0025	0.0188	331.5	0.0010	0.0035	No risk of deterioration to OP indicative WQ
	Lough Swilly	CWB	Summer High/ Winter High	0.0025	0.0188	4.3	0.000005	0.0025	No risk of deterioration to OP indicative WQ
Trawreaga Bay SPA (004148)	Trawbreaga Bay	CWB	*Summer High/ Winter High*	0.0125	0.0188	171.3	0.0014	0.0139	No risk of deterioration to OP indicative WQ
	East Inishowen	GWB	Good	0.0050	0.0263	16.2	0.0003	0.0053	No risk of deterioration to OP indicative WQ
	Carndonagh Gravels	GWB	Good	0.0050	0.0263	4.5	0.0009	0.0059	No risk of deterioration to OP indicative WQ
	Ballycramsy_010	RWB	*High*	0.0125	0.0188	1.2	0.0001	0.0126	No risk of deterioration to OP indicative WQ
	Donagh_030	RWB	High	0.0075	0.0188	134.5	0.0036	0.0111	No risk of deterioration to OP indicative WQ
	Glennagannon_020	RWB	High	0.0080	0.0188	10.8	0.0004	0.0083	No risk of deterioration to OP indicative WQ
	Straid_010	RWB	High	0.0121	0.0188	8.1	0.0004	0.0124	No risk of deterioration to OP indicative WQ
	Rashenny_010	RWB	*High*	0.0125	0.0188	7.8	0.0008	0.0133	No risk of deterioration to OP indicative WQ

Site Name (Code)	Contributing WB Code_Name	WB Type[3]	Ortho P Status[4] and Trends[5]	Baseline [6] P Conc.[7,8]	75% of Status Threshold (mg/l)	Cumulative Ortho P load to SW and GW[9]	Modelled Conc.[10] (mg/l)	Baseline Conc. @ 0.6 mg/l dosing rate	Evaluation
	Northern Atlantic Seabord	CWB	*Summer High/ Winter High*	0.0025	0.0188	331.5	0.0010	0.0035	No risk of deterioration to OP indicative WQ
Malin Head SPA (004146)	Keenagh_020	RWB	High	0.0200	0.0188	10.5	0.0004	0.0204	No risk of deterioration to OP indicative WQ
	Ballygorman_010	RWB	*High*	0.0125	0.0188	2.1	0.0002	0.0127	No risk of deterioration to OP indicative WQ
	East Inishowen	GWB	Good	0.0050	0.0263	16.2	0.0003	0.0053	No risk of deterioration to OP indicative WQ

5.3.1 Assessment of direct impact from WWTPs and Storm Water Overflows

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

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

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

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

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

Table 4: Increased loading/concentration due to Orthophosphate Dosing – Dosing rate = 0.6 mg/l P at Inishowen West 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%)*[11]		
				0.5	*0.4*	*0.68*
Ballyliffen Primary Discharge		Pre-Dosing	261	1.10	0.88	1.50
		Post Dosing	299	1.26	1.01	1.72
		% Increase	14.5%	14.5%	14.7%	14.6%
Ballyliffin SWO (1 No.)		Pre-Dosing	16	0.34	0.27	0.46
		Post Dosing	17	0.36	0.29	0.49
Carndonagh Malin Primary Discharge	**Total P- 2.0 mg/l Compliant**	Pre-Dosing	1773	1.28	1.02	1.74
		Post Dosing	1883	1.36	1.09	1.85
		% Increase	6.2%	6.2%	6.8%	6.3%
Carndonagh Malin SWO (1 No.)		Pre-Dosing	111	0.39	0.31	0.53
		Post Dosing	114	0.40	0.32	0.55
Clonmany Primary Discharge	**OrthoP- 1.5mg/l effective 2020**	Pre-Dosing	151	1.36	1.09	1.85
		Post Dosing	174	1.57	1.26	2.13
Clonmany SWO (1 No.)		% Increase	15.2%	15.4%	15.6%	15.1%
		Pre-Dosing	9	0.42	0.33	0.57
		Post Dosing	10	0.45	0.36	0.61
Gleneely Primary		Pre-Dosing	136	3.74	2.99	5.08

[11] Cells highlighted in amber are exceeding ELV

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%)*[11]		
				0.5	*0.4*	*0.68*
Discharge		Post Dosing	145	3.96	3.17	5.39
		% Increase	6.6%	5.8%	6%	6.1%
Glengad		Pre-Dosing	20	3.74	2.99	5.08
		Post Dosing	22	3.96	3.17	5.39
		% Increase	10%	5.8%	6%	6.1%
Malin Head		Pre-Dosing	21	3.74	2.99	5.08
		Post Dosing	23	3.96	3.17	5.39
		% Increase	9.5%	5.8%	6%	6.1%

Ballyliffen WWTP Agglomeration

The Ballyliffen WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 1.10 mg/l P to 1.26 mg/l P as a result of dosing (14.5% increase). The annual average SWO effluent concentration will increase from 0.34 mg/l P to 0.36 mg/l P as a result of dosing. This WWTP discharges into the Ardagh River (Ardagh_010). The Ardagh River is hydrologically linked to the North Inishowen Coast SAC.

Carndonagh Malin WWTP Agglomeration

The Carndonagh Malin WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. It has an ELV for total P of 2.0 mg/l which it is compliant with. The annual average effluent orthophosphate concentration will increase from 1.28 mg/l P to 1.36 mg/l P as a result of dosing (6.2% increase). The annual average SWO effluent concentration will increase from 0.39 mg/l P to 0.40 mg/l P as a result of dosing. This WWTP discharges into the Donagh River (Donagh_030). The Donagh River is hydrologically linked to the North Inishowen Coast SAC and Trawbreagh Bay SPA.

Clonmany WWTP Agglomeration

The Clonmany WWTP provides secondary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. It has an ELV for Ortho-P of 1.5 mg/l which is in effect as of 2020. The annual average effluent orthophosphate concentration will increase from 1.36 mg/l P to 1.57 mg/l P as a result of dosing (15.4% increase). The annual average SWO effluent concentration will increase from 0.42 mg/l P to 0.45 mg/l P as a result of dosing. This WWTP discharges into the Clonmany River (Clonmany_020). The Clonmany River is not directly hydrologically linked to any European Site but is upstream of the North Inishowen Coast SAC.

Gleneely WWTP Agglomeration

The Gleneely WWTP provides primary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 3.74 mg/l P to 3.96 mg/l P as a result of dosing (5.8% increase). There are no SWOs associated with the WWTP. This WWTP discharges into the Culduff River (Culduff_010). The Gleneely River is not directly hydrologically linked to any European Site but is upstream of the North Inishowen Coast SAC.

Glenad WWTP Agglomeration

The Glenad WWTP provides primary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 3.74 mg/l P to 3.96 mg/l P as a result of dosing (5.8% increase). There are no SWOs associated with the WWTP. This WWTP discharges into the Portaleen River (Portaleen_010). The Portaleen River is is hydrologically linked to the North Inishowen Coast SAC.

Malin Head WWTP Agglomeration

The Malin Head WWTP provides primary treatment and the assessment assumes that additional loading will not receive treatment as described by the EAM. The annual average effluent orthophosphate concentration will increase from 3.74 mg/l P to 3.96 mg/l P as a result of dosing (5.8% increase). There are no SWOs associated with the WWTP. This WWTP discharges into the Keenagh River (Keenagh_010). The Keenagh River is hydrologically linked to the North Inishowen Coast SAC and Malin Head SPA.

5.3.2 Combined assessment of direct and indirect impacts to receiving waterbodies

This section presents the results of the EAM regarding the combined loading as a result of increased OP dosing from the WWTP discharge, seepage from mains and DWWTS. Upstream dosing areas have been considered and cumulatively assessed by the EAM. The figures presented here are representative of this.

River waterbodies

- Redford Glebe_010 (IE_NW_40R040490), Portaleen_010 (IE_NW_40P020200), Ballygorman_010 (IE_NW_40B210940), Keenagh_020 (IE_NW_40K010400), Ballycramsy_010 (IE_NW_40B200980), Rashenny_010 (IE_NW_40R020770), Ardagh_010 (IE_NW_40A090780), Donagh_030 (IE_NW_40D010400), Ballyboe_010 (IE_NW_40B030400), Malin Stream_010 (IE_NW_40M010200), Lenan_010 (IE_NW_39L120930) and Glennagannon_020 (IE_NW_40G10200) river waterbodies are hydrologically connected to **North Inishowen Coast SAC**

- Ballycramsy_010 (IE_NW_40B200980), Donagh_030 (IE_NW_40D010400), Glennagannon_020 (IE_NW_40G10200), Straid_010 (IE_NW_40S010400), Rashenny_010 (IE_NW_40R020770) river waterbodies are hydrologically connected to **Trawreaga Bay SPA (004148).**

- Keenagh_020 (IE_NW_40K010400) and Ballygorman_010 (IE_NW_40B210940) river waterbodies are hydrologically connected to **Malin Head SPA (004146).**

The OP dosing contributes OP load to receiving RWBs via loading from mains leakage and domestic wastewater treatment systems (DWWTS) via subsurface pathways. Loading from mains leakage is estimated at 396 kg/yr P of which 318 kg/yr is assumed to be attenuated along flow paths. The hydraulic loading from the DWWTS is 232.1 kg/yr P, 229.7 kg/yr P of which is assumed to be attenuated along the flow paths.

The increase in OP concentrations in river waterbodies following dosing is estimated to be as much as 0.0056 mg/l P. The resulting Orthophosphate concentrations following dosing ranges from 0.0053 mg/l P to 0.0320 mg/l P. The increases do not cause a deterioration in the status of any river waterbody. All RWBs will receive a predicted dosing concentration below the 5% of Good/ High boundary (0.00125mg/l P) except for the Ardagh_010, Donagh_030, Clonmany_020 and Clonmany_030 who receive a predicted dosing concentration of 0.0056 mg/l P, 0.0036 mg/l P, 0.0014 mg/l P and 0.0014 mg/l P respectively. These rivers have a High indicative water quality status and have predicted post dosing concentrations within the 75% upper threshold of this status. Therefore, there is no risk of deterioration in the WFD OP indicative water quality of these waterbodies.

Groundwater bodies

- East Inishowen (IEGBNI_NW_G_051) groundwater body is hydrologically linked to **Magheradrumman Bog SAC (000168)**, **Malin Head SPA (004146)** and **Trawreaga Bay SPA (004148)**

- Lough Swilly (IEGBNI_NW_G_059) and Carndonagh Gravels (IE_NW_G_078) groundwater bodies are hydrologically connected to the **North Inishowen Coast SAC (002012).**

- Carndonagh Gravels (IE_NW_G_078) groundwater bodies are hydrologically connected to the **Trawreaga Bay SPA (004148).**

The OP dosing contributes OP load to receiving GWBs via subsurface and surface pathways. The increase in Orthophosphate concentrations due to dosing is up to 0.0009 mg/l P. The resulting Orthophosphate concentrations following dosing ranges from 0.0053 mg/l P to 0.0066 mg/l P. The modelled increases are below the 5% of the Good / Fail boundary (0.00175 mg/l P) for GW, and do not result in a change of WFD OP indicative water quality of these waterbodies.

Coastal waterbodies

- Lough Swilly (IE_NW_220_0000) coastal waterbody is hydrologically linked to **North Inishowen Coast SAC (002012)**

- Trawbreaga Bay (IE_NW_240_0000) coastal waterbody is hydrologically linked to **North Inishowen Coast SAC (002012)** and **Trawbreaga Bay SPA (004148).**

- North Atlantic Seabored (IE_NW_230_0000) coastal waterbody is hydrologically linked to **North Inishowen Coast SAC (002012)** and **Trawbreaga Bay SPA (004148).**

The increase in OP concentrations in coastal waterbodies as a result of the OP dosing is up to 0.0014 mg/l P. The resulting Orthophosphate concentrations following dosing ranges from 0.0025 mg/l P to 0.0139 mg/l P. Impact from OP dosing on coastal waterbodies does not lead to a reduction in their OP indicative water quality status. All coastal waterbodies have predicted dosing concentrations below the 5% of Good/ Fail boundary (0.00125mg/l P) (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 transitional and coastal waterbodies.

5.3.3 Conclusions

The EAM model data identifies that additional OP dosing as part of this Project does not cause a deterioration in the OP indicative water quality of any surface waterbody or groundwater body listed in **Table 3**. Concentrations from other dosing areas with regard to cumulative loading on downstream waterbodies has been considered in this assessment.

6. EVALUATION OF POTENTIAL FOR SIGNIFICANT EFFECTS

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

With regard to operational impact pathways, the key pressure associated with the proposed OP dosing is the potential for increased OP levels in the receiving waters and the connectivity to the qualifying interests (habitats and species) identified in **Table 2** that are both water dependent and nutrient sensitive (**Appendix B**). Four European sites remain for evaluation of potential for significant effect: **Magheradrumman Bog SAC (000168)**, **North Inishowen Coast SAC (002012)**, **Trawbreaga Bay SPA (004034)** and **Malin Head SPA (004146)**. The potential for the proposed orthophosphate dosing to give rise to significant effects on these habitats and species, in view of their conservation objectives, are assessed in detail below.

6.1 MAGHERADRUMMAN BOG SAC 000168

6.1.1 (4010) Northern Atlantic wet heaths with *Erica tetralix*, (7130) Blanket bogs (*if active bog)

Heath (4010) and bog habitat (7130) are reported to occur in the upland areas of the SAC and conservation objectives are to restore favourable conservation conditions. Relevant nutrients and their natural ranges are yet to be defined however, Appendix B lists this habitat as water sensitive and nutrient dependent for the purposes of this OP dosing project.

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

- East Inishowen groundwater body (IEGBNI_NW_G_050) and estimated an increase in OP concentrations of up to 0.000001 mg/l P. The resulting OP concentration following dosing is 0.0066 mg/l P (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00175 mg/l P) and the GWB WFD 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 Inishowen West WTP for this groundwater body.

The EAM assessment results which evaluate the additional OP loading from dosing at Inishowen West WTP on WFD OP indicative water quality have demonstrated that there will be no change in the OP WFD indicative water quality of the East Inishowen groundwater body, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there will be no potential for significant effect on heath and bog habitats in Magheradrumman Bog SAC.

Furthermore, dosing will not prevent the maintenance or restoration of the favourable conservation condition of these habitats in Magheradrumman Bog SAC/ no deterioration of its favourable conservation condition is identified.

6.2 NORTH INISHOWEN COAST SAC 002012

6.2.1 (1140) Mudflats and sandflats not covered by seawater at low tide

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

sediment with *Pygospio elegans* community complex; Sand with *Angulus tenuis* and *Scoloplos (Scoloplos) armiger* community complex' in a natural condition.

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

Table 3 identifies the surface and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to North Inishowen Coast SAC. Mud and sand habitat (1140) is associated with transitional and coastal waterbodies. Other surface waterbodies are not connected to this habitat particularly and neither are the groundwater bodies. As such only this coastal waterbody is considered further. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.000005 mg/l P. The resulting OP concentration following dosing is 0.0025 mg/l P during summer and 0.0105 mg/l P during winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

- Trawbreaga Bay coastal waterbody (IE_NW_240_0000) and estimated an increase in OP concentrations of up to 0.0014 mg/l P. The resulting OP concentration following dosing is 0.0139 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

- Northern Atlantic Seaboard (Has 40;02) coastal waterbody (IE_NW_230_0000) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0028 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

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

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

6.2.2 (1230) Vegetated sea cliffs of the Atlantic and Baltic coasts, (2130) Fixed coastal dunes with herbaceous vegetation (grey dunes), (21A0) Machairs

North Inishowen Coast SAC is designated for a range of coastal habitats as listed above that are usually found in close association with each other. The SSCOs (NPWS, 2014) and coastal supporting document (NPWS, 2014) set out the conservation objectives for these habitats and species and are defined by the following list of attributes and targets: Range, Area, Structure and Functions. Functions, is further broken into three attributes, i.e. physical structure, vegetation structure and vegetation composition. This OP

dosing project has the potential to impact on the vegetation composition of these habitats increasing the percentage of negative indicator species present.

Table 3 identifies the surface and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to the aforementioned coastal habitats North Inishowen Coast SAC. Other surface waterbodies are not connected to this habitat particularly and neither are the groundwater bodies. As such only this coastal waterbody is considered further. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.000005 mg/l P. The resulting OP concentration following dosing is 0.0025 mg/l P during summer and 0.0105 mg/l P during winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

- Trawbreaga Bay coastal waterbody (IE_NW_240_0000) and estimated an increase in OP concentrations of up to 0.0014 mg/l P. The resulting OP concentration following dosing is 0.0139 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

- Northern Atlantic Seaboard (Has 40;02) coastal waterbody (IE_NW_230_0000) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0028 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

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

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

6.2.3 (1014) Narrow-mouthed Whorl Snail (*Vertigo angustior*)

Vertigo angustior is a terrestrial groundwater-dependant species. There are two known sites for this species in this SAC on the sand dunes in the townlands of Lag and Drung and at Tullagh Bay (NPWS, 2014). The target is to maintain the favourable conservation condition. A review of the SSCOs targets and measures for *Vertigo angustior* found no nutrient specific targets for the species (NPWS, 2014). However, the IUCN Red List of threatened species lists eutrophication as a 'main threat' to this species. Increases in P levels would allow higher vegetation to grow and outcompete the yellow sedge and moss habitat that is required by the snail.

Table 3 identifies the groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to narrow-mouthed whorl snail in North Inishowen Coast SAC. Narrow-mouthed Whorl Snail (1014) is associated with groundwater bodies. Other

surface waterbodies are not connected to this habitat particularly. As such only groundwater bodies are considered further. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- East Inishowen groundwater body (IEGBNI_NW_G_050) and estimated an increase in OP concentrations of up to 0.000001 mg/l P. The resulting OP concentration following dosing is 0.0066 mg/l P (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00175 mg/l P) and the GWB WFD 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 Inishowen West WTP for this groundwater body.

- Carndonagh Gravels groundwater body (IE_NW_G_078) and estimated an increase in OP concentrations of up to 0.0009 mg/l P. The resulting OP concentration following dosing is unchanged remaining at 0.0059 mg/l P (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00175 mg/l P) and the GWB WFD 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 Inishowen West WTP for this groundwater body.

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

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

6.2.4 (1355) Otter (*Lutra lutra*)

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

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

- Redford Glebe_010 river waterbody (IE_NW_40R040490) and estimated an increase in OP concentrations of up to 0.0000 mg/l P. The resulting OP concentration following dosing is 0.013 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Portaleen_010 river waterbody (IE_NW_40P020200) and estimated an increase in OP concentrations of up to 0.0005 mg/l P. The resulting OP concentration following dosing is 0.0095 mg/l P (Table 3; Appendix C). The increase in orthophosphate following dosing does not exceed the 5% significance threshold (<0.00125 mg/l P) and is within the 75% status threshold so there is no risk of significant deterioration in water quality for this RWB. The OP indicative water quality does not change, i.e. high status.

- Ballygorman_010 river waterbody (IE_NW_40B210940) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0127 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Keenagh_020 river waterbody (IE_NW_40K010400) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0204 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Ballycramsy_010 river waterbody (IE_NW_40B200980) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0126 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Rashenny_010 river waterbody (IE_NW_40R020770) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0133 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Ardagh_010 river waterbody (IE_NW_40A090780) and estimated an increase in OP concentrations of up to 0.0056 mg/l P. The resulting OP concentration following dosing is 0.0181 mg/l P (Table 3; Appendix C). The increase in orthophosphate following dosing exceeds the 5% significance threshold (<0.00125 mg/l P) but is within the 75% status threshold so there is no risk of significant deterioration in water quality for this RWB. The OP indicative water quality does not change, i.e. *High* status. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this river waterbody.

- Donagh_030 river waterbody (IE_NW_40D010400) and estimated an increase in OP concentrations of up to 0.0036 mg/l P. The resulting OP concentration following dosing is 0.0111 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The increase in orthophosphate following dosing exceeds the 5% significance threshold (<0.00125 mg/l P) but is within the 75% status threshold so there is no risk of significant deterioration in water quality for this RWB. The OP indicative water quality does not change, i.e. High status. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this river waterbody.

- Ballyboe_010 river waterbody (IE_NW_40B030400) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.009 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Malin Stream_010 river waterbody (IE_NW_40M010200) and estimated an increase in OP concentrations of up to 0.0009 mg/l P. The resulting OP concentration following dosing is 0.032 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Lenan_010 river waterbody (IE_NW_39L120930) and estimated an increase in OP concentrations 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 resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Glennagannon_020 river waterbody (IE_NW_40G10200) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0083 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Lough Swilly coastal waterbody (IE_NW_220_0000) and estimated an increase in OP concentrations of up to 0.000005 mg/l P. The resulting OP concentration following dosing is 0.0025 mg/l P during summer and 0.0105 mg/l P during winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

- Trawbreaga Bay coastal waterbody (IE_NW_240_0000) and estimated an increase in OP concentrations of up to 0.0014 mg/l P. The resulting OP concentration following dosing is 0.0139 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

- Northern Atlantic Seaboard (Has 40;02) coastal waterbody (IE_NW_230_0000) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0028 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

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

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

6.3 MALIN HEAD SPA 004146

Malin Head SPA comprise areas of agricultural grassland around the village of Ballygorman near Malin Head at the northern end of the Inishowen Peninsula Co. Donegal. The site is an SPA for (A122) Corncrake (*Crex crex*). The COs (NPWS, 2018) are to maintain or restore the favourable conservation condition of the Corncrake.

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 Corncrake in Malin Head 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 Orthophosphate indicative water quality on:

- Ballygorman_010 river waterbody (IE_NW_40B210940) and estimated an increase in OP concentrations of up to 0.0002 mg/l P. The resulting OP concentration following dosing is 0.0127 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Keenagh_020 river waterbody (IE_NW_40K010400) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0204 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- East Inishowen groundwater body (IEGBNI_NW_G_050) and estimated an increase in OP concentrations of up to 0.000001 mg/l P. The resulting OP concentration following dosing is 0.0066 mg/l P (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00175 mg/l P) and the GWB WFD 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 Inishowen West WTP for this groundwater body.

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

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

6.4 TRAWBREAGA BAY SPA 004034

Trawbreaga Bay SPA is a well-sheltered sea bay situated on the north-western coast of the Inishowen Peninsula, Co. Donegal. The site includes Glashedy Island which lies approximately 1 km offshore. The site is an SPA for the following species: Barnacle Goose, Light-bellied Brent Goose and Chough. The COs (NPWS, 2014) are to maintain the favourable conservation condition of the above listed bird species.

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 bird species in Trawbreaga Bay 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 Orthophosphate indicative water quality on:

- Ballycramsy_010 river waterbody (IE_NW_40B200980) and estimated an increase in OP concentrations of up to 0.0001 mg/l P. The resulting OP concentration following dosing is 0.0126 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Rashenny_010 river waterbody (IE_NW_40R020770) and estimated an increase in OP concentrations of up to 0.0008 mg/l P. The resulting OP concentration following dosing is 0.0133 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Donagh_030 river waterbody (IE_NW_40D010400) and estimated an increase in OP concentrations of up to 0.0036 mg/l P. The resulting OP concentration following dosing is 0.0111 mg/l P (Table 3; Appendix C). The RWB WFD OP indicative water quality is unchanged following dosing, i.e. High. The increase in orthophosphate following dosing exceeds the 5% significance threshold (<0.00125 mg/l P) but is within the 75% status threshold so there is no risk of significant deterioration in water quality for this RWB. The OP indicative water quality does not change, i.e. High status. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this river waterbody.

- Glennagannon_020 river waterbody (IE_NW_40G10200) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0083 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- Straid_010 river waterbody (IE_NW_40) and estimated an increase in OP concentrations of up to 0.0004 mg/l P. The resulting OP concentration following dosing is 0.0124 mg/l P (Table 3; Appendix C). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the RWB WFD 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 Inishowen West WTP for this river waterbody.

- East Inishowen groundwater body (IEGBNI_NW_G_050) and estimated an increase in OP concentrations of up to 0.000001 mg/l P. The resulting OP concentration following dosing is 0.0066 mg/l P (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00175 mg/l P) and the GWB WFD 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 Inishowen West WTP for this groundwater body.

- Carndonagh Gravels groundwater body (IE_NW_G_078) and estimated an increase in OP concentrations of up to 0.0009 mg/l P. The resulting OP concentration following dosing is unchanged remaining at 0.0059 mg/l P (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00175 mg/l P) and the GWB WFD 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 Inishowen West WTP for this groundwater body.

- Trawbreaga Bay coastal waterbody (IE_NW_240_0000) and estimated an increase in OP concentrations of up to 0.0014 mg/l P. The resulting OP concentration following dosing is 0.0139 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P) and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. *High* for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

- Northern Atlantic Seaboard (Has 40;02) coastal waterbody (IE_NW_230_0000) and estimated an increase in OP concentrations of up to 0.0003 mg/l P. The resulting OP concentration following dosing is 0.0028 mg/l P during both summer and winter (**Table 3; Appendix C**). The resulting concentration following dosing is below the significance threshold (<0.00125 mg/l P)

and the CWB WFD OP indicative water quality is unchanged following dosing, i.e. High for both summer and winter. Therefore, there is no risk of deterioration in WFD OP indicative water quality following OP dosing in Inishowen West WTP for this coastal waterbody.

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

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of these species in the Horn Head to Fanad Head SPA / no deterioration of its favourable conservation condition is identified.

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

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

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

Donegal County Council Development Plan was reviewed for developments that may have in-combination effects on European Sites with the ZoI. Plans relevant to the area were searched in order to identify any elements of the plans that may act cumulatively or in-combination with the proposed development.

Based on this search and the Project Teams knowledge of the study area a list of those projects and Plans which may potentially contribute to cumulative or in-combination effects with the proposed project was generated and listed in **Table 5** below.

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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
Donegal County Council Development Plan 2018 – 2024. The objectives of relevance in the Donegal County Development Plan include under Infrastructure (Water and Environmental Services): **WES-0-3:** Provision of adequate and secure supply of clean and wholesome drinking water to existing supply areas and to those areas identified for growth; Protection and improvement of existing water quality supply; protection and conservation of the County's water resources through minimisation of leakage and promotion of public awareness and involvement in water conservation; provision of adequate wastewater treatment for public collection systems and adequate capacity. **WES-0-5:** Maintain, protect, improve and enhance surface waters and groundwater quality in accordance with the relevant River Basin Management Plan. **WES-0-6** Provision of environmental protection of surface water and groundwater from pollution in accordance with the River Basin Management Plan, Groundwater Protection Scheme and Source Protection Plans for public water supplies; protection against soil contamination; ensuring full compliance with relevant National and European Regulations, Statutes and Directives through monitoring and control of relevant activities. **CCG-P-4:** Any developments, in the form of individual projects and plans will be subjected, during the early planning and application stages to assessments to investigate their impacts, either alone or in combination with other plans or projects on Natura 2000 sites. Specific and targeted mitigation measures will be proposed for individual projects and plans as they evolve and are brought through the planning process. This approach will ensure that the content, policies and objectives of the Donegal County Development Plan 2018 to 2024 adequately protects, conserves or restores the Natura 2000 network.	▪ N/A	The Donegal County Council Development Plan 2014 – 2020 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 North Western River Basin Management Plan (now replaced by the Draft National Plan 2018-2021[12]), and emphasises compliance with environmental objectives. There is no potential for cumulative effects with these plans.
River Basin Management Plan For Ireland 2018 – 2021 Public Consultation on the River Basin Management Plan (RBMP) for Ireland (2018 – 2021), began in February 2017. 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;	▪ N/A	The objectives of the RBMP are to: ▪ Prevent deterioration; ▪ Restore good status; ▪ Reduce chemical pollution; and ▪ Achieve water related protected areas objectives.

[12] DHPLG (2016) Public Consultation on the River Basin Management Plan for Ireland (2018-2021)

nevertheless, this figure does not reflect a significant number of improvements and dis-improvements across these waters since 2009. Provisional figures from the EPA suggest that approximately 900 river waterbodies and lakes have either improved or dis-improved. In addition, the previously observed long term trend of decline in the number of high status river sites has continued. 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 implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each waterbody. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of this plan will have a positive impact on biodiversity and the Project will not affect the achievement of the RBMP objectives.
Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC which is being carried out through a Catchment based Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Alterations to water quality and/or water movement; ▪ Disturbance; and ▪ In-combination impacts within the same scheme	CFRAM Studies and their product Flood Risk Management Plans, will each undergo appropriate assessment. Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of waterbodies. The establishment of how flooding may be contributing to deterioration in water quality in areas where other relevant pressures are absent is a significant consideration in terms of achieving the objectives of the WFD. The AA of the plans will need to consider the potential for impacts from hard engineering solutions and how they might affect hydrological connectivity and hydromorphological supporting conditions for protected habitats and species. There is no potential for cumulative effects with the CFRAMS programme as no infrastructure is proposed as part of this project.
Foodwise 2025 Foodwise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth Projection includes increasing	▪ Land use change or intensification; ▪ Water pollution;	Foodwise 2025 was subject to its own AA[13]. 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

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

the value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion.	▪ Nitrogen deposition; and ▪ Disturbance to habitats / species	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 2014 – 2020 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 2014-2020 of 50,000 farmers which have to engage in specific training and tasks in order to receive full payment. Farmers within the scheme must have a nutrient management plan which is a strategy for maximising the return from on and off-farm chemical and organic fertilizer resources. This has a direct positive contribution towards protecting waterbodies from pollution through limiting the amount of fertiliser that is placed on the land. The scheme prioritises farms in vulnerable catchments with 'high status' waterbodies and also focuses on educating farmers on best practices to try and improve efficiency along with environmental outcomes. 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	▪ Overgrazing; ▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; and ▪ Disturbance to habitats / species;	The RDP for 2014 – 2020 has been subject to SEA[14], and AA[15]. 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.

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

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

farmyard manures. Within the TAMS scheme are two further schemes; the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have the ability to contribute towards a reduction in point and diffuse source pollution through improved nutrient management.		
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[16]. 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 2014 - 2020 Ireland's forestry sector is striving to increase forestry cover and one of the recommended policy actions in the Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) is to increase the level of afforestation annually over time and support afforestation and mobilisation measures under the Forestry Programme 2014-2020. Two key objectives within the Forestry Programme 2014-2020 that will influence the RBMP are to increase Ireland's forest cover to 18% and to establish 10,000 ha of new forests and woodlands per annum. As part of this programme there are a number of schemes that promote sustainable forest management and they include the Afforestation Scheme, the Woodland Improvement Scheme, the Forest Road Scheme and the Native Woodland Conservation Scheme. Under the Native Woodland Conservation Scheme funding is provided to restore existing native woodland which promotes Ireland's native woodland resource and associated biodiversity. Native woodlands provide wider ecosystem functions and services which once restored can contribute to the protection and enhancement of water quality and aquatic habitats. New guidance and plans are also being developed to address forestry adjacent to waterbodies, Freshwater Pearl Mussel Plans for 8 priority catchments and a Hen Harrier Threat Response Plan (NPWS). The mitigation	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Water quality changes; and ▪ Disturbance to species.	Ireland's Forestry Programme 2014 – 2020 has undergone AA[17]. 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.

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

[17] https://www.agriculture.gov.ie/media/migration/forestry/publicconsultation/newforestryprogramme2014-2020/nis/ForestryProgrammeNaturaImpactStatement290914.pdf

measures within these plans will be particularly important in terms of protecting sensitive habitats and species from such forestry increases.		
Water Services Strategic Plan (WSSP, 2015) Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and WFD requirements. The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Irish Water's short, medium and long term objectives and identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Irish Water owned asset and this is a significant piece of the puzzle in terms of the expected improvements from the RBMP.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; and ▪ Nutrient enrichment /eutrophication.	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.
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 Irish Water facilities. In relation to the plan as it stands, no in-combination effects are expected with the implementation of proposed mitigation measures.
Lead Mitigation Plan (2016) Included in the WSSP (2015) is the strategy WS1e – Prepare and implement a "Lead in Drinking Water Mitigation Plan" to effectively address the risk of failure to comply with the drinking water quality standard for lead due to lead pipework. This strategy has been realised in the 2016 Lead Mitigation Plan.	▪ Changes to water quality or quantity; and ▪ Nutrient enrichment /eutrophication.	The plan is subject to SEA and AA which have also been published and are available at http://www.water.ie. Upstream dosing areas have been considered in the EAM and the cumulative effect of dosing has been taken into account in the EAMs model.

7. SCREENING CONCLUSION STATEMENT

This Screening for AA has considered the potential for significant effects on European Sites arising from the proposed OP dosing at Inishowen West WTP, within the Inishowen West and Carndonagh WSZs 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 **Magheradrumman Bog SAC (000168)**, **North Inishowen Coast SAC (002012)**, **Malin Head SPA (004146)** and **Trawbreaga Bay SPA (004034)** has been assessed. The appraisal undertaken in this Screening report has been informed by an EAM (see **Appendix C**) with reference to the ecological communities and habitats potentially affected by the proposed project, in order to provide a scientific basis for the evaluations. The Screening for AA has determined that there is not potential for significant direct, indirect or cumulative impacts which could affect the qualifying interests/special conservation interests of the European sites within the study area. It is therefore concluded, beyond reasonable scientific doubt, that the proposed project will not give rise to significant effects, either individually or in combination with other plans and projects, within the identified European Site(s).

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

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Appendix A

European Sites - Conservation Objectives

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Magheradrumman Bog SAC 000168

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

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Citation:

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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***

000168	Magheradrumman Bog SAC
4010	Northern Atlantic wet heaths with *Erica tetralix*
7130	Blanket bogs (* if active bog)

Supporting documents, relevant reports & publications

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 :	2005
Title :	National Parks and Wildlife Service Conservation Plan for 2005-2010. Magheradrumman Bog cSAC Site Code 000168 Co. Donegal
Author :	NPWS
Series :	Conservation Plan
Year :	2012
Title :	Ireland Red List No. 8: Bryophytes
Author :	Lockhart, N.; Hodgetts, N.; Holyoak, D.
Series :	Ireland Red List series, 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 :	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 :	Magheradrumman Bog SAC (site code: 168) Conservation objectives supporting document-blanket bogs and associated habitats V1
Author :	NPWS
Series :	Conservation objectives supporting document

4010 Northern Atlantic wet heaths with Erica tetralix

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Northern Atlantic wet heaths with *Erica tetralix* has not been mapped in detail for Magheradrumman Bog SAC but from current available data the total area of the qualifying habitat is estimated to be approximately 403ha, covering 40% of the SAC (NPWS internal files). Further details on this and the following attributes can be found in the Magheradrumman Bog SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat occurs in the south of the SAC on Tavash Hill, Puckan Hill and Croaghmore. Further information can be found within NPWS (2005) 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	The diversity of wet heath communities within this SAC is unknown. 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)
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)

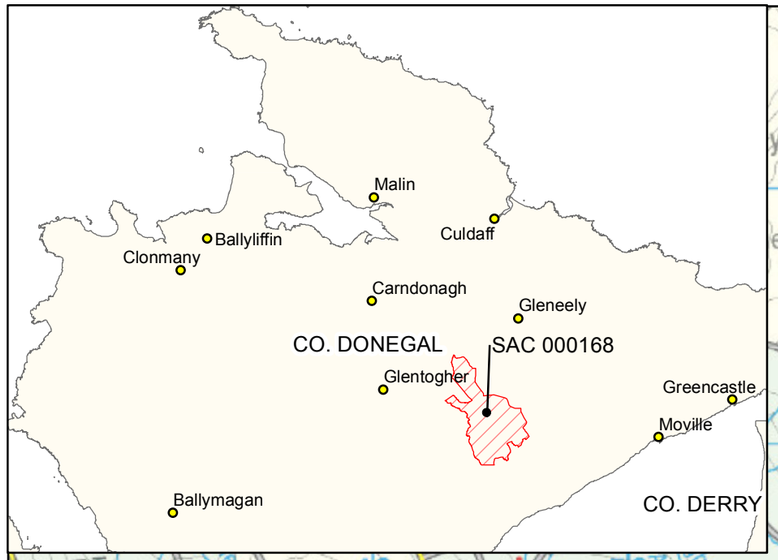
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken (*Pteridium aquilinum*) less than 10%	Attribute and target based on Perrin et al. (2014)
Vegetation composition: soft rush	Percentage cover in local vicinity of a representative 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), 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)
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)

7130 Blanket bogs (* if active bog)

To restore the favourable conservation condition of Blanket bogs (* if active bog) in Magheradrumman Bog SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Blanket bog has not been mapped in detail for Magheradrumman Bog SAC but from current available data the total area of the qualifying habitat is estimated to be approximately 559ha, covering 56% of the SAC. Further information can be found in NPWS (2005). Further details on this and the following attributes can be found in the Magheradrumman Bog SAC conservation objectives supporting document for blanket bogs and associated habitats
Habitat distribution	Occurrence	No decline, subject to natural processes	The habitat dominates the central and northern areas of the SAC. Further information can be found within Douglas et al. (1990), NPWS (2005) 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	Douglas et al. (1990) recorded a variety of blanket bog vegetation communities in this SAC, 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: 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)
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 and/or the red data lists (Lockhart et al., 2012; Wyse Jackson et al., 2016). The Near Threatened moss *Sphagnum teres* (Lockhart et al., 2012) is associated with regenerating cutover bog in the north of Magheradrumman Bog SAC (Douglas et al., 1990; NPWS, 2005)



Legend

Magheradrumman Bog SAC 000168

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

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

MAP 1:
MAGHERADRUMMAN BOG SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

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

SITE CODE:
SAC 000168; version 1. Co. Donegal

0 0.4 0.8 1.2 1.6 km

N

Map Version 1
Date: Feb 2017

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National Parks and Wildlife Service

Conservation Objectives Series

North Inishowen Coast SAC 002012

An Roinn
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Introduction

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

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

Qualifying Interests

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

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

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

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

NPWS Documents

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

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

Other References

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

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

Spatial data sources

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

1140 Mudflats and sandflats not covered by seawater at low tide

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated using OSi data as 988ha
Community extent	Hectares	Maintain the extent of the *Zostera*-dominated community, subject to natural processes. See map 4	Based on an intertidal walkover undertaken in 2013. See marine supporting document for further details
Community structure: *Zostera* density	Shoots/m²	Conserve the high quality of the *Zostera*-dominated community, subject to natural processes	Based on an intertidal walkover undertaken in 2013. See marine supporting document for further details
Community distribution	Hectares	Conserve the following community types in a natural condition: Fine to medium sand with *Eurydice pulchra* community complex; Muddy sand to coarse sediment with *Pygospio elegans* community complex; Sand with *Angulus tenuis* and *Scoloplos* (*Scoloplos*) *armiger* community complex. See map 4	Based on intertidal surveys undertaken in 2007 (ASU, 2007), 2009 and 2010 (RPS, 2013). See marine supporting document for further details

1220 Perennial vegetation of stony banks

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Culdaff - 0.02ha; Doagh Isle - 1.21ha; Lag - 0.09ha; Lenankeel - 0.01ha; White Strand - 1.33ha. See map 6	Entire area within the SAC is unknown. 18 sub-sites (Tramone Bay; Slievebane; Bulbin; Portmore; Bulbinbeg; Esky Bay; Pebble Strand; Ineuran Bay; Whitestrand Bay; Whitestrand Bay - Culoort; Back Strand; Doaghmore Point; Lagacurry, Doagh Strand, Bincree, Binderg; Pollan Bay; Tullagh Bay and Tullan Point; Rockstown Harbour; Dunaff Bay; Lehan Bay) were surveyed during the National Shingle Beach Survey (NSBS) (Moore and Wilson, 1999) but extent is not recorded. The habitat was also recorded and mapped by the Coastal Monitoring Project (CMP) at Culdaff; Doagh Isle; Lag; Lenankeel and White Strand sub-sites, covering a total area of 3.46ha (Ryle et al., 2009). See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for surveyed locations	Complete distribution currently unknown. The best shingle formations in the county are found on the Inishowen Peninsula and on Doagh Isle (Moore and Wilson, 1999). See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Moore and Wilson (1999). Shingle features are relatively stable in the long term. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Moore and Wilson (1999). Transitions from shingle to intertidal shingle, rocky shore, shingle-based grassland, cliff, sand dunes and machair occur in this SAC. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities with typical species: sea sandwort (*Honckenya peploides*), sea beet (*Beta vulgaris* ssp *maritima*), rock samphire (Crithmum maritimum), sea mayweed (*Tripleurospermum maritimum*), yellow-horned poppy (*Glaucium flavum*) and sea campion (*Silene uniflora*)	Based on data from Moore and Wilson (1999). Lichens were recorded at White Strand Bay-Culoort, Doaghmore Point, Tullagh Bay and Tullagh Point and Rockstown Harbour and are an indication of stabilisation. All sub-sites containing the habitat were rated of high interest except Doaghmore Point which was rated medium interest owing to damage caused by extraction. The rare and protected oysterplant (*Mertensia maritima*) was recorded at two sub-sites: White Strand Bay-Culoort and Tullagh Bay and Tullagh Point. See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Moore and Wilson (1999). Negative indicators include non-native species indicative of changes in nutrient status and species not considered characteristic of the habitat. Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. The negative indicator species, ragwort (*Senecio jacobaea*) and montbretia (*Crocosmia x crocosmiiflora*) were recorded in vegetated shingle at White Strand by Ryle et al. (2009) See coastal habitats supporting document for further details

1230 Vegetated sea cliffs of the Atlantic and Baltic coasts

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

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

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

2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)

To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation ('grey dunes') in North Inishowen Coast SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area increasing, subject to natural processes including erosion and succession. For sub-sites mapped: Crummies Bay - 11.92ha; Culdaff - 17.03ha; Doagh Isle - 324.53ha; Lag - 103.17ha; Lenankeel - 6.27ha; Tullagh - 30.81ha; White Strand - 2.33ha. See map 6	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney et al., 2013). Habitat was mapped at seven sub-sites, giving a total estimated area of 496.06ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes. See map 6 for known distribution	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Fixed dunes were recorded at all of the seven sub-sites. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. At Lenankeel, rock armour affects the natural build up of the sand dune system. Extraction was noted from Tullagh and Doagh Isle sub-sites. Coastal protection works at Lag will cause a disruption to the natural functioning of the system over the longterm. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: sward height	Centimetres	Maintain structural variation within sward	Based on data from Ryle et al. (2009) and Delaney et al. (2013). At Crummies Bay, the absence of grazers has produced a rank sward with low species diversity. At Tullagh, heavy grazing and poaching occur. Undergrazing is a feature of Culdaff. Both undergrazing and over grazing occur at Doagh Isle. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Delaney et al. (2013)	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). The seven sub-sites support a characteristic dune flora. See coastal habitats supporting document for further details

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

21A0 Machairs (* in Ireland)

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

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes including erosion and succession. For sub-sites mapped: Doagh Isle - 90.11ha; Lenankeel - 12.15ha; Tullagh - 15.42ha, White Strand - 0.25ha. See map 6	Based on data from the Coastal Monitoring Project (CMP) (Ryle et al., 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney et al., 2013). Four sub-sites (Doagh Isle, Lenankeel, Tullagh and White Strand) were mapped, giving a total estimated area of 117.96ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 6 for known distribution	The largest machair site is at Doagh Isle. See coastal habitats supporting document for further details
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Physical barriers can lead to fossilisation or over-stabilisation of dunes, as well as beach starvation resulting in increased rates of erosion. At Lenankeel, rock armour affects the natural build up of the sand system. Extraction was noted from Tullagh and Doagh Isle sub-sites. See coastal habitats supporting document for further details
Physical structure: hydrological and flooding regime	Water table levels; groundwater fluctuations (metres)	Maintain natural hydrological regime	Based on data from Ryle et al. (2009), Delaney et al. (2013), Crawford et al. (1996) and Gaynor (2006). See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of machair habitat, subject to natural processes	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details
Vegetation structure: sward height	Centimeters	Maintain structural variation within sward	Based on data from Ryle et al. (2009) and Delaney et al. (2013). At Tullagh, heavy grazing and poaching occur. Both undergrazing and overgrazing occur at Doagh Isle. See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Delaney et al. (2013)	Based on data from Gaynor (2008), Ryle et al. (2009) and Delaney et al. (2013). The four sub-sites support a characteristic machair flora. See coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	Based on data from Ryle et al. (2009) and Delaney et al. (2013). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. See coastal habitats supporting document for further details
Vegetation composition: bryophytes	Percentage cover	Should always be at least an occasional component of the vegetation	Based on data from Ryle et al. (2009) and Delaney et al. (2013). See coastal habitats supporting document for further details

4030 European dry heaths

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

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

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

1014 Narrow-mouthed Whorl Snail *Vertigo angustior*

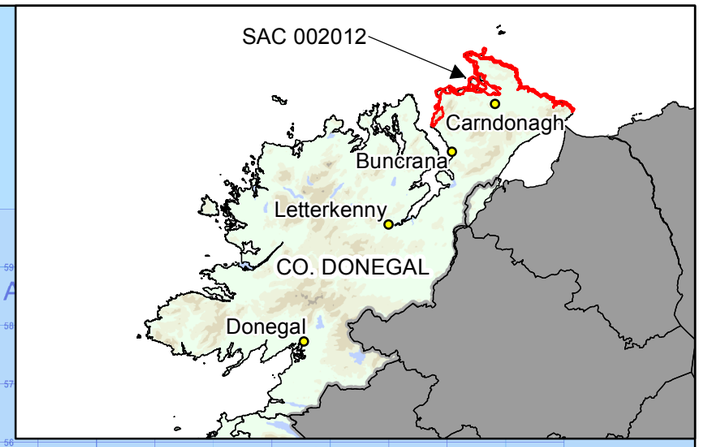
To maintain the favourable conservation condition of Narrow-mouthed Whorl Snail in North Inishowen Coast SAC, which is defined by the following list of attributes and targets:

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

1355 Otter *Lutra lutra*

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

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



ATLANTIC OCEA
An tAigéan Atlantach

Malin Head
Cionn Mhálanna

OAGH ISLAND
Oileán na Bumbeha

Trawbreaga Bay
Trá Bhréige

Glengad Head
Cionn Ghleann Gad

Dunaff Head
Cionn Dhún Dathaí

Ballyliffin
Baile Lifín

Clonmany
Cluain Maine

Carndonagh
Carn Domhnach

Culdaff
Cora Dabhcha

Dunree Head
Cionn an Dúin Riabhaigh

Slieve Snaght
Sliabh Sneachta

Slieve Main

Greencastle
An Caisleán Nua

Moville
Bun an Phobail

Legend

North Inishowen Coast SAC 002012

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Department of Arts, Heritage and the Gaeltacht

MAP 1:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
SAC DESIGNATION

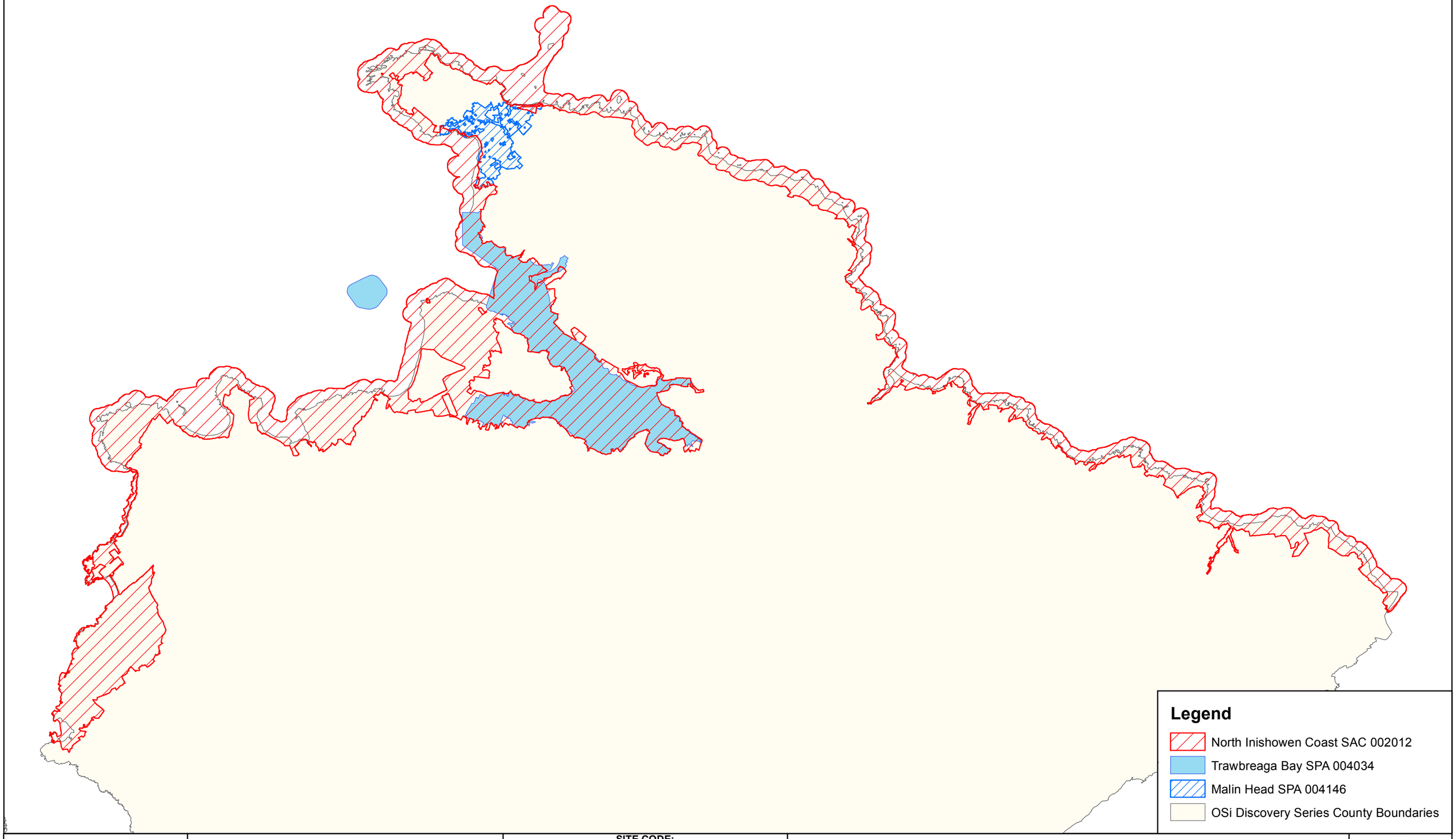
Map to be read in conjunction with the NPWS Conservation Objectives Document.

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

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014



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Department of Arts, Heritage and the Gaeltacht

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

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

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

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

Legend

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

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

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

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

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

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

Legend

North Inishowen Coast SAC 002012

OSi Discovery Series County Boundaries

Marine Community Types

Fine to medium sand with *Eurydice pulchra* community complex

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

Reef community complex

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

Zostera-dominated community

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

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

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

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

Altnadarrow
Site Id: 03002

Glengad
Site Id: 03042

Binbane
Site Id: 03003

Stookanillar and
Five Fingers
Site Id: 03004

Carrickabraghy
Site Id: 03005

Binnion
Site Id: 03006

Tirmacroragh
Site Id: 03041

Mossy Glen
Site Id: 03001

Dunaff
Site Id: 03007

Lenan
Site Id:03008

Lederg
Site Id: 03009

Dunree

Legend

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

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Department of Arts, Heritage and the Gaeltacht

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

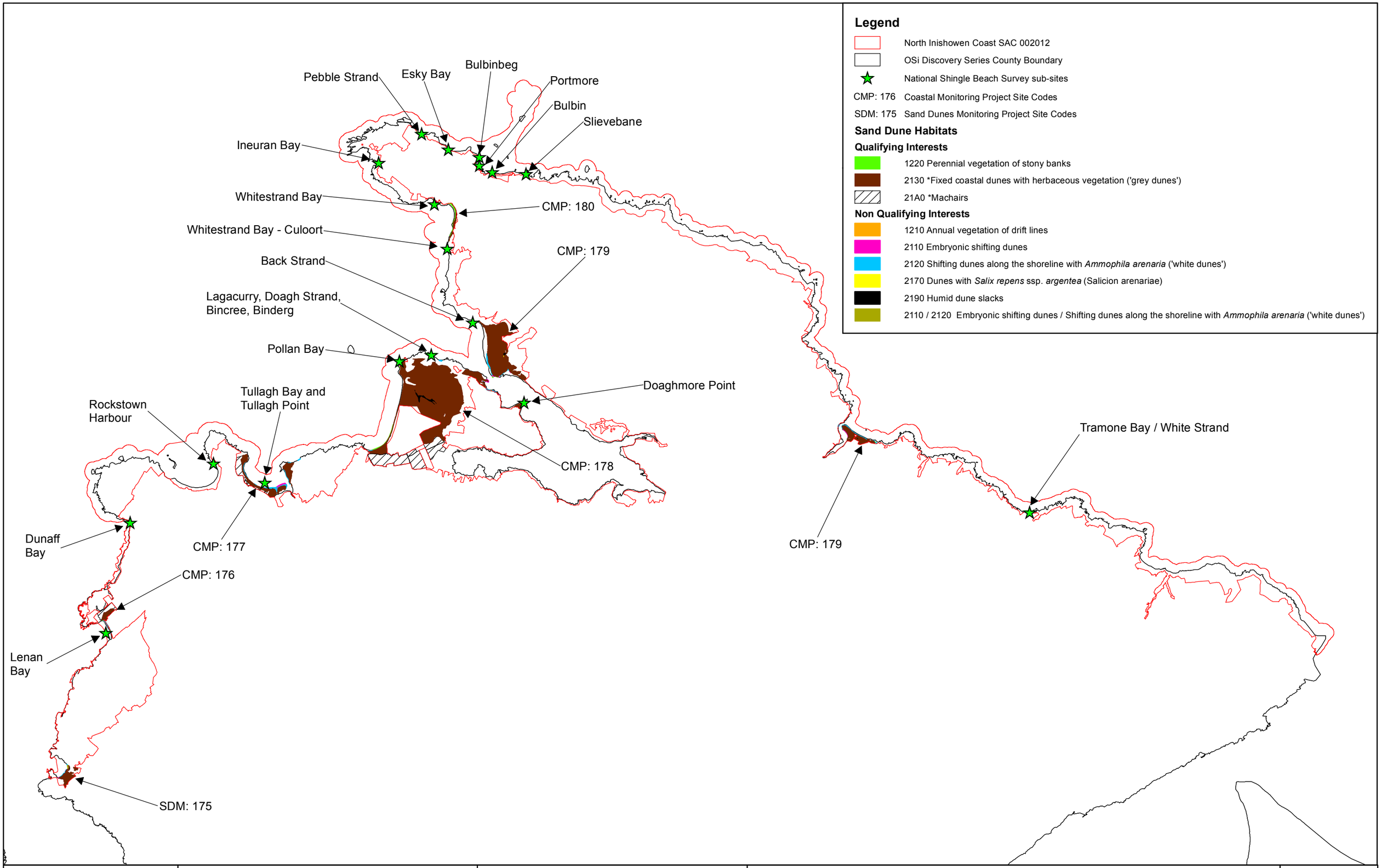
Map to be read in conjunction with the NPWS Conservation Objectives Document.

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

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014



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

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

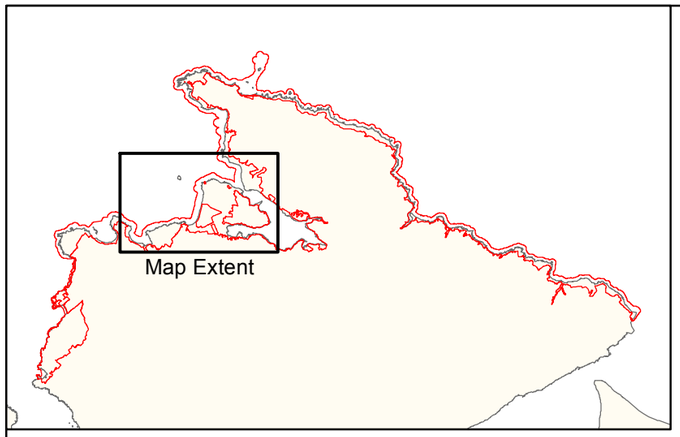
Map to be read in conjunction with the NPWS Conservation Objectives Document.

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

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014



C4253

C4252

C3548

Legend

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

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Department of
Arts, Heritage and the Gaeltacht

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

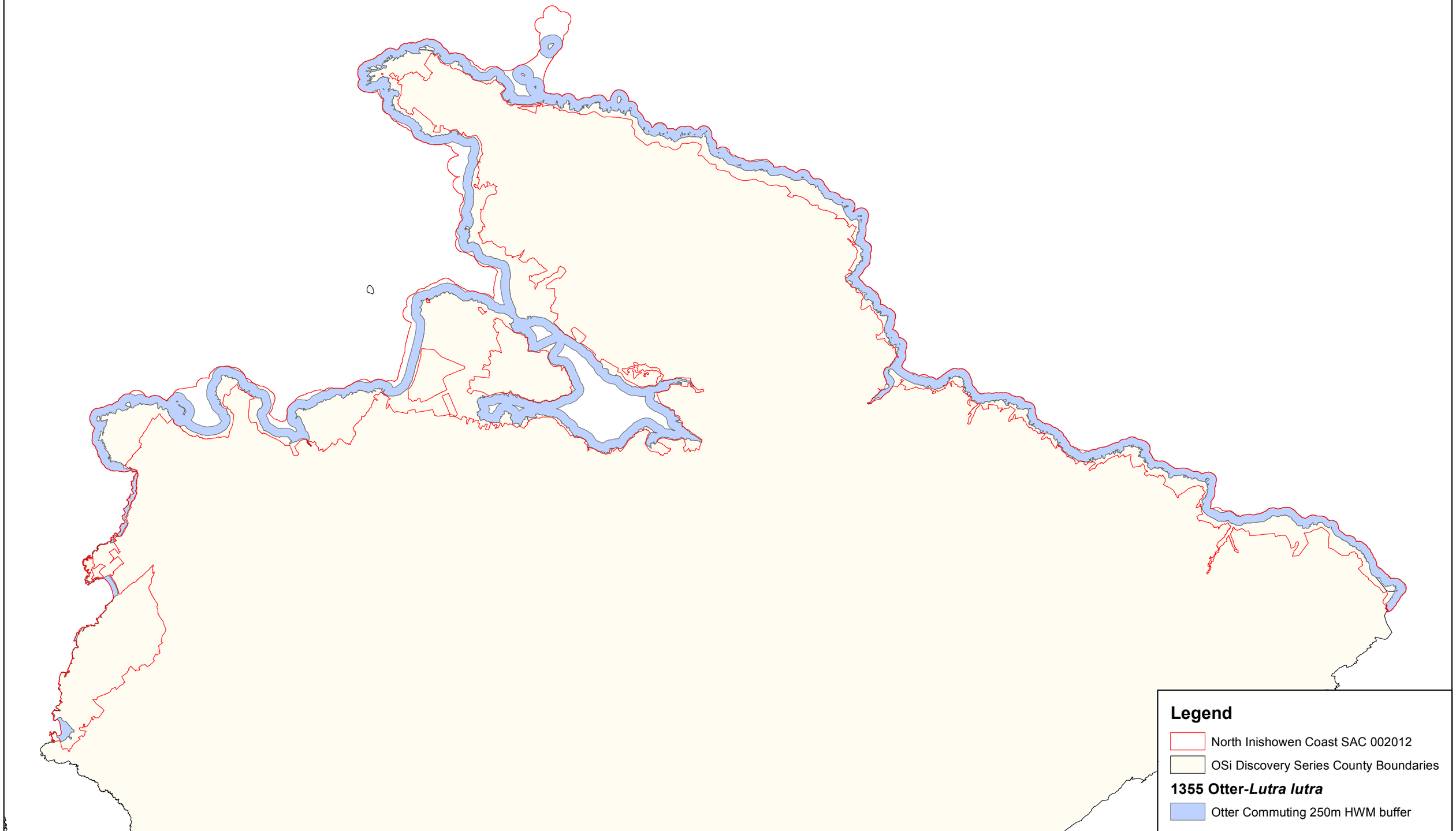
Map to be read in conjunction with the NPWS Conservation Objectives Document.

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

0 0.2 0.4 0.6 0.8 1 km

N

Map Version 1
Date: Nov 2014



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Department of Arts, Heritage and the Gaeltacht

MAP 8:
NORTH INISHOWEN COAST SAC
CONSERVATION OBJECTIVES
OTTER COMMUTING

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

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

0 1 2 3 4 5 km

N

Map Version 1
Date: Nov 2014

ISSN 2009-4086

National Parks and Wildlife Service

Conservation Objectives Series

Trawbreaga Bay SPA 004034

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta

Department of
Arts, Heritage and the Gaeltacht

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

7 Ely Place, Dublin 2, Ireland.

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

Citation:

NPWS (201п) Conservation Objectives: Trawbreaga Bay SPA 004034. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Series Editor: Rebecca Jeffrey
ISSN 2009-4086

Introduction

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

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

Notes/Guidelines:

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

Qualifying Interests

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

004034	Trawbreaga Bay SPA
A045	Barnacle Goose *Branta leucopsis*
A046	Brent Goose *Branta bernicla hrota*
A346	Chough *Pyrrhocorax pyrrhocorax*
A999	Wetlands

Please note that this SPA overlaps with North Inishowen Coast SAC (002012). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping site as appropriate.

Supporting documents, relevant reports & publications

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

NPWS Documents

Year :	2006
Title :	The status and ecology of the chough *Pyrrhocorax pyrrhocorax* in the Republic of Ireland, 2002 -2005
Author :	Trewby, M.; Gray, N.; Cummins, S.; Thomas, G.; Newton, S.
Series :	Final report to NPWS
Year :	2014
Title :	Trawbreaga Bay SPA (site code: 4034) Conservation objectives supporting document V1
Author :	NPWS
Series :	Conservation objectives supporting document

Other References

Year :	2006
Title :	The status and distribution of choughs *P. pyrrhocorax* in Co. Donegal: September 2004 to August 2005
Author :	Gray, N.; Trewby, M.; Cummins, S.; Thomas, G.; Newton, S.
Series :	BirdWatch Ireland Conservation Report No. 06/1

Spatial data sources

Year :	2014
Title :	NPWS SPA boundary data
GIS Operations :	SPA boundary polygons divided into two classifications (wetlands, primary chough habitat) based on lines identified by expert judgement. Expert opinion used as necessary to resolve any issues arising
Used For :	Wetlands and chough habitat (map 3)

A045 Barnacle Goose *Branta leucopsis*

To maintain the favourable conservation condition of Barnacle Goose in Trawbreaga Bay SPA, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by barnacle goose other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document
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

A046 Brent Goose *Branta bernicla hrota*

To maintain the favourable conservation condition of Light-bellied Brent Goose in Trawbreaga Bay 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 and intensity of use of areas by light-bellied brent goose, other than that occurring from natural patterns of variation	As determined by regular low tide and other waterbird surveys. Waterbird distribution from the 2009/2010 waterbird survey programme is discussed in part five of the conservation objectives supporting document

A346 Chough *Pyrrhocorax pyrrhocorax*

To maintain the favourable conservation condition of Chough in Trawbreaga Bay SPA, which is defined by the following list of attributes and targets:

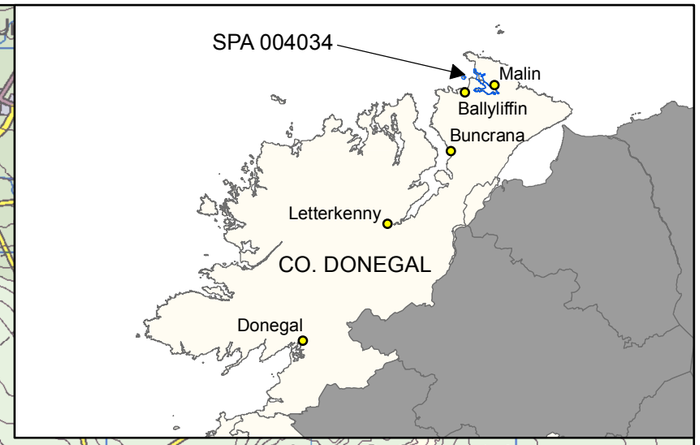
Attribute	Measure	Target	Notes
Population trend	Percentage change	Long term population trend stable or increasing	This SPA contains coastal habitats used by chough. Nest sites have been recorded in the past at the northern end of the site. However, the main importance of this SPA to chough conservation is that it contains an important foraging resource centred on the dune system at Lag (see map 3) and parts of the coastal slope that support coastal heath and maritime grassland. These areas are used by recently fledged young and others particularly during the autumn period. Furthermore, the coastal cliffs contain a regularly-used communal roost site. For further information see the NPWS site synopsis (site code: 004034); Trewby et al. (2006); Gray et al. (2006)
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing and intensity of use of areas by chough, other than that occurring from natural patterns of variation	See note above

Conservation Objectives for : Trawbreaga Bay SPA [004034]

A999 Wetlands

To maintain the favourable conservation condition of the wetland habitat in Trawbreaga Bay SPA as a resource for the regularly-occurring migratory 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 1,317 hectares, other than that occurring from natural patterns of variation. See map 3	The wetland habitat area was estimated as 1,317ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document



Legend

Trawbreaga Bay SPA 004034

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

MAP 1:
TRAWBREAGA BAY SPA
CONSERVATION OBJECTIVES
SPA DESIGNATION

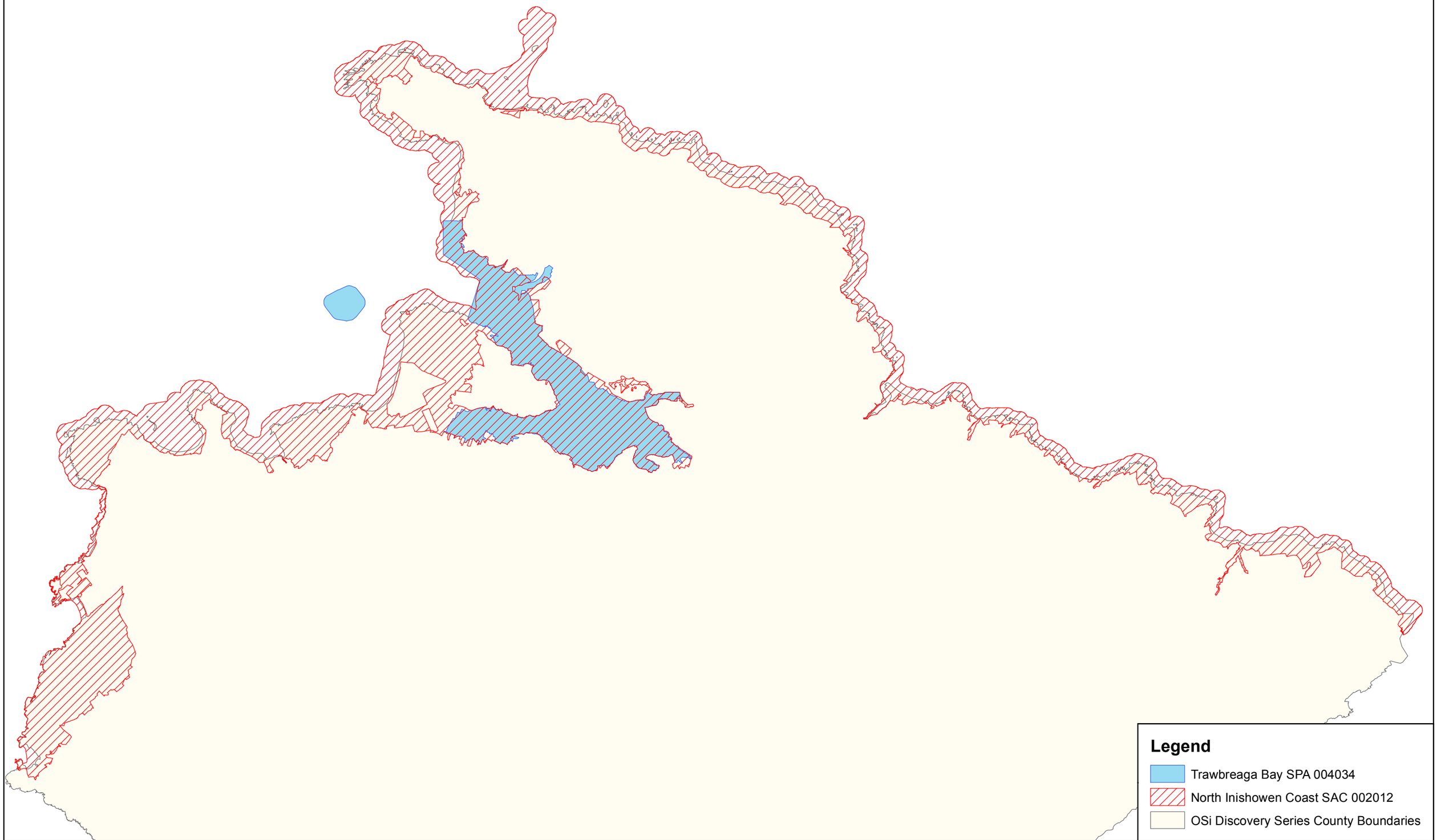
Map to be read in conjunction with the NPWS Conservation Objectives Document.

SITE CODE:
SPA 004034; version 1.05. CO. DONEGAL

0 0.5 1 1.5 2 km

N

Map Version 1
Date: April 2014



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

MAP 2:
TRAWBREAGA BAY SPA
CONSERVATION OBJECTIVES
ADJOINING & OVERLAPPING DESIGNATIONS

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

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

0 1 2 3 4 5 km

N

Map Version 1
Date: April 2014

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

MAP 3:
TRAWBREAGA BAY SPA
CONSERVATION OBJECTIVES
WETLANDS AND CHOUGH HABITAT

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

SITE CODE:
SPA 004034; version 1.05. CO. DONEGAL

0 0.5 1 1.5 2 km

N

Map Version 1
Date: April 2014

Conservation objectives for Malin Head SPA [004146]

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
A122	Corncrake	*Crex crex*

Citation: *NPWS (2020) Conservation objectives for Malin Head SPA [004146]. Generic Version 7.0. Department of Culture, Heritage and the Gaeltacht.*

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 091 Inishowen West and Carndonagh WSZs

Irish Water

Lead in Drinking Water Mitigation Plan - EAM

Inishowen West EAM

Issue 4 | 19 January 2022

Job number 257367

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50 Ringsend Road
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RYAN HANLEY
ARUP

Document Verification

ARUP
RYAN HANLEY

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Document title		Inishowen West EAM			**File reference**
Document ref					
Revision	**Date**	**Filename**	091. Inishowen West		
Draft 1	07 Jan 2018	**Description**	First Draft		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Gerry Baker	Gerry Baker
		Signature			
Draft 2	28 Jan 2020	**Filename**			
		Description	Dosing concentration typo updated & Redglobe RWB added		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Gerry Baker	Gerry Baker
		Signature			
Issue	17 Jun 2020	**Filename**	091. Inishowen West I01.docx		
		Description	Nick Morley Comments		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Gerry Baker	Gerry Baker
		Signature			
Issue 2	29 Jul 2020	**Filename**	091. Inishowen West I02.docx		
		Description	Format Update		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Gerry Baker	Gerry Baker
		Signature			Gerry Baker
				Issue Document Verification with Document	✓

Document Verification

Job title		Lead in Drinking Water Mitigation Plan - EAM			**Job number** 257367
Document title		Inishowen West EAM			**File reference**
Document ref					
Revision	**Date**	**Filename**	091. Inishowen West I02.docx		
Issue 3	13 Jan 2022	**Description**	Eden unverified data assessment		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Alison Orr	Gerry Baker
		Signature			Gerry Baker
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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 Inishowen West (including Cardonagh and Gleneely) Water Supply with orthophosphate.

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

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

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

- Results of the Plumbosolvency reports by Ryan Hanley.
- Results of pre-processing GIS work to generate regional input files.
- Data relating to Waste Water Treatment Plants (WWTP) from Annual Environmental Reports (AER) and the Environmental Protection agency (EPA) web-based WFD App which is accessed through their Eden Portal.
- Data relating to water body monitoring and characterisation from the EPA WFD App, downloaded on the 16th December 2022.
- 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 - Geographic Information Systems
- GWB- Ground Water Body
- IW – Irish Water
- LWB – Lake Water Body
- OP- Orthophosphate (measured as PO_4-P)
- PE- Population Equivalent or unit per capita loading in waste-water treatment. PE can be considered the estimated number of people required to produce a measured load (eg. of organic matter, water or P) at the WWTP
- RWB – River Water Body
- SAAR - Standard-period Average Annual Rainfall method. The 30%ile flow for the river catchment is calculated using the catchment area and the SAAR value at the catchment outlet point. The area of the total river catchment is calculated using the Water Framework Directive App defined river subbasin GIS layer. The SAAR value is from the OPW FSU portal.
- SWO- Storm Water Overflow
- TP- Total Phosphorus
- TraC – Transitional and Coastal
- WFD- Water Framework Directive
- WSZ - Water Supply Zone
- WWTP – Waste Water Treatment Plant

3 Inishowen West Water Supply Scheme (0600PUB1005)

Inishowen West (RWSS) (0600PUB1005) is located in County Donegal. The Illies and Carndonagh WTPs currently supply the Inishowen West and Inishowen West mixed including Cardonagh and Gleneely WSZ in Donegal.

The Plumbosolvency Control Plan for the Water Supply Zones (WSZs) serviced by these plants proposes that targeted dosing of orthophosphate takes place at the outlet from Illies WTP. Figure 1, at the end of this report, shows the location of the areas proposed to receive orthophosphate dosed water.

The average flows to Inishowen West and Inishowen West Mixed is 2,000m^3/day and 2,300m^3/day respectively. Approximately 58% of the flow is accounted for, and this fixed rate for water mains leakage (42%) is assumed in all the WSZs. The WSZ boundaries cover a large rural area. There are an estimated 3,738 properties across the WSZs that are serviced by Domestic Wastewater Treatment Systems (DWWTS).

Water Supply Zone	Inishowen West (0600PUB1005)
Step 1 – Appropriate Assessment Screening	*To be completed by Ryan Hanley*
Model Assumptions	Concentration and loading units for orthophosphate (as PO_4-P) are mg/l and kg/yr. Adopted orthophosphate optimum dosing concentration is 1.2 mg/l. Unaccounted for water from the mains is 42%. 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 (TP) to Orthophosphate (OP) for WWTP effluent is 0.5. It is assumed there will be no treatment of additional orthophosphate load for WWTPs with secondary, primary or no treatment. For plants with tertiary treatment it is assumed all the additional load will be treated. Where a tertiary plant is in exceedance of its ELV for total phosphate or orthophosphate 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.

Water Supply Zone	Inishowen West (0600PUB1005)
	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 Concentrations and receiving WBs	This section assesses the influent and effluent P loads and resultant orthophosphate dosages at WWTP within the WSZ before and after dosing. Inputs to and results of the Step 2 assessment for individual WWTP are given in Table 1. Where an agglomeration includes SWOs, discharges from this source are included. Emission Limit Value (ELVs) are assigned for WWTPs to protect the receiving River Waterbodies (RWB) from direct discharges during low flows. Where ELVs are in force these are shown in Table 1. WWTPs that are failing to comply with their ELVs are also indicated. The treatment level and PE of the WWTPs within the agglomerations are as follows; - Ballyliffen – Secondary treatment PE 766 - Carndonagh Malin – Secondary treatment PE 5,200 - Clonmany – Secondary treatment PE 443 - Gleneely – Secondary treatment PE 400 - Glengad – Secondary treatment PE 60 - Malin – Secondary treatment PE 63 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 1,806 m^3/d (791 kg/yr). Approximately 636 kg/yr of the load is attenuated along the flowpaths. The hydraulic loading from the DWWTS 1,060 m^3/d (464 kg/yr). Approximately 459kg/yr of the load is attenuated along the flowpaths. Flow monitoring gauges are not available for any waterbodies within the assessment area. The river flows for ungauged waterbodies are established from Hydrotool data or, if that is not available, using the using the Area-Standard-period Average Annual Rainfall (SAAR) method. Baseline orthophosphate monitoring data and associated thresholds are available for 15 of the 22 RWBs in the assessment areas. There is no monitoring data for the following RWBs; Ballycramsy_010, Ballygorman_010, Clonmany_030, Donagh_020, Keenagh_010, Lenan_010, Rashenny_010 and Redford Glebe_010.

Water Supply Zone	Inishowen West (0600PUB1005)
	The most recent monitoring data for Ardagh_010 is considered to have numerous erroneously recorded laboratory limits of detection, higher than for all other monitoring points. The data has therefore been used to inform the surrogate status however the baseline concentration adopted in the assessment is the mid-point of the range as opposed to being directly calculated from the data until the data can be verified. The Inishowen West dosing area extends into Redford_Glebe_010 RWB however there are no DWWTS or watermains within or upstream of the area, thus the catchment does not receive any orthophosphate dosed water. Orthophosphate drinking water dosing does not lead to a deterioration in RWB status from subsurface and near 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 drinking water dosing areas on RWBs. The increase in orthophosphate concentrations in the RWBs as a result of the P drinking water dosing is shown in Table 2. Figure 2 illustrates the scale of orthophosphate loading to the receiving waterbodies from mains leakage, DWWTS and direct discharges from WWTP and SWOs and upstream dosing areas. This illustrates that a significant proportion of the loads, within this EAM, come from primary discharges from WWTP and mains seepage through the near surface pathway. Figure 3 presents the total loading to the drinking water dosing area from the main sources and illustrates how much of the loading is attenuated in the subsurface, treated in WWTPs and ultimately how much is transported to the receiving RWBs. This illustrated that the mains leakage, DWWTS and loading from upstream dosing areas account for the largest proportion of load and a large proportion of the mains leakage and DWWTS are attenuated. Direct discharges from WWTPs are combined with diffuse discharges at the following receiving waterbodies and tracked downstream from that point: - Ballyliffen WWTP – Ardagh_010 - Carndonagh Malin WWTP – Donagh_030 - Clonmany WWTP – Clonmany_020 - Gleneely WWTP – Culduff_010 - Glenad WWTP – Portaleen_010 - Malin WWTP – Keenagh_020 The remainder receive diffuse discharge only.

Water Supply Zone	Inishowen West (0600PUB1005)
	The increase in concentration as a result of the drinking water dosing with orthophosphate does not cause a deterioration in the status of any RWB.
Step 5 and 6 - Combined Impact through subsurface and surface pathways on Groundwater Waterbodies (GWB)	The increase in orthophosphate concentrations in the Groundwater Waterbodies (GWBs) as a result of the P drinking water dosing is shown in Table 3. Monitoring data is available for two of the three groundwater bodies within the assessment area. There is no monitoring data available for Lough Swilly GWB. The increase in concentration as a result of the drinking water dosing with orthophosphate does not cause a deterioration in the status of any GWB.
Step 5 and 6 - Combined Impact from direct and diffuse sources on Lakes within the Water Supply Zone	The Fad Meendoran lake water body is within the Clonmany_010 river water body however it is located upstream of the dosing area and does not receive orthophosphate dosed water.
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 Coastal (TraC) Waterbodies as a result of drinking water dosing is shown in Table 4. Baseline orthophosphate monitoring data and associated thresholds are available for Lough Swilly , Northern Athlantic Seaboard (HAs 40;02) and Northwestern Athlantic Seaboard (HAs 37;38) but not for Trawbrega Bay. A surrogate status is assigned for Trawbreaga Bay based on inflowing river waterbody. The drinking water dosing with orthophosphate does not deteriorate the status of either transitional waterbodies 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 EAMs. The assessment is carried out on a catchment scale. **Donagh-Moville, Lough Swilly and Foyle** The following EAM dosing areas are within the Donagh- Moville, Lough Swilly and Foyle catchment and discharge to the same TraC as the Inishowen West EAM, see Figure 4. 022. Letterkenny 029. Illies 093. Inishowen East 103. Milford 136. Glenties 163. Buncrana 249. Greencastle 261. Tullyconnel

Water Supply Zone	Inishowen West (0600PUB1005)
	The increase in orthophosphate concentration in the downstream TraC WBs as a result of the drinking water dosing of all nine EAMs with orthophosphate is shown in Table 5. Step 5 and 6 Cumulative Assessment of impact from EAMs on downstream Protected Waterbodies There are no additional downstream Special Areas of Conservation (SAC) which have not already been assessed in the EAM.
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 mitigation measures are 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 (2017) Compliance	Primary Discharge Receiving WB		Annual average TP Load kg/yr	OP Concentration mg/l TP – OP Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Ballyliffen Primary Discharge	Secondary		Ardagh_010	Pre-Dosing	261	1.10	0.88	1.50
				Post Dosing	299	1.26	1.01	1.72
Ballyliffen SWO (1 No.)				Pre-Dosing	16	0.34	0.27	0.46
				Post Dosing	17	0.36	0.29	0.49
Carndonagh Malin Primary Discharge	Secondary	Total P – 2.0 mg/l Compliant	Donagh_030	Pre-Dosing	1,773	1.28	1.02	1.74
				Post Dosing	1,883	1.36	1.09	1.85
Carndonagh Malin SWO (1 No.)				Pre-Dosing	111	0.39	0.31	0.53
				Post Dosing	114	0.40	0.32	0.55
Clonmany Primary Discharge	Secondary	Ortho-P -1.5mg/l effective 2020	Clonmany_020	Pre-Dosing	151	1.36	1.09	1.85
				Post Dosing	174	1.57	1.26	2.13
Clonmany SWO (1. No)				Pre-Dosing	9	0.42	0.33	0.57
				Post Dosing	10	0.45	0.36	0.61
Gleneely Primary Discharge	Secondary		Culduff_010	Pre-Dosing	136	3.74	2.99	5.08
				Post Dosing	145	3.96	3.17	5.39
Glengad	Secondary		Portaleen_010	Pre-Dosing	20	3.74	2.99	5.08
				Post Dosing	22	3.96	3.17	5.39
Malin Head	Secondary		Keenagh_020	Pre-Dosing	21	3.74	2.99	5.08
				Post Dosing	23	3.96	3.17	5.39

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)**	**75% of status threshold (mg/l)**	**Cumulative load (kg/yr)**	**Modelled dosing conc. (mg/l)**	**Potential conc. following dosing (mg/l)**
Ardagh_010	IE_NW_40A090780	*High*	0.0125*	0.0188	47.7	0.0056	0.0181
Ballyboe_010	IE_NW_40B030400	High	0.0089	0.0188	0.7	0.0001	0.0090
Ballycramsy_010	IE_NW_40B200980	*High*	0.0125	0.0188	1.2	0.0001	0.0126
Ballygorman_010	IE_NW_40B210940	*High*	0.0125	0.0188	2.1	0.0002	0.0127
Ballyhallan_010	IE_NW_40B010200	High	0.0111	0.0188	1.3	0.0001	0.0112
Clonmany_010	IE_NW_40C010100	High	0.0078	0.0188	11.8	0.0009	0.0087
Clonmany_020	IE_NW_40C010200	High	0.0117	0.0188	71.3	0.0014	0.0131
Clonmany_030	IE_NW_40C010300	*High*	0.0125	0.0188	79.1	0.0014	0.0139
Cloontagh_010	IE_NW_40C040400	High	0.0083	0.0188	14.6	0.0009	0.0092
Culdaff_010	IE_NW_40C020100	High	0.0050	0.0188	16.7	0.0003	0.0053
Culdaff_020	IE_NW_40C020150	High	0.0059	0.0188	17.2	0.0003	0.0062
Donagh_010	IE_NW_40D010040	High	0.0182	0.0188	1.8	0.0001	0.0183
Donagh_020	IE_NW_40D010100	*High*	0.0125	0.0188	9.3	0.0003	0.0128
Donagh_030	IE_NW_40D010400	High	0.0075	0.0188	134.5	0.0036	0.0111
Glennagannon_020	IE_NW_40G010200	High	0.0080	0.0188	10.8	0.0004	0.0083
Keenagh_010	IE_NW_40K010200	*High*	0.0125	0.0188	4.3	0.0003	0.0128
Keenagh_020	IE_NW_40K010400	High	0.0200	0.0188	10.5	0.0004	0.0204**
Lenan_010	IE_NW_39L120930	*High*	0.0125	0.0188	4.3	0.0003	0.0128
Malin Stream_010	IE_NW_40M010200	Good	0.0311	0.0325	8.0	0.0009	0.0320
Portaleen_010	IE_NW_40P020200	High	0.0090	0.0188	3.6	0.0005	0.0095

Name	EU_CD	Indicative Quality *Surrogate Status in italic*	Baseline Conc. (mg/l)	75% of status threshold (mg/l)	Cumulative load (kg/yr)	Modelled dosing conc. (mg/l)	Potential conc. following dosing (mg/l)
Rashenny_010	IE_NW_40R020770	*High*	0.0125	0.0188	7.8	0.0008	0.0133
Straid_010	IE_NW_40S010400	High	0.0121	0.0188	8.1	0.0004	0.0124
Redford_Glebe_010	IE_NW_40R040490	*High*	0.0125	0.0188	0.0	0.0	0.0125

*Unverified Eden data for Ardagh_010 is used only to indicate the surrogate status.
** Baseline concentration >75% threshold but concentration increase is below significance threshold (0.00125mg/l)

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

Name	EU_CD	Indicative Quality *Surrogate Status in italic*	Baseline Conc. (mg/l)	75% of status threshold (mg/l)	Cumulative load (kg/yr)	Modelled dosing conc. (mg/l)	Potential Baseline conc. following dosing (mg/l)
Carndonagh Gravels	IE_NW_G_078	Good	0.0050	0.0263	4.5	0.0009	0.0059
East Inishowen	IEGBNI_NW_G_050	Good	0.0050	0.0263	16.2	0.0003	0.0053
Lough Swilly	IEGBNI_NW_G_059	*Good*	0.0175	0.0263	0.1	0.000001	0.0066

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

Name	**EU_CD**	**Season**	**Indicative Quality** *Surrogate Status in italic*	**Baseline Conc. (mg/l)**	**75% of status threshold (mg/l)**	**Cumulative load (kg/yr)**	**Modelled dosing conc. (mg/l)**	**Potential conc. following dosing (mg/l)**
Trawbreaga Bay	IE_NW_240_0000	Summer	*High*	0.0125	0.0188	171.3	0.0014	0.0139
		Winter	*High*	0.0125	0.0188	171.3	0.0014	0.0139
Lough Swilly	IE_NW_220_0000	Summer	High	0.0025	0.0188	4.3	0.000005	0.0025
		Winter	High	0.0025	0.0188	4.3	0.000005	0.0025
Northern Atlantic Seaboard (HAs 40;02)	IE_NW_230_0000	Summer	High	0.0025	0.0188	331.5	0.0010	0.0035
		Winter	High	0.0025	0.0188	331.5	0.0010	0.0035
Northwestern Atlantic Seaboard (HAs 37;38)	IE_NW_100_0000	Summer	High	0.0025	0.0188	4.3*	0.0003	0.0028
		Winter	High	0.0025	0.0188	4.3*	0.0003	0.0028

*The northern Atlantic seaboard covers a large area. Only the area receiving load from the Inishowen West EAM is considered in this assessment.

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

Name	**EU_CD**	**Season**	**Indicative Quality** *Surrogate Status in italic*	**Baseline Conc. (mg/l)**	**75% of status threshold (mg/l)**	**Load, (kg/yr) from current EAM**	**Cumulative load (kg/yr)**	**Modelled dosing conc. (mg/l)**	**Potential conc. following dosing (mg/l)**
Lough Swilly	IE_NW_220_0000	Summer	High	0.0025	0.0188	4.3	814.5	0.0009	0.0034
		Winter	High	0.0025	0.0188	4.3	814.5	0.0009	0.0034

Figure 1: Inishowen West Regional Water Supply Dosing Areas

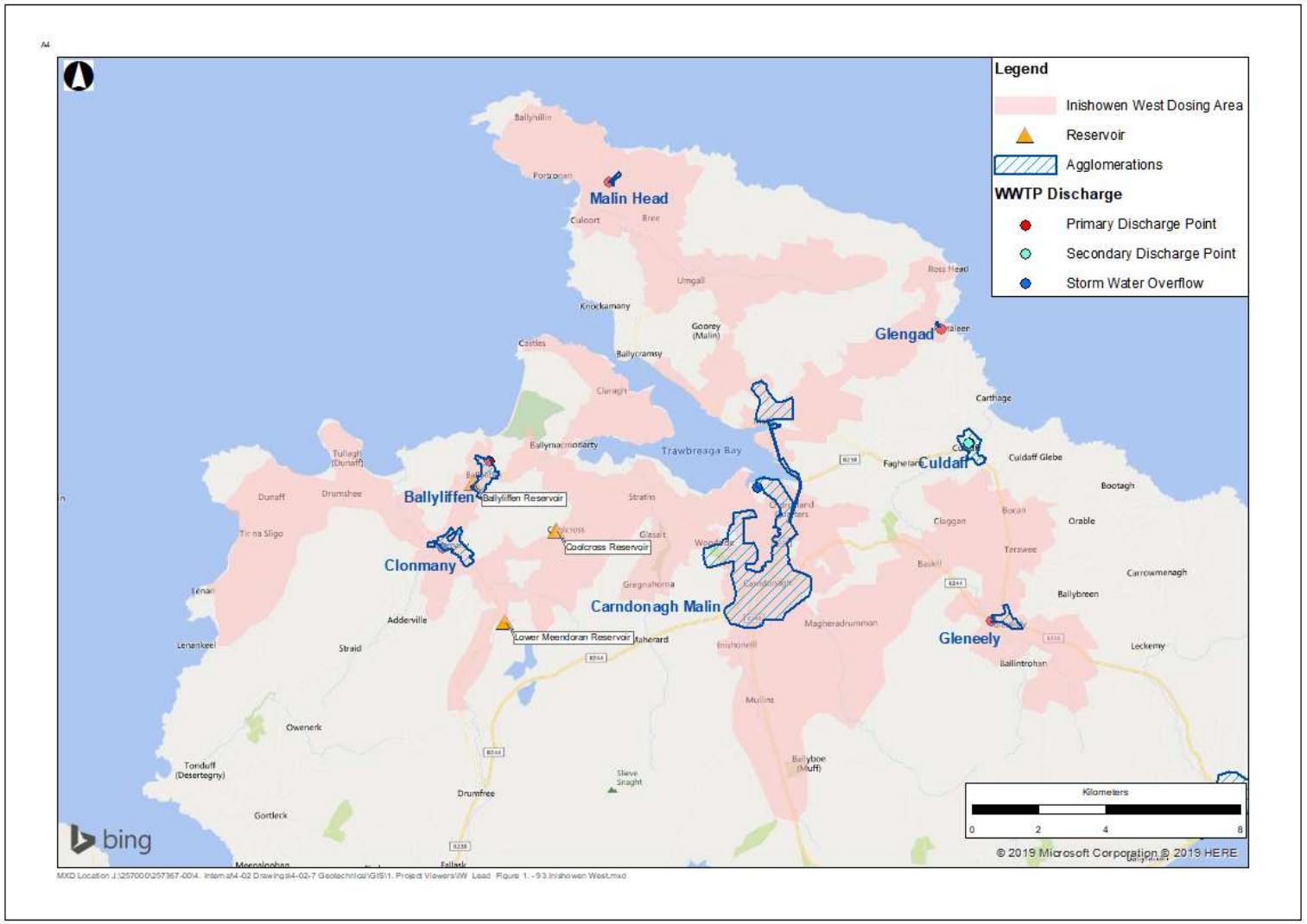

Figure 2: RWB Cumulative Loading Assessment

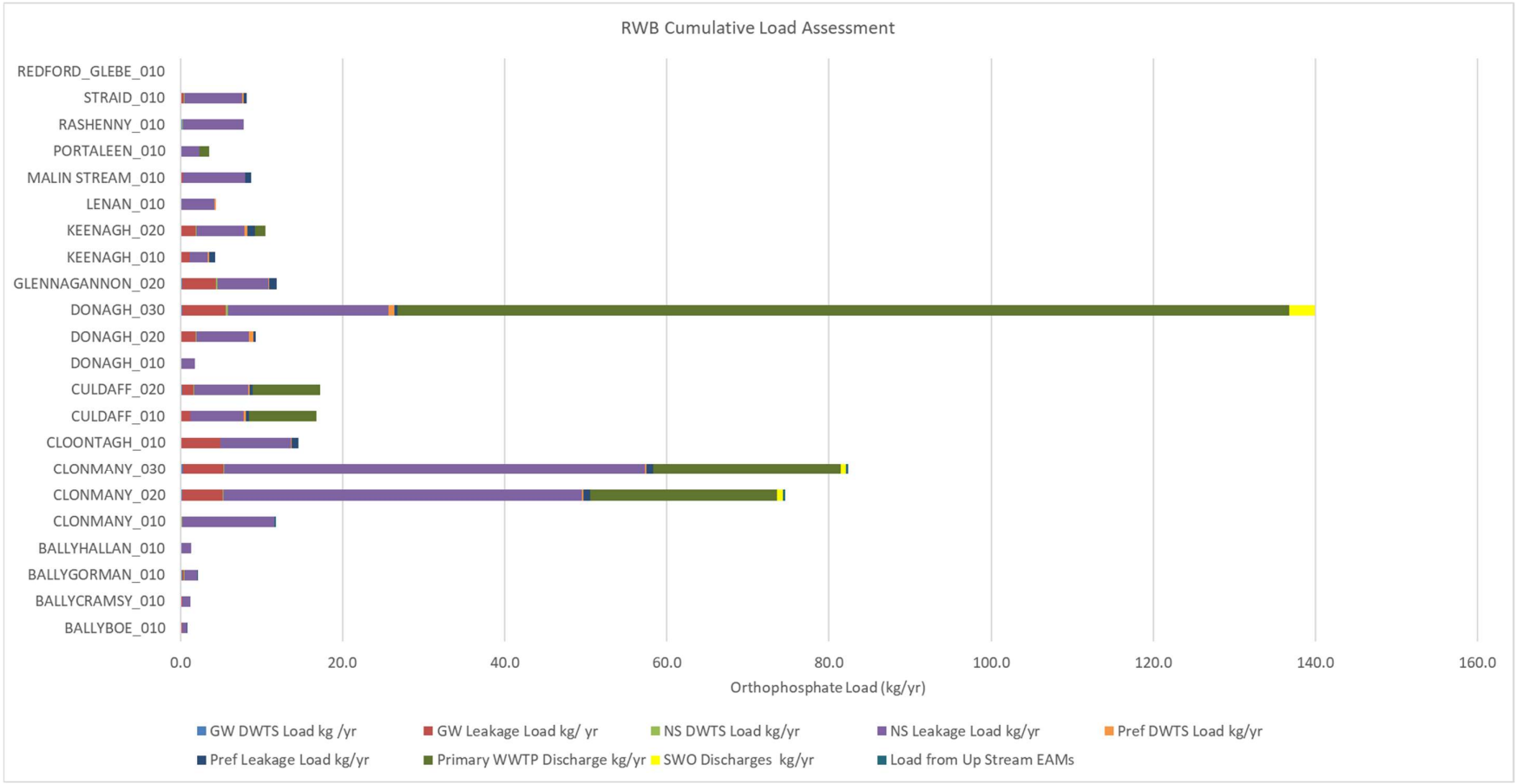

Figure 3: Total dosing area Attenuated, Treated and Transported loads

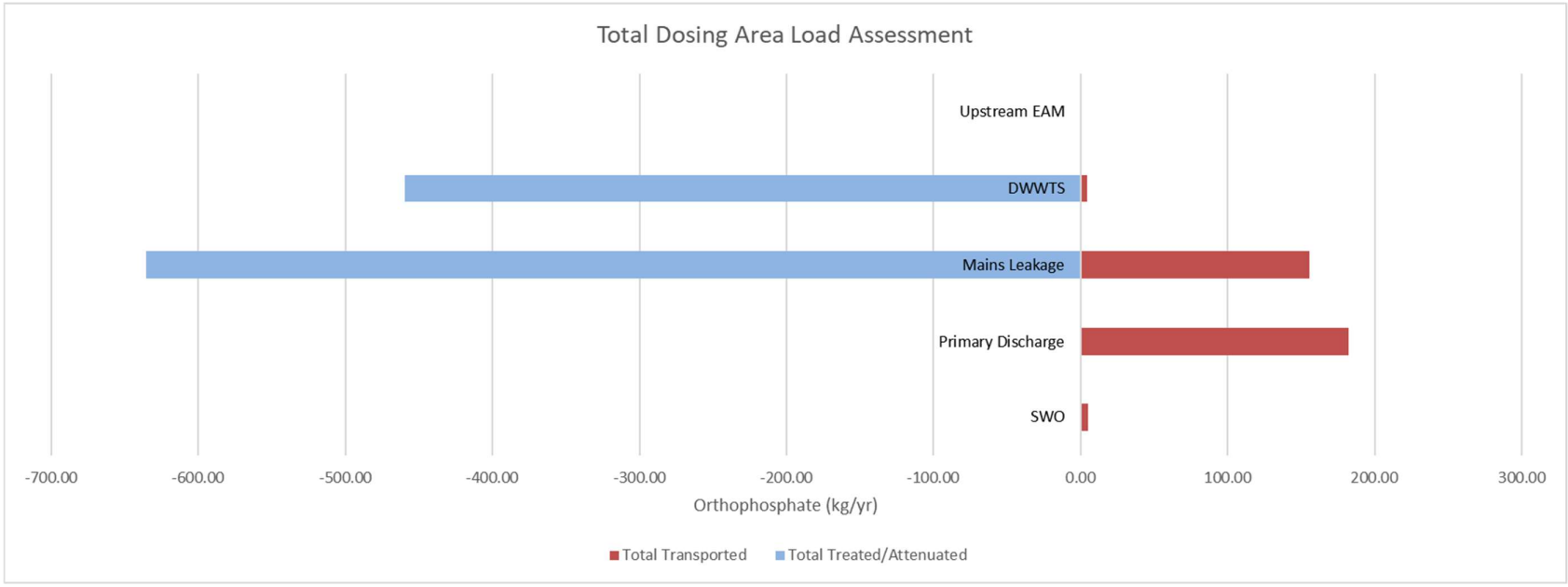

Figure 4: Upstream and downstream EAMs within WFD catchment

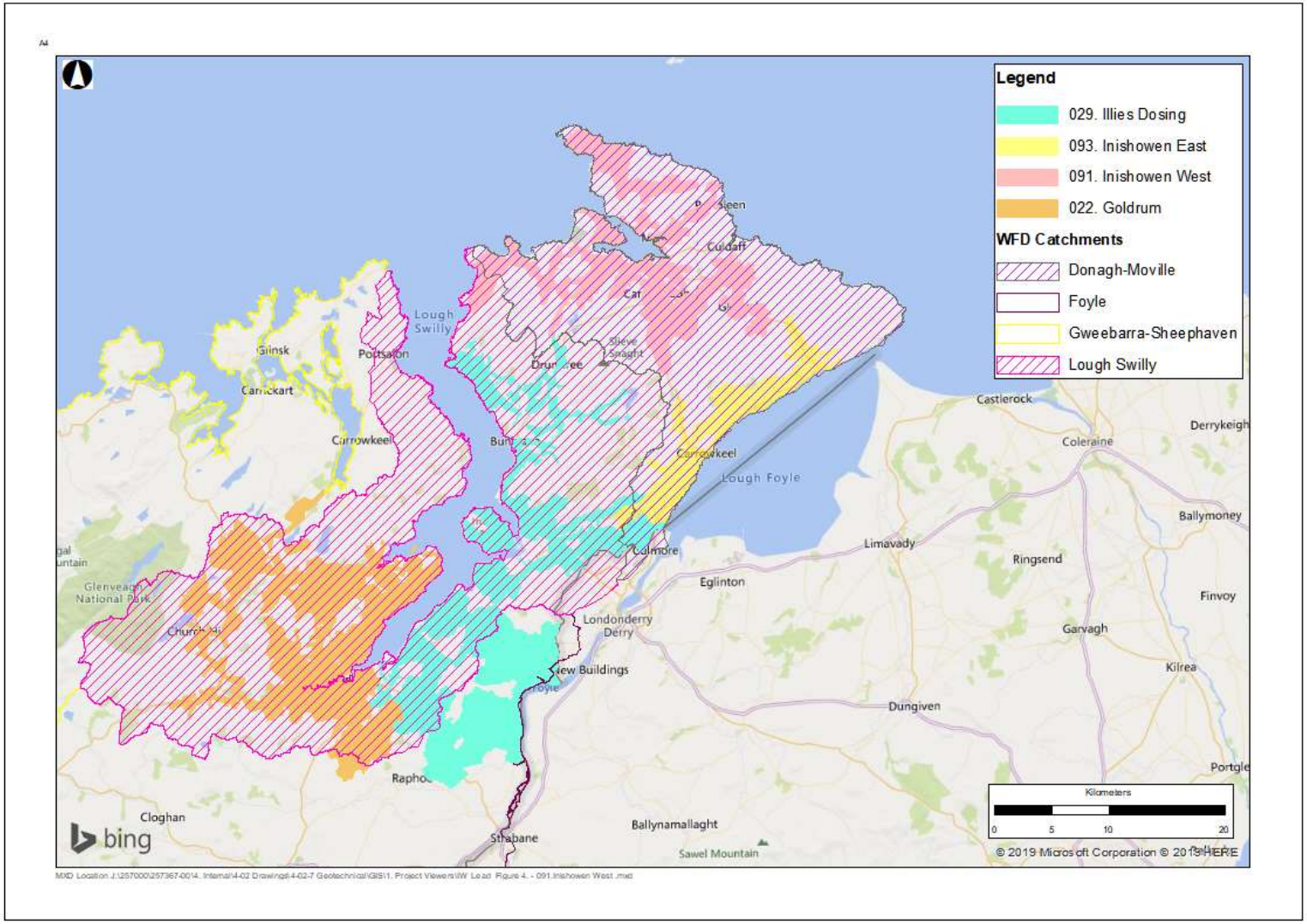

Figure 5: Red, Amber, Green (RAG) Status of waterbodies