Irish Water-Lead in Drinking Water Mitigation Plan

Screening for Appropriate Assessment

060 Ballyhilty WTP - Zone 1 Skibbereen Ballyhilty WSZ (0500PUB4605)

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GLOSSARY OF TERMS & ABBREVIATIONS

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

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

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

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

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

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

Natura 2000: European network of protected sites, which represent areas of the highest value for natural habitats and species of plants and animals, which are rare, endangered or vulnerable in the European Community. The Natura 2000 network of sites will include two types of area. Areas 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.

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

RPS was commissioned by Irish Water (IW) to undertake Screening for Appropriate Assessment (AA) for the proposed orthophosphate dosing (herein referred to as the proposed project) of drinking water supplied by Ballyhilty Water Treatment Plant (WTP), Skibbereen, Co. Cork.

This report comprises information to support the Screening for AA 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 likely 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

The overall purpose of the Screening for AA, as a first step in determining the requirement for AA, is to determine whether the project is likely to have a significant effect on any European Site within the zone of influence (ZoI) of the Water Supply Zone (WSZ), either individually or in combination with other plans or projects, in view of the site's 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, S.I. No. 477 of 2011 (as amended). In the context of the proposed project, the governing legislation is the EC Birds and Habitats Regulations 2011 (as amended).

1.2 THE PLAN

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

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

[1] Now known as the Department of Housing, Planning and Local Government (DHPLG).
[2] Irish Water (IW) (2016) Lead in Drinking Water Mitigation Plan. https://www.water.ie/projects-plans/lead-mitigation-plan/Lead-in-Drinking-Water-Mitigation-Plan.pdf

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

Health studies have identified risks to human health from ingestion of lead. In December 2013, the acceptable limit for lead in drinking water was reduced to 10 micrograms per litre (µg/l) as per the European Union (Drinking Water) Regulations. From 2003 to 2013, the limit was 25µg/l, which was a reduction on the previous limit (i.e. pre 2003) of 50µg/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 orthophosphate 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, which is 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 quantity of orthophosphate that IW will be required to add to treated water is between 0.5 mg/l to 1.5 mg/l. At Ballyhilty WTP orthophosphate will be added at a rate of 0.6 mg/l.

The typical concentration of phosphorus ingested from drinking 3 litres of water per day that has been treated with food grade phosphoric acid at 1.5 mg/l phosphorus, would be 4.5 milligrams.

The orthophosphate is dosed into the water at a rate which is dependent on raw water chemistry in a similar process to the addition of chlorine for disinfection. Orthophosphate dosing takes a period of 6-12 months to develop a full coating, after which dosing must be maintained in order to sustain the protective coating.

1.3 PROJECT BACKGROUND

Phosphorus can influence water quality status through the process of nutrient enrichment and promotion of excessive plant growth (eutrophication). It is therefore necessary to evaluate the significance of any potential environmental impact and the pathways by which the added orthophosphate may reach environmental receptors. To facilitate the assessment, 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 the EAM is to identify the European Sites that have a hydrological or hydrogeological connectivity to the WSZs affected by the proposed orthophosphate dosing. The EAM recognises that for those European Sites with nutrient sensitive Qualifying Interests (habitats and species) and connectivity to the WSZ indicates that pathways for effects exist. The project effects on these European Sites, and an evaluation as to whether these are potentially significant, are the subject of the Screening for AA. The Screening report applies objective scientific information from the EAM as outlined in this document in the context of the Site Specific Conservation Objectives (SSCO) as published on the NPWS website.

The EAM process identified 23 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Kilkeran Lake and Castlefreke Dunes SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Great Island Channel SAC, Ballymacoda (Clonpriest and Pillmore) SAC, Blackwater River (Cork/Waterford) SAC and Ardmore Head SAC; and

- SPA sites: Sheep's Head to Toe Head SPA, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA, Old Head of Kinsale SPA, Sovereign Islands SPA, Cork Harbour SPA, Ballycotton Bay SPA, Ballymacoda Bay SPA and Blackwater Estuary SPA.

Each of these European Sites includes habitats and/or species identified as nutrient sensitive. Following the precautionary principle the potential for likely significant effects arising from the proposed project requires assessment, due to connectivity to each of the identified European Sites, in light of their nutrient sensitive Qualifying Interests.

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 an EU-wide network of sites known as Natura 2000. 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 obligation to undertake appropriate assessment derives from Articles 6(3) and 6(4) of the Habitats Directive and both involve a number of steps and tests that need to be applied in sequential order. Article 6(3), which is concerned with the strict protection of sites, 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".

The results of each step must be documented and recorded so there is full traceability and transparency of the decisions made.

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 has had regard to the following legislation and guidance documents:

European and National Legislation:

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

Guidance / Case Law:

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

Departmental/NPWS Circulars:

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

2.3 STAGES OF THE APPROPRIATE ASSESSMENT PROCESS

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

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

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

Stage 1: Screening for a likely significant effect

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

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

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

Stage 3: Assessment of Alternative Solutions

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

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

This stage of the AA process is undertaken where no alternative solutions exist and where adverse impacts remain. At this stage of the AA process, it is the characteristics of the plan or project itself

that will determine whether or not the competent authority can allow it to progress. This is the determination of 'over-riding public interest'.

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

2.4 INFORMATION SOURCES CONSULTED

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

- Information provided by IW as part of the project;
- Environmental Protection Agency – Water Quality www.epa.ie and www.catchments.ie;
- Geological Survey of Ireland – Geology, Soils and Hydrogeology www.gsi.ie;
- Information on the conservation status of birds in Ireland (Colhoun & Cummins 2013);
- National Parks and Wildlife Service – online Natura 2000 network information www.npws.ie;
- National Biodiversity Action Plan 2017 - 2021 (DCHG 2017);
- Article 17 Overview Report Volume 1 (NPWS, 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;
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie;
- National Summary for Article 12 (NPWS, 2013d); and
- Format for a Prioritised Action Framework (PAF) for Natura 2000 (2014) www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf.

2.5 EVALUATION OF THE RECEIVING ENVIRONMENT

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

Ireland aims to conserve habitats and species, through designation of conservation areas under both European and Irish law. The focus of this Screening report 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 if the integrity of designated sites is to be maintained/restored.

In relation to protected water-dependent habitats and species under the Birds and Habitats Directive, the river basin management planning process contributes towards achieving water related environmental supporting conditions that support Favourable Conservation Status. In preparing the RBMP (2018-2021) (DHPLG, 2018[3]) the characterisation assessment carried out by the EPA for these water dependent European Site protected areas has focussed on looking at the risks to the water standards/objectives established for the purpose of supporting Good Ecological Status (GES), or High Ecological Status (HES) where required. GES, which is the default objective of the WFD, is considered adequate for supporting many water dependent European Site protected areas where site specific environmental supporting conditions have not been defined within SSCOs by the NPWS. A number of lake habitats (e.g. oligotrophic lakes) and species (e.g. the freshwater pearl mussel) will require a more stringent environmental objective i.e. high status. Where this applies, this has been taken into account in the EAM and evaluated within the context of this Screening report.

2.5.1 Identification of European Sites

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

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

As stated above, a buffer of 15km is typically taken as the initial ZoI extending beyond the reach of the footprint of a plan or project, although there may be scientifically appropriate reasons for extending this ZoI further depending on pathways for potential impacts. With regard to the current project, the 15km distance is considered inadequate to screen all likely significant effects that might impact upon European Sites. This is primarily due to the need to consider the potential for likely significant effects on European Sites with regard to aquatic and water dependent receptors. Therefore, the ZoI for this project includes all of the hydrologically connected surface water sub catchments and groundwater bodies (**Figure 4-2**).

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,

[3] DHPLG (2018) The River Basin Management Plan for Ireland (2018-2021). Available at: http://www.housing.gov.ie/sites/default/files/publications/files/rbmp_reportbodyenglish_web_version_final_0.pdf

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. Web links for 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 2013a, 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 habitats and species were identified as having the greatest sensitivity to the proposed dosing activities, and the Water Framework Directive SAC water dependency list (NPWS, December 2015), was used as part of the criteria for screening European Sites.

There are 60 habitats, 25 species and 68 bird species which are water dependent and / or where nutrients are a key pressure or threat and where compliance with the Environmental Quality Standards for nutrient levels (including orthophosphate) will contribute to achieving or maintaining favourable conservation status. These are listed in **Appendix B**.

3 DESCRIPTION OF THE PROJECT

3.1 OVERVIEW OF THE PROPOSAL

Ballyhilty WTP supplies the town of Skibbereen, Co Cork and a large hinterland including the villages of Ballydehob, Baltimore, Castletownshend, Schull, Sherkin Island, Union Hall and Drimoleague on the southwest coast of Ireland. The total distribution input for Ballyhilty WTP is 3,599 m3/day (55% of which is accounted for, with the remainder assumed to be lost through leakage), comprising 2,789 m3/day for Zone 1 Skibbereen Ballyhilty, (0500PUB4605), 509 m3/day for Zone 1 Schull (0500PUB4503), 301 m3/day for Zone 1 Baltimore/Lakecross (0500PUB4601) and 305 m3/day for Zone1 Drimoleague. The total population served is approximately 9,000. The non-domestic demand is 11% of the distribution input.

The area is served by Ballydehob (D0467), Baltimore (D0296), Castletownshend (D0468), Schull (D0295), Skibbereen (D0166), Union Hall (D0469) and Drimoleague (D0470) WWTPs which are licenced in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 as amended. The impact of the orthophosphate dosing on the emission limit values and the receiving water body downstream of the point of discharge are assessed. There is also one WWTP with a population equivalent of less than 500, namely Sherkin Island (A0404) WWTP. The estimated additional load from this small agglomeration due to the orthophosphate dosing is considered at the water body level via the surface water pathways. It is estimated that there are 2,700 properties across the WSZ that are serviced by a DWWTS (see **Appendix C**).

Ballyhilty WTP lies in the vicinity of the Ilen River in the Ilen catchment. The EAM process identified 23 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Kilkeran Lake and Castlefreke Dunes SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Great Island Channel SAC, Ballymacoda (Clonpriest and Pillmore) SAC, Blackwater River (Cork/Waterford) SAC and Ardmore Head SAC; and

- SPA sites: Sheep's Head to Toe Head SPA, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA, Old Head of Kinsale SPA, Sovereign Islands SPA, Cork Harbour SPA, Ballycotton Bay SPA, Ballymacoda Bay SPA and Blackwater Estuary SPA.

3.2 CONSTRUCTION OF CORRECTIVE WATER TREATMENT WORKS

The corrective water treatment works at Ballyhilty WTP will involve the provision of orthophosphate dosing, pH control works and associated safety equipment. As part of the Skibbereen Regional Water Supply Scheme, Ballyhilty WTP has been upgraded. The installation of new chemical storage and preparation building, with bunded storage tanks for liquid chemicals formed part of the upgrade which includes orthophosphate dosing equipment. The upgrade to Ballyhilty WTP was subject to its own screening for AA and EIA. For the purpose of this screening assessment the focus will be on the minor external civil works required and the in-combination effects with the upgrade works are assessed below in **Section 6.3.**

The location for the orthophosphate dosing system at Ballyhilty WTP is within the confines of the existing WTP boundary. The surrounding landscape is dominated by agricultural grassland and stands of broadleaf forestry. The site layout for the upgrade works at Ballyhilty WTP is available in **Appendix D**.

The implementation of orthophosphate dosing at the Ballyhilty WTP requires the following elements:

- Bulk Storage Tanks for phosphoric acid;
- Dosing pumps;
- Dosing pipework and carrier water pipework; and,
- Associated electrical installations.

The bulk storage tanks (1 no. tanks, each with a working volume of 750 l) sits upon an above ground reinforced concrete plinth, designed to support the combined weight of the storage tanks, equipment and total volume of chemical to be stored (**Figure 3-3**).

Each storage tank is self-bunded to accommodate greater than 110% of the tank working volume. The tanks conform to Irish Water design guidelines and include the following environmental safety design features; level detection sensors, visual level indicators and alarms and a bund leak detection system. All materials and associated equipment, fixtures and fittings are compatible with 75% phosphoric acid.

There is an existing pH correction system at the Ballyhilty WTP, which was upgraded as part of the . pH is corrected by the addition of lime injected on the line prior to entering the underground final clear water tank. A stable pH is critical to facilitate effective plumbosolvency control. With implementation of orthophosphate dosing it is necessary to provide a back-up system to ensure a stable pH of the final water.

Dosing pipelines, carrier water pipework and electrical cables have been installed within 100mm diameter ducts, placed in trenches constructed within existing made ground at the Ballyhilty WTP. The ducts are installed at approximately 700mm below ground level and following installation the trench was backfilled and the surface reinstated to match the existing surface. Where pipework and cables are routed through existing structures, they are surface mounted within trunking.

A suitable kiosk is installed on an above ground concrete plinth to house all electrical and control equipment required for the orthophosphate system. This control system has been incorporated into the existing Supervisory Control and Data Acquisition (SCADA) system on site. The proposed automation solution is managed using a new Programmable Logic Computer (PLC) / Human Machine Interface (HMI) controller.

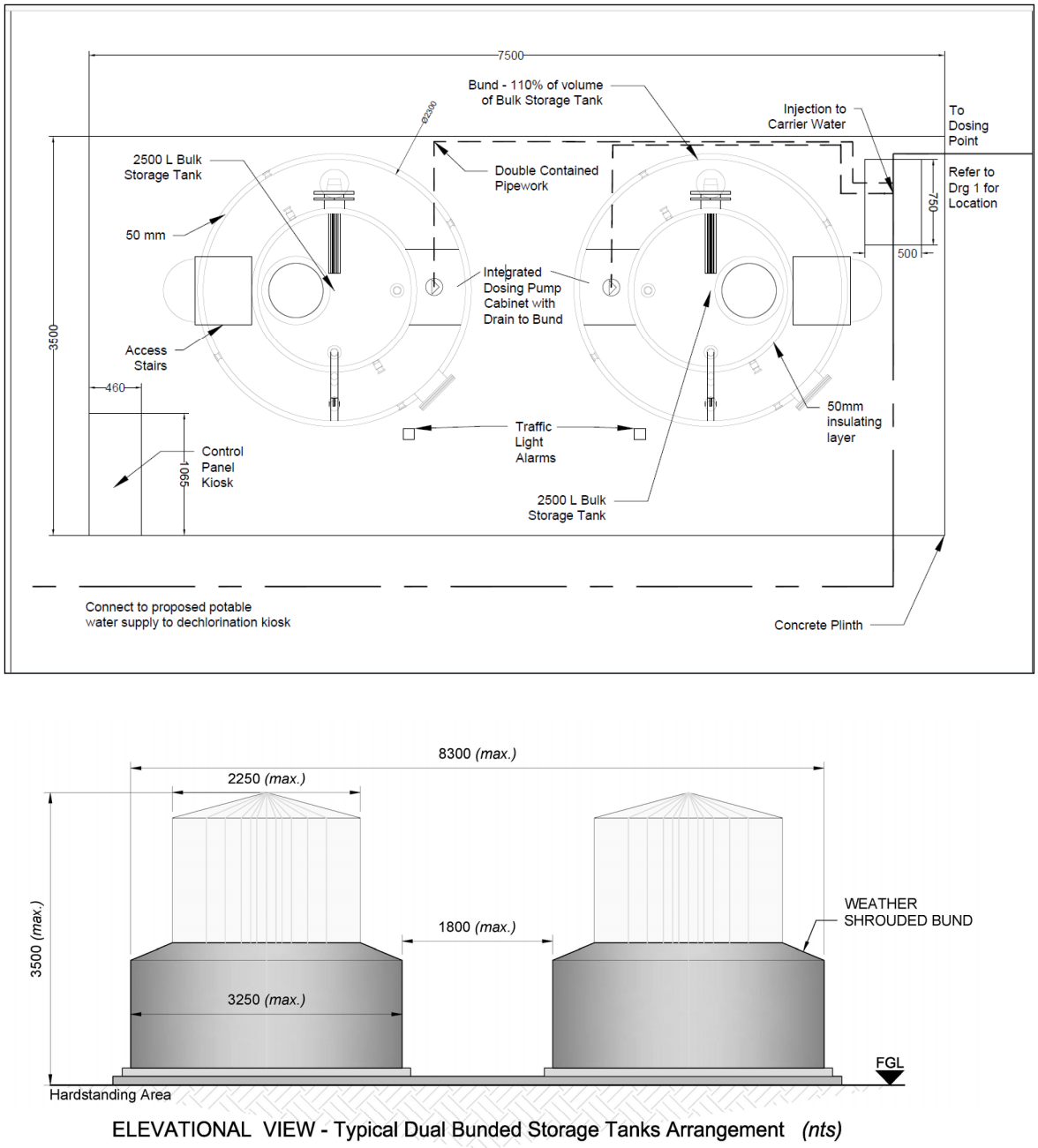


Figure 3-1: Plan and Elevation Drawings of a typical Orthophosphate Dosing Unit

3.3 CONSTRUCTION METHODOLOGY

The works will be carried out by suitably qualified contractors. The proposed dosing unit will be located within the bounds of the existing Ballyhilty WTP on an area of made ground.

3.4 OPERATION OF CORRECTIVE WATER TREATMENT WORKS

The operational stage for the corrective water treatment works will be a part of the day to day activities of the WTP and will be operated in accordance with the SOPs.

The orthophosphate dosing system will be controlled by the site SCADA system, whereby, orthophosphoric acid will be dosed proportional to the flow of the water being distributed to the network. At Ballyhilty WTP, orthophosphate will be added to treated water at a rate of 0.6 mg/l. The onsite storage tanks have been designed to provide 60 days of storage so it is anticipated that deliveries will be approximately once every two months. All deliveries will be via existing access roads within the boundary of the WTP.

3.5 LDWMP APPROACH TO ASSESSMENT

3.5.1 Work Flow Process

In line with the relevant guidance, the Screening report for AA comprises of two steps:

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

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

This EAM conceptual model, 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 water bodies; 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 (DWWTS).

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 3.5.2** below.

3.5.2 Environmental Assessment Methodology

The EAM has been developed based on a conceptual model of phosphorus (P) transfer (see **Figure 3-2)** 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 the water treatment plant 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 DWWTSs.
- Receptors refer to SACs and SPAs which may receive orthophosphate dosed water via the pathway examples outlined above. Receptors and their sensitivity, is of key consideration in the EAM. A water body 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 a SAC/SPA could receive orthophosphate dosing inputs at more than one WSZ, the cumulative effects are considered in the EAM.

A flow chart of the methodology applied in the EAM is provided in **Figure 3-3** 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 risk assessment process. A summary report outlining the EAM results is available in **Appendix C**, which further outlines P dynamics and the consideration of P trends and capacity in receiving waters and the risk to WFD objectives from any increase in P load from orthophosphate dosing.

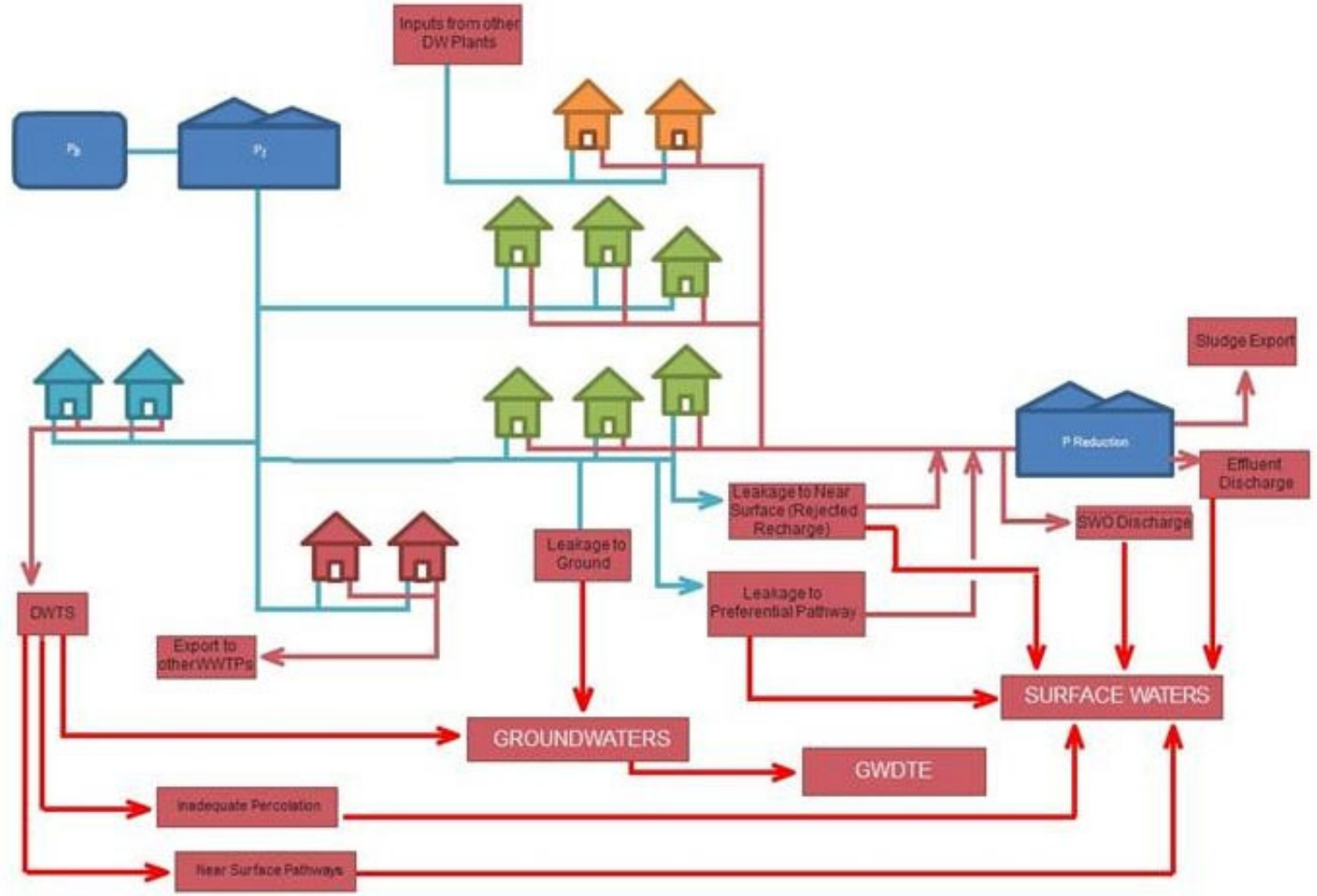


Figure 3-2: Conceptual Model of P Transfer

(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.)

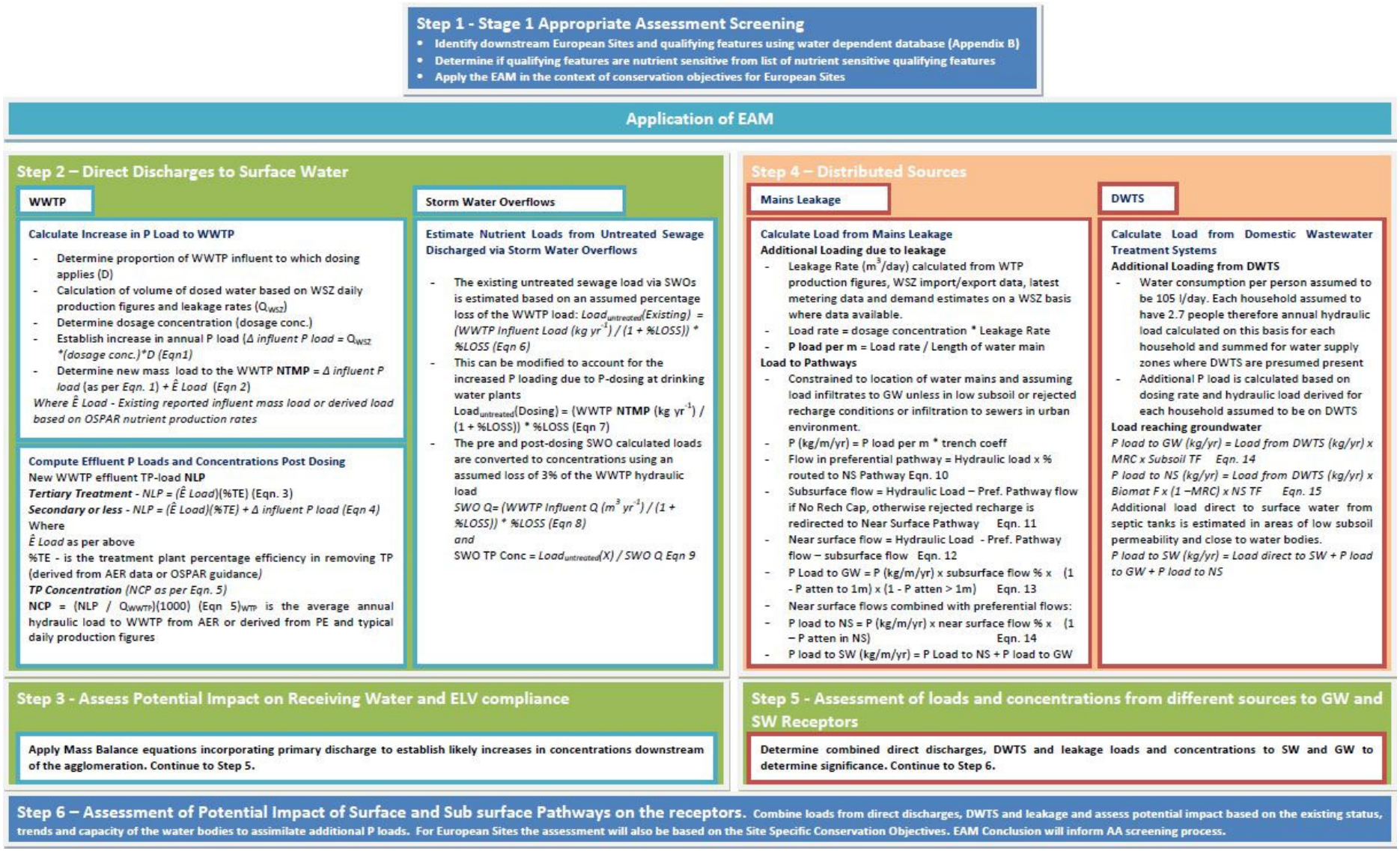


Figure 3-3: Stepwise Approach to the Environmental Assessment Methodology

4 PROJECT CONNECTIVITY TO EUROPEAN SITES

4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

4.1.1 Construction Phase

The construction phase of the proposed project will take place within the confines of the existing Ballyhilty WTP. The WTP is not located within or directly adjacent to the boundary of any European Site. Given the small-scale nature of construction works, the ZoI was considered to include the footprint of the existing Ballyhilty WTP followed by a review of hydrological and hydrogeological connectivity between the proposed development site and European Sites. The European Sites within ZoI for the construction phase of the project are listed in **Table 4-1** and displayed in **Figure 4-1.**

Table 4-1: European Sites within the ZoI of the Proposed Project – Construction Phase

	Site Name	SAC / SPA Code	Direct Impact	Water Dependent Species / Habitats	Surface Water Connectivity	Groundwater Connectivity[4],[5]	Potential Source Pathway Receptor
1	Barley Cove to Ballyrisode Point	SAC 001040	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
2	Roaringwater Bay and Islands	SAC 000101	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
3	Lough Hyne Nature Reserve and Environs	SAC 000097	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
4	Castletownshend	SAC 001547	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
5	Myross Wood	SAC 001070	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
6	Kilkeran Lake and Castlefreke Dunes	SAC 001061	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
7	Clonakilty Bay	SAC 000091	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes

[4] Ballyhilty WTP overlies the Skibbereen-Clonakilty (IE_SW_G_085) GWB. All European Sites overlying or supporting connectivity to this GWB have been assessed to determine potential source-pathway-receptors. This GWB comprises poorly productive bedrock. There is no further information available from GSI regarding groundwater flow paths however as with the adjacent groundwater body Bandon IE_SW_G_086 (also poorly productive bedrock) flow direction is expected to mimic the surface water pattern and flow radially out towards the coast.. The nearest surface waterbody is the Ilen River located approximately 200m west of the WTP. As a result, potential interactions between the WTP site and the groundwater body can only be conveyed via the Ilen River which provides connectivity with sites 2 and 9 only. The remaining sites have been ruled out owing to open marine buffers via Roaring Water Bay (IE_SW_140_0000) or are located >7km from the WTP with no surface water connections.

[5] https://jetstream.gsi.ie/iwdds/delivery/GSI_Transfer/Groundwater/GWB/BandonGWB.pdf

	Site Name	SAC / SPA Code	Direct Impact	Water Dependent Species / Habitats	Surface Water Connectivity	Groundwater Connectivity[4],[5]	Potential Source Pathway Receptor
8	Courtmacsherry Estuary	SAC 001230	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
9	Sheep's Head to Toe Head SPA	SPA 004156	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
10	Galley Head to Duneen Point SPA	SPA 004190	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
11	Clonakilty Bay SPA	SPA 004081	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
12	Seven Heads SPA	SPA 004191	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
13	Courtmacsherry Bay SPA	SPA 004219	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes
14	Old Head of Kinsale SPA	SPA 004021	No	Yes	No	Yes (Skibbereen – Clonakilty)	Yes

4.1.2 Operational Phase

The ZoI for the operational phase of the proposed project was determined by establishing the potential for hydrological and hydrogeological connectivity between the Ballyhilty WTP and associated WSZ and European Sites. The ZoI was therefore defined by the surface and groundwater bodies that are hydrologically and hydrogeologically connected with the project.

In the EAM, all water bodies linked to the WSZ have been identified. Downstream water bodies to the estuary and coastal water bodies have also been identified. Groundwater bodies touching or intersecting the WSZs are also included in the ZoI. Hydrogeological linkages in karst areas have also been taken into account. European Sites within the ZoI are listed in **Table 4-2** and are displayed in **Figure 4-1**.

Table 4-2: European Sites within the ZoI of the Proposed Project- Operational Phase

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive Species / Habitats	Surface Water Connectivity	Ground-water Connectivity	Potential Source Pathway Receptor
1	Barley Cove to Ballyrisode Point SAC	SAC 001040	Yes	Yes	Yes (Multiple RWBs. TWB - Ilen Estuary. CWB - Roaring Water Bay, Western Celtic Sea)	Yes (Skibbereen – Clonakilty)	Yes
2	Roaringwater Bay and Islands SAC	SAC 000101	Yes	Yes	Yes (Multiple RWBs, Ilen	Yes (Skibbereen	Yes

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive Species / Habitats	Surface Water Connectivity	Ground-water Connectivity	Potential Source Pathway Receptor
					Estuary, Roaring Water Bay, Western Celtic Sea)	– Clonakilty, Bandon Islands)	
3	Lough Hyne Nature Reserve and Environs SAC	SAC 000097	Yes	Yes	Yes - RWB (Ardgehane River) CWB (Western Celtic Sea)	Yes (Skibbereen – Clonakilty)	Yes
4	Castletownshend SAC	SAC 001547	Yes	Yes	Yes – RWB (Killangal River), CWB - (Rosscarbery Bay, Western Celtic Sea)	Yes (Skibbereen – Clonakilty)	Yes
5	Myross Wood SAC	SAC 001070	Yes	Yes	Yes - RWB (Killangal River), TWB – (Glandore Harbour)	Yes (Skibbereen – Clonakilty)	Yes
6	Kilkeran Lake and Castlefreke Dunes SAC	SAC 001061	Yes	Yes	Yes - CWB (Western Celtic Sea, Rosscarbery Bay)	Yes (Skibbereen – Clonakilty)	Yes
7	Clonakilty Bay SAC	SAC 000091	Yes	Yes	Yes - CWB (Western Celtic Sea, Clonakilty Bay)	Yes (Skibbereen – Clonakilty)	Yes
8	Courtmacsherry Estuary SAC	SAC 001230	Yes	Yes	Yes – CWB (Western Celtic Sea, Courtmacsherry Bay)	Yes (Skibbereen – Clonakilty)	Yes
9	Great Island Channel	SAC 001058	Yes	Yes	Yes – CWB (Western Celtic Sea, Outer Cork Harbour)	No	Yes
10	Ballymacoda (Clonpriest and Pillmore) SAC	SAC 000077	Yes	Yes	Yes - CWB (Western Celtic Sea, Youghal Bay)	No	Yes
11	Blackwater River (Cork / Waterford) SAC	SAC 002170	Yes	Yes	Yes - CWB (Western Celtic Sea, Youghal Bay)	No	Yes
12	Ardmore Head SAC	SAC 002123	Yes	Yes	Yes - CWB (Western Celtic Sea)	No	Yes
13	Sheep's Head to Toe Head SPA	SPA 004156	Yes	Yes	Yes - RWB (Multiple) TWB (Ilen Estuary, Glandore Harbour) CWB (Roaring Water Bay, Rosscarbery Bay, Western	Yes (Skibbereen – Clonakilty)	Yes

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive Species / Habitats	Surface Water Connectivity	Ground-water Connectivity	Potential Source Pathway Receptor
					Celtic Sea)		
14	Galley Head to Duneen Point SPA	SPA 004190	Yes	Yes	Yes – RWB (Ardgehane, Killangal) TWB - (Glandore Harbour), CWB (Western Celtic Sea, Rosscarbery Bay, Clonakilty Bay)	Yes (Skibbereen – Clonakilty)	Yes
15	Clonakilty Bay SPA	SPA 004081	Yes	Yes	Yes – CWB (Western Celtic Sea, Clonakilty Bay)	Yes (Skibbereen – Clonakilty)	Yes
16	Seven Heads SPA	SPA 004191	Yes	Yes	Yes – CWB (Western Celtic Sea, Clonakilty Bay, Courtmacsherry Bay)	Yes (Skibbereen – Clonakilty)	Yes
17	Courtmacsherry Bay SPA	SPA 004219	Yes	Yes	Yes - CWB (Western Celtic Sea, Courtmacsherry Bay)	Yes (Skibbereen – Clonakilty)	Yes
18	Old Head of Kinsale SPA	SPA 004021	Yes	Yes	Yes - CWB (Western Celtic Sea, Courtmacsherry Bay)	Yes (Skibbereen – Clonakilty)	Yes
19	Sovereign Islands SPA	SPA 004124	Yes	Yes	Yes - CWB (Western Celtic Sea)	No	Yes
20	Cork Harbour SPA	SPA 004030	Yes	Yes	Yes – CWB (Western Celtic Sea, Outer Cork Harbour)	No	Yes
21	Ballycotton Bay SPA	SPA 004022	Yes	Yes	Yes - CWB (Western Celtic Sea, Ballycotton Bay)	No	Yes
22	Ballymacoda Bay SPA	SPA 004023	Yes	Yes	Yes – CWB (Western Celtic Sea, Youghal Bay)	No	Yes
23	Blackwater Estuary SPA	SPA 004028	Yes	Yes	Yes - CWB (Western Celtic Sea, Youghal Bay)	No	Yes

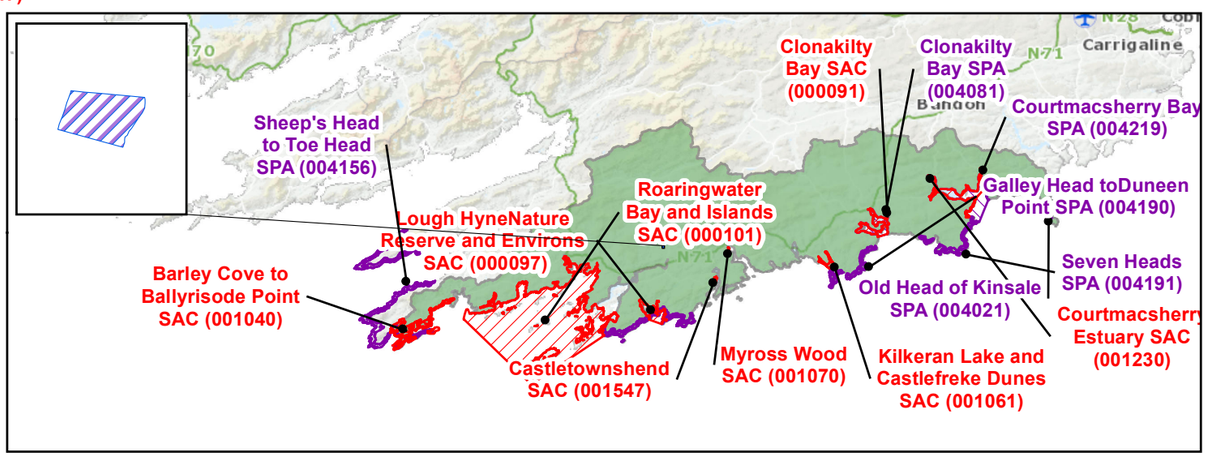
Zone of Influence (ZoI) for Operational Phase

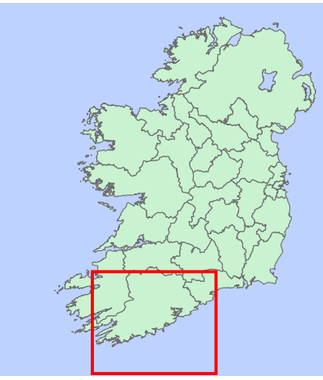
Tralee
Killarney
Mallow
Youghal
An Rinn
Cobh
Carrigaline
Bandon

Blackwater River (Cork/Waterford) SAC (002170)
Blackwater Estuary SPA (004028)
Ardmore Head SAC (002123)
Cork Harbour SPA (004030)
Great Island Channel SAC (001058)
Ballymacoda Bay SPA (004023)
Ballymacoda (Clonpriest and Pillmore) SAC (000077)
Ballycotton Bay SPA (004022)
Courtmacsherry Bay SPA (004219)
Courtmacsherry Estuary SAC (001230)
Kilkeran Lake and Castlefreke Dunes SAC (001061)
Seven Heads SPA (004191)
Sovereign Islands SPA (004124)
Roaringwater Bay and Islands SAC (000101)
Barley Cove to Ballyrisode Point SAC (001040)
Clonakilty Bay SAC (000091)
Clonakilty Bay SPA (004081)
Old Head of Kinsale SPA (004021)
Myross Wood SAC (001070)
Galley Head to Duneen Point SPA (004190)
Castletownshend SAC (001547)
Lough Hyne Nature Reserve and Environs SAC (000097)
Sheep's Head to Toe Head SPA (004156)

Zone2 Cork Harbour and City
Zone2 Innishannon
Zone1 Clonakilty
Zone1 Drimoleague
Zone1 Skibbereen Ballyhilty
Zone1 Schull
Zone1 Baltimore Lakecross

Zone of Influence (ZoI) for Construction Phase





Legend

LEMA Emission Type

- Emergency Overflow
- Primary Discharge Point
- Secondary Discharge Point
- Storm Water Overflow
- Waste Water Treatment Plant
- Ballyhilty WTP
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Water Supply Zone Boundary (WSZ)
- Additional WSZ considered for dosing
- Zone of Influence

Data Source:
Irish Water
NPWS (Feb. 2023)
EPA

N

0 5 10 20 Kilometres

Client: UISCE ÉIREANN : IRISH WATER

Project: Lead Mitigation Plan
Corrective Water Treatment Works

Title

Zone 1 Skibbereen Ballyhilty

European Sites within the ZoI of the Proposed Project

RPS

Scale: 1:500,000 @ A3	Date: 05/05/2023
File Ref: MDW0766Arc0060aF02	Map Projection: Irish National Grid (TM65)

4.2 IDENTIFICATION OF RELEVANT EUROPEAN SITES

For the construction and operational phase of the project, each European Site was assessed for the presence of water dependent habitats and species, their associated nutrient sensitivity, together with the hydrological/hydrogeological connectivity of each site to the proposed project. A number of sites are excluded from further assessment in Section 6 at this stage of the process and those included, are detailed in **Table 4-3** and are displayed in **Figure 4-2.** Seven sites are included for further assessment on the basis of the operational phase and two sites are included for further assessment on the basis of the construction phase, with justification provided below.

The construction phase of the proposed project will take place within the confines of the existing Ballyhilty WTP. There is no potential for surface water connectivity to the Ilen River. The closest point of connection is > 200 m from the WTP; however the site and the river are separated by agricultural grassland, roadway, broadleaved woodland and a riparian zone. The WTP is located within the Skibbereen-Clonakilty groundwater body (IE_SW_G_085). As discussed above, the groundwater body is poorly productive with preferential flow paths to the nearest surface water feature, in this case the Ilen River. Therefore, only two sites support potential hydrogeological connectivity, indirectly via the Ilen River. The sites included for further assessment on the basis of the construction phase are Roaringwater Bay and Islands SAC and Sheep's Head to Toe Head SPA.

The WSZs for the operational phase include Zone 1 Skibbereen Ballyhilty (0500PUB4605), Zone 1 Schull (0500PUB4503), Zone 1 Baltimore/Lakecross (0500PUB4601) and Zone1 Drimoleague are large and dispersed along the coast. The surface water bodies that intersect the WSZs discharge to Roaring Water Bay (IE_SW_140_0000), the Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000) and Rosscarbery Bay (IE_SW_110_0000). As a result, eight European Sites are intersected via surface water pathways i.e. Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Kilkeran Lake and Castlefreke Dunes SAC, Castletownshend SAC, Myross Wood SAC, Sheep's Head to Toe Head SPA and Galley Head to Duneen Point SPA, and are included in the Section 5 and Section 6 assessment.

The WSZs also intersect three groundwater bodies – Skibbereen-Clonakilty (IE_SW_G_085), Bandon Islands (IE_SW_G_013) and Waste Facility (W0089-02) (IE_SW_G_016) (**Table 3, Appendix C**). No European Sites or surface water bodies intersect the Waste Facility (W0089-02), therefore it is excluded from further assessment. The following 14 European Sites overlay or intersect Skibbereen-Clonakilty (IE_SW_G_085) – Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Kilkeran Lake and Castlefreke Dunes SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Sheep's Head to Toe Head SPA, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA and Old Head of Kinsale SPA. In addition, Roaringwater Bay and Islands SAC is intersected by Bandon Islands (IE_SW_G_013).

Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Kilkeran Lake and Castlefreke Dunes SAC, Sheep's Head to Toe Head SPA and Galley Head to Duneen Point SPA are all included for further assessment due to surface water connectivity and groundwater interactions. No European Site is connected solely via groundwater. However the following sites are connected by groundwater and the Western Celtic Sea only, i.e. Clonakilty Bay SAC, Courtmacsherry Bay SAC, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA and Old Head of Kinsale SPA. For these sites an

assessment was made of the direction of flow in the groundwater body forming the connection, whilst the coastal water body connectivity is discussed below.

Groundwater flows through voids such as connected pore spaces in sand and gravel aquifers and through fissures, faults, joints and bedding planes in bedrock aquifers. Regional groundwater flows tend to follow the regional topography and generally discharge towards main surface water bodies including rivers, lakes and coastal water bodies. In areas of karstified limestones, high permeability zones give rise to rapid groundwater velocities with more complex flow directions, which may vary seasonally and are difficult to predict with certainty. In this case, the assumption is that groundwater flow direction is from areas of higher elevations to lower elevations, unless groundwater specific information indicates otherwise. Groundwater body specific information relating to flow and discharge is available from the GSI[6], and was consulted in making the assessment.

The Skibbereen-Clonakilty groundwater body comprises poorly productive bedrock and flow direction is expected to mimic the surface water pattern flowing radially out towards the coast. There is no available information for this groundwater body from GSI[6]. The surface water network overlaying this groundwater body is considered to be of medium to high drainage density, which is indicative of the characteristics expected from a poorly productive aquifer below. The sites connected by Skibbereen-Clonakilty and the Western Celtic Sea include Clonakilty Bay SAC, Courtmacsherry Bay SAC, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA and Old Head of Kinsale SPA. Although groundwater flow is likely to interact with these sites, as the modelled post-dosing increase in orthophosphate concentration is 0.0000 mg/l Skibbereen-Clonakilty, these sites have been excluded from further assessment. Hydrological connectivity via the Western Celtic Sea is discussed below.

A large coastal water body i.e. the Western Celtic Sea lies downstream of the WSZ. The majority of the river water bodies connected to the WSZ discharge to Roaring Water Bay (IE_SW_140_0000). Ardgehane_010 (IE_SW_20A430910) and Killangal_010 (IE_SW_20K950970) discharge to Rosscarbery Bay (IE_SW_110_0000), whilst Ardgehane_010 (IE_SW_20A430910) also discharges to the Western Celtic Sea directly. The EAM results show that the potential increase in orthophosphate concentration in each of these coastal water bodies is not detectable (0.0000 mg/l) (see **Table 5-2** below). Therefore, the ZoI for the project has been determined to terminate at Roaring Water Bay and Rosscarbery Bay coastal water bodies, and the following sites connected by the Western Celtic Sea are excluded from further assessment due to having only hydrological connectivity: Ballymacoda (Clonpriest and Pillmore) SAC, Blackwater River (Cork/Waterford) SAC, Ardmore Head SAC, Sovereign Islands SPA, Cork Harbour SPA, Ballycotton Bay SPA, Ballymacoda Bay SPA and Blackwater Estuary SPA. The sites discussed above that are connected by both the Skibbereen-Clonakilty groundwater body and the Western Celtic Sea have also been excluded from further assessment as both potential source-impact pathways have been excluded. These include: Clonakilty Bay SAC, Courtmacsherry Bay SAC, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA and Old Head of Kinsale SPA.

In addition, seven European Sites are connected via coastal water bodies but also via groundwater which was discussed above, and the pathway was excluded from further assessment. These include: Kilkeran Lake and Castlefreke Dunes SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA and Old Head of Kinsale SPA. These sites have been excluded from further assessment as discussed above for both groundwater and coastal connectivity.

6 https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx

On this basis, two sites have been included for further assessment in order to evaluate the significance of potential effects arising during construction phase in Section 5 below i.e. Roaringwater Bay and Islands SAC and Sheep's Head to Toe Head SPA. Eight sites have been included for further assessment for the operational phase in Sections 5 and 6 below i.e. Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Kilkeran Lake and Castlefreke Dunes SAC, Sheep's Head to Toe Head SPA and Galley Head to Duneen Point SPA.

Table 4-3: European Sites Hydrologically or Hydrogeologically 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 Species / Habitats	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
Construction and Operational Phases								
Roaringwater Bay and Islands SAC	SAC 000101	19th Jul 2011 Version 1.0	1160	Large shallow inlets and bays	Yes	Yes	Yes	Yes
			1170	Reefs	Yes	Yes		
			1230	Vegetated sea cliffs of the Atlantic and Baltic Coasts	Yes	Yes		
			1351	Harbour porpoise (*Phocoena phocoena*)	Yes	Yes		
			1355	Otter (*Lutra lutra*)	Yes	Yes		
			1364	Grey seal (*Halichoerus grypus*)	Yes	Yes		
			4030	European dry heaths	No	Yes		
			8330	Submerged or partially submerged sea caves	Yes	Yes		
Sheep's Head to Toe Head SPA	SPA 004156	21st Feb 2018 Version 6.0	A103	Peregrine (*Falco peregrinus*)	Yes	Yes	Yes	Yes
			A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes		
Operation Phase Only								
Barley Cove to Ballyrisode Point SAC	SAC 001040	2nd Sep 2014 Version 1.0	1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes	Yes	Yes
			1220	Perennial vegetation of stony banks	Yes	No		
			1310	*Salicornia* and other annuals colonising mud and sand	Yes	Yes		
			1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Yes	Yes		
			1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Yes	Yes		
			2120	Shifting dunes along the shoreline with *Ammophila*	Yes	Yes		

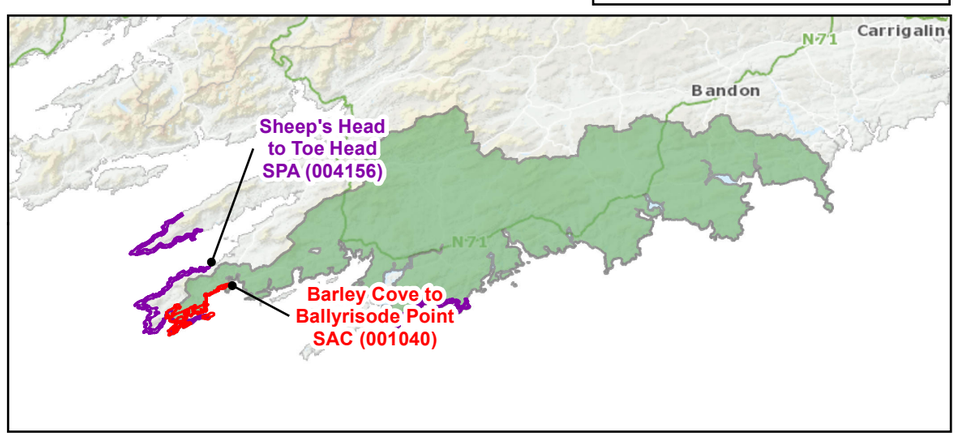
Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive Species / Habitats	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
				arenaria (white dunes)				
			2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Yes	Yes		
			4030	European dry heaths	No	Yes		
Lough Hyne Nature Reserve and Environs SAC	SAC 000097	19th Aug 2014 Version 1.0	1160	Large shallow inlets and bays	Yes	Yes	Yes	Yes
			1170	Reefs	Yes	Yes		
			8330	Submerged or partially submerged sea caves	Yes	Yes		
Castletownshend SAC	SAC 001547	21st Feb 2018 Version 6.0	1421	Killarney Fern (*Trichomanes speciosum*)	Yes	Yes	Yes	Yes
Myross Wood SAC	SAC 001070	21st Feb 2018 Version 6.0	1421	Killarney Fern (*Trichomanes speciosum*)	Yes	Yes	Yes	Yes
Kilkeran Lake and Castlefreke Dunes SAC	SAC 001061	7th Dec 2016 Version 1.0	1150	Coastal lagoons*	Yes	Yes	Yes	Yes
			2110	Embryonic shifting dunes	Yes	Yes		
			2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Yes	Yes		
			2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Yes	Yes		
Galley Head to Duneen Point SPA	SPA 004190	21st Feb 2018 Version 6.0	A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes	Yes	Yes

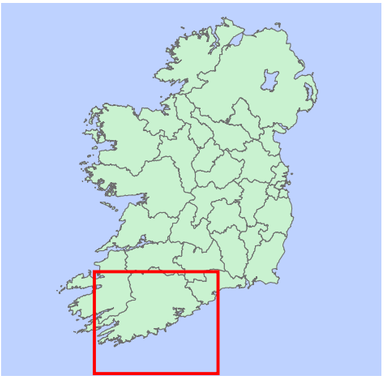
*Indicates a priority habitat under the Habitats Directive

Zone of Influence (Zol) for Operational Phase

Tralee
N22
N21
N23
N70
N72
Killarney
N71
N22
N70
N73
Mallow
N72
N20
N72
Dungarvan
An Rinn
N25
Youghal
Zone2 Cork Harbour and City
Cork
N25
N22
Cobh
N71
Zone2 Innishannon
Bandon
Zone1 Drimoleague
Myross Wood SAC (001070)
Zone1 Clonakilty
Barley Cove to Ballyrisode Point SAC (001040)
Zone1 Baltimore Lakecross
Zone1 Skibbereen Ballyhilty
Galley Head to Duneen Point SPA (004190)
Zone1 Schull
Kilkeran Lake and Castlefreke Dunes SAC (001061)
Castletownshend SAC (001547)
Lough Hyne Nature Reserve and Environs SAC (000097)
Sheep's Head to Toe Head SPA (004156)
Roaringwater Bay and Islands SAC (000101)

Zone of Influence (Zol) for Construction Phase





Legend

LEMA Emission Type

- Emergency Overflow
- Primary Discharge Point
- Secondary Discharge Point
- Storm Water Overflow
- Waste Water Treatment Plant
- Ballyhilty WTP
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Water Supply Zone Boundary (WSZ)
- Additional WSZ considered for dosing
- Subcatchments intersecting Water Supply Zone(s) related to the WTP
- Zone of Influence

Data Source:
Irish Water
NPWS (Feb. 2023)
EPA

N

0 5 10 20 Kilometres

Client: UISCE ÉIREANN : IRISH WATER

Project: Lead Mitigation Plan
Corrective Water Treatment Works

Title

Zone 1 Skibbereen Ballyhilty

European Sites within the Zol which are hydro(geo)logically connected

RPS

Scale: 1:500,000 @ A3	Date: 08/05/2023
File Ref: MDW0766Arc0060bF02	Map Projection: Irish National Grid (TM65)

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 effects;
- Short and long-term effects;
- Construction, operational and decommissioning effects; and
- Isolated, interactive and cumulative effects.

5.2 IMPACT IDENTIFICATION

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

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

- 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).

5.2.1 Construction Phase

The source-pathway-receptor approach has identified a number of impact pathways associated with the construction of orthophosphate treatment works at Ballyhilty WTP. These will be evaluated with regard to the potential for likely significant effects on European Sites. These are potential effects and in the absence of pathways (which is evaluated in **Section 5.3.1** below) the construction phase may not give rise to these effects.

- Sediment laden run-off from excavation areas (trenches for dosing pipelines, carrier water pipework and electrical cables) and the introduction of fine sediments to watercourses connected to the works area causing a deterioration in water quality;
- Dust and noise emissions from excavation (trenches for dosing pipelines, carrier water pipework and electrical cables and transportation of material and equipment close to watercourses causing a deterioration in water quality or disturbance to species (e.g. birds);

- Environmental incident or accident during the construction phase e.g. spillage of a contaminant such as diesel or phosphoric acid causing a deterioration in water quality;
- Groundwater level drawdown through the excavation of trenches for dosing pipelines, carrier water pipework and electrical cables.

5.2.2 Operational Phase

The source-pathway-receptor approach has identified a number of impact pathways associated with the operation of orthophosphate treatment works at Ballyhilty WTP. These will be evaluated with regard to the potential for likely significant effects on European Sites in relation 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 impacts for these habitats and species;
- The discharge of additional orthophosphate loads to the environment (through surface and sub surface pathways) may have potentially negative effects on nutrient sensitive species such as the freshwater pearl mussel, Atlantic salmon and the white-clawed crayfish;
- Phosphorus in wastewater collection systems is the result of drinking water and derived from a number of other sources, including phosphorus 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 orthophosphate;
- Direct discharges of increased phosphorus to water bodies from the wastewater treatment plant licensed discharges; and
- Potential discharges to water bodies of untreated effluent potentially high in orthophosphate from Storm Water Overflows (SWOs).

5.3 ASSESSMENT OF 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 evaluation of the potential for likely significant effects associated with the additional orthophosphate load due to orthophosphate dosing and the construction of treatment works at Ballyhilty WTP.

5.3.1 Construction Phase

The location for the orthophosphate dosing system at Ballyhilty WTP is within the confines of the existing WTP boundary. The assessment of potential significant effects associated with construction of the corrective water treatment works was conducted taking the whole Ballyhilty WTP into account. The assessment of impacts associated with the construction of the corrective water treatment works at Ballyhilty WTP is presented in **Table 5.1** and is based on a desktop study using the following information:

- Design descriptions and drawings for the proposed corrective water treatment works at Ballyhilty WTP;
- A review of hydrological connectivity between the proposed works and European Sites using the EPA Mapping Resources: http://gis.epa.ie/; www.Catchments.ie;
- Ordnance Survey Ireland Map viewer: http://maps.osi.ie/publicviewer/#V1,591271,743300,0,10
- Site synopses, Conservation Objectives and Qualifying Interest data for European Sites.

Table 5-1: Likely significant effects to European Sites arising as a result of the construction of the corrective water treatment works

Site Name (Code)	Contributing WB Code_Name	WB Type[7]	Evaluation of Potential Significant Effects
Roaringwater Bay and Islands SAC (000101)	Skibbereen-Clonakilty (IE_SW_G_085)	GWB	The construction works will be located within the confines of the existing Ballyhilty WTP. Ballyhilty WTP is not located within or directly adjoining a European Site. **Surface water** There are no surface water bodies within the confines of Ballyhilty WTP. The footprint of the WTP is bounded by roads, stands of broadleaved woodland and agricultural grassland before reaching the Ilen River (Ilen_030 IE_SW_20I010300 & Ilen_040 IE_SW_20I010350) approximately 200m west of the WTP. The Ilen River flows south of the WTP site into the Ilen Estuary (IE_SW_130_0100) approximately 3 km downstream. The closest European Site, Roaringwater Bay and Islands SAC is a further 19 km (approximately) downstream, therefore >20 km downstream of the WTP site. In addition Sheep's Head to Toe Head SPA is connected to the Ilen Estuary (IE_SW_130_0100) >25 km downstream the WTP. The proximity of the proposed construction works to the Ilen River results in the potential for remote connectivity to European Sites downstream in Roaring Water Bay and its associated transitional and coastal water bodies. However, the proposed construction works are small scale in nature and will be undertaken within the confines of the existing built infrastructure associated with Ballyhilty WTP. There will be no aspects of the proposed works that will
Sheep's Head to Toe Head SPA (004156)	Skibbereen-Clonakilty (IE_SW_G_085)	GWB	

[7] Monitoring period is annual unless specified.

Site Name (Code)	Contributing WB Code_Name	WB Type[7]	Evaluation of Potential Significant Effects
			result in the release of potential impacts sources identified in **Section 5.2.1.** The works will be localised and contained to the immediate development area which supports amenity grassland / buildings and artificial surfaces. Works such as excavations will be contained to the defined working area and necessary works with cast in place concrete will be undertaken within sealed shuttered units. Such works practices will retain all potential construction related pollutants at source. Owing to the small scale nature of the proposed works and the large distance between the WTP and the European Sites (>20 km downstream) there is no potential for likely significant effects on Roaringwater Bay and Islands SAC, Sheep's Head to Toe Head through sediment laden run-off, dust emissions or environmental incidents. Therefore, there is no potential for likely significant effects to these European Sites. **Groundwater** The WTP overlies the Skibbereen - Clonakilty (IE_SW_G_085) groundwater body a sizeable groundwater body which encapsulates much of south Co. Cork. The excavation of trenches to install dosing pipelines, carrier water pipework and electrical cables to 700mm below ground level has the potential to interfere with the water table potentially causing groundwater drawdown. The Skibbereen-Clonakilty (IE_SW_G_085) groundwater body is comprised of poorly productive bedrock. There is no further water body-specific information on Skibbereen-Clonakilty (IE_SW_G_085) available from the GSI website. It is a large GWB and as with the adjacent groundwater body Bandon IE_SW_G_086 (also poorly productive bedrock) flow direction is expected to mimic the surface water pattern and flow radially out towards the coast[8]. As the excavation works will not be extensive (up to c. 75m for pipework and to an approximate depth of 700mm) and upon made ground, interference with water table will be unlikely to occur. Any interference would be localised, minor and temporary. Therefore, there is no potential for likely significant effects to the underlying groundwater body, the receiving surface water feature and subsequently those European Sites included for further assessment, as a result of the construction of the corrective water treatment works at Ballyhilty WTP.

[8] https://jetstream.gsi.ie/iwdds/delivery/GSI_Transfer/Groundwater/GWB/BandonGWB.pdf

5.3.2 Operational Phase

In the case of the additional orthophosphate load due to dosing at Ballyhilty WTP, the EAM conceptual model developed for orthophosphate transfer identified the surface and groundwater bodies that have the potential to be affected by the orthophosphate dosing and for which hydrological or hydrogeological pathways to the European Sites exist. These water bodies are listed in **Table 5-2.** The table identifies the following:

- European Sites included for assessment;
- Water bodies hydrologically or hydrogeologically connected to the European Sites;
- Existing orthophosphate indicative quality and trend of each water body as presented in the EPA's WFD App;
- The baseline orthophosphate concentration of each water body;
- 75% of the upper threshold for indicative quality;
- Cumulative orthophosphate load to surface from leakage, DWWTS and agglomerations;
- The modelled orthophosphate concentration following dosing at the WTP; and,
- The orthophosphate potential baseline concentration (mg/l) following dosing at the WTP.

The EAM has been undertaken assuming the capacity of a water body is a measure of its ability to absorb extra pressures before its indicative quality changes. In order to do this the indicative quality as presented in the EPA's WFD APP is used as the baseline concentration for the different monitoring points within a water body. For example, a river water body with Good orthophosphate indicative quality will have mean orthophosphate value in the range 0.025 to 0.035 mg/l. River water bodies with mean orthophosphate concentrations of 0.0275 mg/l have 75% capacity left, i.e. high capacity, while river water bodies with a mean of 0.0325 mg/l have lower capacity (25%) as the baseline concentrations are closer to the Good/Moderate indicative quality boundary. Where a water body does not have monitored orthophosphate concentrations, a conservative approach is used whereby the surrogate indicative quality is calculated based on the ecological status assigned to that water body by the EPA.

When assessing the increase in orthophosphate concentrations as a result of proposed dosing, an increase which is <5% of the Good / High indicative quality boundary, i.e. 0.00125mg/l, is excluded from further assessment and is assumed to result in no significant impact to a water body. If the baseline orthophosphate concentration in addition to the potential increase in orthophosphate concentration as a result of dosing is less than the 75% upper threshold of the indicative quality band for a water body, this also results in no significant impact.

For significance threshold band (i.e. 75% of the upper threshold for the indicative quality band) in transitional and coastal water bodies, a sliding linear scale is used depending on median salinity. The EAM determines if the dosing will result in a baseline concentration that exceeds the relevant 75% threshold for the indicative quality bands (based on salinities) in order to evaluate whether there could be an increased risk of deterioration in indicative quality.

Where a transitional or coastal water body does not have monitored orthophosphate concentrations or salinity levels, a conservative approach is used whereby the surrogate indicative quality is calculated based on the ecological status assigned to that water body by the EPA but the more

conservative freshwater orthophosphate limits for the different indicative quality bands are applied[9].

Therefore, in assessing the additional loads from the proposed orthophosphate dosing, the capacity of the water body will be assessed. This information is available on the WFD App on a national basis using the "Distance to Threshold" parameter, where water bodies with high capacity are termed "Far" from the threshold and those with low capacity are "Near" the threshold.

It is predicted that orthophosphate dosing will not have a significant effect on water bodies (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 orthophosphate indicative quality 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 orthophosphate dosing and statistically significant trends for a water body will not result in deterioration in status by 2021 even where the distance to threshold is currently assessed to be far. Where the water body baseline indicative quality concentration is "Near" to the threshold before the effect of orthophosphate dosing is considered, this does not cause an automatic fail for this test. If the predicted increase in concentration due to orthophosphate is very low (i.e. below 5% of the Good/Moderate indicative quality this test will pass as the orthophosphate dosing itself can be defined as having no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

The identification of statistically and environmentally significant trends for water bodies 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 Ecological Status will not be achieved within two future river basin cycles, i.e. within the next 12 years.

This test applies only when the trend for orthophosphate concentration for the water body is considered statistically significant in the WFD App. For surface water bodies, the predicted concentration is given and the additional concentration due to orthophosphate dosing is added and assessed as appropriate. If the new calculated predicted concentration prevents the achievement of good indicative quality then this test fails.

This assessment assumes a dosing rate of 0.6 mg/l; this test could be reassessed in the future.

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 orthophosphate concentration is lower than the absolute value of the Sens Slope, then the test passes.

The initial assessment is automated using existing WFD App data. If tests fail and more investigation is required, more recent data can be used and the assessment rerun. For example, where 2019-2021 concentrations for a river water body are available, the 2019-2021 average can be used instead of the 2017 baseline provided in the WFD App.

[9] The conservative thresholds in transitional and coastal water bodies for orthophosphate indicative quality in unassigned water bodies i.e. upper limits are: High 0.025 mg/l; Good 0.04 mg/l; Moderate 0.06 mg/l; Poor 0.09 mg/l; Bad – N/A. The higher range for transitional and coastal water bodies with a median salinity ≤ 17mg/l are: High 0.03 mg/l; Good 0.06 mg/l; Moderate 0.1 mg/l; Poor 0.2 mg/l; Bad N/A.

Table 5-2: 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[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
Barley Cove to Ballyrisode Point SAC (001040)	IE_SW_20L560540 Lowertown_010	RWB	*High*	*0.013*	*0.019*	*3.9*	*0.0006*	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20E070850 Skull_010	RWB	*High*	*0.013*	*0.019*	5.0	0.0005	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20D770630 Derreennatra_010	RWB	*High*	*0.013*	*0.019*	4.3	0.0024	0.015	Modelled conc. >5% Good / High indicative quality boundary but does not exceed 75% of indicative quality upper threshold, therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.
	IE_SW_20S360700 Shanavagh_010	RWB	*High*	*0.013*	*0.019*	1.3	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of

[10] Monitoring period is annual unless specified.
[11] Surrogate indicative quality in italic.
[12] Distance to threshold.
[13] Baseline year is 2014 for surface water bodies and 2012 for groundwater bodies.
[14] Surrogate concentration is given in italic mg/l
[15] Values above 5% of Good / High indicative quality boundary (0.00125 mg/l) for SW or 5% of Good / Fail indicative quality boundary (0.00175 mg/l) for GW highlighted in yellow.
[16] Green cells signify that there is no risk of deterioration in indicative quality of the water body following dosing at the WTP.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									WFD objectives.
	IE_SW_20R010400 Rathruane_010	RWB	*High*	*0.013*	*0.019*	1.7	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20K050700 Knockroe_010	RWB	*Good*	*0.030*	*0.033*	3.0	0.0002	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20L010400 Leamawaddra_020	RWB	*High*	*0.013*	*0.019*	1.7	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20R030900 Roaring Water River_010	RWB	*High*	*0.013*	*0.019*	2.9	0.0002	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20L450850 Lettershaw_010	RWB	*High*	*0.013*	*0.019*	6.9	0.0008	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20M580810 Mallavonea_010	RWB	*High*	*0.013*	*0.019*	7.2	0.0012	0.014	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20C030400 Clodagh_010	RWB	*Good*	*0.030*	*0.033*	*0.1*	*0.0000*	*0.030*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010100 Ilen_010	RWB	*High*	*0.013*	*0.019*	*5.9*	*0.0001*	*0.013*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010160 Ilen_020	RWB	Moderate Downwards Far	0.037	0.051	24.0	0.0002	0.037	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			High Downwards Far	0.016	0.019	24.0	0.0002	0.016	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010300 Ilen_030	RWB	*High*	*0.013*	*0.019*	*24.9*	*0.0001*	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010350 Ilen_040	RWB	*Good*	*0.030*	*0.033*	*37.1*	*0.0001*	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_130_0100 Ilen Estuary	TWB Summer	High Downwards Far	0.006	0.019	130.0	0.0000	0.006‡*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
		TWB Winter	High Upwards Near	0.021	0.021			0.021‡*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_010_0000 Western Celtic Sea	CWB	*High*	*0.013*	*0.019*	3.9	0.0000	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_140_0000 Roaring Water Bay	CWB Summer	High Downwards Far	0.003	0.019	184.8	0.0000	0.003‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.017	0.019			0.017‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_085 Skibbereen - Clonakilty	GWB	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Roaringwater Bay and Islands SAC (000101)	IE_SW_20L560540 Lowertown_010	RWB	*High*	*0.013*	*0.019*	3.9	0.0006	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20E070850 Skull_010	RWB	*High*	*0.013*	*0.019*	5.0	0.0005	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20D770630 Derreennatra_010	RWB	*High*	*0.013*	*0.019*	4.3	0.0024	0.015	Modelled conc. >5% Good / High indicative quality boundary but does not exceed 75% of indicative quality upper threshold, therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.
	IE_SW_20S360700 Shanavagh_010	RWB	*High*	*0.013*	*0.019*	1.3	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20R010400 Rathruane_010	RWB	*High*	*0.013*	*0.019*	1.7	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20K050700 Knockroe_010	RWB	*Good*	*0.030*	*0.033*	3.0	0.0002	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20L010400 Leamawaddra_020	RWB	*High*	*0.013*	*0.019*	1.7	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20R030900 Roaring Water River_010	RWB	*High*	*0.013*	*0.019*	2.9	0.0002	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20L450850 Lettershaw_010	RWB	*High*	*0.013*	*0.019*	6.9	0.0008	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20M580810 Mallavonea_010	RWB	*High*	*0.013*	*0.019*	7.2	0.0012	0.014	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20C030400 Clodagh_010	RWB	*Good*	*0.030*	*0.033*	*0.1*	*0.0000*	*0.030*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010100 Ilen_010	RWB	*High*	*0.013*	*0.019*	*5.9*	*0.0001*	*0.013*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010160 Ilen_020	RWB	Moderate Downwards Far	0.037	0.051	24.0	0.0002	0.037	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			High Downwards Far	0.016	0.019	24.0	0.0002	0.016	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010300 Ilen_030	RWB	*High*	*0.013*	*0.019*	24.9	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20I010350 Ilen_040	RWB	*Good*	*0.030*	*0.033*	37.1	0.0001	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_130_0100 Ilen Estuary	TWB Summer	High Downwards Far	0.0060	0.019	130.0	0.0000	0.0060‡*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	High Upwards Near	0.021	0.021			0.021‡*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_010_0000 Western Celtic Sea	CWB	*High*	*0.013*	*0.019*	3.9	0.0000	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_140_0000 Roaring Water Bay	CWB Summer	High Downwards Far	0.003	0.019	184.8	0.0000	0.003‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.017	0.019			0.017‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_085 Skibbereen - Clonakilty	GWB	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_G_013 Bandon Islands	GWB	*Good*	*0.018*	*0.026*	0.0	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Lough Hyne Nature Reserve and Environs SAC (000097)	IE_SW_20A430910 Ardgehane_010	RWB	*Good*	*0.030*	*0.033*	3.9	0.0016	0.032	Modelled conc. >5% Good / High indicative quality boundary but does not exceed 75% of indicative quality upper threshold, therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.
	IE_SW_010_0000 Western Celtic Sea	CWB	*High*	*0.013*	*0.019*	3.9	0.0000	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_085 Skibbereen - Clonakilty	GWB	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Castletown-shend SAC (001547)	IE_SW_20A430910 Ardgehane_010	RWB	*Good*	*0.030*	*0.033*	3.9	0.0016	0.032	Modelled conc. >5% Good / High indicative quality boundary but does not exceed 75% of indicative quality upper threshold, therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.
	IE_SW_010_0000 Western Celtic Sea	CWB	*High*	*0.013*	*0.019*	3.9	0.0000	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									WFD objectives.
	IE_SW_110_0000 Rosscarbery Bay	CWB	*Moderate*	*0.046*	*0.051*	37.8	0.0000	0.046 ‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_085 Skibbereen - Clonakilty	GWB	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Myross Wood SAC (001547)	IE_SW_20K950970 Killangal_010	RWB	*Good*	*0.030*	*0.033*	10.3	0.0006	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_110_0300 Glandore Harbour	TWB	*Good*	*0.030*	*0.033*	17.5	0.0000	0.030 ‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_085 Skibbereen - Clonakilty	GWB	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Sheep's Head to Toe Head SPA (004156)	IE_SW_20L560540 Lowertown_010	RWB	*High*	*0.013*	*0.019*	3.9	0.0006	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20E070850 Skull_010	RWB	*High*	*0.013*	*0.019*	5.0	0.0005	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20D770630 Derreennatra_010	RWB	*High*	*0.013*	*0.019*	4.3	0.0024	0.015	Modelled conc. >5% Good / High indicative quality boundary but does not exceed 75% of indicative quality upper threshold, therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.
	IE_SW_20S360700 Shanavagh_010	RWB	*High*	*0.013*	*0.019*	1.3	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20R010400 Rathruane_010	RWB	*High*	*0.013*	*0.019*	1.7	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20K050700 Knockroe_010	RWB	*Good*	*0.030*	*0.033*	3.0	0.0002	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20L010400 Leamawaddra_020	RWB	*High*	*0.013*	*0.019*	1.7	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20R030900 Roaring Water River_010	RWB	*High*	*0.013*	*0.019*	2.9	0.0002	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20L450850 Lettershaw_010	RWB	*High*	*0.013*	*0.019*	6.9	0.0008	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20M580810 Mallavonea_010	RWB	*High*	*0.013*	*0.019*	7.2	0.0012	0.014	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20C030400 Clodagh_010	RWB	*Good*	*0.030*	*0.033*	*0.1*	*0.0000*	*0.030*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010100 Ilen_010	RWB	*High*	*0.013*	*0.019*	*5.9*	*0.0001*	*0.013*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010160 Ilen_020	RWB	Moderate Downwards Far	0.037	0.051	24.0	0.0002	0.037	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			High Downwards Far	0.016	0.019	24.0	0.0002	0.016	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20I010300 Ilen_030	RWB	*High*	*0.013*	*0.019*	24.9	0.0001	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20I010350 Ilen_040	RWB	*Good*	*0.030*	*0.033*	37.1	0.0001	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20A430910 Ardgehane_010	RWB	*Good*	*0.030*	*0.033*	3.9	0.0016	0.032	Modelled conc. >5% Good / High indicative quality boundary but does not exceed 75% of indicative quality upper threshold, therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.
	IE_SW_110_0300 Glandore Harbour	TWB	*Good*	*0.030*	*0.033*	17.5	0.0000	0.030 ‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_130_0100 Ilen Estuary	TWB Summer	High Downwards Far	0.006	0.019	130.0	0.0000	0.006‡*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	High Upwards Near	0.021	0.021			0.021‡*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_010_0000 Western Celtic Sea	CWB	*High*	*0.013*	*0.019*	3.9	0.0000	0.013	No risk of deterioration in the Ortho P indicative quality or of

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									preventing the achievement of WFD objectives.
	IE_SW_140_0000 Roaring Water Bay	CWB Summer	High Downwards Far	0.003	0.019	184.8	0.0000	0.003‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.017	0.019			0.017‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_110_0000 Rosscarbery Bay	CWB	*Moderate*	*0.046*	*0.051*	37.8	0.0000	0.046 ‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_085 Skibbereen - Clonakilty	GWB	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Galley Head to Duneen Point SPA (004190)	IE_SW_20A430910 Ardgehane_010	RWB	*Good*	*0.030*	*0.033*	3.9	0.0016	0.032	Modelled conc. >5% Good / High indicative quality boundary but does not exceed 75% of indicative quality upper threshold, therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.
	IE_SW_20K950970 Killangal_010	RWB	*Good*	*0.030*	*0.033*	10.3	0.0006	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[10]	Ortho P Indicative Quality[11] and Trends[12]	Baseline [13] Ortho P Conc.[14] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_110_0300 Glandore Harbour	TWB	*Good*	*0.030*	*0.033*	17.5	0.0000	0.030 ‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_010_0000 Western Celtic Sea	CWB	*High*	*0.013*	*0.019*	3.9	0.0000	0.013	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_110_0000 Rosscarbery Bay	CWB	*Moderate*	*0.046*	*0.051*	37.8	0.0000	0.046 ‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_085 Skibbereen - Clonakilty	GWB	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

* Trends are Statistically Significant.
‡ Load from WWTP / SWO following treatment added.

The assessment of discharges from the wastewater collection system and WWTPs and the loading from leakage and DWWTSs to lakes is based on the Vollenweider equation. This is an empirical equation which aims to predict the critical total P loading to a lake where eutrophic conditions can occur. It is calculated based on area, mean depth, and hydraulic outflow of lake (Vollenweider, 1968[17]) (see

Drimoleague	**1**	**Existing**	171.1	1.138	0.910	1.548

[17] Vollenweider, R. A. (1968) *Scientific fundamentals of stream and lake eutrophication with particular reference to nitrogen and phosphorus*. OECD Technical Report DAF/DST/88. Organisation of Economic Cooperation and Development, Paris.

Primary Discharge		**Post Dosing**	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5**)**.

Table 5-3: Vollenweider Assessment of Lakes within the WSZs

Site Name (Code)	Contributing WB Code_Name	TP Indicative Quality and Trends[18]	Baseline[19] Ortho P Conc.[20] (mg/l)	TP Total Dosing Load (kg/yr)	Est. Existing Areal Loading Based on Vollenweider (mg/m²/yr)	Est. Post Dosing Areal Loading Based on Vollenweider (mg/m²/yr)	Lc – Critical Load (mg/m²/yr)	Increase (%)
Barley Cove to Ballyrisode Point SAC (001040)	IE_SW_20_148 Abisdealy	Moderate Downwards Far	0.026	0.21	1053.6	1054.9	569.8	0.1
Roaringwater Bay and Islands SAC (000101)								
Sheep's Head to Toe Head SPA (004156)								

[18] Distance to Threshold. Surrogate indicative quality in *italic*
[19] Baseline year is 2014.
[20] Surrogate concentrations given in italic

5.3.3 Assessment of Potential Direct Impacts from WWTPs and Storm Water Overflows

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

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

For the purposes of assessing the potential impact on the receiving environment a number of scenarios have been assessed at the agglomerations which receive water from the WSZ (**Ballydehob Agglomeration**

As the Ballydehob agglomeration (D0467-01) has only primary treatment in the form of a septic tank, there is no treatment reduction assumed and the entire additional load from orthophosphate dosing is assumed to be discharged into the Roaringwater Bay (IE_SW_140_0000), which is hydrologically connected to Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC and Sheep's Head to Toe Head SPA. The 2021 AER indicates that an upgrade of the WWTP in order to comply with ELVs (Ammonia, BOD, COD and SS) specified in Schedule A of the licence will be reviewed by Irish Water to assess the works required to comply with the licence condition on a prioritised basis. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is not detectable (0.0%) (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve WFD objectives for Roaringwater Bay (IE_SW_140_0000), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Table 5-4). The existing baseline prior to orthophosphate dosing is established and compared to the potential impact on the receiving waters post-dosing. In-combination effects of the operation of the SWO and the continuous discharge from the WWTP were also assessed.

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

Ballydehob Agglomeration

As the Ballydehob agglomeration (D0467-01) has only primary treatment in the form of a septic tank, there is no treatment reduction assumed and the entire additional load from orthophosphate dosing is assumed to be discharged into the Roaringwater Bay (IE_SW_140_0000), which is hydrologically connected to Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC and Sheep's Head to Toe Head SPA. The 2021 AER indicates that an upgrade of the WWTP in order to comply with ELVs (Ammonia, BOD, COD and SS) specified in Schedule A of the licence will be reviewed by Irish Water to assess the works required to comply with the licence condition on a prioritised basis. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is not detectable (0.0%) (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve WFD objectives for Roaringwater Bay (IE_SW_140_0000), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Table 5-4 provides the data used for the WWTP continuous discharge, and the SWO intermittent discharge, to compare with the emission limit values (ELVs) from the waste water discharge licence (WWDL) (if it has been set) that are applicable to the agglomeration discharge to transitional waters or freshwaters. The resultant concentration in the waters downstream of the discharge point from the agglomerations is provided in

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5, assuming mean flows**.**

The quantification of loads in a mass balance calculation was carried out using the standardised approach developed in the EAM which was devised using national data sets and applying a series of conservative and robust assumptions. The model was prepared in discussion with and utilises data supplied by the EPA, NPWS and the DHPLG to ensure that a robust model simulation is provided.

Ballydehob Agglomeration

As the Ballydehob agglomeration (D0467-01) has only primary treatment in the form of a septic tank, there is no treatment reduction assumed and the entire additional load from orthophosphate dosing is assumed to be discharged into the Roaringwater Bay (IE_SW_140_0000), which is hydrologically connected to Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC and Sheep's Head to Toe Head SPA. The 2021 AER indicates that an upgrade of the WWTP in order to comply with ELVs (Ammonia, BOD, COD and SS) specified in Schedule A of the licence will be reviewed by Irish Water to assess the works required to comply with the licence condition on a prioritised basis. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is not detectable (0.0%) (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve WFD objectives for Roaringwater Bay (IE_SW_140_0000), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Table 5-4: Increased loading/concentration due to Orthophosphate Dosing – Dosing rate = 0.6 mg/l

Agglom. and Discharge Type	ELV from WWDL (mg/l)		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*
Ballydehob Primary Discharge	n/a	**Existing**	198.2	2.951	2.361	4.013
		Post Dosing	216.1	3.218	2.574	4.376
Ballydehob SWOs (1 no.)	n/a	**Existing**	8.7	4.424	3.539	6.017
		Post Dosing	9.2	4.691	3.753	6.380
Baltimore Primary Discharge	TP 10 mg/l Compliant with ELV in AER 2017	**Existing**	329.0	1.329	1.063	1.808
		Post Dosing	363.4	1.468	1.175	1.997
Baltimore SWOs (3 no.)	n/a	**Existing**	21.3	2.954	2.363	4.017
		Post Dosing	22.3	3.093	2.474	4.207
Castletownshend Primary Discharge	n/a	**Existing**	326.3	8.000	6.400	10.880
		Post Dosing	338.3	8.295	6.636	11.281
Castletownshend SWOs (0 no.)	n/a	**Existing**	9.5	8.000	6.400	10.880
		Post Dosing	9.9	8.295	6.636	11.281
Schull Primary Discharge	n/a	**Existing**	37.3	0.029	0.024	0.040
		Post Dosing	81.7	0.065	0.052	0.088
Schull SWOs (1 no.)	n/a	**Existing**	12.1	0.327	0.262	0.445
		Post Dosing	13.4	0.362	0.290	0.493
Skibbereen Primary Discharge	TP 8 mg/l Compliant with ELV in AER 2017	**Existing**	422.5	0.281	0.224	0.382
		Post Dosing	541.3	0.359	0.288	0.489
Skibbereen SWOs (3 no.)	n/a	**Existing**	44.0	1.002	0.802	1.363
		Post Dosing	47.4	1.081	0.865	1.470
Union Hall Primary Discharge	n/a	**Existing**	301.9	4.178	3.342	5.682
		Post Dosing	316.0	4.372	3.498	5.946
Union Hall SWOs (0 no.)	n/a	**Existing**	9.4	4.444	3.556	6.044
		Post Dosing	9.8	4.639	3.711	6.309
Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5: Mass balance assessment based on 0.6 mg/l dosing using available background concentrations and mean flow information from Hydrotool and as assumed daily tidal exchange volume.

Agglom.	RWB Name / Code for Primary Discharge	Background Conc.[21] (mg/l)	Modelled Conc. Existing (mg/l)	Modelled Conc. Post Dosing (mg/l)	% Inc
Ballydehob (D0467)	Roaring Water Bay IE_SW_140_0000	0.0145	0.0145	0.0145	0.0
Baltimore (D0296)	Ilen Estuary IE_SW_130_0100	0.0150	0.0150	0.0150	0.0
Castletownshend (D0468)	Rosscarbery Bay IE_SW_110_0000	0.0140	0.0140	0.0140	0.0
Schull (D0295)	Roaring Water Bay IE_SW_140_0000	0.0430	0.0430	0.0430	0.0
Skibbereen (D0166)	Ilen Estuary IE_SW_130_0100	0.0160	0.0160	0.0160	0.0
Union Hall (D0469)	Glandore Harbour IE_SW_110_0300	0.0150	0.0154	0.0154	0.1
Drimoleague (D0470)	ILEN_020 IE_SW_20I010160	0.0150	0.0203	0.0211	3.7

Baltimore Agglomeration

The Baltimore agglomeration (D0296-01) has tertiary treatment so the EAM assumes that the entire load from the primary discharge is removed during the treatment process. The WWTP was compliant with ELVs in 2021. The effluent is discharged into the Ilen Estuary (IE_SW_130_0100), which is hydrologically connected to the Roaringwater Bay and Islands SAC and Sheep's Head to Toe Head SPA. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is not detectable (0.0%) (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve WFD objectives for the Ilen Estuary (IE_SW_130_0100), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Castletownshend Agglomeration

The Castletownshend agglomeration (D0468-01) collection system comprises an old stone culvert acting as a combined sewer, taking foul and surface water from the old properties fronting onto the Main Street, as well as pavement run-off. This is the primary discharge. There is also a small secondary discharge at Western Quay (serving eight houses). There are no wastewater treatment facilities within the agglomeration therefore there is no treatment reduction assumed and the entire

[21] Annual mean from AER u/s monitoring point

additional load from orthophosphate dosing is assumed to be discharged into Rosscarbery Bay (IE_SW_110_0000), which is hydrologically connected to the Castletownshend SAC, Kilkeran Lake and Castlefreke Dunes SAC, Sheep's Head to Toe Head SPA and Galley Head to Duneen Point SPA. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is not detectable (0.0%) (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve WFD objectives for Rosscarbery Bay (IE_SW_110_0000), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Schull Agglomeration

The Schull agglomeration (D0295-01) is serviced by a WWTP that provides secondary treatment through a series of three sequential batch reactors. The final effluent from the primary discharge point was compliant with ELVs in 2021 and is discharged into Roaringwater Bay (IE_SW_140_0000), which is hydrologically connected to the Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC and Sheep's Head to Toe Head SPA. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is not detectable (0.0%) (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve the WFD objectives of Roaringwater Bay (IE_SW_140_0000), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Skibbereen Agglomeration

The Skibbereen agglomeration (D0166-01) is serviced by a WWTP that provides secondary treatment through a series of three sequential batch reactors. The final effluent from the primary discharge point was compliant with ELVs in 2021 and is discharged into the Ilen Estuary (IE_SW_130_0100), which is hydrologically connected to the Roaringwater Bay and Islands SAC and Sheep's Head to Toe Head SPA. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is undetectable (0.0%) (

Drimoleague	**1**	**Existing**	171.1	1.138	0.910	1.548

Primary Discharge		**Post Dosing**	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve WFD objectives for Roaringwater Bay (IE_SW_140_0000), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Union Hall Agglomeration

As the Union Hall agglomeration (D0469-01) does not have a WWTP but is serviced by a septic tank, there is no treatment reduction assumed and the entire additional load from orthophosphate dosing is assumed to be discharged into Glandore Harbour (IE_SW_110_0300), which is hydrologically connected to Myross Wood SAC. The 2021 AER notes that construction of a WWTP for the Union Hall agglomeration which was due to take place in 2020 was not undertaken. However, the project will be included in the 2025-2029 investment period. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is negligible (0.1%) (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Table 5-5). Therefore there is no risk of failing to achieve WFD objectives for Glandore Harbour (IE_SW_110_0300), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

Drimoleague Agglomeration

The Drimoleague agglomeration (D0470-01) is serviced by a WWTP that provides secondary treatment. The final effluent from the primary discharge point was non-compliant with ELVs in 2021 and is discharged into the Ilen_020 (IE_SW_20I010160), which is hydrologically connected to the Roaringwater Bay and Islands SAC and Sheep's Head to Toe Head SPA. The 2021 AER indicates that an upgrade of the WWTP in order to comply with ELVs (Ammonia, BOD, ortho-Phosphate, COD and SS) specified in Schedule A of the licence will be reviewed by Irish Water to assess the works required to comply with the licence condition on a prioritised basis. The 2021 AER notes that construction of a WWTP for the Drimoleague agglomeration will be included in the 2025-2029 investment period. The mass balance assessment in Table 2, based on Mean flows, indicates that the orthophosphate dosing will increase the levels by 0.0008 mg/l which is below significant levels (

Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague	**n/a**	**Existing**	10.7	2.437	1.950	3.314

SWO (1 no.)		**Post Dosing**	11.4	2.602	2.082	3.539

Table 5-5). The dosing will not result in any further significant impact on the receiving water downstream of the plant and will not prevent the achievement of the overall water body's WFD objectives. When orthophosphate conditions are considered for both the surface and sub-surface pathways; the OP indicative quality will remain consistent with the achievement of high ecological status in the ILEN_020 (see Table 5-1). Therefore, the dosing will not result in any further significant impact to the Ilen_020 (IE_SW_20I010160), and its hydrologically connected European Sites as a result of dosing at Ballyhilty WTP.

5.3.4 Assessment of Indirect Impact from Subsurface Flow

5.3.4.1 Sub surface flows from leakage and DWWTP

Step 4 of the EAM model assesses the distributed inputs to river water bodies from subsurface pathways (**Appendix C**). The modelled concentrations due to subsurface pathways are insignificant in the majority of the water bodies, i.e. < 0.00125 mg/l (5% of the High / Good indicative quality boundary for surface water bodies). For both Ardgehane_010 (IE_SW_20A430910) and Derreennatra_010 (IE_SW_2D770630) the modelled post-dosing increases in orthophosphate concentration exceed 5% of the Good / High indicative quality boundary (0.0016 mg/l and 0.0024 mg/l respectively); however they do not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the indicative quality of river water bodies as a result of dosing at Ballyhilty WTP, or of preventing the achievement of WFD objectives.

All transitional and coastal water bodies have modelled post-dosing concentrations that are not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of transitional or coastal water bodies as a result of dosing at Ballyhilty WTP, or of preventing the achievement of WFD objectives.

5.3.4.2 Groundwater assessment

The predicted loads and concentrations to groundwater bodies (GWBs) are undetectable (i.e. <0.00175 mg/l = 5% of the Good / Fail indicative quality boundary) as shown in **Table 3 of Appendix C**. The modelled post-dosing increase in orthophosphate concentration is 0.0000 mg/l for all groundwater bodies.

Therefore, there is no risk in deterioration in the indicative quality of the groundwater bodies as a result of dosing at Ballyhilty WTP, or of preventing the achievement of WFD objectives.

5.3.5 Combined Assessment

Table 4-A of Appendix C provides details of the combined orthophosphate inputs to river water bodies from direct discharges, DWWTSs and leakage loads. The increased loads due to orthophosphate dosing are not predicted to be significant for most water bodies i.e. are <0.00125

mg/l (5% of High / Good indicative quality boundary). However, for both Ardgehane_01 (IE_SW_20A430910) and Derreennatra_010 (IE_SW_2D770630) the modelled post-dosing increases in orthophosphate concentration exceed 5% of the Good / High indicative quality boundary (0.0016 mg/l and 0.0024 mg/l respectively); however they do not cause the post-dosing baseline to exceed 75% of the upper orthophosphate indicative quality threshold. The dosing therefore poses no risk of deterioration in status of the river water bodies identified in **Table 5-2.**

Table 4-B of Appendix C gives the loads and concentrations to Transitional / Coastal water bodies. None of the modelled increases exceed 5% of the Good / High status boundary. The increased load due to the WWTPs in Glandore Harbour (IE_SW_110_0300), Ilen Estuary (IE_SW_130_0100), Rosscarbery Bay (IE_SW_110_0000) and Roaring Water Bay (IE_SW_140_0000) also have no detectable impact, as demonstrated in **Table 2 of Appendix C;** therefore, there will be no likely significant effect to the receiving water bodies as a result of dosing at Ballyhilty WTP.

Table 4-C of Appendix C gives the loads and concentrations to lake water bodies. The Vollenweider assessment indicates that the critical loading for oligotrophic conditions is exceeded under the existing scenario. The existing orthophosphate levels in Abisdealy (IE_SW_20_148) are moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake, however this increase is considered to be negligible (0.1%) and will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

5.3.6 Assessment of Cumulative Impacts from other WSZs

The cumulative loads to Bandon-Ilen Catchment (HA 20) catchment associated with the orthophosphate dosing i.e. 006 Inniscarra WTP –Zone 2 Cork Harbour & City, 030 Innishannon WTP – Zone 2 Innishannon and 036 Clonakilty RWSS WTP – Zone 1 Clonakilty, have been assessed in combination with the Zone 1 Skibbereen-Ballyhilty WSZ. The common water bodies that are impacted by the WSZs supplied by these WTPs have been summarised in **Table 5-6** below.

The modelled post-dosing increase in concentration for Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350) was 0.0001 mg/l which does not exceed 5% of the High / Good indicative quality boundary. The modelled post-dosing increases for the Ilen Estuary (IE_SW_130_0100) and Roaring Water Bay (IE_SW_140_0000)do not exceed 5% of the Good / High indicative quality threshold (not detectable at 0.0000 mg/l in all cases), while Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000) is negligible (0.0001 mg/l). Furthermore the modelled post-dosing baseline concentrations do not exceed 75% of the indicative quality upper threshold. Therefore there is no risk of deterioration in the indicative quality of the receiving water bodies or of preventing the achievement of WFD objectives, as outlined in **Table 5, Appendix C** and **Table 5-6** below.

Table 5-6 Cumulative assessment of the increased loading and concentrations to receiving water bodies from 060 Ballyhilty WTP – Zone 1 Skibbereen Ballyhilty (0500PUB4605) and other WSZs proposed for corrective water treatment in the upstream catchments

EU Code_Name	Period	Ortho P Indicative Quality[22] and Trends[23]	Baseline Year 2014 and Conc.[24] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Conc. using 30%ile Flows (mg/l)	PO4 Potential Baseline Conc. Following Dosing (mg/l)
IE_SW_20I010300 Ilen_030	n/a	*High*	*0.013*	*0.019*	28.7	0.0001	0.013 ‡
IE_SW_20I010350 Ilen_040	n/a	*Good*	*0.030*	*0.033*	40.3	0.0001	0.030 ‡
IE_SW_130_0100 Ilen Estuary	Summer	High Downwards Far	0.006	0.019	133.7	0.0000	0.006 ‡*
	Winter	High Upwards Near	0.021	0.021			0.021 ‡*
IE_SW_110_0000 Rosscarbery Bay	n/a	*Moderate*	*0.046*	*0.051*	93.6	0.0000	0.046 ‡
IE_SW_140_0000 Roaring Water Bay	Summer	High Downwards Far	0.003	0.019	188.6	0.0000	0.003 ‡
	Winter	High Downwards Far	0.017	0.019			0.017 ‡
IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	n/a	*High*	*0.013*	*0.019*	9601.2	0.0001	0.013 ‡

‡ Load from WWTP / SWO following treatment added.
* Trends are Statistically Significant.

5.3.7 Conclusions

The increased orthophosphate dosing concentrations do not result in a noticeable impact from the direct surface water pathways, i.e. agglomerations with an increase in the orthophosphate concentrations in the receiving water bodies not resulting in a risk to the receiving water bodies, as shown by the mass balance assessment in **Table 2 Appendix C**.

The modelled concentrations due to subsurface pathways are insignificant in the majority of river water bodies, i.e. < 0.00125 mg/l (5% of the High / Good indicative quality boundary for surface water bodies) and therefore there is no risk of deterioration in the indicative quality of the river water bodies. The increase in concentration for the remaining two river water bodies does not cause the baseline to exceed 75% of the orthophosphate indicative quality upper threshold.

[22] Surrogate indicative quality in *italic*
[23] Distance to threshold
[24] Surrogate concentration indicated in *italic*

Though the assessment shows that the critical loading for oligotrophic conditions in Abisdealy lake (IE_SW_20_148) is already being exceeded under the current conditions (currently indicative of moderate indicative quality) the modelled increase is negligible (0.1%) and therefore there is no risk of affecting the trophic status of the lake or preventing the achievement of WFD objectives. The predicted loads to all groundwater bodies are undetectable (0.0000 mg/l).

All river water bodies have a post dosing concentration that does not exceed 75% of indicative quality upper threshold, and therefore no risk of deterioration in indicative quality or of failing to achieve WFD objectives.

The transitional and coastal water bodies hydrologically connected to the Ballyhilty WTP all have undetectable increase in orthophosphate indicative quality (0.000 mg/l).

The cumulative assessment of dosing at Ballyhilty WTP together with other WTPs which may be subject to dosing in the same catchments, has demonstrated that there will not be a significant effect on receiving water bodies. These WTPs are also subject to their own Screening for AA.

Therefore there is no risk of deterioration in the indicative quality of the water bodies as a result of the proposed project and the dosing will not prevent the achievement of the WFD objectives for these water bodies.

6 EVALUATION OF LIKELY SIGNIFICANT EFFECTS

6.1 CONSTRUCTION PHASE

Ballyhilty WTP is not located within or directly adjacent to the boundary of any European Site. The WTP is adjacent to Ilen_030 (IE_SW_20I010300) and Ilen_040_(IE_SW_20I010350) river water bodies. The Ilen River flows south of the WTP site into Rosscarbery Bay (IE_SW_110_0000) via Glandore Harbour (IE_SW_110_0300) and is hydrologically connected to Roaringwater Bay and Islands SAC, and Sheep's Head to Toe Head SPA via the Ilen Estuary (IE_SW_130_0100). Roaringwater Bay (IE_SW_140_0000) connects to a large coastal water body, the Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000), which hydrologically connects a further 18 European Sites, however the potential for likely significant effects on these sites have been discounted due to distance from the proposed works. The WTP is located more than 20 km upstream (approximately) of Roaringwater Bay and Islands SAC and >25km upstream of Sheep's Head to Toe Head SPA. These are the closest European Sites to the proposed works. The proposed construction works will be localised and contained within the WTP development boundary which comprises amenity grassland / buildings and artificial surfaces. Works such as excavations will be contained to the defined working area and necessary works with cast in place concrete will be undertaken within sealed shuttered units. Such works practices will retain all potential construction related pollutants at source.

In addition, the WTP overlies the Skibbereen – Clonakilty (IE_SW_G_085) groundwater body. This is a large groundwater body and intersects 14 European Sites: Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Kilkeran Lake and Castlefreke Dunes SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Sheep's Head to Toe Head SPA, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA and Old Head of Kinsale SPA. Potential source impact pathways have been ruled out for Barley Cove to Ballyrisode Point SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Kilkeran Lake and Castlefreke Dunes SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, Seven Heads SPA, Courtmacsherry Bay SPA and Old Head of Kinsale SPA. For the remaining European Sites, the interference with the underlying water table will be unlikely to occur owing to the nature of the construction works. Any interference would be localised, minor and temporary.

Therefore, it can be concluded on the basis of objective scientific information that the construction of the corrective water treatment works at Ballyhilty WTP, individually or in combination with other plans or projects, will not to have a likely significant effect on European Sites.

6.2 OPERATIONAL PHASE

The key pressure associated with the proposed orthophosphate dosing is the potential for increased orthophosphate levels in the receiving waters which support the qualifying interests (habitats and species) identified in **Table 4-3** that are both water dependent and nutrient sensitive (**Appendix B**). The likelihood of significant effects on these habitats and species, in view of their Conservation Objectives, are assessed in detail below.

6.2.1 Barley Cove to Ballyrisode Point SAC 001040

6.2.1.1 [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 Blackwater River 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 (NPWS, 2014[25]). The COs supporting document for Marine habitats (NPWS, 2014[26]) does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Barley Cove to Ballyrisode Point SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010 (IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water body hydrologically connected to the site is: Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

The habitat area for Mudflats and sandflats not covered by seawater at low tide in this site is estimated using OSi data as 66 ha. This SAC is located in Roaring Water Bay (IE_SW_140_0000). The SAC itself does not receive any direct discharges from the WSZ; however most of the surface water bodies that intersect the WSZ ultimately discharge to Roaring Water Bay (IE_SW_140_0000).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

[25] NPWS 2014 Barley Cove to Ballyrisode Point SAC 001040 Conservation Objectives
[26] NPWS 2014 Barley Cove to Ballyrisode Point SAC (site code: 1040) Conservation Objectives Supporting Document - Marine Habitats

Most modelled increases in concentrations did not exceed 5% Good / High indicative quality boundary for river water bodies. The Ilen_030 (IE_SW_20I010300), Ilen_040 (IE_SW_20I010350) and Clodagh_010 (IE_SW_20C030400) have modelled increases in post-dosing concentrations that are not detectable (0.0000 mg/l). Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Leamawaddra_020 (IE_SW_20L010400) and Ilen_010 (IE_SW_20I010100) have negligible modelled increases in post-dosing concentrations (0.0001 mg/l). While Ilen_020 (IE_SW_20I010160), Knockroe_010 (IE_SW_20K050700) and Roaring Water River_010 (IE_SW_20R030900) have a modelled post-dosing increase in concentration of 0.0002 mg/l. Skull_010 (IE_SW_20E070850) has a modelled increase of 0.0005 mg/l. Lowertown_010 (IE_SW_20L560540) has a modelled increase of 0.0006 mg/l. Finally, Lettershaw_010 (IE_SW_20L450850) and Mallavonea_010 (IE_SW_20M580810) have been modelled at 0.0008 mg/l and 0.0012 mg/l respectively. Therefore there is no risk of deterioration in the indicative quality of these river water bodies or of failing to achieve WFD objectives.

One river water body exceeds 5% of the Good / High indicative quality boundary. Derreennatra_010 (IE_SW_20D770630) had a modelled post-dosing increase in orthophosphate concentration of 0.0024 mg/l. However, this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of the water body, or of failing to achieve WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not affect the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water body Ilen Estuary (IE_SW_130_0100) has a modelled post-dosing increase in concentration that is not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water body, which is at High, or of failing to achieve WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000) have modelled post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the indicative quality of the water body which is currently at Good, or of failing to achieve WFD objectives.

In light of the EAM assessment result, which evaluates the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat.

6.2.1.2 [1330] Atlantic salt meadows (*Glauco-puccinellietalia maritimae*), [1410] Mediterranean salt meadows (*Juncetalia maritimi*) and [1310] *Salicornia* and other annuals colonising mud and sand

A review of the SSCOs (NPWS, 2014[25]) for the site found no nutrient specific targets for these habitats; however, one attribute common to all three under physical structure is to maintain the natural tidal regime i.e. regular tidal inundation. The CO supporting document on coastal habitats (NPWS, 2014[27]) for the Barley Cove to Ballyrisode Point SAC was reviewed, and discusses the flooding regime attribute and associated target in further detail. The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and survival of saltmarshes.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Barley Cove to Ballyrisode Point SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010 (IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water body hydrologically connected to the site is: Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

This SAC is located in Roaring Water Bay (IE_SW_140_0000). The SAC itself does not receive any direct discharges from the WSZ; however most of the surface water bodies that intersect the WSZ ultimately discharge to Roaring Water Bay (IE_SW_140_0000).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

Most modelled increases in concentrations did not exceed 5% Good / High indicative quality boundary for river water bodies. The Clodagh_010 (IE_SW_20C030400), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350) have modelled increases in post-dosing concentrations that are not detectable (0.0000 mg/l). Ilen_010 (IE_SW_20I010100), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400) and Leamawaddra_020

[27] NPWS 2014 Barley Cove to Ballyrisode Point SAC (site code: 1040) Conservation Objectives Supporting Document - Coastal Habitats

(IE_SW_20L010400) have negligible modelled increases in post-dosing concentrations (0.0001 mg/l). While Ilen_020 (IE_SW_20I010160), Knockroe_010 (IE_SW_20K050700) and Roaring Water River_010 (IE_SW_20R030900) have a modelled post-dosing increase in concentration of 0.0002 mg/l. Skull_010 (IE_SW_20E070850) has a modelled increase of 0.0005 mg/l. Lowertown_010 (IE_SW_20L560540) has a modelled increase of 0.0006 mg/l. Finally, Lettershaw_010 (IE_SW_20L450850) and Mallavonea_010 (IE_SW_20M580810) have been modelled at 0.0008 mg/l and 0.0012 mg/l respectively. Therefore there is no risk of deterioration in the indicative quality of these river water bodies or of failing to achieve WFD objectives.

One river water body exceeds 5% of the Good / High indicative quality boundary. Derreennatra_010 (IE_SW_20D770630) had a modelled post-dosing increase in orthophosphate concentration of 0.0024 mg/l. However, this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of the water body, or of failing to achieve WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not affect the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water body Ilen Estuary (IE_SW_130_0100) has a modelled post-dosing increase in concentration that is not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water body, which is at High, or of failing to achieve WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000) have modelled post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the indicative quality of the water body which is currently at Good, or of failing to achieve WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on these habitats can be excluded. Furthermore, dosing will not prevent the restoration of the favourable conservation condition of habitats 1330 and 1410, or the maintenance of favourable conservation condition for 1310.

6.2.1.3 [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes), [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)*

Two dune habitat types are found within this SAC. Where sand accumulation is more rapid than in embryonic dunes, marram grass (*Ammophila arenaria*) invades, initiating the transition to mobile dunes. Fixed dunes refer to the more stabilised area of dune systems. A review of the SSCOs (NPWS, 2014[25]) for the site found no nutrient specific targets for these habitats; however, one attribute common to both under vegetation composition it that negative indicator species should represent

less than 5% cover (e.g. species indicative of changes in nutrient status). There is an overall target to restore favourable conservation condition. The CO supporting document on coastal habitats (NPWS, 2014[28]) for the Barley Cove to Ballyrisode Point SAC indicates that species diversity and plant distribution in dunes is strongly controlled by a range of factors, including mobility of the substrate, grazing intensities, moisture gradients, nutrient gradients and human disturbance.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Barley Cove to Ballyrisode Point SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010 (IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water body hydrologically connected to the site is: Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

This SAC is located in Roaring Water Bay (IE_SW_140_0000). The SAC itself does not receive any direct discharges from the WSZ; however most of the surface water bodies that intersect the WSZ ultimately discharge to Roaring Water Bay (IE_SW_140_0000).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

Most modelled increases in concentrations did not exceed 5% Good / High indicative quality boundary for river water bodies. Clodagh_010 (IE_SW_20C030400), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350) have modelled increases in post-dosing concentrations that are not detectable (0.0000 mg/l). Ilen_010 (IE_SW_20I010100), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400) and Leamawaddra_020 (IE_SW_20L010400) have negligible modelled increases in post-dosing concentrations (0.0001 mg/l). While Ilen_020 (IE_SW_20I010160), Knockroe_010 (IE_SW_20K050700) and Roaring Water River_010 (IE_SW_20R030900) have a modelled post-dosing increase in concentration of 0.0002 mg/l. Skull_010 (IE_SW_20E070850) has a modelled increase of 0.0005 mg/l. Lowertown_010 (IE_SW_20L560540) has a modelled increase of 0.0006 mg/l. Finally, Lettershaw_010 (IE_SW_20L450850) and Mallavonea_010 (IE_SW_20M580810) have been modelled at 0.0008 mg/l and 0.0012 mg/l respectively. Therefore there is no risk of

[28] NPWS 2014 Barley Cove to Ballyrisode Point SAC (site code: 1040) Conservation Objectives Supporting Document - Coastal Habitats

deterioration in the indicative quality of these river water bodies or of failing to achieve WFD objectives.

One river water body exceeds 5% of the Good / High indicative quality boundary. Derreennatra_010 (IE_SW_20D770630) had a modelled post-dosing increase in orthophosphate concentration of 0.0024 mg/l. However, this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of the water body, or of failing to achieve WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not affect the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water body Ilen Estuary (IE_SW_130_0100) has a modelled post-dosing increase in concentration that is not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water body, which is at High, or of failing to achieve WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000) have modelled post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the indicative quality of the water body which is currently at Good, or of failing to achieve WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on these habitats can be excluded. Furthermore, dosing will not prevent the restoration of their favourable conservation condition.

6.2.2 Roaringwater Bay and Islands SAC 000101

6.2.2.1 [1160] Large shallow inlets and bays, [1170] Reefs and [8330] Submerged of partially submerged sea caves

The overall objectives for Large shallow inlets and bays, Reefs and for Submerged or partially submerged sea caves are to maintain the favourable conservation condition of the habitats. There are no nutrient specific targets in the SSCOs (NPWS, 2011[29]). The attributes and targets that will maintain the favourable conservation condition of these habitats do not make specific reference to water quality and nutrient conditions. The COs supporting document for Marine habitats (NPWS, 2011[30]) does require that activities or operations that cause significant disturbance to communities

[29] NPWS 2011 Roaringwater Bay and Islands SAC 000101 Conservation Objectives
[30] NPWS 2011 Roaringwater Bay and Islands SAC (site code: 0101) Conservation Objectives Supporting Document - Marine Habitats

but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Roaringwater Bay and Islands SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010 (IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water body hydrologically connected to the site is: Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000); and
- The groundwater bodies hydrogeologically connected to the site are: Skibbereen-Clonakilty (IE_SW_G_085) and Bandon Islands (IE_SW_G_013).

The Annex I habitat Large shallow inlets and bays is a large physiographic feature that may wholly or partly incorporate other Annex I habitats including, reefs and sea caves within its area. Large shallow inlets and bays occupies the vast majority of the SAC (approximately 12,809 ha – broken down into a number of features encompassed within the habitat and inclusive of Reefs and Sea caves).

Intertidal reef is for the most part present as a narrow band consisting of vertical walls including overhangs and ledges (NPWS, 2011[30]). Sub tidally, it is most common and extensive in the outer bay and around the islands. The estimated areas of the communities within the Reefs habit are based on spatial interpolation, and the extent of areas of sheer, steeply sloping rock are likely to be underestimated. Exposed to moderately exposed intertidal reef has been estimated as 327 ha. Exposed to moderately exposed subtidal reef below 20 m has been estimated as 1,286 ha. Finally, sheltered reef has been estimated as 39 ha.

There are a number of sea caves located throughout the SAC; however there may be as yet unknown sea caves at the site. The information regarding the location of partly submerged sea caves came from the analysis of imagery provided by a coastal oblique aerial survey commissioned for the purpose of coastal protection (NPWS, 2011[30]). The habitats are all located within the coastal water body Roaring Water Bay (IE_SW_140_0000). All of the water bodies identified in **Table 5-2** and **Table 5-3** ultimately discharge to Roaring Water Bay.

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

Most modelled increases in concentrations did not exceed 5% Good / High indicative quality boundary for river water bodies. Clodagh_010 (IE_SW_20C030400), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350) have modelled increases in post-dosing concentrations that are not detectable (0.0000 mg/l). Ilen_010 (IE_SW_20I010100), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400) and Leamawaddra_020 (IE_SW_20L010400) have negligible modelled increases in post-dosing concentrations (0.0001 mg/l). While Ilen_020 (IE_SW_20I010160), Knockroe_010 (IE_SW_20K050700) and Roaring Water River_010 (IE_SW_20R030900) have a modelled post-dosing increase in concentration of 0.0002 mg/l. Skull_010 (IE_SW_20E070850) has a modelled increase of 0.0005 mg/l. Lowertown_010 (IE_SW_20L560540) has a modelled increase of 0.0006 mg/l. Finally, Lettershaw_010 (IE_SW_20L450850) and Mallavonea_010 (IE_SW_20M580810) have been modelled at 0.0008 mg/l and 0.0012 mg/l respectively. Therefore there is no risk of deterioration in the indicative quality of these river water bodies or of failing to achieve WFD objectives.

One river water body exceeds 5% of the Good / High indicative quality boundary. Derreennatra_010 (IE_SW_20D770630) had a modelled post-dosing increase in orthophosphate concentration of 0.0024 mg/l. However, this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of the water body, or of failing to achieve WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not affect the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water body Ilen Estuary (IE_SW_130_0100) has a modelled post-dosing increase in concentration that is not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water body, which is at High, or of failing to achieve WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000) have modelled post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the indicative quality of the water body which is currently at Good, or of failing to achieve WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on the habitats can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitats.

6.2.2.2 [1230] Vegetated sea cliffs of the Atlantic and Baltic coasts

The overall objective for Vegetated sea cliffs of the Atlantic and Baltic coasts is to maintain the favourable conservation condition of the habitat. The SSCOs (NPWS, 2011[29]) do not make reference

to any nutrient specific targets for this habitat. However a target included is no alteration to natural functioning of geomorphological and hydrological processes, including groundwater quality, due to artificial structures. Hydrological processes maintain flushes, and in some cases tufa formations, that can be associated with sea cliffs.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Roaringwater Bay and Islands SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010 (IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water body hydrologically connected to the site is: Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000); and
- The groundwater bodies hydrogeologically connected to the site are: Skibbereen-Clonakilty (IE_SW_G_085) and Bandon Islands (IE_SW_G_013).

The habitat is located in Roaring Water Bay (IE_SW_140_0000), into which all of the water bodies listed above discharge.

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

Most modelled increases in concentrations did not exceed 5% Good / High indicative quality boundary for river water bodies. Clodagh_010 (IE_SW_20C030400), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350) have modelled increases in post-dosing concentrations that are not detectable (0.0000 mg/l). Ilen_010 (IE_SW_20I010100), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400) and Leamawaddra_020 (IE_SW_20L010400) have negligible modelled increases in post-dosing concentrations (0.0001 mg/l). While Ilen_020 (IE_SW_20I010160), Knockroe_010 (IE_SW_20K050700) and Roaring Water River_010 (IE_SW_20R030900) have a modelled post-dosing increase in concentration of 0.0002 mg/l. Skull_010 (IE_SW_20E070850) has a modelled increase of 0.0005 mg/l. Lowertown_010 (IE_SW_20L560540) has a modelled increase of 0.0006 mg/l. Finally, Lettershaw_010 (IE_SW_20L450850) and Mallavonea_010 (IE_SW_20M580810) have been modelled at 0.0008 mg/l and 0.0012 mg/l respectively. Therefore there is no risk of deterioration in the indicative quality of these river water bodies or of failing to achieve WFD objectives.

One river water body exceeds 5% of the Good / High indicative quality boundary. Derreennatra_010 (IE_SW_20D770630) had a modelled post-dosing increase in orthophosphate concentration of

0.0024 mg/l. However, this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of the water body, or of failing to achieve WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not affect the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water body Ilen Estuary (IE_SW_130_0100) has a modelled post-dosing increase in concentration that is not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water body, which is at High, or of failing to achieve WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000) have modelled post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the indicative quality of the water body which is currently at Good, or of failing to achieve WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat.

6.2.2.3 [1351] Harbour porpoise (*Phocoena phocoena*), [1364] Grey seal (*Halichoerus grypus*)

A review of the SSCOs (NPWS, 2011[29]) for each species found no specific attributes or targets relating to water quality. In the supporting document for marine habitats in the SAC (NPWS, 2011[30]) there is a target that relates to the deterioration of key resources for both the Grey seal and Harbour porpoise (e.g. water quality, feeding etc.) on which both species depend. In the absence of complete knowledge on their ecological requirements at this site, it is stated that such considerations should be assessed where appropriate on a case-by-case basis.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Roaringwater Bay and Islands SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010

(IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water body hydrologically connected to the site is: Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000); and
- The groundwater bodies hydrogeologically connected to the site are: Skibbereen-Clonakilty (IE_SW_G_085) and Bandon Islands (IE_SW_G_013).

The entire extent of Roaring Water Bay (IE_SW_140_0000) is considered to be suitable habitat for both Harbour porpoise and Grey seal. For the latter, there are breeding sites, moult haul-out sites and resting haul-out sites scattered throughout the islands in the bay. Grey seals feed on a wide variety of fish and cephalopod species, while the Harbour porpoise feeds on fish, cephalopod and crustacean species.

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

Most modelled increases in concentrations did not exceed 5% Good / High indicative quality boundary for river water bodies. Clodagh_010 (IE_SW_20C030400), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350) have modelled increases in post-dosing concentrations that are not detectable (0.0000 mg/l). Ilen_010 (IE_SW_20I010100), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400) and Leamawaddra_020 (IE_SW_20L010400) have negligible modelled increases in post-dosing concentrations (0.0001 mg/l). While Ilen_020 (IE_SW_20I010160), Knockroe_010 (IE_SW_20K050700) and Roaring Water River_010 (IE_SW_20R030900) have a modelled post-dosing increase in concentration of 0.0002 mg/l. Skull_010 (IE_SW_20E070850) has a modelled increase of 0.0005 mg/l. Lowertown_010 (IE_SW_20L560540) has a modelled increase of 0.0006 mg/l. Finally, Lettershaw_010 (IE_SW_20L450850) and Mallavonea_010 (IE_SW_20M580810) have been modelled at 0.0008 mg/l and 0.0012 mg/l respectively. Therefore there is no risk of deterioration in the indicative quality of these river water bodies or of failing to achieve WFD objectives.

One river water body exceeds 5% of the Good / High indicative quality boundary. Derreennatra_010 (IE_SW_20D770630) had a modelled post-dosing increase in orthophosphate concentration of 0.0024 mg/l. However, this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of the water body, or of failing to achieve WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not affect the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water body Ilen Estuary (IE_SW_130_0100) has a modelled post-dosing increase in concentration that is not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water body, which is at High, or of failing to achieve WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000) have modelled post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the indicative quality of the water body which is currently at Good, or of failing to achieve WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that there is no potential for likely significant effects on these Annex II species or fish species, a food source for both Harbour porpoise and Grey seal. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the species or their habitat.

6.2.2.4 [1355] Otter (*Lutra lutra*)

A review of the SSCOs (NPWS, 2011[29]) found no specific attributes or targets relating to water quality. There is an overall objective to restore the favourable conservation condition of otter in the SAC. The National Parks and Wildlife Service's 'Threat Response Plan for the Otter' (NPWS, 200926F[31]), which comprised a review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Roaringwater Bay and Islands SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010 (IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water body hydrologically connected to the site is: Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000); and
- The groundwater bodies hydrogeologically connected to the site are: Skibbereen-Clonakilty (IE_SW_G_085) and Bandon Islands (IE_SW_G_013).

[31] NPWS (2009) Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

The extent of terrestrial, marine and freshwater (river) otter habitat within the site is not identified in SSCOs for the site. The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater. It is assumed that otter have the potential to interact with all surface water bodies identified **Table 5-2**.

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

Most modelled increases in concentrations did not exceed 5% Good / High indicative quality boundary for river water bodies. Clodagh_010 (IE_SW_20C030400), Ilen_030 (IE_SW_20I010300) and Ilen_040 (IE_SW_20I010350) have modelled increases in post-dosing concentrations that are not detectable (0.0000 mg/l). Ilen_010 (IE_SW_20I010100), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400) and Leamawaddra_020 (IE_SW_20L010400) have negligible modelled increases in post-dosing concentrations (0.0001 mg/l). While Ilen_020 (IE_SW_20I010160), Knockroe_010 (IE_SW_20K050700) and Roaring Water River_010 (IE_SW_20R030900) have a modelled post-dosing increase in concentration of 0.0002 mg/l. Skull_010 (IE_SW_20E070850) has a modelled increase of 0.0005 mg/l. Lowertown_010 (IE_SW_20L560540) has a modelled increase of 0.0006 mg/l. Finally, Lettershaw_010 (IE_SW_20L450850) and Mallavonea_010 (IE_SW_20M580810) have been modelled at 0.0008 mg/l and 0.0012 mg/l respectively. Therefore there is no risk of deterioration in the indicative quality of these river water bodies or of failing to achieve WFD objectives.

One river water body exceeds 5% of the Good / High indicative quality boundary. Derreennatra_010 (IE_SW_20D770630) had a modelled post-dosing increase in orthophosphate concentration of 0.0024 mg/l. However, this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of the water body, or of failing to achieve WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not affect the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water body Ilen Estuary (IE_SW_130_0100) has a modelled post-dosing increase in concentration that is not detectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water body, which is at High, or of failing to achieve WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Roaring Water Bay (IE_SW_140_0000) have modelled post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the indicative quality of the water body which is currently at Good, or of failing to achieve WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that there is no potential for likely significant effects on this Annex II species or fish species, the main food source for the otter. Furthermore, dosing will not prevent the restoration of the favourable conservation condition of the species or its habitat.

6.2.3 Lough Hyne Nature Reserve and Environs SAC 000097

6.2.3.1 [1160] Large shallow inlets and bays, [1170] Reefs and [8330] Submerged or partially submerged sea caves

The overall objectives for Large shallow inlets and bays, Reefs and for Submerged or partially submerged sea caves are to maintain the favourable conservation condition of the habitats. There are no nutrient specific targets in the SSCOs (NPWS, 2014[32]). The attributes and targets that will maintain the favourable conservation condition of these habitats do not make specific reference to water quality and nutrient conditions. The COs supporting document for Marine habitats (NPWS, 2014[33]) does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Lough Hyne Nature Reserve and Environs SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water body hydrologically connected to the site is: Ardgehane_010 (IE_SW_20A430910);
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085); and
- The coastal water body hydrologically connected to the site is: Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000).

The Annex I habitat Large shallow inlets and bays is a large physiographic feature that may wholly or partly incorporate other Annex I habitats including, reefs and sea caves within its area. Large shallow inlets and bays occupies the vast majority of the SAC (approximately 266 ha – broken down into a number of features encompassed within the habitat and inclusive of Reefs and Sea caves). Reefs surround the habitat at its coastal edge, occupying approximately 13 ha. There is one sea cave located within the SAC which occupies approximately 0.05 ha; however there may be as yet unknown sea caves at the site. The habitats are all located within the coastal water body Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000). The Ardgehane_010 (IE_SW_20A430910) discharges to the SAC. The habitat is hydrogeologically connected to the Skibbereen-Clonakilty groundwater body (IE_SW_G_085).

[32] NPWS 2014 Lough Hyne Nature Reserve and Environs SAC 000097 Conservation Objectives
[33] NPWS 2014 Lough Hyne Nature Reserve and Environs SAC (site code: 000097) Conservation Objectives Supporting Document - Marine Habitats

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

The river water body Ardgehane_010 (IE_SW_20A430910) has a modelled post-dosing increase in concentration of 0.0016 mg/l, which exceeds 5% of the Good / High indicative quality boundary. However as this increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold, there is no risk of deterioration in the Good (surrogate) indicative quality of the river water body as a result of dosing, or of preventing the achievement of WFD objectives.

The Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000) coastal water body that is hydrologically connected to the SAC has a modelled increase in orthophosphate concentration of 0.0000 mg/l which is not detectable following dosing at Ballyhilty, therefore there is no risk of deterioration in the High (surrogate) indicative quality of the water body.

The EAM assessment has determined that the modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the Good indicative quality of the water body as a result of dosing, or pf preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on the habitats can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitats.

6.2.4 Castletownshend SAC 001547

6.2.4.1 [1421] Killarney Fern (*Trichomanes speciosum*)

Killarney fern is a type of filmy fern. It grows in deeply shaded, humid situations such as dripping caves, crevices and overhangs on cliffs and rocky slopes, in stream gullies, by waterfalls and in woodlands, and occasionally occurs under fallen trees and on the floor of damp woodlands[34]. There is currently one location within the SAC where a small colony of Killarney Fern occurs. According to the Natura 2000 Data Form[35], a stream (Killangal_010, IE_SE_20K950970) bisects the site from east to west and flows through a rocky ravine on the higher western edge of the site. It is in this ravine that the population of Killarney Fern occurs. There are no SSCOs for Killarney fern in Castletownshend SAC (NPWS, 2018[36]). Killarney fern is potentially threatened by a variety of activities and impacts, either directly by loss of habitat, deliberate collection, encroachment of invasive or vigorous species, or indirectly by water pollution, removal of woodland or alteration of watercourses (NPWS, 2013[37]).

[34] https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf
[35] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF001547.pdf
[36] NPWS 2018 Castletownshend SAC 001547 Conservation Objectives
[37] NPWS (2013) The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Editor: Deirdre Lynn

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Castletownshend SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water body hydrologically connected to the site is: Killangal_010 (IE_SW_20K950970);
- The coastal water bodies hydrologically connected to the site are: Rosscarbery Bay (IE_SW_110_0000) and Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

As discussed above, the river water body Killangal_010 (IE_SW_20K950970) bisects the site. The modelled post dosing increase in orthophosphate concentration is 0.0006 mg/l which does not exceed 5% of the Good / High indicative quality boundary and therefore there is no risk of deterioration in the Good (surrogate) indicative quality of the river water body, or of preventing the achievement of WFD objectives.

The coastal water bodies Rosscarbery Bay (IE_SW_110_0000) and Western Celtic Sea (HAs 18;19;20) (IE_SW_010_0000) are located downstream of Castletownshend SAC and there is no potential for the transfer of orthophosphate concentrations from these water bodies to the SAC.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the Good indicative quality of the water body as a result of dosing, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on the species can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the species.

6.2.5 Myross Wood SAC 001070

6.2.5.1 [1421] Killarney Fern (*Trichomanes speciosum*)

Killarney fern is a type of filmy fern. It grows in deeply shaded, humid situations such as dripping caves, crevices and overhangs on cliffs and rocky slopes, in stream gullies, by waterfalls and in woodlands, and occasionally occurs under fallen trees and on the floor of damp woodlands[38]. The site is characterised by remnant areas of native broad-leaved woodlands which occur on the steep, rocky slopes near the head of a narrow sea inlet, Glandore Harbour. Killarney Fern occurs in small

[38] https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf

waterfalls and on earthen banks by a stream, according to the Natura 2000 Data Form[39]. There are no SSCOs for Killarney fern in Myross Wood SAC (NPWS, 2018[40]). Killarney fern is potentially threatened by a variety of activities and impacts, either directly by loss of habitat, deliberate collection, encroachment of invasive or vigorous species, or indirectly by water pollution, removal of woodland or alteration of watercourses (NPWS, 2013[41]).

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Myross Wood SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water body hydrologically connected to the site is: Killangal_010 (IE_SW_20K950970);
- The transitional water body hydrologically connected to the site is: Glandore Harbour (IE_SW_110_0300); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

The river water body Killangal_010 (IE_SW_20K950970) bisects the site. The modelled post dosing increase in orthophosphate concentration is 0.0006 mg/l which does not exceed 5% of the Good / High indicative quality boundary and therefore there is no risk of deterioration in the Good (surrogate) indicative quality of the river water body, or of preventing the achievement of WFD objectives.

The transitional water body hydrologically connected to the site is Glandore Harbour (IE_SW_110_0300). The modelled post-dosing increase in orthophosphate concentration is 0.0000 mg/l which does not exceed 5% of the Good / High indicative quality boundary. This is located downstream of the SAC and therefore there is no potential for the transfer of orthophosphate concentrations from this water body to the SAC.

The EAM assessment has determined that the modelled concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the Good indicative quality of the water body as a result of dosing, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on the species can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the species.

[39] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF001070.pdf
[40] NPWS 2018 Myross Wood SAC 001070 Conservation Objectives
[41] NPWS (2013) The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Editor: Deirdre Lynn

6.2.6 Kilkeran Lake and Castlefreke Dunes SAC 001061

6.2.6.1 [1150] Coastal lagoons

"Coastal lagoons" is a priority habitat in Annex I of the Habitats Directive. A coastal lagoon is a lake or pond that is fully or partially separated from the sea by a permeable barrier that can be entirely natural such as shingle, or can be an artificial embankment. Salinity varies depending on factors such as freshwater inputs and barrier permeability.

Kilkeran Lake and Castlefreke Dunes SAC is situated approximately 6km south-east of Rosscarbery in Co. Cork. It is a coastal SAC in which well-developed sand dunes have impounded a natural sedimentary lagoon, with an area of 20.3ha (NPWS 2016[42]). There is a single coastal lagoon, Kilkeran Lake, listed for the SAC with a conservation assessment of '*Unfavourable-Bad'*. There is a channel approximately 400 m long leading from the lagoon to the sea. For most of the year this is blocked by a barrier of coarse sand, at the south-eastern end of the Castlefreke Dunes system. The barrier is breached both naturally and occasionally, artificially. The main freshwater input is through a stream (IE_SW_20H070690 Haye's Cross Roads_010) that enters the northern end of the lagoon. Salinity is generally low, measuring around 1-2 psu, classing the lagoon as '*Oligohaline*'.

In the SSCOs supporting document for coastal lagoons for the site (NPWS, 2016[43]) there are nutrient (nitrogen and phosphorus) specific targets for the attribute water quality. The target for Molybdate Reactive Phosphorus (MRP) is: annual median MRP within natural ranges and less than 0.1 mg/l. target is based on Roden and Oliver (2013[44]). This limit is required to ensure that excessive shading from phytoplankton does not reduce submergent colonisation of the littoral zone.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Kilkeran Lake and Castlefreke Dunes SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site are: Ardgehane_010 (IE_SW_20A430910) and Killangal_010 (IE_SW_20K950970);
- The transitional water body hydrologically connected to the site is: Glandore Harbour (IE_SW_110_0300);
- The coastal water bodies connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Rosscarbery Bay (IE_SW_110_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

[42] NPWS 2016 Kilkeran Lake and Castlefreke Dunes SAC 001061 Conservation Objectives
[43] NPWS 2016 Kilkeran Lake and Castlefreke Dunes SAC (site code: 001061) Conservation Objectives Supporting Document - Coastal Lagoons
[44] Roden, C.M. and Oliver, G. (2013) Monitoring and assessment of Irish lagoons for the purpose of the EU Water Framework Directive. Unpublished report to the Environmental Protection Agency.

Kilkeran Lake is a coastal lagoon and for large parts of the year there is no water exchange with the adjacent water body due to a sand bar at the outlet preventing the exchange of water with the open sea, therefore it behaves more like a lake. Connectivity to the WSZ is indirect via Ardgehane_010 (IE_SW_20A430910) and Killangal_010 (IE_SW_20K950970) river water bodies, Glandore Harbour (IE_SW_110_0300) transitional water body and Rosscarbery Bay (IE_SW_110_0000) and Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000). In addition there is a hydrogeological connection via Skibbereen-Clonakilty (IE_SW_G_085).

The water bodies that directly interact with the coastal lagoon are Rosscarbery Bay (IE_SW_110_0000) and Skibbereen-Clonakilty (IE_SW_G_085). The modelled post-dosing increase in concentration in both water bodies is not detectable (0.0000 mg/l), therefore there is no risk of deterioration in their indicative quality, which are at Moderate (surrogate) and Good (surrogate) respectively, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the restoration of the favourable conservation condition of the habitat.

6.2.6.2 [2110] Embryonic shifting dunes, [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes), [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes)*

The overall objective for Embryonic shifting dunes and shifting dunes along the shoreline is to maintain the favourable conservation condition of the habitats (NPWS, 2016[42]). The overall objective for Fixed coastal dunes with herbaceous vegetation is to restore the favourable conservation condition of the habitat. There are no nutrient specific targets for these habitats in the SSCOs for the Kilkeran and Castlefreke Dunes SAC. There is however, a target for negative indicator species to represent less than 5% cover. Negative indicators include species indicative of changes in nutrient status. The COs supporting document for coastal habitats (NPWS, 2016[42]) does not outline any objectives in relation to water quality and nutrient requirements for the habitats. It does however, identify that nutrient development on the dunes systems is supplemented by decaying detritus in the tidal litter, which releases nutrients into what would otherwise be a nutrient-poor environment. The habitat is often represented as patchy, fragmented stands of vegetation that are short-lived and subject to frequent re-working of the sediment.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Kilkeran Lake and Castlefreke Dunes SAC and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site are: Ardgehane_010 (IE_SW_20A430910) and Killangal_010 (IE_SW_20K950970);
- The transitional water body hydrologically connected to the site is: Glandore Harbour (IE_SW_110_0300);
- The coastal water bodies connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Rosscarbery Bay (IE_SW_110_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

According to the CO supporting document for coastal habitats in Kilkeran Lake and Castlefreke Dunes SAC (NPWS, 2016[45]), all three dune habitats are found at the sub-site Castlefreke, within the SAC. The habitat 2110 Embryonic shifting dunes were not well developed at Castlefreke in 2011, or during the CMP[46]. This is probably related to the exposed nature of the beach, steeply sloped shoreline and lack of available sediment for dune building. The area of the habitat has decreased from 0.05 ha during the CMP to 0.04 ha during the SDM[45]. The loss in area is due to habitat succession to 2120 Marram dunes (white dunes) and *2130 Fixed dunes (grey dunes).

The habitat 2120 Marram dunes (white dunes) form a narrow band in front of the *2130 Fixed dunes (grey dunes) at Castlefreke. There is one break in the habitat where visitors access the strand. The area of the habitat declined from 1.78 ha during the CMP to 1.65 ha during the SDM. This change is due to succession from 2120 Marram dunes (white dunes) to *2130 Fixed dunes (grey dunes).

The area of *2130 Fixed dunes (grey dunes) increased from 28.19 ha during the CMP to 28.75 ha during the SDM. This increase was due to recovery from damage and succession from 2120 Marram dunes (white dunes).

All three dune habitats are located downstream of the water bodies identified above and in **Table 5.2**, all of which ultimately discharge to the coastal water body Rosscarbery Bay (IE_SW_110_0000).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

The modelled increase in concentrations in Ardgehane_010 (IE_SW_20A430910) and Killangal_010 (IE_SW_20K950970) were 0.0016 mg/l and 0.0006 mg/l respectively. As the concentration in Killangal_010 (IE_SW_20K950970) does not exceed the 5% Good / High indicative quality boundary, dosing does not pose a risk of deterioration in the indicative quality of the water body which is currently at Good (surrogate), as identified in **Table 5-2**. For Ardgehane_010 (IE_SW_20A430910), the modelled post-dosing concentration exceeds 5% of the Good / High indicative quality boundary, however it does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the Good (surrogate) indicative quality of the water body, or of preventing the achievement of WFD objectives.

Glandore Harbour (IE_SW_110_0300) transitional water body has a modelled post-dosing increase in concentration of 0.0000 mg/l, which does not exceed the 5% Good / High indicative quality boundary and therefore there is no risk of deterioration in the Good (surrogate) indicative quality of the water body, or of preventing the achievement of WFD objectives.

Rosscarbery Bay (IE_SW_110_0000), the coastal water body connected to the habitat via the 400 m long channel, has a post-dosing increase in concentration of 0.0000 mg/l and similarly, is not at risk of deterioration in the Moderate indicative quality (surrogate) of the water body as a result of dosing, or of preventing the achievement of WFD objectives.

[45] Delaney, A., Devaney, F.M., Martin, J.R. and Barron, S.J. (2013) *Monitoring survey of Annex I sand dune habitats in Ireland*. Irish Wildlife Manual No. 75.

[46] Ryle, T., Murray, A., Connolly, K. and Swann, M., (2009). *Coastal Monitoring Project 2004-2006*. Unpublished report to National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there will be no risk of deterioration to the Good (surrogate) indicative quality of the water body as a result of dosing, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Ballyhilty WTP, it has been demonstrated that the potential for likely significant effects on these dune habitats can be excluded. Furthermore, dosing will not prevent the maintenance or restoration of the favourable conservation condition of the habitats.

6.2.7 Sheep's Head to Toe Head SPA 004156

The Sheep's Head to Toe Head SPA is a large site situated on the south-west coast of Co. Cork. It encompasses the high coast and sea cliffs from the Sheep's Head to Mizen Head, Brow Head and Crookhaven in the west and from Baltimore to Tragumna Bay, Gokane Point and the Toe Head peninsula in the east. The site includes the sea cliffs, the land adjacent to the cliff edge, an area further inland to the east of Dunlough Bay, and also areas of sand dunes at Barley Cove and Crookhaven. The high water mark forms the seaward boundary (NPWS, 2015[47]).

The site is a SPA under the E.U. Birds Directive, of special conservation interest for Peregrine and Chough, which are considered nutrient sensitive (see **Appendix B**). The site supports an internationally important population of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive. The birds are found in pairs and flocks along the coast from Sheep's Head in the north to beyond Toe Head in the south. The Mizen Head cliffs hold some of the highest concentrations of breeding pairs in Ireland. The site also supports a nationally important population of Peregrine and a range of other breeding seabirds including Fulmar, Herring Gull, Shag, Kittiwake, Black Guillemot, and Great Black-backed Gull, all seabird data from 1999, 2001 and 2002.

There are no SSCOs for the site (NPWS, 2018[48]); however, there is an overall objective to maintain or restore the favourable conservation condition of the bird species listed as SCIs for the SPA.

In relation to protected water-dependent habitats and species under the Birds and Habitats Directive, the river basin management planning process contributes towards achieving water conditions that support Favourable Conservation Status. In preparing the RBMP (2018-2021) (DHPLG, 2018[49]) the risk assessment carried out by the EPA for these water dependent European Site protected areas has focussed on looking at the risks to the water standards/objectives established for the purpose of supporting Good Ecological Status (GES). GES, which is the default objective of the WFD, is considered adequate for supporting many water dependent European Site protected areas where site specific environmental supporting conditions have not been defined within SSCOs by the NPWS. This is the case for SPA birds and wetlands.

[47] NPWS 2015 Sheep's Head to Toe Head SPA 004156 Site Synopsis
[48] NPWS 2018 Sheep's Head to Toe Head SPA 004156 Conservation Objectives
[49] DHPLG (2018) The River Basin Management Plan for Ireland (2018-2021). Available at: https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

Table 5-2 and **Table 5-3** identify the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Sheep's Head to Toe Head SPA and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

- The river water bodies hydrologically connected to the site include: Lowertown_010 (IE_SW_20L560540), Skull_010 (IE_SW_20E070850), Derreennatra_010 (IE_SW_20D770630), Shanavagh_010 (IE_SW_20S360700), Rathruane_010 (IE_SW_20R010400), Knockroe_010 (IE_SW_20K050700), Leamawaddra_020 (IE_SW_20L010400), Roaring Water River_010 (IE_SW_20R030900), Lettershaw_010 (IE_SW_20L450850), Mallavonea_010 (IE_SW_20M580810), Clodagh_010 (IE_SW_20C030400), Ilen_010 (IE_SW_20I010100), Ilen_020 (IE_SW_20I010160), Ilen_030 (IE_SW_20I010300), Ilen_040 (IE_SW_20I010350) and Ardgehane_010 (IE_SW_20A430910);
- The lake water body hydrologically connected to the site is: Abisdealy (IE_SW_20_148);
- The transitional water bodies hydrologically connected to the site are: Glandore Harbour (IE_SW_110_0300) and Ilen Estuary (IE_SW_130_0100);
- The coastal water bodies hydrologically connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000), Roaring Water Bay (IE_SW_140_0000) and Rosscarbery Bay (IE_SW_110_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

Most modelled increases in concentration did not exceed 5% Good / High status boundary for river water bodies. Both Ardgehane_010 (IE_SW_20A430910) and Derreennatra_010 (IE_SW_20D770630) had modelled post-dosing increases in concentration that exceeded 5% of the Good / High indicative quality boundary, at 0.0016 mg/l and 0.0024 mg/l respectively. However, the respective increases do not cause the post-dosing baselines to exceed 75% of the indicative quality upper threshold and therefore there is no risk of deterioration in the indicative quality of these water bodies, or of preventing the achievement of WFD objectives.

For the lake water body Abisdealy (IE_SW_20_148), the assessment shows that the critical loading for oligotrophic conditions is currently being exceeded under the existing scenario. The existing orthophosphate levels in the lake are indicative of moderate indicative quality and an assessment of the trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake (0.1%), it will not have a significant impact on the trophic status. This increase will not affect the lake ecology which is already at poor ecological status due to phytoplankton conditions.

The transitional water bodies are Glandore Harbour (IE_SW_110_0300) and Ilen Estuary (IE_SW_130_0100). Glandore Harbour has a modelled post-dosing increase in orthophosphate concentration of 0.0000 mg/l, while the increase in the Ilen Estuary is not detectable (0.0000 mg/l). As neither one exceeds 5% of the Good / High indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies, which are at Good (surrogate) and High respectively; or of preventing the achievement of WFD objectives.

The coastal water bodies Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000), Roaring Water Bay (IE_SW_140_0000) and Rosscarbery Bay (IS_SW_110_0000) had post-dosing increases in concentration of 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water bodies, or of preventing the achievement of WFD objectives.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there is no risk of deterioration to the indicative quality of the water body which is currently at Good, or of preventing the achievement of WFD objectives.

In light of the EAM assessment which has determined that there is no risk of deterioration in the indicative quality of the water bodies that support the SPA, or of preventing the achievement of WFD objectives, the additional loading from the orthophosphate dosing will not have any likely significant effects on the favourable conservation status of its SCIs.

6.2.8 Galley Head to Duneen Point SPA 004190

The Galley Head to Duneen Point SPA is situated to the south-west of the town of Clonakilty, Co, Cork. It encompasses the sea cliffs south of Castlefreke dunes to Galley Head, north-eastwards along the coast to Dunowen Head and Ringlea Point as far as the north side of Duneen Point. The site includes the sea cliffs and the land adjacent to the cliff edge. The high water mark forms the seaward boundary. Most of the site is underlain by Devonian sandstones, siltstones and mudstones, but similar rocks of Carboniferous age also occur (NPWS, 2010[50]).

The site is a SPA under the E.U. Birds Directive, of special conservation interest for Chough, which is considered nutrient sensitive (see **Appendix B**). The site supports a nationally important population of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive. The site also supports a variety of breeding seabirds, including: Fulmar, Herring Gull, Cormorant, Shag, Great Black-backed Gull and Lesser Black-backed Gull – all seabird data from 1985. The site is also used by Peregrine which is an Annex I species of particular significance.

There are no SSCOs for the site however there is an overall objective to maintain or restore the favourable conservation condition of the bird species listed as SCIs for the SPA (NPWS, 2018[51]).

In relation to protected water-dependent habitats and species under the Birds and Habitats Directive, the river basin management planning process contributes towards achieving water conditions that support Favourable Conservation Status. In preparing the RBMP (2018-2021) (DHPLG, 2018[49]) the risk assessment carried out by the EPA for these water dependent European Site protected areas has focussed on looking at the risks to the water standards/objectives established for the purpose of supporting Good Ecological Status (GES). GES, which is the default objective of the WFD, is considered adequate for supporting many water dependent European Site protected areas where site specific environmental supporting conditions have not been defined within SSCOs by the NPWS. This is the case for SPA birds and wetlands.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Galley Head to Duneen Point SPA and will receive inputs from the proposed orthophosphate dosing at Ballyhilty WTP:

[50] NPWS 2010 Galley Head to Duneen Point SPA 004190 Site Synopsis
[51] NPWS 2018 Galley Head to Duneen Point SPA 004190 Conservation Objectives

- The river water bodies hydrologically connected to the site are: Ardgehane_010 (IE_SW_20A430910) and Killangal_010 (IE_SW_20K950970);
- The transitional water body hydrologically connected to the site is: Glandore Harbour (IE_SW_110_0300);
- The coastal water bodies connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Rosscarbery Bay (IE_SW_110_0000); and
- The groundwater body hydrogeologically connected to the site is: Skibbereen-Clonakilty (IE_SW_G_085).

The EAM has assessed the potential for impact on orthophosphate indicative water quality and nutrient conditions and quality and has based this assessment on a conservative basis using all available flows data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

The modelled post-dosing increases in concentration in the river water bodies hydrologically connected to the SPA, Ardgehane_010 (IE_SW_20A430910) and Killangal_010 (IE_SW_20K950970), are 0.0016 mg/l and 0.0006 mg/l. For Ardgehane_010, whilst the modelled increase exceeds 5% of the Good / High indicative quality boundary, the increase does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold. For Killangal_010, the increase does not exceed 5% of the Good / High indicative quality boundary. Therefore, dosing does not pose a risk of deterioration in the indicative quality of the water bodies both of which are currently at Good, or of preventing the achievement of WFD objectives.

The transitional water body is Glandore Harbour (IE_SW_110_0300). Glandore Harbour has a modelled post-dosing increase in orthophosphate concentration of 0.000 mg/l which does not exceed 5% of the Good / High indicative quality boundary; therefore there is no risk of deterioration in the indicative quality of the water bodies, which is at Good (surrogate), or of preventing the achievement of WFD objectives.

In the coastal water bodies the Western Celtic Sea (IE_SW_010_0000) and Rosscarbery Bay (IE_SW_110_0000) both had a post-dosing increase in concentration of 0.0000 mg/l. All concentrations are within 5% of the Good / High indicative quality boundary and therefore there will be no deterioration in the current indicative quality classification of the coastal water bodies which is currently at High in the Western Celtic Sea (IE_SW_010_0000), and Moderate (surrogate) in Rosscarbery Bay (IE_SW_110_0000), or of preventing the achievement of WFD objectives.

The modelled increase in concentration for the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body was 0.0000 mg/l; therefore there is no risk of deterioration to the indicative quality of the water body which is currently at Good, or of preventing the achievement of WFD objectives.

In light of the EAM assessment which has determined that there is no risk of deterioration in the indicative quality of the water bodies that support the SPA, or of preventing the achievement of WFD objectives, the additional loading from the orthophosphate dosing will not have any likely significant effects on the favourable conservation status of its SCIs.

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

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

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

A search of Cork County Council's planning enquiry system was conducted for developments that may have in-combination effects on European Sites with the ZoI. Plans and projects relevant to the area were searched in order to identify any elements of the plans and projects 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 impacts with the proposed project was generated as listed in **Table 6-1** below.

Table 6-1: In-Combination Impacts with Other Plans, Programmes and Policies

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
Skibbereen Regional Water Supply Scheme - Ballyhilty WTP Upgrade As part of the Skibbereen Regional Water Supply Scheme, Irish Water has proposed to upgrade the Ballyhilty WTP to enable it to treat a larger volume of water to higher quality standards for supply to the Skibbereen Regional Water Supply Scheme (RWWS) distribution network. Both an AA Screening and EIA Screening were carried out for the proposed WTP upgrade works and have been reviewed as part of this assessment of the potential for in-combination effects with the proposed project. The proposed upgrades to Ballyhilty WTP have been developed in line with the IW requirements to increase the production capacity of the plant to meet future demand while also improving the resistance of the plant to changes in raw water quality. The upgrades required at Ballyhilty WTP include the construction of: ▪ A new dual cell raw water balancing tank to provide approximately 3000m^3; ▪ A new chemical storage and preparation building with bunded storage for liquid chemicals; ▪ An additional process stream comprising of coagulation, flocculation, clarification and filtration tanks (including an extended filter gallery to the east of the existing control building); ▪ Sludge treatment works comprising of new equalisation and settling tanks, sludge thickener, thickened sludge holding tank and sludge press building; and ▪ A new ESB substation and backup generator building. This upgrade Has been completed in 2022. **AA Screening Conclusion:** '*On the basis of the findings of this Screening for Appropriate Assessment of European Sites, it is concluded that the proposed Ballyhilty WTP Upgrade project will not have a significant effect on European Sites and a Stage 2 Appropriate Assessment is not*	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ In-combination effects with the proposed construction works.	There is no potential for likely significant effects on any European Sites as a result of the proposed orthophosphate treatment construction works, either individually or in-combination with any other plan/programme/policy.

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
required.'		
Cork County Development Plan 2022-2028[52] The plan outlines under WS 4-1: Water Supply, the following objectives: a) Support the prioritisation of the supply of adequate sustainable drinking water for the resident population and invest and expand the water supply in line with future population targets. b) Ensure that all drinking water in the County complies with the European Union Drinking Water Directive 98/83/EC and that all surface water and groundwater supplies comply with the requirements of Surface Water Directive 75/440/EC and Groundwater Directive 80/68/EEC. c) Conserve sources of drinking water and minimise threats to either the quality or quantity of drinking water reserves that might result from different forms of development or development activity and other sources of pollution. Conserve sources of drinking water and minimise threats to either the quality or quantity of drinking water reserves that might result from difference forms of development or development activity and other sources of pollution. The plan outlines under WM 11-1: EU Water Framework Directive and the River Basin Management Plan the following objectives: a) Protect and improve the County's water resources and ensure that development permitted meets the requirements of the River Basin Management Plan and does not contravene the objectives of the EU Water Framework Directive. b) Promote compliance with the River Basin Management Plan and associated environmental standards and objectives set out in the European Communities (Environmental Objectives) Surface Water Regulations, 2009 and the European Communities (Environmental Objectives) Groundwater Regulations, 2010, to prevent deterioration; restore good status; reduce chemical pollution, and achieve water related protected areas objectives in rivers, lakes, groundwater, estuaries and coastal waters (as applicable). The plan outlines under WM 11-2: Surface Water Protection a) Protect and improve the status and quality of all surface waters throughout the	▪ N/A	The County Development Plan emphasis the objectives for water services in the county which include the enhancement and improved quality of the service to its consumers. The plan also outlines the importance of compliance with the South Western River Basin Management Plan (now replaced by the RBMP 2018-2021), and emphasises compliance with environmental objectives. There is no potential for cumulative impacts with these plans.

[52] https://www.corkcoco.ie/en/resident/planning-and-development/cork-county-development-plan-2022-2028

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
County, including transitional and coastal waters..		
River Basin Management Plan For Ireland 2022 – 2027 The Third Cycle Draft River Basin Management Plan 2022-2027 Consultation Report has been published. This report presents a summary of the issues raised in the submissions reviewed from the public consultation on the draft River Basin Management Plan for Ireland 2022-2027. The 3rd cycle of River Basin Management Plan (RBMP) for the period of 2022-2027 is currently being prepared by Department of Housing, Local Government and Heritage (DHLGH) in line with the EU Water Framework Directive (WFD) (2000/60/EC). The document (Chapter 3) sets out the condition of Irish waters and a summary of status for all monitored waters in the 2013 – 2018 period, including a description of the changes since 2007 – 2009 and 2010-2015. A large number of river waterbodies are still declining and unless this is addressed, sustained and progressive improvements in water quality will be difficult to achieve. Overall, 53% of surface waters are in good or high ecological status while the remaining 47% are in unsatisfactory ecological status. For groundwater bodies, 92% are in good chemical and quantitative status. Chapter 3 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each water body that is *At Risk* of not meeting the environmental objectives of the WFD. Importantly, the assessment includes a review of trends over time to see if conditions were likely to remain stable, improve or deteriorate by 2027. This work was presented in the RBMP for 4,842 water bodies nationally. 1,603 water bodies were classed *At Risk* or 33%. An assessment of significant environmental pressures found that agriculture was the most significant pressure in 1,000 water bodies that are *At Risk*. Urban waste water, hydromorphology and forestry were also significant pressures amongst others.	▪ N/A	The objectives of the RBMP are to • Prevent deterioration; • Restore good status; • Reduce chemical pollution; and • Achieve water related protected areas objectives The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each water body. 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 given the detailed assessment of the effects of dosing on water body environmental objectives under the EAM.
Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC which is being carried out through a Catchment based Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Alterations to water quality and/or water movement; ▪ Disturbance;	CFRAM Studies and their product Flood Risk Management Plans will each undergo AA Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of water bodies. The establishment of how flooding may be contributing to deterioration in water quality in areas

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
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.	▪ In-combination impacts within the same scheme.	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 impacts with the CFRAMS programme as no infrastructure is proposed as part of this project.
Foodwise 2025 Foodwise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth projection includes increasing the value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	Foodwise 2025 were subject to its own AA[53]. 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 impacts are predicted. Mitigation measures included cross compliance with 13 Statutory Management Requirements, EIA Agricultural Regulations 2011, GLAS, and AA Screening of licencing and permitting in the forestry and seafood sectors.
Rural Development Programme 2014 – 2020 The agricultural sector is actively enhancing competitiveness whilst trying to achieve more sustainable management of natural resources. The common set of objectives,	▪ Overgrazing; ▪ Land use change or ▪ intensification;	The RDP for 2014 – 2020 has been subject to SEA[54], and AA[55]. The AA assessed the potential for impacts from the RDP measures e.g. for the GLAS scheme to

[53] http://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/environmentalanalysis/AgriFoodStrategy2025NISDRAFT300615.pdf
[54] https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/StrategEnvironmAssessSumState090615.pdf
[55] https://www.agriculture.gov.ie/media/migration/agarchive/ruralenvironment/preparatoryworkfortherdp2014-2020/RDP20142020DraftAppropriateAssessmentReport160514.pdf

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
principles and rules through which the European Union co-ordinates support for European agriculture is outlined in the Rural Development Programme (RDP) 2014-2020 under the Common Agricultural Policy. The focus of the programme is to assist with the sustainable development of rural communities and while improvements are sought in relation to water management. Within the RDP are two targeted agri-environment schemes; Green Low Carbon Agri-Environment Scheme (GLAS) and Targeted Agriculture Modernisation Scheme (TAMS). They provide the role of a supportive measure to improve water quality and thus provide direct benefits in achieving the measures within the RBMP. The achievement of the objectives outlined within GLAS, to improve water quality, mitigate against climate change and promote biodiversity will be of direct positive benefit in achieving the measures within the RBMP and the goals of the Natura Directives. The scheme has an expected participation for 2014-2020 of 50,000 farmers which have to engage in specific training and tasks in order to receive full payment. Farmers within the scheme must have a nutrient management plan which is a strategy for maximising the return from on and off-farm chemical and organic fertilizer resources. This has a direct positive contribution towards protecting water bodies from pollution through limiting the amount of fertiliser that is placed on the land. The scheme prioritises farms in vulnerable catchments with 'high status' water bodies and also focuses on educating farmers on best practices to try and improve efficiency along with environmental outcomes. The TAMS scheme is open to all farmers and is focused on supporting productive investment for modernisation. This financial grant for farmers is focused on the pig and poultry sectors, dairy equipment and the storage of slurry and other farmyard manures. Within the TAMS scheme are two further schemes; the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have the ability to contribute towards a reduction in point and diffuse source pollution through improved nutrient management.	▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	result in appropriate management prescriptions; minimum stocking rates under the Areas of Natural Constraints measure leading to overgrazing in sensitive habitats with dependent species, and TAMS supporting intensification. Mitigation included project specific AA for individual building, tourism or agricultural reclamation projects, consultations with key stakeholders during detailed measure development, and site-based monitoring of the effects of RDP measures. With such measures in place, it was concluded that there would be no significant in-combination impacts on Natura 2000 sites.
National Nitrates Action Programme Article 28 of the Good Agricultural Practice Regulations, in line with the Nitrates Directive (91/676/EEC), requires the Minister for Housing, Local Government and Heritage, in consultation with the Minister for Agriculture, Food and the Marine, to review the Nitrates Action Programme every four years. Ireland has	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to	In accordance with the Directive 2001/42/EC on the assessment of effects of certain plans and programmes, as transposed into Irish law, a Strategic Environmental Assessment (SEA) is being undertaken and an Environmental Report has been prepared.

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
published the Fifth Nitrates Action Programme on the 11th March 2022. The Programme sets out new measures that have been introduced since the Fourth Programme. This iteration of the NAP is developed in the context of significantly greater environmental ambition in the Programme for Government and at EU level. The key issues considered in the fifth iteration of the NAP include: ▪ Better Policy Alignment; ▪ Compliance and Enforcement; ▪ Climate Action Measures. ▪ Biodiversity Measures; and Nitrates Derogation.	habitats / species.	Appropriate Assessment under EU Directive 92/43/EEC, as transposed into Irish law, is also being undertaken and a Natura Impact Statement (NIS) has been prepared It concluded that the NAP was an environmental programme which imposes environmental constraints on all agricultural systems in the state. Consultation and submission on the 5th NAP have been considered in the SEA Statement and the Natura Impact Statement of the adopted fifth Nitrates Action Programme. These documents provide information on the decision-making process and documents how environmental considerations, the views of consultees/stakeholders and the recommendations of the SEA Environmental Report and the assessment carried out under Article 6 of the Habitats Directive have influenced the final adopted Plan. Adherence to the recommendations in these documents and incorporation into he Plan will ensure that there is no potential for cumulative impacts with the proposed project.
Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2014 - 2020 Ireland's forestry sector is striving to increase forestry cover and one of the recommended policy actions in the Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) is to increase the level of afforestation annually over time and support afforestation and mobilisation measures under the Forestry Programme 2014-2020. Two key objectives within the Forestry Programme 2014-2020 that will influence the RBMP are to increase Ireland's forest cover to 18% and to establish 10,000 ha of new forests and woodlands per annum. As part of this programme there are a number of schemes that promote sustainable forest management and they	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Water quality changes; ▪ Disturbance to species.	Ireland's Forestry Programme 2014 – 2020 has undergone AA[56]. A key recommendation is that all proposed forestry projects should be subject to an assessment of their impacts and the proximity of Natura 2000 habitats and species should be taken into account when proposals are generated. In-combination effects will therefore be assessed at the project specific scale. Adherence to this recommendation will ensure that there is no potential for cumulative impacts with the proposed project.

[56] https://www.agriculture.gov.ie/media/migration/forestry/publicconsultation/newforestryprogramme2014-2020/nis/ForestryProgrammeNaturalImpactStatement290914.pdf

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
include the Afforestation Scheme, the Woodland Improvement Scheme, the Forest Road Scheme and the Native Woodland Conservation Scheme. Under the Native Woodland Conservation Scheme funding is provided to restore existing native woodland which promotes Ireland's native woodland resource and associated biodiversity. Native woodlands provide wider ecosystem functions and services which once restored can contribute to the protection and enhancement of water quality and aquatic habitats. New guidance and plans are also being developed to address forestry adjacent to water bodies, Freshwater Pearl Mussel Plans for 8 priority catchments and a Hen Harrier Threat Response Plan (NPWS). The mitigation measures within these plans will be particularly important in terms of protecting sensitive habitats and species from such forestry increases.		
Water Services Strategic Plan (WSSP, 2015) Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and WFD requirements. The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Irish Water's short, medium and long term objectives and identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Irish Water owned asset and this is a significant piece of the puzzle in terms of the expected improvements from the RBMP.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	The overarching strategy was subject to AA and highlighted the need for additional plan/project environmental assessments to be carried out at the tier 2 and tier 3 level. Therefore, no likely significant in-combination effects are envisaged.
National Wastewater Sludge Management Plan (2016) The National Wastewater Sludge Management Plan was prepared in 2015, outlining the measures needed to improve the management of wastewater sludge.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance;	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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
	▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	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.
National Water Resources Plan – Framework Plan This Framework will deliver a sustainable water supply on a catchment and water resource zone basis, meeting growth and demand requirements through drought and critical periods. The resources plan takes account of WFD objectives and the programme of measures proposed in the relevant catchments and water resource zones. Specific measures in the plan with relevance to Irish Water include those for urban wastewater and urban runoff and also as part of other measures in relation to the lead in drinking water.	▪ Increased abstractions leading to changes / pressure on existing hydrology / hydrogeological regimes.	The plan will seek to develop sustainable water supplies but must consider particularly critical drought periods when assimilation capacity for diffuse runoff may be reduced. The SEA Environmental Report for the Framework Plan has made mitigation recommendations for the implementation of the Framework Plan which are included in the Environmental Action Plan (EAP), and the EAP will provide a basis for tracking recommendations from the SEA and NIS during the Framework Plan implementation and Regional Plan development. A Monitoring Plan has also been developed which covers the integration of environmental and sustainability considerations throughout implementation of the Framework Plan and the options development methodology and provides a framework for future long-term monitoring. Therefore, no likely significant in-combination effects are envisaged.
Planning Applications There are a large number of planning applications approved, pending or recently approved within the Skibbereen Ballyhilty WSZ. The applications are predominantly for the construction of new infrastructure or renovations to existing infrastructure.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	Adherence to the overarching policies and objectives of the Cork County Development Plan 2014 will ensure that local planning applications and subsequent grant of planning will comply with the requirements of relevant environmental legislation including the WFD and Habitats Directive.
Integrated Pollution Control (IPC) Licensing	▪ Changes to water	The EPA is responsible for monitoring emissions and

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
There is only one Industrial Emission licensed (IEL) facility near the Skibbereen Ballyhilty WSZ (piggery), located in Knockskeagh, Leap, Co. Cork. In the wider area surrounding the WSZ, there are three other licensed piggeries. Under the Industrial Emissions Directive 2010/75/EU and Environmental Protection Agency Act, 1992 (as amended) industrial activities (e.g. piggery, pharmaceutical) are licensed by the EPA to prevent or reduce emissions to air, water and land, reduce water and use energy/resources efficiently. An IPC licence is a single integrated licence which covers all emissions from the facility and its environmental management. All related operations that the licence holder carries in connection with the activity are controlled by this licence.	quality or quantity; ▪ Nutrient enrichment /eutrophication.	dealing with any infringements on IPC licences. All emissions must be within set limits which must not be contravened. Limits are set for phosphorus where relevant. Compliance with the limits set for phosphorus will ensure that there will be no significant in-combination impacts on European Sites.

7 SCREENING CONCLUSION STATEMENT

This Screening to inform the AA process has considered whether the proposed construction works and operational orthophosphate dosing at the at the Ballyhilty WTP, within the Zone 1 Skibbereen Ballyhilty WSZ, in combination with other plans or projects, is likely to have a significant effect on European Sites.

The appraisal undertaken in this Screening assessment has been informed by an EAM (see **Appendix C**) with reference to qualifying interests/special conservation interests of the European Sites potentially affected by the proposed project, in order to provide a scientific basis for the evaluations.

During the construction phase of the corrective water treatment works at Ballyhilty WTP, the potential for direct, indirect and cumulative impacts affecting European Sites within the ZoI (i.e., Roaringwater Bay and Islands SAC, and Sheep's Head to Toe Head SPA) has been assessed. There will be no significant direct, indirect or cumulative impacts that will result in likely significant effects to the qualifying interests/special conservation interests of the European Sites within the ZoI.

During the operational phase, the potential for direct, indirect and cumulative impacts affecting European Sites within the ZoI including: Barley Cove to Ballyrisode Point SAC, Roaringwater Bay and Islands SAC, Lough Hyne Nature Reserve and Environs SAC, Castletownshend SAC, Myross Wood SAC, Sheep's Head to Toe Head SPA and Galley Head to Duneen Point SPA have been assessed. Due to the low orthophosphate inputs following dosing at Ballyhilty WTP and no risk of deterioration in the orthophosphate indicative quality of the receiving water bodies or of preventing the achievement of WFD objectives, there will be no significant direct, indirect or cumulative impacts that will result in likely significant effects to the qualifying interests/special conservation interests of the European Sites within the ZoI. This is concluded with regard to the range, population densities and overall conservation status of the habitats and species for which these sites are designated (i.e. Conservation Objectives).

The screening has been carried out on the basis of the information presented in the Project Description. It has been concluded that the project is no connected or necessary to the management of any European Site. It can be concluded on the basis of objective scientific information and in view of best scientific knowledge, the proposed orthophosphate dosing and associated construction works at the Ballyhilty WTP; individually or in combination with other plans or projects, will not have a significant effect on any European Sites. Therefore, AA is not required.

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APPENDIX A

European Sites

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. Links to the COs for the European Sites relevant to this Screening for AA are provided below.

Site Name (Code)	Conservation Objectives Source
Barley Cove to Ballyrisode Point SAC (001040)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001040.pdf
Roaringwater Bay and Islands SAC (000101)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000101.pdf
Lough Hyne Nature Reserve and Environs SAC (000097)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000097.pdf
Castletownshend SAC(001547)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001547.pdf
Myross Wood SAC (001070)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001070.pdf
Kilkeran Lake and Castlefreke Dunes SAC (001061)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001061.pdf
Sheep's Head to Toe Head SPA (004156)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004156.pdf
Galley Head to Duneen Point SPA (004190)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004190.pdf

APPENDIX B

Nutrient Sensitive Qualifying Interests

Water dependant and nutrient sensitive SAC species

Code	Qualifying Interest	Water dependant	Nutrient sensitive
1013	Whorl snail (*Vertigo geyeri*)	Yes	Yes
1014	Whorl snail (*Vertigo angustior*)	Yes	Yes
1016	Whorl snail (*Vertigo moulinsiana*)	Yes	Yes
1024	Kerry Slug (*Geomalacus maculosus*)	No	Yes
1029	Freshwater Pearl mussel (*Margaritifera margaritifera*)	Yes	Yes
1065	Marsh Fritillary (*Euphydryas aurinia*)	Yes	No
1092	White-clawed crayfish (*Austropotamobius pallipes*)	Yes	Yes
1095	Sea lamprey (*Petromyzon marinus*)	Yes	Yes
1096	Brook lamprey (*Lampetra planeri*)	Yes	Yes
1099	River lamprey (*Lampetra fluviatilis*)	Yes	Yes
1103	Twaite shad (*Alosa fallax*)	Yes	Yes
1106	Atlantic salmon (*Salmo salar* (freshwater only))	Yes	Yes
1303	Lesser Horseshoe bat (*Rhinolophus hipposideros*)	No	Yes
1349	Bottlenose dolphin (*Tursiops truncatus*)	Yes	Yes
1351	Harbour porpoise (*Phocoena phocoena*)	Yes	Yes
1355	Otter (*Lutra lutra*)	Yes	Yes
1364	Grey seal (*Halichoerus grypus*)	Yes	Yes
1365	Common seal (*Phoca vitulina*)	Yes	Yes
1393	Shining sickle moss (*Drepanocladus vernicosus*)	Yes	No
1395	Petalwort (*Petalophyllum ralfsii*)	Yes	Yes
1421	Killarney fern (*Trichomanes speciosum*)	Yes	Yes
1528	Marsh saxifraga (*Saxifraga hirculus*)	Yes	Yes
1833	Slender naiad (*Najas flexilis*)	Yes	Yes
1990	Nore freshwater pearl mussel (*Margaritifera durrovensis*)	Yes	Yes
5046	Killarney shad (*Alosa fallax killarnensis*)	Yes	Yes

Water dependant and nutrient sensitive SAC habitats

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
1110	Sandbanks which are slightly covered by sea water all the time	Yes		Yes
1130	Estuaries	Yes		Yes
1140	Mudflats and sandflats not covered by seawater at low tide	Yes		Yes
1150	Coastal lagoons	Yes		Yes
1160	Large shallow inlets and bays	Yes		Yes
1170	Reefs	Yes		Yes
1180	Submarine structures made by leaking gases	No		No
1210	Annual vegetation of drift lines	Yes		Yes
1220	Perennial vegetation of stony banks	Yes		No
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Yes		Yes
1310	Salicornia and other annuals colonising mud and sand	Yes		Yes
1320	Spartina swards (*Spartinion maritimae*)	No		No
1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Yes	Yes	Yes
1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Yes	Yes	Yes
1420	Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)	Yes		Yes
2110	Embryonic shifting dunes	Yes		Yes
2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Yes		Yes
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)	Yes		Yes
2140	Decalcified fixed dunes with *Empetrum nigrum*	Yes		Yes
2150	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)	Yes		Yes
2170	Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)	Yes	Yes	Yes
2190	Humid dune slacks	Yes	Yes	Yes
21A0	Machairs (* in Ireland)	Yes	Yes	Yes
3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	Yes		Yes
3130	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*	Yes		Yes
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.	Yes		Yes
3150	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation	Yes		Yes
3160	Natural dystrophic lakes and ponds	Yes		Yes
3180	Turloughs	Yes	Yes	Yes
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	Yes		Yes
3270	Rivers with muddy banks with *Chenopodion rubri* p.p. and Bidention p.p. vegetation	Yes	Yes	Yes
4010	Northern Atlantic wet heaths with *Erica tetralix* (Flushes only)	Yes	Yes	Yes
4030	European dry heaths	No		Yes
4060	Alpine and Boreal heaths	No		No
5130	*Juniperus communis* formations on heaths or calcareous grasslands	No		No
6130	Calaminarian grasslands of the *Violetalia calaminariae*	No (flood risk)*		Yes

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	No (flood risk)*		Yes
6230	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)	No		No
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	Yes	Yes	Yes
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	Yes	Yes	Yes
6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	No (flood risk)*		Yes
7110	Active raised bogs	Yes	Yes	Yes
7120	Degraded raised bogs still capable of natural regeneration	Yes	Yes	Yes
7130	Blanket bogs (* if active bog)	Yes	Yes	Yes
7140	Transition mires and quaking bogs	Yes	Yes	Yes
7150	Depressions on peat substrates of the *Rhynchosporion*	Yes	Yes	Yes
7210	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	Yes	Yes	Yes
7220	Petrifying springs with tufa formation (*Cratoneurion*)	Yes	Yes	Yes
7230	Alkaline fens	Yes	Yes	Yes
8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	No		No
8120	Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)	No		No
8210	Calcareous rocky slopes with chasmophytic vegetation	No		No
8220	Siliceous rocky slopes with chasmophytic vegetation	No		No
8240	Limestone pavements	No		Yes
8310	Caves not open to the public	Yes	Yes	Yes
8330	Submerged or partially submerged sea caves	Yes		Yes
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	No		Yes
91D0	Bog woodland	Yes	Yes	Yes
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	Yes	Yes	Yes
91J0	Taxus baccata woods of the British Isles	No		No

*While this habitat is determined to be non-water dependent, it is incuded in the assessment in terms of flood risk only

Water dependant and nutrient sensitive SPA birds

Code	Species of special conservation interest	Water dependant	Nutrient sensitive
A001	Red-throated Diver (*Gavia stellata*)	Yes	Yes
A003	Great Northern Diver (*Gavia immer*)	Yes	Yes
A004	Little Grebe (*Tachybaptus ruficollis*)	Yes	Yes
A005	Great Crested Grebe (*Podiceps cristatus*)	Yes	Yes
A009	Fulmar (*Fulmarus glacialis*)	Yes	Yes
A013	Manx Shearwater (*Puffinus puffinus*)	Yes	Yes
A014	Storm Petrel (*Hydrobates pelagicus*)	Yes	Yes
A015	Leach's Storm-petrel (*Oceanodroma leucorhoa*)	Yes	Yes
A016	Gannet (*Morus bassanus*)	Yes	Yes
A017	Cormorant (*Phalacrocorax carbo*)	Yes	Yes
A018	Shag (*Phalacrocorax aristotelis*)	Yes	Yes
A028	Grey Heron (*Ardea cinerea*)	Yes	Yes
A037	Bewick's Swan (*Cygnus columbianus bewickii*)	Yes	Yes
A038	Whooper Swan (*Cygnus cygnus*)	Yes	Yes
A043	Greylag Goose (*Anser anser*)	Yes	Yes
A045	Barnacle Goose (*Branta leucopsis*)	Yes	Yes
A046	Light-bellied Brent Goose (*Branta bernicla hrota*)	Yes	Yes
A048	Shelduck (*Tadorna tadorna*)	Yes	Yes
A050	Wigeon (*Anas penelope*)	Yes	Yes
A051	Gadwall (*Anas strepera*)	Yes	Yes
A052	Teal (*Anas crecca*)	Yes	Yes
A053	Mallard (*Anas platyrhynchos*)	Yes	Yes
A054	Pintail (*Anas acuta*)	Yes	Yes
A056	Shoveler (*Anas clypeata*)	Yes	Yes
A059	Pochard (*Aythya ferina*)	Yes	Yes
A061	Tufted Duck (*Aythya fuligula*)	Yes	Yes
A062	Scaup (*Aythya marila*)	Yes	Yes
A063	Eider (*Somateria mollissima*)	Yes	Yes
A065	Common Scoter (*Melanitta n*igra)	Yes	Yes
A067	Goldeneye (*Bucephala clangula*)	Yes	Yes
A069	Red-breasted Merganser (*Mergus serrator*)	Yes	Yes
A082	Hen Harrier (*Circus cyaneus*)	Yes	Yes
A098	Merlin (*Falco columbarius*)	Yes	Yes
A103	Peregrine (*Falco peregrinus*)	Yes	Yes
A122	Corncrake (*Crex crex*)	Yes	Yes
A125	Coot (*Fulica atra*)	Yes	Yes
A130	Oystercatcher (*Haematopus ostralegus*)	Yes	Yes
A137	Ringed Plover (*Charadrius hiaticula*)	Yes	Yes
A140	Golden Plover (*Pluvialis apricaria*)	Yes	Yes
A141	Grey Plover (*Pluvialis squatarola*)	Yes	Yes

Code	Species of special conservation interest	Water dependant	Nutrient sensitive
A142	Lapwing (*Vanellus vanellus*)	Yes	Yes
A143	Knot (*Calidris canutus*)	Yes	Yes
A144	Sanderling (*Calidris alba*)	Yes	Yes
A148	Purple Sandpiper (*Calidris maritima*)	Yes	Yes
A149	Dunlin (*Calidris alpina*) (non-breeding)	Yes	Yes
A156	Black-tailed Godwit (*Limosa limosa*)	Yes	Yes
A157	Bar-tailed Godwit (*Limosa lapponica*)	Yes	Yes
A160	Curlew (*Numenius arquata*)	Yes	Yes
A162	Redshank (*Tringa totanus*)	Yes	Yes
A164	Greenshank (*Tringa nebularia*)	Yes	Yes
A169	Turnstone (*Arenaria interpres*)	Yes	Yes
A179	Black-headed Gull (*Larus ridibundus*)	Yes	Yes
A182	Common Gull (*Larus canus*)	Yes	Yes
A183	Lesser Black-backed Gull (*Larus fuscus*)	Yes	Yes
A184	Herring Gull (*Larus argentatus*)	Yes	Yes
A188	Kittiwake (*Rissa tridactyla*)	Yes	Yes
A191	Sandwich Tern (*Sterna sandvicensis*)	Yes	Yes
A192	Roseate Tern (*Sterna dougallii*)	Yes	Yes
A193	Common Tern (*Sterna hirundo*)	Yes	Yes
A194	Arctic Tern (*Sterna paradisaea*)	Yes	Yes
A195	Little Tern (*Sterna albifrons*)	Yes	Yes
A199	Guillemot (*Uria aalge*)	Yes	Yes
A200	Razorbill (*Alca torda*)	Yes	Yes
A204	Puffin (*Fratercula arctica*)	Yes	Yes
A229	Kingfisher (*Alcedo atthis*)	Yes	Yes
A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes
A395	Greenland White-fronted Goose (*Anser albifrons flavirostris*)	Yes	Yes
A466	Dunlin (*Calidris alpina schinzii*) (breeding)	Yes	Yes

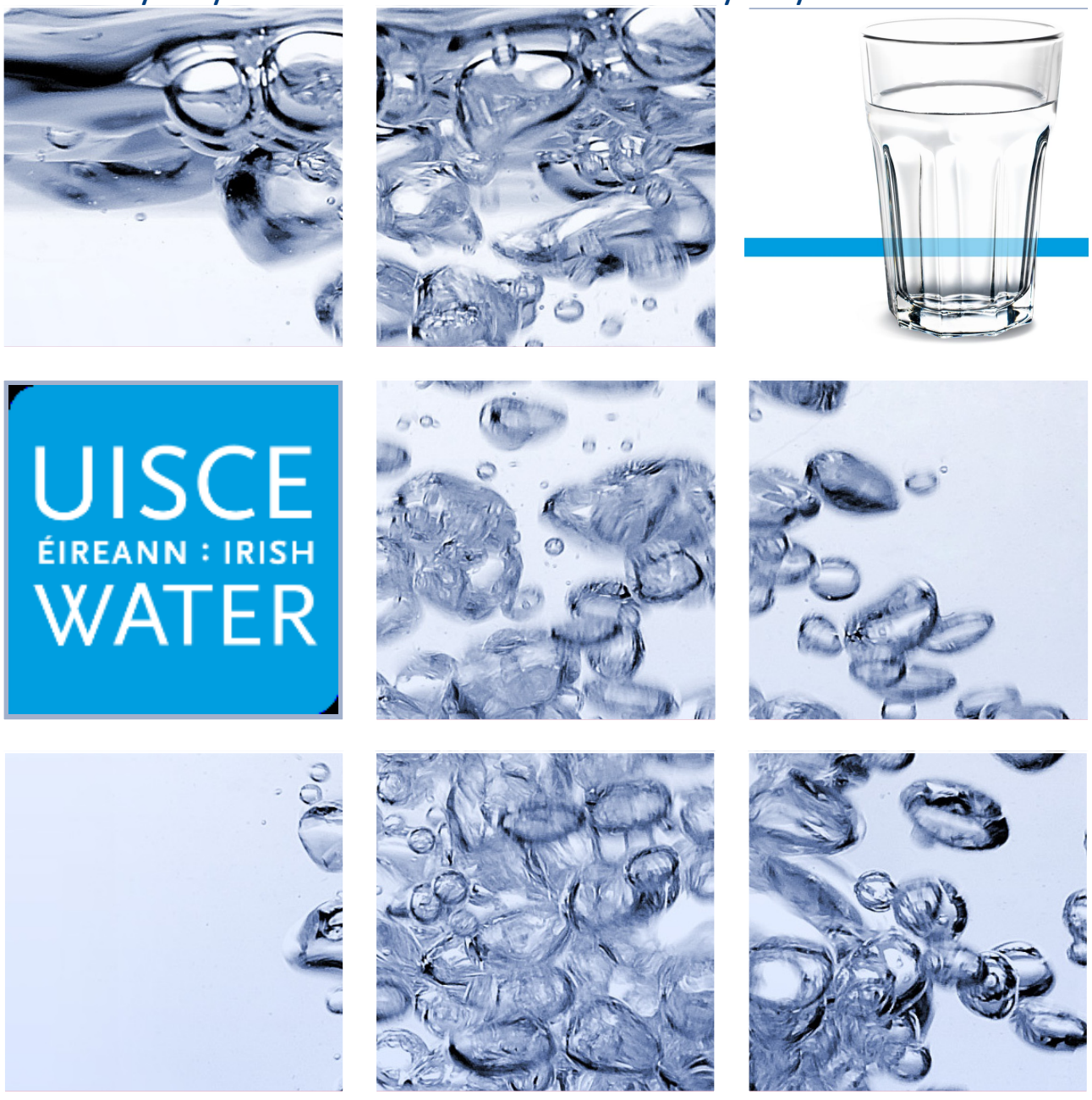
APPENDIX C

EAM Summary Report

Irish Water - Lead in Drinking Water Mitigation Plan

Environmental Assessment Methodology (EAM) Summary Report

060 Ballyhilty WTP - Zone 1 Skibbereen Ballyhilty



National Lead in Water Mitigation Strategy

Environmental Assessment Methodology Report – 060 Ballyhilty WTP (Zone 1 Skibbereen Ballyhilty)

Document Control Sheet

Client:	Irish Water
Project Title:	National Lead in Water Mitigation Strategy
Document Title:	Environmental Assessment Methodology Report: 060 Ballyhilty WTP – Zone 1 Skibbereen Ballyhilty (0500PUB4605)
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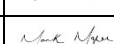
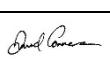
Text Pages:	11	Appendices:	-

Rev.	Status	Date	Author(s)		Reviewed By		Approved By	
F01	Final	9th Oct 2018	YE		MM		DC	
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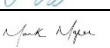
F03	Final	23nd Jan 2019	IP		MM		DC	
F04	Final	15nd Aug 2019	IP		MM		GJG	
F05	Final	21st Apr 2023	YE		IP		MM	

060 Ballyhilty WTP – Zone 1 Skibbereen Ballyhilty (0500PUB4605)

Supporting spreadsheet: 060 Ballyhilty WTP – Zone 1 Skibbereen Ballyhilty (0500PUB4605)_V08

This EAM report should be read in conjunction with the Irish Water Lead in Drinking Water Mitigation Plan – Environmental Assessment Methodology report (MDE1218Rp0005 F02).

Ballyhilty WTP supplies the town of Skibbereen, Co Cork and a large hinterland including the villages of Ballydehob, Baltimore, Castletownshend, Schull, Sherkin Island, Union Hall and Drimoleague on the southwest coast of Ireland. The total distribution input for Ballyhilty WTP is 3,599 m^3/day (55% of which is accounted for, with the remainder assumed to be lost through leakage), comprising 2,789 m^3/day for Zone 1 Skibbereen Ballyhilty, (0500PUB4605), 509 m^3/day for Zone 1 Schull (0500PUB4503), 301 m^3/day for Zone 1 Baltimore/Lakecross (0500PUB4601) and 305 m3/day for Zone1 Drimoleague. The total population served is approximately 9,000. The non-domestic demand is 11% of the distribution input.

The area is served by Ballydehob (D0467), Baltimore (D0296), Castletownshend (D0468), Schull (D0295), Skibbereen (D0166), Union Hall (D0469) and Drimoleague (D0470) WWTPs which are licenced in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 as amended. The impact of the orthophosphate dosing on the emission limit values and the receiving water body downstream of the point of discharge are assessed. There is also one WWTP with a population equivalent of less than 500, namely Sherkin Island (A0404) WWTP. The estimated additional load from this small agglomeration due to the orthophosphate dosing is considered at the water body level via the surface water pathways. It is estimated that there are 2,700 properties across the WSZ that are serviced by a DWWTS.

This assessment has been undertaken for the WSZ in isolation. However, if corrective water treatment is proposed for WTPs in the same catchment area, the cumulative impact from the combined loads to downstream water bodies are assessed (see Summary, Mitigation, and Table 5).The WTPs listed in the summary and mitigation section are currently being considered for corrective water treatment in the Bandon-Ilen Catchment (HA 20).

Water Treatment Plant	**Ballyhilty WTP**	
Water Supply Zone	Zone 1 Skibbereen Ballyhilty, (0500PUB4605) Zone 1 Schull (0500PUB4503) Zone 1 Baltimore/Lakecross (0500PUB4601) Zone1 Drimoleague (0500PUB4103) See Figure 4.1 and 4.2 of the AA Screening report	
Step 1 Appropriate Assessment Screening	**European Sites within Zone of Influence**	
	SACs	
	Clonakilty Bay SAC Lough Hyne Nature Reserve And Environs SAC Roaringwater Bay And Islands SAC Barley Cove To Ballyrisode Point SAC	Courtmacsherry Estuary SAC Myross Wood SAC Castletownshend SAC Ardmore Head SAC

	Kilkeran Lake And Castlefreke Dunes SAC Courtmacsherry Estuary SAC Ballymacoda (Clonpriest and Pillmore) SAC	Great Island Channel SAC Blackwater River (Cork/Waterford) SAC Ardmore Head SAC
	SPAs	
	Old Head of Kinsale SPA Clonakilty Bay SPA Sovereign Islands SPA Sheep's Head to Toe Head SPA Cork Harbour SPA Ballymacoda Bay SPA	Galley Head to Duneen Point SPA Seven Heads SPA Courtmacsherry Bay SPA Ballycotton Bay SPA, Blackwater Estuary SPA.
	Nutrient Sensitive Qualifying Interests present – Yes **Appropriate Assessment Screening Required – See AA screening report for details**	

Step 2 – Direct Inputs to Surface Water

Table 1: Increased loading/concentration to agglomerations due to Orthophosphate Dosing – Dosing rate = 0.6 mg/l

Agglomeration and discharge type	ELV (Ortho P unless otherwise stated) from WWDL (mg/l)	Scenario	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*
Ballydehob Primary Discharge	n/a	Existing	198.2	2.951	2.361	4.013
		Post Dosing	216.1	3.218	2.574	4.376
Ballydehob SWOs (1 no.)	n/a	Existing	8.7	4.424	3.539	6.017
		Post Dosing	9.2	4.691	3.753	6.380
Baltimore Primary Discharge	10	Existing	329.0	1.329	1.063	1.808
		Post Dosing	363.4	1.468	1.175	1.997
Baltimore SWOs (3 no.)	n/a	Existing	21.3	2.954	2.363	4.017
		Post Dosing	22.3	3.093	2.474	4.207
Castletownshend Primary Discharge	n/a	Existing	326.3	8.000	6.400	10.880
		Post Dosing	338.3	8.295	6.636	11.281
Castletownshend SWOs (0 no.)	n/a	Existing	9.5	8.000	6.400	10.880
		Post Dosing	9.9	8.295	6.636	11.281
Schull Primary Discharge	n/a	Existing	37.3	0.029	0.024	0.040
		Post Dosing	81.7	0.065	0.052	0.088
Schull SWOs (1 no.)	n/a	Existing	12.1	0.327	0.262	0.445
		Post Dosing	13.4	0.362	0.290	0.493
Skibbereen	8	Existing	422.5	0.281	0.224	0.382

Primary Discharge		**Post Dosing**	541.3	0.359	0.288	0.489
Skibbereen SWOs (3 no.)	**n/a**	**Existing**	44.0	1.002	0.802	1.363
		Post Dosing	47.4	1.081	0.865	1.470
Union Hall Primary Discharge	**n/a**	**Existing**	301.9	4.178	3.342	5.682
		Post Dosing	316.0	4.372	3.498	5.946
Union Hall SWOs (0 no.)	**n/a**	**Existing**	9.4	4.444	3.556	6.044
		Post Dosing	9.8	4.639	3.711	6.309
Drimoleague Primary Discharge	**1**	**Existing**	171.1	1.138	0.910	1.548
		Post Dosing	196.0	1.303	1.043	1.772
Drimoleague SWO (1 no.)	**n/a**	**Existing**	10.7	2.437	1.950	3.314
		Post Dosing	11.4	2.602	2.082	3.539

Note: All WWTPs have either no treatment (Castletownshend), primary treatment (Ballydehob and Union Hall) or secondary treatment (Baltimore, Drimoleague Skibbereen and Schull) and the additional load resulting from the orthophosphate dosing is assumed to pass through the plant untreated.

The 2021 AERs for Baltimore and Skibbereen WWTPs report full compliance with the orthophosphate ELV, therefore the plant is operating adequately in terms of P removal. There are no ELVs for orthophosphate on any of the other WWTP WWDLs given that primary discharge in all cases is to the Marine Environment.

For Drimoleague WWTP, the modelled effluent concentrations are not compliant with ELVs for orthophosphate in WWDL D0470 for all the post dosing scenarios. The 2021 AER effluent monitoring was also non-compliant as the WWTP is not designed for nutrient removal.

Step 3 – Potential impact of Direct Inputs on Receiving Water Bodies

Table 2: Mass balance assessment based on 0.6 mg/l dosing using available background concentrations and tidal flow information

Agglom. (WWDL code)	RWB Name / Code for Primary Discharge	Background Conc. (mg/l) (annual mean from AER u/s monitoring point)	Modelled Conc. existing (mg/l)	Modelled Conc. Post Dosing (mg/l)	% Inc.
Ballydehob (D0467)	Roaring Water Bay IE_SW_140_0000	0.0145	0.0145	0.0145	0.0
Baltimore (D0296)	Ilen Estuary IE_SW_130_0100	0.0150	0.0150	0.0150	0.0
Castletownshend (D0468)	Rosscarbery Bay IE_SW_110_0000	0.0140	0.0140	0.0140	0.0
Schull (D0295)	Roaring Water Bay IE_SW_140_0000	0.0430	0.0430	0.0430	0.0
Skibbereen (D0166)	Ilen Estuary IE_SW_130_0100	0.0160	0.0160	0.0160	0.0
Union Hall (D04)	Glandore Harbour IE_SW_110_0300	0.0150	0.0154	0.0154	0.1

	Drimoleague (D0470)	ILEN_020 IE_SW_20I010160	0.0150	0.0203	0.0211	3.7%

Surface Assessment

Roaring Water Bay (IE_SW_140_0000) **–** The WWDLs for Ballydehob and Schull WWTPs do not have an ELV for orthophosphate. The increase in effluent and SWO discharges from these WWTPS are shown in Table 1. The mass balance assessment in Table 2 shows insignificant impact for the existing and post dosing scenarios due to the large assimilative capacity of this water body.

Ilen Estuary (IE_SW_130_0100) **–** The Ilen Estuary receives effluent and SWO discharges from Baltimore and Skibbereen WWTPs. Baltimore WWTP is compliant with the ELV set and has tertiary treatment so the EAM assumes that all the load from the primary discharge is removed during the treatment process. There is an insignificant increase from the SWOs and therefore there is no impact on this receiving water body. Skibbereen WWTP receives secondary treatment only and the effluent and SWO discharges are as shown in Table 1. There is no impact on Ilen Estuary as shown by the mass balance assessment in Table 2.

Rosscarbery Bay (IE_SW_110_0000) **–** Castletownshend is a small agglomeration (PE – 447) that discharges to Rosscarbery Bay and the impact of the additional load from the orthophosphate dosing from the primary discharge is insignificant as shown by the mass balance assessment in Table 2**.**

Glandore Harbour (IE_SW_110_0300) **–** Union Hall agglomeration has an insignificant impact on Glandore Harbour when the additional load from orthophosphate dosing from the primary discharge is considered. Shown in Table 2.

The dosing will therefore have an insignificant impact on the direct discharges to surface water from agglomerations within the WSZ.

Ilen_020 (IE_SW_20I010160) – The predicted effluent concentrations are not compliant with ELVs given for Drimoleague WWTP (D0470), which uses Secondary Treatment only. The 2021 AER reports that the final effluent from the Primary Discharge Point was non-compliant with the Emission Limit Values. There were two samples non-compliant with the ELVs in relation to Ortho P / MRP (mg/l) and one exceeding the condition 2 interpretation. The WWTP is not designed for phosphate removal. The mass balance assessment in Table 2, based on Mean flows, indicates that the orthophosphate dosing will increase the levels by 0.0008 mg/l which is below significant levels.

Improvements in the current operating regime and any planned upgrades of the WWTP will address existing issues at the WWTP. A specified improvement programme has been given in the 2021 AER, but this is awaiting allocation of funding. The dosing will not result in any further significant impact on the receiving water downstream of the plant (Table 2) and will not prevent the achievement of the overall water body's WFD objectives. When orthophosphate conditions are considered for both the surface and sub-surface pathways; the OP indicative quality will remain consistent with the achievement of high ecological status in the ILEN_020 (see Table 4.A, Step 5 and 6:

	Combined Inputs to Surface Water Bodies). Therefore, the dosing will not result in any further significant impact to the receiving environment.
Step 4 Distributed Inputs to surface water bodies from sub surface pathways	**Subsurface Assessment** The modelled increases in concentrations following dosing in the subsurface pathways are insignificant for all river water bodies (less than 0.00125 mg/l, which is 5% of the Good/High indicative quality boundary for surface water bodies), with the exception of Ardgehane_010 (IE_SW_20A430910) and Derreennatra_010 (IE_SW_20D770630) where the increases in concentration are 0.0012 mg/l and 0.0018 mg/l, respectively. However, these increases will not increase the risk of these water bodies failing to achieve their WFD Objectives. The modelled increases due to dosing in concentrations in the subsurface pathways are insignificant for all transitional and coastal water bodies (less than 0.00125 mg/l).
Step 5 and 6: Combined Inputs to Groundwater Bodies	**Groundwater Bodies as receptors connected to WSZ** Table 3 gives the loads and modelled concentrations for the assessment of groundwater bodies. The predicted increases in concentration to groundwater bodies are undetectable (0.0000 mg/l). The subsurface assessment takes into account the groundwater/surface water interaction and as the potential for impact on surface water is not significant, and none of the overlying surface waterbodies are at Bad ecological status, there is no risk of impact on groundwater receptors due to orthophosphate dosing. **Table 3: Increased loading and concentrations to groundwater bodies connected to the WSZs** ***(note: where existing monitoring data is not available, a surrogate Indicative Quality is derived from initial characterisation or chemical status of the WB, and the mid-range of that Indicative Quality is used as Baseline Concentration)***

EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate Indicative Quality indicated in italic]*	Baseline Year 2012 Ortho P Conc. mg/l *[Surrogate Conc. given in*	75% of Ortho P Indicative Quality upper threshold mg/l	Ortho P load to GW kg/yr	Potential Increase in Ortho P Conc. due to Dosing mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_G_013 Bandon Islands	*Good*	*0.018*	*0.026*	0.0	0.0000	0.018	
IE_SW_G_016 Waste Facility (W0089-02)	*Good*	*0.018*	*0.026*	0.0	0.0000	0.018	
IE_SW_G_085 Skibbereen-Clonakilty	*Good*	*0.018*	*0.026*	2.5	0.0000	0.018	

Step 5 and 6: Combined	**Combined Assessment**

Inputs to Surface Water Bodies

Table 4.A and Table 4.B summarise the loads and modelled concentrations for the combined assessment to rivers and receiving waterbodies respectively. The increased concentrations due to orthophosphate dosing are predicted to be insignificant [i.e., are below 5% of the Good / High boundary for Ortho P Indicative Quality (0.00125mg/l)], with the exception of Ardgehane_010 (IE_SW_20A430910) and Derreennatra_010 (IE_SW_20D770630) where the increase in concentration is 0.0016 mg/l and 0.0024 mg/l respectively. However, this increase will not increase the risk of these water bodies failing to achieve their WFD Objectives.

There is one lake water body directly affected by this WTP, Lough Abisdealy and a Vollenweider assessment of the additional loading has been undertaken for the lake. Table 4.C shows the results of the assessment. The lake is within the ILEN_040 (IE_SW_20I010350) sub catchment therefore an estimate of the load impacting on the lake, rather than the load from the entire ILEN_040 river water body, is used in this assessment. The assessment shows that the critical loading for oligotrophic conditions has already been exceeded. The existing orthophosphate levels in the Lough are indicative of moderate indicative quality and an assessment of the Trophic status of the lake indicates that the lake is mesotrophic. Whilst the orthophosphate dosing has the potential to increase the loading to the lake, it will not have a significant impact on the trophic status which is already influenced due to diffuse agricultural pressures. This increase is considered to be insignificant (0.1%) and will not affect the lake ecology which is already at poor status due to phytoplankton conditions.

Table 4.A: Increased loading and concentrations to River water bodies connected to the WSZs ***(note: where existing monitoring data is not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P indicative quality / ecological status of upstream and downstream WBS, the mid-range of that indicative quality is used as Baseline Concentration)***

EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate Indicative Quality indicated in italic]*	Baseline Year 2014 and Conc. mg/l *[Surrogate Conc. given in italic]*	75% of Ortho P Indicative Quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage & DWWTS kg/yr	Conc. using flows (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_20A430910 Ardgehane_010	*Good*	*0.030*	*0.033*	*3.9*	*0.0016*	*0.032*	
IE_SW_20D770630 DERREENNATRA_010	*High*	*0.013*	*0.019*	*4.3*	*0.0024*	*0.015*	
IE_SW_20E070850 SKULL_010	*High*	*0.013*	*0.019*	*5.0*	*0.0005*	*0.013*	
IE_SW_20I010300 ILEN_030	*High*	*0.013*	*0.019*	*24.9*	*0.0001*	*0.013*	‡
IE_SW_20I010350 ILEN_040	*Good*	*0.030*	*0.033*	*37.1*	*0.0001*	*0.030*	‡
IE_SW_20K050700 KNOCKROE_010	*Good*	*0.030*	*0.033*	*3.0*	*0.0002*	*0.030*	
IE_SW_20K950970 KILLANGAL_010	*Good*	*0.030*	*0.033*	*10.3*	*0.0006*	*0.031*	
IE_SW_20L010400 LEAMAWADDRA_020	*High*	*0.013*	*0.019*	*1.7*	*0.0001*	*0.013*	

IE_SW_20L450850 LETTERSHAW_010	*High*	*0.013*	*0.019*	*6.9*	*0.0008*	*0.013*	
IE_SW_20M580810 MALLAVONEA_010	*High*	*0.013*	*0.019*	*7.2*	*0.0012*	*0.014*	
IE_SW_20R010400 RATHRUANE_010	*High*	*0.013*	*0.019*	*1.7*	*0.0001*	*0.013*	
IE_SW_20R030900 Roaring Water River_010	*High*	*0.013*	*0.019*	*2.9*	*0.0002*	*0.013*	
IE_SW_20S360700 SHANAVAGH_010	*High*	*0.013*	*0.019*	*1.3*	*0.0001*	*0.013*	
IE_SW_20L560540 LOWERTOWN_010	*High*	*0.013*	*0.019*	*3.9*	*0.0006*	*0.013*	
IE_SW_20T030990 TOORMORE_010	*High*	*0.013*	*0.019*	*0.0*	*0.0000*	*0.013*	
IE_SW_20I010100 ILEN_010	*High*	*0.013*	*0.019*	*5.9*	*0.0001*	*0.013*	
IE_SW_20I010160 ILEN_020	Moderate Downwards Far	0.037	0.051	24.0	0.0002	0.037	MP1 ‡
	High Downwards Far	0.016	0.019			0.016	MP2 ‡
IE_SW_20C030400 CLODAGH_010	*Good*	*0.030*	*0.033*	*0.1*	*0.0000*	*0.030*	

MP: Monitoring Point

‡ Load from WWTP / SWO following treatment added

Table 4.B: Increased loading and concentrations to Transitional and Coastal water bodies connected to the WSZs ***(note: where existing monitoring data is not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P indicative quality / ecological status of upstream and downstream WBS, the mid-range of that indicative quality is used as Baseline Concentration)***

EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate Indicative Quality indicated in italic]*	Baseline Year 2014 and Conc. mg/l *[Surrogate Conc. given in italic]*	75% of Ortho P Indicative Quality upper threshold mg/l	Total Ortho P Load in receiving waters kg/ yr	Conc. using flows (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_110_0300 Glandore Harbour	*Good*	*0.030*	*0.033*	*17.5*	*0.0000*	*0.030*	ǂ
IE_SW_130_0100 Ilen Estuary	High (S) Downwards Far	0.006	0.019	130.0	0.0000	0.006	‡ *
	High (W) Upwards Near	0.021	0.021			0.021	
IE_SW_110_0000 Rosscarbery Bay	*Moderate*	*0.046*	*0.051*	*37.8*	*0.0000*	*0.046*	ǂ
IE_SW_140_0000 Roaring Water Bay	High (S) Downwards Far	0.003	0.019	184.8	0.0000	0.003	‡
	High (W) Downwards Far	0.017	0.019			0.017	

IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	*High*	*0.013*	*0.019*	*3.9*	*0.0000*	*0.013*	

‡ Load from WWTP / SWO following treatment added.

* Trends are Statistically Significant.

S = Summer monitoring period, W = Winter monitoring period

Table 4.C: Vollenweider assessment of Lakes within the WSZs

EU_CD / NAME Lakes	Parameter	TP Indicative Quality and Trends (Distance to Threshold. Surrogate Indicative Quality in *italic*	Baseline 2014 Conc. Surrogate Conc. given in *italic* mg/l	TP Dosing Load kg/yr	Estimated Existing Areal loading based on Vollenweider mg/m²/yr)	Estimated Post dosing Areal loading based on Vollenweider(mg/m²/yr)	Lc (mg/m²/yr)	% Increase
Abisdealy IE_SW_20_148	TP	Moderate Downwards Far	0.026	0.21	1053.6	1054.9	569.8	0.1

Summary and Mitigation Proposed

Considering Ballyhilty WTP in isolation, orthophosphate dosing is predicted to have insignificant impact on all waterbodies. The modelled increases in loads and concentrations to both groundwater and surface water receptors do not cause an increased risk to WFD objectives.

The breakdown from source to pathway is depicted in Figure 1 and the fate of P loads from Ballyhilty_WTP is shown in Figure 2.

The cumulative impacts on the Bandon-Ilen Catchment (HA 20), associated with the corrective water treatment at the following additional WTPs have been assessed in combination with Ballyhilty WTP and are summarised in Table 5 below:

- 006 Inniscarra WTP –Zone 2 Cork Harbour & City
- 030 Innisshannon WTP - Zone2 Innishannon
- 036 Clonakilty RWSS WTP - Zone1 Clonakilty

Table 5 indicates that the increased loads due to orthophosphate dosing are predicted to be insignificant, i.e. are below 5% of the Good / High boundary for Ortho P Indicative Quality (0.00125mg/l), in all cases, indeed they are predominantly negligible (0.0001 mg/l or lower).

The cumulative assessment has demonstrated that there will not be significant impact on the receiving waters and the dosing will not cause an increase in the risk of deterioration in Orthophosphate indicative quality or prevent the achievement of the WFD objectives.

Table 5: Cumulative assessment of the increased loading and concentrations to water bodies impacted by 060 Ballyhilty WTP – Zone1 Skibbereen Ballyhilty (0500PUB4605) and other WSZs proposed for corrective water treatment in the Bandon-Ilen Catchment (HA 20) ***(note: where existing monitoring data is not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P indicative quality / ecological status of upstream and downstream WBS, the mid-range of that indicative quality is used as Baseline Concentration)***

EU_CD/Name	Ortho P indicative quality and Trends (distance to threshold) *Surrogate Indicative Quality indicated in italic*	Baseline Year 2014 and Conc. *Surrogate Conc. given in italic* mg/l	75% of Ortho P Indicative Quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & agglomerations kg/yr	Conc. using 30%ile flows and tidal flows mg/l	PO4 Potential Baseline Conc. following dosing mg/l	Notes
IE_SW_20I010300 ILEN_030	*High*	*0.013*	*0.019*	*28.7*	*0.0001*	*0.013*	
IE_SW_20I010350 ILEN_040	*Good*	*0.030*	*0.033*	*40.3*	*0.0001*	*0.030*	
IE_SW_130_0100 Ilen Estuary	High (S) Downwards Far	0.006	0.019	133.7	0.0000	0.006	‡ *
	High (W) Upwards Near	0.021	0.021			0.021	
IE_SW_110_0000 Rosscarbery Bay	*Moderate*	*0.046*	*0.051*	*93.6*	*0.0000*	*0.046*	‡
IE_SW_140_0000 Roaring Water Bay	High (S) Downwards Far	0.003	0.019	188.6	0.0000	0.003	‡
	High (W) Downwards Far	0.017	0.019			0.017	
IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	*High*	*0.013*	*0.019*	*9601.2*	*0.0001*	*0.013*	

‡ Load from WWTP / SWO following treatment added.

* Trend is Statistically Significant.

S = Summer monitoring period, W = Winter monitoring period

MITIGATION OPTION – None required

RAG STATUS – GREEN

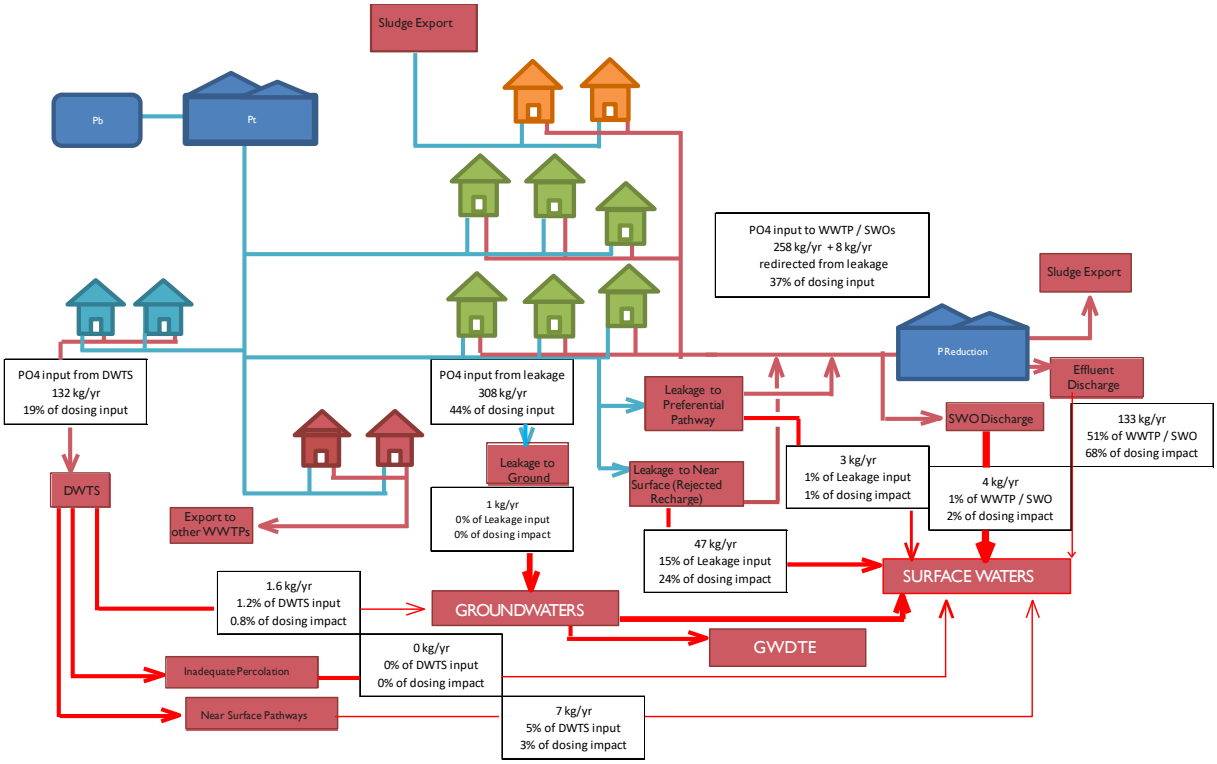
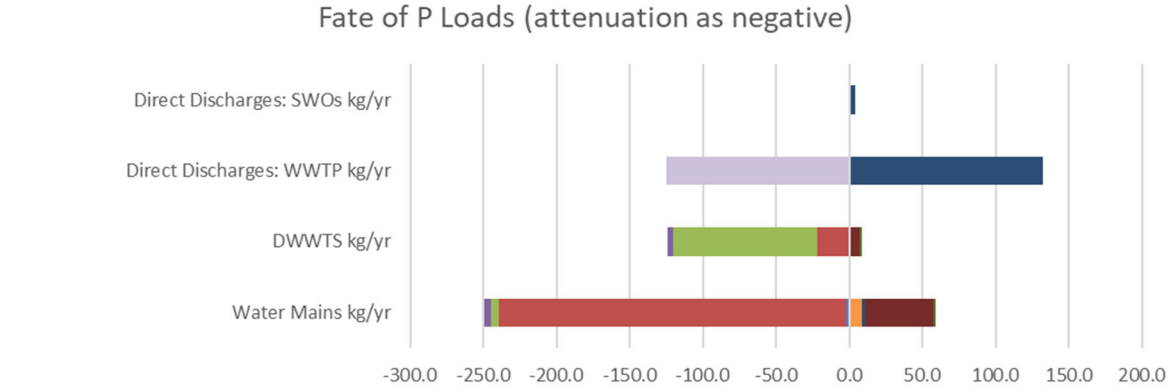


Figure 1 – Source Pathway Receptor model for by 060 Ballyhilty WTP – Zone1 Skibbereen Ballyhilty (0500PUB4605) illustrating key sources and pathways to the associated WSZs

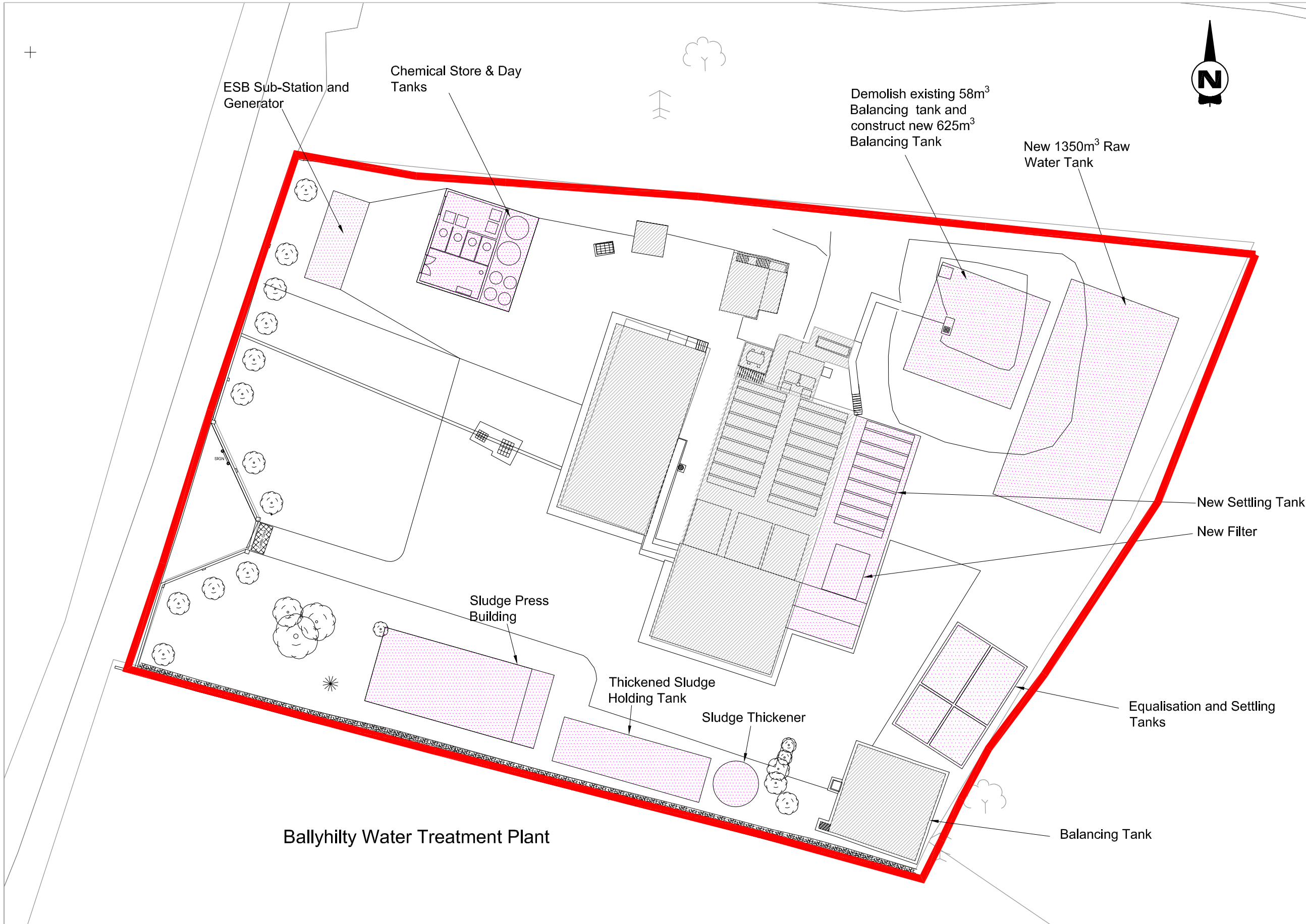


	Water Mains kg/yr	DWWTS kg/yr	Direct Discharges: WWTP kg/yr	Direct Discharges: SWOs kg/yr
Load attenuated in Preference (inadequate percolation) pathway	-1.8	-0.1		
Load attenuated in Near Surface Pathway	-237.2	-21.9		
Load attenuated in 1m below trench	-5.6	-98.2		
Load attenuated in Subsurface Pathway	-4.9	-3.8		
Load intercepted by gravity main in Preference Pathway	0.8			
Load intercepted by gravity main in Near Surface Pathway	7.9			
Load reaching SW direct or via Preference (inadequate percolation) Pathway	2.1	0.2	132.7	3.9
Load reaching SW via Near Surface Pathway	47.2	6.8		
Load reaching SW via Subsurface Pathway	0.9	1.6		
Load treated in WWTP			-125.2	

Figure 2 – Fate of orthophosphate loads modelled for Ballyhilty WTP impacting on IE_SW_110_0000 (Rosscarbery Bay) and IE_SW_140_0000 (Roaring Water Bay) due to dosing by source type, indicating levels of attenuation in pathways and relative impact on the surface water receptor.

APPENDIX D

Proposed Site Layout for Ballyhilty WTP upgrade



Output Format:
==========
DWG_35_LEVEL

Output File:
==========
6755.DWG

Map Series:
==========
1:5000

6755
REVISION DATE = 08-Oct-2010
SURVEY DATE = 01-Jul-2000

Clip Extent:
==========
LLX,LLY = 108000,34000
LRX,LRY = 112000,34000
ULX,ULY = 108000,37000
URX,URY = 112000,37000

Projection:
==========
IG

ITM Centre Point Co-ordinate:
==========
X,Y = 511767,536439

Extraction Date:
==========
04-Feb-2013

Ní bhíonann bóthar, bealach nó cosán a bheith ar an léarscáil seo agus fianaise ar chead slí. The representation on this map of a road, track or footpath is not evidence of the existence of a right of way.

Ní thaispeánann léarscáil de chuid Ordanáis Shuirbhéireacht na hÉireann teorann phointí dleathúil de mhaoin riamh, ná úinéireacht de ghnéithe fhisiciúla. Ordnance Survey maps never show legal property boundaries, nor do they show ownership of physical features.

1:2500 OSI RASTER MAPPING TILES
6755-B

SITE AREA
2883 Sq.m

SITE CO-ORDINATES
E. 111798 N. 36369

1:5000 OSI VECTOR MAPPING TILES :-
6755

SITE AREA :-	SITE CORDINATES :-
9362 sq.m	E.111960 N.36467

LEGEND:

Site Boundary Outlined in Red

Existing WTP Structures

Proposed Works

NOTES

1. This drawing is the property of RPS Group PLC. It is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
3. Existing Services.
   Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
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5. Datum: Ordnance Survey Datum, Malin Head

No.	Date	Drn. Chk.	Amendment / Issue	App
D02	Jun '16	JJOS LN	Draft	TQ
D01	May '16	JJOS LN	Draft	TQ

Client: UISCE ÉIREANN - IRISH WATER

Drawn By	Checked By	Approved By	Date
JJOS	LN	TQ	May. 2016

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Project: **Skibbereen Regional Water Supply Scheme**

Drawing Status	Sheet Size	Scale
Draft	A3	1/500 @ A3

Drawing Number: MCW0846/Dg1501

Rev: D02

Title: BALLYHILTY WATER TREATMNET PLANT
1:500 Proposed Site Layout Plan

MCW0846Dg1501 - Wtp Site planD01.dwg