



IRISH WATER

LEAD IN DRINKING WATER MITIGATION PLAN  
– 009 STALEEN WSS

SCREENING TO INFORM APPROPRIATE ASSESSMENT  
DECEMBER 2021



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## Table of Contents

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Purpose of this Report .....	1
1.2	The Plan.....	1
1.3	Project Background.....	3
<b>2.</b>	<b>APPROPRIATE ASSESSMENT METHODOLOGY .....</b>	<b>3</b>
2.1	Legislative Context .....	3
2.2	Guidance for the Appropriate Assessment Process.....	4
2.3	Stages of the Appropriate Assessment Process.....	5
2.4	Information Sources Consulted .....	6
2.5	Evaluation of the Receiving Environment.....	6
<b>3.</b>	<b>DESCRIPTION OF THE PROJECT .....</b>	<b>9</b>
3.1	Description of the proposal .....	9
3.2	LDWMP Approach to Assessment .....	10
<b>4.</b>	<b>PROJECT CONNECTIVITY TO EUROPEAN SITES .....</b>	<b>14</b>
4.1	Overview of the Project Zone of Influence .....	14
<b>5.</b>	<b>EVALUATION OF POTENTIAL IMPACTS .....</b>	<b>18</b>
5.1	Context for Impact Prediction.....	18
5.2	Impact Identification.....	18
5.3	Assessment of operational Impacts.....	19
<b>6.</b>	<b>EVALUATION OF POTENTIAL FOR SIGNIFICANT EFFECTS.....</b>	<b>25</b>
6.1	Clogher Head SAC 001459 .....	25
6.2	Boyne Coast and Estuary SAC 001957 .....	26
6.3	River Boyne and River Blackwater SAC 002299.....	29
6.4	Boyne Estuary SPA 004080 .....	32
6.5	River Boyne and River Blackwater SPA 004232.....	34
6.6	Assessment of In-Combination Effects with Other Plans or Projects.....	34
<b>7.</b>	<b>SCREENING CONCLUSION STATEMENT .....</b>	<b>41</b>
<b>8.</b>	<b>REFERENCES .....</b>	<b>42</b>

## APPENDICES

- Appendix A European Sites - Conservation Objectives
- Appendix B Nutrient Sensitive Qualifying Interests
- Appendix C EAM Summary Report for 09 Staleen WSS

## LIST OF FIGURES

Figure 1: Location of the Staleen WTP, Co. Louth .....	9
Figure 2 Conceptual Model of P Transfer .....	12
Figure 3 Stepwise Approach to the Environmental Assessment Methodology .....	13
Figure 4 European Sites within the Zol of the Proposed Project .....	16

## LIST OF TABLES

Table 1: European Sites within the Zol of the Proposed Project .....	15
Table 2: European Sites Hydrologically Connected to or Downstream of the WTP and WSZ .....	17
Table 3: Surface and groundwater bodies within the WSZ with a hydrological or hydrogeological connection to European Sites .....	21
Table 4: Increased loading/concentration due to Orthophosphate Dosing – Dosing rate = 0.8 mg/l P at Staleen Water Treatment Plant .....	22
Table 5: In-Combination Impacts with Other Plans, Programmes and Policies .....	36

## 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 Donore Reservoir via Staleen WTP in Co. Louth.

This report comprises information in support of the Screening of the proposed works 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 orthophosphate 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 phosphorus.

### 1.1 PURPOSE OF THIS REPORT

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

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

### 1.2 THE PLAN

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

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

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

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

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 ( $\mu\text{g}/\text{l}$ ) as per the European Union (Drinking Water) Regulations. From 2003 to 2013, the limit was 25  $\mu\text{g}/\text{l}$ , which was a reduction on the previous limit (i.e. pre 2003) of 50  $\mu\text{g}/\text{l}$ .

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

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

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

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

IW proposes to introduce corrective water treatment at up to 400 water treatment plants. 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 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 phosphorus every day as part of the normal diet. The OP dose rate for the Staleen WSS will be 0.8 mg/l P.

### 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 orthophosphate may reach environmental receptors and 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 phosphorus 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 have a hydrological or hydrogeological connectivity to the WSZs affected by the proposed orthophosphate 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 (2018).

### **Departmental/NPWS Circulars:**

- *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities*. Circular NPWS 1/10 and PSSP 2/10. (DEHLG, 2010);
- *Appropriate Assessment of Land Use Plans*. Circular Letter SEA 1/08 & NPWS 1/08;
- *Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments*. Circular L8/08;



- *Guidance on Compliance with Regulation 23 of the Habitats Directive*. Circular Letter NPWS 2/07; and
- *Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites*. Circular Letter PD 2/07 and NPWS 1/07.

### 2.3 STAGES OF THE APPROPRIATE ASSESSMENT PROCESS

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

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

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

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

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

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

The aim of stage 2 of the AA process is to identify any 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 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 impacts remain. At this stage of the AA process, it is the characteristics of the plan or project itself that will determine whether or not the competent authority can allow it to progress. This is the determination of 'over-riding public interest'.

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

#### 2.4 INFORMATION SOURCES CONSULTED

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

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

#### 2.5 EVALUATION OF THE RECEIVING ENVIRONMENT

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

contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally”.

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

### 2.5.1 Identification of European Sites

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

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

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

### 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 have been prepared for a number of individual Sites to take account of the specific QIs/ SCIs of that Site. Both the generic and site specific COs 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 site specific COs in the context of maintaining and restoring favourable conservation condition as follows:

**For SACs:**

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

**For SPAs:**

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

Favourable Conservation status of a habitat is achieved when:

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

Favourable Conservation status of a species is achieved when:

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

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

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

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

### 3. DESCRIPTION OF THE PROJECT

#### 3.1 DESCRIPTION OF THE PROPOSAL

Approximately 24.4 MLD of treated water is distributed from Staleen WTP to South Louth and East Meath WSZs (Figure 1). Based on an assessment of the risk of lead exceedances, the recommended Plumbosolvency Control Plan for the Staleen Water Supply Scheme (WSS)/ South Louth and East Meath WSZs, is for all high-risk areas to receive Orthophosphate dosed water whereas low risk areas will not receive it. It has been demonstrated that this can be achieved by dosing at Staleen WTP to the outlet pipe to Donore reservoir at a dose rate of 0.8mg/l P. pH correction facilities have recently been installed at the WTP, sized to facilitate an operational pH of up to 8 in line with Irish Water policy for treated water entering a distribution network. As part of the recently completed Staleen WTP upgrade works, facilities for pH correction and OP dosing have being installed. The pH correction facilities installed at the WTP has been sized to facilitate an operational pH of up to 8 in line with Irish Water policy for treated water entering a distribution network. Donore Reservoir feeds 15 MLD to Drogheda/ South Louth, i.e. 53% of water used in the South Louth and East Meath WSZs. Approximately 54.5% of the flow is accounted for and a fixed rate of water mains leakage of 54.5% has been assumed for the WSZ with seepage from the mains distributed evenly across the entire length of the WSZ network.

The proposed OP dosing targeted area of the Staleen WSS (South Louth and East Meath WSZ: Zones 100 and 200) covers the large urban centre of Drogheda and smaller urban areas of Clogherhead and Termonfeckin. The Staleen WSS is served by Drogheda and Clogherhead WWTPs and an estimated 1,291 properties are serviced by Domestic Wastewater Treatment Systems (DWWTS).



Figure 1: Location of the Staleen WTP, Co. Louth

### 3.1.1 Construction Works

Staleen WTP has recently undergone an upgrade in a number of areas including:

Provision of orthophosphoric acid storage and dosing system capable of dosing at a rate of up to 2 mg/l (as P) at maximum hydraulic capacity. Provision of bunded chemical storage for a minimum of 30 days and minimum 50/50 capacity split.

Furthermore, as part of recent Staleen WTP upgrade, pH correction facility has been installed.

With this upgrade no further facilities will be required to meet the requirements of the Plumbosolvency Control Plan. The upgrade has already been subject to Appropriate Assessment. No further assessment is therefore required as no further works specific to this project are required.

### 3.1.2 Operational Works

The scope of the **operational** works includes the dosing of OP to treated water at a rate of 0.8 mg/l P in a process similar to the addition of chlorine for disinfection. Waste from the phosphate analyser will be routed to a public sewer on site where available and if not, waste shall be stored for a maximum of 60 days prior to removal by a transport vehicle.

## 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 risk 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.

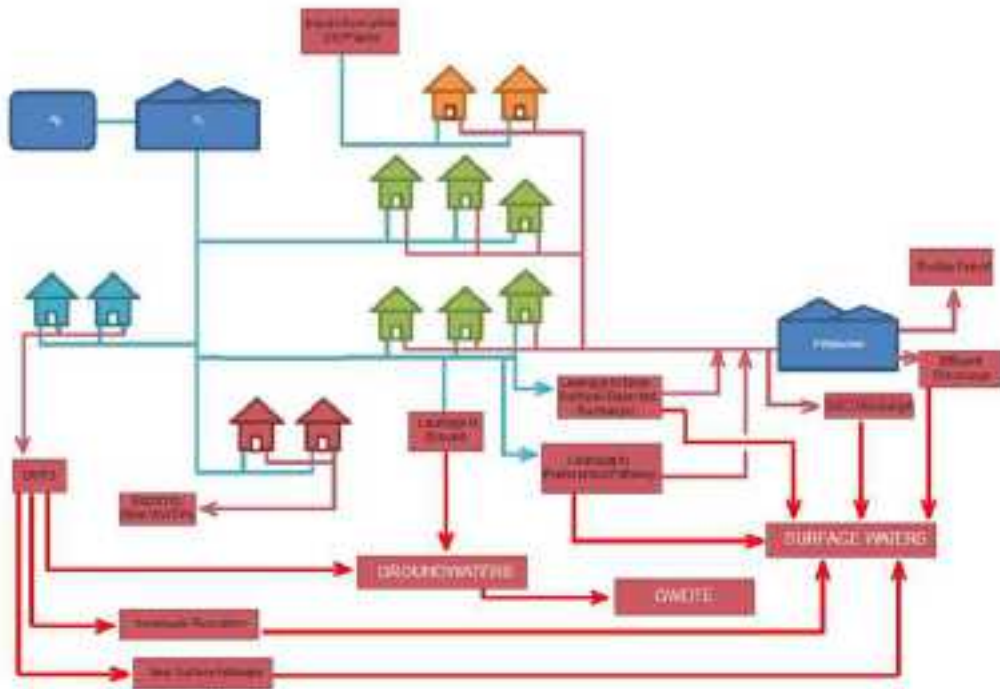
### 3.2.2 Environmental Assessment Methodology

The EAM has been developed based on a conceptual model of P transfer (see **Figure 2**), 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 3** 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 further outlines P dynamics and the consideration of P trends and capacity in receiving waters and the potential for any impact on OP indicative water quality status from any increase in OP loading arising from the proposed OP dosing.



**Figure 2 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.



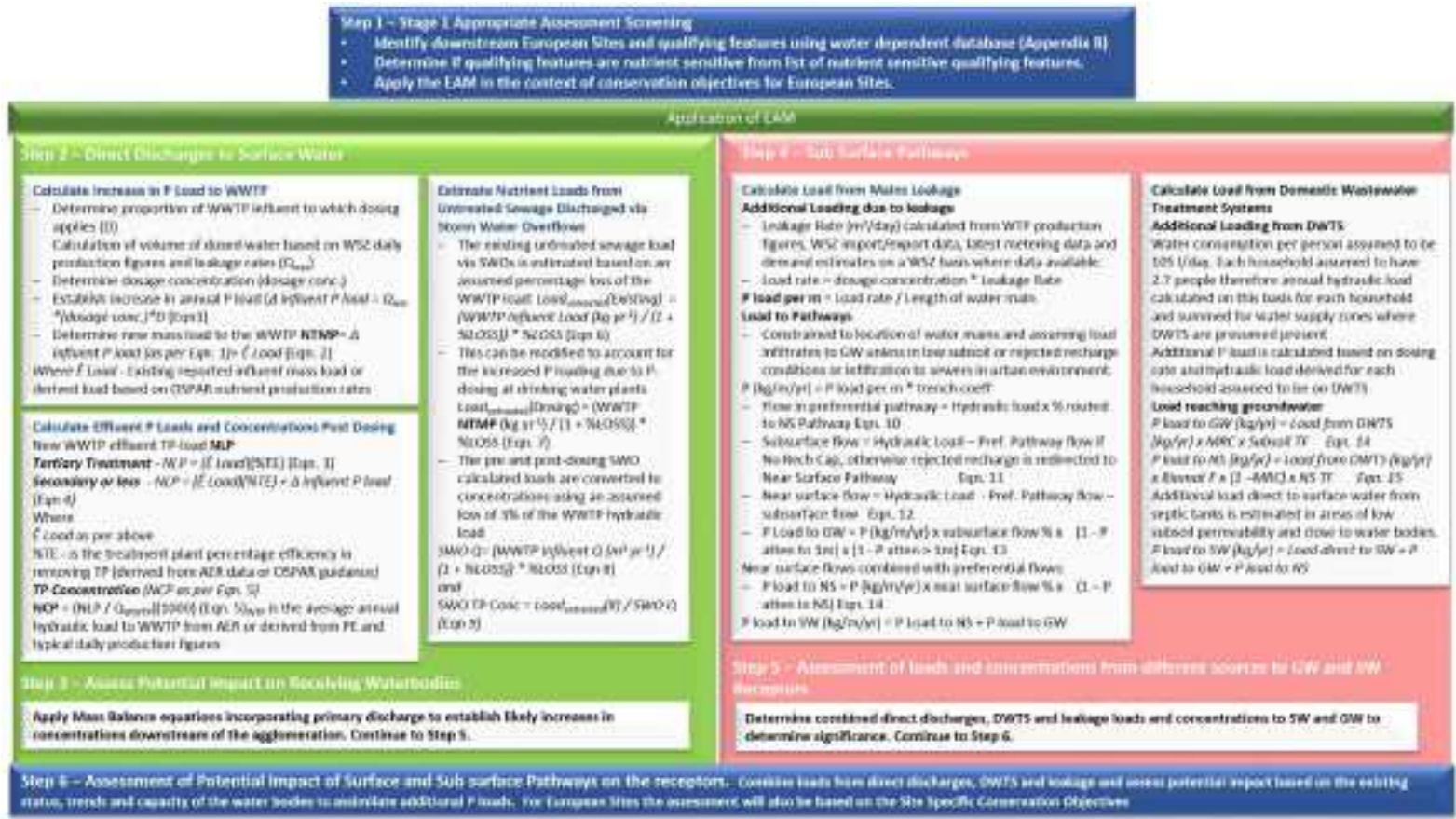


Figure 3 Stepwise Approach to the Environmental Assessment Methodology

## 4. PROJECT CONNECTIVITY TO EUROPEAN SITES

### 4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

#### 4.1.1 Construction Phase

Staleen WTP has recently being upgraded with works including an OP dosing system and a system for pH adjustment. No further construction works are required in order to implement the Plumbosolvency Control Plan. The Staleen upgrade was a consented project which has already been subject to and had obtained approval for completion by the Competent Authority, including an evaluation of potential effects within the context of the AA process. There are no further construction works associated with the current project beyond what has already been consented within the remit of the recently completed upgrade works.

#### 4.1.2 Operational Phase

With regard to the operation of the proposed project, the pathways by which the added OP may reach and / or affect environmental receptors is considered by means of an operational Zol, which was determined by establishing the potential for hydrological and hydrogeological connectivity between the Staleen WTP and associated WSZs and European Sites. This operational Zol was therefore defined by the surface water sub-catchments and groundwater bodies that are hydrologically and hydrogeologically connected with the Project. European Sites within the operational Zol are listed in **Table 1** and are displayed in **Figure 4**

The EAM process identified 5 river waterbodies, one transitional waterbody and two coastal waterbodies potentially impacted following OP dosing of drinking water highlighted in bold. This AA Screening identifies the connectivity between EAM identified surface waterbodies and downstream receiving waterbodies and European Sites:

- Boyne\_180 (IE\_EA\_07B042200) river waterbody flows into the Boyne Estuary (IE\_EA\_010\_0100) transitional waterbody which flows into the Boyne Estuary Plume Zone (IE\_EA\_010\_0000) coastal waterbody.
- Stagrennan\_010 (IE\_EA\_07S320550) river waterbody flows into the Boyne Estuary (IE\_EA\_010\_0100) transitional waterbody which flows into the Boyne Estuary Plume Zone (IE\_EA\_010\_0000) coastal waterbody.
- Tullyeskar\_010 (IE\_EA\_07T270880) river waterbody flows into the Boyne Estuary (IE\_EA\_010\_0100) transitional waterbody which flows into the Boyne Estuary Plume Zone (IE\_EA\_010\_0000) coastal waterbody.
- Termonfeckin\_020 (IE\_NB\_06T010400) river waterbody flows into the Louth Coast (IE\_NB\_025\_0000) coastal waterbody.
- Slieveboy\_010 (IE\_NB\_06S160790) river waterbody flows into the Louth Coast (IE\_NB\_025\_0000) coastal waterbody.

The EAM process identified 4 groundwater bodies. Groundwater bodies touching or intersecting the WSZs, are also included in the Zol. Hydrogeological linkages in karst areas are considered:

- Clogher Head Gravels (IE\_NB\_G\_023)
- Drogheda (IE\_EA\_G\_025)
- Industrial Facility (P078401)

- Louth (IEGBNI\_NB\_G\_019)

**Louth (IEGBNI\_NB\_G\_019)** is a large groundwater body accounting for approximately 1621 km<sup>2</sup>. The main discharges are to rivers and streams crossing the GWB, reflecting short groundwater flow paths (30-300m) and overall flow direction is expected to be to the northwest as determined by topography<sup>3</sup>. Small springs and seeps are likely to issue at the stream heads and along their course and seepages will also develop along coastal cliff faces. As a result of this only those European Sites within a 300m radius of the OP dosing area within this groundwater body are considered in the Zol. European Sites within the Zol are listed in **Table 1** and are displayed in **Figure 4**.

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

<b>Site Name</b>	<b>SAC/SPA Code</b>	<b>Water Dependent Species/Habitats</b>	<b>Nutrient Sensitive</b>	<b>Potential Hydrological/ Hydrogeological Connectivity</b>
<b>Clogherhead SAC</b>	<b>001459</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Boyne Coast and Estuary SAC</b>	<b>001957</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>River Boyne and River Blackwater SAC</b>	<b>002299</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Boyne Estuary SPA</b>	<b>004080</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>River Boyne and River Blackwater SPA</b>	<b>004232</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>

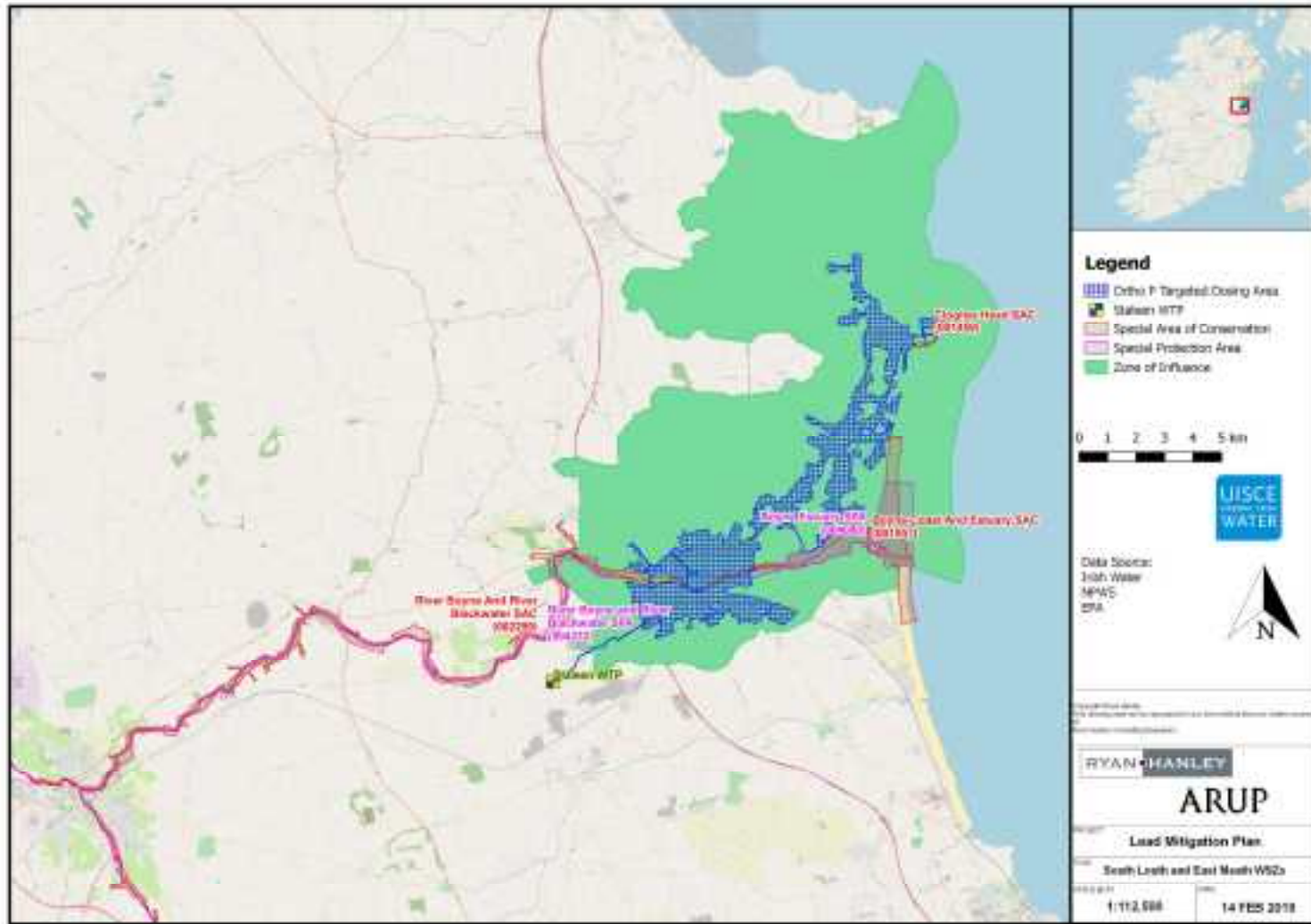


Figure 4 European Sites within the Zol of the Proposed Project

**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
Clogherhead	SAC 001459	27 <sup>th</sup> Jan 2017	1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Yes	Yes	Yes
			4030	European dry heaths	No	Yes	
Boyne Coast and Estuary	SAC 001957	31 <sup>st</sup> Oct 2012	1130	Estuaries	Yes	Yes	Yes
			1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes	
			1310	Salicornia and other annuals colonizing mud and sand	Yes	Yes	
			1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )	Yes	Yes	
			1210	Annual vegetation of drift lines	Yes	Yes	
			2110	Embryonic shifting dunes	Yes	Yes	
			2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')	Yes	Yes	
			2130	*Fixed coastal dunes with herbaceous vegetation ('grey dunes')	Yes	Yes	
River Boyne and River Blackwater	SPA 0004232	21 <sup>st</sup> Feb 2018	A229	Kingfisher <i>Alcedo atthis</i>	Yes	Yes	Yes
River Boyne and River Blackwater	SAC 002299	15 <sup>th</sup> Aug 2016	1099	River Lamprey ( <i>Lampetra fluviatilis</i> )	Yes	Yes	Yes
			1106	Salmon ( <i>Salmo salar</i> )	Yes	Yes	
			1355	Otter ( <i>Lutra lutra</i> )	Yes	Yes	
			7230	Alkaline fens	Yes	Yes	
			91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> ( <i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i> )*	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).

#### Construction Phase

The upgrade of the Staleen WTP was subject to AA Screening at the planning stage. No further assessment is required in this report.

#### Operational Phase

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

- Excessive phosphate within an aquatic ecosystem may lead to eutrophication; with a corresponding reduction in oxygen levels, reduction in species diversity and subsequent impacts on animal life;
- Groundwater dependent habitats include both surface water habitats (e.g. hard oligo-mesotrophic lakes) and Groundwater Dependent Terrestrial Ecosystems (GWDTEs, e.g. alkaline fens). Any change in the water quality of these systems may have subsequent effects on these habitats and species; and therefore will be subject to an evaluation of the significance of any such effects:



- The discharge of additional P loads to the environment (through surface and sub surface pathways) may have implications for nutrient sensitive species such as the freshwater pearl mussel, Atlantic salmon and the white-clawed crayfish;
- Phosphorus (P) in wastewater collection systems is the result of drinking water and derived from a number of other sources, including P imported from areas outside the agglomeration through import of sludges or leachates for treatment at the plant. The disposal and use of phosphorus removed in wastewater sludge is regulated (i.e. through nutrient management plans) and should not pose further threat of environmental impact;
- Leakage of phosphates from the drinking water supply network to the environment from use of OP;
- Direct discharges of increased P to waterbodies from the wastewater treatment plant licensed discharges; and
- Potential discharges to waterbodies of untreated effluent potentially high in OP Storm Water Overflows (SWOs).

### 5.3 ASSESSMENT OF 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 Screening to inform AA is the potential for significant effects arising from the additional OP load due to OP dosing at Staleen 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 orthophosphate 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 OP dosing, the capacity of the water will be assessed. This information is available on the WFD App on a national basis using the "Distance to Threshold" parameter, where waterbodies with high capacity are termed "Far" from the threshold and those with low capacity are "Near" the threshold.

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

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

An additional test for groundwater bodies states that downward trends should not be reversed as a result of pollution. 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 the most recent WFD Environmental Monitoring data (Accessed November 2021).

Baseline OP monitoring data and associated thresholds were not available for the following RWBs in the study area: Slieveboy\_010, Stagrennan\_010, and Tullyeskar\_010. A surrogate status is derived from the ecological status of adjacent RWBs. The mid-range of that surrogate status is used as baseline concentration. On the basis of predicted loading, the risk of using surrogate data is excluded because even if high status was ascribed, the loading values are significantly below the 0.00125 mg/l P significance threshold and would not register a significant effect even on high status waterbodies with QI receptors that require high status.



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

Site Name (Code)	Contributing WB Code_Name	WB Type <sup>4</sup>	P Status <sup>5</sup> and Trends <sup>6</sup>	Baseline <sup>7</sup> P Conc. <sup>8</sup> (mg/l P)	75% of Status Threshold (mg/l P)	Cumulative Ortho P load to SW <sup>9</sup>	Modelled Conc. <sup>10</sup> (mg/l P)	Potential Baseline Conc. @0.8 mg/l P	Evaluation
<b>Clougher Head SAC (001459)</b>	Louth	GWB	Good	0.0062	0.0263	1.1	0.0000	0.0062	No deterioration to OP indicative WQ
	Louth Coast	CWB	Summer <i>High</i> / Winter <i>Good</i>	0.0125/ 0.0325	0.0188/ 0.0363	58.6	0.00004	0.0125/ 0.0325	No deterioration to OP indicative WQ
<b>Boyne Coast and Estuary SAC (001957)</b>	Boyne Estuary	TWB	Summer <i>High</i> / Winter <i>Good</i>	0.0170/ 0.0360	0.0188/ 0.0363	1734.1	0.0010	0.0180/ 0.0370	No deterioration to OP indicative WQ
	Boyne Estuary Plume Zone	CWB	Summer <i>High</i> / Winter <i>Good</i>	0.0125/ 0.0325	0.0188/ 0.0363	1734.1	0.0010	0.0135/ 0.0335	No deterioration to OP indicative WQ
	Louth Coast	CWB	Summer <i>High</i> / Winter <i>Good</i>	0.0125/ 0.0325	0.0188/ 0.0363	58.6	0.00004	0.0125/ 0.0325	No deterioration to OP indicative WQ
<b>River Boyne and River Blackwater SPA</b>	Boyne_180	RWB	High	0.0203	0.0188	496.4	0.0003	0.0206	No deterioration to OP indicative WQ
	Boyne Estuary	TWB	Summer <i>High</i> / Winter <i>Good</i>	0.0170/ 0.0360	0.0188/ 0.0363	1734.1	0.0010	0.0180/ 0.0370	No deterioration to OP indicative WQ
<b>River Boyne and River Blackwater SAC (002299)</b>	Boyne_180	RWB	High	0.0203	0.0188	496.4	0.0003	0.0206	No deterioration to OP indicative WQ
	Drogheda	GWB	Good	0.0311	0.0263	26.6	0.0040	0.0350	No deterioration to OP indicative WQ
	Industrial Facility (P0784-01)	GWB	Good	0.0175	0.0263	0.8	0.0041	0.0216	No deterioration to OP indicative WQ
	Boyne Estuary	TWB	Summer <i>High</i> / Winter <i>Good</i>	0.0170/ 0.0360	0.0188/ 0.0363	1734.1	0.0010	0.0180/ 0.0370	No deterioration to OP indicative WQ

<sup>4</sup> Monitoring period is annual unless specified.

<sup>5</sup> Surrogate Status indicated in italic.

<sup>6</sup> Distance to threshold in parentheses.

<sup>7</sup> Baseline year is 2021.

<sup>8</sup> Surrogate concentration is given in italic mg/l P

<sup>9</sup> Cumulative P load to SW from Upstream Dosing Areas, Leakage, DWWTS and agglomerations (kg/yr)

<sup>10</sup> Values above 5% of Good / High boundary (0.00125 mg/l P) for SW or 5% of Good / Fail boundary (0.00175 mg/l P) for GW highlighted in yellow.

### 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 the potential direct impacts are:

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

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

The pre-dosing scenario is based on a mass balance calculation of both the intermittent SWO discharges, in combination with the continuous discharge from the WWTP. A comparison of the pre- and post-dosing scenarios is made to identify changes in predicted concentrations downstream of the point of discharge. A summary of the results of and evaluation 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 (WVDL) (if it has been set) that are applicable to the agglomeration discharge to transitional waters or freshwaters.

**Table 4: Increased loading/concentration due to Orthophosphate Dosing – Dosing rate = 0.8 mg/l P at Staleen Water Treatment Plant**

Agglom. & Discharge Type	ELV from WVDL	TP Load Kg/yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)			
			0.5	0.4	0.68	
Drogheda Primary Discharge	Total Phosphate 2 mg/l P - compliant Orthophosphate 1.5 mg/l P – compliant	Existing	5545	0.36	0.29	0.49
		Post Dosing	7751	0.50	0.40	0.68
		% Increase	39%	39%	38%	39%
Drogheda SWOs (14 No.)	Total Phosphate 2 mg/l P - compliant Orthophosphate 1.5 mg/l P – compliant	Existing	4337	1.37	1.10	1.87
		Post Dosing	4402	1.39	1.11	1.89
		Existing	897	1.14	0.91	1.55
Clogherhead Primary Discharge	No ELVs	Post Dosing	1012	1.28	1.03	1.75
		% Increase	13%	12%	13%	13%
		Existing	56	0.35	0.28	0.47
Clogherhead SWOs (4 No.)	No ELVs	Post Dosing	59	0.37	0.30	0.50
		Existing	21	0.18	0.14	0.25
		Post Dosing	21	0.18	0.14	0.25
Donore Primary Discharge	Orthophosphate 3.0 mg/l P - Compliant	% Increase	0%	0%	0%	0%
		Existing	22	0.91	0.72	1.23
		Post Dosing	22	0.92	0.74	1.25
Donore SWOs (1 No.)	Orthophosphate 3.0 mg/l P - Compliant	Existing	22	0.91	0.72	1.23
		Post Dosing	22	0.92	0.74	1.25

#### Drogheda WWTP

The Drogheda WWTP provides secondary treatment and the assessment assumes that additional P loading will not receive treatment, i.e. no chemical dosing for P removal. The annual average effluent

OP concentration will increase from 0.36 mg/l P to 0.50 mg/l P as a result of dosing (39% increase). The annual average SWO effluent concentration will increase from 1.37 mg/l P to 1.39 mg/l P as a result of dosing (2% increase). The WWTP primary discharge discharges directly into the Boyne Estuary (coastal waterbody) at approximate coordinates: E312565 N275882. The Boyne Estuary TWB forms part of the **Boyne Coast and Estuary SAC (001957)** at this point.

#### **Clogherhead WWTP**

The Clogherhead WWTP provides secondary treatment and the assessment assumes that P loading will not receive treatment, i.e. no chemical dosing for P removal. The annual average effluent OP concentration will increase from 1.14 mg/l P to 1.28 mg/l P as a result of dosing (12% increase). The annual average SWO effluent concentration will increase from 0.35 mg/l P to 0.37 mg/l P as a result of dosing (6% increase). The WWTP primary discharge and SWOs discharge directly into Louth Coast (coastal waterbody) at approximate coordinates: E316429 N263066. The Louth Coast CWB forms part of the **Boyne Coast and Estuary SAC (001957)** and **Clogher Head SAC (001459)**.

#### **Donore WWTP**

The Donore WWTP provides tertiary treatment and the assessment assumes that P loading will be entirely treated in the plant. The annual average effluent OP concentration will be 0.18 mg/l P before and after dosing. The WWTP has an ELV for OP of 3 mg/l P and it was compliant in 2017. The annual average SWO effluent concentration will increase from 0.91 mg/l P to 0.92 mg/l P as a result of dosing. The WWTP primary discharge and SWO discharges directly into the Boyne\_180 river waterbody. The Boyne\_180 RWB forms part of the **River Boyne And River Blackwater SAC and River Boyne and River Blackwater 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**

- Boyne\_180 RWB is hydrologically connected to **River Boyne and River Blackwater SAC (002299)**.
- Boyne\_180 RWB is hydrologically connected to **River Boyne and River Blackwater SPA (0004232)**.

Leakage from the rising main to the WTP is collected by sewers and discharged by SWO to the Boyne\_180 RWB. This leakage and associated OP is <1 kg/yr and therefore does not register an increase in concentration of the Boyne\_180 RWB (i.e. <0.0000) therefore does not cause a deterioration in the OP indicative water quality status of this RWB.

#### **Groundwater bodies**

- Louth (IEGBNI\_NB\_G\_019) groundwater body is hydrologically connected to the **Clogher Head SAC (001459)**.
- Drogheda (IE\_EA\_G\_025) and Industrial Facility (IE\_EA\_G\_029) groundwater bodies are hydrologically connected to the **River Boyne and River Blackwater SAC (002299)**.

The OP dosing contributes OP load to receiving GWBs via subsurface and surface pathways. The increase in OP concentrations due to dosing ranges from 0.0000 mg/l P to 0.0041 mg/l P. The resulting OP concentrations following dosing ranges from 0.0062 mg/l P to 0.035 mg/l P. The modelled increase in OP exceeds the 5% of the Good / Fail boundary (0.00175 mg/l P) for both the Industrial Facility GW body and Drogheda GW body, but is not exceeded for Louth GWB. For Louth and Industrial Facility GWB's there is no change in the OP indicative water quality, i.e. the status remains at 'Good', however Drogheda GWB fails to achieve 'Good' status. The modelled dosing concentration is significant but the EAM has determined the impact on the associated river waterbody is <0.0000 mg/l P, and the receiving surface waterbody is not at risk, therefore the Drogheda GWB is not considered to be failing the assessment.

#### **Transitional and Coastal waterbodies**

- Boyne Estuary (IE\_EA\_010\_0100) transitional waterbody and Boyne Estuary Plume Zone (IE\_EA\_010\_0000) coastal waterbody are hydrologically connected to the **Boyne Coast and Estuary SAC (001957)**.
- Boyne Estuary (IE\_EA\_010\_0100) transitional waterbody is hydrologically connected to the **River Boyne and River Blackwater SAC (002299)**.
- Louth Coast (IE\_NB\_025\_0000) coastal waterbody is hydrologically linked to the **Clogher Head SAC (001459)** and the **Boyne Coast and Estuary SAC (001957)**.

The increase in OP concentrations in the transitional and coastal waterbodies as a result of the OP dosing is up to 0.010 mg/l P. The resulting OP concentrations following dosing ranges from 0.0125 mg/l P to 0.0370 mg/l P.

The Boyne Estuary transitional waterbody has predicted dosing concentrations below the 5% of Good/ Fail boundary (0.00125 mg/l P) (as highlighted in Table 3) and within the 75% of upper threshold of the WFD status and therefore there is no risk of deterioration in the OP indicative water quality status of this TWB.

The Boyne Estuary Plume Zone coastal waterbody has predicted dosing concentrations below the 5% of Good/ Fail boundary (0.00125 mg/l P) (as highlighted in Table 3) and within the 75% of upper threshold of the WFD status and therefore there is no risk of deterioration in the OP indicative water quality status of this CWB.

The Louth Coast Coastal waterbody has predicted dosing concentrations below the 5% of Good/ Fail boundary (0.00125 mg/l P) (as highlighted in Table 3) and within the 75% of upper threshold of the WFD status and therefore there is no risk of deterioration in the OP indicative water quality status of this CWB.

#### **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 listed in **Table 3**. Concentrations from other dosing areas with regard to cumulative loading on downstream waterbodies has been considered in this assessment. Section 6 evaluates the OP indicative water quality 'no deterioration' in the context of AA and the QIs of the European Sites.

## 6. EVALUATION OF POTENTIAL FOR SIGNIFICANT EFFECTS

The key pressure associated with the proposed OP dosing is the potential for increased OP levels in the receiving waters and the connectivity to the qualifying interests (habitats and species) identified in **Table 2** that are both water dependent and nutrient sensitive (**Appendix B**). Four European sites remain for evaluation of potential for significant effect: **Clogherhead SAC (001459)**, **Boyne Coast and Estuary SAC (001957)**, **River Boyne and River Blackwater SAC (002299)**, **River Boyne and River Blackwater SPA (004232)** and **Boyne Estuary SPA (004080)**. The potential for the proposed OP dosing to give rise to significant effects on these habitats and species, in view of their conservation objectives, are assessed in detail below.

### 6.1 CLOGHER HEAD SAC 001459

#### 6.1.1 (1230) Vegetated sea cliffs of the Atlantic and Baltic coasts

Both hard and soft cliffs occur in Clogher Head SAC. The Clogher Head sub-site has a total cliff length of 2.1km, of which approximately 0.6km is soft cliff (NPWS, 2017a&b). The overall objective for 'Vegetated sea cliffs of the Atlantic and Baltic coasts' in Clogher Head SAC is to 'maintain favourable conservation condition'. There are no nutrient specific targets in the SSCO (NPWS, 2017a&b) for vegetated sea cliffs of the Atlantic and Baltic coast. However the attributes: Vegetation composition: typical species and sub communities, and negative indicator species are relevant. Targets under these attributes are to: maintain the range of sub communities with typical species and that negative indicator species (including species indicative of changes in nutrient status e.g. *Urtica dioica*) represent less than 5% cover. Changes in nutrient status may affect typical species and sub communities and/or encourage negative indicator species.

**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 Vegetated sea cliff habitat in the Clogher Head SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Louth (IEGBNI\_NB\_G\_019) groundwater body which has a 'Good' OP indicative water quality, a baseline concentration of 0.0062 mg/l P, a cumulative load of 1.1 kg/yr, a potential concentration of 0.0062 mg/l P following dosing, and a 'Good' OP status following dosing. The increase in P following dosing is below the 5% of Good/ High boundary for GW (0.00175 mg/l P) and does not breach the 75% upper status threshold so there is no risk of significant deterioration in water quality for this GWB and the OP indicative water quality status remains unchanged i.e. Good.
- Louth Coast (HA 06) coastal waterbody (IE\_NB\_025\_0000) which has a 'High' OP indicative water quality in summer and a 'Good' OP indicative water quality in winter, a baseline concentration of 0.0125 mg/l P in summer and 0.0325 mg/l P in winter, a cumulative load of 58.6 kg/yr, a potential concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and 'Good' in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.

The EAM assessment results which evaluate the additional OP loading from dosing at Staleen WTP has demonstrated that there will be no change in the OP indicative water quality status of surface or ground waterbodies connected to Vegetated sea cliff habitat in the Clogher Head SAC. Therefore potential for significant effects on these habitats can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat / no deterioration of its favourable conservation condition is identified as no change to the OP indicative water quality status for these waterbodies has been demonstrated.

## 6.2 BOYNE COAST AND ESTUARY SAC 001957

### 6.2.1 (1130) Estuaries

The attributes and targets that will maintain the favourable conservation condition of this habitat in the Boyne Coast and Estuary SAC do not make specific reference to water quality and nutrient conditions however there is a requirement to conserve community types in their natural conditions. The SSCOs attribute and target with specific relevance are to maintain the 'Intertidal estuarine mud and fine sand with *Hediste diversicolor* and *Corophium volutator* community'; and 'Subtidal fine sand dominated by polychaetes community' (NPWS, 2012). Pressures and threats to this habitat associated with the current project include nutrient/ P enrichment which can be associated with accelerated growth of macroalgae/ phytoplankton or reduced concentrations of dissolved oxygen.

**Table 3** identifies the surface and groundwater bodies that have the potential to be impacted by the OP dosing and which have hydrologically or hydrogeologically connectivity to this habitat in the Boyne Coast and Estuary SAC:

- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP indicative water quality status in summer and a 'Good' status in winter, a baseline concentration of 0.0170 mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180 mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP indicative water quality status following dosing in summer and a 'Good' status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P) and so there is no risk of significant deterioration in water quality for this TWB and the OP indicative water quality status remains unchanged i.e. High/Good in Summer/Winter. Therefore, there is no risk of deterioration in water quality for this TWB.
- Boyne Estuary Plume Zone coastal waterbody (IE\_EA\_010\_0000) which has a 'High' OP indicative water quality status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0135 mg/l P (summer) and 0.0335 mg/l P (winter) following dosing, and a 'High' OP indicative water quality status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB
- Louth Coast (HA 06) coastal waterbody (IE\_NB\_025\_0000) which has a 'High' OP indicative water quality in summer and a 'Good' status in winter, a baseline concentration of 0.0125 mg/l P in summer and 0.0325 mg/l P in winter, a cumulative load of 58.6 kg/yr, a potential concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter) following dosing, and a 'High' OP indicative water quality status following dosing in summer and 'Good' in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.

The EAM assessment results which evaluate the additional OP loading from dosing at Staleen WTP has demonstrated that there will be no change in the WFD status of surface or ground waterbodies connected to Estuarine habitat in the Boyne Coast and Estuary SAC. Therefore potential for significant effects on these habitats can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat / no deterioration of its favourable conservation condition is identified as no change to the OP indicative water quality status for these waterbodies has been demonstrated.

### 6.2.2 (1140) Mudflats and sandflats not covered by seawater at low tide

The attributes and targets that will maintain the favourable conservation condition of this habitat in the Boyne Coast and Estuary SAC do not make specific reference to water quality and nutrient conditions however there is a requirement to conserve community types in their natural conditions. Specifically, 'Intertidal estuarine mud and fine sand with *Hediste diversicolor* and *Corophium volutator* community'; and 'Fine sand dominated by bivalves community complex' (NPWS. 2012 a&b). Pressures and threats to this habitat associated with the current project include nutrient/ P enrichment which can be associated with accelerated growth of macroalgae/ phytoplankton or reduced concentrations of dissolved oxygen.

**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 mud and sandflat habitat in the Boyne Coast and Estuary SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0170 mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180 mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P) and so there is no risk of significant deterioration in water quality for this TWB and the OP indicative water quality status remains unchanged i.e. High/Good in Summer/Winter. Therefore, there is no risk of deterioration in water quality for this TWB.
- Boyne Estuary Plume Zone coastal waterbody (IE\_EA\_010\_0000) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0135 mg/l P (summer) and 0.0335 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB
- Louth Coast (HA 06) coastal waterbody (IE\_NB\_025\_0000) which has a 'High' OP indicative water quality in summer and a 'Good' OP indicative water quality in winter, a baseline concentration of 0.0125 mg/l P in summer and 0.0325 mg/l P in winter, a cumulative load of 58.6 kg/yr, a potential concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and 'Good' in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.

The EAM assessment results which evaluate the additional OP loading from dosing at Staleen WTP has demonstrated that there will be no change in the WFD status of surface or ground waterbodies connected to mud and sandflat habitat in the Boyne Coast and Estuary SAC. Therefore potential for significant effects on these habitats can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat / no deterioration of its favourable conservation condition is identified as no change to the OP indicative water quality status for these waterbodies has been demonstrated

### 6.2.3 (1310) *Salicornia* and other annuals colonizing mud and sand, (1330) Atlantic salt meadows, (1410) Mediterranean salt meadows

*Salicornia* habitat has been mapped at two sub-sites within the SAC giving a total estimate of 4.05 ha. The CO is to 'restore' and there has been widespread expansion of *Spartina*, a negative indicator species at one site. Atlantic salt meadows is the dominant saltmarsh habitat at the site and has been mapped at



two sub-sites giving a total estimated area of 26.43 ha. The CO is to 'maintain'. The status of 'Mediterranean salt meadows' is currently under review (NPWS, 2012a&c).

These habitats are located in the transitional water body of Boyne Estuary and require no significant change to community composition or distribution. Impact on communities can be in the form of nutrients as a change in the current input which is central to the distribution and assemblage of species present 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 saltmarsh habitat in the Boyne Coast and Estuary SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0170 mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P) and so there is no risk of significant deterioration in water quality for this TWB and the OP indicative water quality status remains unchanged ie High/Good in Summer/Winter. Therefore, there is no risk of deterioration in water quality for this TWB.
- Boyne Estuary Plume Zone coastal waterbody (IE\_EA\_010\_0000) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0135 mg/l P (summer) and 0.0335 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB
- Louth Coast (HA 06) coastal waterbody (IE\_NB\_025\_0000) which has a 'High' OP indicative water quality in summer and a 'Good' OP indicative water quality in winter, a baseline concentration of 0.0125 mg/l P in summer and 0.0325 mg/l P in winter, a cumulative load of 58.6 kg/yr, a potential concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and 'Good' in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.

The EAM assessment results which evaluate the additional OP loading from dosing at Staleen WTP has demonstrated that there will be no change in the WFD status of surface or ground waterbodies connected to saltmarsh habitat in the Boyne Coast and Estuary SAC. Therefore potential for significant effects on these habitats can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat / no deterioration of its favourable conservation condition is identified as no change to the OP indicative water quality status for these waterbodies has been demonstrated.

#### 6.2.4 (2110) Embryonic shifting dunes, (2120) Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes'), (2130) \*Fixed coastal dunes with herbaceous vegetation

There are two sand dune systems in the site, at Baltray and Mornington, are of conservation value, despite the restricted distribution of the intact areas and the high recreational pressure to which they are subjected. A gradient from embryonic dunes to Marram (*Ammophila arenaria*) dunes and then fixed dunes is shown at both systems. The SSCO (NPWS, 2012a&c) for the dune habitats in the Boyne Coast and Estuary SAC with specific relevance to the current project include the attributes 'Vegetation composition: typical species and sub-communities' and 'Vegetation composition: negative indicator



species'. The nutrient-poor status is crucial for the survival of certain vegetation types and so the target for 'Vegetation composition' is to 'Maintain the presence of species-poor communities dominated by marram (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*)'. Species diversity and plant distribution in dunes is reliant on specific nutrient gradients and so the target is to maintain a typical flora for the particular sand dune habitat. Negative indicators (including non-native species), such as nettles (indicators of nutrient enrichment), should represent <5% of the vegetation cover.

**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 dune habitats in the Boyne Coast and Estuary SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0170mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180 mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P) and so there is no risk of significant deterioration in water quality for this TWB and the WFD OP status remains unchanged ie High/Good in Summer/Winter. Therefore, there is no risk of deterioration in water quality for this TWB.
- Boyne Estuary Plume Zone coastal waterbody (IE\_EA\_010\_0000) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0135 mg/l P (summer) and 0.0335 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.
- Louth Coast (HA 06) coastal waterbody (IE\_NB\_025\_0000) which has a 'High' OP indicative water quality in summer and a 'Good' OP indicative water quality in winter, a baseline concentration of 0.0125 mg/l P in summer and 0.0325 mg/l P in winter, a cumulative load of 58.6 kg/yr, a potential concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and 'Good' in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.

The EAM assessment results which evaluate the additional OP loading from dosing at Staleen WTP has demonstrated that there will be no change in the OP indicative water quality status of surface or ground waterbodies connected to dune habitats in the Boyne Coast and Estuary SAC. Therefore potential for significant effects on these habitats can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat / no deterioration of its favourable conservation condition is identified as no change to the OP indicative water quality status for these waterbodies has been demonstrated.

### 6.3 RIVER BOYNE AND RIVER BLACKWATER SAC 002299

#### 6.3.1 (7230) Alkaline Fens

There are no SSCOs for the River Boyne and River Blackwater SAC (NPWS, 2018); the main areas of alkaline fen with the SAC are concentrated in the vicinity of Lough Shesk, Freehan Lough and Newtown Lough (NPWS, 2014). These lake waterbodies are a significant distance upstream of the dosing area and lie outside of the zone of influence. Therefore, it is not considered that OP dosing will have an impact on this habitat and is not considered further.

### 6.3.2. (91E0) Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)\*

Wet woodland fringes are located along many stretches of the Boyne. The Boyne River Islands are a small chain of three islands situated 2.5 km west of Drogheda. The islands were formed by the build-up of alluvial sediment in this part of the river where water movement is sluggish. All of the islands are covered by dense thickets of wet, willow (*Salix* spp.) woodland. A small area of Alder (*Alnus glutinosa*) woodland is found on soft ground at the edge of the canal in the north-western section of the islands. Along other stretches of the rivers of the site Rusty Willow scrub and pockets of wet woodland dominated by Alder have become established, particularly at the river edge of mature deciduous woodland (NPWS, 2014).

Alluvial woodland is present approximately 400 m upstream of the dosing area. Alluvial woodlands require periodic flooding from the river waterbody; no change to the flooding regime of the Boyne and Blackwater Rivers will result from the proposed dosing operation. Changes to the nutrient status of the river may impact upon Alluvial woodlands by, for example, encouraging negative indicator species.

**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 alluvial woodland habitat in the River Boyne and River Blackwater Estuary SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on:

- Boyne\_180 river waterbody (IE\_EA\_07B042200) has a 'High' OP indicative water quality status, a baseline concentration of 0.0203 mg/l P and a modelled dosing concentration of 0.0003 mg/l P. The OP indicative water quality after dosing remains at High status. Therefore there is no risk of deterioration in water quality for this RWB.
- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0170 mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180 mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P) and so there is no risk of significant deterioration in water quality for this TWB and the OP indicative water quality status remains unchanged ie High/Good in Summer/Winter. Therefore, there is no risk of deterioration in water quality for this TWB.
- Drogheda GWB (IE\_EA\_G\_025) has a 'Good' OP indicative water quality status and the modelled dosing concentration is >0.00175 mg/l P (0.0040 mg/l P) however the EAM has determined that although the GWB increase is not insignificant, the impact on the associated RWB is negligible and as alluvial woodland is not a GWDE, it is therefore considered not to impact on this QI within the River Boyne and River Blackwater SAC.

The EAM assessment results which evaluate the additional OP loading from dosing at Staleen WTP has demonstrated that there will be no change in the OP indicative water quality status of surface waterbodies connected to alluvial woodland habitat in River Boyne and River Blackwater SAC. Therefore potential for significant effects on these habitats can be excluded.

Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat / no deterioration of its favourable conservation condition is identified as no change to the OP indicative water quality status for these waterbodies has been demonstrated.

### 6.3.3 (1099) River Lamprey *Lampetra fluviatilis* and (1106) Salmon *Salmo salar*

Adult Atlantic salmon spawn in freshwater channels and juvenile salmon generally live for two years in freshwater before descending to the sea as smolts. Adult River Lamprey spawn in freshwater and adults live in the sea; they may spend one to two years in estuarine habitat before reaching maturity

(Maitland, 2003). Habitat use by the above listed fish species, therefore potentially extends throughout all reaches of the River Boyne and River Blackwater SAC.

Water quality is a particular threat to all fish fauna listed as qualifying interests. The latest Red List of Irish amphibians, reptiles & freshwater fish (King *et al.*, 2011) highlights the deterioration in water quality and ongoing point and diffuse sources of pollution as a key threat to these species and includes the potential effects from municipal discharges. A deterioration in water quality has the potential for a detrimental effect on spawning habitats, particularly where nutrient conditions result in excessive algal growth and macrophyte abundance, leading to smothering, shading effects, alteration of macroinvertebrate communities and silt deposition. Salmon require a Q value of at least 4, which equates to good ecological status.

**Table 3** identifies the surface waterbodies and groundwater bodies that are hydrologically or hydrogeologically connected to the proposed OP dosing and which are further connected to the above listed fish fauna in the River Boyne and River Blackwater SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on OP indicative water quality on waterbodies:

- Boyne\_180 river waterbody (IE\_EA\_07B042200) has a 'High' OP indicative water quality status, a baseline concentration of 0.0203 mg/l P and a modelled dosing concentration of 0.0003 mg/l P. The OP indicative water quality after dosing remains at High status. Therefore there is no risk of deterioration in water quality for this RWB.
- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0170 mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180 mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P) and so there is no risk of significant deterioration in water quality for this TWB and the OP indicative water quality status remains unchanged ie High/Good in Summer/Winter. Therefore, there is no risk of deterioration in water quality for this TWB.
- Drogheda GWB (IE\_EA\_G\_025) has a 'Good' OP indicative water quality status and the modelled dosing concentration is >0.00175 mg/l P (0.0040 mg/l P) however the EAM has determined that although the GWB increase is not insignificant, the impact on the associated RWB is negligible and as alluvial woodland is not a GWDTE, it is therefore considered not to impact on this QI within the River Boyne and River Blackwater SAC.

The EAM assessment results which evaluate the additional OP loading from dosing at the existing Staleen WTP on OP indicative water quality statuses have demonstrated that there will be no change in the status of the above-mentioned surface waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning potential for significant effects on these species can be excluded in the River Boyne and River Blackwater SAC.

Furthermore, dosing will not prevent the maintenance/ restoration of the favourable conservation condition of salmon and lamprey in River Boyne and River Blackwater SAC/ no deterioration of their favourable conservation condition is identified.

#### 6.3.4 (1355) Otter *Lutra lutra*

Otter is present throughout the River Boyne and River Blackwater SAC (NPWS, 2014). Otter use the river, streams and associated riparian habitats for feeding, travelling, resting and breeding. A review of the COs for otter found no specific attributes or targets relating to water quality however in the National Parks and Wildlife Service's Threat Response Plan for the Otter (NPWS, 2009), a review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. There will be no interference with the terrestrial, marine or freshwater habitat of Otter as a result of this project. The diet of the species varies locally and seasonally; however, it is dominated by fish, in

particular salmonids, eels and sticklebacks in freshwater. A nutrient quality target of 'good' status is adopted here, to align with that outlined for fish fauna that form part of the diet of otter in the River Boyne and River Barrow SAC.

**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 the River Boyne and River Barrow SAC. The EAM (**Table 3; Appendix C**) has assessed the potential for impact on Orthophosphate indicative water quality on:

- Boyne\_180 river waterbody (IE\_EA\_07B042200) has a 'High' OP indicative water quality status, a baseline concentration of 0.0203 mg/l P and a modelled dosing concentration of 0.0003 mg/l P. The OP indicative water quality after dosing remains at High status. Therefore there is no risk of deterioration in water quality for this RWB.
- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0170 mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180 mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P) and so there is no risk of significant deterioration in water quality for this TWB and the OP indicative water quality status remains unchanged i.e. High/Good in Summer/Winter. Therefore, there is no risk of deterioration in water quality for this TWB.
- Drogheda GWB (IE\_EA\_G\_025) has a 'Good' OP indicative water quality status and the modelled dosing concentration is >0.00175 mg/l P (0.0040 mg/l P) however the EAM has determined that although the GWB increase is not insignificant, the impact on the associated RWB is negligible and as alluvial woodland is not a GWDTE, it is therefore considered not to impact on this QI within the River Boyne and River Blackwater SAC.

The EAM assessment results which evaluate the additional OP loading from dosing at the existing Staleen WTP on OP indicative water quality statuses have demonstrated that there will be no change in the status of the above-mentioned surface waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning potential for significant effects on otter can be excluded in the River Boyne and River Blackwater SAC.

Furthermore, dosing will not prevent the maintenance/ restoration of the favourable conservation condition of otter in River Boyne and River Blackwater Estuary SAC/ no deterioration of its favourable conservation condition is identified.

## 6.4 BOYNE ESTUARY SPA 004080

6.4.1 (A048) Shelduck (*Tadorna tadorna*), (A130) Oystercatcher (*Haematopus ostralegus*), (A140) Golden Plover (*Pluvialis apricaria*), (A141) Grey Plover (*Pluvialis squatarola*), (A142) Lapwing (*Vanellus vanellus*), (A143) Knot (*Calidris canutus*), (A144) Sanderling (*Calidris alba*), (A156) Black-tailed Godwit (*Limosa limosa*), (A162) Redshank (*Tringa tetanus*), (A169) Turnstone (*Arenaria interpres*), (A195) Little Tern (*Sterna albifrons*), (A999) Wetlands

The Boyne Estuary SPA is a moderately sized coastal site incorporating most of the Boyne Estuary. The SPA supports internationally and nationally important number of wintering birds and nationally important numbers of breeding Little Tern (NPWS, 2013a&b). The SSCOs for the Boyne Estuary SPA list targets for the following species: (A048) Shelduck (*Tadorna tadorna*), (A130) Oystercatcher (*Haematopus ostralegus*), (A140) Golden Plover (*Pluvialis apricaria*), (A141) Grey Plover (*Pluvialis squatarola*), (A142) Lapwing (*Vanellus vanellus*), (A143) Knot (*Calidris canutus*), (A144) Sanderling (*Calidris alba*), (A156) Black-tailed Godwit (*Limosa limosa*), (A162) Redshank (*Tringa totanus*), (A195) Little Tern (*Sterna albifrons*). The targets for each species relate to:

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

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

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

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

- Boyne Estuary transitional waterbody (IE\_EA\_010\_0100) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0170 mg/l P (summer) and 0.0360 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0180 mg/l P (summer) and 0.0370 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l) and so there is no risk of significant deterioration in water quality for this TWB and the WFD OP status remains unchanged i.e. High/Good in Summer/Winter
- Boyne Estuary Plume Zone coastal waterbody (IE\_EA\_010\_0000) which has a 'High' OP status in summer and a 'Good' OP status in winter, a baseline concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter), a cumulative load of 1734.1 kg/yr, a potential concentration of 0.0135 mg/l P (summer) and 0.0335 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and a 'Good' OP status in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.
- Louth Coast (HA 06) coastal waterbody (IE\_NB\_025\_0000) which has a 'High' OP indicative water quality in summer and a 'Good' OP indicative water quality in winter, a baseline concentration of 0.0125 mg/l P in summer and 0.0325 mg/l P in winter, a cumulative load of 58.6 kg/yr, a potential concentration of 0.0125 mg/l P (summer) and 0.0325 mg/l P (winter) following dosing, and a 'High' OP status following dosing in summer and 'Good' in winter. The increase in P following dosing is below the 5% of Good/ High boundary for SW (0.00125 mg/l P). Therefore, there is no risk of deterioration in water quality for this CWB.

The EAM assessment results which evaluate the additional OP loading from dosing at the existing Staleen WTP on OP indicative water quality statuses have demonstrated that there will be no change in the OP indicative water quality of the above-mentioned waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effect to wintering and breeding birds and wetland habitats in Boyne Estuary SPA.

Furthermore, dosing will not prevent the maintenance/ restoration of the favourable conservation condition of wintering and breeding birds and wetland habitats in the Boyne Estuary SPA/ no deterioration of its favourable conservation condition is identified.

## 6.5 RIVER BOYNE AND RIVER BLACKWATER SPA 004232

### 6.5.1 (A229) Kingfisher *Alcedo atthis*

There are no SSCOs for the River Boyne and River Blackwater SPA (NPWS, 2018). The Site Synopsis (NPWS, 2010) reported 19 pairs of kingfisher in the River Boyne and River Blackwater SPA site. Kingfisher have been identified as nutrient sensitive and water dependent (Appendix B).

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 kingfisher in the River Boyne and River Blackwater SPA. The EAM (Table 3; Appendix C) has assessed the potential for impact on OP indicative water quality on:

- Boyne\_180 river waterbody (IE\_EA\_07B042200) has a 'High' OP indicative water quality status, a baseline concentration of 0.0203 mg/l P and a modelled dosing concentration of 0.0003 mg/l P. The OP indicative water quality after dosing remains at High status. Therefore there is no risk of deterioration in water quality for this RWB.

The EAM assessment results which evaluate the additional OP loading from dosing at the existing Staleen WTP on OP indicative water quality statuses have demonstrated that there will be no change in the OP indicative water quality of the above-mentioned waterbodies, there is sufficient capacity within the status threshold, and there will be no alteration to water quality meaning there is no potential for significant effect to kingfisher in the River Boyne and River Blackwater SPA.

Furthermore, dosing will not prevent the maintenance/ restoration of the favourable conservation condition of kingfisher in the River Boyne and River Blackwater SPA / no deterioration of its favourable conservation condition is identified.

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

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

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

A search of Laois County Council planning enquiry system was conducted for developments that may have in-combination effects on European Sites with the Zol. Plans relevant to the area were searched in order to identify any elements of the plans that may act cumulatively or in-combination with the proposed development. Based on this search and the Project Teams knowledge of the study area a list of those

projects and Plans which may potentially contribute to cumulative or in-combination effects with the proposed realignment project was generated and listed in **Table 5** below.



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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
<p><b>Louth County Development Plan 2015 – 2021.</b></p> <p>The policies of relevance in the Louth County Development Plan include under Chapter 8, section 4 Water Quality:</p> <p>To develop, protect, improve and extend, water wastewater, surface water and flood alleviation services throughout the county and to prioritise the provision of water services infrastructure to complement the overall strategy for economic and population growth and to achieve improved environmental protection.</p>	<ul style="list-style-type: none"> <li>▪ N/A</li> </ul>	<p>The Louth County Development Plan 2015 – 2021 outlines the importance of compliance with the Eastern River Basin Management Plan and the Neagh Bann River Basin District Management Plan(now replaced by the national River Basin Management Plan 2018-2021), and emphasises compliance with environmental objectives. There is no potential for cumulative effects with these plans.</p>
<p><b>River Basin Management Plan For Ireland 2018 – 2021</b></p> <p>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; nevertheless, this figure does not reflect a significant number of improvements and dis-improvements across these waters since 2009. Provisional figures from the EPA suggest that approximately 900 river waterbodies and lakes have either improved or dis-improved. In addition, the previously observed long term trend of decline in the number of high status river sites has continued.</p> <p>Chapter 5 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each waterbody that is <i>At Risk</i> of not meeting the environmental objectives of the WFD. Importantly, the assessment includes a review of trends over time to see if conditions were likely to remain stable, improve or deteriorate by 2021. This work was presented in the RBMP for 81% of waterbodies nationally, which had been characterised at the time. 1,517 waterbodies were classed <i>At Risk</i> 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 <i>At Risk</i>. Urban waste water, hydromorphology and forestry were also significant pressures amongst others.</p>	<ul style="list-style-type: none"> <li>▪ N/A</li> </ul>	<p>The objectives of the RBMP are to:</p> <ul style="list-style-type: none"> <li>▪ Prevent deterioration;</li> <li>▪ Restore good status;</li> <li>▪ Reduce chemical pollution; and</li> <li>▪ Achieve water related protected areas objectives.</li> </ul> <p>The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each waterbody. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of this plan will have a positive impact on biodiversity and the Project will not affect the achievement of the RBMP objectives.</p>
<p><b>Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive</b></p> <p>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,</p>	<ul style="list-style-type: none"> <li>▪ Habitat loss or destruction;</li> <li>▪ Habitat fragmentation or degradation;</li> </ul>	<p>CFRAM Studies and their product Flood Risk Management Plans, will each undergo appropriate assessment. Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of</p>



<p>to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.</p>	<ul style="list-style-type: none"> <li>▪ Alterations to water quality and/or water movement;</li> <li>▪ Disturbance; and</li> <li>▪ In-combination impacts within the same scheme</li> </ul>	<p>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.</p>
<p><b>Foodwise 2025</b> Foodwise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth Projection includes increasing the value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion.</p>	<ul style="list-style-type: none"> <li>▪ Land use change or intensification;</li> <li>▪ Water pollution;</li> <li>▪ Nitrogen deposition; and</li> <li>▪ Disturbance to habitats / species</li> </ul>	<p>Foodwise 2025 was subject to its own AA<sup>11</sup>. Growth is to be achieved through sustainable intensification to maximise production efficiency whilst minimising the effects on the environment however there is increased risk of nutrient discharge to receiving waters and in turn a potential risk to biodiversity and Europe Sites if not controlled. With the required mitigation in the Food Wise Plan, no significant in-combination effects are predicted. Mitigation measures included cross compliance with 13 Statutory Management Requirements, EIA Agricultural Regulations 2011, GLAS, and AA Screening of licencing and permitting in the forestry and seafood sectors.</p>
<p><b>Rural Development Programme 2014 – 2020</b> The agricultural sector is actively enhancing competitiveness whilst trying to achieve more sustainable management of natural resources. The common set of objectives, principles and rules through which the European Union co-ordinates support for European agriculture is outlined in the Rural Development Programme (RDP) 2014-2020 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</p>	<ul style="list-style-type: none"> <li>▪ Overgrazing;</li> <li>▪ Land use change or intensification;</li> <li>▪ Water pollution;</li> <li>▪ Nitrogen deposition; and</li> <li>▪ Disturbance to habitats / species;</li> </ul>	<p>The RDP for 2014 – 2020 has been subject to SEA<sup>12</sup>, and AA<sup>13</sup>. 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</p>

<sup>11</sup><http://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/environmentalanalysis/AgriFoodStrategy2025NISDRAFT300615.pdf>

<sup>12</sup><https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/StrategEnvironmAssessSumState090615.pdf>

<sup>13</sup><https://www.agriculture.gov.ie/media/migration/agarchive/ruralenvironment/preparatoryworkfortherdp2014-2020/RDP20142020DraftAppropriateAssessmentReport160514.pdf>

<p>provide the role of a supportive measure to improve water quality and thus provide direct benefits in achieving the measures within the RBMP.</p> <p>The achievement of the objectives outlined within GLAS, to improve water quality, mitigate against climate change and promote biodiversity will be of direct positive benefit in achieving the measures within the RBMP and the goals of the Natura Directives. The scheme has an expected participation for 2014-2020 of 50,000 farmers which have to engage in specific training and tasks in order to receive full payment. Farmers within the scheme must have a nutrient management plan which is a strategy for maximising the return from on and off-farm chemical and organic fertilizer resources. This has a direct positive contribution towards protecting waterbodies from pollution through limiting the amount of fertiliser that is placed on the land. The scheme prioritises farms in vulnerable catchments with 'high status' waterbodies and also focuses on educating farmers on best practices to try and improve efficiency along with environmental outcomes.</p> <p>The TAMS scheme is open to all farmers and is focused on supporting productive investment for modernisation. This financial grant for farmers is focused on the pig and poultry sectors, dairy equipment and the storage of slurry and other farmyard manures. Within the TAMS scheme are two further schemes; the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have the ability to contribute towards a reduction in point and diffuse source pollution through improved nutrient management.</p>		<p>measures in place, it was concluded that there would be no significant in-combination effects on Natura 2000 sites.</p>
<p><b>National Nitrates Action Programme</b></p> <p>Ireland is obliged under the Nitrates Directive 91/676/EEC to prepare a National Nitrates Action Programme which is designed to prevent pollution of surface and ground waters from agricultural sources. This will directly contribute to the improvement of water quality and thus the objectives within the RBMP. Ireland's 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.</p>	<ul style="list-style-type: none"> <li>▪ Land use change or intensification;</li> <li>▪ Water pollution;</li> <li>▪ Nitrogen deposition; and</li> <li>▪ Disturbance to habitats / species</li> </ul>	<p>This programme has been subject to a Screening for Appropriate Assessment and it concluded that the NAP will not have a significant effect on the Natura 2000 network and a Stage 2 AA was not required<sup>14</sup>. It concluded that the NAP was an environmental programme which imposes environmental constraints on all agricultural systems in the state. It therefore benefits Natura 2000 sites and their species. In terms of in-combination effects, it stated that the Food Wise 2025 strategy would have to operate within the constraints of the NAP.</p>
<p><b>Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2014 - 2020</b></p>	<ul style="list-style-type: none"> <li>▪ Habitat loss or destruction;</li> </ul>	<p>Ireland's Forestry Programme 2014 – 2020 has undergone AA<sup>15</sup>. A key recommendation is that all proposed forestry</p>

<sup>14</sup> [http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/Environment/Water/FileDownload\\_35218.en.PDF](http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/Environment/Water/FileDownload_35218.en.PDF)

<sup>15</sup> <https://www.agriculture.gov.ie/media/migration/forestry/publicconsultation/newforestryprogramme2014-2020/nis/ForestryProgrammeNaturalImpactStatement290914.pdf> 663

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

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

## 7. SCREENING CONCLUSION STATEMENT

This Screening for AA has considered the potential for significant effects on European Sites arising from the proposed OP dosing at Donore Reservoir, within the South Louth and East Meath WSZs and the Zol. 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 Clogherhead SAC (001459), Boyne Coast and Estuary SAC (001957), River Boyne and River Blackwater SAC (002299), River Boyne and River Blackwater SPA (004232) and Boyne Estuary SPA (004080) 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 no 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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NPWS (2013a) Conservation Objectives: Boyne Estuary SPA 004080. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013b) Boyne Estuary SPA (004080) Conservation objectives supporting document (Version 1). National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS (2013a) Article 17 Overview Report (Vol. 1) The Status of EU Protected Habitats and Species in Ireland.

NPWS (2013b) Article 17 Habitat Conservation Assessments (Vol. 2) Version 1.1. The Status of EU Protected Habitats and Species in Ireland.

NPWS (2013c) Article 17 Species Conservation Assessments (Vol. 3) Version 1.1. The Status of EU Protected Habitats and Species in Ireland.

NPWS (2013) Ireland's Summary Report for the period 2008 – 2012 under Article 12 of the Birds Directive. [https://circabc.europa.eu/sd/a/a211d525-ff4d-44f5-a360-e82c6b4d3367/IE\\_A12NatSum\\_20141031.pdf](https://circabc.europa.eu/sd/a/a211d525-ff4d-44f5-a360-e82c6b4d3367/IE_A12NatSum_20141031.pdf)

NPWS (2014) Site Synopsis: River Boyne and River Blackwater SAC (002299). DAHG.

NPWS (2015) Water Framework Directive Annex IV Protected Areas: Water Dependent Habitats and Species and High Status Sites.

NPWS (2017a) Conservation Objectives: Clogher Head SAC 001459. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2017b) Clogher Head SAC (001459) Conservation objectives supporting document- Coastal habitat (Version 1). National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

NPWS (2018) Conservation objectives for River Boyne and River Blackwater SAC [002299]. Generic Version 6.0. Department of Culture, Heritage and the Gaeltacht

UKTAG (2009) Reporting confidence in groundwater status assessments. 4pp.

<http://www.wfduk.org/resources%20/reporting-confidence-groundwater-status-ssessments>



# Appendix A

## European Sites - Conservation Objectives

# National Parks and Wildlife Service

## *Conservation Objectives Series*

Clogher Head SAC 001459



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

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



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**Citation:**

**NPWS (2017) Conservation Objectives: Clogher Head SAC 001459. Version 1.  
National Parks and Wildlife Service, Department of Arts, Heritage, Regional,  
Rural and Gaeltacht Affairs.**

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

## Introduction

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

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

### **Notes/Guidelines:**

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

## Qualifying Interests

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

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001459 Clogher Head SAC

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1230 Vegetated sea cliffs of the Atlantic and Baltic coasts

4030 European dry heaths

## Supporting documents, relevant reports & publications

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

### NPWS Documents

<b>Year :</b>	2011
<b>Title :</b>	National survey and assessment of the conservation status of Irish sea cliffs
<b>Author :</b>	Barron, S.J.; Delaney, A.; Perrin, P.M.; Martin, J.; O'Neill, F.
<b>Series :</b>	Irish Wildlife Manual No. 53
<b>Year :</b>	2012
<b>Title :</b>	Ireland Red List No. 8: Bryophytes
<b>Author :</b>	Lockhart, N.; Hodgetts, N.; Holyoak, D.
<b>Series :</b>	Ireland Red List series, NPWS
<b>Year :</b>	2013
<b>Title :</b>	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation assessments
<b>Year :</b>	2014
<b>Title :</b>	Guidelines for a national survey and conservation assessment of upland vegetation and habitats in Ireland, Version 2.0
<b>Author :</b>	Perrin, P.M.; Barron, S.J.; Roche, J.R.; O'Hanrahan, B.
<b>Series :</b>	Irish Wildlife Manual No. 79
<b>Year :</b>	2016
<b>Title :</b>	Ireland Red List No. 10: Vascular Plants
<b>Author :</b>	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
<b>Series :</b>	Ireland Red Lists series, NPWS
<b>Year :</b>	2017
<b>Title :</b>	Clogher Head SAC (site code: 1459) Conservation objectives supporting document- coastal habitats V1
<b>Author :</b>	NPWS
<b>Series :</b>	Conservation objectives supporting document

### Other References

<b>Year :</b>	2005
<b>Title :</b>	National inventory of sea cliffs and coastal heaths
<b>Author :</b>	Browne, A.
<b>Series :</b>	Unpublished Report to NPWS

## Spatial data sources

**Year :** 2011  
**Title :** National survey and assessment of the conservation status of Irish sea cliffs  
**GIS Operations :** Clipped to SAC boundary  
**Used For :** 1230 (map 2)

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## Conservation Objectives for : Clogher Head SAC [001459]

### 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 Clogher Head 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 the sub-site (Clogher Head) mapped, total length of cliff sections: 1.63km. See map 2	Based on data from the Irish Sea Cliff Survey (ISCS) (Barron et al., 2011). Cliffs are linear features and are therefore measured in kilometres. The sub-site Clogher Head (ISCS site ID: 07001) was identified using a combination of aerial photos and the DCENR helicopter viewer. The length of cliff was measured (in sections) to give a total estimated area of 1.63km within Clogher Head SAC. The length of cliff is likely to be underestimated. See the Clogher Head SAC conservation objectives supporting document for coastal habitats for further details
Habitat distribution	Occurrence	No decline, subject to natural processes. See map 2	Sea cliffs occur along the coastline around Clogher Head from the beach in the south, to the pier at Port Oriel in the north. Both hard and soft cliffs have been noted at Clogher Head and it is estimated that the majority of the cliffs are of the hard type (Browne, 2005; Barron et al., 2011). See the 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, including groundwater quality, 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 vegetated sea cliffs. Hydrological processes maintain flushes, and in some cases tufa formations, that can be associated with sea cliffs. No hydrological features such as gullies, streams or cascades were identified by the ISCS as occurring at Clogher Head. See the coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the 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). Dry heath occurs adjacent to sea cliff vegetation in Clogher Head SAC. See the 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). The ISCS noted ungrazed grassland on the cliff tops with a vegetation height of 30cm. See the coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in the Irish Sea Cliff Survey (Barron et al., 2011)	Cliff top vegetation includes shrift ( <i>Armeria maritima</i> ), sea campion ( <i>Silene uniflora</i> ), wild carrot ( <i>Daucus carota</i> ), buck's-horn plantain ( <i>Plantago coronopus</i> ), English stonecrop ( <i>Sedum anglicum</i> ), rock sea-spurrey ( <i>Spergularia rupicola</i> ), red fescue ( <i>Festuca rubra</i> ) and kidney vetch ( <i>Anthyllis vulneraria</i> ). These are indicative of maritime grassland on hard cliffs. Coastal heath species such as western gorse ( <i>Ulex gallii</i> ) and sheep's-bit ( <i>Jasione montana</i> ) have been recorded, along with the grassland species cock's-foot ( <i>Dactylis glomerata</i> ), cat's-ear ( <i>Hypochaeris radicata</i> ), lady's bedstraw ( <i>Galium verum</i> ), ribwort plantain ( <i>Plantago lanceolata</i> ) and the lichens <i>Cladonia</i> spp., <i>Xanthoria</i> spp., <i>Caloplaca</i> spp. and <i>Verrucaria</i> spp. See the coastal habitats supporting document for further details
Vegetation composition: negative indicator species	Percentage	Negative indicator species (including non-native species) to represent less than 5% cover	Based on data from Barron et al. (2011). No negative species were recorded by the ISCS in this SAC. See the 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). Apart from western gorse (*Ulex gallii*), which is an integral part of the dry heath vegetation, no bracken or woody species were recorded within this SAC by the ISCS. See the coastal habitats supporting document for further details

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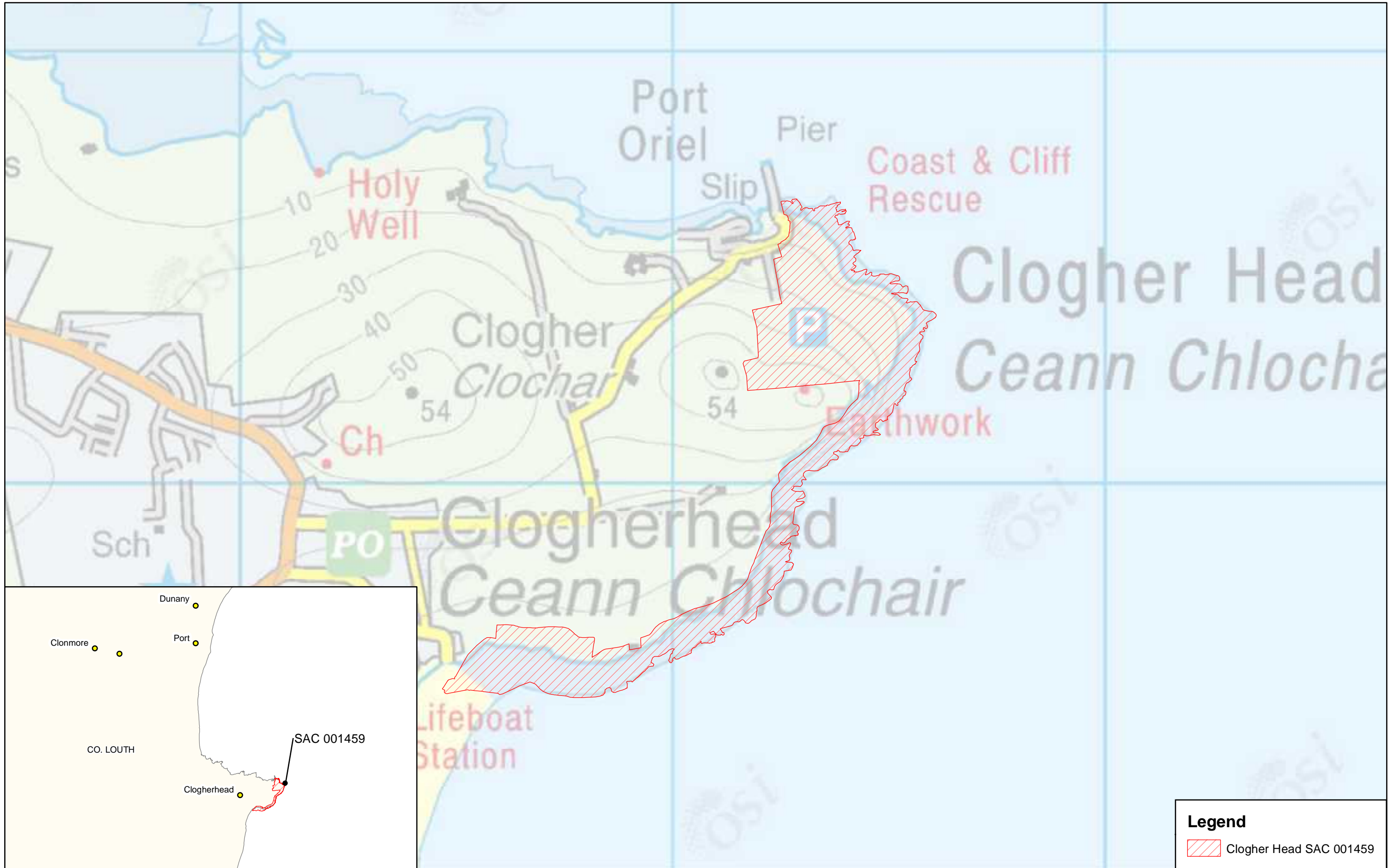
## Conservation Objectives for : Clogher Head SAC [001459]

### 4030 European dry heaths


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

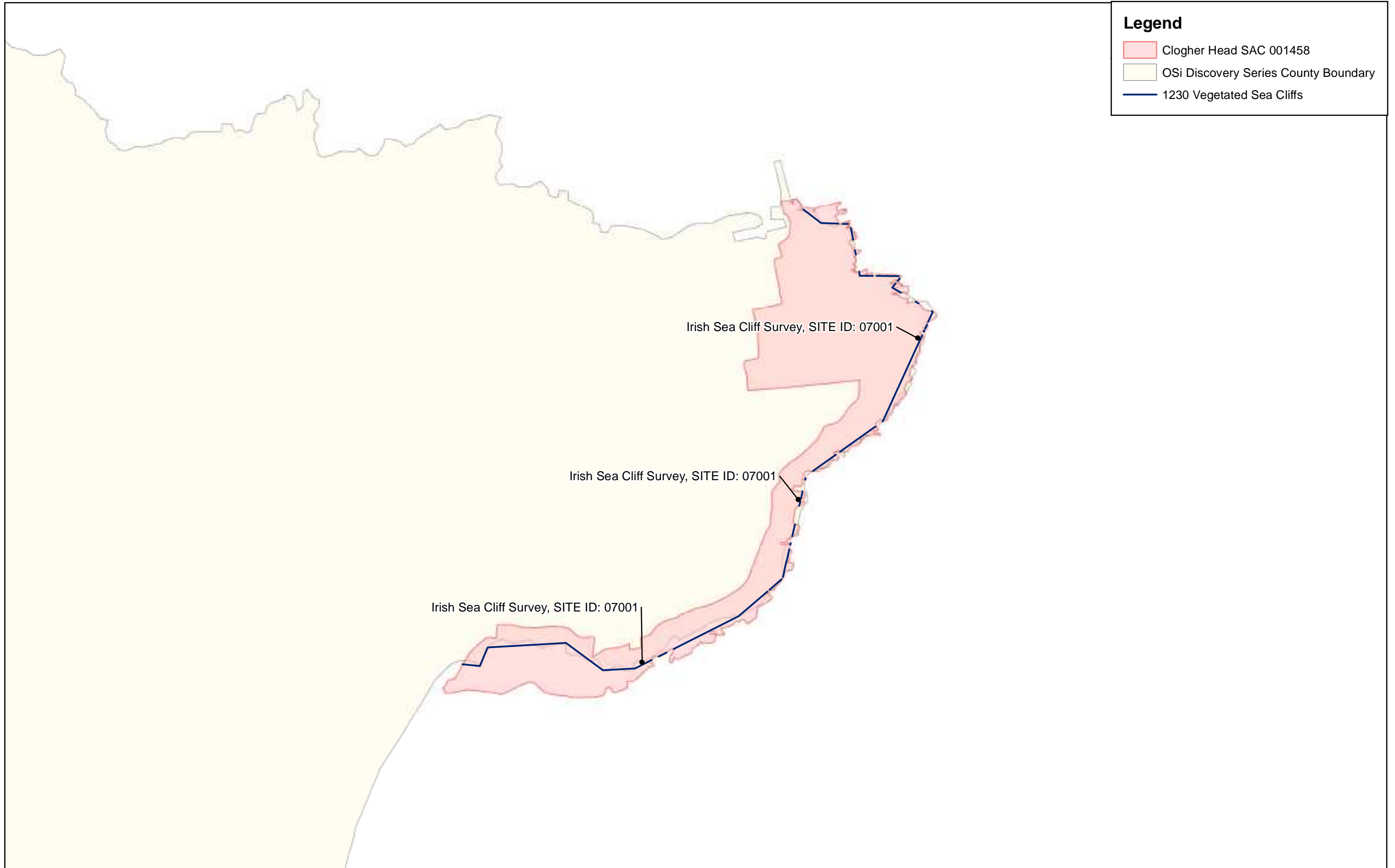
Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	European dry heaths has not been mapped in detail for Clogher Head SAC and thus the total area of the qualifying habitat is unknown. Dry heath is known to occur on thin soils covering rocks. Vegetated sea cliffs (1230), bedrock shore and dry grassland also occur within the SAC (NPWS internal files)
Habitat distribution	Occurrence	No decline, subject to natural processes	See note on area above
Ecosystem function: soil nutrients	Soil pH and appropriate nutrient levels at a representative number of monitoring stops	Maintain soil nutrient status within natural range	Relevant nutrients and their natural ranges are yet to be defined. However, nitrogen deposition is noted as being relevant to this habitat (NPWS, 2013)
Community diversity	Abundance of variety of vegetation communities	Maintain variety of vegetation communities, subject to natural processes	The diversity of dry heath communities within this SAC is unknown. Information on vegetation communities associated with this habitat is presented in Perrin et al. (2014)
Vegetation composition: lichens and bryophytes	Number of species at a representative number of 2m x 2m monitoring stops	Number of bryophyte or non-crustose lichen species present at each monitoring stop is at least three, excluding <i>Campylopus</i> and <i>Polytrichum</i> mosses	Attribute and target based on Perrin et al. (2014). Dry heath is not necessarily rich in lichen and bryophyte species, but a minimum amount should still be present
Vegetation composition: number of positive indicator species	Number of species at a representative number of 2m x 2m monitoring stops	Number of positive indicator species present at each monitoring stop is at least two	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented. Western gorse ( <i>Ulex gallii</i> ), bell heather ( <i>Erica cinerea</i> ) and ling ( <i>Calluna vulgaris</i> ) are listed as present in the dry heath in this SAC (NPWS internal files)
Vegetation composition: cover of positive indicator species	Percentage cover at a representative number of 2m x 2m monitoring stops	Cover of positive indicator species at least 50% for siliceous dry heath and 50-75% for calcareous dry heath	Attribute and target based on Perrin et al. (2014), where the list of positive indicator species for this habitat, which is composed of dwarf shrubs, is also presented
Vegetation composition: dwarf shrub composition	Percentage cover at a representative number of 2m x 2m monitoring stops	Proportion of dwarf shrub cover composed collectively of bog-myrtle ( <i>Myrica gale</i> ), creeping willow ( <i>Salix repens</i> ) and western gorse ( <i>Ulex gallii</i> ) is less than 50%	Attribute and target based on Perrin et al. (2014). Bog-myrtle is indicative of flushed conditions and is more characteristic of wet heaths and blanket bogs. Creeping willow is more characteristic of dune heaths. Western gorse is a component of dry heath, but high proportions of it may indicate a history of undesirable levels of grazing
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). Non-native species can be invasive and have deleterious effects on native vegetation. A low target is set as non-native species can spread rapidly and are most easily dealt with when still at lower abundances
Vegetation 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). High cover of native trees and shrubs would indicate that the habitat may be succeeding towards scrub or woodland due to lack of grazing
Vegetation composition: bracken	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of bracken ( <i>Pteridium aquilinum</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of bracken would indicate that the habitat may be succeeding towards a dense bracken community

Vegetation composition: soft rush	Percentage cover in local vicinity of a representative number of monitoring stops	Cover of soft rush ( <i>Juncus effusus</i> ) less than 10%	Attribute and target based on Perrin et al. (2014). High cover of soft rush would suggest undesirable hydrological conditions. Note however, that poor flushes dominated by soft rush can naturally occur in mosaic with this habitat. Discrete areas of this separate habitat should not be considered here
Vegetation structure: senescent ling	Percentage cover at a representative number of 2m x 2m monitoring stops	Senescent proportion of ling ( <i>Calluna vulgaris</i> ) cover less than 50%	Attribute and target based on Perrin et al. (2014). Senescence is part of the natural cycle of ling, but a dominance of ling in the senescent phase would indicate a lack of management (appropriate grazing or burning) to promote ling regeneration
Vegetation structure: signs of browsing	Percentage of shoots browsed at a representative number of 2m x 2m monitoring stops	Less than 33% collectively of the last complete growing season's shoots of ericoids showing signs of browsing	Attribute and target based on Perrin et al. (2014)
Vegetation structure: burning	Occurrence in local vicinity of a representative number of monitoring stops	No signs of burning in sensitive areas	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. Fires can be part of the natural cycle of dry heaths and may also be used as a valuable management tool to promote a diversity of growth phases in ling ( <i>Calluna vulgaris</i> ). However, currently most hill fires in Ireland are intentionally started to encourage grass growth for livestock. Fires which are too intense, too frequent, too extensive or which occur in sensitive areas are damaging to the habitat
Vegetation structure: growth phases of ling	Percentage cover in local vicinity of a representative number of monitoring stops	Outside sensitive areas, all growth phases of ling ( <i>Calluna vulgaris</i> ) should occur throughout, with at least 10% of cover in the mature phase	Attribute and target based on Perrin et al. (2014), where the list of sensitive areas is also presented. The growth phases of ling are pioneer (<10cm high), building (10-30cm high) and mature (<30cm high). As burning is undesirable in sensitive areas, it is not reasonable to require the stated diversity of growth phases within these areas
Physical structure: disturbed bare ground	Percentage cover at, and in local vicinity of, a representative number of 2m x 2m monitoring stops	Cover of disturbed bare ground less than 10%	Attribute and target based on Perrin et al. (2014). Disturbance can include hoof marks, wallows, human foot prints and vehicle and machinery tracks. Excessive disturbance can result in loss of characteristic species and presage erosion for heaths and peatlands
Indicators of local distinctiveness	Occurrence and population size	No decline in distribution or population sizes of rare, threatened or scarce species associated with the habitat	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)



**Legend**

 Clogher Head SAC 001459



**Legend**

- Clogher Head SAC 001458
- OSi Discovery Series County Boundary
- 1230 Vegetated Sea Cliffs



# National Parks and Wildlife Service

## Conservation Objectives Series

### Boyne Coast and Estuary SAC 001957



*An Roinn  
Ealaíon, Oidhreachta agus Gaeltachta*  

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*Department of  
Arts, Heritage and the Gaeltacht*





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**Citation:**

NPWS (2012) Conservation Objectives: Boyne Coast and Estuary SAC 001957. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

**Series Editors: Rebecca Jeffrey & Naomi Kingston  
ISSN 2009-4086**

## Introduction

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

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

### Notes/Guidelines:

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

## Qualifying Interests

\* indicates a priority habitat under the Habitats Directive

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001957	Boyne Coast and Estuary SAC
1130	Estuaries
1140	Mudflats and sandflats not covered by seawater at low tide
1310	Salicornia and other annuals colonizing mud and sand
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )
2110	Embryonic shifting dunes
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ('white dunes')
2130	*Fixed coastal dunes with herbaceous vegetation ('grey dunes')

**Please note that this SAC overlaps with Boyne Estuary SPA (004080) and is adjacent to the River Boyne and River Blackwater SAC (002299). See map 2. The conservation objectives for this site should be used in conjunction with those for overlapping and adjacent sites as appropriate.**

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

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

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**Title:** Boyne Coast and Estuary SAC (001957). Conservation objectives supporting document - marine habitats. [Version 1]

**Year:** 2012

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** Boyne Coast and Estuary SAC (001957). Conservation objectives supporting document - coastal habitats. [Version 1]

**Year:** 2012

**Author:** NPWS

**Series:** Unpublished Report to NPWS

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**Title:** An intertidal soft sediment survey of the Boyne Coast and Estuary

**Year:** 2011

**Author:** ASU

**Series:** Unpublished Report to NPWS & MI

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**Title:** Benthic Survey of the Boyne Coast and Estuary Special Area of Conservation and Boyne Estuary Special Protection Area

**Year:** 2011

**Author:** EcoServe

**Series:** Unpublished Report to NPWS & MI

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**Title:** Saltmarsh Monitoring Report 2007-2008

**Year:** 2009

**Author:** McCorry, M.; Ryle, T.

**Series:** Unpublished Report to NPWS

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**Title:** Coastal Monitoring Project 2004-2006

**Year:** 2009

**Author:** Ryle, T.; Murray, A.; Connolly, C.; Swann, M.

**Series:** Unpublished Report to NPWS

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**Title:** The phytosociology and conservation value of Irish sand dunes

**Year:** 2008

**Author:** Gaynor, K.

**Series:** Unpublished PhD thesis, National University of Ireland, Dublin

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## Spatial data sources

<b>Year:</b>	2010
<b>Title:</b>	EPA WFD transitional waterbody data
<b>GIS operations:</b>	Clipped to SAC boundary. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	1130 (map 3)
<b>Year:</b>	Interpolated 2012
<b>Title:</b>	Intertidal and subtidal surveys, 2010
<b>GIS operations:</b>	Polygon feature classes from marine community types base data sub-divided based on interpolation of marine survey data. Expert opinion used as necessary to resolve any issues arising
<b>Used for:</b>	Marine community types, 1140 (maps 4 and 5)
<b>Year:</b>	2005
<b>Title:</b>	OSi Discovery series vector data
<b>GIS operations:</b>	High water mark (HWM) and low water mark (LWM) polyline feature classes converted into polygon feature classes and combined; EU Annex I Saltmarsh and Coastal data erased out if present
<b>Used for:</b>	Marine community types base data (map 5)
<b>Year:</b>	Revision 2010
<b>Title:</b>	Saltmarsh Monitoring Project 2007-2008. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary; overlapping regions with Coastal CO data investigated and resolved with expert opinion used
<b>Used for:</b>	1310, 1330 (map 6)
<b>Year:</b>	2009
<b>Title:</b>	Coastal Monitoring Project 2004-2006. Version 1
<b>GIS operations:</b>	QIs selected; clipped to SAC boundary; overlapping regions with Saltmarsh CO data investigated and resolved with expert opinion used
<b>Used for:</b>	2110, 2120, 2130 (map 7)

1130 Estuaries

To maintain the favourable conservation condition of Estuaries in Boyne Coast and Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 3	Habitat area was estimated as 403ha using OSi data and the defined Transitional Water Body area under the Water Framework Directive
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal estuarine mud and fine sand with <i>Hediste diversicolor</i> and <i>Corophium volutator</i> community; and Subtidal fine sand dominated by polychaetes community. See map 5	Habitat structure was elucidated from intertidal and subtidal surveys undertaken in 2010 (ASU, 2011; EcoServe, 2011)

**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 Boyne Coast and Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes. See map 4	Habitat area was estimated using OSi data as 403ha
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal estuarine mud and fine sand with <i>Hediste diversicolor</i> and <i>Corophium volutator</i> community; and Fine sand dominated by bivalves community complex. See map 5	Habitat structure was elucidated from an intertidal survey undertaken in 2010 (ASU, 2011). See marine supporting document for further details



**1310 Salicornia and other annuals colonizing mud and sand**

To restore the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in Boyne Coast and Estuary 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: Baltray- 2.91ha, Mornington- 1.14ha. See map 6	Based on data from Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Habitat mapped at two sub-sites surveyed, giving a total estimated area of 4.05ha. NB further unsurveyed areas maybe present within the site. 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 McCorry and Ryle (2009). <i>Salicornia</i> is an annual species, so its distribution can vary significantly from year to year. At Baltray, saltmarsh is expanding in infilled intertidal zone. Large area of Mornington saltmarsh was reclaimed in the past. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). Sediment supply is particularly important for this pioneer saltmarsh community, as the distribution of this habitat depends on accretion rates. Sediment supply to saltmarshes at Baltray and Mornington is likely to be affected by the construction of navigation walls and dredging of the main channel. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creeks deliver sediment throughout saltmarsh system. At Baltray and Mornington the structure is modified by drainage channels. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	This pioneer saltmarsh community requires regular tidal inundation. 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 McCorry and Ryle (2009). At Baltray and Mornington there are zonations within the saltmarsh habitats as well as transitions to adjacent sand dune systems. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). At Baltray and Mornington grazing is absent and sward height is variable. See coastal habitats supporting document for further details

**1310 Salicornia and other annuals colonizing mud and sand**

To restore the favourable conservation condition of *Salicornia* and other annuals colonizing mud and sand in Boyne Coast and Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species listed in the Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	Based on data from McCorry & Ryle (2009). See coastal habitats supporting document for further details
Vegetation structure: negative indicator species- <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1%	Based on data from McCorry & Ryle (2009). <i>Spartina</i> is well established at this site. Swards of <i>Spartina</i> are widespread at Baltray and there has been significant expansion of <i>Spartina</i> at Mornington since 2000. See coastal habitats supporting document for further details

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

To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia*) in Boyne Coast and Estuary 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: Baltray- 17.67ha, Mornington- 8.76ha. See map 6	Based on data from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Habitat mapped at two sub-sites surveyed, giving a total estimated area of 26.43ha. NB further unsurveyed areas maybe present within the site. 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 McCorry and Ryle (2009). At Baltray there has been some extensive recent development of ASM. At Mornington the saltmarsh may have been more extensive in the past. See coastal habitats supporting document for further details
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions	Based on data from McCorry and Ryle (2009). At Baltray and Mornington saltmarsh development likely to be affected by the construction of navigation walls in the past and dredging of the main channel. See coastal habitats supporting document for further details
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession	Based on data from McCorry and Ryle (2009). Creek and pan structures are well-developed in some parts of Baltray and Mornington but modified in other areas by drainage channels. See coastal habitats supporting document for further details
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime	See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from McCorry and Ryle (2009). At Baltray and Mornington there are zonations within the saltmarsh habitats as well as transitions to adjacent sand dune systems. See coastal habitats supporting document for further details
Vegetation structure: vegetation height	Centimeters	Maintain structural variation within sward	Based on data from McCorry and Ryle (2009). The saltmarshes at Baltray and Mornington are ungrazed by livestock and the sward height is quite variable. See coastal habitats supporting document for further details
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	See coastal habitats supporting document for further details

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

To maintain the favourable conservation condition of Atlantic salt meadows (*Glauco-Puccinellietalia*) in Boyne Coast and Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	See coastal habitats supporting document for further details
Vegetation structure: negative indicator species - <i>Spartina anglica</i>	Hectares	No significant expansion of common cordgrass ( <i>Spartina anglica</i> ), with an annual spread of less than 1%	Based on data from McCorry and Ryle (2009). <i>Spartina</i> is well established at this site. Swards of <i>Spartina</i> are widespread at Baltray and there has been significant expansion of <i>Spartina</i> at Mornington since 2000. See coastal habitats supporting document for further details

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

The status of Mediterranean salt meadows (*Juncetalia maritimi*) as a qualifying Annex I habitat for Boyne Coast and Estuary SAC is currently under review. The outcome of this review will determine whether a site-specific conservation objective is set for this habitat.

Attribute	Measure	Target	Notes

**2110 Embryonic shifting dunes**

To restore the favourable conservation condition of Embryonic shifting dunes in Boyne Coast and Estuary 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: Baltray- 2.52ha, Mornington- 0.67ha. See map 7	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Habitat is very difficult to measure in view of its dynamic nature and was recorded at both sub-sites, giving a total estimated area of 3.18ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 7 for known distribution	Based on data from Ryle et al. (2009). 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). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. The training wall at the mouth of the Boyne Estuary has led to an accumulation of sand at Mornington and enhanced the development of dunes at the northern section. The dunes are accreting at the southern end of Baltray, with wide areas of embryonic dune and strandine fronting mobile and fixed dunes. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). Both sand dune systems at Baltray and Mornington occur adjacent to extensive estuarine saltmarshes. See coastal habitats supporting document for further details
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch ( <i>Elytrigia juncea</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> ) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species: sand couch ( <i>Elytrigia juncea</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> )	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details

**2110 Embryonic shifting dunes**

To restore the favourable conservation condition of Embryonic shifting dunes in Boyne Coast and Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
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). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. See coastal habitats supporting document for further details

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

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) in Boyne Coast and Estuary 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: Baltray- 2.97ha, Mornington- 1.99ha. See map 7	Habitat was mapped during the Coastal Monitoring Project (Ryle et al. 2009). Habitat was recorded at both sub-sites, giving a total estimated area of 4.97ha. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 7 for known distribution	Based on data from Ryle et al. (2009). Shifting dunes were recorded at both Baltray and Mornington 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	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram ( <i>Ammophila arenaria</i> ) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. The training wall at the mouth of the Boyne Estuary has led to an accumulation of sand at Mornington and enhanced the development of dunes at the northern section. The dunes are accreting at the southern end of Baltray, with wide areas of embryonic dune and strandine fronting mobile and fixed dunes. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Gaynor (2008) and Ryle et al. (2009). Both sand dune systems at Baltray and Mornington occur adjacent to extensive estuarine saltmarshes. See coastal habitats supporting document for further details
Vegetation composition: plant health of dune grasses	Percentage cover	More than 95% of marram ( <i>Ammophila arenaria</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> ) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by marram ( <i>Ammophila arenaria</i> ) and/or lyme-grass ( <i>Leymus arenarius</i> )	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details



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

To restore the favourable conservation condition of Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) in Boyne Coast and Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
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). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. Ragwort ( <i>Senecio jacobaea</i> ) was recorded from Mobile dunes at both Baltray and Mornington. 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 Boyne Coast and Estuary 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: Baltray-26.41ha; Mornington-20.46ha. See map 7	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Habitat was recorded at both sub-sites, giving a total estimated area of 46.87ha. See coastal habitats supporting document for further details
Habitat distribution	Occurrence	No decline or change in habitat distribution, subject to natural processes. See map 7 for known distribution	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Fixed dunes recorded at both Baltray and Mornington. 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 the Coastal Monitoring Project (Ryle et al., 2009). The training wall at the mouth of the Boyne Estuary has led to an accumulation of sand at Mornington and enhanced the development of dunes at the northern section. The dunes are accreting at the southern end of Baltray, with wide areas of embryonic dune and strandine fronting mobile and fixed dunes. See coastal habitats supporting document for further details
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Based on data from Ryle et al. (2009). Both sand dune systems at Baltray and Mornington occur adjacent to extensive estuarine saltmarshes. 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) and Ryle et al. (2009). The estimated area of bare sand at Mornington currently accounts for greater than 10% of the fixed dune habitat. See coastal habitats supporting document for further details
Vegetation composition: sward height	Centimeters	Maintain structural variation within sward	Based on data from Gaynor (2008) and Ryle et al. (2009). See coastal habitats supporting document for further details
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain range of sub-communities with typical species listed in Ryle et al. (2009)	Based on data from Gaynor (2008) and Ryle et al. (2009). The locally rare species viper's bugloss ( <i>Echium vulgare</i> ) was recorded in the fixed dunes at Baltray. Mornington is the most northerly known site in Ireland for wild clary ( <i>Salvia verbenaca</i> ). See coastal habitats supporting document for further details

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

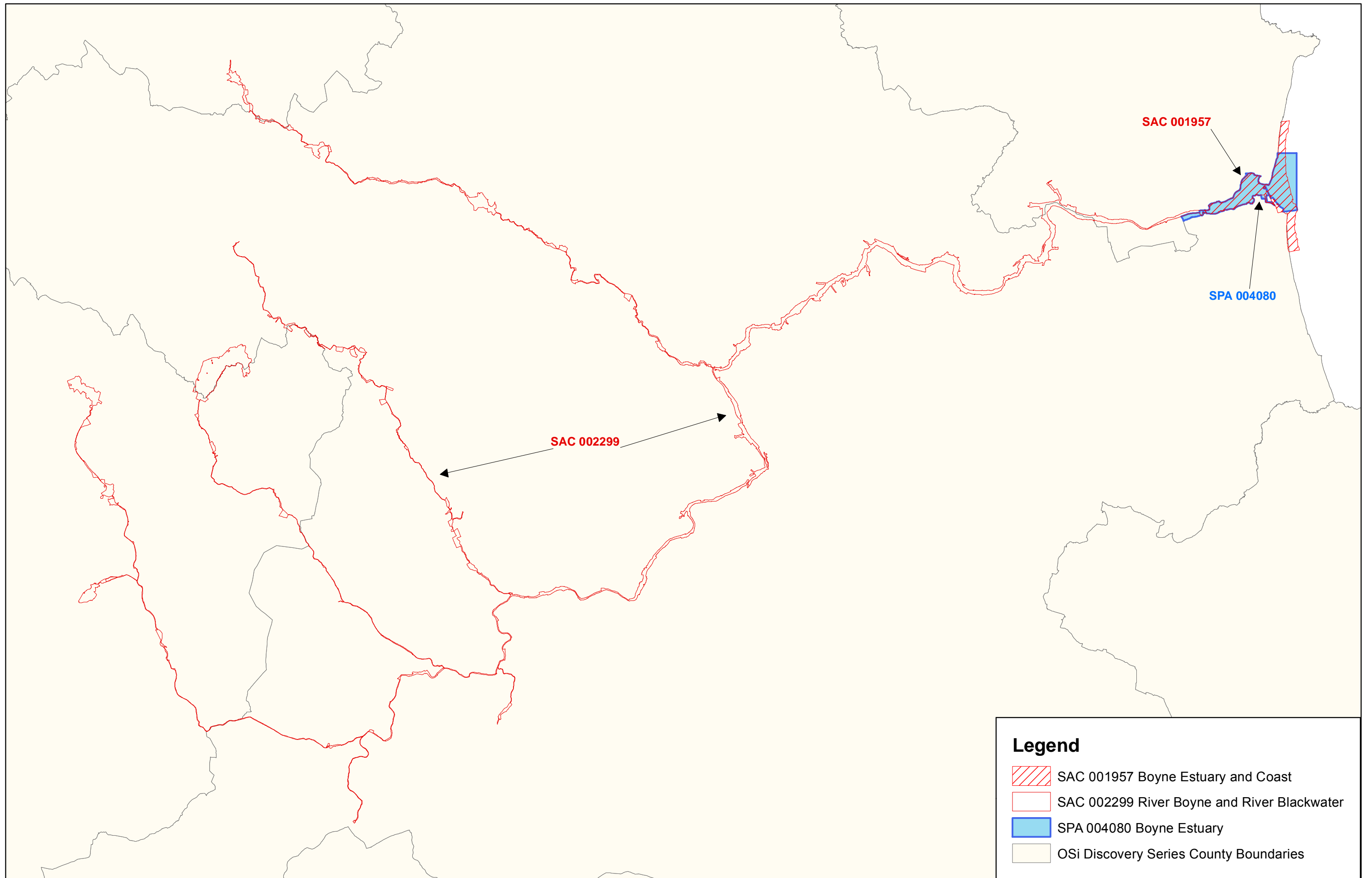
To restore the favourable conservation condition of Fixed coastal dunes with herbaceous vegetation (grey dunes) in Boyne Coast and Estuary SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
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). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn ( <i>Hippophae rhamnoides</i> ) should be absent or effectively controlled. At both Baltray and Mornington, creeping thistle ( <i>Cirsium arvense</i> ), ragwort ( <i>Senecio jacobaea</i> ) and common nettle ( <i>Urtica dioica</i> ) were recorded in fixed dunes. 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). See coastal habitats supporting document for further details







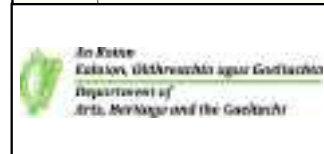






**Legend**

-  SAC 001957 Boyne Estuary and Coast
-  SAC 002299 River Boyne and River Blackwater
-  SPA 004080 Boyne Estuary
-  OSi Discovery Series County Boundaries



**MAP 2:**  
**BOYNE COAST AND ESTUARY SAC**  
**CONSERVATION OBJECTIVES**  
**ADJOINING / OVERLAPPING DESIGNATIONS**  
 Map to be read in conjunction with the NPWS  
 Conservation Objectives Document.

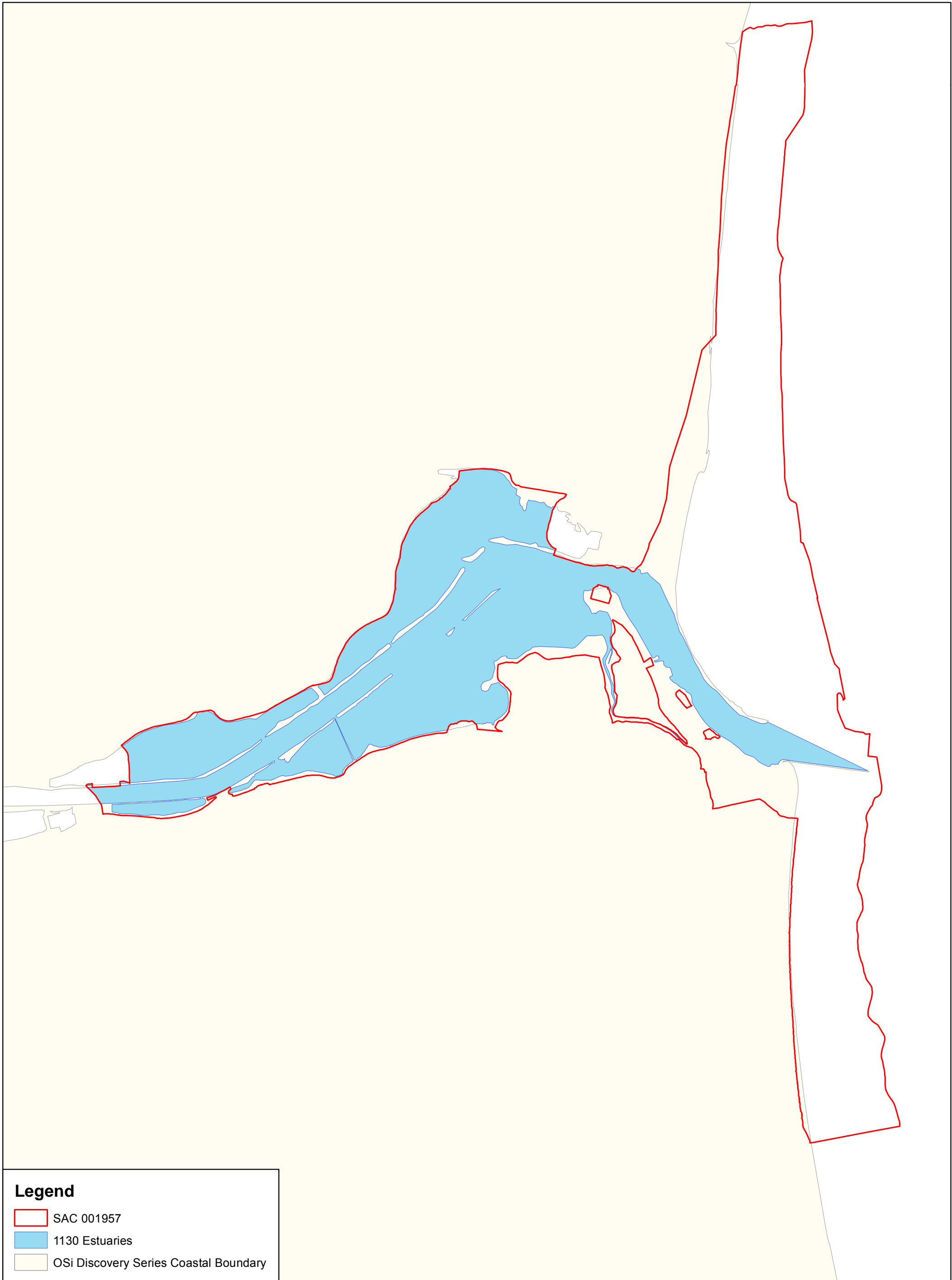
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 SAC 001957 CO. LOUTH; version 1.01, CO. MEATH; version 1.06  
 SAC 002299 CO. CAVAN; version 1.01, CO. LOUTH; version 1.01,  
 CO. WESTMEATH; version 1.05, CO. MEATH; version 1.11  
 SPA 004080 version 3

0 5 10 15 km

Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).

Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)

**N**  
  
 Map Version 1  
 Date: Sept 2012



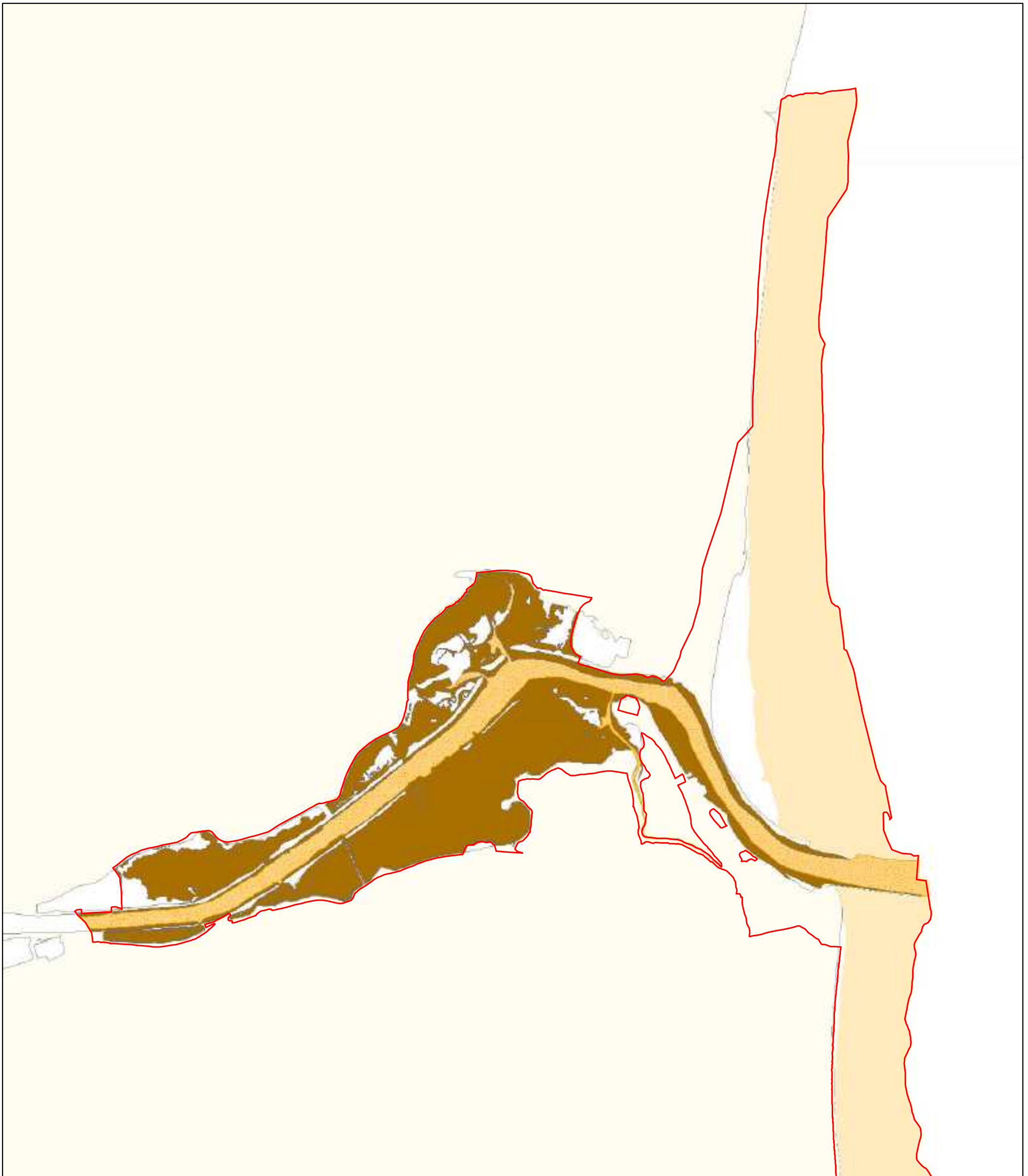
**Legend**

- SAC 001957
- 1130 Estuaries
- OSi Discovery Series Coastal Boundary



**Legend**

- SAC 001957
- 1140 Mudflats and sandflats not covered by seawater at low tide
- OSi Discovery Series Coastal Boundary



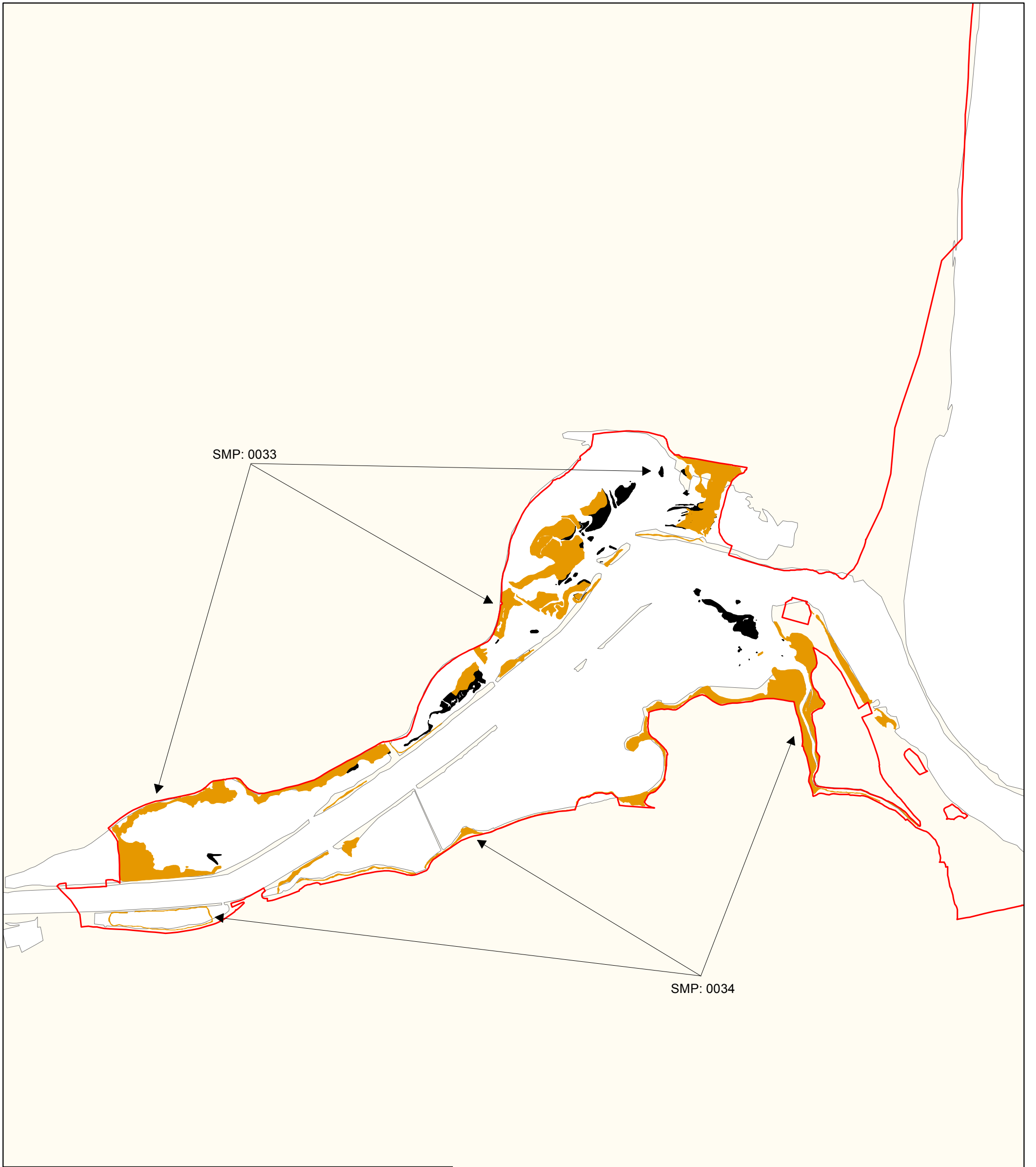
**Legend**

- SAC 001957
- OSi Discovery Series Coastal Boundary

**Marine Community Types**

- Fine sand dominated by bivalves community complex
- Intertidal estuarine mud and fine sand with *Hediste diversicolor* and *Corophium volutator* community
- Subtidal fine sand dominated by polychaetes community





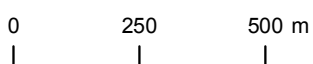
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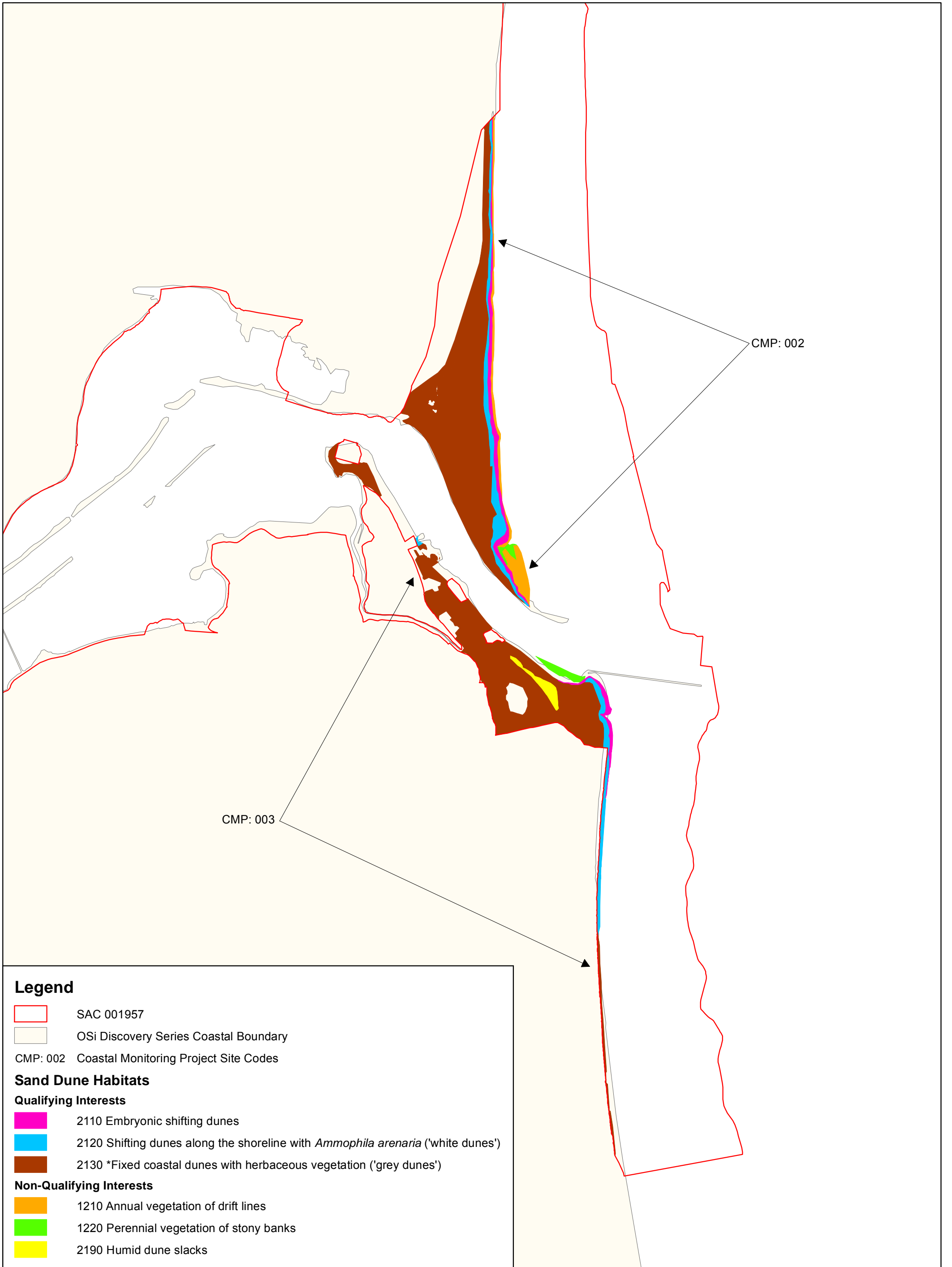
- SAC 001957
- OSi Discovery Series Coastal Boundary
- SMP: 0033 Saltmarsh Monitoring Project Site Codes

**Saltmarsh Habitats**

**Qualifying Interests**

- 1310 *Salicornia* and other annuals colonising mud and sand
- 1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)





**Legend**

- SAC 001957
- OSi Discovery Series Coastal Boundary
- CMP: 002 Coastal Monitoring Project Site Codes

**Sand Dune Habitats**

**Qualifying Interests**

- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- 2130 \*Fixed coastal dunes with herbaceous vegetation ('grey dunes')

**Non-Qualifying Interests**

- 1210 Annual vegetation of drift lines
- 1220 Perennial vegetation of stony banks
- 2190 Humid dune slacks

## Conservation objectives for River Boyne and River Blackwater SAC [002299]

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

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

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

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status of a species is achieved when:

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

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

Code	Description
7230	Alkaline fens
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae)*

\* denotes a priority habitat

Code	Common Name	Scientific Name
1099	River Lamprey	<i>Lampetra fluviatilis</i>
1106	Salmon	<i>Salmo salar</i>
1355	Otter	<i>Lutra lutra</i>

**Citation:** NPWS (2016) Conservation objectives for River Boyne and River Blackwater SAC [002299].  
Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht  
Affairs.

# National Parks and Wildlife Service

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## *Conservation Objectives Series*

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Boyne Estuary SPA 004080



*An Roinn  
Ealaíon, Oidhreachta agus Gaeltachta*  

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*Department of  
Arts, Heritage and the Gaeltacht*



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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

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004080	Boyne Estuary SPA
A048	Shelduck <i>Tadorna tadorna</i>
A130	Oystercatcher <i>Haematopus ostralegus</i>
A140	Golden Plover <i>Pluvialis apricaria</i>
A141	Grey Plover <i>Pluvialis squatarola</i>
A142	Lapwing <i>Vanellus vanellus</i>
A143	Knot <i>Calidris canutus</i>
A144	Sanderling <i>Calidris alba</i>
A156	Black-tailed Godwit <i>Limosa limosa</i>
A162	Redshank <i>Tringa totanus</i>
A169	Turnstone <i>Arenaria interpres</i>
A195	Little Tern <i>Sterna albifrons</i>
A999	Wetlands

**Please note that this SPA overlaps with Boyne Coast and Estuary SAC (001957) and River Boyne and River Blackwater SAC (002299). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping SACs as appropriate.**



## Supporting documents, relevant reports & publications

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

<b>Year :</b>	1995
<b>Title :</b>	Seabird monitoring handbook for Britain and Ireland: a compilation of methods for survey and monitoring of breeding seabirds.
<b>Author :</b>	Walsh, P.; Halley, D.J.; Harris, M.P.; del Nevo, A.; Sim, I.M.W.; Tasker, M.L.
<b>Series :</b>	JNCC, Peterborough
<b>Year :</b>	2004
<b>Title :</b>	Seabird Populations of Britain and Ireland
<b>Author :</b>	Mitchell, P.I.; Newton, S.F.; Ratcliffe, N.; Dunn, T.E.
<b>Series :</b>	Poyser, London
<b>Year :</b>	2010
<b>Title :</b>	2010 report for the little tern conservation project at Baltray, Co. Louth
<b>Author :</b>	Reilly, M.
<b>Series :</b>	Unpublished report by Louth Nature Trust
<b>Year :</b>	2013
<b>Title :</b>	Seabird Monitoring Programme (SMP) Database
<b>Author :</b>	JNCC
<b>Series :</b>	<a href="http://jncc.defra.gov.uk/smp/Default.aspx">http://jncc.defra.gov.uk/smp/Default.aspx</a>
<b>Year :</b>	2013
<b>Title :</b>	BirdLife International Seabird Ecology and Foraging Range Database
<b>Author :</b>	BirdLife International
<b>Series :</b>	<a href="http://seabird.wikispaces.com">http://seabird.wikispaces.com</a>
<b>Year :</b>	2012
<b>Title :</b>	Boyne Estuary SPA (site code 4080) Conservation Objectives Supporting Document V1
<b>Author :</b>	NPWS
<b>Series :</b>	Unpublished report to NPWS

**A048**                      **Shelduck *Tadorna tadorna***

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

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

## Conservation Objectives for : Boyne Estuary SPA [004080]

### A130 Oystercatcher *Haematopus ostralegus*

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

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

**A140 Golden Plover *Pluvialis apricaria***

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

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

## Conservation Objectives for : Boyne Estuary SPA [004080]

### A141 Grey Plover *Pluvialis squatarola*

To maintain the favourable conservation condition of Grey Plover in Boyne Estuary SPA, which is defined by the following list of attributes and targets:

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

**A142 Lapwing *Vanellus vanellus***

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

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

**A143**                      **Knot *Calidris canutus***

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

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

**A144 Sanderling *Calidris alba***

**To maintain the favourable conservation condition of Sanderling in Boyne Estuary SPA, which is defined by the following list of attributes and targets:**

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



**A156 Black-tailed Godwit *Limosa limosa***

**To maintain the favourable conservation condition of Black-tailed Godwit in Boyne Estuary SPA, which is defined by the following list of attributes and targets:**

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

**A162**                      **Redshank *Tringa totanus***

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

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

**A169**                      **Turnstone *Arenaria interpres***

**To maintain the favourable conservation condition of Turnstone in Boyne Estuary SPA, which is defined by the following list of attributes and targets:**

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

**A195 Little Tern *Sterna albifrons***

**To maintain the favourable conservation condition of Little Tern in Boyne Estuary SPA, which is defined by the following list of attributes and targets:**

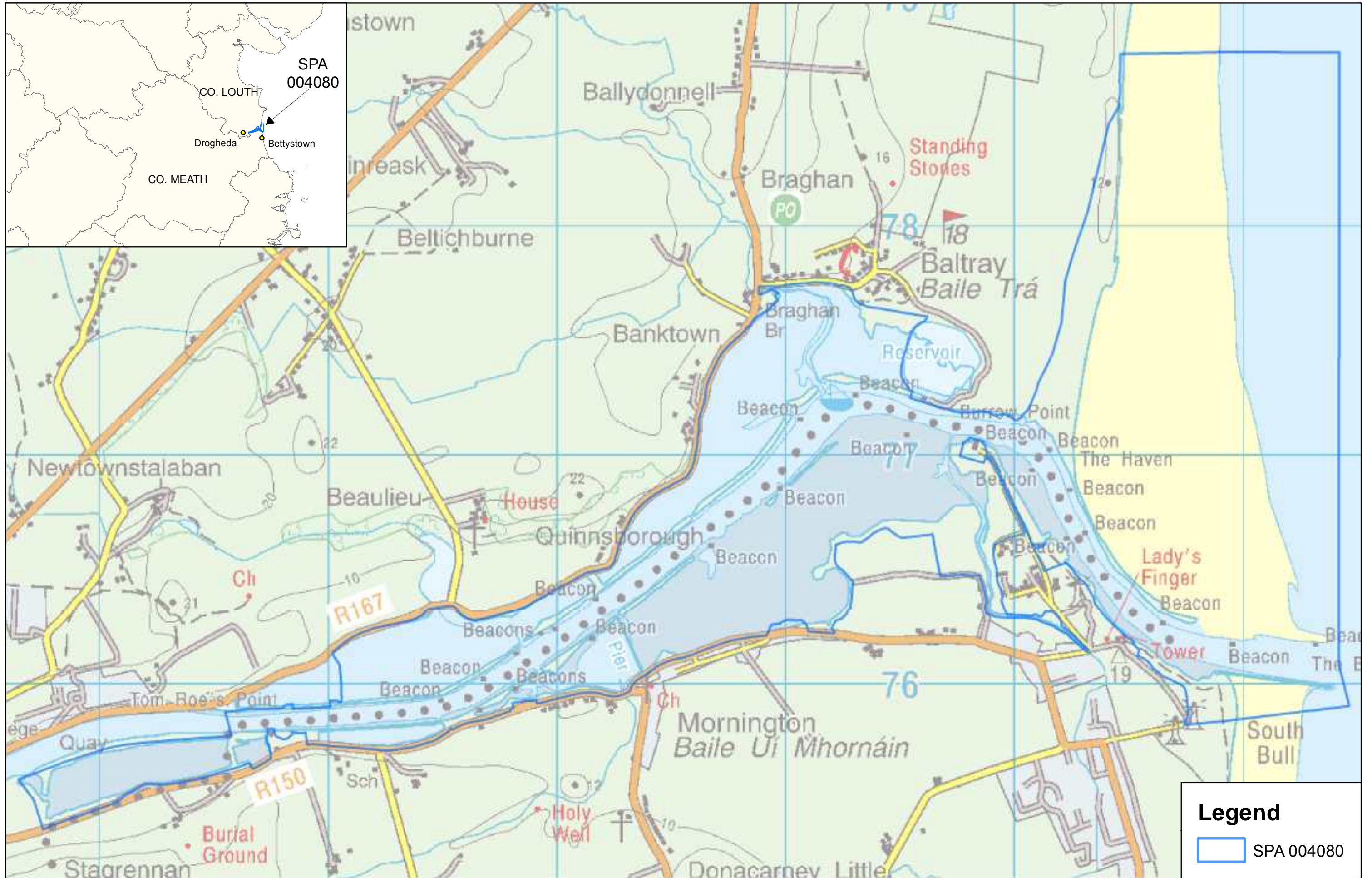
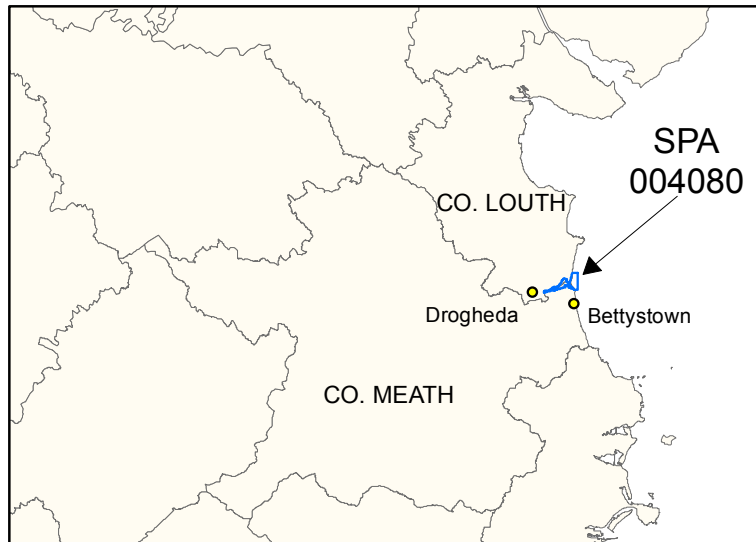
Attribute	Measure	Target	Notes
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). Mitchell et al. (2004) provides summary population information for Louth. The Seabird Monitoring Programme (SMP) also provides background data (JNCC, 2013). In 2010, 43 breeding pairs were recorded at this colony (Reilly, 2010)
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh et al., 1995). For 2010, an estimated productivity rate of 2.2 fledged birds per breeding pair was reported (Reilly, 2010)
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	Little tern nest in well-camouflaged shallow scrapes on sand and shingle beaches, spits or inshore islets (Mitchell et al., 2004). For a description of the area used by the colony in 2010, see Reilly (2010)
Prey biomass available	Kilogrammes	No significant decline	Key prey items: Mainly small, often juvenile, fish; invertebrates, especially crustaceans and insects. Key habitats: Very shallow water, advancing or receding tidelines, brackish lagoons and saltmarsh creeks, sand-banks close to the coast. Foraging range: Max 11km, mean max 6.94km, mean 4.14km (BirdLife International Seabird Database (Birdlife International, 2013))
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	Seabird species can make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: Max 11km, mean max 6.94km, mean 4.14km (BirdLife International Seabird Database (Birdlife International, 2013))
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding little tern population	Little tern nest in well-camouflaged shallow scrapes on sand and shingle beaches, spits or inshore islets (Mitchell et al., 2004)

**A999 Wetlands**

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

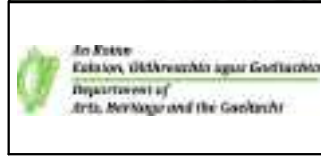
<b>Attribute</b>	<b>Measure</b>	<b>Target</b>	<b>Notes</b>
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 594ha, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 594ha using OSi data and relevant orthophotographs. For further information see part three of the conservation objectives supporting document



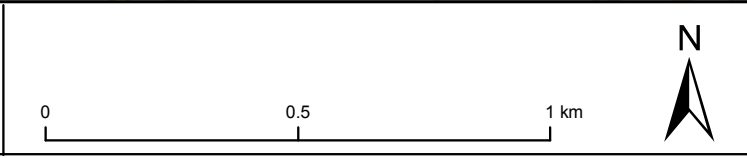


**Legend**

SPA 004080



MAP 1:  
**BOYNE ESTUARY SPA**  
**CONSERVATION OBJECTIVES**  
**SPA DESIGNATION**  
 Map to be read in conjunction with the NPWS  
 Conservation Objectives Document.



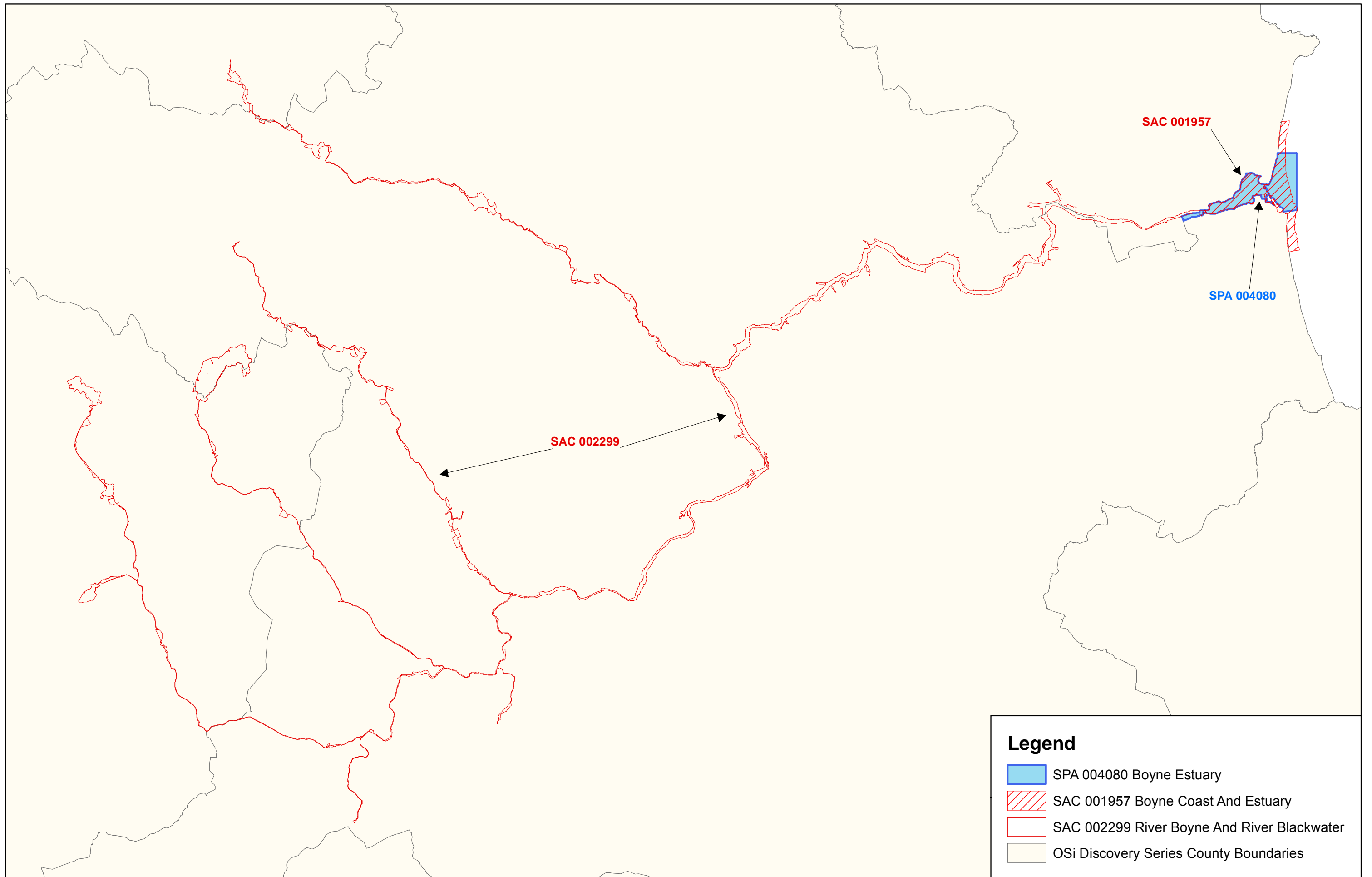
Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059208).

Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)

Site Code  
 SPA 004080  
 Version: 3

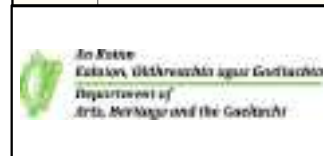
Map Version 1  
 Date: September 2012





**Legend**

- SPA 004080 Boyne Estuary
- SAC 001957 Boyne Coast And Estuary
- SAC 002299 River Boyne And River Blackwater
- OSi Discovery Series County Boundaries



**MAP 2:**  
**BOYNE ESTUARY SPA**  
**CONSERVATION OBJECTIVES**  
**ADJOINING / OVERLAPPING DESIGNATIONS**  
 Map to be read in conjunction with the NPWS  
 Conservation Objectives Document.

**SITE CODE:**  
 SPA 004080 version 3  
 SAC 001957 CO. LOUTH; version 1.01, CO. MEATH; version 1.06  
 SAC 002299 CO. CAVAN; version 1.01, CO. LOUTH; version 1.01,  
 CO. WESTMEATH; version 1.05, CO. MEATH; version 1.11

Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material  
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Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na  
 Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059208)

N  
  
 Map Version 1  
 Date: September 2012

## Conservation objectives for River Boyne and River Blackwater SPA [004232]

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
A229	Kingfisher	<i>Alcedo atthis</i>



**Citation:** NPWS (2016) Conservation objectives for River Boyne and River Blackwater SPA [004232].  
Generic Version 5.0. Department of Arts, Heritage, Regional, Rural and Gaeltacht  
Affairs.

# Appendix B

## Nutrient Sensitive Qualifying Interests

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

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

# Appendix C

## EAM Summary Report for South Louth and East Meath WSZ

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

Issue 8 | 17 December 2021

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

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

Job number 257367

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# Document Verification

# ARUP

RYAN HANLEY

<b>Job title</b>		Lead in Drinking Water Mitigation Plan - EAM		<b>Job number</b> 257367	
<b>Document title</b>		Staleen EAM		<b>File reference</b>	
<b>Document ref</b>					
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Draft 1	20 Dec 2017	<b>Description</b>	First draft		
			Prepared by	Checked by	Approved by
		Name	Alison Orr	Gerry Baker	Sean Mason
		Signature			
Draft 2	15 June 2018	<b>Filename</b>	009. Staleen EAM D02.docx		
		<b>Description</b>			
			Prepared by	Checked by	Approved by
		Name	Alison Orr	Orla Murphy	Gerry Baker
Draft 3	30 Aug 2018	<b>Filename</b>	009. Staleen EAM D03.docx		
		<b>Description</b>	Updated after cumulative assessment		
			Prepared by	Checked by	Approved by
		Name	Niall Gibbons	Gerry Baker	
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		<b>Description</b>			
			Prepared by	Checked by	Approved by
		Name	Alison Orr	Gerry Baker	Gerry Baker
	Signature				

Issue Document Verification with Document





# Document Verification

<b>Job title</b>		Lead in Drinking Water Mitigation Plan - EAM		<b>Job number</b>	
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<b>Document title</b>		Staleen EAM		<b>File reference</b>	
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Issue 2	1 Mar 2019	<b>Description</b>			
			Prepared by	Checked by	Approved by
		Name	Alison Orr	Gerry Baker	Gerry Baker
		Signature			
Issue 3	6 Mar 2019	<b>Filename</b>	009. Staleen EAM I03.docx		
		<b>Description</b>			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
Issue 4	26 Mar 2019	<b>Filename</b>	009. Staleen EAM I04.docx		
		<b>Description</b>			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
Issue 5	24 May 2019	<b>Filename</b>	009. Staleen EAM I05.docx		
		<b>Description</b>	Updated Boyne_0180 error		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Gerry Baker	Gerry Baker
		Signature			
<b>Issue Document Verification with Document</b>					<input checked="" type="checkbox"/>



# Document Verification

<b>Job title</b>		Lead in Drinking Water Mitigation Plan - EAM		<b>Job number</b>	
				257367	
<b>Document title</b>		Staleen EAM		<b>File reference</b>	
<b>Document ref</b>					
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Issue 6	27 May 2019	<b>Description</b>	IW Review		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Gerry Baker	Gerry Baker
		Signature			
Issue 7	15 Dec 2021	<b>Filename</b>	009. Staleen EAM I07.docx		
		<b>Description</b>	Updated with new monitoring data		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Alison Orr	Gerry Baker
		Signature			
Issue 7	17 Dec 2021	<b>Filename</b>	009. Staleen EAM I08.docx		
		<b>Description</b>	Minor text edits		
			Prepared by	Checked by	Approved by
		Name	Sam Marchant	Alison Orr	Gerry Baker
		Signature			
		<b>Filename</b>			
		<b>Description</b>			
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		Name			
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## Contents

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	Page
<b>1 Introduction</b>	<b>1</b>
<b>2 Abbreviations &amp; Glossary</b>	<b>2</b>
<b>3 South Louth and East Meath and related WSZs</b>	<b>3</b>

### Tables

Table 1:	Increased loading/concentration from WWTPs due to dosing of drinking water – Dosing rate = 0.8 mg/l P
Table 2:	Orthophosphate concentrations in river water bodies following dosing of drinking water
Table 3:	Orthophosphate concentrations in groundwater bodies following dosing of drinking water
Table 4:	Orthophosphate concentrations in transitional water bodies following dosing of drinking water
Table 5:	Cumulative assessment of orthophosphate concentrations in transitional and coastal water bodies following dosing of drinking water

### Figures

Figure 1:	Staleen Drinking Water 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

# 1 Introduction

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This document presents the results of the implementation of the Lead Mitigation Environmental Assessment Methodology (EAM) to assess the impact of dosing South Louth and East Meath Water Supply Zone (WSZ) with orthophosphate.

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

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

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

- Results of the Plumbosolvency reports by Ryan Hanley.
- Results of pre-processing GIS work to generate regional input files.
- Data relating to Waste Water Treatment Plants (WWTP) from Annual Environmental Reports (AER) and the Environmental Protection agency (EPA) web-based WFD App which is accessed through their Eden Portal.
- Data relating to water body monitoring and characterisation from the EPA WFD App. Data was downloaded on 20<sup>th</sup> November 2021. The upper and lower thresholds for orthophosphate for transitional and coastal waterbodies assess has been used have been determined based on an assumed median salinity of 34.5 psu for the downloaded data.
- Data relating to rainfall and catchment areas from the OPW Flood Studies Update (FSU) Portal.
- GIS data river segment data providing river flows from the EPA “hydrotool data”.
- Gauge data providing river flows from the EPA web-based HydroNet.

## 2 Abbreviations & Glossary

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

### 3 South Louth and East Meath and related WSZs

The South Louth and East Meath WSZs (2100SC001) are supplied by the Staleen WTP serviced from Staleen and Dunore reservoirs. The Draft Plumbosolvency Control Plan for the WSZ serviced by Staleen WTP proposes that targeted dosing of Orthophosphate takes place at the outlet from Dunore Reservoir which supplies Drogheda Town and South Louth. \* There is no upper threshold as the WB is at Bad status

\*\* Includes dilution based on summer and winter mean salinity

Figure 1, at the end of this report, shows the location of the proposed to receive Orthophosphate dosed water.

An average of 24,400 m<sup>3</sup>/day is distributed to the zones from the Staleen WTP however the average daily flow from the Dunore Reservoir is 15,000 m<sup>3</sup>/day, the flow will be dosed with Orthophosphate and is used within the EAM model. Approximately 54.5% of the flow is accounted for, and this fixed rate for water mains leakage is assumed in all the Water Supply Zones (WSZs). The WSZ boundaries cover the large urban centre of Drogheda and smaller urban area of Clogherhead, which are served by WWTP agglomerations. There are an estimated 1,291 properties across the WSZs that are serviced by DWWTS.

Water Supply Zone	Staleen (SZPUB0403)
<b>Step 1 – Appropriate Assessment Screening</b>	<i>To be completed by Ryan Hanley</i>
<b>Model Assumptions</b>	<p>All concentration and loading units for orthophosphate (PO<sub>4</sub>-P) are expressed as mg/l P and kg P/yr. Adopted orthophosphate Optimum Dosing Concentration is 0.8 mg/l (P).</p> <p>Unaccounted for water from the mains is 45.5%. Seepage from the mains is distributed evenly across the entire length of the WSZ network.</p> <p>The water consumption per person has been assigned as 125 litres per day in order to calculate the direct discharges to surface water with 2.7 people per household. The water discharge per person is assigned as 105 litres per day for the discharge to DWWTS with 2.7 persons per household.</p> <p>Conversion factor for Total Phosphorus to orthophosphate for WWTP effluent is 0.5.</p> <p>It is assumed there will be no treatment of additional OP load for WWTPs with secondary, primary or no treatment. For plants with tertiary treatment it is assumed all the additional load will be treated. Where a tertiary plant is in exceedance of its ELV for TP or OP then the ability of the plant to treat the additional load is confirmed with Irish Water. Where IW indicates a tertiary plant has not remaining treatment capacity it will be assumed the entire additional load is not treated.</p>

	<p>Where existing monitoring data is not available a surrogate status is derived from the Orthophosphate indicative quality of the waterbody in the following hierarchy:</p> <ul style="list-style-type: none"> <li>• Upstream waterbodies</li> <li>• Downstream waterbodies</li> <li>• Adjacent waterbodies of similar hydrological settings</li> <li>• Ecological status of the waterbody.</li> </ul> <p>The mid-point of that surrogate indicative quality range is used as baseline concentration.</p>
<p><b>Step 2 &amp; 3 – Impact on Waste Water Treatment Plant (WWTP) Effluent Concentrations and receiving WBs</b></p>	<p>This section assesses the influent and effluent P loads and resultant OP dosages at WWTP within the WSZ before and after dosing. Inputs to and results of the Step 2 assessment for individual WWTP are given in Table 1. Where an agglomeration includes SWOs, discharges from this source are included. Emission Limit Value (ELVs) are assigned for WWTPs to protect the receiving River Waterbodies (RWB) from direct discharges during low flows. Where ELVs are in force these are shown in Table 1.</p> <p>The treatment level and PE of the WWTPs within the agglomerations are as follows;</p> <ul style="list-style-type: none"> <li>- Drogheda – Secondary treatment PE 70,283</li> <li>- Clogherhead – Secondary treatment PE 2,630</li> <li>- Donore - Tertiary Treatment PE 1,027</li> </ul> <p>A sensitivity analysis was carried out on the conversion between Orthophosphate and Total Phosphorus at three factors; 0.4, 0.5 and 0.68. The results of the assessment are presented in Table 1.</p>
<p><b>Step 4 - Subsurface pathways</b></p>	<p>The loading from mains leakage is 6832 m<sup>3</sup>/d (1,995 kg/yr P). Approximately 1,786 kg/yr P of the load is attenuated along the flowpaths. The hydraulic loading from the DWWTS is 367 m<sup>3</sup>/d (107 kg/yr P). Approximately 103 kg/yr P of the load is attenuated along the flowpaths.</p> <p>A flow monitoring gauge is available on the main Boyne Channel at Drogheda. Flow monitoring gauges are not available for the other waterbodies within the assessment area. Flows are established using the Area-SAAR method as these catchment discharge into transitional or coastal water bodies.</p> <p>Baseline orthophosphate monitoring data is not available for any of the four river water bodies in the study area.</p> <p>The increase in concentration as a result of the drinking water dosing with Orthophosphate does not cause a deterioration in the status of any RWB.</p>
<p><b>Step 5 and 6 - Combined Impact from direct and diffuse sources on River Waterbodies (RWB)</b></p>	<p>This section assesses the combined impact as a result of increased Orthophosphate load from WWTP discharges (Steps 2 &amp; 3), seepage from mains and DWWTS and cumulative impacts from other dosing areas on River Waterbodies (RWBs). The increase in Orthophosphate concentrations in the RWBs as a result of the P drinking water dosing is shown in Table 2.</p>

	<p>Figure 2 illustrates the scale of Orthophosphate loading to the receiving water bodies from mains leakage, DWWTS and direct discharges from WWTP and SWOs and upstream dosing areas. This illustrates that a significant proportion of the loads come from mains leakage through the near and preferential pathway and leakage load diverted to the WWTP.</p> <p>Figure 3 presents the total loading to the dosing area from the main sources and illustrates how much of the loading is attenuated in the subsurface, treated in WWTPs and ultimately how much is transported to the receiving RWBs. This illustrated that the mains leakage and primary WWTP discharges account for the largest proportion of load and that a large proportion of the mains leakage is attenuated.</p> <p>Direct discharges from WWTPs are combined with diffuse discharges at the following receiving waterbodies and tracked downstream from that point:</p> <ul style="list-style-type: none"> <li>• Clogherhead WWTP – Termonfeekin_020 (SWO only).</li> </ul> <p>The increase in Orthophosphate concentrations due to the drinking water dosing is shown in Table 2.</p> <p>The increase in concentration as a result of the drinking water dosing with Orthophosphate does not cause a deterioration in the status of any RWB.</p>
<p><b>Step 5 and 6 - Combined Impact through subsurface and surface pathways on Groundwater Waterbodies (GWB)</b></p>	<p>The increase in Orthophosphate concentrations in the Groundwater Waterbodies (GWBs) as a result of the P drinking water dosing is shown in Table 3.</p> <p>Monitoring data is available for two of the four groundwater bodies. Where multiple monitoring points are available within a GWB the results are averaged spatially to derive a GWB average.</p> <p>The Drogheda GWB is currently failing to achieve good status and therefore no additional significant loads are permitted. The modelled increase in concentration (0.0040mg/l) represents a not insignificant increase (&gt;0.00125mg/l). The GWB is therefore coloured amber in Table 3 to highlight this issue.</p> <p>The Groundwater Threshold Value (GTV) for orthophosphate is based on not leading to a deterioration in the receiving surface water body. The Drogheda discharges to the Boyne Estuary and also the Tullyeskar_010 and Stagrennan_010. As these water bodies are at good status and the dosing is not leading to a deterioration in status the increase in the GWB orthophosphate concentration will not lead to a deterioration in surface water body status and the groundwater body is therefore not considered to be failing the assessment.</p>
<p><b>Step 5 and 6 - Combined Impact from direct and</b></p>	<p>There are no lakes within or downstream of the dosing area.</p>

<b>diffuse sources on Lakes within the Water Supply Zone</b>	
<b>Step 5 and 6 - Combined Impact from direct and diffuse sources on Transitional and Coastal Waterbodies</b>	<p>The increase in Orthophosphate concentrations in the downstream Transitional Waterbodies and small Coastal (TraC) Waterbodies as a result of drinking water dosing is shown in Table 4.</p> <p>Baseline Orthophosphate monitoring data and associated thresholds are available for all the TraC waterbodies.</p> <p>The drinking water dosing with Orthophosphate does not deteriorate the status of the transitional water body for both the summer and winter seasons.</p> <p>The initial assessment based only on fluvial inputs indicated there could be a deterioration in status of coastal Louth Coast (HA 06) during the summer period. Once the fluvial inputs are combined with the estimated estuarine fluxes the resulting concentration reduces to an insignificant level.</p>
<p><b>Step 5 and 6 Cumulative Assessment of impact from all EAMs within the catchment on:</b></p> <p><b>Transitional and Coastal Water Bodies</b></p> <p><b>AND</b></p> <p><b>Protected Waterbodies</b></p>	<p><u>Step 5 and 6 Cumulative Assessment of impact from all EAMs within catchment on Transitional and Coastal Waterbodies</u></p> <p>A cumulative assessment was undertaken to assess the impact on TraC WBs from all the contributing EAMs. The assessment is carried out on a catchment scale.</p> <p><b>Boyne</b></p> <p>The following EAM dosing areas are in the Boyne catchment and discharge to the same TraC WBs as the Staleen EAM, see Figure 4:</p> <ul style="list-style-type: none"> <li>178. Kells Oldcastle</li> <li>031. Navan Mid Meath</li> <li>207. Blundlewood</li> <li>049. Ballany</li> <li>148. Coill Dois</li> <li>049. Ballany</li> <li>016. Srowland</li> <li>073. Trim</li> </ul> <p>The increase in Orthophosphate concentrations in the downstream TraC WBs as a result of the drinking water dosing of all EAMs with Orthophosphate is shown in*. There is no upper threshold as the WB is at Bad status</p> <p>Table 5.</p> <p>There is no deterioration in waterbody status as a result of the cumulative assessment. The dilution of fluvial inputs in the Boyne Estuary is estimated based on the observed salinity levels in the estuary.</p> <p><u>Step 5 and 6 Cumulative Assessment of impact from EAMs on downstream Protected Waterbodies</u></p>



	There are no downstream protected waterbodies which are not already assessed in this EAM.
<b>Conclusions</b>	<p><b>Red, Amber, Green (RAG) STATUS: EAM Result - GREEN</b></p> <p>The purpose of the RAG status is to indicate the waterbodies that are failing the EAM assessment on a map. Any waterbodies failing the EAM model will be marked as <b>Amber</b> in the interim while further analysis is being completed, where the further analysis confirms the water body is failing the water body will be coloured <b>Red</b>. If the EAM indicates there will not be a deterioration in the waterbody status as a result of drinking water dosing it will remain <b>Green</b>.</p> <p>A map of the RAG status of water bodies is presented in Figure 5.</p>
<b>Recommendation</b>	No mitigation measures are required.

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

Agglomeration and Discharge Type	Effluent Treatment level	WWDL ELV AER (2017) Compliance	Primary Discharge Receiving WB		Annual average TP Load kg/yr	Ortho P Concentration mg/l P TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
						0.5	0.4	0.68
Drogheda Primary Discharge	Secondary	Total Phosphate 2mg/l TP– Compliant	Boyne Estuary	Existing	5545	0.36	0.29	0.49
				Post Dosing	7751	0.50	0.40	0.68
Drogheda SWOs (14 No.)		Orthophosphate 1.5mg/l P – Compliant		Existing	4337	1.37	1.10	1.87
				Post Dosing	4402	1.39	1.11	1.89
Clogherhead Primary Discharge	Secondary	No ELVs	Louth Coast (HA 06)	Existing	897	1.14	0.91	1.55
				Post Dosing	1012	1.28	1.03	1.75
Clogherhead SWOs (4 No.)				Existing	56	0.35	0.28	0.47
				Post Dosing	59	0.37	0.30	0.50
Donore Primary Discharge	Tertiary	Orthophosphate 3.0mg/l P - Compliant	Boyne_180	Existing	21	0.18	0.14	0.25
				Post Dosing	21	0.18	0.14	0.25
Donore SWOs (1 No.)				Existing	22	0.91	0.72	1.23
				Post Dosing	22	0.92	0.74	1.25

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

Name	EU_CD	Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Boyne_180	IE_EA_07B042200	High	0.0203	0.0188	496.4	0.0003	0.0206
Stagrennan_010	IE_EA_07S320550	<i>High</i>	0.0125	0.0188	45.6	0.0024	0.0149
Tullyskar_010	IE_EA_07T270880	<i>High</i>	0.0125	0.0188	56.9	0.0020	0.0145
Nanny (Meath)_050	IE_EA_08N010700	Moderate	0.0514	0.0508	10.2	0.0001	0.0515
Slieveboy_010	IE_NB_06S160790	<i>Poor</i>	0.0765	0.0868	5.8	0.0002	0.0767
Termonfeckin_02 0	IE_NB_06T010400	Bad	0.1171	N/A*	31.1	0.0012	0.1183

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

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

Name	EU_CD	Indicative Quality <i>Surrogate Status in italic</i>	Baseline Conc. used in calculation (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential Baseline conc. following dosing (mg/l P)
Trim	IE EA G 002	Good	0.0168	0.0263	2.6	0.00002	0.0168
Bettystown	IE EA G 016	Good	0.0072	0.0263	0.2	0.00002	0.0072
Realtage	IE EA G 020	<i>Good</i>	0.0175	0.0263	0.1	0.00005	0.0175
Donore	IE EA G 021	<i>Good</i>	0.0175	0.0263	0.01	0.000004	0.0175
Drogheda	IE EA G 025	Good	0.0311	0.0263	26.6	0.0040	0.0350*
Industrial Facility (P0784-01)	IE_EA_G_029	<i>Good</i>	0.0175	0.0263	0.8	0.0041	0.0216
Clogher Head Gravels	IE_NB_G_023	<i>Good</i>	0.0175	0.0263	0.1	0.0001	0.0176
Louth	IEGBNI_NB_G_019	Good	0.0062	0.0263	1.1	0.00001	0.0062

\* *GWB increase is not insignificant but impact on associated RWB is negligible and therefore does not affect the overall EAM result.*

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

Name	EU_CD	Season	Indicative Quality <i>Surrogate Status in italic</i>	Baseline conc used in calculation (mg/l P)	75% of status threshold (mg/l P)	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Boyne Estuary	IE_EA_010_0100	Summer	High	0.0170	0.0188	1734.1	0.0010	0.0180
		Winter	Good	0.0360	0.0363			0.0370
Boyne Estuary Plume Zone	IE_EA_010_0000	Summer	<i>High</i>	0.0125	0.0188	1734.1	0.0010	0.0135
		Winter	<i>Good</i>	0.0325	0.0363			0.0335
Louth Coast (HA 06)	IE_NB_025_0000	Summer	<i>High</i>	0.0125	0.0188	58.6	0.00004	0.0125
		Winter	<i>Good</i>	0.0325	0.0363			0.0325

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

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

Name	EU_CD	Season	Indicative Quality <i>Surrogate Status in italic</i>	Baseline conc used in calculation (mg/l P)	75% of status threshold (mg/l P)	Load, (kg/yr P) from current EAM	Cumulative load (kg/yr P)	Modelled dosing conc. (mg/l P)	Potential conc. following dosing (mg/l P)
Boyne Estuary	IE_EA_010_0100	Summer	High	0.0170	0.0188	1734.1	2170.8	0.00005**	0.0170
		Winter	Good	0.0360	0.0363	1734.1	2170.8	0.0001**	0.0361
Boyne Estuary Plume Zone	IE_EA_010_0000	Summer	<i>High</i>	0.0125	0.0188	1734.1	2170.8	0.0013	0.0138
		Winter	<i>Good</i>	0.0325	0.0363	1734.1	2170.8	0.0013	0.0338

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

\*\* Includes dilution based on summer and winter mean salinity

Figure 1: Staleen Drinking Water Dosing Areas



Figure 2: RWB Cumulative Loading Assessment

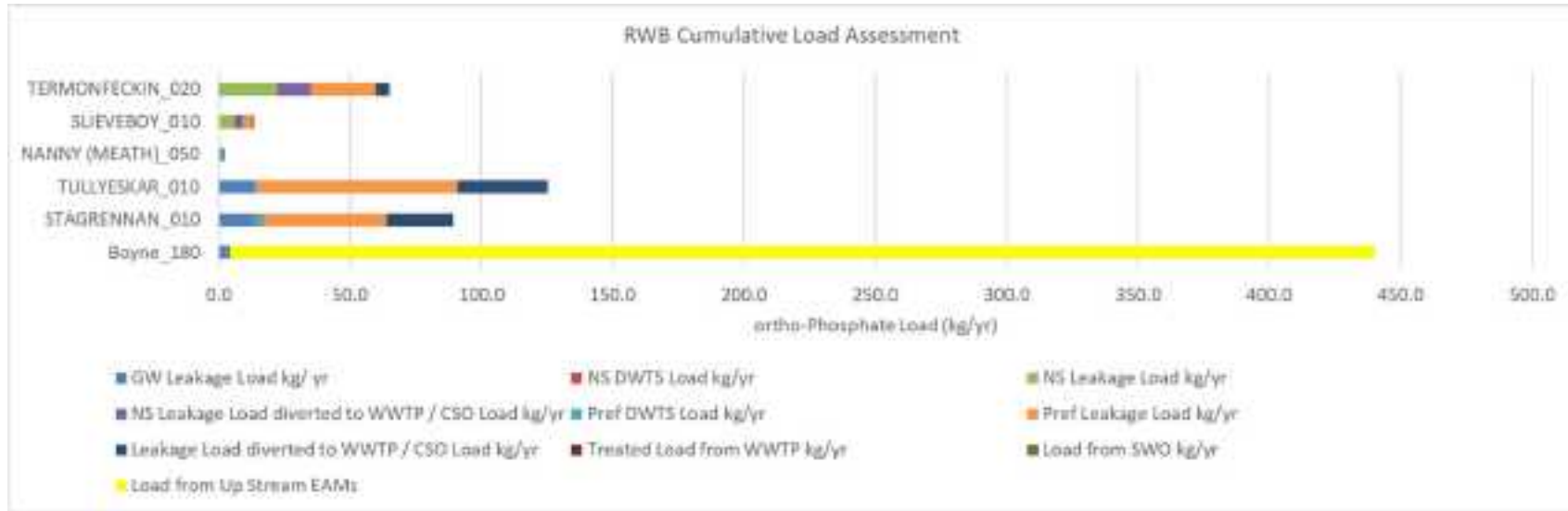


Figure 3: Total dosing area Attenuated, Treated and Transported Loads

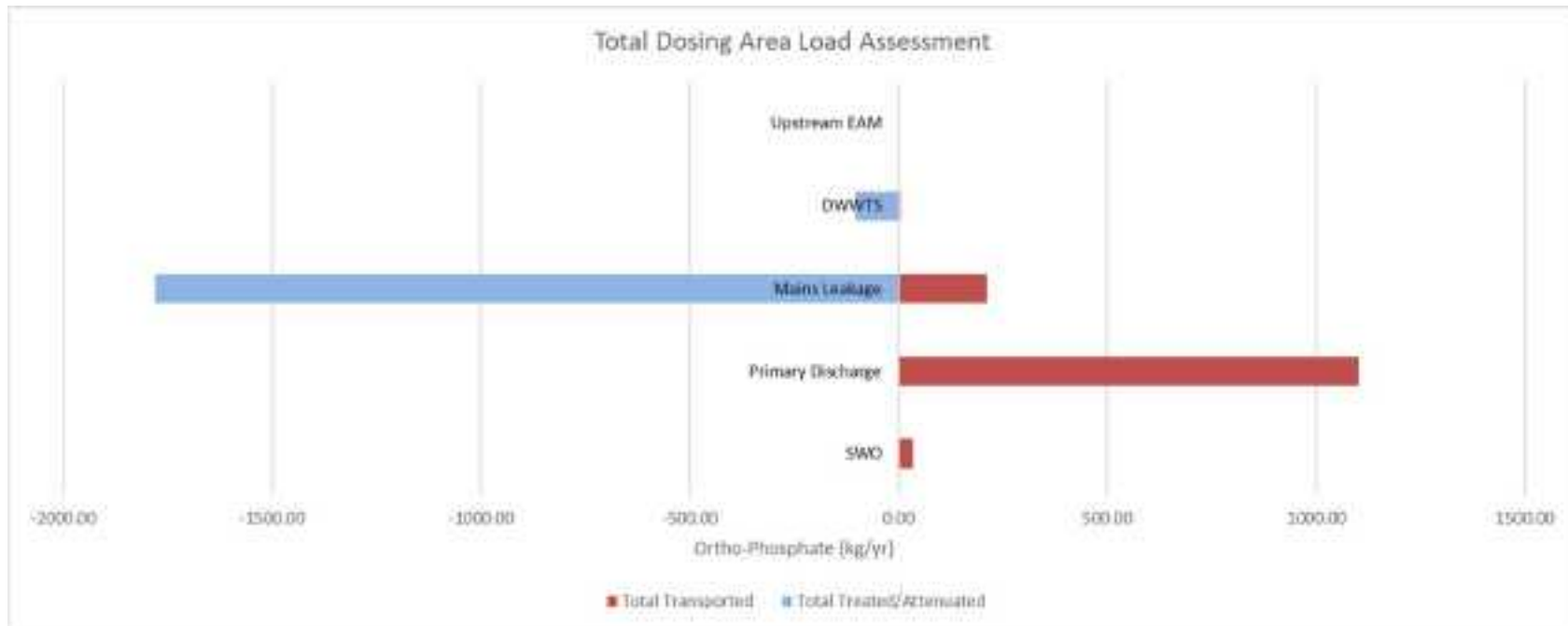




Figure 4: Upstream and downstream EAMs within WFD catchment

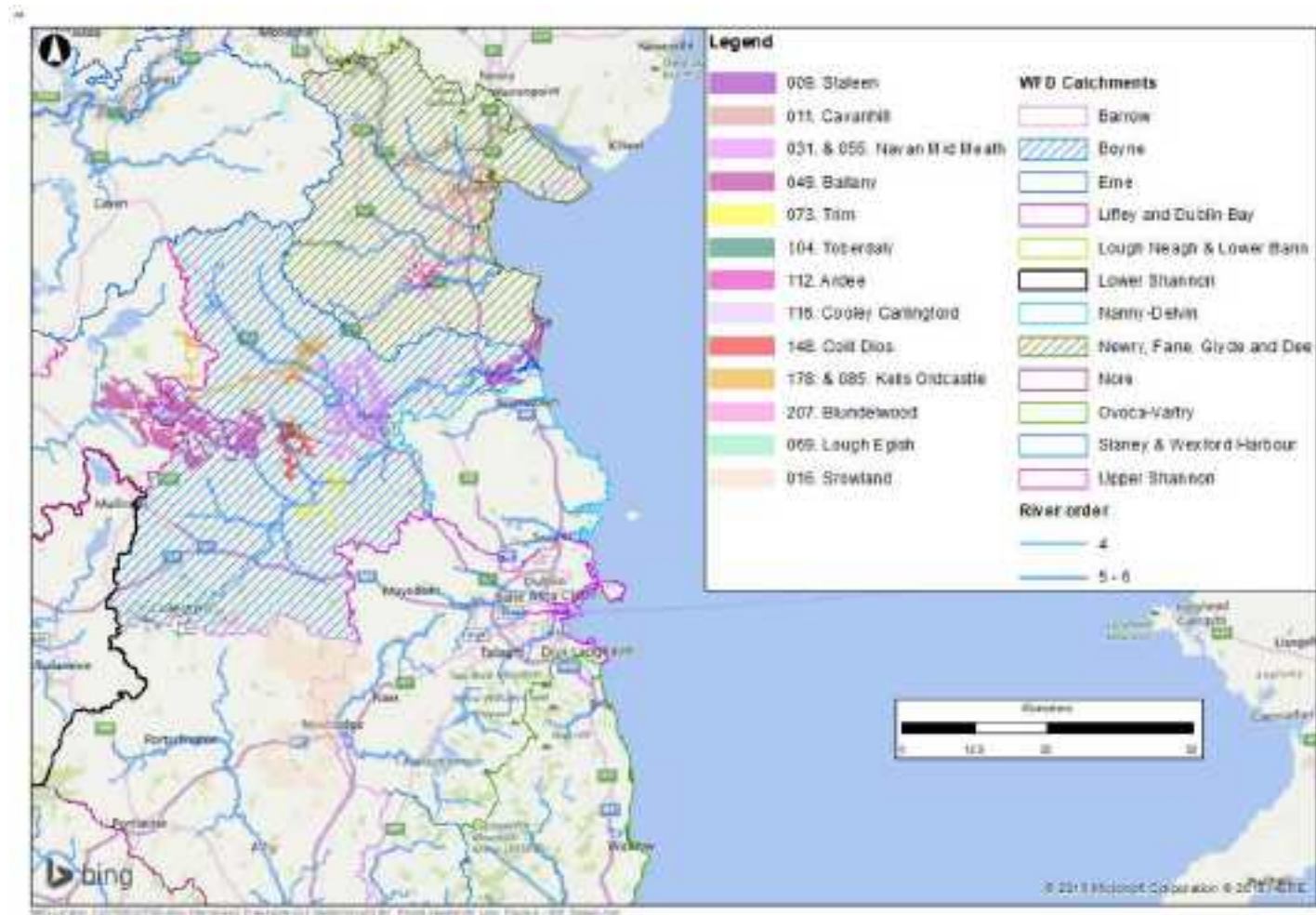


Figure 5: Red, Amber, Green (RAG) Status of waterbodies

